

National Numeracy and Mathematics Progression Framework

[BEGIN](#)

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National Numeracy Progression Framework

ESTIMATION AND
ROUNDING

NUMBER AND
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FRACTIONS AND
PERCENTAGES

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TIME

MEASUREMENT

DATA AND ANALYSIS

IDEAS OF CHANCE
AND UNCERTAINTY

National Mathematics Progression Framework

EXPRESSIONS AND
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ANGLES, SYMMETRY AND
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MULTIPLES, FACTORS AND
PRIMES

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POWERS AND ROOTS

PROPERTIES OF 2D SHAPES
AND 3D OBJECTS

MATHEMATICS —
ITS IMPACT ON THE
WORLD PAST, PRESENT
AND FUTURE

Estimation and rounding

Awareness
of size and
amount

Concept of
estimation

Concept of
rounding

Accuracy within
rounding

Tolerance

Estimation and rounding

X

Awareness of size and amount

Why is it important?

Comparing size and amount supports the development of appropriate language relating to quantities. This also supports an understanding of where numbers sit on a number line.

Awareness
of size and
amount

Tolerance

Awareness of size
and amount

Estimation and rounding

Awareness of size and amount X

What is it?

Comparing different sizes and amounts (quantities) using appropriate vocabulary to describe them in relation to each other.

Previous knowledge and understanding

- Demonstrate an ability to compare items, shapes and groups
- In play, can group or sort items by own criteria
- Can talk about items, shapes or groups in own words, with some evidence of comparative language, e.g. taller, smaller, longer, shorter

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Aware
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Tolerance

Awareness of size
and amount

Estimation and rounding

Concept of estimation

X

Why is it important?

Early estimation skills allow for more refined comparisons and for approximations to be made. Estimating is the interpretation of relative size and quantities.

Awareness
of size and
amount

Concept of
estimation

Tolerance

Estimation and rounding

Awareness
of size and
amount

Concept of estimation

What is it?

As this skill becomes more refined, learners will be able to predict solutions and check the accuracy of calculations.

Previous knowledge and understanding

- Can apply knowledge of number in relation to quantities
- Is able to group or segregate items to a given criteria
- Can talk about items, shapes or groups and can use comparative language

Concept of
estimation

refined comparisons
estimating is the
quantities.

Tolerance

Estimation and rounding

X

Concept of rounding

Why is it important?

The ability to round supports the development of mental agility. It also allows for quick estimations to be made in calculations and to check the reasonableness of a solution.

**Awareness
of size and
amount**

Concept of rounding

Tolerance

Estimation and rounding

Awareness
of size and
amount

Concept of rounding

What is it?

The concept of rounding is the application of understanding of place value and knowing what is the most appropriate whole number (or decimal fraction) to round it to, within a given context.

Previous knowledge and understanding

- Have an understanding of place value
- Have an understanding of estimation and approximate values

Concept of rounding

Development of mental
operations to be made in
flexibility of a solution.

Tolerance

Estimation and rounding

Accuracy within rounding X

Why is it important?

Rounding accurately is an essential component of determining the reasonableness of a solution. In different contexts there will be different degrees of accuracy required.

Accuracy with
rounding

Awareness
of size and
amount

Tolerance

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Accuracy within rounding

X

What is it?

As this skill becomes more refined, learners will be able to predict solutions and check the accuracy of calculations.

Previous knowledge and understanding

- Understand that a rounded value is not equal to the original value
- Can use knowledge of place value to make a decision on how a number should be rounded
- Can explain what rounding means using vocabulary of estimation, e.g. about, nearly, roughly
- Can select and apply appropriate rounding strategy in a given situation, e.g. measurement, time, money
- Using knowledge of number, is able to give an increasingly accurate estimation of the quantity of a given set
- Can determine the reasonableness of an outcome

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Accuracy with
rounding

Tolerance

Estimation and rounding

Awareness
of size and
amount

Tolerance

X

Why is it important?

To understand that there are acceptable degrees of accuracy required in calculations, including with measurement and real-life contexts.

Tolerance

Tolerance

Esti

Aware
of size
amount

Tolerance

X

What is it?

Tolerance intervals are the differences between the greatest and least acceptable values of the measurement. Tolerance is the maximum range of variation allowed within particular situations and contexts and supports the understanding of inaccuracy.

Previous knowledge and understanding

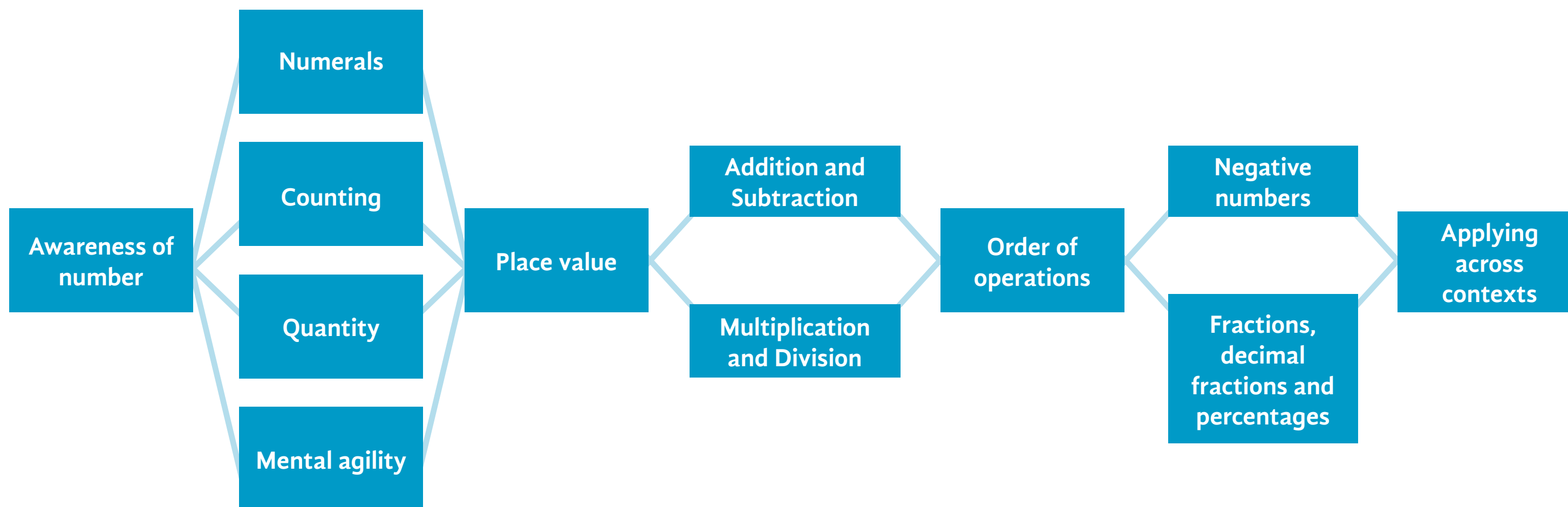
- Knows that depending on the situation, degrees of accuracy in rounding may differ, e.g. when measuring room for a carpet, rounding up should be applied to ensure enough carpet is purchased
- Display an awareness of appropriateness of rounding, e.g. when preparing to arrive for a train journey, rounding up would be inappropriate
- Understand that measurements are not always accurate to varying degrees

Tolerance

degrees of accuracy
measurement and

Tolerance

Number and number processes



Number and number processes

Awareness of number

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Awareness of number

X

Why is it important?

Numbers are all around us and they are used in many different ways. Developing an understanding of numbers and their role in the description of quantities is fundamental to forming the connections needed to describe a group of objects. To be confident and comfortable with numbers, it is necessary to understand how the number system works and how numbers relate to each other. It is important to understand numbers can be classified into sets called number systems, e.g. natural numbers and real numbers. All numbers can be expressed using the digits: 0,1,2,3,4,5,6,7,8 and 9.

Awareness of number

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Applying
across
contexts

Number and number processes

Awareness of number

Awareness of number


What is it?

Learners need to have an awareness of what numbers are through understanding and application of

- the meaning of numbers
- the relationship between numbers
- comparison and contrast between the relative size (magnitude of numbers)

Here are video exemplars:

 <http://www.educationscotland.gov.uk/video/n/nnpf/learnerstalkingaboutnumbersoutsideschool1.asp>

 <http://www.educationscotland.gov.uk/video/n/nnpf/learnerstalkingaboutnumbersoutsideschool2.asp>

 <http://www.educationscotland.gov.uk/video/n/nnpf/learnerstalkingaboutnumbers.asp>

Awareness of
number

Menta

Awareness of
number

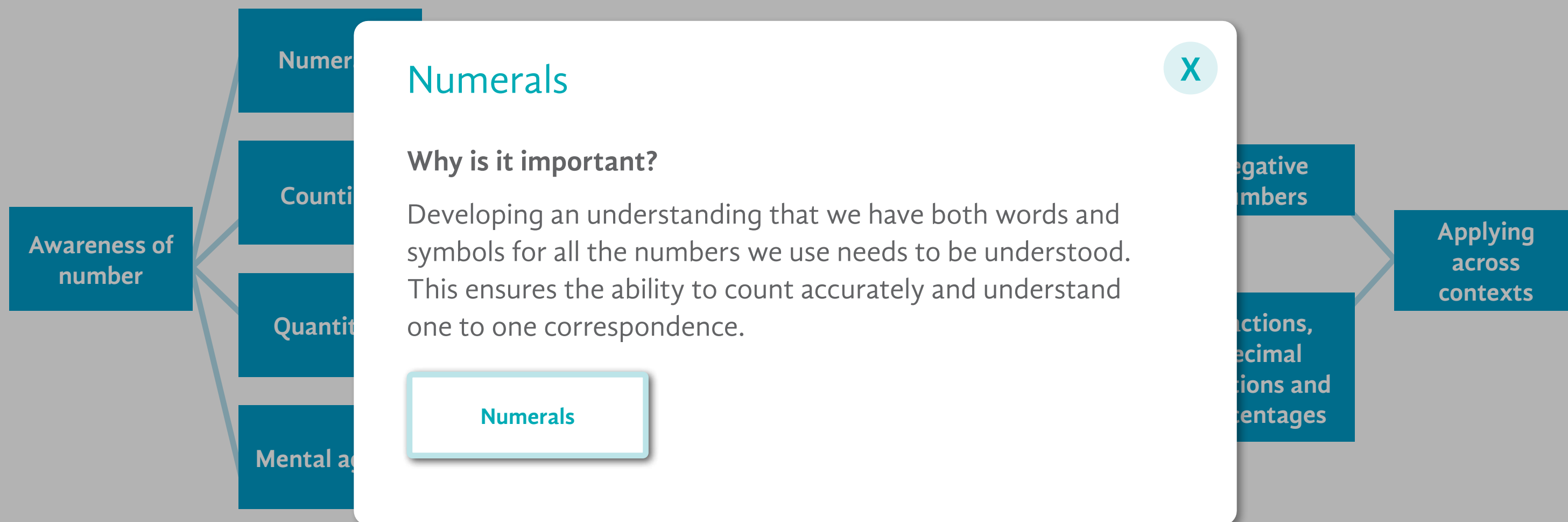
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of numbers and their role
fundamental to forming the
group of objects. To be confident
necessary to understand how
numbers relate to each other.
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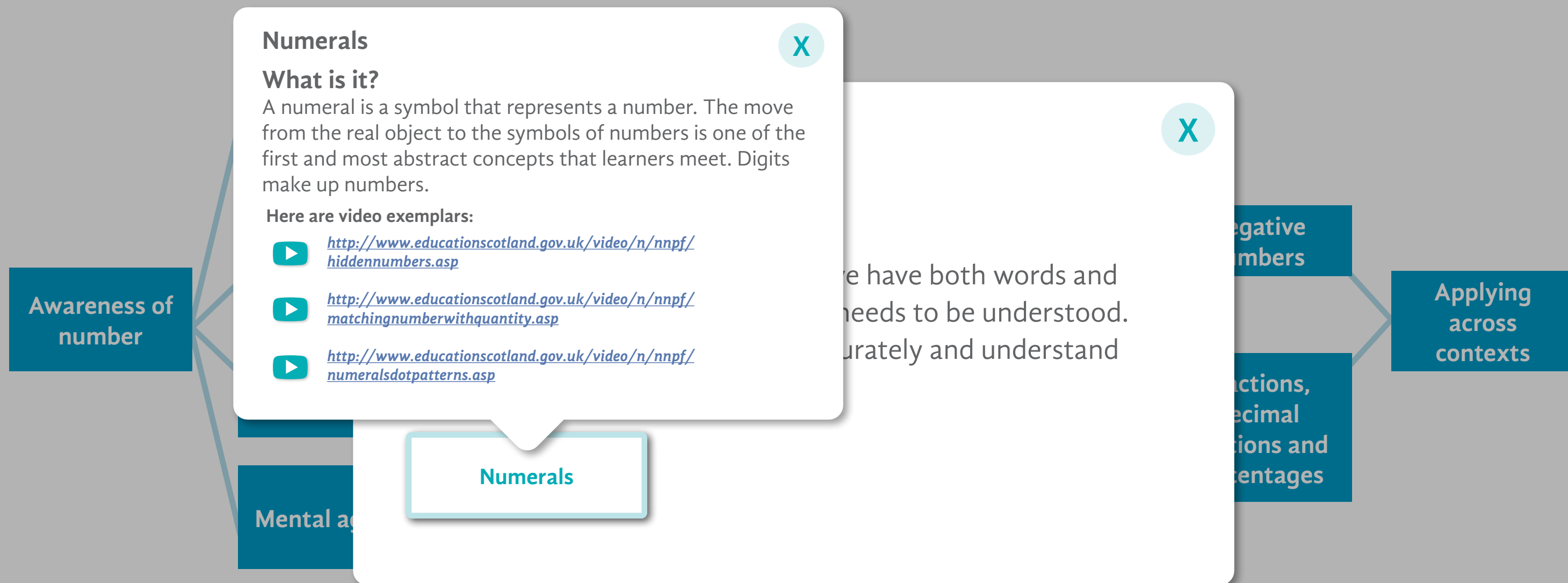
Applying
across
contexts

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Number and number processes



Number and number processes






Numerals

What is it?

A numeral is a symbol that represents a number. The move from the real object to the symbols of numbers is one of the first and most abstract concepts that learners meet. Digits make up numbers.

Here are video exemplars:

-  <http://www.educationscotland.gov.uk/video/n/nnpf/hiddennumbers.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/matchingnumberwithquantity.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/numeralsdotpatterns.asp>

Numerals

Awareness of number

Mental arithmetic

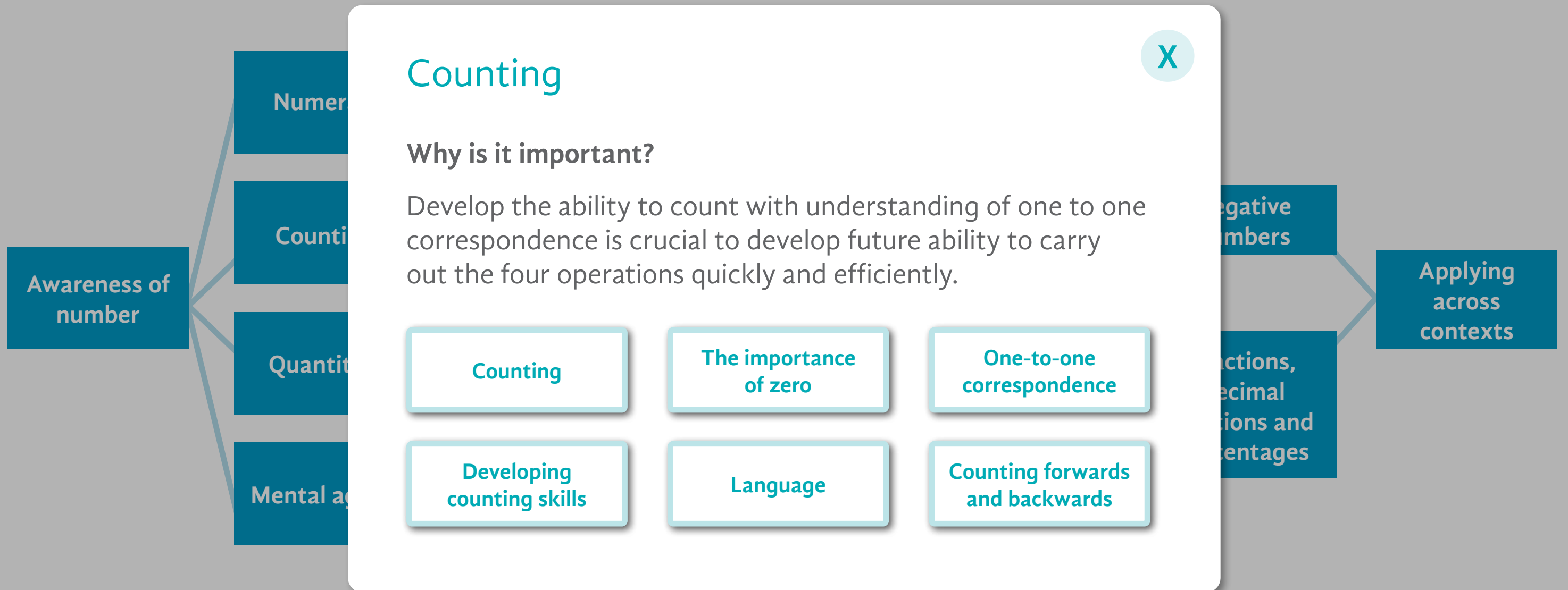
We have both words and symbols. Needs to be understood. Accurately and understand

Negative numbers

Fractions, decimal numbers and percentages

Applying across contexts

Number and number processes



Number and number processes

Counting

What is it?

Counting is more than reciting numbers in order. It involves understanding of the number system and being able to apply this knowledge. Using a one-to-one correspondence to link numbers to their amounts or quantities enables the development of counting with understanding. Zero should be included when learning about numbers, to build understanding for future work in developing understanding of place value and decimal fractions.



Here is a video exemplar:

<http://www.educationscotland.gov.uk/video/n/npf/counting.asp>

Awareness of number

Quantity

Mental

Counting

The importance of zero

One-to-one correspondence

Developing counting skills

Language

Counting forwards and backwards

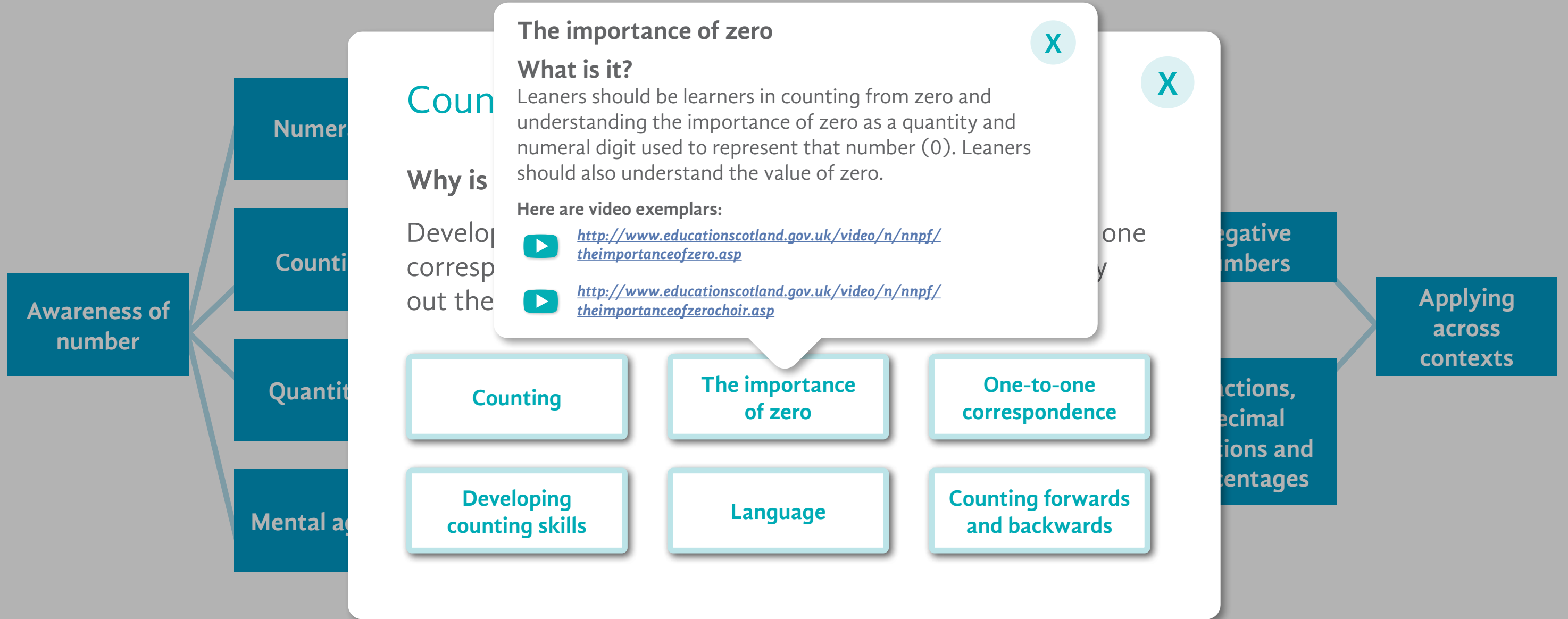
Negative numbers

Fractions, decimal fractions and percentages

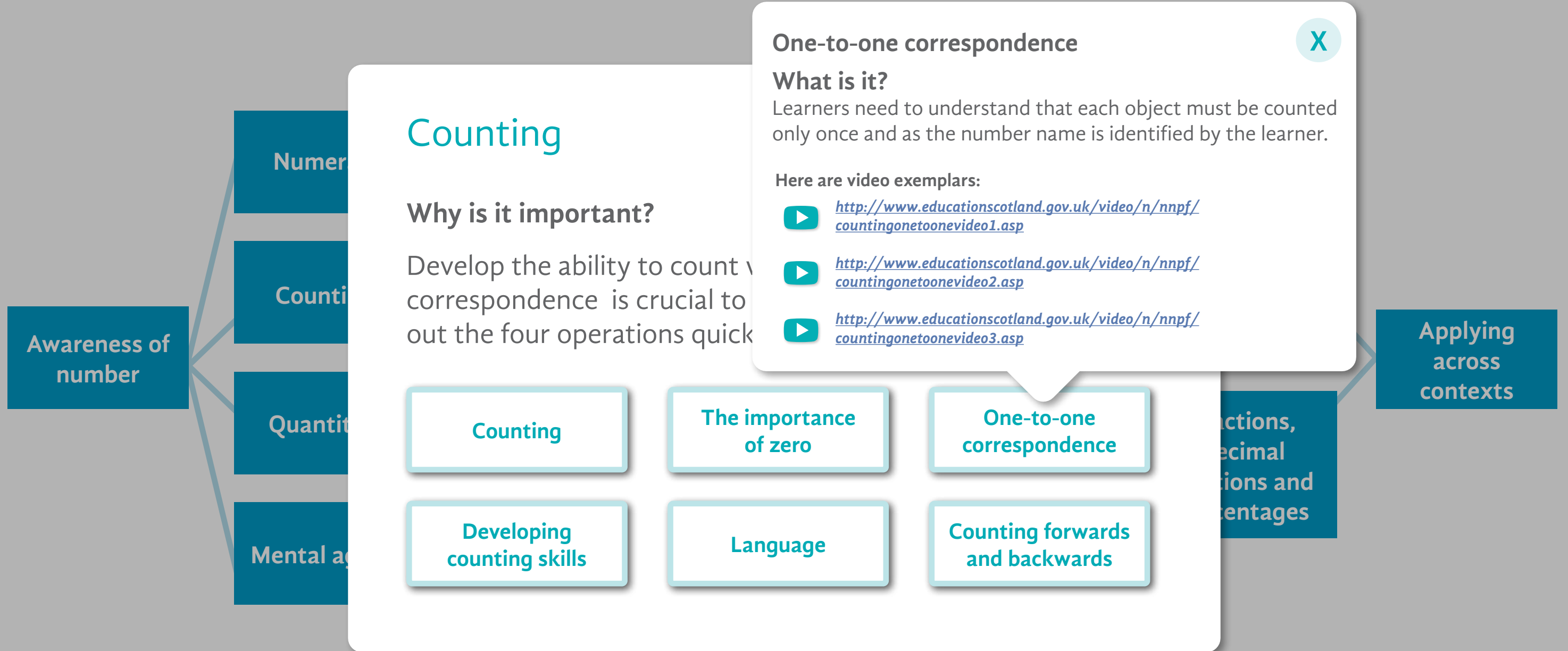
Applying across contexts

Understanding of one to one
to help future ability to carry
efficiently.

Number and number processes



Number and number processes



Awareness of number

Numerical understanding

Counting

Quantification

Mental arithmetic

Counting

Why is it important?

Develop the ability to count with one-to-one correspondence is crucial to understanding the four operations quickly and accurately.

One-to-one correspondence



What is it?

Learners need to understand that each object must be counted only once and as the number name is identified by the learner.

Here are video exemplars:

- <http://www.educationscotland.gov.uk/video/n/nnpf/countingonetooonevideo1.asp>
- <http://www.educationscotland.gov.uk/video/n/nnpf/countingonetooonevideo2.asp>
- <http://www.educationscotland.gov.uk/video/n/nnpf/countingonetooonevideo3.asp>

Counting

The importance of zero

One-to-one correspondence

Developing counting skills

Language

Counting forwards and backwards

Operations, decimal fractions and percentages

Applying across contexts

Number and number processes

Developing counting skills X

What is it?

When counting a group of items, and then re-counting the same group starting with a different item, the total remains unchanged. This concept is the conservation of number-the arrangement of a group of items does not affect the total. The last number said in a count indicates how many items there are in a group; it does not describe the last item counted. As counting develops, within a known range of numbers and beyond, other techniques can be learned, e.g. counting in jumps, e.g. 2,4,6,8 or 5,10,15,20 etc.

Here are video exemplars:

- [▶ http://www.educationscotland.gov.uk/video/n/nnpf/developingcountingskills.asp](http://www.educationscotland.gov.uk/video/n/nnpf/developingcountingskills.asp)
- [▶ http://www.educationscotland.gov.uk/video/n/nnpf/developingcountinginjumpsof3.asp](http://www.educationscotland.gov.uk/video/n/nnpf/developingcountinginjumpsof3.asp)
- [▶ http://www.educationscotland.gov.uk/video/n/nnpf/developingcountingskillsalearnerusingjumpcountingskills1.asp](http://www.educationscotland.gov.uk/video/n/nnpf/developingcountingskillsalearnerusingjumpcountingskills1.asp)
- [▶ http://www.educationscotland.gov.uk/video/n/nnpf/developingcountingskillsalearnerusingjumpcountingskills2.asp](http://www.educationscotland.gov.uk/video/n/nnpf/developingcountingskillsalearnerusingjumpcountingskills2.asp)

Awareness
number

Mental a

Developing
counting skills

Language

Counting forwards
and backwards

Understanding of one to one
correspondence
and the ability to carry
on mentally.

One-to-one
correspondence

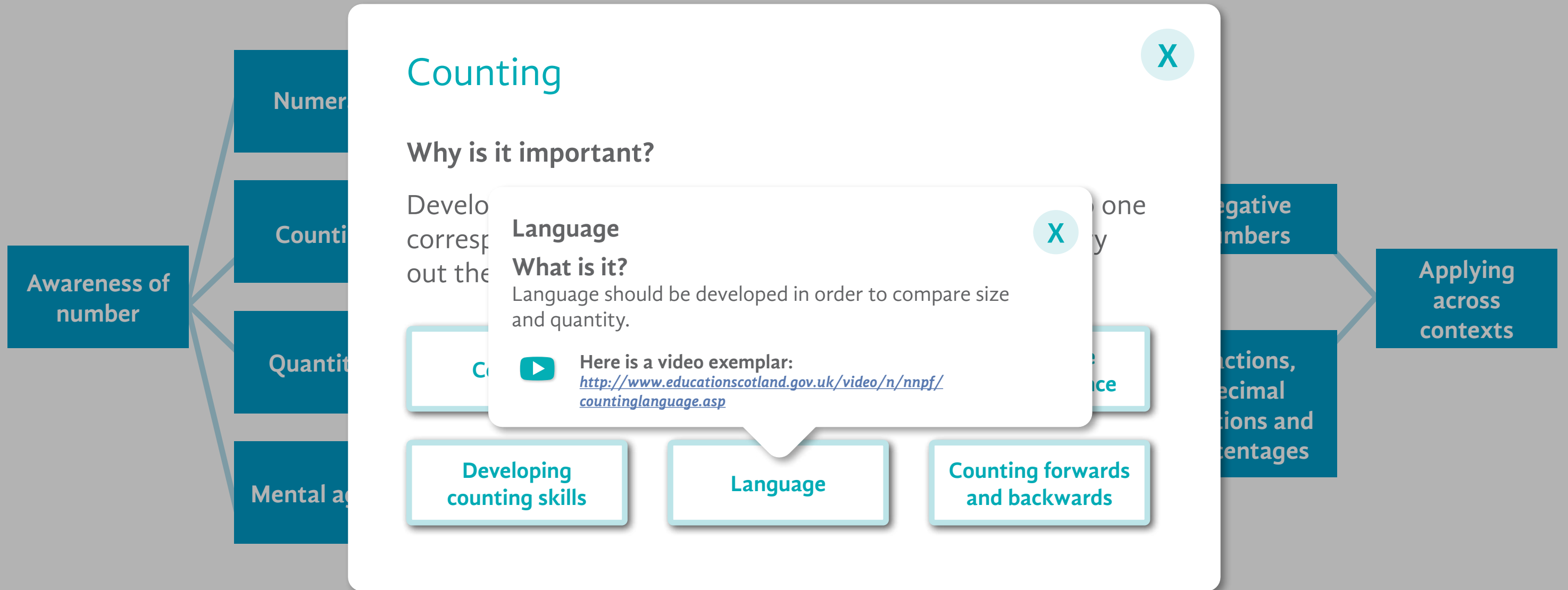
X

Negative
numbers

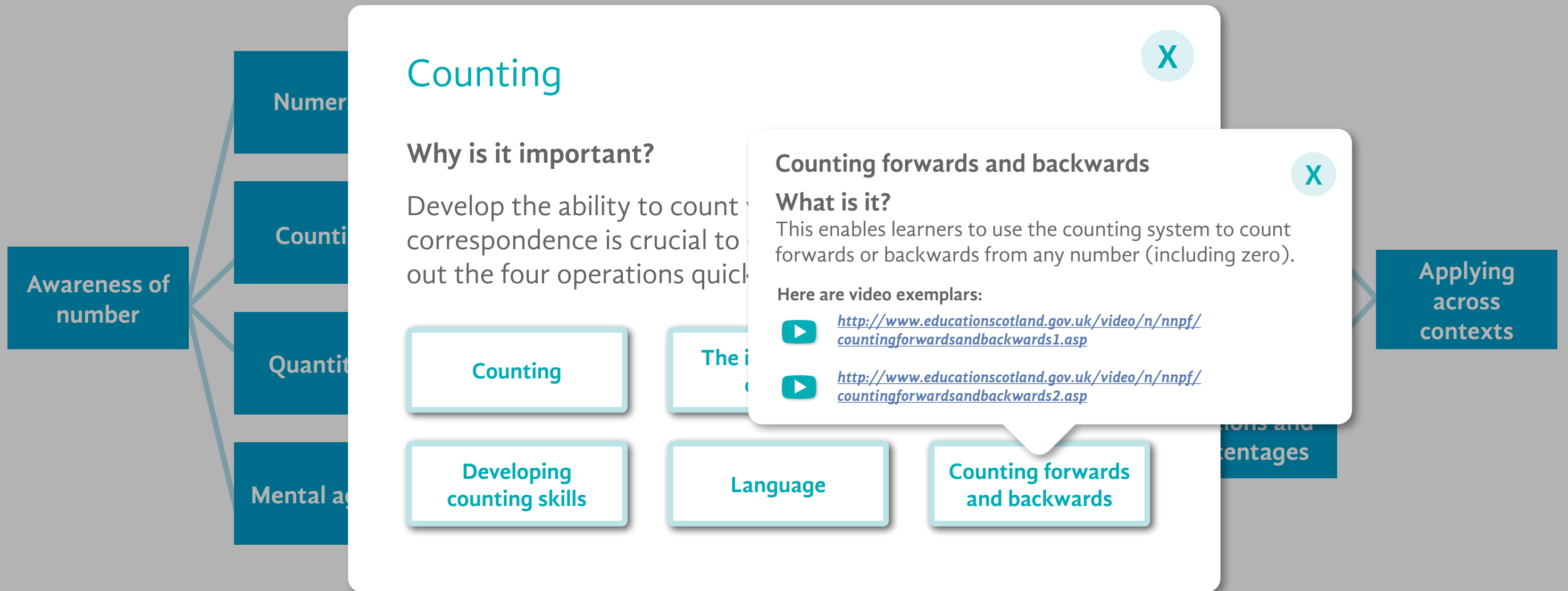
Operations,
decimal
fractions and
percentages

Applying
across
contexts

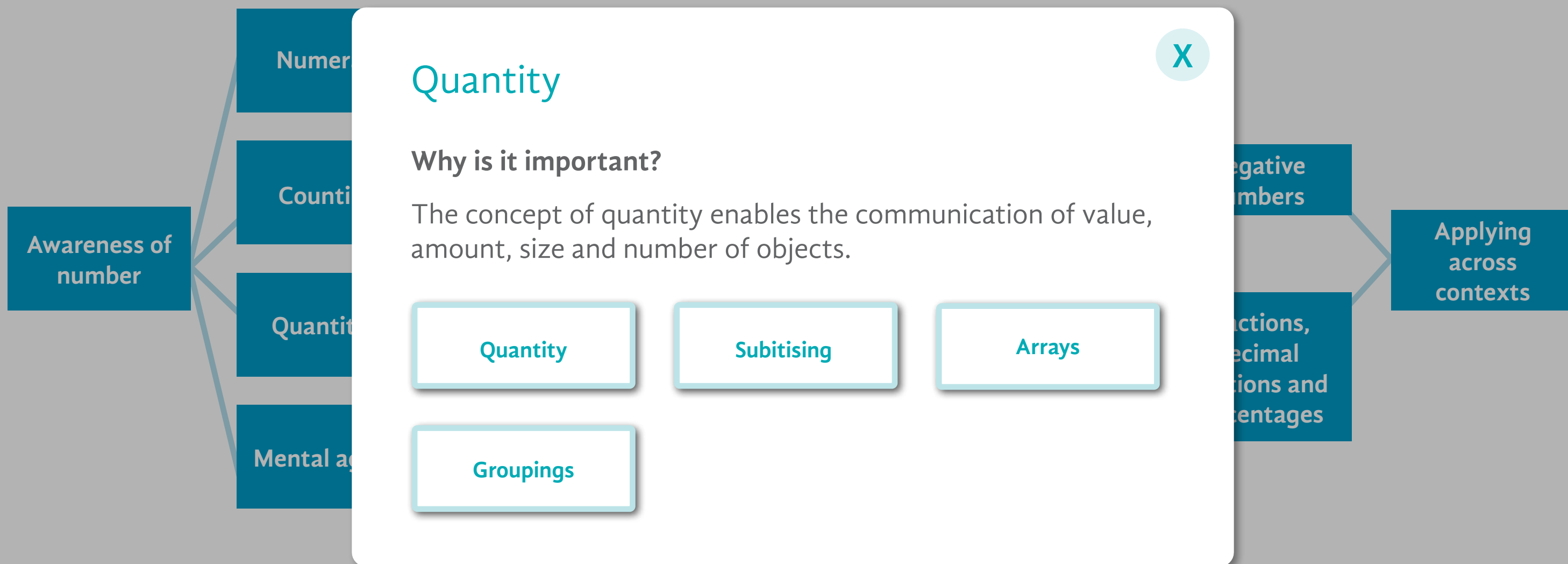
Number and number processes



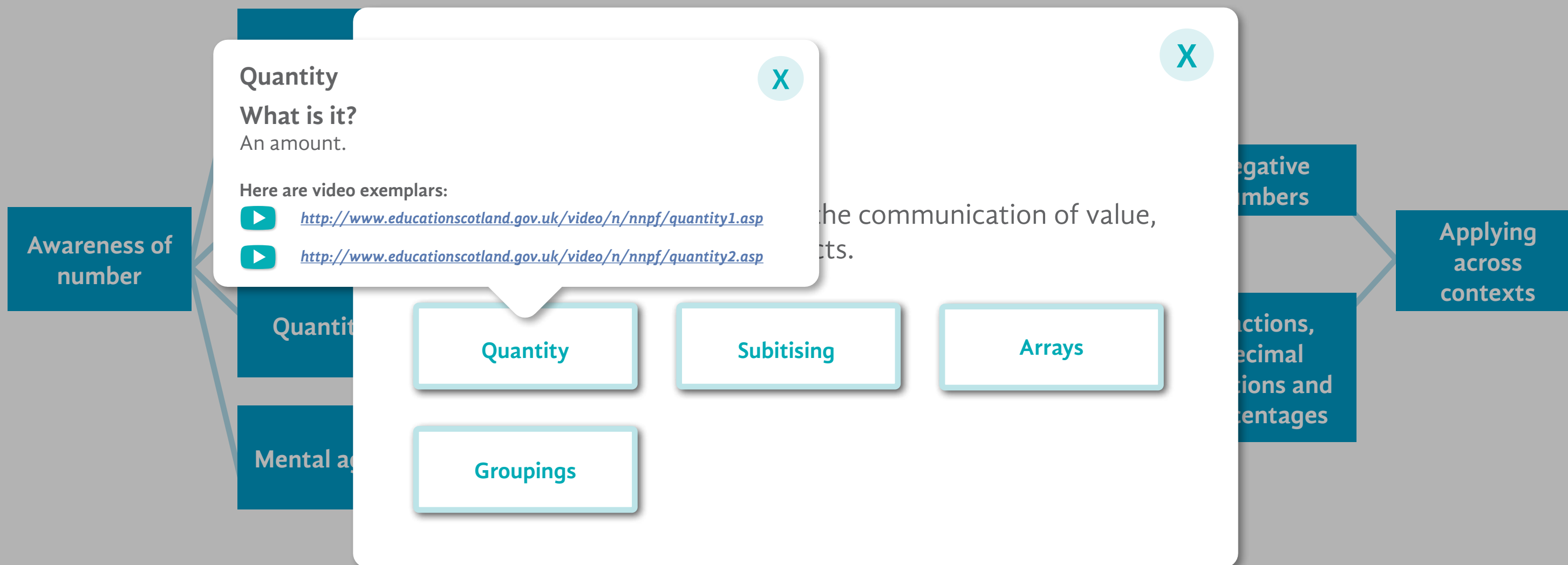
Number and number processes



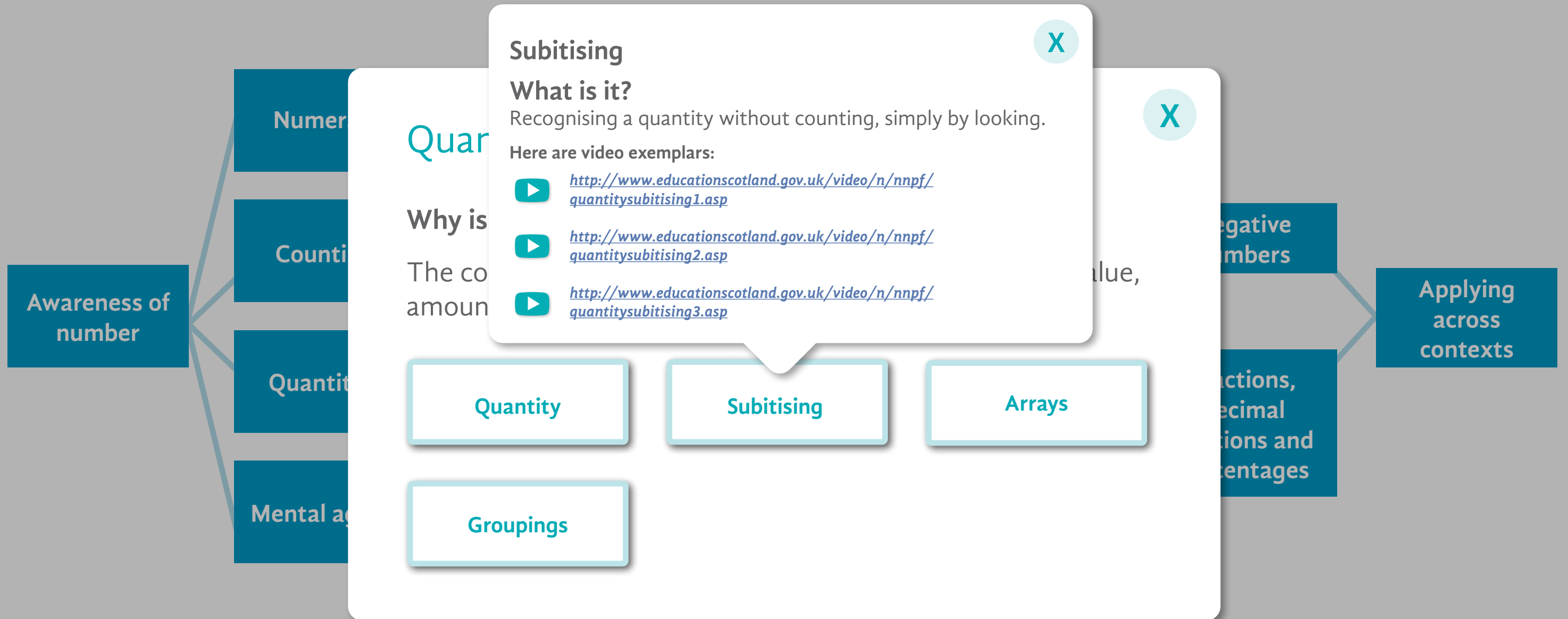
Number and number processes



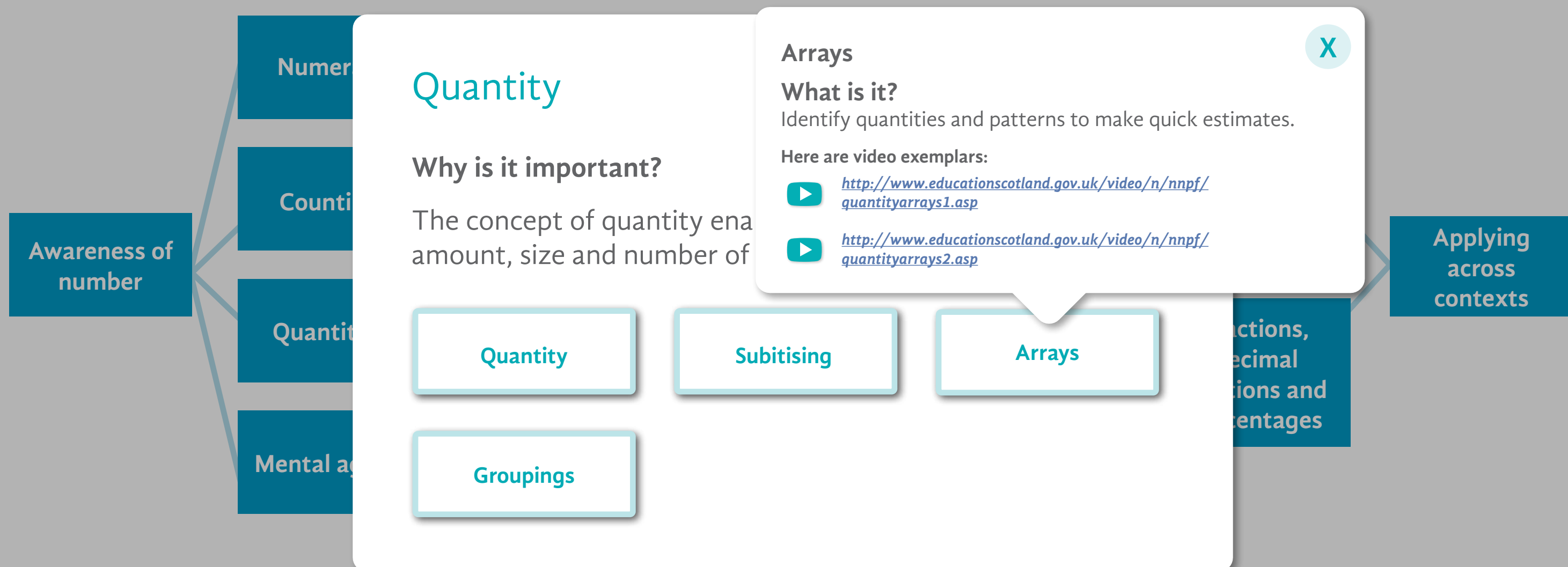
Number and number processes



Number and number processes



Number and number processes



Quantity

Why is it important?



The concept of quantity enables the understanding of amount, size and number of

Arrays

What is it?

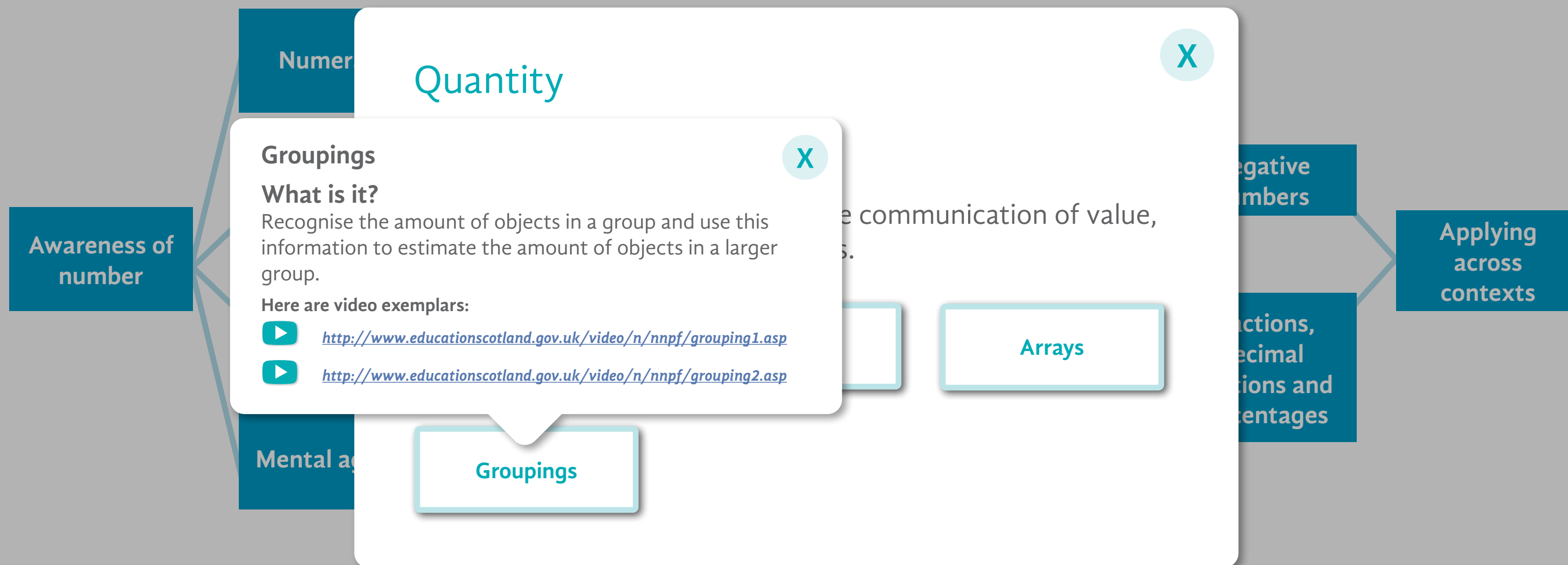
Identify quantities and patterns to make quick estimates.

Here are video exemplars:

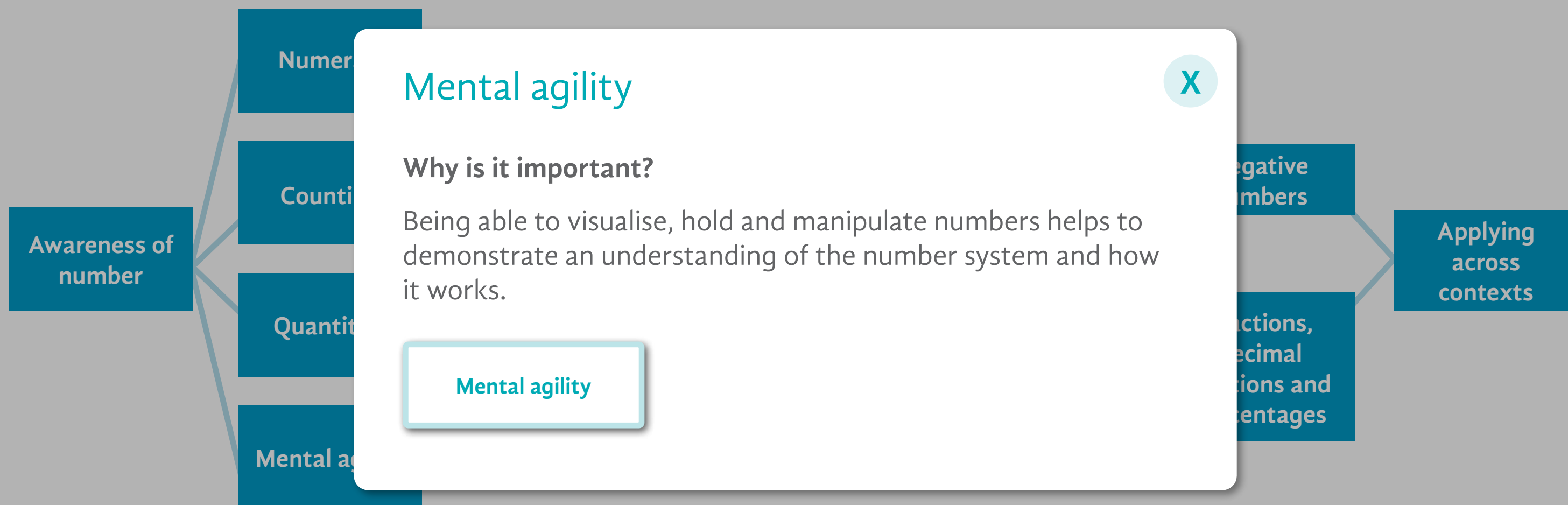
-  <http://www.educationscotland.gov.uk/video/n/nnpf/quantityarrays1.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/quantityarrays2.asp>



Number and number processes



Number and number processes



Mental agility

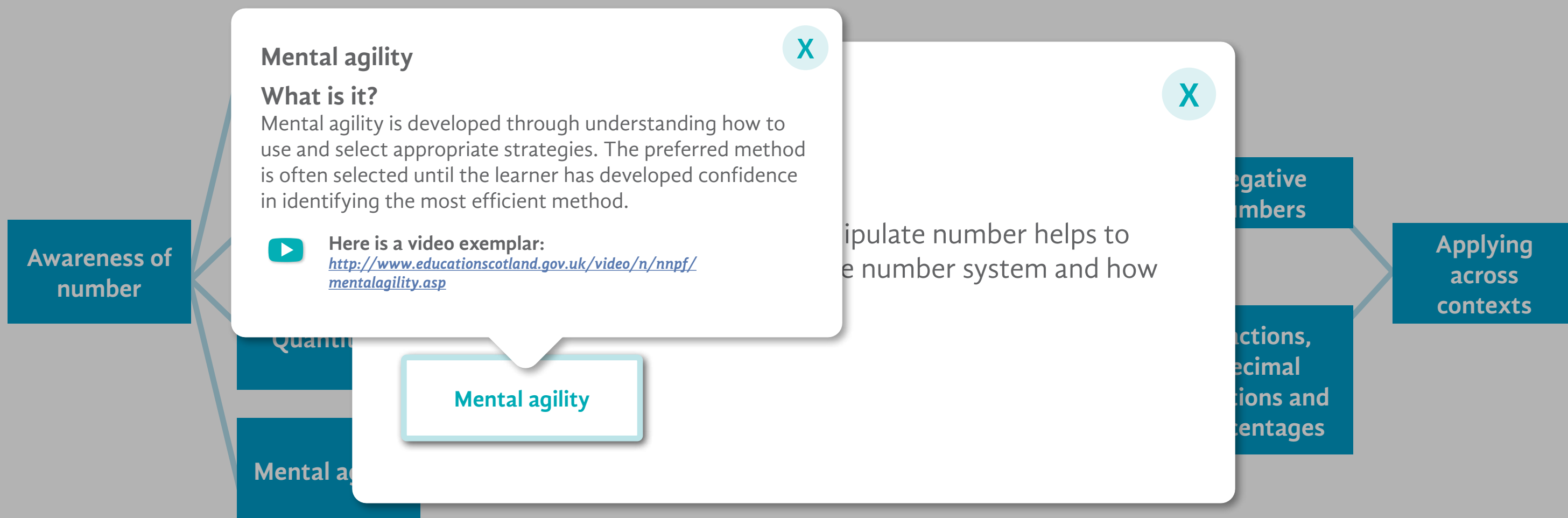


Why is it important?

Being able to visualise, hold and manipulate numbers helps to demonstrate an understanding of the number system and how it works.

Mental agility

Number and number processes



Mental agility

What is it?

Mental agility is developed through understanding how to use and select appropriate strategies. The preferred method is often selected until the learner has developed confidence in identifying the most efficient method.



Here is a video exemplar:

<http://www.educationscotland.gov.uk/video/n/nnpf/mentalagility.asp>

Mental agility

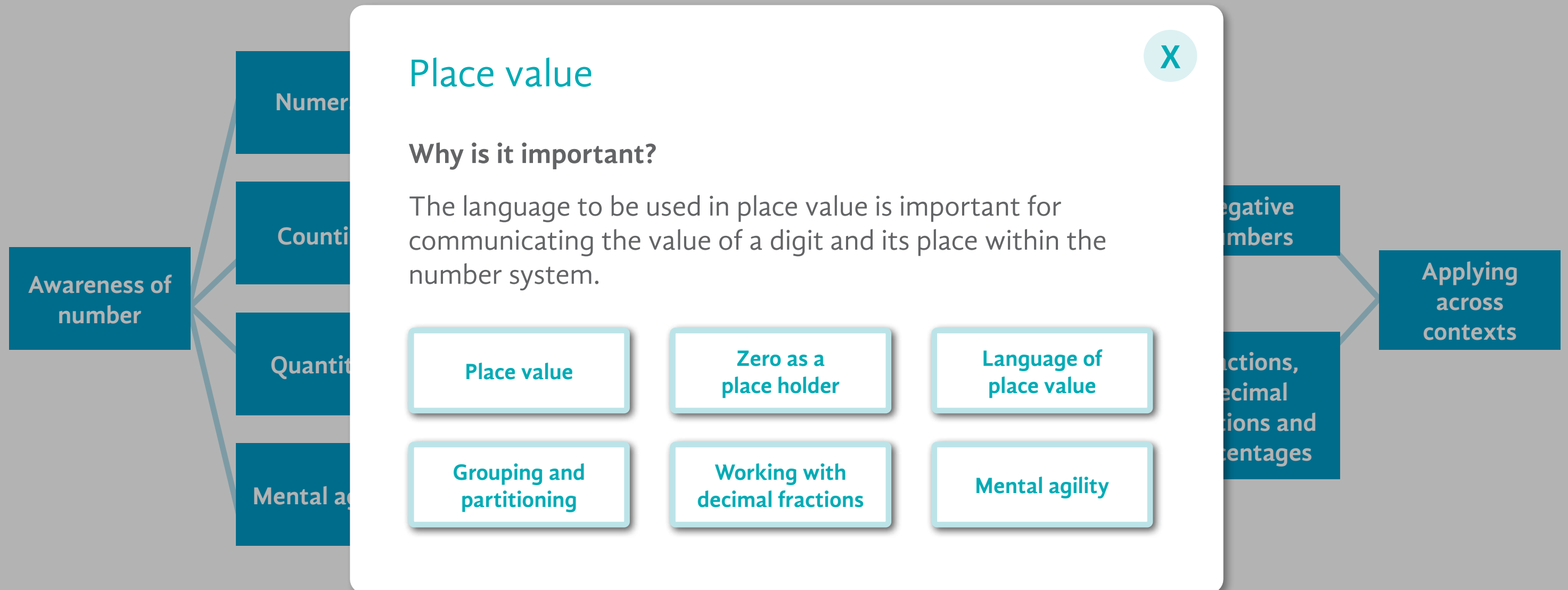
Manipulate number helps to understand the number system and how to use it

Negative numbers

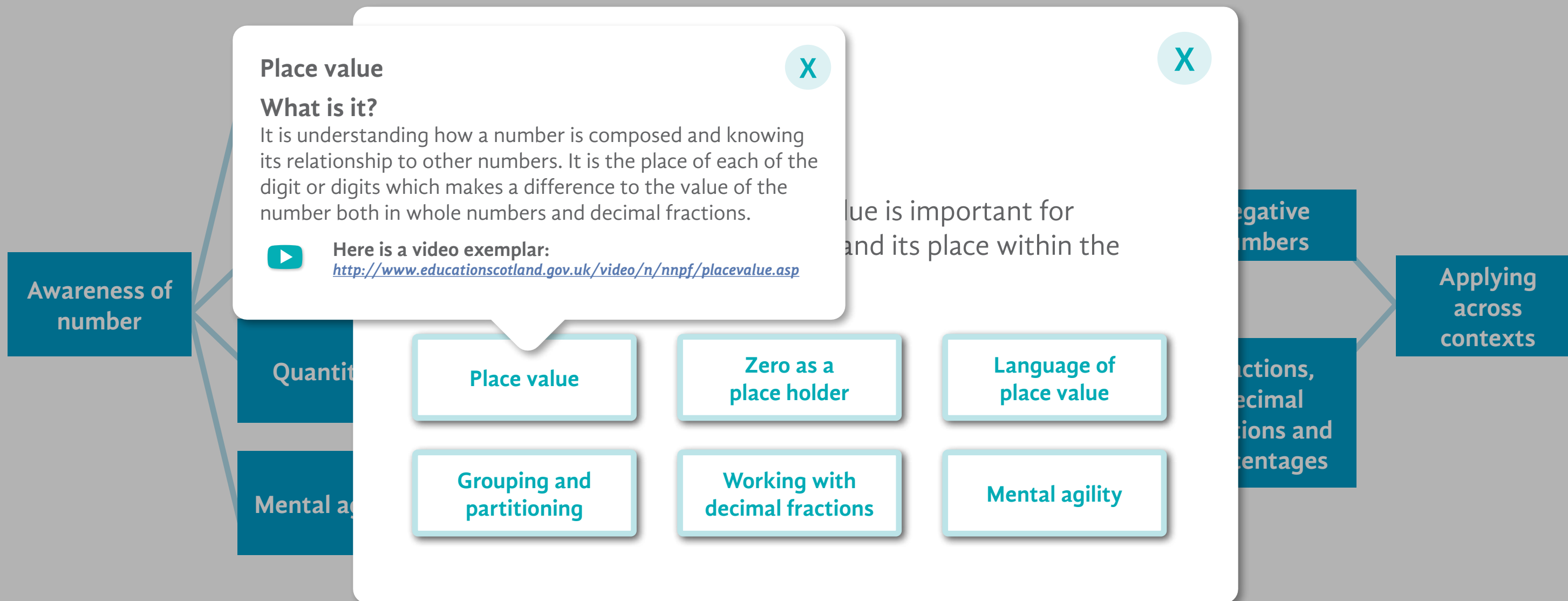
Fractions, decimals, percentages and percentages

Applying across contexts

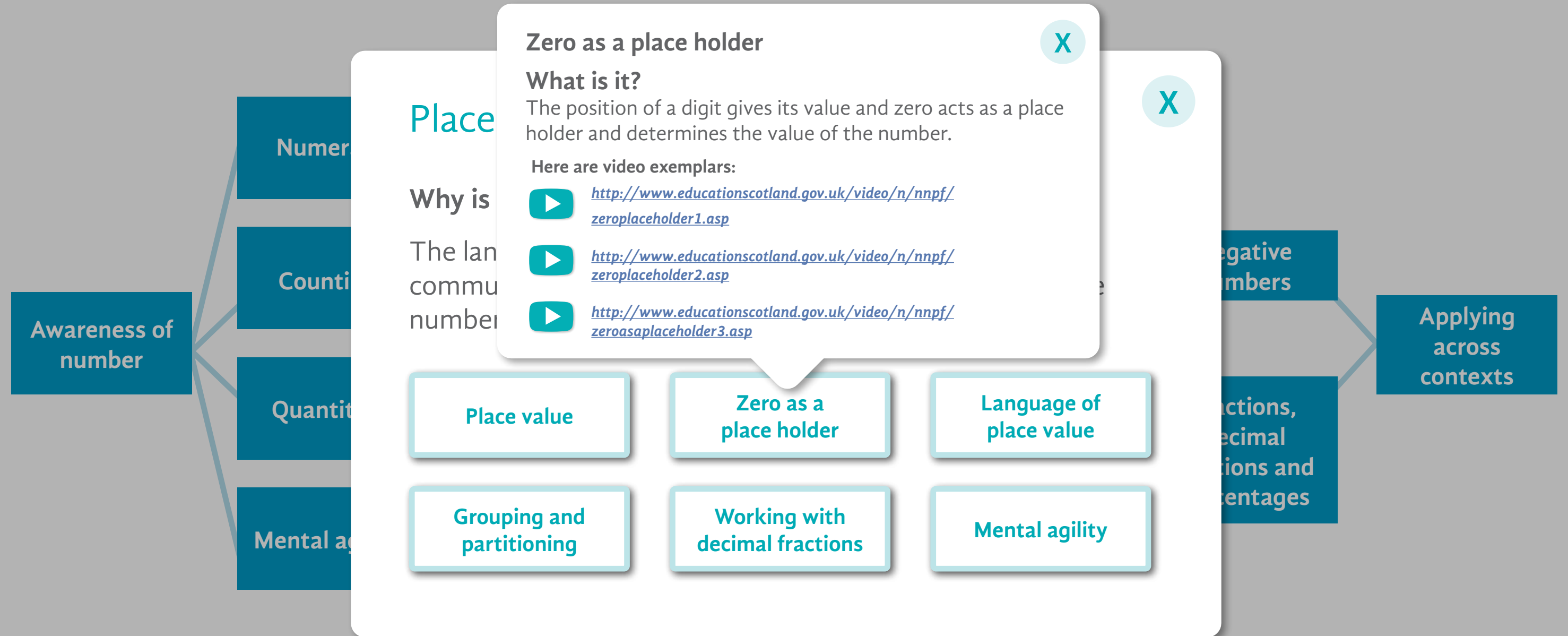
Number and number processes



Number and number processes



Number and number processes



Zero as a place holder



What is it?

The position of a digit gives its value and zero acts as a place holder and determines the value of the number.

Here are video exemplars:



<http://www.educationscotland.gov.uk/video/n/nnpf/zeroplaceholder1.asp>



<http://www.educationscotland.gov.uk/video/n/nnpf/zeroplaceholder2.asp>



<http://www.educationscotland.gov.uk/video/n/nnpf/zeroasaplaceholder3.asp>



Place

Why is

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number

Place value

Zero as a
place holder

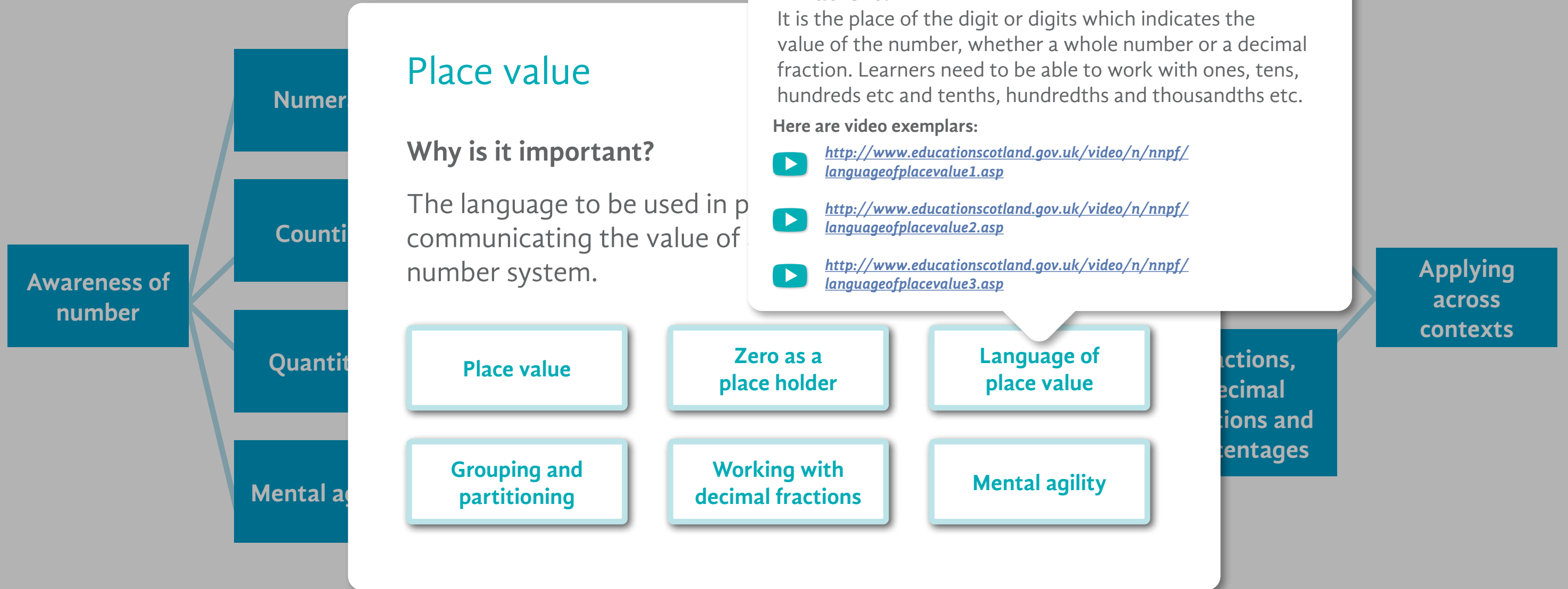
Language of
place value

Grouping and
partitioning

Working with
decimal fractions

Mental agility

Number and number processes



Place value

Why is it important?

The language to be used in communicating the value of number system.

Language of place value



What is it?

It is the place of the digit or digits which indicates the value of the number, whether a whole number or a decimal fraction. Learners need to be able to work with ones, tens, hundreds etc and tenths, hundredths and thousandths etc.

Here are video exemplars:

 <http://www.educationscotland.gov.uk/video/n/nnpf/languageofplacevalue1.asp>

 <http://www.educationscotland.gov.uk/video/n/nnpf/languageofplacevalue2.asp>

 <http://www.educationscotland.gov.uk/video/n/nnpf/languageofplacevalue3.asp>

Place value

Zero as a place holder

Language of place value

Grouping and partitioning

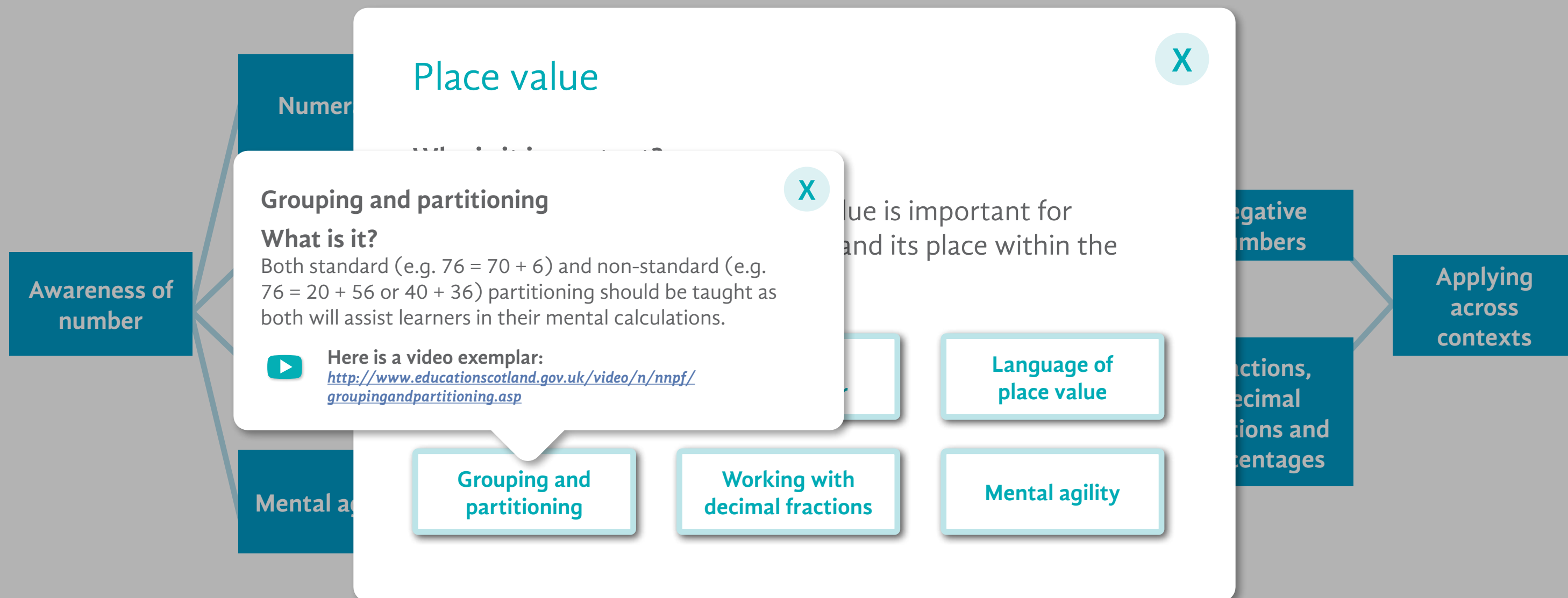
Working with decimal fractions

Mental agility

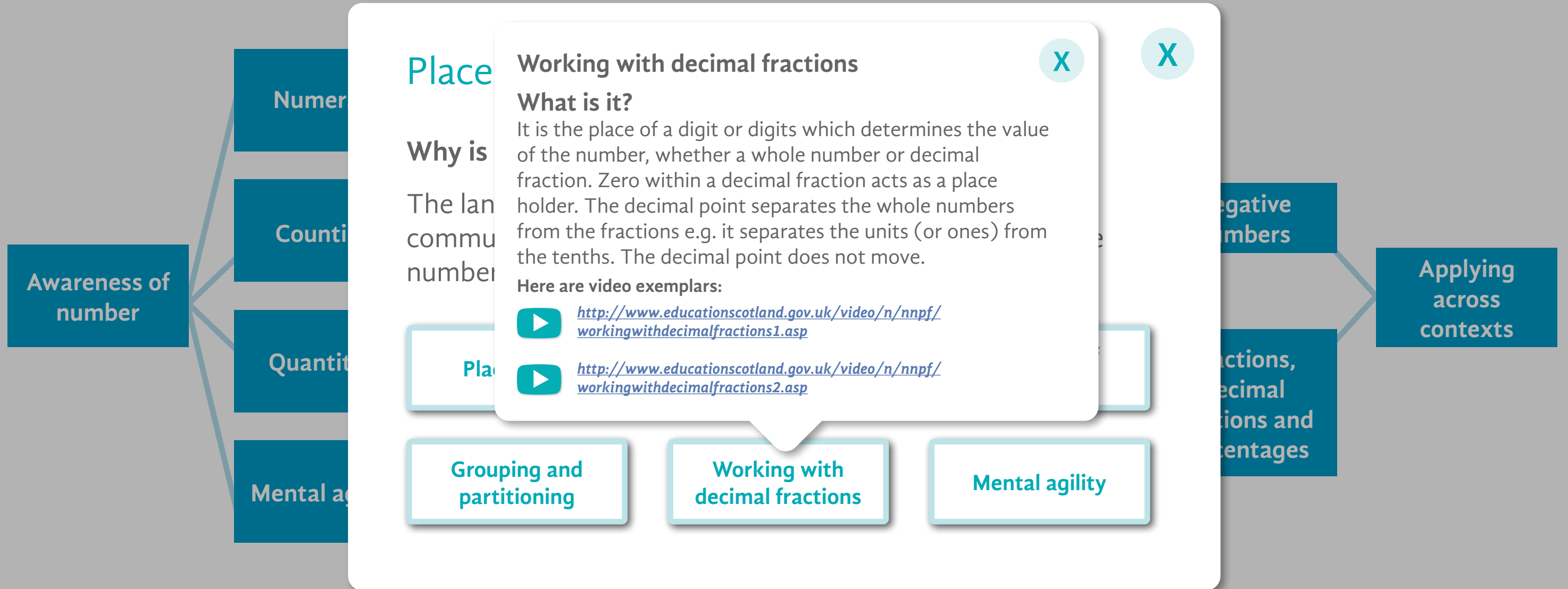
Fractions, decimal fractions and percentages

Applying across contexts

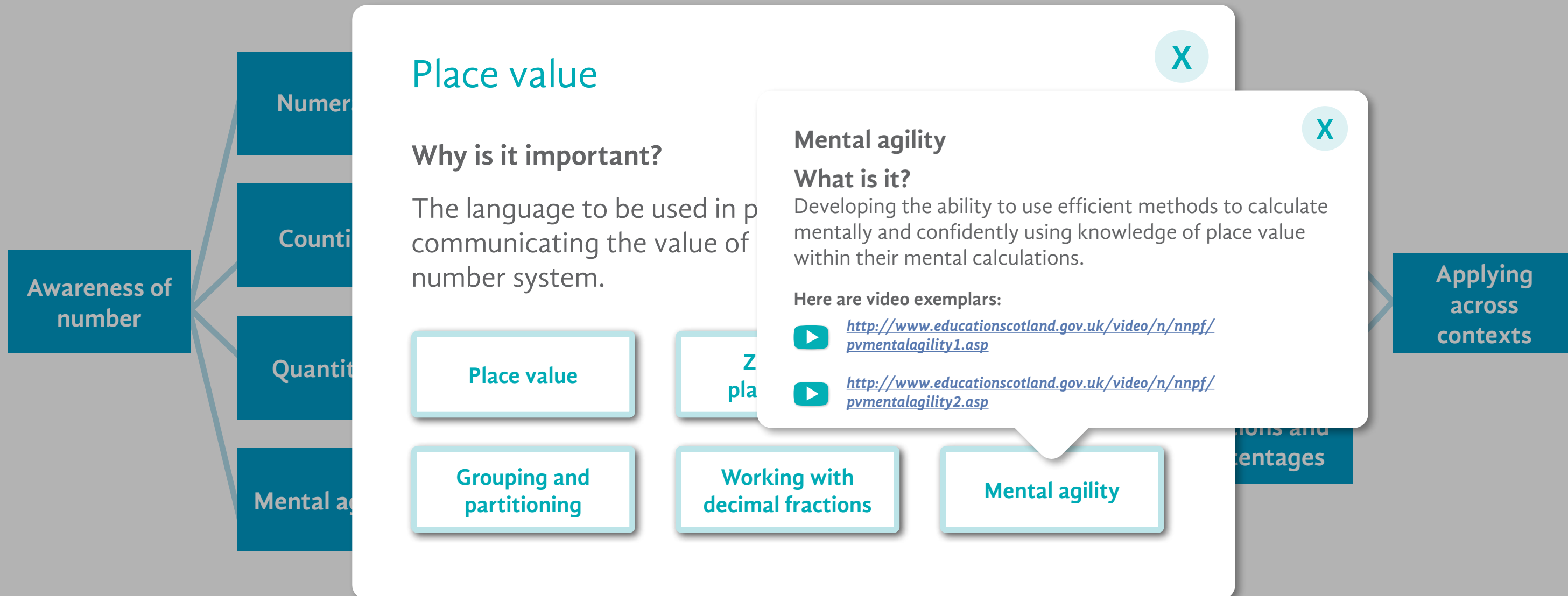
Number and number processes



Number and number processes



Number and number processes



Place value

Why is it important?

The language to be used in communicating the value of number system.

Place value

Mental agility

What is it?

Developing the ability to use efficient methods to calculate mentally and confidently using knowledge of place value within their mental calculations.

Here are video exemplars:

- <http://www.educationscotland.gov.uk/video/n/nnpf/pvmentalagility1.asp>
- <http://www.educationscotland.gov.uk/video/n/nnpf/pvmentalagility2.asp>

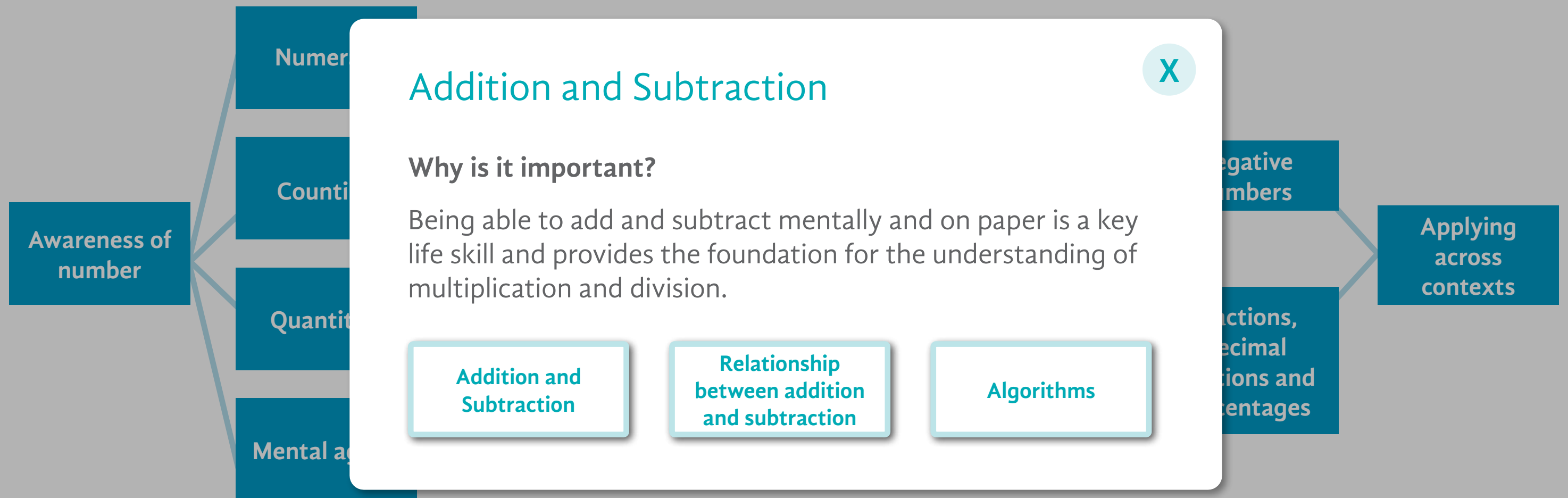
Working with decimal fractions

Working with decimal fractions

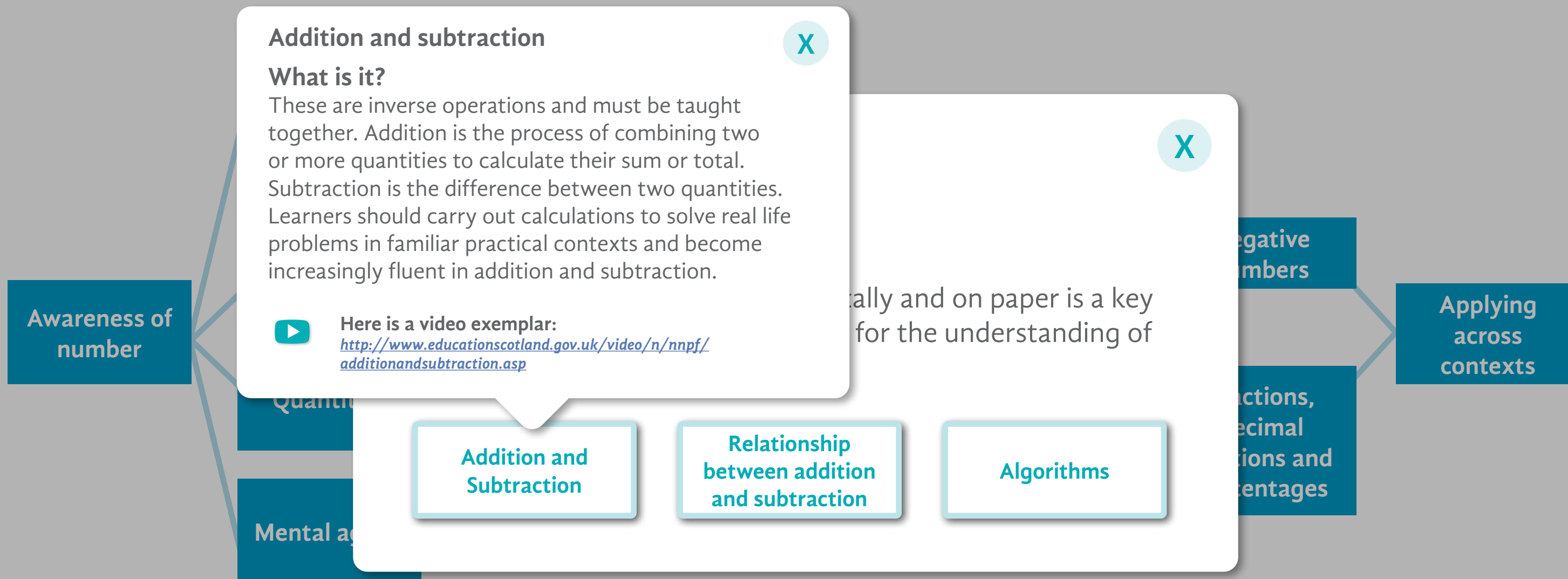
Mental agility

Percentages

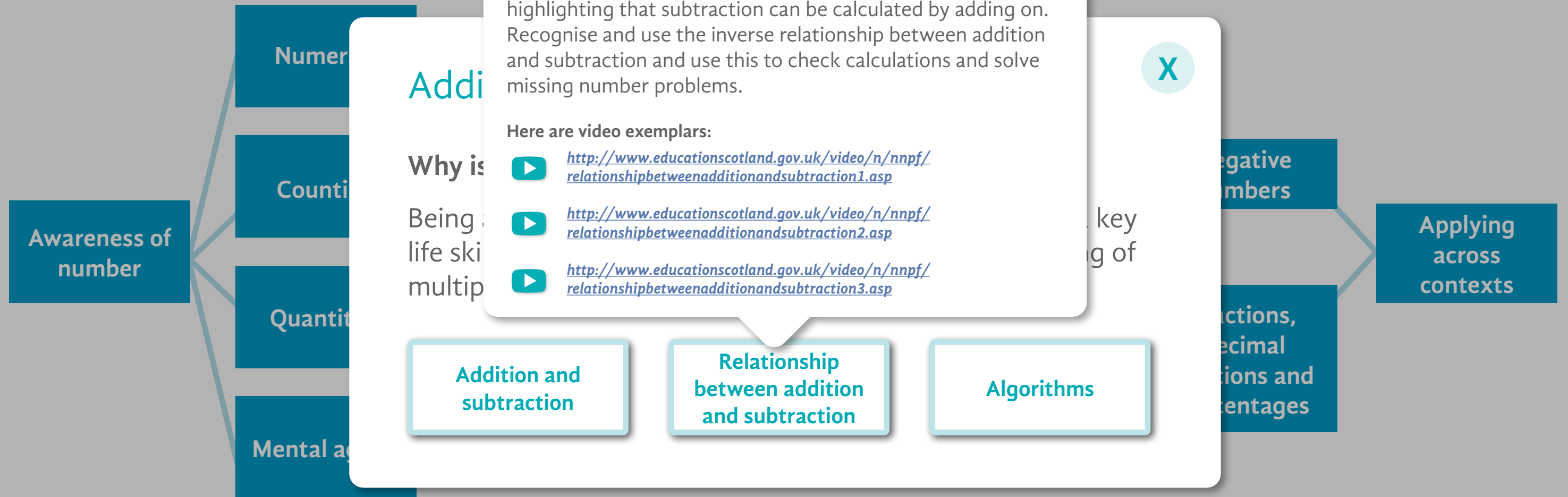
Number and number processes



Number and number processes



Number and number processes



Relationship between addition and subtraction



What is it?

Exploring the relationship between addition and subtraction. Addition and subtraction need to be taught together e.g. highlighting that subtraction can be calculated by adding on. Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Here are video exemplars:

-  <http://www.educationscotland.gov.uk/video/n/nnpf/relationshipbetweenadditionandsubtraction1.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/relationshipbetweenadditionandsubtraction2.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/relationshipbetweenadditionandsubtraction3.asp>

Addition and subtraction

Why is it important?

Being confident in life skills
multiplication and division

Addition and subtraction

Relationship between addition and subtraction

Algorithms



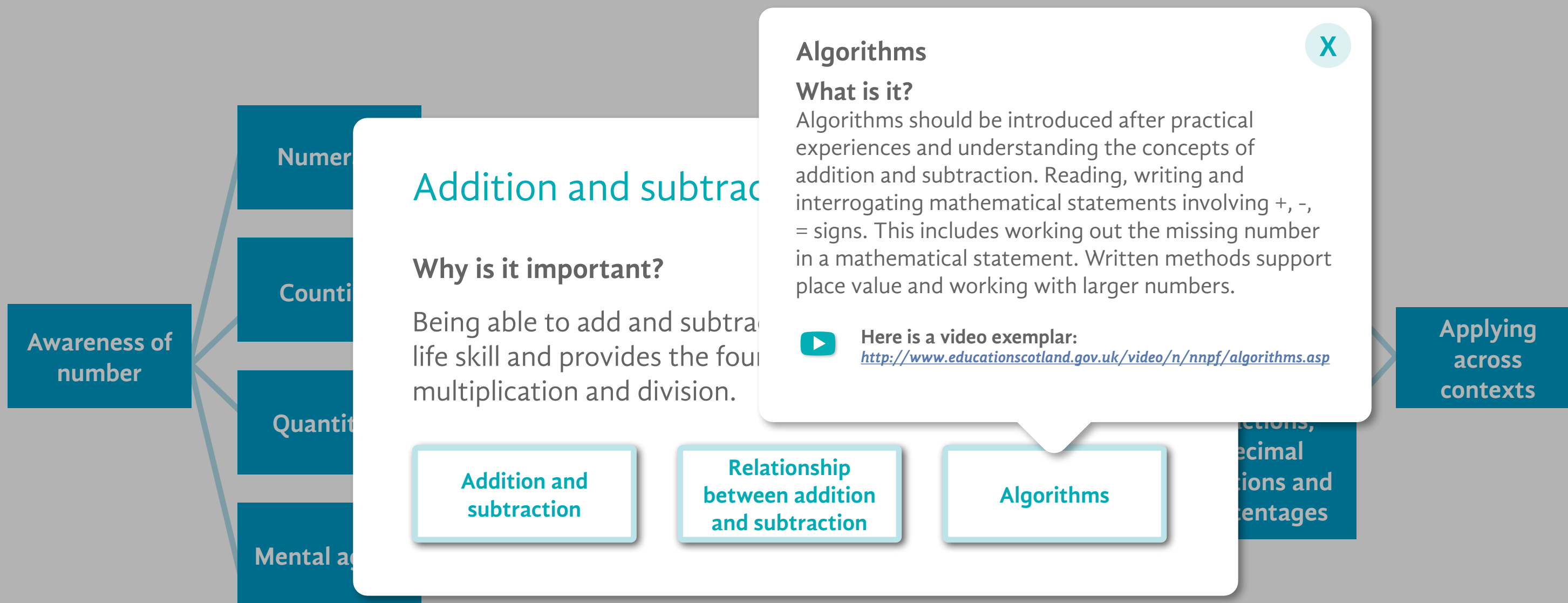
Key skills
of

Negative numbers

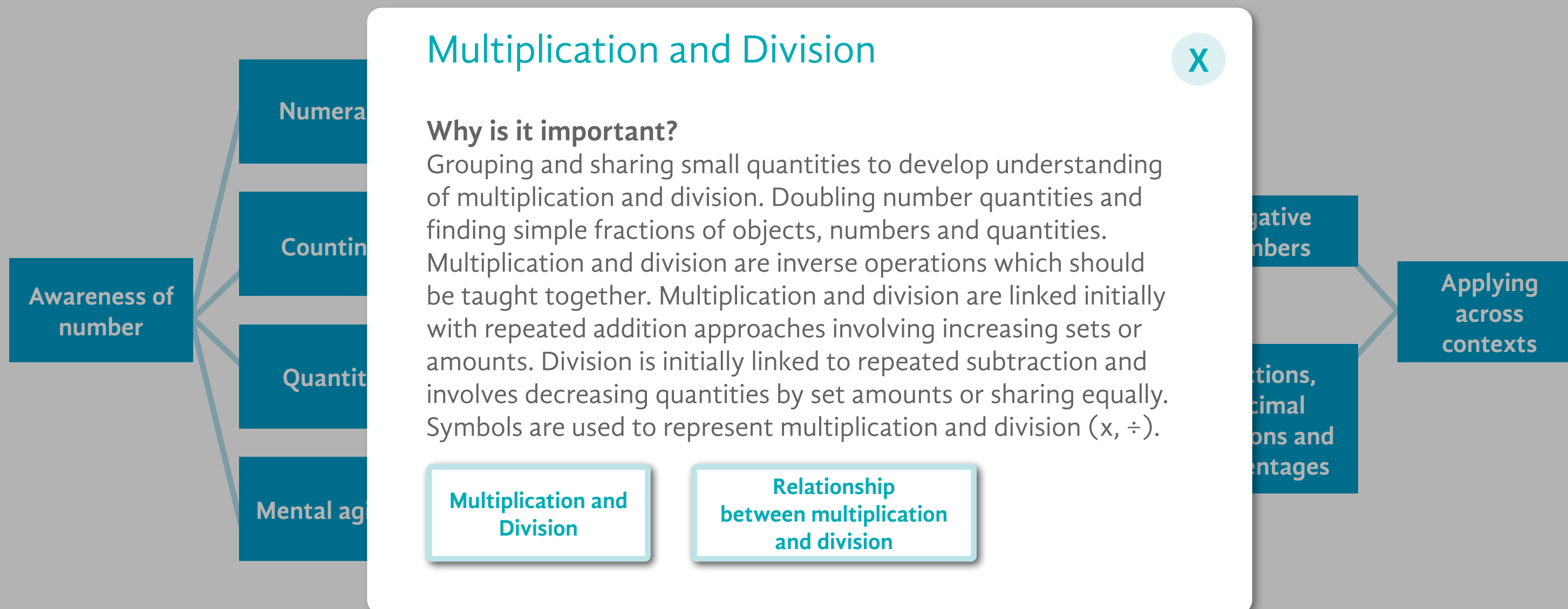
Fractions, decimal fractions and percentages

Applying across contexts

Number and number processes



Number and number processes



Multiplication and Division X

Why is it important?

Grouping and sharing small quantities to develop understanding of multiplication and division. Doubling number quantities and finding simple fractions of objects, numbers and quantities.

Multiplication and division are inverse operations which should be taught together. Multiplication and division are linked initially with repeated addition approaches involving increasing sets or amounts. Division is initially linked to repeated subtraction and involves decreasing quantities by set amounts or sharing equally. Symbols are used to represent multiplication and division (\times , \div).

**Multiplication and
Division**

**Relationship
between multiplication
and division**

Number and number processes

Awareness of number

Mental ag

Multiplication and Division

What is it?

Grouping and sharing small quantities to develop understanding of multiplication and division. Doubling number quantities and finding simple fractions of objects, numbers and quantities. Multiplication and division are inverse operations which should be taught together. Multiplication and division is linked initially with repeated addition approaches involving increasing sets or amounts. Division is initially linked to repeated subtraction and involves decreasing quantities by set amounts or sharing equally. Symbols are used to represent multiplication and division (\times , \div).



Here is a video exemplar:

<http://www.educationscotland.gov.uk/video/n/nnpf/multiplicationanddivision.asp>

Multiplication and Division

Relationship between multiplication and division

mentally and on paper is understand the relationship be able to carry out work with fractions. It is to appreciate and make when developing and

gative numbers

tions, decimal ons and entages

Applying across contexts

Number and nu







Relationship between multiplication and division



What is it?

Knowing how to find multiplication and division facts, including use of partitioning and the inverse operation. Being able to recall a particular multiplication fact and being able to use this to solve related multiplication and division tasks. The set of related facts is known as a fact family. Using relationships to support recall and being able to manipulate numbers facts mentally, accurately and confidently. Using knowledge of division when working with fractions e.g. $\frac{1}{2}$ of 40. The relationship between digits in the decimals system should be highlighted when multiplying and dividing by 10, 100, 1000 etc.

Here are video exemplars:

-  <http://www.educationscotland.gov.uk/video/n/nnpf/relationshipbetweenmultiplicationanddivisionmandd.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/relationshipbetweenmultiplicationanddivision1.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/relationshipbetweenmultiplicationanddivision2.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpfrelationshipbetweenmultiplicationanddivision3.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/relationshipbetweenmultiplicationanddivision4.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/relationshipbetweenmultiplicationanddivision5.asp>

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Multiplication and Division

Relationship between multiplication and division

Awareness of number

Numeration

Counting

Quantities

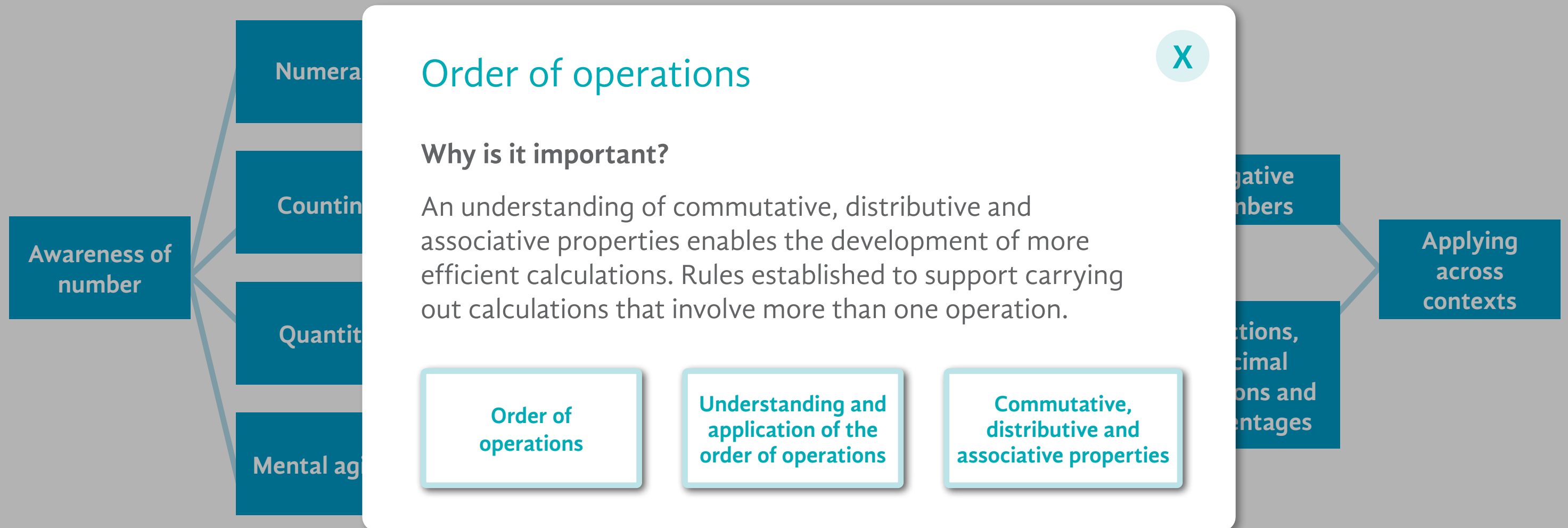
Mental agility

Operations

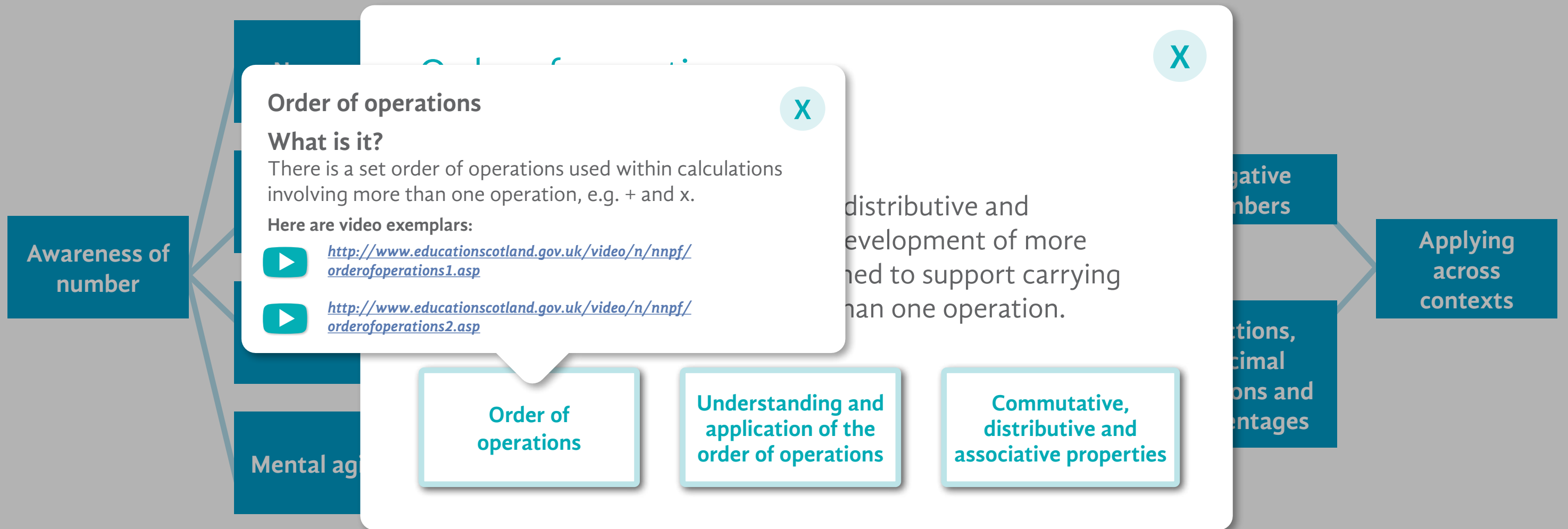
Applying across contexts

Patterns, shapes, measures, and percentages

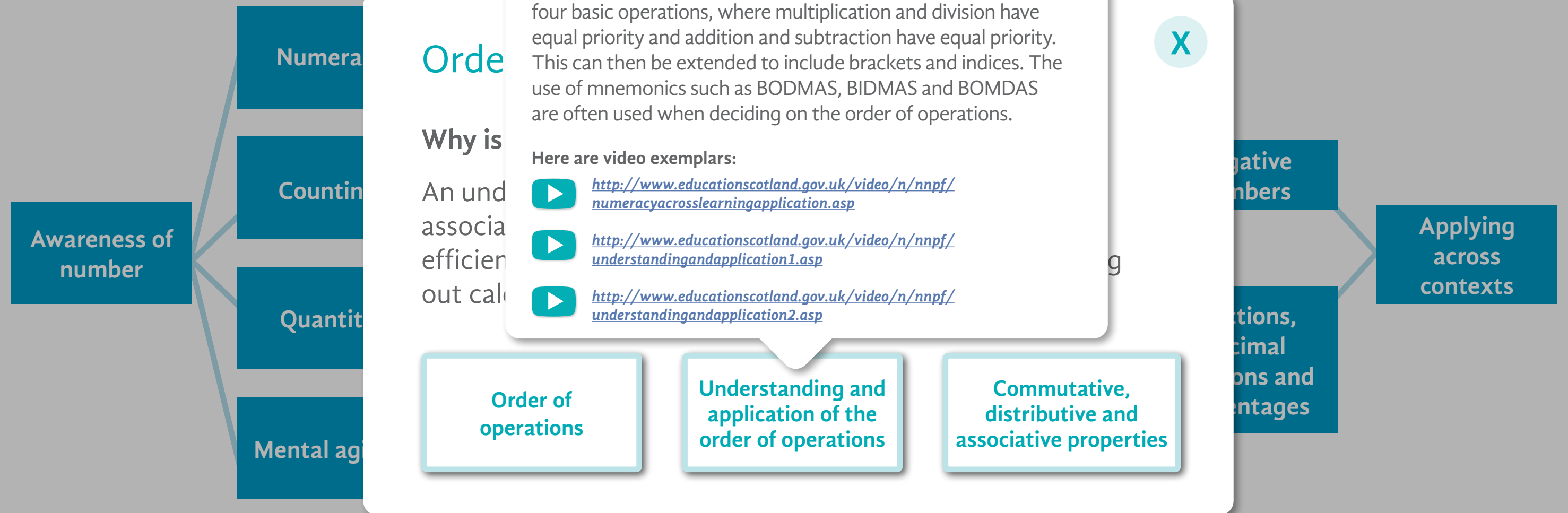
Number and number processes



Number and number processes



Number and number processes






Understanding and application of the order of operations



What is it?

At the introductory stage the order of operations applies to the four basic operations, where multiplication and division have equal priority and addition and subtraction have equal priority. This can then be extended to include brackets and indices. The use of mnemonics such as BODMAS, BIDMAS and BOMDAS are often used when deciding on the order of operations.

Here are video exemplars:

-  <http://www.educationscotland.gov.uk/video/n/nnpf/numeracyacrosslearningapplication.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/understandingandapplication1.asp>
-  <http://www.educationscotland.gov.uk/video/n/nnpf/understandingandapplication2.asp>

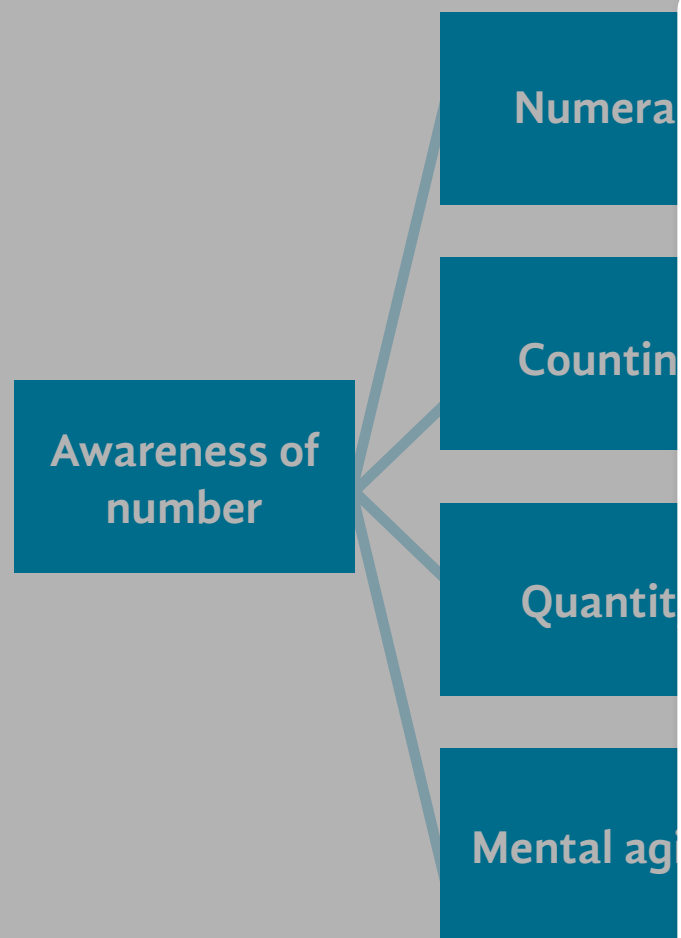
Order of operations

Understanding and application of the order of operations

Commutative, distributive and associative properties



Number and number processes



Order of operations

Why is it important?

An understanding of associative properties allows for efficient calculations. It helps to work out calculations that

Order of operations

Understanding and application of the order of operations

Commutative, distributive and associative properties

Commutative, distributive and associative properties X

What is it?

The commutative law states that you can swap numbers around (within a calculation) and still get the correct answer. The commutative law and inverse relationship develops multiplicative reasoning. The distributive law states that multiplying a number by a group of numbers added together is the same as doing each multiplication separately.

The associative law states:

- It doesn't matter how you group the numbers when you add
- It doesn't matter how you group the numbers when you multiply

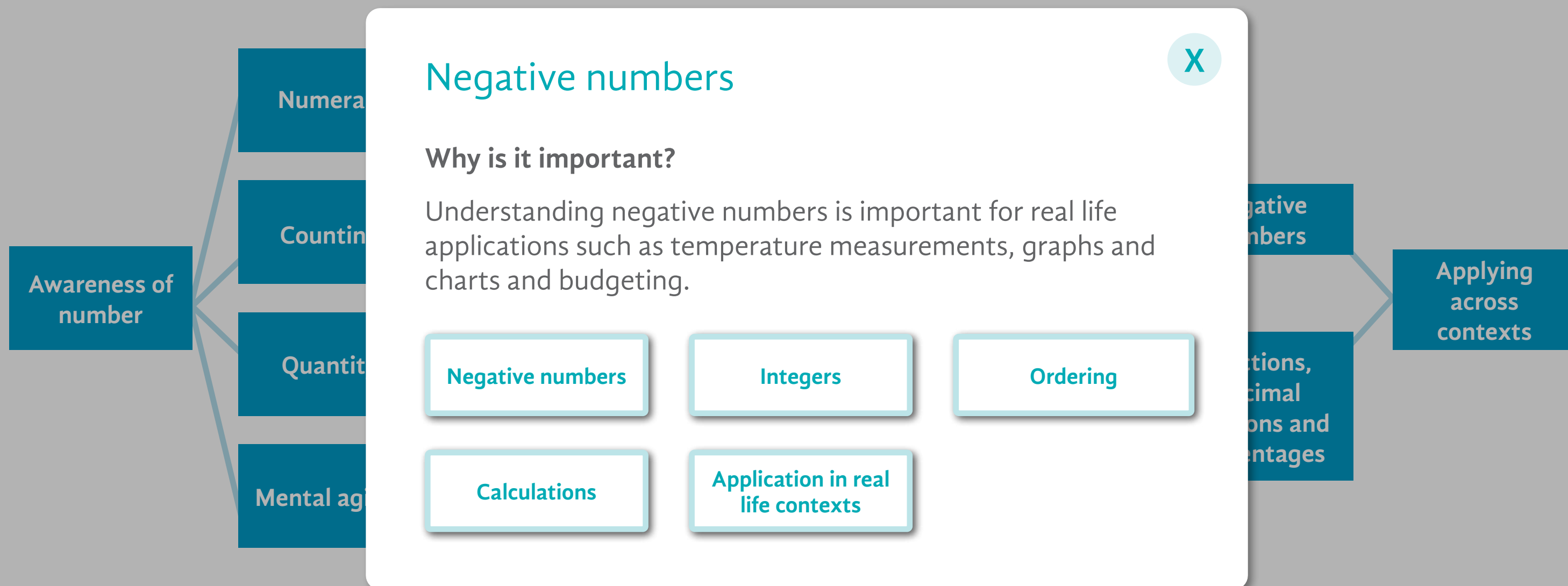
Here are video exemplars:

<http://www.educationscotland.gov.uk/video/n/nnpf/oofocdap.asp>

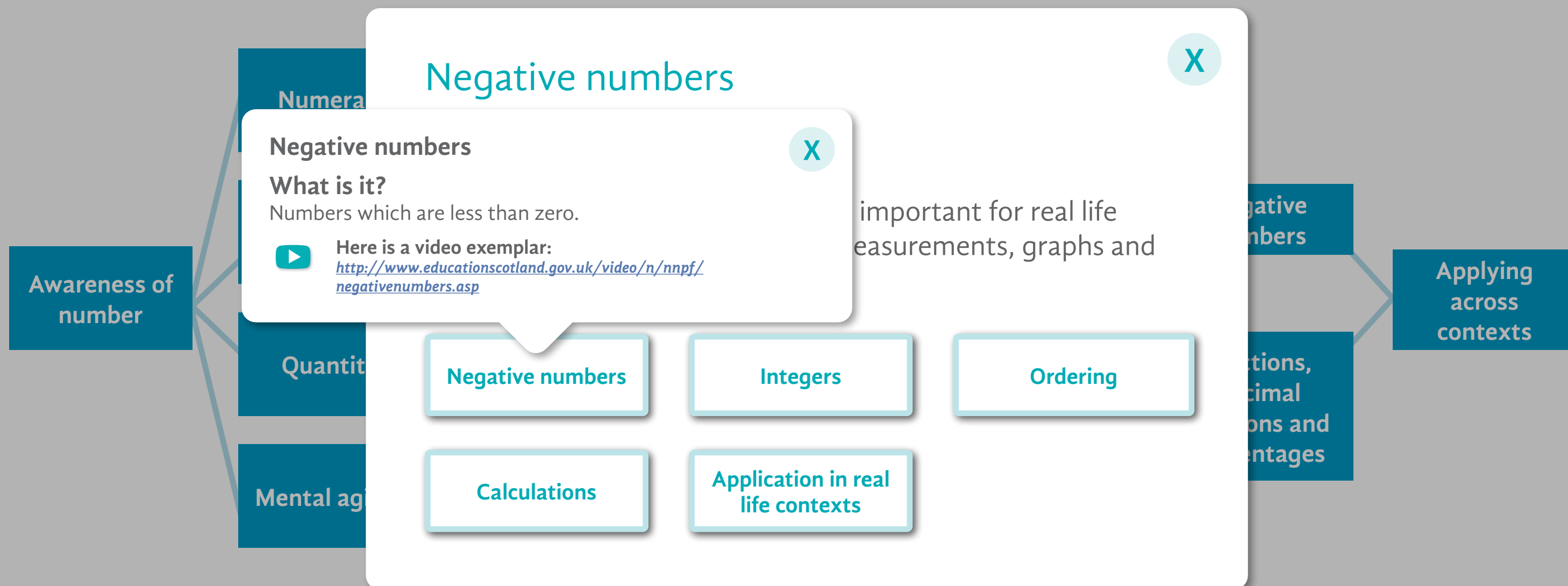
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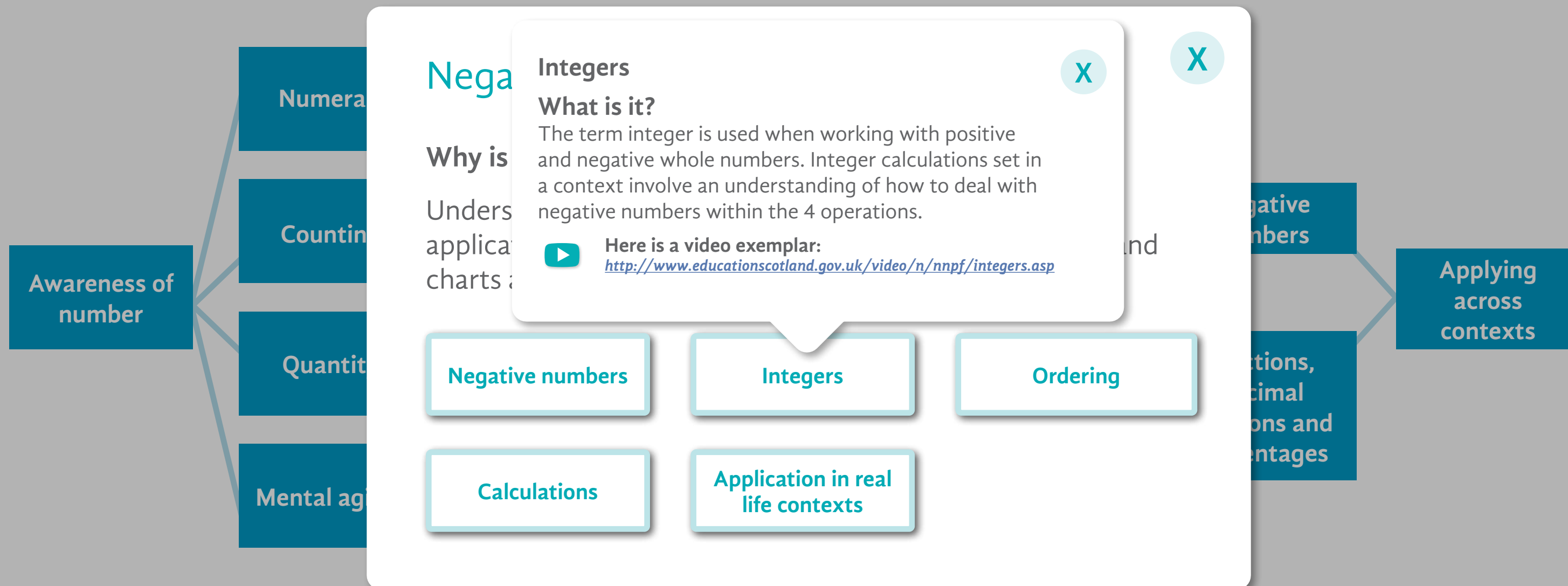
Number and number processes



Number and number processes



Number and number processes



Number and number processes

Awareness of number

- Numeration
- Counting
- Quantities
- Mental agility

Negative numbers

Why is it important?

Understanding negative numbers has many applications such as temperature, bar charts and budgeting.

Ordering

What is it?

Recognising the position of negative numbers on a number line or measuring device.

Here is a video exemplar:

<http://www.educationscotland.gov.uk/video/n/nnpf/ordering.asp>

Negative numbers

Integers

Ordering

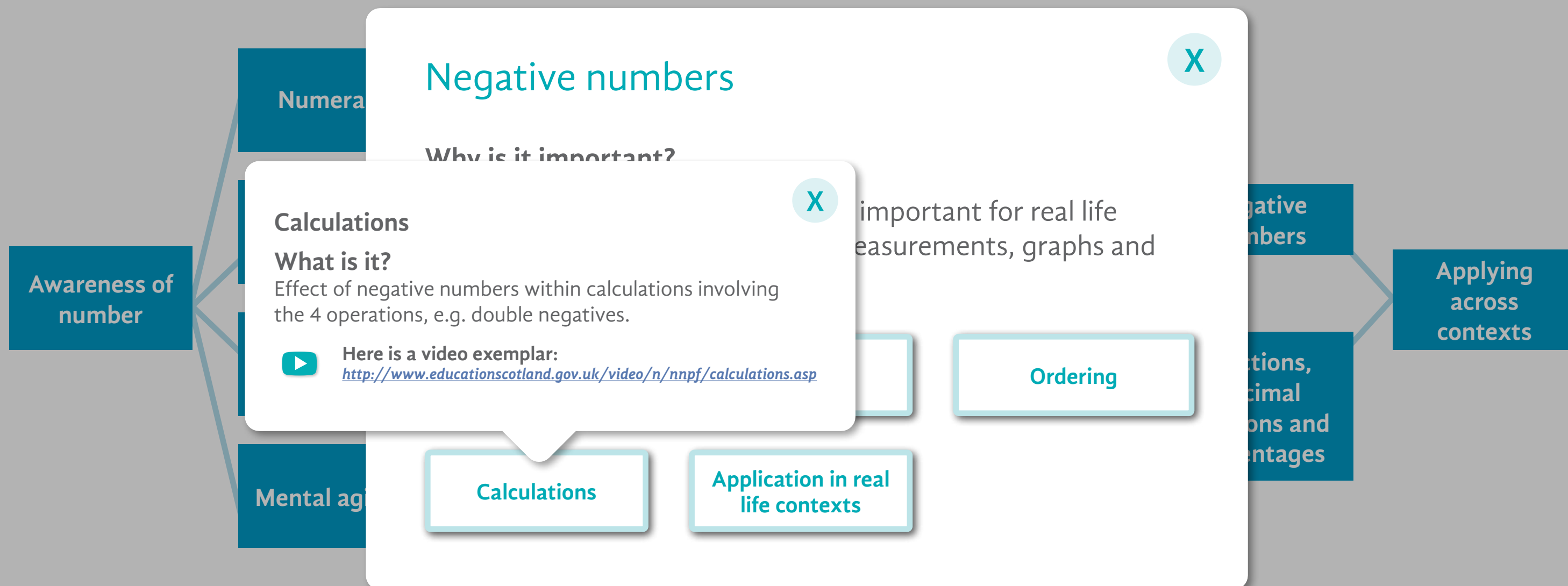
Calculations

Application in real life contexts

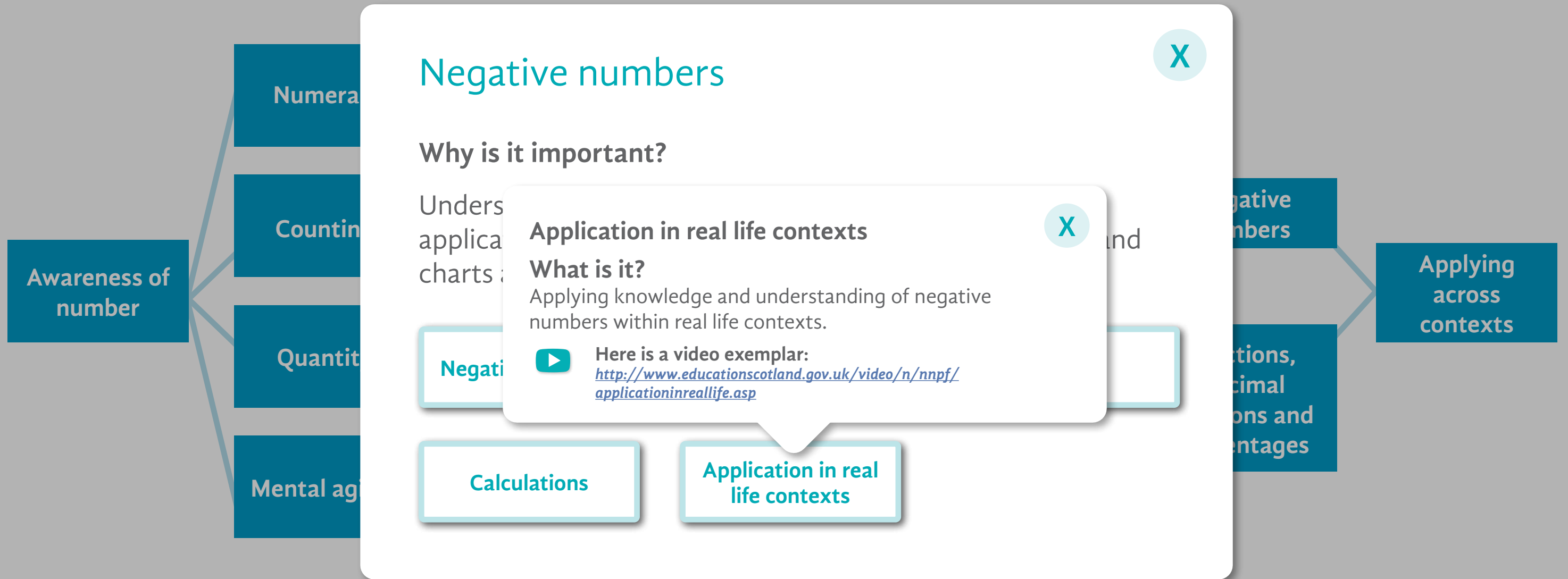
Applying across contexts

Operations, fractions and percentages

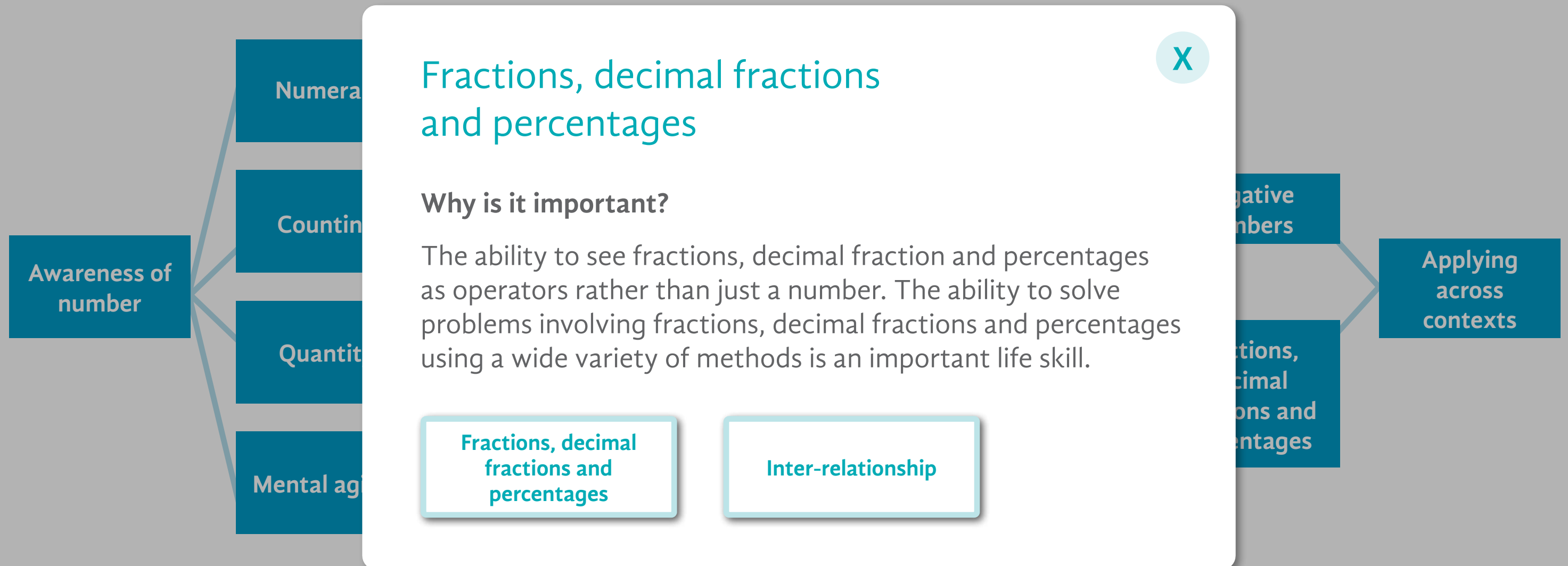
Number and number processes



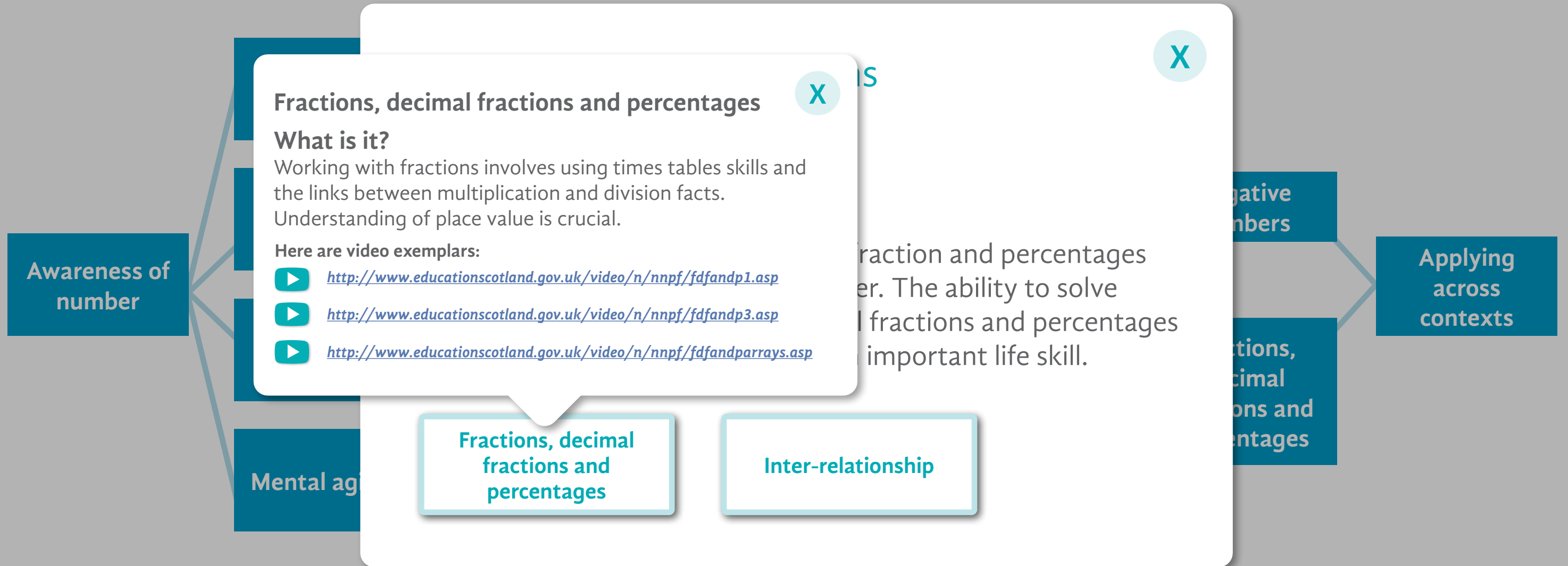
Number and number processes



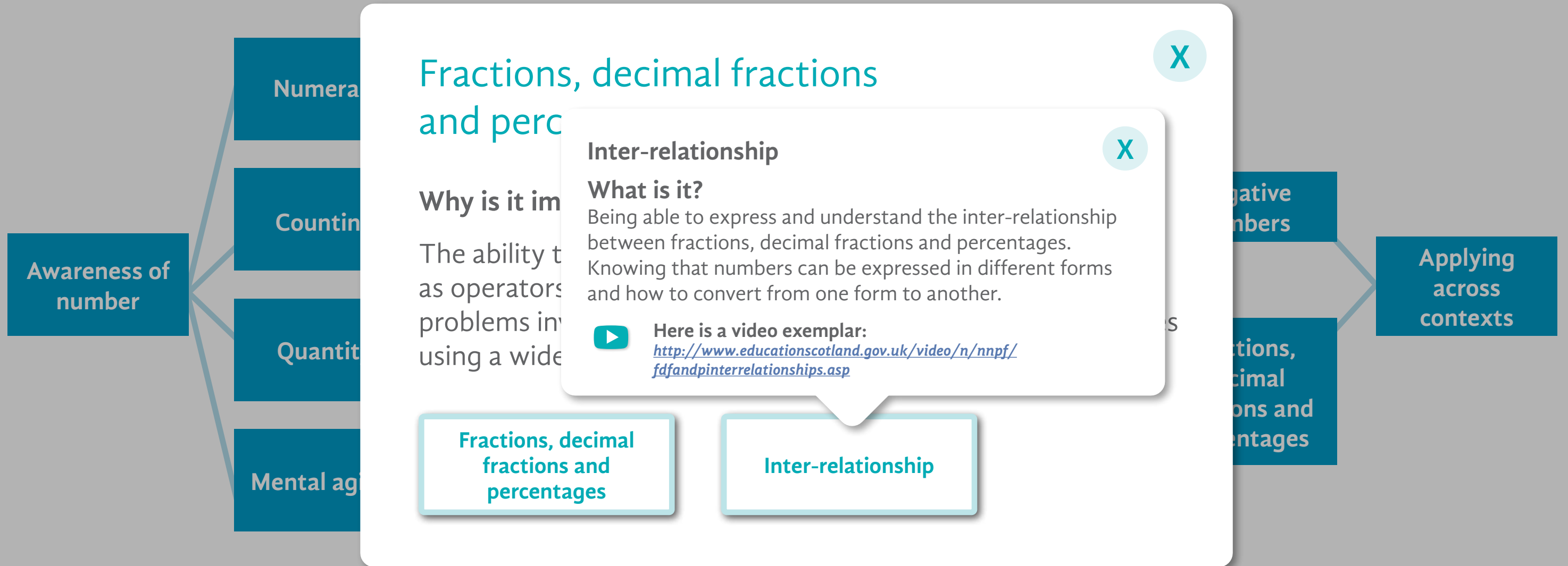
Number and number processes



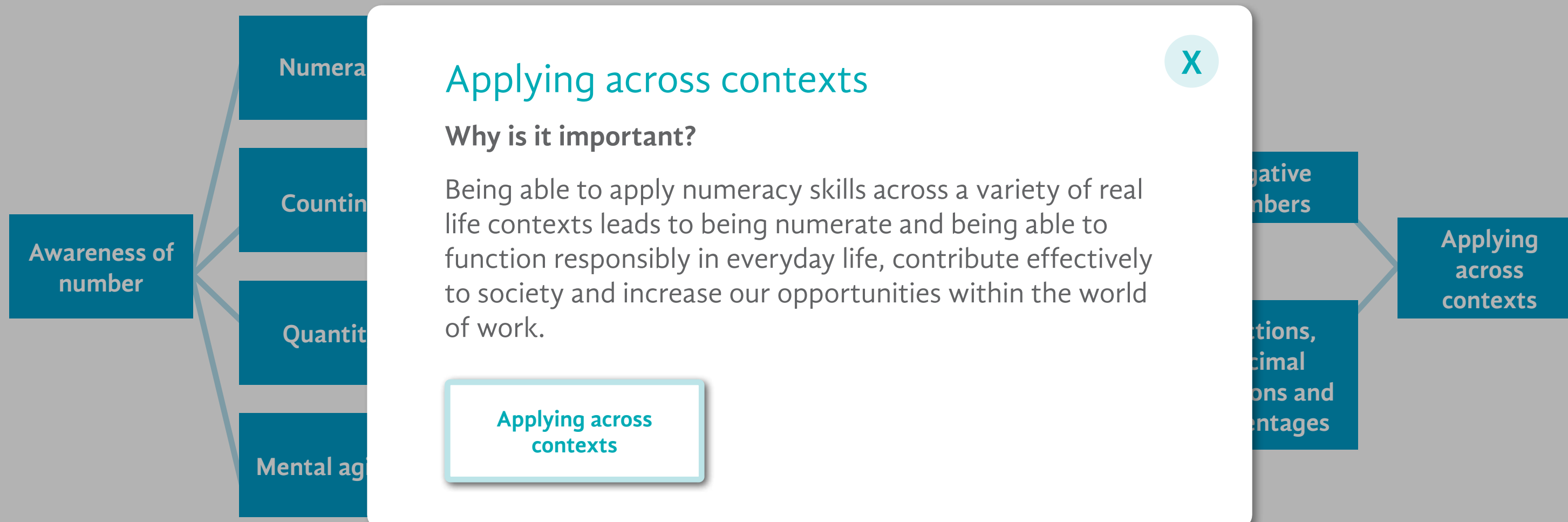
Number and number processes



Number and number processes



Number and number processes



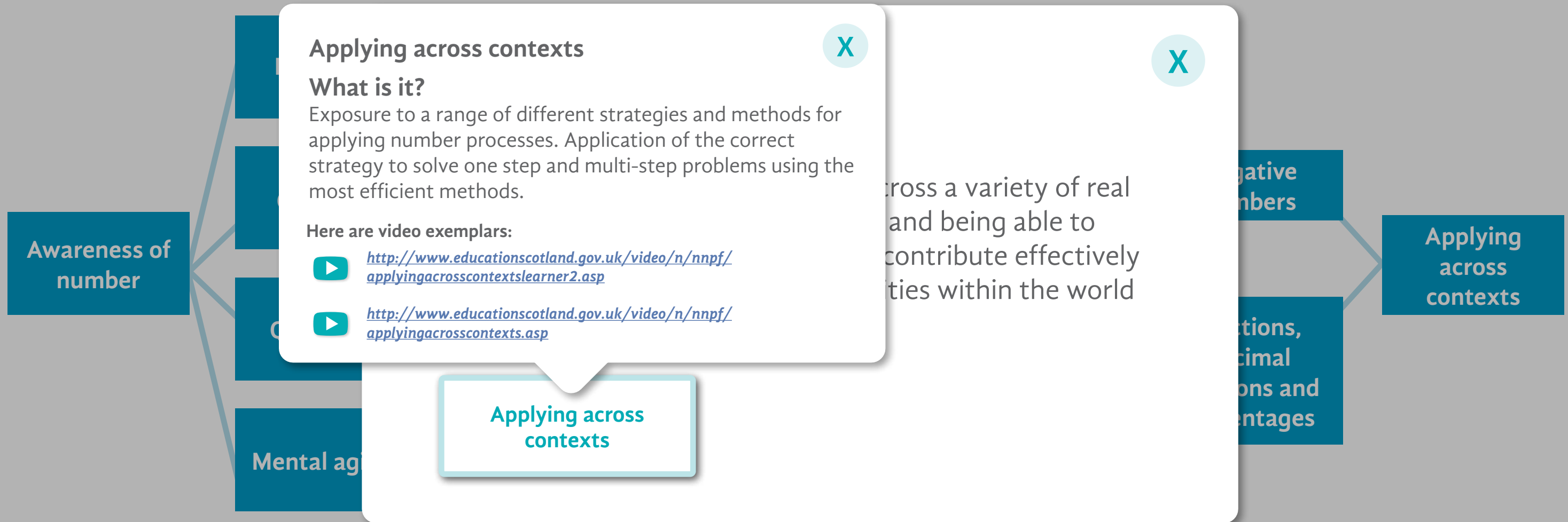
Applying across contexts X

Why is it important?

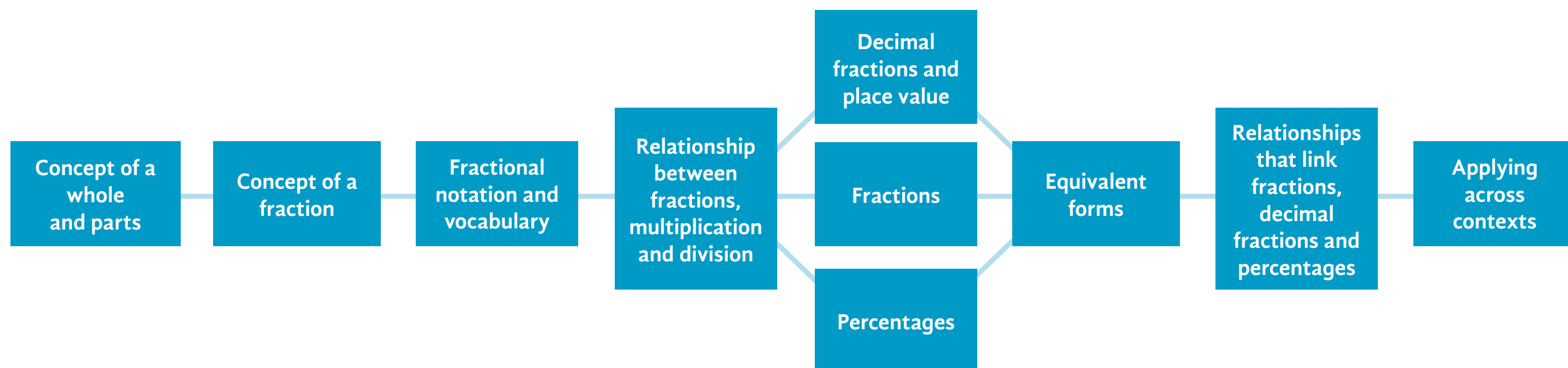
Being able to apply numeracy skills across a variety of real life contexts leads to being numerate and being able to function responsibly in everyday life, contribute effectively to society and increase our opportunities within the world of work.

Applying across contexts

Number and number processes



Fractions, decimal fractions and percentages



Fractions, decimal fractions and percentages

Concept of a whole and parts

X

Why is it important?

To develop an understanding of fractions learners must have knowledge and understanding of what is meant by a whole or a part.

Concept of a whole
and parts

One object, shape or
quantity can be
shared into parts

A group of items
can be shared out

Equal parts

Concept of a
whole
and parts

Concept of
fraction

Relationships
that link
fractions,
decimal
fractions and
percentages

Applying
across
contexts

Fractions, decimal fractions and percentages

Concept of a whole or a part

What is it?

A whole can represent one item or a group of items.

Previous knowledge and understanding

- Awareness of vocabulary related to wholes and parts
- Awareness that a part of an object, shape or group is less than the whole

Concept of a whole and parts

Concept of a fraction

Concept of a whole or a part

One object, shape or quantity can be shared into parts

A group of items can be shared out

Equal parts

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions and perc

One object, shape or quantity can be shared into equal parts

X

What is it?

When an object, shape or quantity is split into two equal parts then each part is one half. When an item is split into two unequal parts then these two parts are not halves. This principle applies to all unitary fractions, e.g. splitting into tenths and each part is an equal 10th.

Previous knowledge and understanding

- Awareness that a part of an object, shape or group is less than the whole
- Understand and demonstrate the concept of sharing
- Understand and demonstrate the concept of sharing fairly
- Have experience of sharing in real life situations, e.g. with siblings, in play situations

Concept of a whole and parts

Concept of fraction

Concept of a whole or a part

One object, shape or quantity can be shared into parts

A group of items can be shared out

Equal parts

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Concept of a whole

Why is it important?

To develop an understanding of knowledge and understanding of a whole or a part.

A group of items can be shared out



What is it?

Sharing a collection of items into equal groups and into groups which are not equal.

Previous knowledge and understanding

- Awareness of sharing fairly and splitting a group of items
- Have experience of sharing out items in a variety of contexts

Concept of a whole and parts

Concept of fraction

Concept of a whole or a part

One object, shape or quantity can be shared into parts

A group of items can be shared out

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Equal parts

Fractions, decimal fractions and percentages

Concept of a whole and parts

Why is it important?

Equal parts

What is it?

Equal parts can form a whole.

Previous knowledge and understanding

Is able to identify and explain when an object, shape or quantity has not been split/shared equally.

Fractions learners must have a clear understanding of what is meant by a whole

Concept of a whole and parts

Concept of a whole and parts

Shape or quantity can be split into parts

A group of items can be shared out

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Equal parts

Fractions, decimal fractions and percentages

Concept of a fraction

X

Why is it important?

Understanding this concept is needed to appreciate the notation of fractions. When working with a fraction it is essential to understand that the denominator denotes the number of equal parts.

Concept of
a fraction

Fractions with
equal parts

Sharing with a
remainder

Equal sharing

Concept of a
whole
and parts

Concept of
fraction

Relationships
that link
fractions,
decimal
fractions and
percentages

Applying
across
contexts

Fractions, decimal fractions and percentages

Concept of a fraction

What is it?

That a whole can be separated into equal parts. These parts are called fractions.

Previous knowledge and understanding

- Understand that a whole can be split into smaller parts
- Understand the term equal

Concept of a whole and parts

Concept of a fraction

Concept of a fraction

Fractions with equal parts

Sharing with a remainder

Equal sharing

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Concept

What

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Fractions with equal parts



What is it?

Understanding that fractions of a whole are equal parts.

Previous knowledge and understanding

- Understand that a whole can be split into smaller parts
- Understand the term 'equal'
- Is aware of the relationship between equal fractions and the whole

Concept of a whole and parts

Concept of fraction

Concept of a fraction

Fractions with equal parts

Sharing with a remainder

Equal sharing

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Concept of a fraction

Why is it important?

Understanding this concept is essential to understand the notation of fractions. When a whole is divided into a number of equal parts.

Sharing with a remainder



What is it?

Awareness that when a group of items is shared equally there may be some 'left over.' This is known as the remainder.

Previous knowledge and understanding

- Experience of one to one correspondence
- Understand equal sharing
- Experience of sharing out items in a variety of contexts

Concept of a fraction

Fractions with equal parts

Sharing with a remainder

Equal sharing

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Concept of a whole and parts

Concept of fraction

Fractions, decimal fractions and percentages

Concept of a fraction

Equal sharing

What is it?

Splitting a group of items equally into a number of smaller groups. This underpins the concept of fractions.

Previous knowledge and understanding

- Understand the term 'equal'
- Have experience of sharing out items in a variety of contexts

needed to appreciate the... with a fraction it is... denominator denotes the

Concept of a whole and parts

Sharing with no remainder

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Equal sharing

Fractions, decimal fractions and percentages

Fractional notation and vocabulary X

Why is it important?

Understanding fractional notation aids communication, reinforces the concept of equal sharing and can be developed further to investigate equivalent fractions. Understanding what the two numbers that make up a fraction represent, allows for calculations to be made.

Fractional notation and vocabulary

Numerator and denominator

Concept of a whole and parts

Concept of fraction

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Fractional notation and vocabulary

What is it?

Fractional notation is used to find, name and write fractions of a length, shape, object or quantity.

Previous knowledge and understanding

- Awareness that fractional notation has a top and bottom number, e.g. $\frac{1}{2}$

Vocabulary

Provides communication, understanding and can be developed through activities. Understanding what a fraction represents, allows for

Concept of a whole and parts

Concept of fraction

Fractional notation and vocabulary

Numerator and denominator

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Concept of a whole and parts

Concept of fraction

Fraction

Why is it?

Understand and reinforce further the two calculations

Numerator and denominator

What is it?

Numerator indicates the number of equal parts.

Denominator indicates the number of equal parts the unit is divided into. The greater the numerator the more parts there are. The greater the denominator the more parts the whole has been divided into.

Previous knowledge and understanding

- Understand that the top and bottom number of a fraction mean different things

Fractional notation and vocabulary

Numerator and denominator

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Relationship between fractions, multiplication and division

X

Why is it important?

Understanding the link between fractions and multiplication leads to an understanding of percentages and the application of multiplication and division in calculations such as those involving ratio.

Relationship between fractions,
multiplication and divisions

Concept of a
whole
and parts

Concept of
fraction

Relationships
that link
fractions,
decimal
fractions and
percentages

Applying
across
contexts

Fractions, decimal fractions and percentages

Concept of a whole and parts

Concept of a fraction

Relationship between fractions, multiplication and division

What is it?

There is a direct link between finding a fraction of an object or a quantity and multiplication and division.

Previous knowledge and understanding

- Apply multiplication facts and corresponding division facts (inverse operations) to whole numbers
- Understand the role of numerator and denominator in a fraction



Relationship between fractions, multiplication and divisions

and multiplication of the application such as those

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Decimal fractions and place value X

Why is it important?

Understanding decimal fractions is important for conversion in measurement and understanding what proportion of a whole is represented. It is also important relative to interpreting answers generated through the use of calculators.

Decimal fractions
and place value

The decimal point

Concept of a
whole
and parts

Concept of
fraction

Relationships
that link
fractions,
decimal
fractions and
percentages

Applying
across
contexts

Fractions

Decimal fractions and place value

What is it?

Learning and teaching about decimal fractions is an extension of learners' understanding of place value. There is a multiplicative relationship between the decimal places and the value of the positions increases in powers of 10 from right to left. Moving left from the decimal point the powers of 10 increase and moving right from the decimal point the powers of 10 decrease. There are many contexts for learning about decimal fractions, e.g. money and measurement.

Previous knowledge and understanding

- Have a knowledge of place value and its role in calculation
- Have an awareness that not all numbers are whole numbers

Concept of a whole and parts

Concept of a fraction

Decimal fractions and place value

The decimal point

Percentages

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

for conversion in
tion of a whole
interpreting
ors.

Fractions, Decimals, and Percentages

Concept of a whole and parts

Concept of a fraction

Decimal fractions and place value

The decimal point

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

The decimal point

X

What is it?

In order to successfully manipulate numbers, learners need to have a conceptual understanding of place value, including the role of the decimal point. The decimal point separates the whole numbers from the fractions and is placed between the units (or ones) and the tenths. It is important to ensure that when multiplying or dividing by multiples of 10, learners understand that the decimal point does not move.

Previous knowledge and understanding

- Can talk about the multiplicative relationship between the digits in whole numbers
- Can give examples of where the decimal point can be seen in real life contexts, e.g. money £2.39, measurement 2.5l of paint

X

Fractions, decimal fractions and percentages

Fractions

X

Why is it important?

Working with fractions is an important skill in the world of work and daily life.

[Fractions](#)

Concept of a whole and parts

Concept of fraction

Percentages

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions

X

What is it?

A proper fraction is when the numerator is less than the denominator e.g. $\frac{1}{2}$. An improper fraction is when the numerator is more than the denominator, e.g. $\frac{3}{2}$. A fraction expresses a part of a whole. When carrying out calculations, the most appropriate form of a fraction should be used, e.g. $\frac{6}{100}$ of 500 (calculate $\frac{1}{100}$ then multiply by 6, rather than $\frac{3}{50}$ which is the fraction in its simplest form).

Previous knowledge and understanding

- Apply multiplication facts and corresponding division facts (inverse operations) to whole numbers
- Know that the numerator is the number on the top of a fraction
- Know that the denominator is the number on the bottom of a fraction
- Know that the numerator shows the number of equal parts
- Know that the denominator shows the total number of parts the whole has been split into
- Understand that the larger the denominator is, the greater the number of parts the whole has been split into

X

Concept of a whole and parts

Concept of a fraction

Fractions

Percentages

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Percentages

X

Why is it important?

Percentages are used in a wide variety of contexts, many of which are used in everyday life. Understanding that percentages are a specific way of representing fractions with a denominator of 100 can support understanding of the relationships between fractions, decimal fractions.

Percentages

Concept of a
whole
and partsConcept of
fractionRelationships
that link
fractions,
decimal
fractions and
percentagesApplying
across
contexts

Fractions, decimal fractions and percentages

Percentages

What is it?

Percent means out of 100 therefore 100% is equivalent to one whole.

Previous knowledge and understanding

- Have a knowledge of fractions and decimal fractions
- Can give examples of where they have experienced percentages in real life, e.g. 2% battery left, 50% off sale
- Have a knowledge of place value and its role in calculation



In many contexts, many students have a good understanding that percentages are just another way of representing fractions with a denominator of 100. This understanding of the relationship between fractions and percentages is essential for working with fractions.

Concept of a whole and parts

Fraction

Percentages

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Equivalent forms X

Why is it important?

This understanding leads to confidence when using fractions in calculations and in relation to decimal fractions and percentages. Knowledge and understanding of equivalences can help to make calculations simpler when carrying out calculations in relation to fractions, decimal fractions and percentages.

Equivalent forms

Concept of a
whole
and parts

Concept of
fraction

Relationships
that link
fractions,
decimal
fractions and
percentages

Applying
across
contexts

Fractions, Decimals and Percentages

Concept of a whole and parts

Equivalent forms

What is it?

Fractions which have the same value, even though they may look different, e.g. $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent, because they are both equal to a half. The simplest form of a fraction can be used to support efficient calculation skills.

Previous knowledge and understanding

- Apply multiplication facts and corresponding division facts (inverse operations) to whole numbers
- Know that 'equivalent' means an equal value
- Know and understand fractional notation and know the relationship between fractions, decimal fractions and percentages, e.g. $\frac{3}{4} = 3 \text{ divided by } 4 = 0.75 = 75\%$

Equivalent forms

X

X

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ages. Knowledge
elp to make
calculations in
d percentages.

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Relationships that link fractions, decimal fractions and percentages X

Why is it important?

The ability to interchange between a fraction, decimal fraction and percentage is a skill that allows for different ways to solve problems efficiently, including mental calculations.

Relationships that link fractions, decimal fractions and percentages

Comparisons between fractions, decimal fractions and percentages

Concept of a whole and parts

Concept of fraction

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fract and p

Relationships that link fractions, decimal fractions and percentages X

What is it?

Understand the relationship between fractions, decimal fractions and percentages. Ability to change between the different forms for the most efficient ways of carrying out calculations, in different contexts.

Previous knowledge and understanding

- Is aware that hundredths can be written as a fraction, decimal fraction or a percentage
- Can multiply and divide whole numbers and decimal fractions by multiples of 10
- Be able to place fractions, decimal fractions and percentages on a number line
- Know and understand fractional notation specifically that e.g. $\frac{3}{4} = 3$ divided by 4 = 0.75 etc.

ecimal X

decimal
different ways
calculations.

Concept of a
whole
and parts

Concept of
fraction

Relationships that link
fractions, decimal fractions
and percentages

Comparisons between
fractions, decimal fractions
and percentages

Relationships
that link
fractions,
decimal
fractions and
percentages

Applying
across
contexts

Fractions, decimal fractions and percentages

Relationships that link fractions, decimal fractions and percentages

Why is it important?

The ability to compare fractions, decimal fractions and percentages is important to solve problems.

Comparisons between fractions, decimal fractions and percentages

What is it?

Being able to place different forms in order on a number line and know the relative value of each one.

Previous knowledge and understanding

- When given different representations can convert to most appropriate form
- Have a knowledge of place value with decimals and whole numbers
- Be able to order decimals on a number line
- Knowledge of the concept of hundredths and its equivalent forms
- Can place examples of the same form in order



Concept of a whole and parts

Concept of fraction

Relationships that link fractions, decimal fractions and percentages

Comparisons between fractions, decimal fractions and percentages

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Fractions, decimal fractions and percentages

Applying across contexts X

Why is it important?

Being able to carry out calculations and move between different forms is an important skill. Choosing the most important form to display the answer depends on context.

Applying across
contexts

Linking fractions
and ratio

Proportion

Concept of a
whole
and parts

Concept of
fraction

Relationships
that link
fractions,
decimal
fractions and
percentages

Applying
across
contexts

Percentages

Fractions and Percentages

Applying across contexts X

What is it?

Being able to carry out calculations and move between different forms is an important skill. Choosing the most important form to display the answer depends on context.

Previous knowledge and understanding

- Has experience of fractions, decimal fractions and percentages in a range of contexts including new and unfamiliar situations
- Can place examples of the same form in order
- Can convert between forms to assist ordering a variety of fractions, decimal fractions and percentages
- Can select the most appropriate strategy when approaching a calculation
- Can convert between fractions, decimal fractions and percentages to assist ordering when written in different forms

move between using the most ends on context.

Concept of a whole and parts

Concept of fraction

Applying across contexts

Linking fractions and ratio

Proportion

Relationships that link fractions, decimal fractions and percentages

Applying across contexts

Percentages

Fractions, and percc

Linking fractions and ratios

X

What is it?

Understanding how ratio links to fractions. Numbers in a given ratio can be expressed in fractional form. In its fractional form it is easier to make comparisons and carry out calculations.

Previous knowledge and understanding

- Apply multiplication facts and corresponding division facts (inverse operations) to whole numbers
- Know how to construct a ratio from a problem in context
- Apply knowledge of fractions to problems in context
- Awareness of real life examples of ratio vocabulary, e.g. diluting juice
- Knowledge and role of numerator and denominator

Concept of a
whole
and parts

Concept of
fraction

Applying across
contexts

Linking fractions
and ratio

Proportion

Relationships
that link
fractions,
decimal
fractions and
percentages

Applying
across
contexts

Percentages

Fractions, decimal and percentages

Applying across contexts

Why is it important?

Being able to carry out calculations in different forms is an important form to do

Proportion

What is it?

Two variables are proportional if a change in one is always accompanied by a change in the other. As one quantity increases or decreases another quantity increases or decreases in proportion.

Previous knowledge and understanding

- Awareness that multiplication and division are inverse operations
- Apply multiplication facts and corresponding division facts (inverse operations) to whole numbers
- Awareness of practical concept of proportion
- Apply multiplication facts and corresponding division facts (inverse operations) to fractions

Concept of a whole and parts

Concept of fraction

Applying across contexts

Linking fractions and ratio

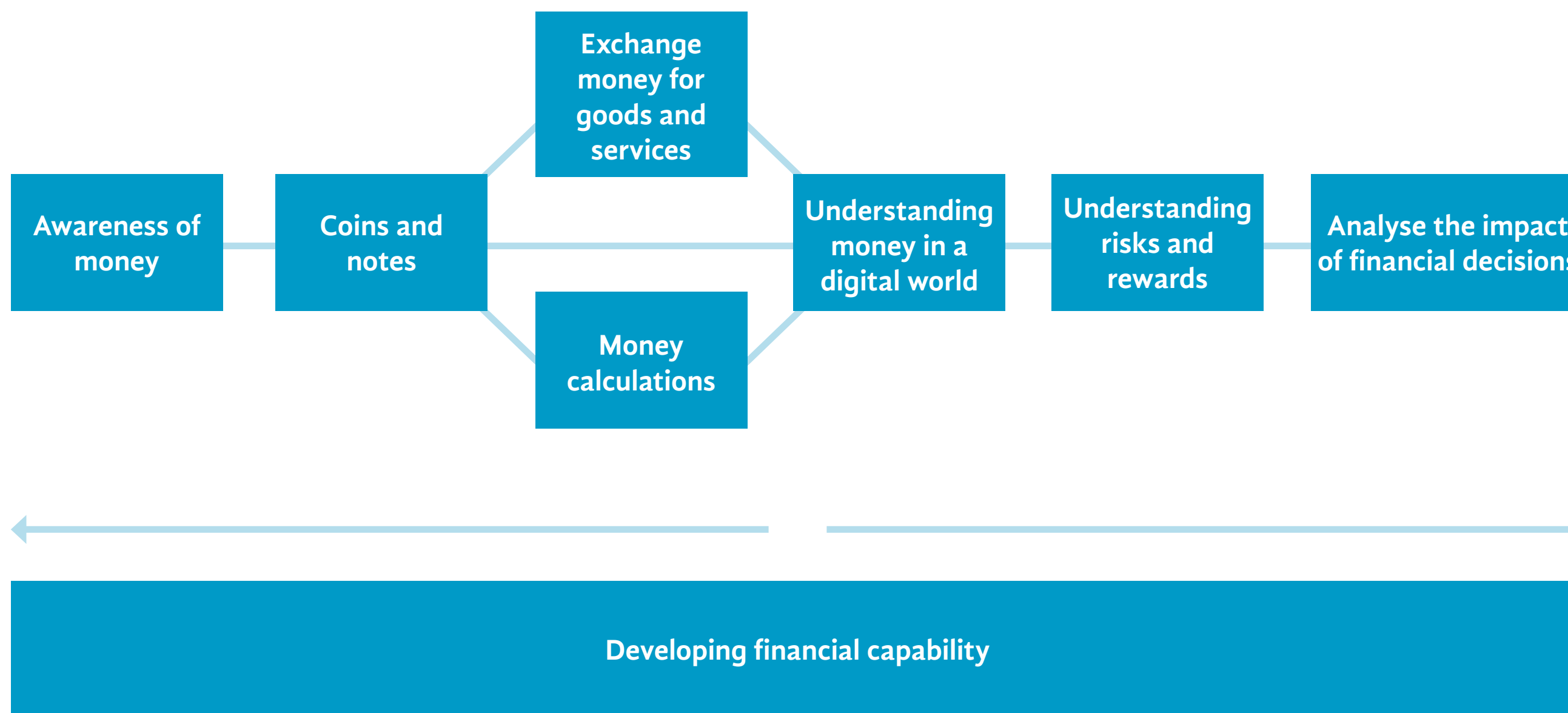
Proportion

that link fractions, decimal fractions and percentages

Applying across contexts

Percentages

Money



Money

Awareness of money X

Why is it important?

An early appreciation of the contexts in which money is used is important. This includes an awareness that money is valuable and there is a need to keep it safe. In doing so young people will appreciate the difference between needs and wants.

Awareness of
money

Awareness of
money

Analyse the impact
of financial decisions

Developing financial capability

Money

Awareness of money

What is it?

Working with money is the application of numbers in a specific context. Understanding that money can be used in exchange for goods and services.

Previous knowledge and understanding

- Knowledge of the existence of money
- Awareness of buying and selling

Awareness of money

...n which money is used.

...y is valuable and there is a
...people will appreciate the

Awareness of money

Analyse the impact of financial decisions

Developing financial capability

Money

Coins and notes



Why is it important?

Using notes and coins is an everyday life skill. In many transactions change should be given/received.

Awareness of money

Coins and notes

Using coins and notes

Relevant contexts

Analyse the impact of financial decisions

The inter-relationship between different sets of coins and notes

Developing financial capability

Money

Coins and notes

What is it?

Coins and notes have different monetary values and are used to buy products and services, as well as being used to save.

Previous knowledge and understanding

- Awareness that money takes various forms, e.g. coins, notes, cards and vouchers
- Know that money is used in real life to buy items and services

life skill. In many /received.

Awareness of money

Coins and notes

Using coins and notes

Relevant contexts

Analyse the impact of financial decisions

The inter-relationship between different sets of coins and notes

Developing financial capability

Money

Using coins and notes



What is it?

The relationship between the value of coins and the cost of goods that are exchanged leads to understanding that different coins and notes have varying values. The ability to exchange an appropriate amount of money for goods or services and estimate/calculate the amount payable and change.

Coins

Why is

Using r
transac

Previous knowledge and understanding

- Know and understand whole number addition and subtraction
- Understand the notion of saving



Awareness of money

Coins and notes

Using coins and notes

Relevant contexts

Analyse the impact of financial decisions

The inter-relationship between different sets of coins and notes

Developing financial capability

Money

Coins and notes

Why is it important?

Using notes and coins is an essential part of everyday life. Transactions change should be made.

Relevant contexts



What is it?

Apply the knowledge of coins in play and in real life situations.

Previous knowledge and understanding

- Recognise that there are different ways to make exact amounts of money
- Be able to make exact combinations of simple amounts using mental strategies
- Have experienced the concept of giving and receiving change

Awareness of money

Coins and notes

Using coins and notes

Relevant contexts

Analyse the impact of financial decisions

The inter-relationship between different sets of coins and notes

Developing financial capability

Money

The inter-relationship between different sets of coins and notes

What is it?

Understanding that different combinations of coins/notes create a total amount, e.g. five 20p coins have the same value as a £1 coin, two £10 notes have the same value as a £20.

Previous knowledge and understanding

- Be able to use a range of addition and subtraction strategies with money
- Knowledge and understanding of whole numbers and their relative values
- Awareness of the units of money

... life skill. In many ...
... /received.

Awareness
money

Analyse the impact
of financial decisions

Relevant contexts

The inter-
relationship between
different sets of
coins and notes

Developing financial capability

Money

Exchange money for goods and services X

Why is it important?

Understanding that, in order to purchase goods or services, money has to be exchanged. Developing an awareness of where money comes from. Awareness of the difference between needs and wants.

Exchange money for
goods and services

Application in
everyday life

Awareness of
money

Analyse the impact
of financial decisions

Developing financial capability

Money

Exchange money for goods and services X

What is it?

Knowing how much money is available and what can be purchased with it.

Previous knowledge and understanding

- Understand that money includes coins, notes, cards and vouchers
- Be able to calculate the costs of items by adding the prices together using the most appropriate strategies
- Be able to use a range of strategies to add and subtract
- Be able to confidently use vocabulary: more, less etc.

and services X

use goods or services,
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ness of the difference

Awareness of money

Analyse the impact of financial decisions

Exchange money for goods and services

Application in everyday life

Developing financial capability

Money

Awareness of money

Exchange

Why

Understand more
when
between

Application in everyday life

X

What is it?

The ability to solve contextualised problems. Applying mental agility skills to solve abstract problems. When exchanging money for goods or services, being able to calculate change.

Previous knowledge and understanding

- Has experience of working with money through relevant contexts
- Is able to estimate and calculate costs
- Is able to estimate and calculate change
- Understands that affordability is based on money available

X

Analyse the impact of financial decisions

Exchange money for goods and services

Application in everyday life

Developing financial capability

Money

Money calculations X

Why is it important?

Developing confidence in mental and written calculations involving money is an important skill in everyday life.

Money calculations

Applying the four operations in calculations involving money

Awareness of money

Analyse the impact of financial decisions

Developing financial capability

Mon

Money calculations



What is it?

Money calculations are any calculations involving addition, subtraction, multiplication or division (or a combination of these operations.) Mental strategies can involve rounding. Written calculations can involve decimal fractions.

Previous knowledge and understanding

- Use a range of strategies to be able to add, subtract, multiply and divide using whole numbers
- Understand that monetary amounts can be written with no more than 2 decimal places
- Use a range of strategies to be able to add, subtract, multiply and divide numbers to 2 decimal places



written calculations
everyday life.

Awareness
money

Analyse the impact
of financial decisions

Money calculations

Applying the four
operations in calculations
involving money

Developing financial capability

Money

Awareness of money

Money

Why is

Developed
involvi

Applying the four operations in calculations involving money

X

What is it?

Using money as a context for the application of number skills, including decimal fractions and percentages. Estimation or calculating the total cost of goods or services purchased.

X

Previous knowledge and understanding

- Use a range of strategies to be able to add, subtract, multiply and divide numbers to 2 decimal places
- Estimate amounts using rounding strategies

Analyse the impact of financial decisions

Money calculations

Applying the four operations in calculations involving money

Developing financial capability

Money

X

Understanding money in a digital world

Why is it important?

The increased variety of methods of payment has changed money from a concrete to a more abstract concept.

Awareness of money

Analyse the impact of financial decisions

Understanding money in a digital world

Online shopping

Online banking

Best value

Developing financial capability

Money

Understanding money in a digital world

What is it?

Recognising the advantages and disadvantages of debit and credit cards.

Previous knowledge and understanding

- Understand the various methods of paying for goods and services
- Understand the terms credit/debit and debt

Understanding money in a digital world

Payment has changed
contract concept.

Awareness
money

Analyse the impact
of financial decisions

Understanding
money in a digital
world

Online shopping

Online banking

Best value

Developing financial capability

Money

Awareness of money

Analyse the impact of financial decisions

Ur

Online shopping

What is it?

Using cards to make payments for goods online. Making comparisons between different websites and shops.

Wh

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Previous knowledge and understanding

- Use a range of strategies add/subtract/multiply and divide numbers to 2 decimal places to compare costs

Understanding money in a digital world

Online shopping

Online banking

Best value

Developing financial capability

Money

Awareness of money

Understanding money

Why is it important?

The increased variety of money from a concrete to a digital form

Understanding money in a digital world

Online shopping

Online banking

Best value

Impact decisions

Online banking



What is it?

This involves keeping track of online banking, transactions using cards (including contactless technologies) and withdrawals from ATMs.

Previous knowledge and understanding

- Recognise and understand how to read a bank balance statement
- Use IT to login to secure websites
- Understanding of importance of online security

Developing financial capability

Money



Best value

What is it?

Making comparisons between different websites, shops and online savings accounts.

Previous knowledge and understanding

- Use a range of strategies add/subtract/multiply and divide numbers to 2 decimal places to compare costs
- Understand the concept of benefits and comparing these with overall costs

digital world

payment has changed
contract concept.

Awareness
money

Analyse the impact
of financial decisions

Online banking

Best value

Developing financial capability

Money

Understanding risks and rewards X

Why is it important?

Spending and saving money responsibly involves budgeting, incomes and expenditure over a period of time.

Understanding risks and rewards

Risks and rewards of online shopping

Personal financial products

Borrowing

Awareness of money

Analyse the impact of financial decisions

Developing financial capability

Money

Understanding risks and rewards



What is it?

Recognising that there are a range of rewards for saving and investing money, as well as risks involved in borrowing. This includes calculations involving varying rates of interest and transactions.

Previous knowledge and understanding

- Understand the terms save, invest and borrow
- Understand the concept of debt
- Use a range of strategies add/subtract/multiply and divide numbers to 2 decimal places
- Use knowledge of percentages to calculate interest and compare costs

Rewards



... involves budgeting, ... of time.

Awareness of money

Analyse the impact of financial decisions

Understanding risks and rewards

Risks and rewards of online shopping

Personal financial products

Borrowing

Developing financial capability

Money

Awareness of money

Un

Wh

Spe

inco

Risks and rewards of online shopping



What is it?

There can be financial benefits of purchasing goods and services online. There can be hidden costs e.g. delivery charges.

Previous knowledge and understanding

- Use a range of strategies add/subtract/multiply and divide numbers to 2 decimal places to compare costs
- Able to use literacy skills to determine hidden costs such as delivery



Understanding risks and rewards

Risks and rewards of online shopping

Personal financial products

Borrowing

Analyse the impact of financial decisions

Developing financial capability

Money

Awareness of money

Understanding risks and rewards

Why is it important?

Spending and saving money, understanding incomes and expenditure

Understanding risks and rewards

Risks and rewards of online shopping

Personal financial products

Borrowing

The impact of financial decisions

Developing financial capability

Personal financial products



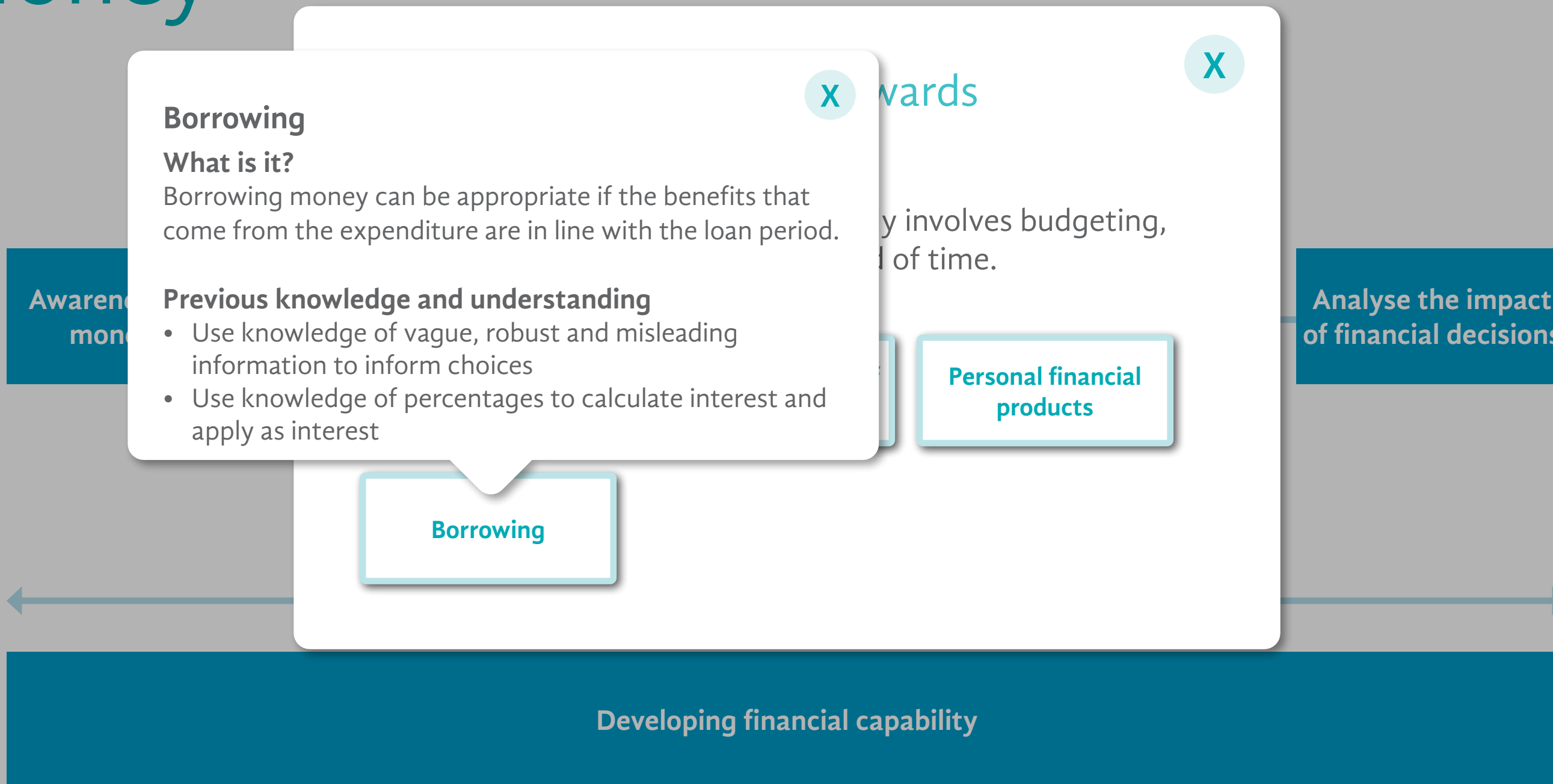
What is it?

Making informed choices around basic bank accounts, insurance products, credit/debit cards, investments and loans.

Previous knowledge and understanding

- Understand the terms associated with financial products
- Use knowledge of percentages to calculate interest and apply as interest
- Understand the concept of insurance
- Use knowledge of vague, robust and misleading information to inform choices

Money



Money

Analyse the impact of financial decisions X

Why is it important?

The ability to analyse the impact of financial decisions ensures greater responsibility for individual economic wellbeing.

Analyse the impact of financial decisions

Awareness of money

Analyse the impact of financial decisions

Developing financial capability

Money

Analyse the impact of financial decisions



What is it?

Financial decisions impact on the development of financial capability. This includes being able to analyse the impact of individual financial decisions on others as well as the impact that the financial decisions of others have on individuals.

Previous knowledge and understanding

- An understanding of ethical trading, tax (including direct and indirect taxation), National Insurance
- Applying understanding of financial services, saving, borrowing, overspending, online spending, debit, credit and scams to make financial decisions

Financial decisions



Financial decisions ensures economic wellbeing.

Awareness of money

Analyse the impact of financial decisions

Analyse the impact of financial decisions

Developing financial capability

Money

Developing financial capability X

Why is it important?

Developing financial capability involves;

- Financial understanding
- Financial competence
- Financial responsibility
- Financial enterprise

These four aspects are interconnected and mutually supportive and outline a framework for developing skills, attitudes and behaviours that will support learners as employees, employers, entrepreneurs or voluntary workers.

The ability to make decisions on spending and saving money is vital in order to balance lifestyle with the cost of living.

Financial
understanding

Financial
competence

Financial
responsibility

Financial
enterprise

Awareness of
money

Use the impact
of financial decisions

M

Financial understanding

What is it?

Developing financial understanding is the first step in ensuring young people leaving school have the skills required to deal confidently with everyday financial issues. It will also help them to make informed decisions and choices about their personal finances.

- This milestone includes knowledge, understanding and skills from across the curriculum

This video clip highlights the impact of Financial Education on young people and their families. It includes learners conversations with advice and support for practitioners.

 <http://www.educationscotland.gov.uk/video/n/nnpf/money.asp>

Financial understanding

Financial competence

Financial responsibility

Financial enterprise

use the impact
financial decisions

and mutually supportive and outline
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preneurs or voluntary workers.

ding and saving money is vital in order
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Money

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Financial competence



What is it?

This means being able to apply knowledge and understanding of financial matters across a range of contexts, using digital technologies where appropriate. Being financially competent includes being able to identify and tackle problems or issues with confidence and being able to manage financial situations effectively and efficiently.

- This milestone includes knowledge, understanding and skills from across the curriculum

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This video clip highlights the impact of Financial Education on young people and their families. It includes learners conversations with advice and support for practitioners.



<http://www.educationscotland.gov.uk/video/n/nnpf/money.asp>

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Awareness of
money

Financial
understanding

Financial
competence

Financial
responsibility

Financial
enterprise



Money

Developing financial capability X

Why is it important?

Developing financial cap

- Financial understand
- Financial competenc
- Financial responsibil
- Financial enterprise

These four aspects are in a framework for develop learners as employees, e

The ability to make decis to balance lifestyle with

Financial responsibility X

What is it?

This means having a caring and responsible attitude with regard to the use of resources. Children and young people who budget wisely and plan for the future will be responsible citizens who look after themselves.

- This milestone includes knowledge, understanding and skills from across the curriculum

This video clip highlights the impact of Financial Education on young people and their families. It includes learners conversations with advice and support for practitioners.

 <http://www.educationscotland.gov.uk/video/n/nnpf/money.asp>

Awareness of money

Use the impact financial decisions

Financial understanding

Financial competence

Financial responsibility

Financial enterprise

Money

Awareness of
money

Developing financial capability

Why is it important?

Developing financial capability involves;

- Financial understanding
- Financial competence
- Financial responsibility
- Financial enterprise

These four aspects are interconnected and a framework for developing skills, attitudes learners as employees, employers, entrepreneurs

The ability to make decisions on spending and to balance lifestyle with the cost of living.

Financial
understanding

Financial
competence

Financial
responsibility

Financial
enterprise

Financial enterprise

What is it?

Financial enterprise is about being able to deploy resources in an imaginative and confident manner. Financially enterprising behaviours will involve recognising risks and rewards and making decisions based on informed thought enabling children and young people to contribute effectively to the development of Scotland's wealth.

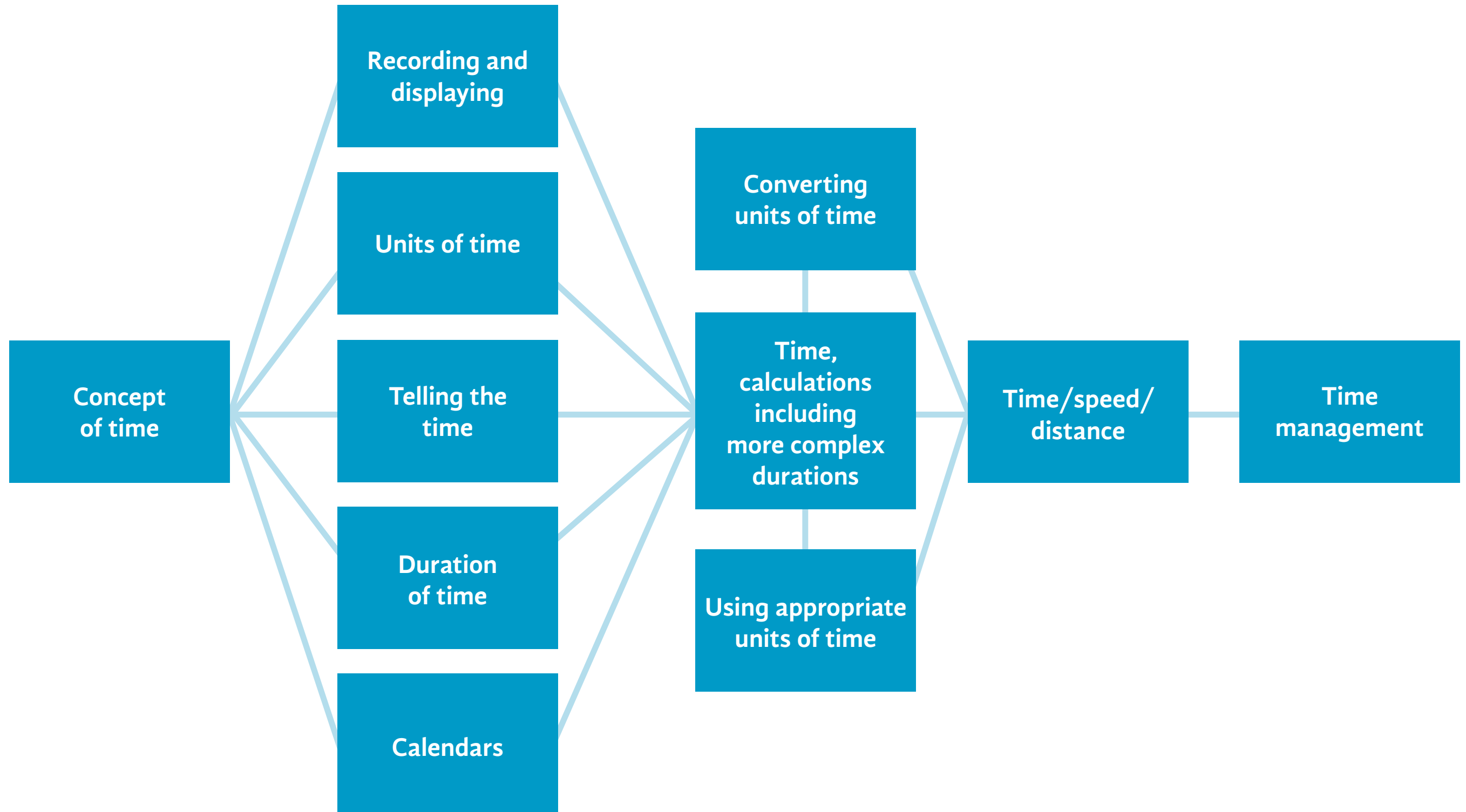
- This milestone includes knowledge, understanding and skills from across the curriculum

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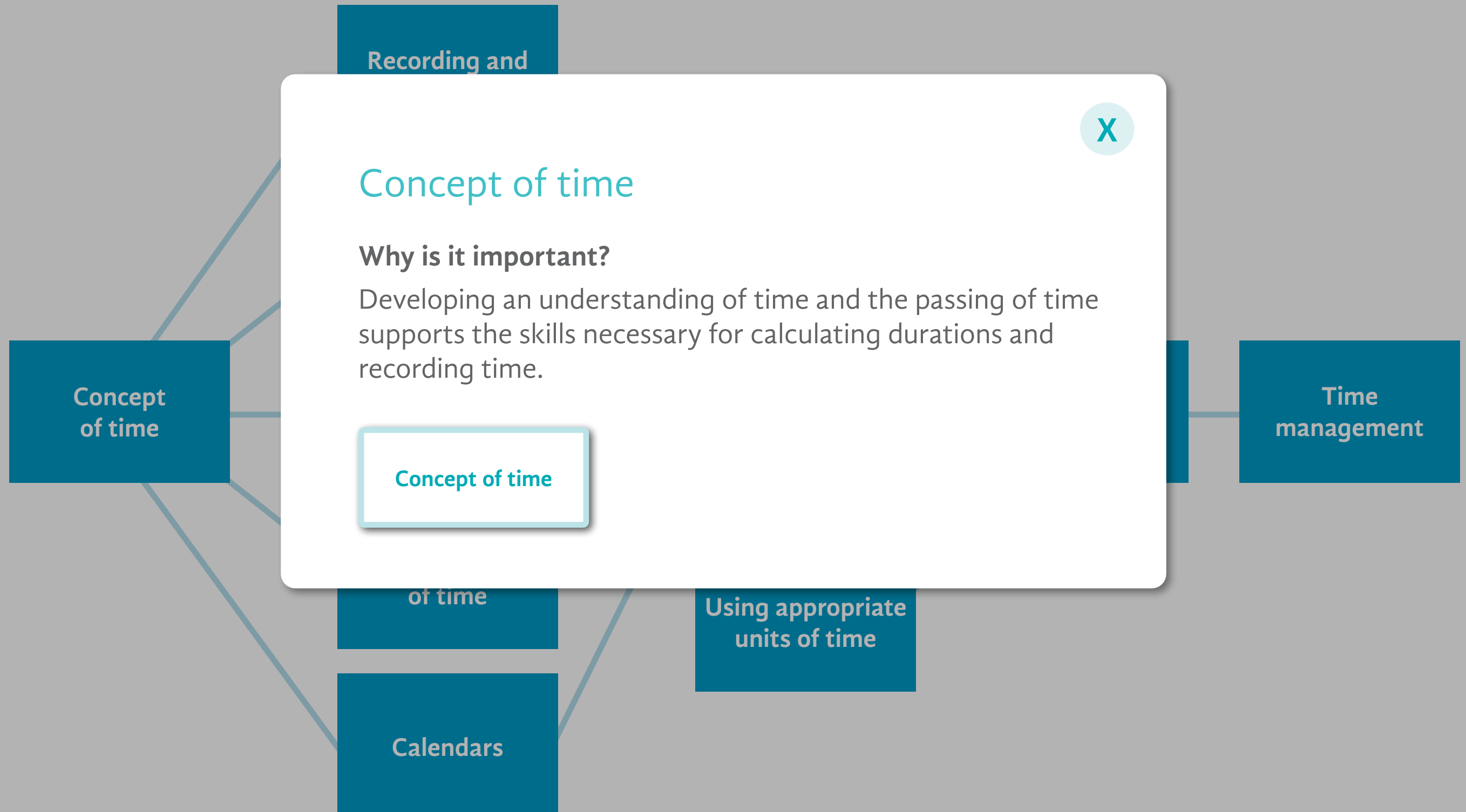


<http://www.educationscotland.gov.uk/video/n/nnpf/money.asp>

Time



Time



Time

Concept of time

What is it?

Awareness of patterns of time and the passing of time in relation to years, seasons, months, weeks, days, hours, minutes and seconds.

Previous knowledge and understanding

- Have experience of routines, e.g. night and day, routines at home
- Recognise and understand that clocks, watches, digital displays etc. are used to tell the time



Concept of time

Concept of time

Time management

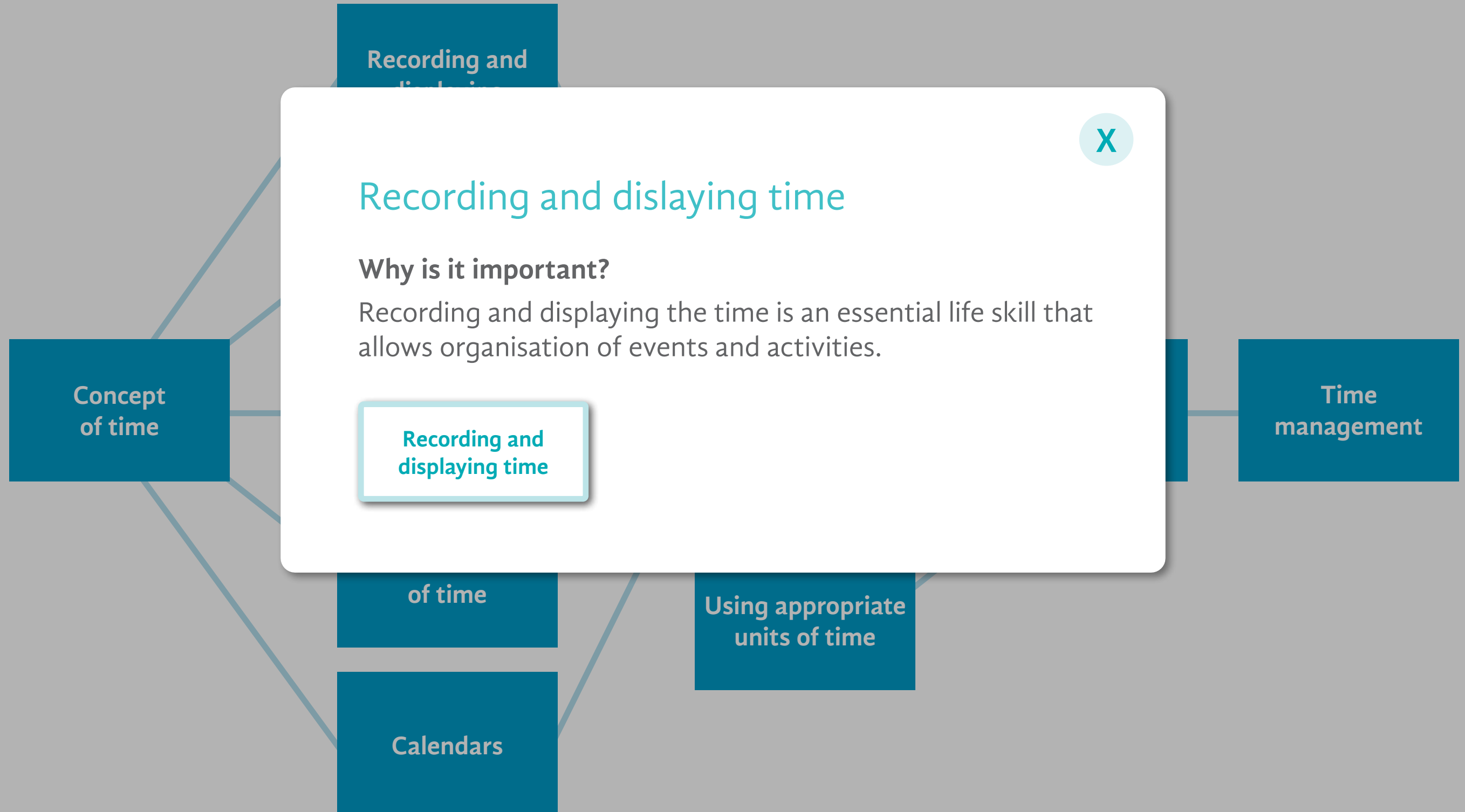
of time

Using appropriate units of time

Calendars

and the passing of time
ating durations and

Time



Recording and displaying time



Recording and displaying time

Why is it important?

Recording and displaying the time is an essential life skill that allows organisation of events and activities.

Recording and displaying time

Concept of time

Time management

of time

Using appropriate units of time

Calendars

Time

Recording and displaying time



What is it?

Recording time involves expressing time using numbers and words. Displaying time is representing the time on a clock face or on a digital display.

Previous knowledge and understanding

- Be able to recognise and understand that clocks, watches and digital displays are used to tell the time
- Be able to recognise and understand that calendars and diaries are used for recording events in time
- Be able to recognise the numerals 1-12, 1-24 then 1-60 as appropriate to learning as required



essential life skill that
S.

Concept
of time

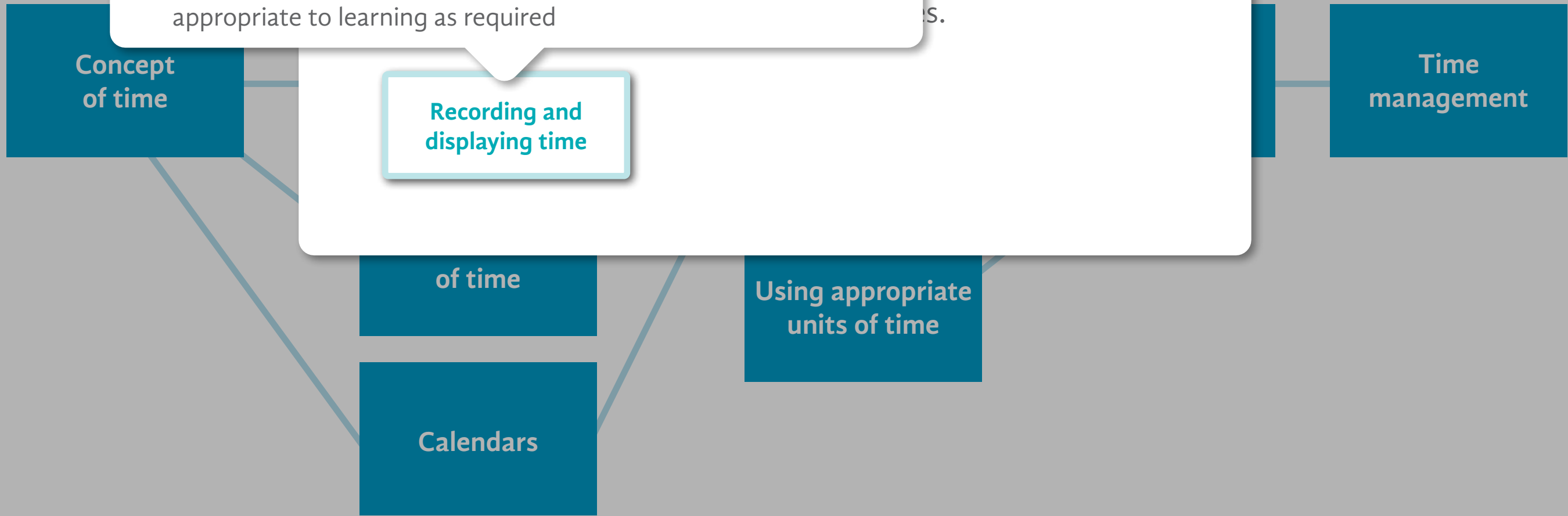
Recording and
displaying time

Time
management

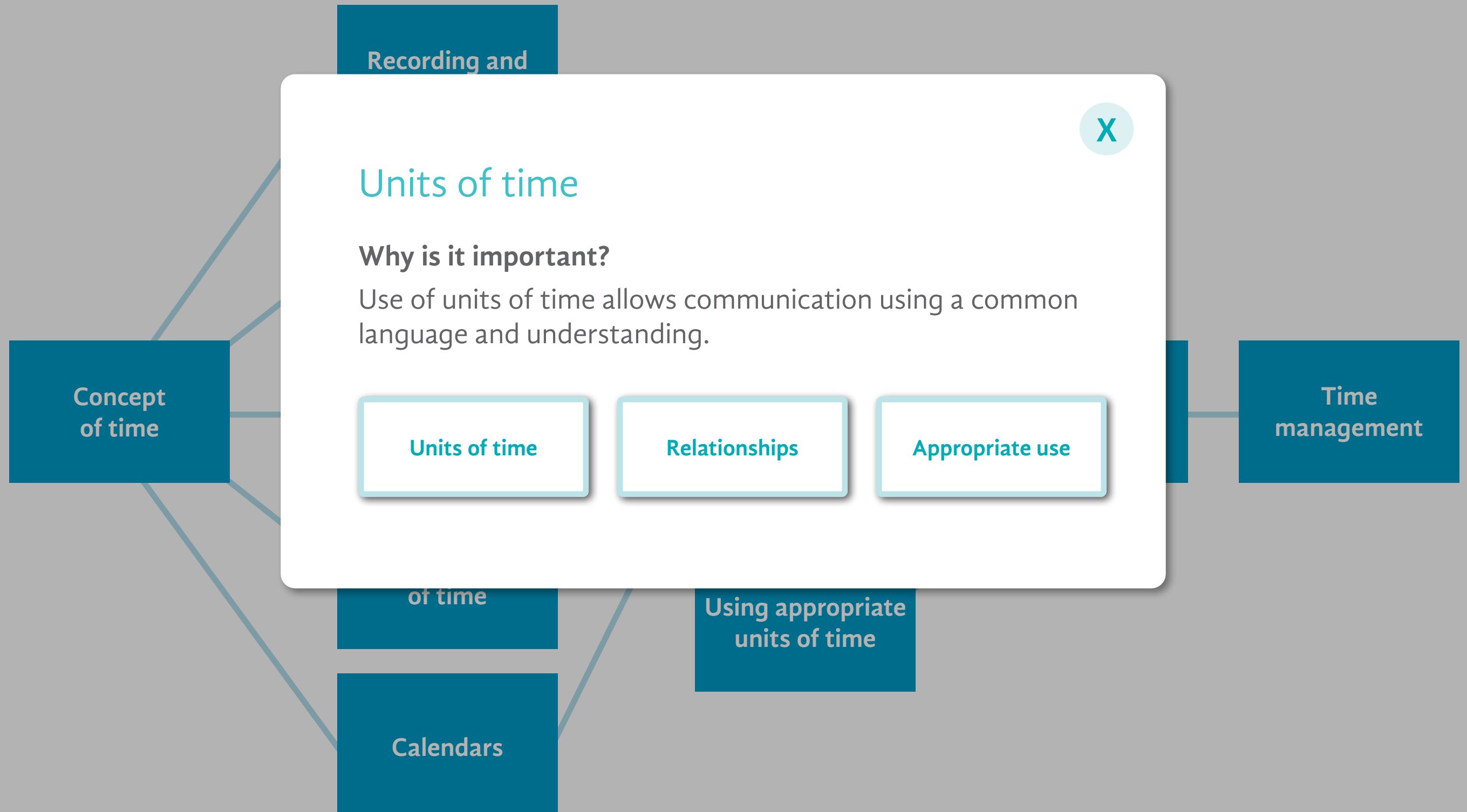
of time

Using appropriate
units of time

Calendars



Time



Time

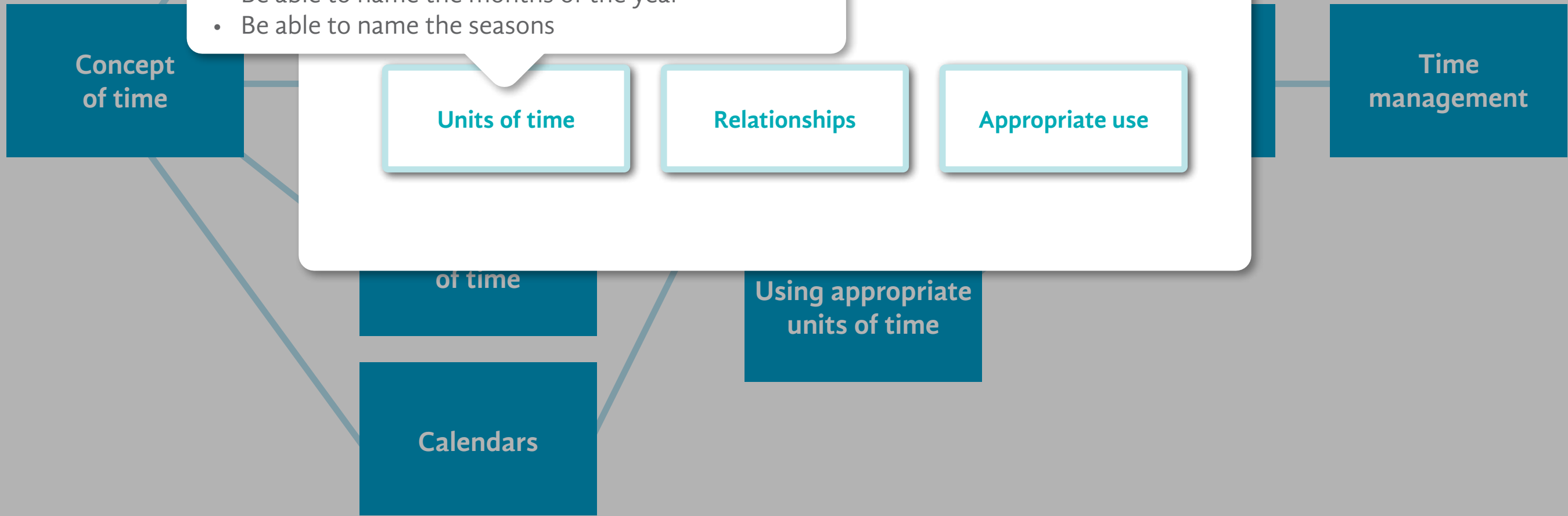
Units of time X

What is it?
 The ways in which we record time using the appropriate vocabulary. Knowledge of the relationship between different units of time.

Previous knowledge and understanding

- Understand routines
- Recognise and understand that there are different styles of clocks, e.g. analogue and digital
- Recognise and understand when calendars and diaries are used
- Be able to name the days of the week
- Be able to name the months of the year
- Be able to name the seasons

Communication using a common X



Concept of time

Units of time

Relationships

Appropriate use

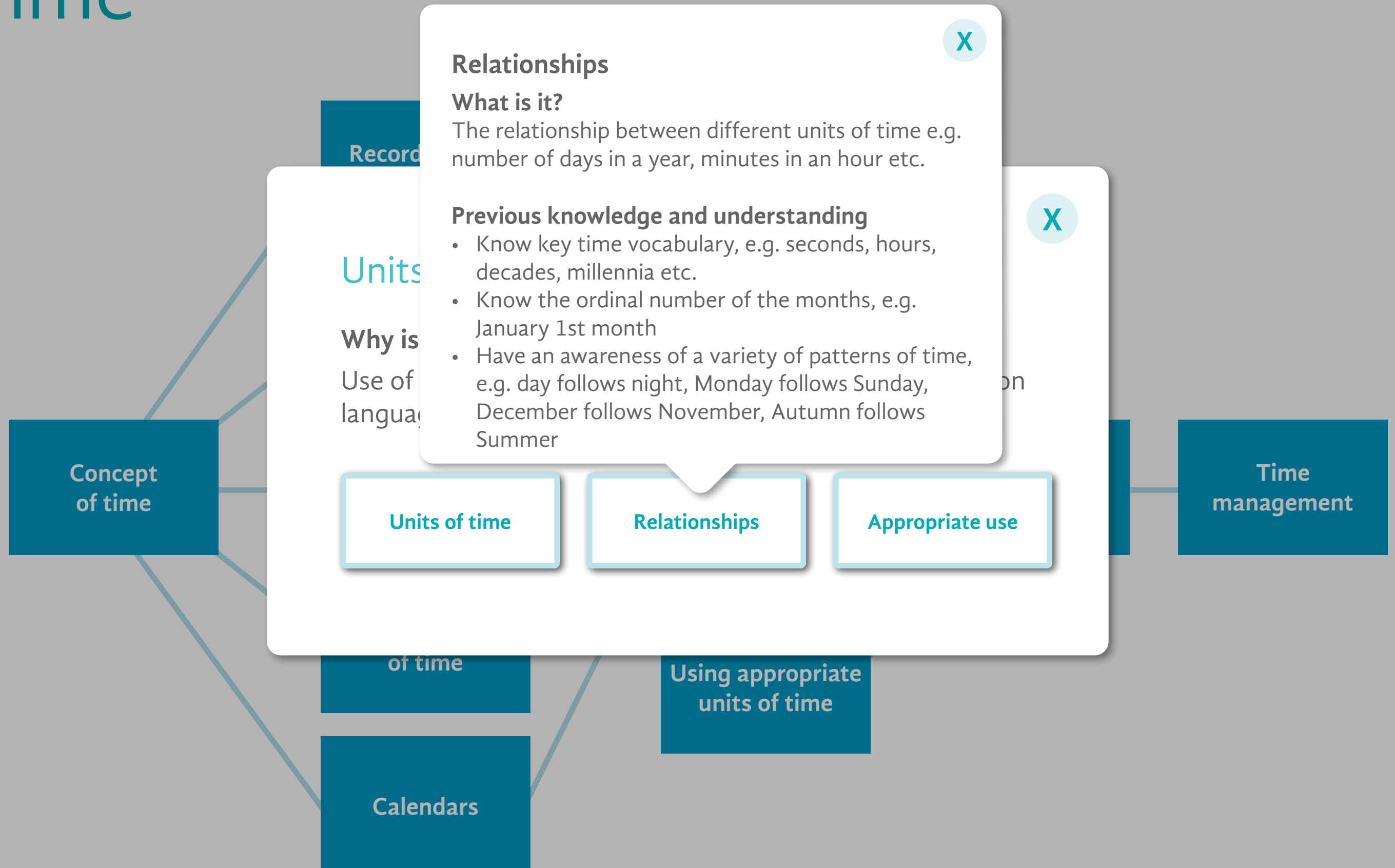
Time management

of time

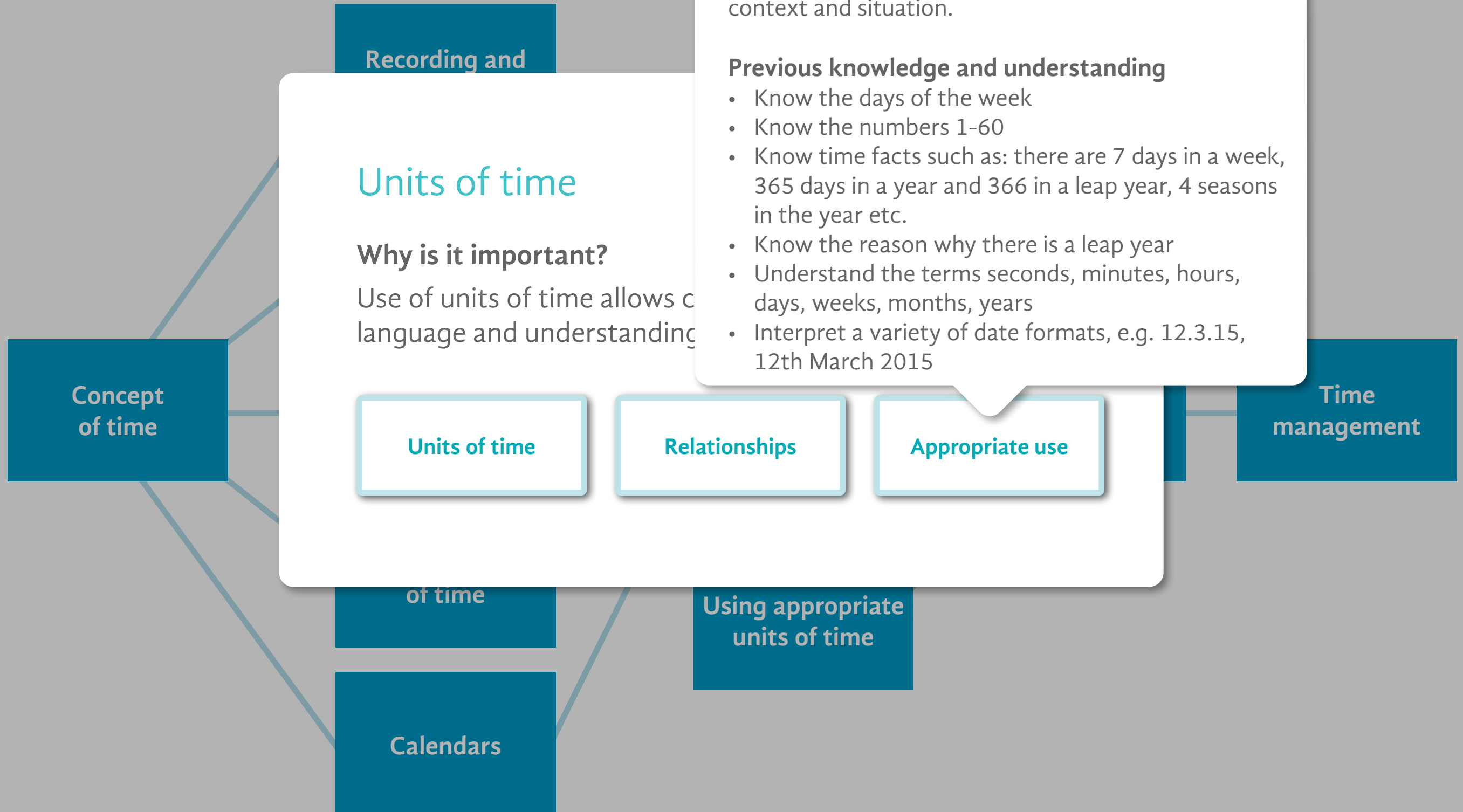
Using appropriate units of time

Calendars

Time



Time



Recording and

Units of time

Why is it important?

Use of units of time allows c
language and understanding

Units of time

Relationships

Appropriate use

of time

Calendars

Using appropriate
units of time



Appropriate use

What is it?

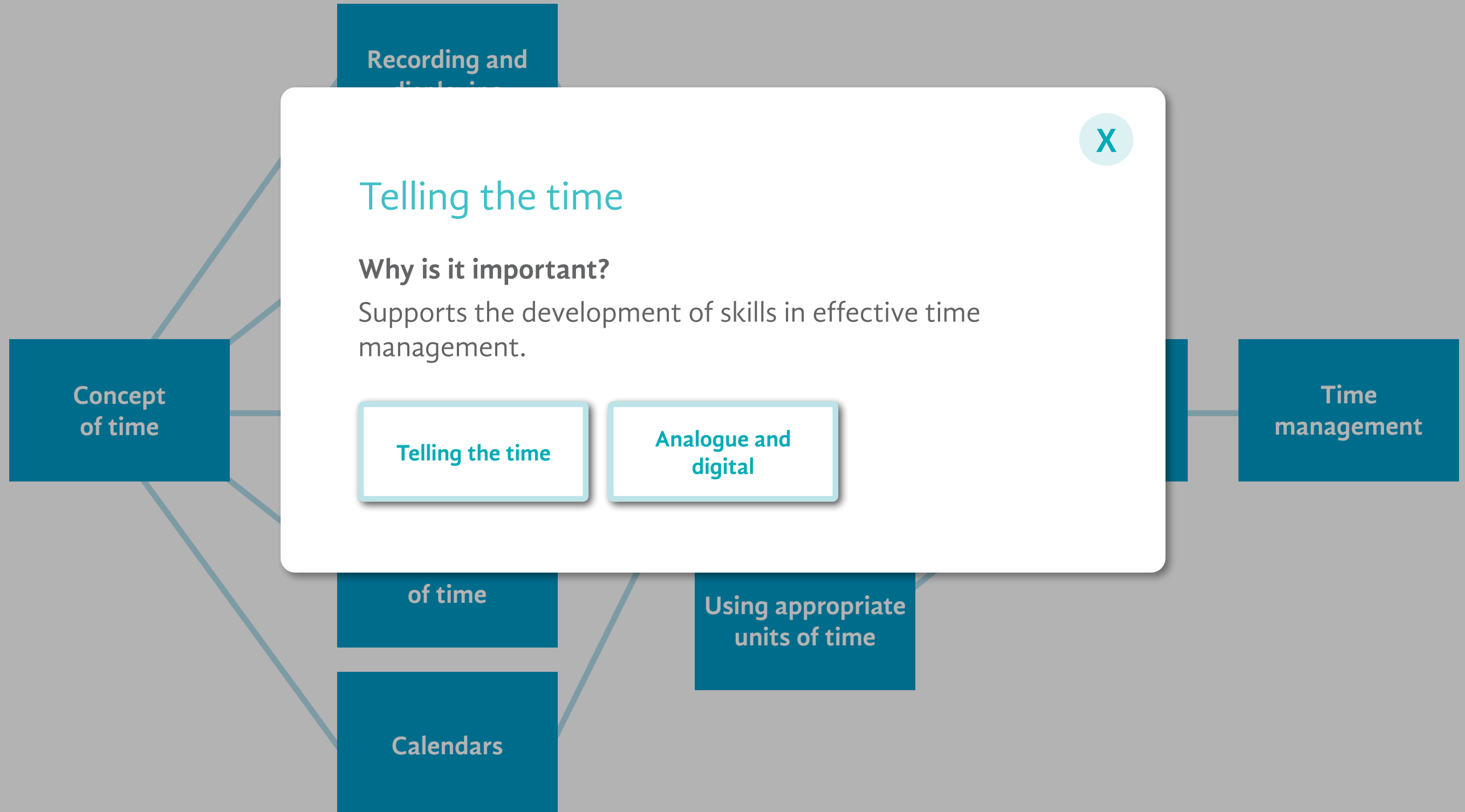
Using the appropriate unit of time depending on the context and situation.

Previous knowledge and understanding

- Know the days of the week
- Know the numbers 1-60
- Know time facts such as: there are 7 days in a week, 365 days in a year and 366 in a leap year, 4 seasons in the year etc.
- Know the reason why there is a leap year
- Understand the terms seconds, minutes, hours, days, weeks, months, years
- Interpret a variety of date formats, e.g. 12.3.15, 12th March 2015

Time
management

Time



Recording and



Telling the time

Why is it important?

Supports the development of skills in effective time management.

Telling the time

Analogue and digital

Concept of time

of time

Calendars

Using appropriate units of time

Time management

Time

Telling the time

What is it?

Understanding time displays of various types and being able to express this using the correct vocabulary and in relation to specific times of the day e.g. morning or afternoon.

Previous knowledge and understanding

- Know the numbers 1-60, e.g. 1-12 for hours on an analogue clock, 0-60 for minutes
- Recognise and understand that there are different styles of clocks, e.g. analogue and digital and different types of timers
- Be able to count in 5s
- Be able to round appropriately
- Know that there are 24 hours in a day, 60 minutes in an hour and 60 seconds in a minute
- Have an understanding of $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ turn

Concept of time

Telling the time

Analogue and digital

of time

Using appropriate units of time

Calendars

Relative time

Time management



Time

Analogue and digital

X

What is it?

Understand the position of and relationship between the hour and minutes hands. Familiarisation with the position of the hands and the vocabulary of half past and quarter to/past. Understanding the link between analogue and the 24 hour digital clock.

Previous knowledge and understanding

- Recognise different types of displays which indicate time
- Know that an analogue clock has an hour hand and a minute hand
- Be able to count on and back
- Understand on a standard analogue clock the main increments are in 5s
- Understand that am is before midday
- Understand that pm is after midday
- Have an understanding of $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ in fractions and are able to relate this to quarter past, half past and quarter to

Concept
of time

Telling the time

Analogue and
digital

Time
management

of time

Using appropriate
units of time

Calendars

Time

Duration of time X

Why is it important?

Understanding duration of time helps to plan and organise events and activities effectively. Understanding the duration of time introduces start and finish times and leads to being able to work out how long events last. The ability to calculate the length of time taken is essential for planning and organising events in daily life. Using timetables helps to develop mental agility in relation to time calculations and develops skills in estimation and in rounding.

Duration of time

Timing of tasks

Simple timetables

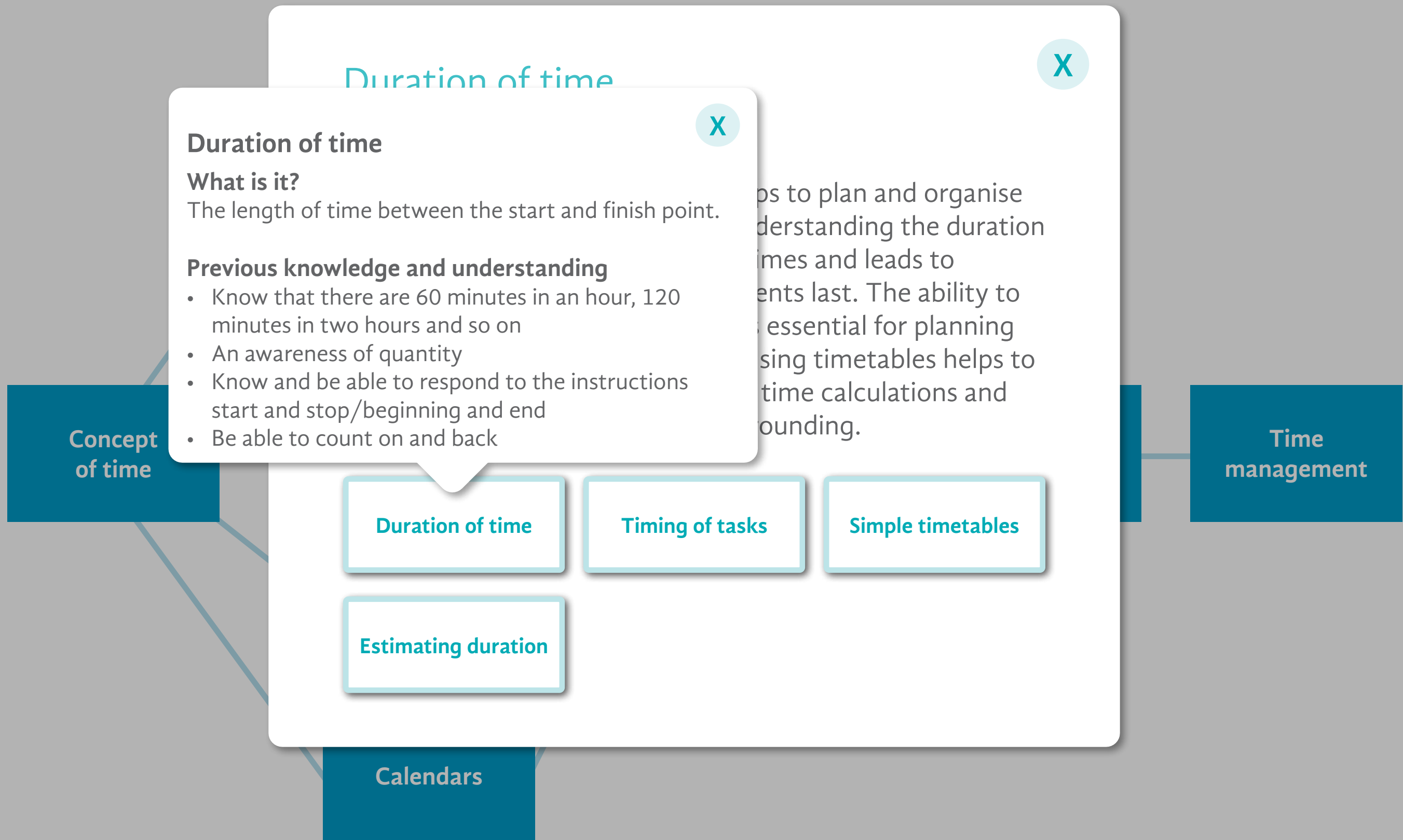
Estimating duration

Concept
of time

Calendars

Time
management

Time



Time

Concept
of time

Timing of tasks

What is it?

Linking the chosen unit of time to the most appropriate timing device. Degree of accuracy is dependent on the situation.

Previous knowledge and understanding

- Have an understanding of place value
- Have an awareness of different units of time
- Recognise different tools for measuring, e.g. stopwatch, wrist watch, clocks, calendars
- Recognise different displays, e.g. analogue, digital

Duration of time

Timing of tasks

Simple timetables

Estimating duration

Calendars

Time
management

Time

Concept of time

Duration of time

Why is it important?

Understanding duration of events and activities effect of time introduces start and being able to work out how to calculate the length of time and organising events in day develops mental agility in real develops skills in estimation

Simple timetables

What is it?

Timetables and schedules provide information including start and finish times for journeys. They can be used to plan events and demonstrate the importance of 24 hour time.

Previous knowledge and understanding

- Have experience of displays, e.g. seasons of the year
- Have an understanding of place value
- Can calculate simple time durations
- Recognise different displays, e.g. analogue, digital, 12 hour, 24 hour time



Duration of time

Timing of tasks

Simple timetables

Estimating duration

Calendars

Time management

Time

Duration of time

X

Estimating duration

What is it?

The ability to estimate how long an event took or will take, using non-standard or standard units of time. Developing a sense of how long a task will take, by using familiar benchmarks.

Previous knowledge and understanding

- Know and understand the units of time, e.g. seconds, minutes, hours, days
- Understand the cyclical nature of time
- Be able to count on and back (in steps of 1 or more)
- Have experience of how long something takes within familiar contexts, e.g. interval/playtime compared to lunchtime

X

plan and organise
 understanding the duration
 and leads to
 last. The ability to
 potential for planning
 timetables helps to
 calculations and
 ding.

Simple timetables

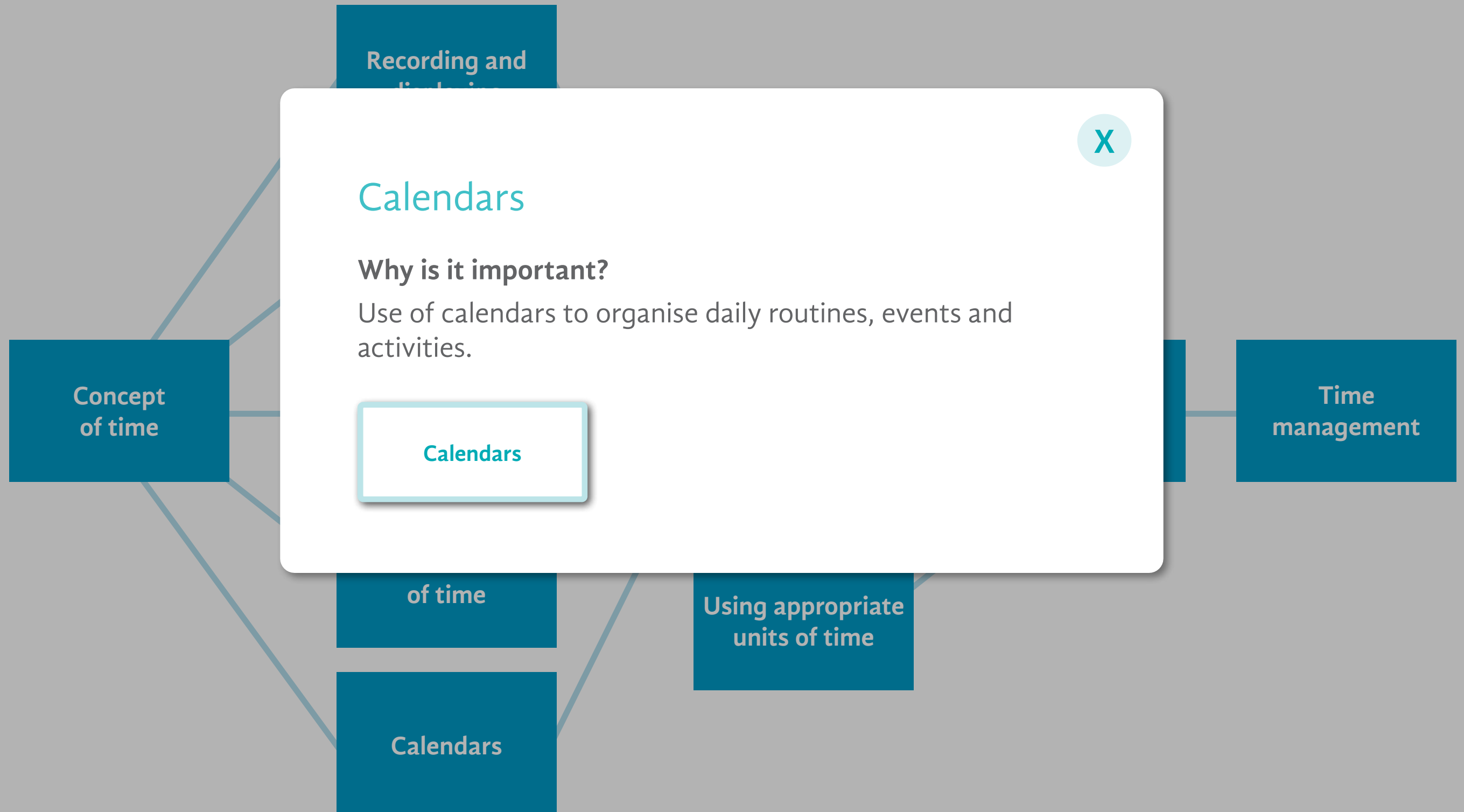
Concept
of time

Estimating duration

Calendars

Time
management

Time



Calendars



What is it?

Calendars are a structured representation of the months of the year. They reinforce the order of and number of days in the months of the year and can be used to illustrate the irregularity of number patterns in the months. Calendars can also be used to calculate elapsed time.

Previous knowledge and understanding

- Have experience of displays, e.g. seasons of the year
- Be able to count on and back
- Know the days of the week, months of the year
- Know the ordinal number of the months, e.g. January 1st month
- Understand the cyclical nature of time
- Know important events in learners' own lives, e.g. birthdays
- Select the most appropriate duration to count in, e.g. seconds, minutes, hours, days or years



events and

Concept
of time

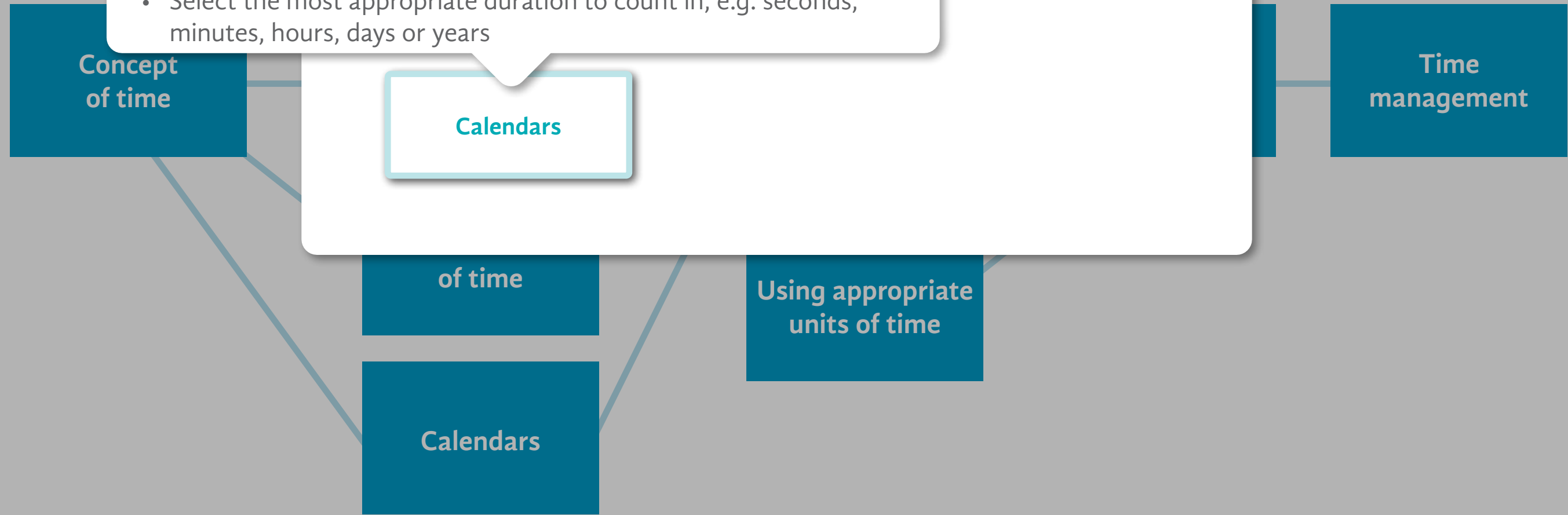
Calendars

Time
management

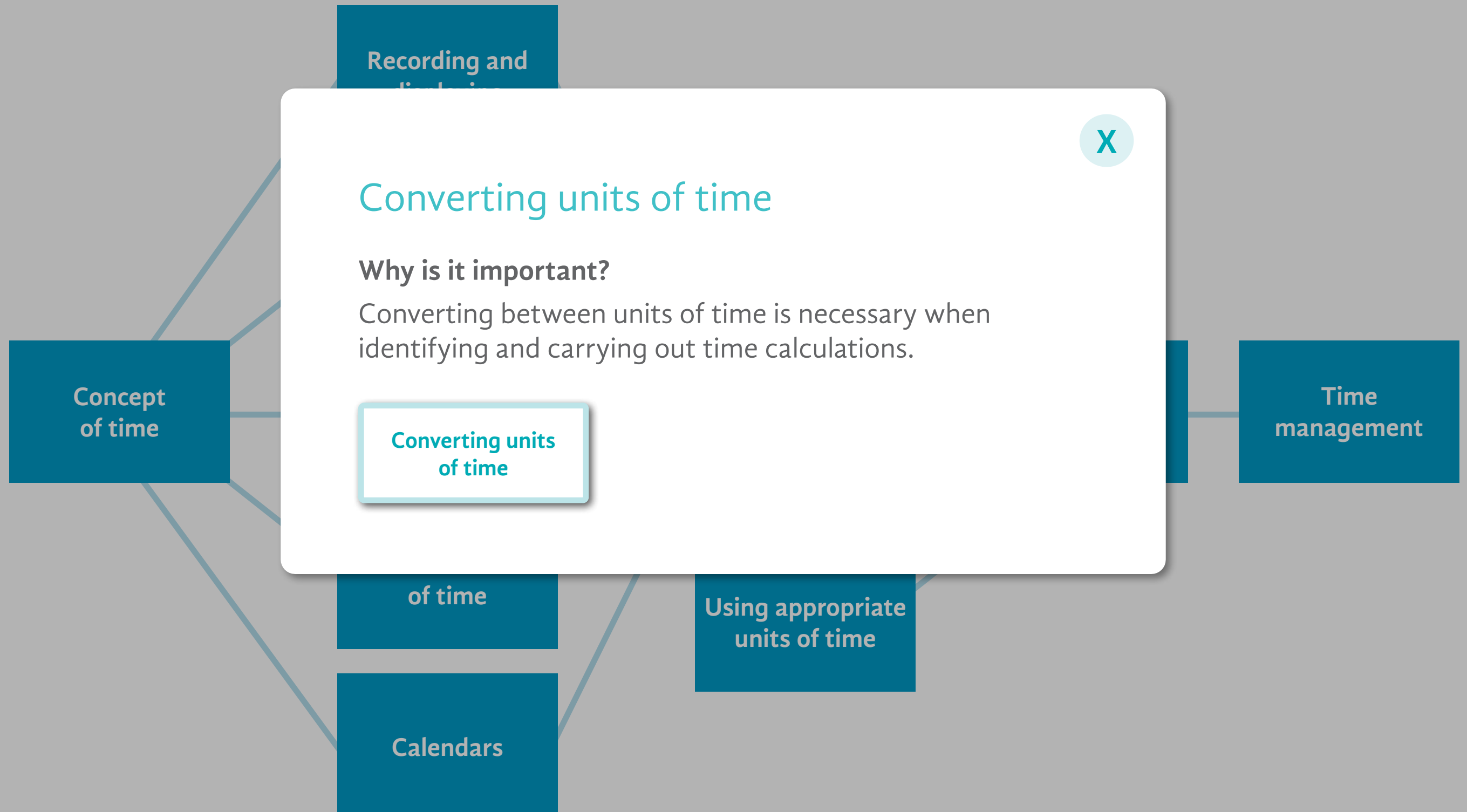
of time

Using appropriate
units of time

Calendars



Time



Recording and ...



Converting units of time

Why is it important?

Converting between units of time is necessary when identifying and carrying out time calculations.

Converting units of time

of time

Using appropriate units of time

Calendars

Time management

Time

Converting units of time

What is it?

Knowledge that there are 60 seconds in a minute, 60 minutes in an hour and 24 hours in a day are essential when estimating or calculating lengths of time.

Previous knowledge and understanding

- Know and understand the relationships between the different units of time, e.g. 60 seconds in a minute, 60 minutes in an hour
- Understand values of time, e.g. that seconds are smaller than minutes and years are longer than months

X

X

necessary when calculations.

Concept of time

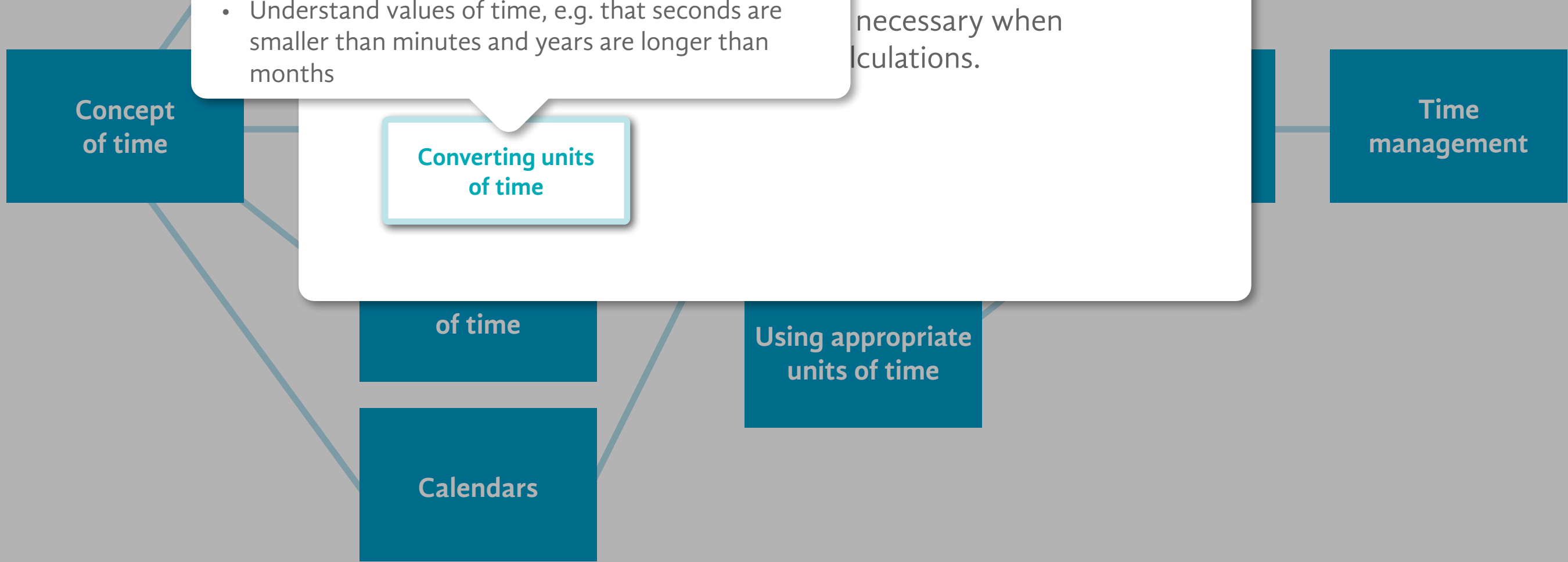
Converting units of time

Time management

of time

Using appropriate units of time

Calendars



Time

X

Time calculations including more complex durations

Why is it important?

Using information from a variety of sources to plan and schedule events and activities, including journeys, for personal lives and for work and leisure is an important life skill. Calculating journey times is an introduction to establishing the relationship between time, speed and distance and sets the foundation for more complex calculations and estimation.

Time calculations including more complex durations

Calendars and timetables

Journey times

Concept of time

Time management

Calendars

Time

Time calculations including more complex durations

What is it?

Using the four operations accurately to do calculations in relation to time, using the most efficient method and unit.

Previous knowledge and understanding

- Be able to tell the time
- Be able to apply the four operations
- Be able to convert times into a common unit, e.g. 2hrs and 90 mins = 2 hours and 1.5 hours
- Have an understanding of decimal fractions
- Have an understanding of place value

Time calculations including more complex durations

Calendars and timetables

Journey times

Calendars

Concept of time

Time management

more

Complex durations
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 s, for personal lives
 Journey times is an
 nship between time,
 tion for more complex

Time

Concept of time

Calendars

Time management

Time calculations including more

Calendars and timetables

What is it?

Identifying and then using specific information in order to calculate durations of journeys or events.

Previous knowledge and understanding

- Understand that timetables and calendars can both be used to represent time durations
- Can identify information from a table of data
- Can use simple timetables and calendars
- Understand the difference between 12 hour and 24 hour notation
- Be able to count on and back in a variety of units

Time calculations including more complex durations

Calendars and timetables

Journey times

Time

Concept
of time

Time calculations complex duration

Why is it important?

Time calculations include...
Extracting and using spe...
of sources. Using this inf...
events and activities, inc...
and for work and leisure...
introduction to establish...
speed and distance and...
calculations and estimat...

Journey times

What is it?

Using the start and finish times to calculate how long a journey will last.

Previous knowledge and understanding

- Be able to tell the time
- Be able to identify 12 and 24 hour notation
- Can convert between 12 and 24 hour notation as appropriate
- Know and be able to use the four operations
- Have an understanding of decimal fractions
- Understand the relationship between the units of time
- Be able to convert times into a common unit, e.g. 2hrs and 90 mins = 2 hours and 1.5 hours

Time calculations
including more
complex durations

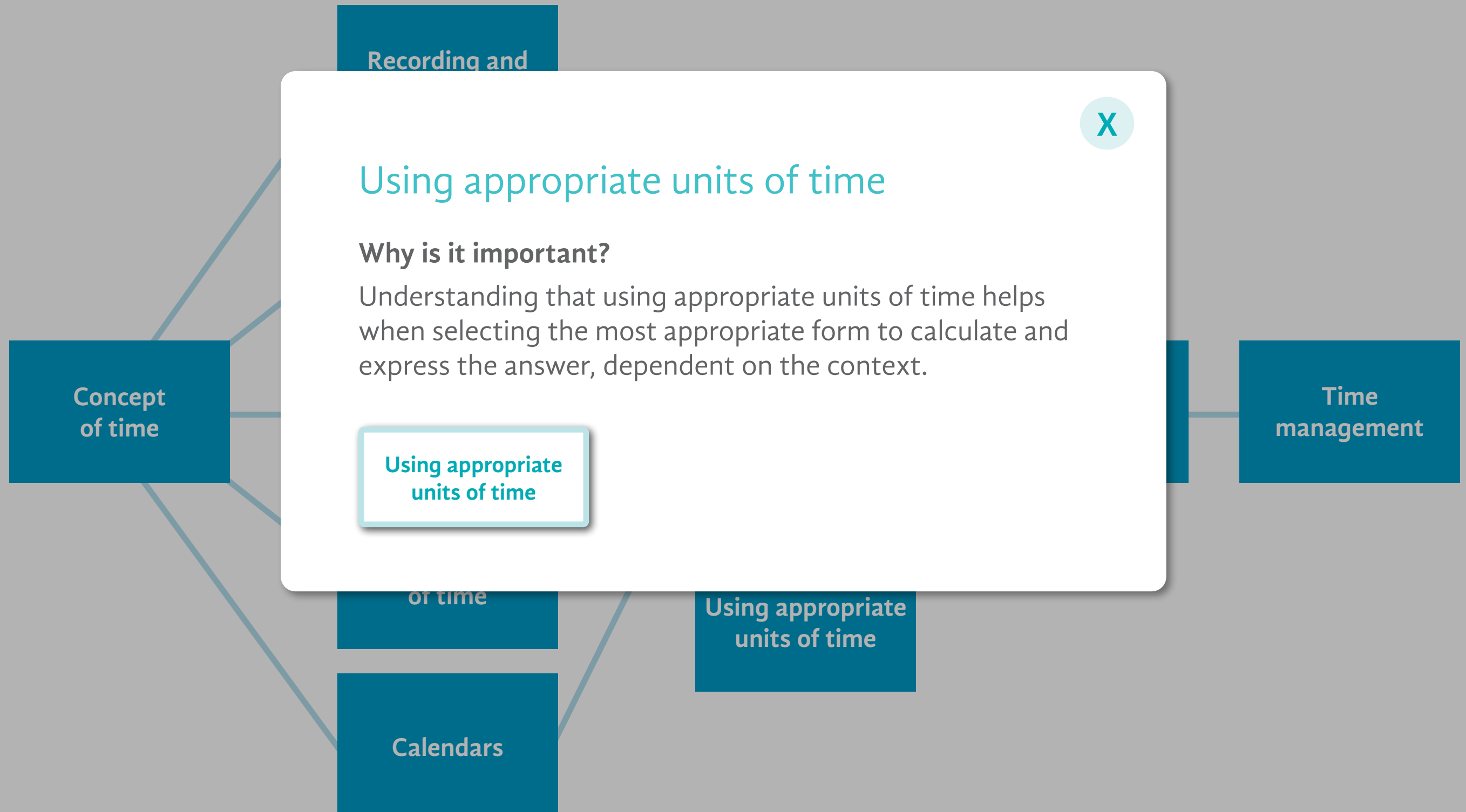
Calendars and
timetables

Journey times

Calendars

Time
agement

Time



Time

Using appropriate units of time

What is it?

Being able to select and use the most appropriate and efficient unit of time for the situation and context.

Previous knowledge and understanding

- Know the units of time
- Understand values of time, e.g. that seconds are smaller than minutes and years are longer than months
- Understand the differences and relationships between units of time
- Know how to convert between the different units of time



Concept of time

Using appropriate units of time

of time

Using appropriate units of time

Calendars

Time management

f time

te units of time helps
e form to calculate and
ontext.

Time

X

Time/speed/distance

Why is it important?

It is important in some aspects of travel and leisure to be able to estimate time taken, speed and distance travelled. More accurate time, speed and distance calculations are required for a range of real life contexts.

Time/speed/
distance

Estimation in
relation to distance/
speed/time

Calculations

Graphs

Concept
of time

Time
management

Calendars

Time

Time/speed/distance

What is it?

Using the standard formula to calculate the unknown value when given the other two.

Previous knowledge and understanding

- Know units of time
- Know units of speed, e.g. mph, km/h
- Know units of distance
- Know and understand inverse operations
- Have experience of exploring a range of approaches to calculating speed, distance or time



travel and leisure to be able to calculate the distance travelled. More calculations are required

Concept of time

Time/speed/distance

Estimation in relation to distance/speed/time

Calculations

Graphs

Time management

Calendars

Time

Concept of time

Calendars

Time/speed/distance

Estimation in relation to distance/speed/time

Calculations

Graphs

Time management

Estimation in relation to distance/speed/time

What is it?

Estimations are used in daily situations to determine either an approximate arrival time, speed or distance for a journey.

Previous knowledge and understanding

- Have experience of estimating appropriately
- Have experience of rounding
- Know and understand the relationship between speed, distance and time, and how this relates to the units of measure
- Apply the four operations in calculations

Time

Why is it important?

It is important to estimate accurately for a range of situations



Time

Concept of time

Time/speed/distance

Why is it important?

It is important in some aspects to estimate time taken, speed, accurate time, speed and distance for a range of real life contexts.

Calculations

What is it?

Calculations are required for specific more formal situations, e.g. areas of employment where this is a necessary part of daily business. Formula can be used to calculate one quantity given the other two.

Previous knowledge and understanding

- Be able to use the four operations
- Understand the inverse relationships between the four operations
- Have experience of using the speed distance time formula

Time/speed/distance

Estimation in relation to distance/speed/time

Calculations

Graphs

Time management

Calendars

Time

Time / speed / distance



Graphs

What is it?

Time distance graphs can be used to investigate the relationships between distance, speed and time. Used to describe the features of a journey.

Previous knowledge and understanding

- Apply knowledge of graphs (link to data and analysis)
- Be able to interpret simple graphs
- Understand that a line graph shows a continuous measure
- Can estimate appropriately



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Calculations

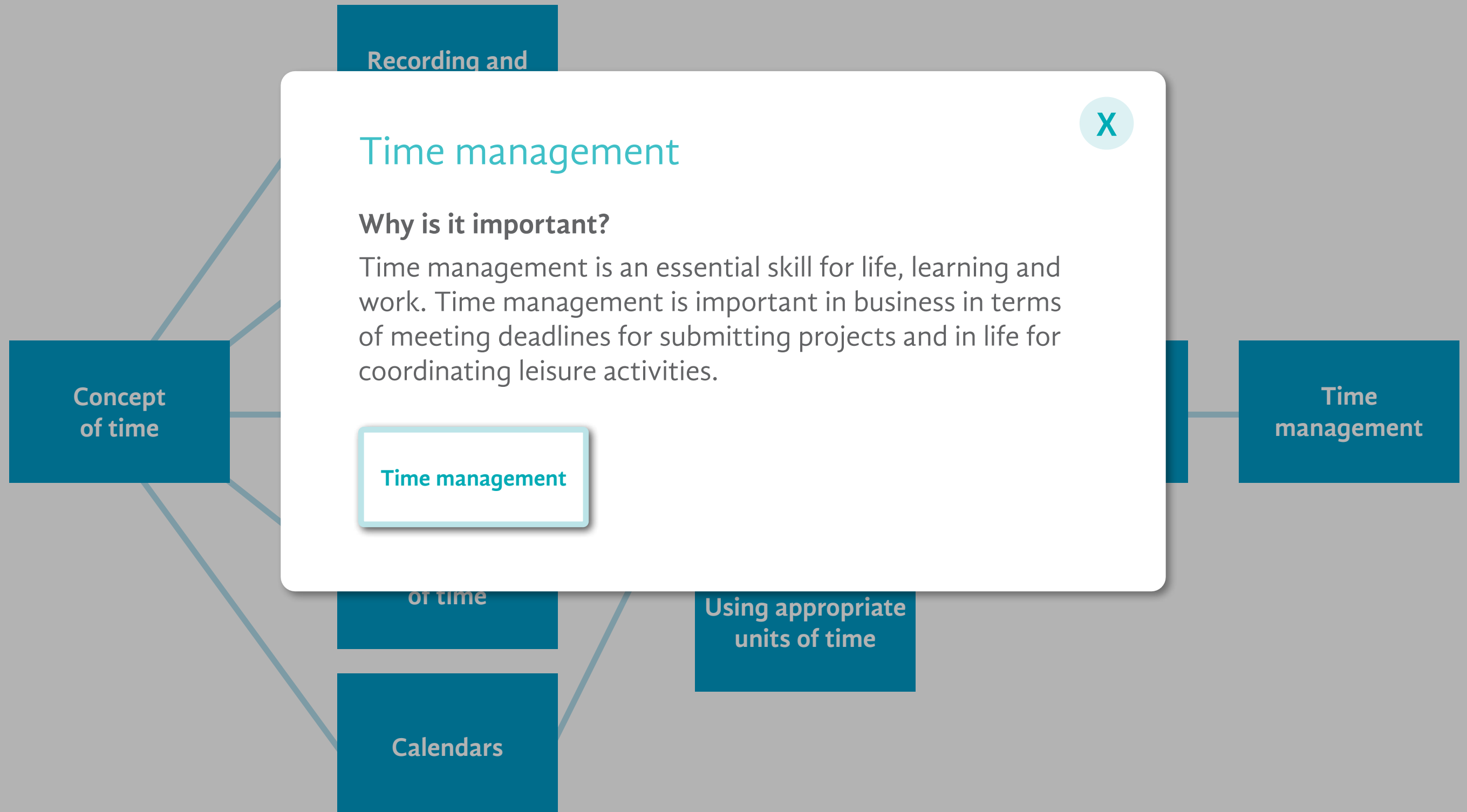
Time management

Graphs

Calendars

Con
of t

Time



Recording and

Time management



Why is it important?

Time management is an essential skill for life, learning and work. Time management is important in business in terms of meeting deadlines for submitting projects and in life for coordinating leisure activities.

Time management

of time

Using appropriate units of time

Calendars

Time management

Time

Time management

What is it?

Planning for different real-life situations. Flexible planning is taken into account when any adjustments are required. Responsive planning is necessary in order to address any unexpected events or changes.

Previous knowledge and understanding

- Be able to use a range of timetables in a variety of contexts
- Be able to tell the time from different displays
- Be able to calculate durations
- Have an understanding of the different types of calendars and be able to use them effectively
- Understand the appropriateness of rounding in relation to time
- Have experience of scheduling tasks within a given time



Co
of time

Time management

Time
management

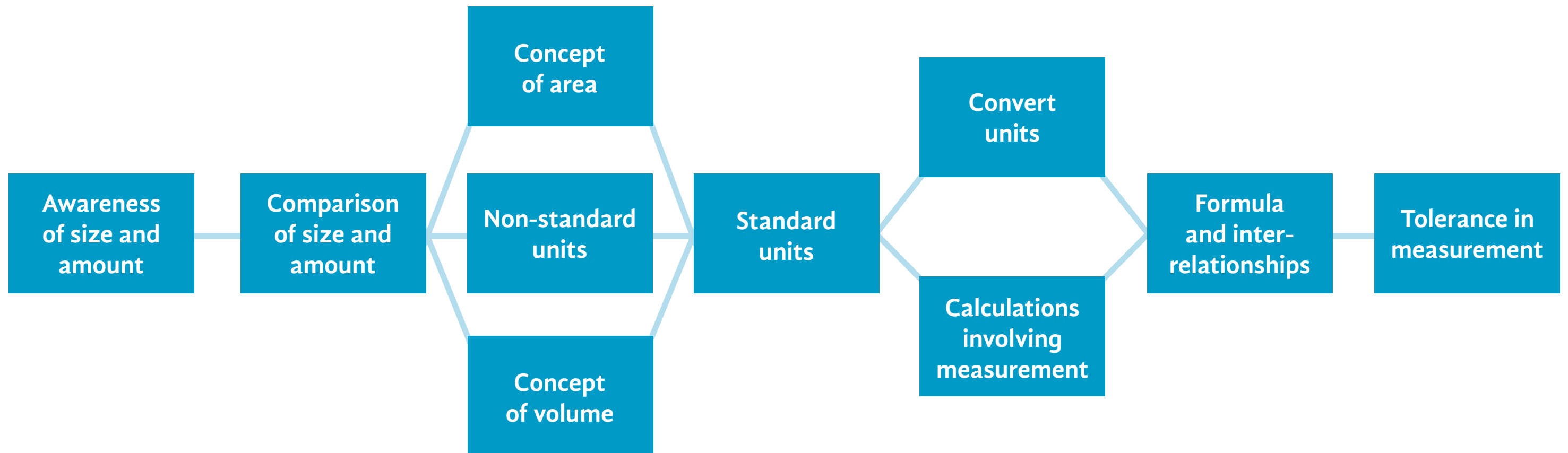
of time

Using appropriate
units of time

Calendars

life, learning and
business in terms
of objects and in life for

Measurement



Measurement

Awareness of size and amount X

Why is it important?

An understanding of how measurements can be taken and applied in everyday contexts is an important life skill. Developing an awareness of size and amount promotes an understanding of spatial awareness and develops the specific vocabulary needed to make comparisons.

Awareness of size
and amount

Awareness
of size and
amount

Compari
of size
amou

of volume

Formula
and inter-
relationships

Tolerance in
measurement

Measurement

Awareness of size and amount

Use of size and amount

Awareness of size and amount

Use of volume

Use of formula and inter-relationships

Tolerance in measurement

Awareness of size and amount X

What is it?
 Use appropriate vocabulary to describe the features of shapes and objects, linking to size and amount. Use the language of opposites and comparisons, particularly within practical situations, to develop understanding of these concepts and how they can be applied.

Previous knowledge and understanding

- In play, can group or segregate items by own criteria

Amount X

Measurements can be taken as an important life skill. Understanding of size and amount promotes an understanding of measurement and develops the specific skills of comparison.

Measurement

Comparison of size and amount X

Why is it important?

The ability to compare size and amount leads to a deeper understanding of relationships between measurements and how these can be applied to a range of situations and contexts.

Comparison of
size and amount

Ordering

Conservation of
size, weight and
volume

Awareness
of size and
amount

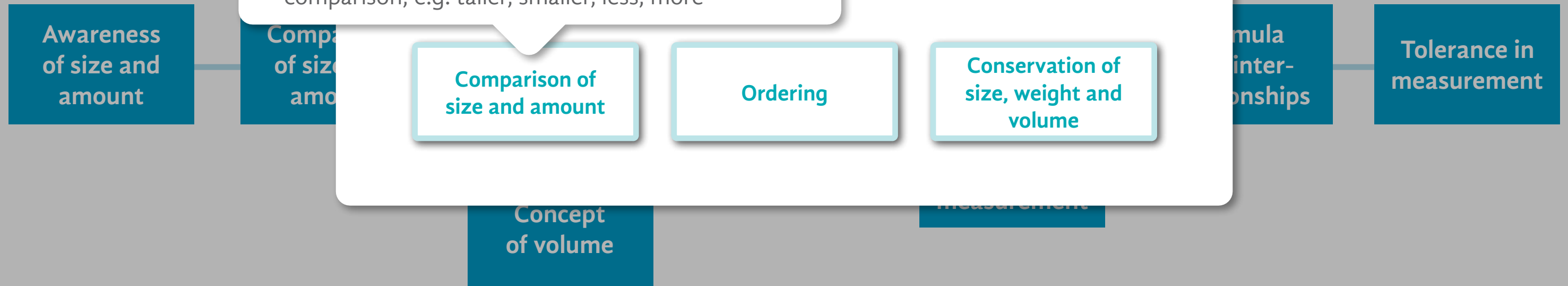
Comparison
of size and
amount

Formulas
and inter-
relationships

Tolerance in
measurement

Concept
of volume

Measurement



Comparison of size and amount

What is it?

Use appropriate vocabulary to describe the features of shapes and objects, linking to size and amount.

Previous knowledge and understanding

- Can talk about objects and shapes in own words and has a basic awareness of the vocabulary of comparison, e.g. taller, smaller, less, more



Comparison of size and amount

Ordering

Conservation of size, weight and volume

Concept of volume

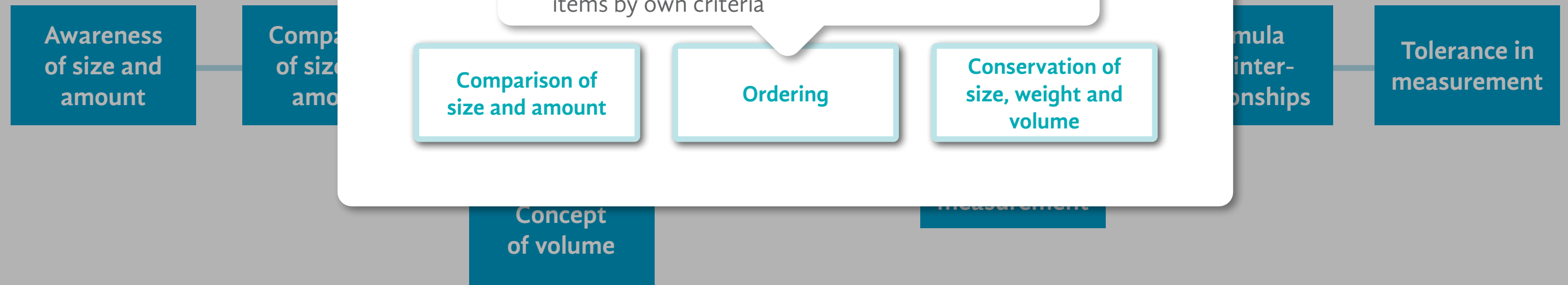
Amount

Amount leads to a deeper understanding of the relationships between measurements and of situations and contexts.

Formula inter-relationships

Tolerance in measurement

Measurement



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Why is

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Ordering

What is it?

Develop vocabulary associated with comparison and order objects according to set criteria and for different purposes.

Previous knowledge and understanding

- Can describe objects and shapes using own language and
 - Through play, can show an ability to sort and order texts.
- items by own criteria

Comparison of
size and amount

Ordering

Conservation of
size, weight and
volume

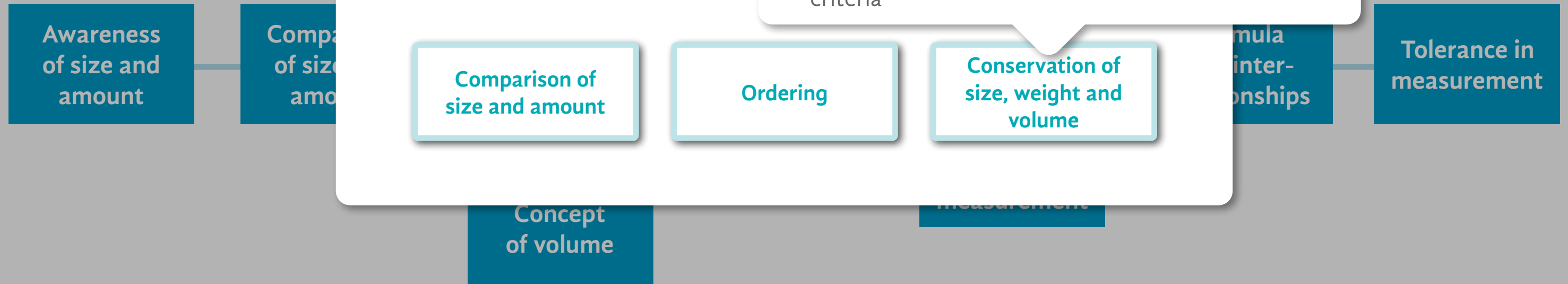
Concept
of volume

Measurement

Formula
relationships

Tolerance in
measurement

Measurement



Comparison of size and amount

Why is it important?

The ability to compare size and amount is an important part of understanding of relationships and how these can be applied to a range of situations.

Conservation of size, weight and volume



What is it?

Recognise that shapes and objects that look different can have equal length, weight or volume.

Previous knowledge and understanding

- Can compare and contrast objects and shapes to identify common properties
- Can group objects and shapes with identical properties together
- Can compare and order objects according to set criteria

Comparison of size and amount

Ordering

Conservation of size, weight and volume

Concept of volume

Measurement

Formulae and relationships

Tolerance in measurement

Measurement

Non-standard units

X

Why is it important?

Measuring and estimating with non-standard units develops understanding of why standard units are necessary and help to provide an estimation of size. This leads to developing an understanding of the concept of standard units.

Non-standard units

Awareness
of size and
amount

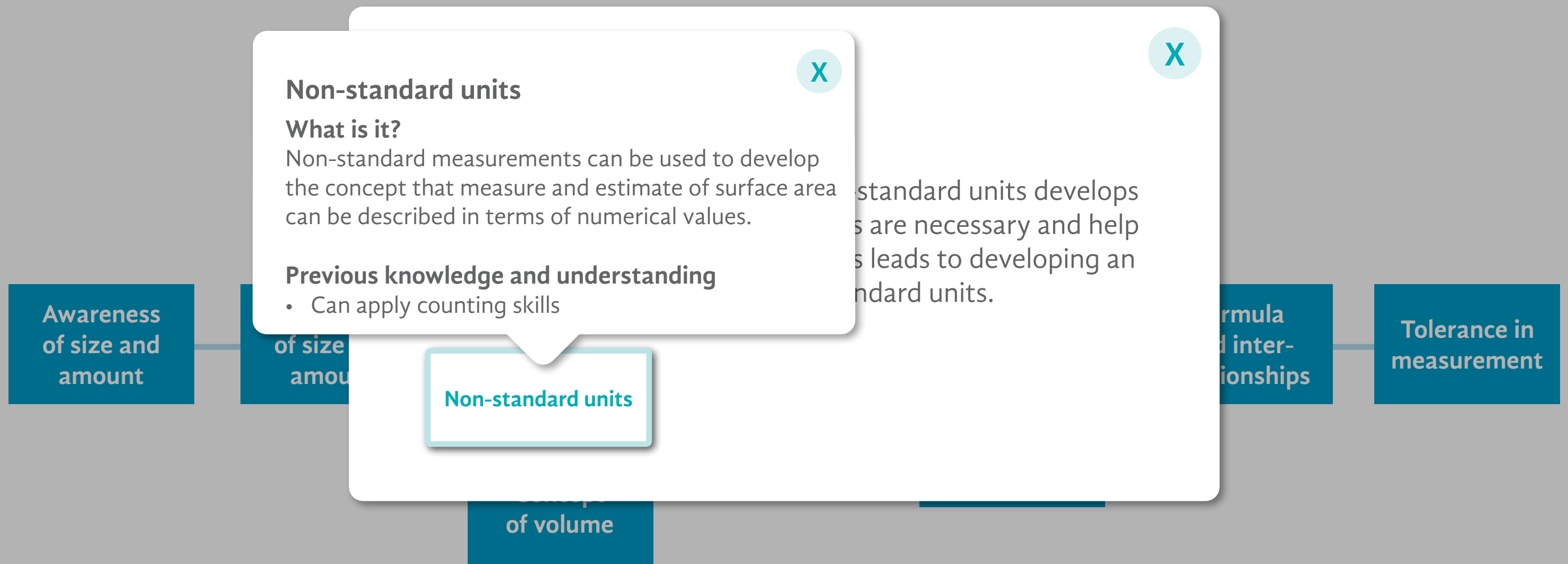
Comparison
of size and
amount

Measurement
of volume

Formulas
and inter-
relationships

Tolerance in
measurement

Measurement



Non-standard units

What is it?
 Non-standard measurements can be used to develop the concept that measure and estimate of surface area can be described in terms of numerical values.

Previous knowledge and understanding

- Can apply counting skills

Non-standard units

of volume

Formula and inter-relationships

Tolerance in measurement

Measurement

Concept of area



Why is it important?

The ability to compare size and amount leads to a deeper understanding of relationships between measurements and how these can be applied to a range of situations and contexts.

Concept of area

Understanding area

Estimating area

Units of area

Awareness
of size and
amount

Comparison
of size and
amount

Formulas
and inter-
relationships

Tolerance in
measurement

Measu

Concept of area

What is it?

Develop an understanding of the concept of area through practical activities, investigation and discussion. This is related to geometric concept of enclosed area.

Previous knowledge and understanding

- Through play, have experience of investigating and comparing different objects and the amount of space they cover

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Awareness
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Concept of area

Understanding area

Estimating area

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Tolerance in
measurement

Units of area

Measurement

Understanding area

What is it?

Area is used to describe the size of any surface. This includes the surface within any given 2D shape. The conservation of area is knowing that when any surface is split into smaller parts then the total area of the parts is equal to the original surface area.

Previous knowledge and understanding

- Can describe area as the amount of space covered by an object
- Understand that the amount of space taken up by a 2D object is known as area
- Understand that objects can look different but have equal areas

Concept of area

Understanding area

Estimating area

Units of area

Awareness
of size and
amount

Comparison
of size and
amount

Formula
relationships

Tolerance in
measurement

Measurement

Concept of area

Why is it important?

The ability to compare understanding of relationships and how these can be applied

Estimating area

What is it?

Use non-standard units to build an understanding of estimating the area of a surface. Then select the most appropriate standard unit for the context.

Previous knowledge and understanding

- Have an awareness of vocabulary of comparison
- Understand that an estimated value is not exact
- Can use knowledge of sizes of common objects to compare size, e.g. is bigger than, smaller than
- Understand area is the size of any surface, including the space within any 2D shape



Concept of area

Understanding area

Estimating area

Units of area

Awareness of size and amount

Comparison of size and amount

Formulae and relationships

Tolerance in measurement

Mea

Units of area

What is it?

Conventions for describing and recording experiential measurements of area are introduced when it is recognised that there is a need for a standard unit of area and initially in context to build from non-standard to standard.

Previous knowledge and understanding

- Have experience of talking about and recording area using a variety of non-standard units, e.g. hands, cubes, sticks
- Have explored a range of measuring instruments, e.g. cubes, sticks, jugs, buckets
- Can use non-standard units accurately when measuring a length
- Can apply counting skills



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measurements and
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Awareness
of size and
amount

Estimating area

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Tolerance in
measurement

Units of area

Measurement

Concept of volume X

Why is it important?

Volume links with spatial awareness and impacts on a variety of objects encountered daily. The skills required to solve problems relating to volume are skills needed for learning, life and work.

Concept of volume

Unit of volume

Estimating volume

Capacity

Mass

Awareness
of size and
amount

Comparison
of size and
amount

Formula
relationships

Tolerance in
measurement

Mea

Concept of volume

What is it?

Volume is the measure of space taken up by a 3D object. The conservation of volume is knowing that when any object is split into smaller parts then the total volume of the parts is equal to the original volume.

Previous knowledge and understanding

- Through play, have experience of investigating the amount different objects and containers can hold
- Explore objects with same volume but different dimensions to develop awareness of conservation of volume
- Can give examples of objects/containers where volume could be measured in relation to real-life, e.g. lunch box, water bottle, sand pit

Impacts on a variety of
required to solve problems
learning, life and work.

Awareness
of size and
amount

Comparison
of size
and amount

Concept of volume

Unit of volume

Estimating volume

Formula
inter-
relationships

Tolerance in
measurement

Capacity

Mass

Measurement

Unit of volume

X

What is it?

Conventions for describing and recording measurements of volume should be introduced when appropriate and initially in context.

Previous knowledge and understanding

- Understand that the amount of space taken up by a 3D object is known as volume
- Understand that objects can look different but have equal volume
- Have experience of talking about and recording volume using a variety of non-standard units, e.g. bean bags, handfuls of sand
- Can use non-standard units accurately to measure and record a range of volume
- Can apply counting skills

Concept of volume

Unit of volume

Estimating volume

Capacity

Mass

Awareness
of size and
amountComparison
of size and
amountFormula
relationshipsTolerance in
measurement

Measurement

Concept of volume

Why is it important?

Volume links with objects encountered relating to volume

Estimating volume

What is it?

The ability to estimate volume is built on an understanding of how to estimate other properties of shapes, e.g. length, breadth, depth, area.

Previous knowledge and understanding

- Understand and use vocabulary of comparison
- Understand that an estimated value is not exact
- Can use knowledge of volume of common objects/containers to compare size, e.g. It has less space than this bucket
- Apply knowledge of length and area to provide an estimation of size
- Be able to estimate properties of 2D shapes, e.g. length, breadth and area



Awareness of size and amount

Comparison of size and amount

Concept of volume

Unit of volume

Estimating volume

Formulae and relationships

Tolerance in measurement

Capacity

Mass

Measurement

Concept of volume



Capacity

What is it?

Spatial awareness of 3D objects and the amount they can contain. Interior volume of an object.

Previous knowledge and understanding

- Understand that the amount of space taken up by a 3D object is known as volume



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Awareness
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Estimating volume

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Tolerance in
measurement

Capacity

Mass

Measurement

Awareness of size and amount

Comparison of size and amount

Concept of volume

Concept of volume

Why is it important?

Volume of objects relating to

Mass

What is it?

A large body of matter with no definite shape. The amount of matter in an object.

Previous knowledge and understanding

- Understand and use the vocabulary of volume and capacity

Capacity

Mass

Volume

Formulae and relationships

Tolerance in measurement

Measurement

Standard units



Why is it important?

Using standard units ensures a universal system of measurement which helps us to interpret, communicate and calculate measurements.

Standard units

Measure using standard units

Inter-relationships between units of measurement

Link between concept and formula of area

Awareness of size and amount

Comparison of size and amount

Formula inter-relationships

Tolerance in measurement

Me

Standard units

What is it?

Standard units are the universal system of measurement.

Previous knowledge and understanding

- Have experience of talking about and recording measurement using a variety of non-standard units, e.g. hands, cubes, sticks, handfuls of sand
- Can estimate and use non-standard units accurately when measuring and recording
- Can apply counting skills
- Have experienced standard units of measure in their own environment even if they do not understand the meaning, e.g. 2litre bottle of Cola, 25g packet of crisps



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Standard units

Measure using
standard units

Inter-relationships
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Tolerance in
measurement

Link between
concept and formula
of area

Measurement

X

Measure using standard units

What is it?

Use of a wide range of measuring instruments to accurately measure length, weight and volume. Awareness of a variety of types of scales should include analogue and digital and the most effective and efficient measuring instruments to be used.

Previous knowledge and understanding

- Through play, have an experience of a wide range of measuring instruments
- Understand that an agreed unit of measure is essential
- Be aware of common standard units and the appropriate use
- Understand that different measurements are required for different types of objects/shapes
- Can select an appropriate unit of measure, e.g. strides to measure the length of a classroom, cubes to measure the length of a pen

Awareness
of size and
amount

Comparison
of size and
amount

Standard units

Measure using
standard units

Inter-relationships
between units of
measurement

Formula
inter-
relationships

Tolerance in
measurement

Link between
concept and formula
of area

Measurement

Standard units

Why is it important?

Using standard units ensures measurement which helps calculate measurements.

Inter-relationships between units of measurement

What is it?

Understanding the relationship between units of measure e.g. $10\text{mm}=1\text{cm}$, $100\text{cm}=1\text{m}$.

Previous knowledge and understanding

- Can describe measurements using a range of units as appropriate, e.g. mm, cm, m, km, g, ml
- Understands that the metric system is structured in multiples and powers of 10
- Have an understanding of decimals and place value

Awareness of size and amount

Comparison of size and amount

Standard units

Measure using standard units

Inter-relationships between units of measurement

Formula inter-relationships

Tolerance in measurement

Link between concept and formula of area



Meas

Link between concept and formula of area



What is it?

More efficient ways of calculating surface area. Methodology should not detract from the concept of area.

Previous knowledge and understanding

- Understand the concept of area
- Be able to calculate the area of common shapes using a range of methods, e.g. cover with cubes then count, counting squares
- Understand that areas of common shapes can be calculated using a standard process
- Can apply multiplication and division facts (inverse operations) to whole numbers, fractions and decimal fractions



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Inter-relationships
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measurement

Awareness
of size and
amount

Link between
concept and formula
of area

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Tolerance in
measurement

Measurement

Convert units

X

Why is it important?

Ability to convert between units enables the most efficient and appropriate unit or measurement to be used. It underpins the rules and concepts in many areas, e.g. science, engineering and technology.

Convert units

Selecting appropriate units

Awareness of size and amount

Comparison of size and amount

Conversion of volume

Formula and inter-relationships

Tolerance in measurement

Meas

Convert units

What is it?

The metric system is the internationally agreed system of units. Knowledge and understanding of the inter-relationship between different units. Knowledge of appropriate prefixes and understanding the language of measurement and notation.

Previous knowledge and understanding

- Can apply multiplication and division facts (inverse operations) to whole numbers, fractions and decimal fractions
- Understand the relationship between the units within the metric system



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Tolerance in
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of volume

Measurement

Awareness
of size and
amount

Comparison
of size and
amount

Convert unit

Selecting
appropriate units

Measurement
of volume

Formula
and inter-
relationships

Tolerance in
measurement

Selecting appropriate units

X

What is it?

Use the most appropriate unit of measurement in relation to individual contexts. The most appropriate unit of measurement is used to carry out a calculation.

Previous knowledge and understanding

- Understand the relationship between the unit of measure and the measuring instrument, e.g. cm – ruler, m – metre stick
- Understand that different objects require different units of measure
- Be able to describe common uses for the different units of measure
- Understand that changing the unit of measure impacts on the numerical value of the measure

Measurement

Calculations involving measurements X

Why is it important?

Calculations involving perimeter, area and volume are needed in real life contexts and enable us to work out accurate amounts.

Calculations involving measurements

Select the most appropriate calculation dependent on the situation

Awareness of size and amount

Comparison of size and amount

Concept of volume

Formula and inter-relationships

Tolerance in measurement

Meas

Calculations involving measurements X

What is it?

Carrying out calculations using the four operations involving perimeter, area and volume. Using whole numbers, fractions, decimal fractions or percentages according to context.

Previous knowledge and understanding

- Understand the terms perimeter, area and volume
- Can apply the four operations to whole numbers, fractions, decimal fractions or percentages
- Select the appropriate unit of measure
- Can convert between standard units
- Understand that using a common standard unit across all dimensions can simplify a calculation, e.g. $l = 2\text{m}$ $b = 90\text{cm}$
 $l = 200\text{cm}$ $b = 90\text{cm}$

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Calculations involving
measurements

Select the most appropriate
calculation dependent on
the situation

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relationships

Tolerance in
measurement

Concept
of volume

Measurement

Select the most appropriate calculation dependent on the situation



What is it?

Being able to apply the right calculation to fit the situation or context. Selecting the appropriate calculation, perimeter, area, or volume taking account of the dimensional aspect of the situation or context.

Previous knowledge and understanding

- Select the appropriate unit of measure
- Can apply the four operations to problems involving measure

Calculations

Why is it important?

Calculations involving measurements in real life contexts and amounts.

Calculations involving measurements

Select the most appropriate calculation dependent on the situation

Awareness of size and amount

Comparison of size and amount

Concept of volume

Formulae and inter-relationships

Tolerance in measurement

Measurement

Formula and inter-relationships X

Why is it important?

Formula is used to simplify the process of calculations and to calculate an unknown variable. Awareness of the inter-relationship between different formulae supports further calculations to be made, e.g. diameter=2 x radius $C=\pi D$ or $C=2\pi r$

Formula

Inter-relationship

Awareness
of size and
amount

Comparison
of size
and amount

of volume

Formula
inter-
relationships

Tolerance in
measurement

Me

Formula



What is it?

Specific formula are used to carry out calculations involving measurement. These provide a method for accurately and efficiently calculating perimeter area and volume. Use knowledge of the formula to be able to undertake a number of related calculations associated with length, breadth, height, area and volume. Understand the interconnectivity between the variances in the formula.

Previous knowledge and understanding

- Can apply the four operations to problems involving measure
- Understand that a common strategy can be applied to the same shape but with different dimensions, e.g. the same formula can be applied to rectangles of all sizes
- Be able to describe dimensions of shapes using length, breadth, height etc.

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Awareness
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Formula

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Tolerance in
measurement

of volume

Measurement

Inter-relationships

What is it?

Understand the links between perimeter and area. Being able to work backwards and forwards when calculating measurements. Knowledge and understanding of relationships between dimensions and how to manipulate formula dependent on the context.

Previous knowledge and understanding

- Can apply common formula to calculate perimeter/area/volume of common shapes
- Can apply the four operations to problems involving measure

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Formula

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Tolerance in
measurement

Measurement

Tolerance in measurement

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Why is it important?

Relates to acceptable margins of error when measuring, estimating or calculating measurements. Understanding of tolerance in measurement is appreciation of accuracy when making calculation.

Awareness
of size and
amount

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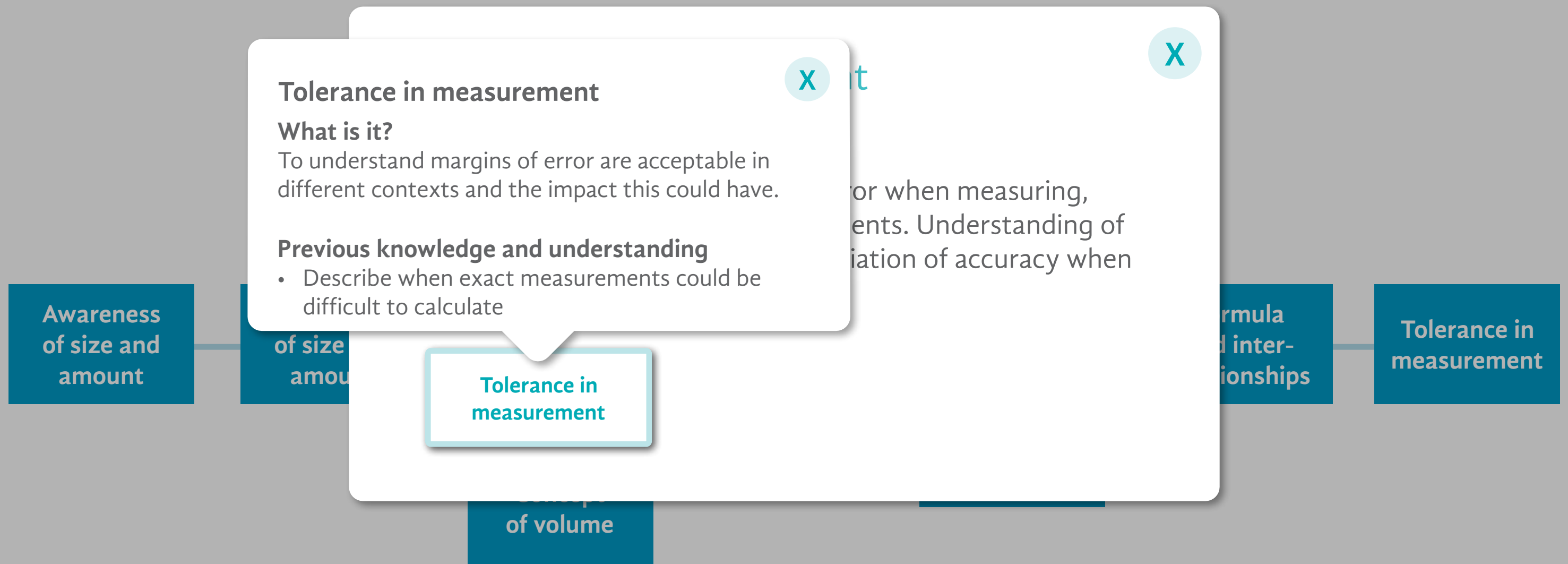
Tolerance in
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Formula
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relationships

Tolerance in
measurement

of volume

Measurement



Awareness of size and amount

of size and amount

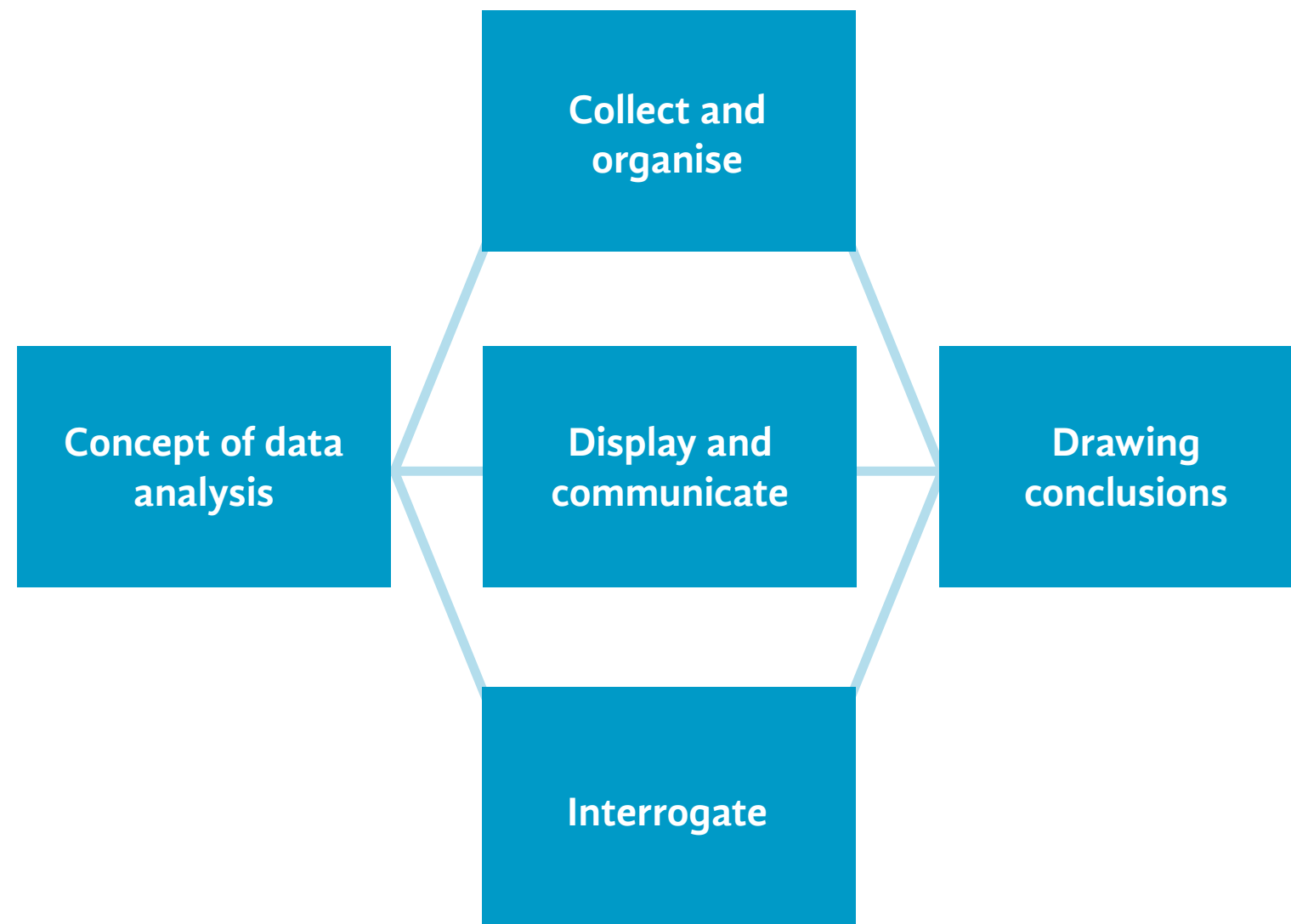
Tolerance in measurement

of volume

Formula and inter-relationships

Tolerance in measurement

Data and analysis



Data and analysis

Concept of data analysis

X

Why is it important?

Data and analysis is an essential aspect of everyday life. The ability to read and analyse data is an important life skill.

Concept of data
analysis

Interrogate

Data

Concept of data analysis



What is it?

Using data to make informed choices and decisions. Exploring data to make sense of the world around us.

Previous knowledge and understanding

- Understand the need to organise objects and/or information
- Awareness of different displays of data, and the use of these to make choices in everyday situations
- Awareness of appropriate vocabulary to talk about and organise data by their own criteria
- Awareness of the existence of information in different forms



of everyday life. It is presented in various

Concept of data analysis

Interrogate

Data and analysis

Collect and organise X

Why is it important?

Collecting and organising data and information supports decision making relevant to the context.

Collect and
organise

Matching, sorting
and comparing

Gathering and
organising

Interrogate

Data

Collect and organise



What is it?

Gathering information from a variety of sources and organising it in a way that suits the audience.

Previous knowledge and understanding

- Awareness of the existence of various sources of information, e.g. self-registration, giving and receiving party invitations
- Awareness of being able to gather information by appropriate means
- Awareness of the need to organise information
- Awareness of appropriate vocabulary to collect data and begin to organise it



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Collect and
organise

Matching, sorting
and comparing

Gathering and
organising

Interrogate

Data and

Matching, sorting and comparing

What is it?

Matching objects which have the same characteristics. As criteria increases then this become sorting, e.g. matching more than two objects. Sorting involves separating objects into groups according to their similarities or differences. Progression is made when moving from comparing individual items to comparing groups. This becomes increasingly sophisticated as learners progress their understanding.

Previous knowledge and understanding

- In play, have experience of matching, sorting and comparing using own criteria
- Have an understanding of characteristics that they are being asked to match, sort and compare with, e.g. size, colour
- Understand that objects (and data) have different characteristics (colour, size, etc.)
- Recognise these characteristics, and be able to differentiate objects based on these

Collect and
organise

Matching, sorting
and comparing

Gathering and
organising

Interrogate

Data and analysis

Collect and organise

Why is it important?

Collecting and organising data is important for decision making relevant to the business.

Gathering and organising

What is it?

A range of information and data can be collected from a variety of appropriate sources and for many purposes. This is organised into an appropriate form; table, chart or diagram to support interrogation and analysis. Data can be organised into groups depending on the context.

Previous knowledge and understanding

- Know that data must be sourced
- Understand that, to make sense of data, one must organise it
- Have had experience of organising techniques, e.g sorting, matching, comparing
- Understand that organisation of the data is preparation for further communication

Collect and organise

Matching, sorting and comparing

Gathering and organising

Interrogate

Data and analysis

Display and communicate X

Why is it important?

Accuracy in displaying and communicating data is important to ensure it is clear and easily understood by the audience.

Display and
communicate

Types of display

Communicating
findings

Interrogate

Data a

Display and communicate X

What is it?
Sharing information in a variety of forms that can be understood by the intended audience.

Previous knowledge and understanding

- Demonstrate knowledge of appropriate organising techniques
- Know how to design a survey appropriate to level, e.g. question(s), organising response(s)
- Understand that the purpose of displaying data is communication
- Have had experience of different types of chart/graph of appropriate complexity to the learner's level

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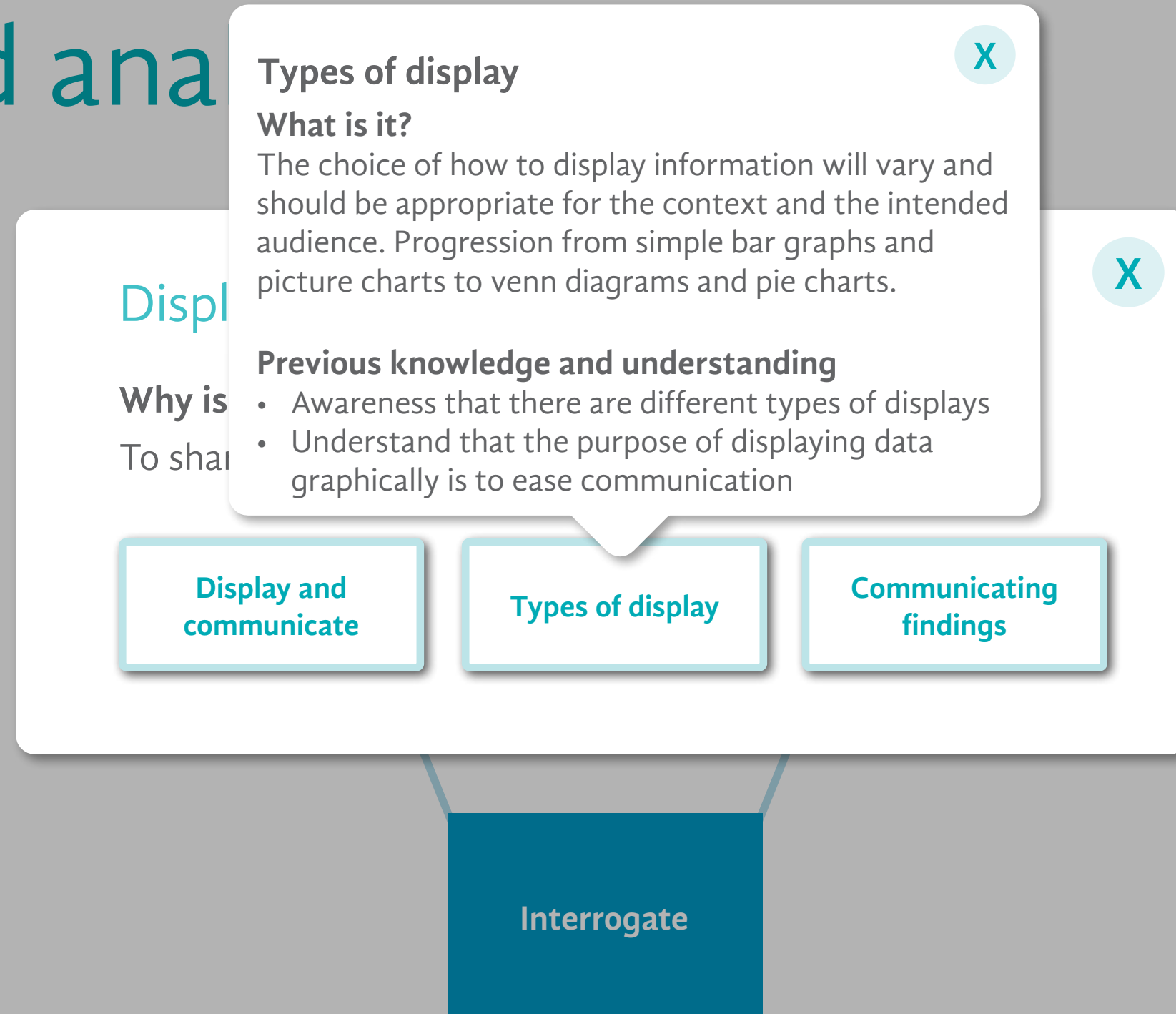
Display and communicate

Types of display

Communicating findings

Interrogate

Data and ana



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Types of display

Communicating
findings

Interrogate

Data and analysis

Display and communicate

Why is it important?

To share information and

Display and
communicate

Types of display

Communicating
findings

Interrogate

Communicating findings

What is it?

Presenting the findings and conclusions from the collation of information and data.

Previous knowledge and understanding

- Know how to construct diagrams/charts
- Know how to interpret diagrams/charts
- Know how to select the most appropriate display method to fit a given purpose/data set
- Understand how to compare data displays
- Understand and recognise that data collecting has a purpose
- Use appropriate vocabulary to describe displays and comparisons e.g. more than, most

Data and analysis

Interrogate

X

Why is it important?

In real life situations information is provided in a variety of ways. To interrogate the information enables choices and decisions to be made.

Interrogate

Critical analysis
of data

Interrogate

Data

Interrogate

What is it?

Simple interrogation of data is reading and extracting key information from tables, charts, graphs etc. This enables decisions around the validity and reliability of the data, e.g. in relation to sample size.

Previous knowledge and understanding

- Know where to find data in relevant displays, e.g. timetable, bar chart, pictograph
- Understand and interpret information from displays at a level appropriate to the learner
- When considering the data, have an awareness of reliability and validity, e.g. what is the sample size?

Interrogate

Critical analysis
of data

Interrogate

X

X

ded in a variety of
bles choices and

Data and an

Critical analysis of data

What is it?

Critical analysis is an indepth scrutiny of data which could include looking at trends, correlations and relationships between data.

Previous knowledge and understanding

- Knowledge and understanding of different comparison techniques
- Demonstrate ability to compare data sets in context, and with purpose, e.g. back to back stem and leaf diagram
- Understand and interpret various graphs and charts, e.g. pie charts, line graphs, scatter graphs

Interrogate

Critical analysis
of data

Interrogate

Data and analysis

Drawing conclusions X

Why is it important?

Knowing how to draw conclusions from data helps make informed choices.

Drawing
conclusions

Reliability
and validity

Bias and
sample size

Statistical
calculations

Interrogate

Data

Drawing conclusions

X

What is it?

Using the information presented in different forms and its source to draw conclusions which could affect decision making.

Previous knowledge and understanding

- Knowledge and understanding of the most appropriate graphical representation for data (line graphs, pie charts etc.)
- Knowledge and understanding of spread of data/account for outliers
- Demonstrate ability to compare data sets in context, and with purpose

X

make informed choices.

Drawing
conclusions

Reliability
and validity

Bias and
sample size

Statistical
calculations

Interrogate

Data and

Reliability and validity

X

What is it?

Reliability is the credibility of the source as well as the collation of the data. Reliability is the repeatability of a particular set of findings e.g. how accurate would the information be in a second identical information gathering activity? Reliability is a necessary ingredient for determining the overall validity of an investigation or survey and enhancing the strength of the results.

Previous knowledge and understanding

- Know how to obtain information from real life sources
- Demonstrate an awareness that not all information is equally reliable
- Understand different types of average and how these can be misleading due to the existence of outliers
- Be able to use calculations to interpret data
- Demonstrate knowledge of how to make predictions based on the data supplied

Drawing
conclusions

Reliability
and validity

Bias and
sample size

Statistical
calculations

Interrogate

Data and analysis

Drawing conclusions

Why is it important?

Drawing conclusions

Drawing conclusions

Statistical calculations

Reliability and validity

Bias and sample size

Interrogate

Bias and sample size

X

What is it?

Bias is who or what is included in the intended sample. A biased sample can result in a non-valid data set. The size of the group can have an impact on the validity of the survey.

Previous knowledge and understanding

- Awareness of word bias
- Know how to design and interpret surveys
- Know how to display data
- Know how to draw conclusions
- Awareness of sample size
- Understand reliability of data

Data

Statistical calculations

X

What is it?

Statistical calculations support the evaluation and interpretation of data and draw conclusions from data.

Previous knowledge and understanding

- Has experienced working with fractions, decimal fractions and percentages in a range of contexts
- Knowledge and understanding of a range of strategies to carry out calculations
- Apply knowledge and understanding of integers, e.g. temperature
- Understanding of what averages are intended to represent

Statistical
calculations

Interrogate

make informed choices.

Bias and
sample size

X

Ideas of chance and uncertainty

Simple choice
and decision
making

Predicting and
describing
likelihood

Choice and
decision
making based
on likelihood

Probability

Applying
knowledge of
probability

Ideas of chance and uncertainty

X

Simple choice and decision making

Why is it important?

Using everyday language to identify outcomes of familiar events supports the development of critical thinking skills. This enables discussion around choices and consideration of alternative options when making choices and decisions.

Simple choice
and decision
making

Simple choice and
decision making

Applying
knowledge of
probability

Ideas of chance and uncertainty

X

Predicting and describing likelihood

Why is it important?

Predicting and describing the likelihood of events occurring can help develop the ability to make informed choices and mathematical thinking.

Simple choice
and decision
making

Predicting and
describing likelihood

Language
of chance

Scale

Applying
knowledge of
probability

Ideas of chance and uncertainty

Simple choice
and decision
making

Predicting and describing likelihood X

What is it?

Using information to determine possible outcomes.

Previous knowledge and understanding

- Know and understand appropriate vocabulary for simple choice and decision making
- Have an awareness of the reasonableness of an outcome
- Be able to make simple choices and decisions

Likelihood X

of events occurring
formed choices and

Applying
knowledge of
probability

Predicting and
describing likelihood

Language
of chance

Scale

Ideas of chance and probability

Simple choice and decision making

Predicting and describing likelihood

Why is it important?
Predicting outcomes can help us make better decisions using mathematical models.

Language of chance

What is it?

Being able to classify outcomes using appropriate language, e.g. likely, certain.

Previous knowledge and understanding

- Know and understand appropriate vocabulary of chance
- Be able to make and justify simple choices and decisions
- Verbally justify reasons for outcomes using appropriate vocabulary

Predicting and describing likelihood

Language of chance

Scale

Applying knowledge of probability

Ideas of chance and uncertainty

Simple choice
and decision
making

Predicting and describing likelihood

Why is it important?

Predicting and describing likelihood can help develop the ability to think mathematically.

Predicting and
describing likelihood

Language
of chance

Scale

Scale

What is it?

Knowledge of the numerical scale to describe probability 0-1.

Previous knowledge and understanding

An awareness of scale

Understand the concepts of certainty and impossibility

Awareness the vocabulary of chance and uncertainty

X

Applying
knowledge of
probability

Ideas of chance and uncertainty

X

Choice and decision making based on likelihood

Why is it important?

Developing an understanding of how likely an event is to happen will support the decision making process.

Choice and decision making based on likelihood

Conducting chance experiments

Order the chance of specified outcomes

Simple choice and decision making

Applying knowledge of probability

Ideas of probability and uncertainty

Simple choice and decision making

Choice and decision making based on likelihood

What is it?

Likelihood is the probable chance of an event occurring and using this information to make informed choices.

Previous knowledge and understanding

Know and understand appropriate vocabulary for likelihood, e.g. impossible, possible, certain
Understand their predictions of outcomes based on past experiences
Have an awareness that you can predict probability based on described likelihood of past events

Choice and decision making based on likelihood

Conducting chance experiments

Order the chance of specified outcomes

How likely an event is to occur during the making process.

Applying knowledge of probability

Ideas of c

X

Conducting chance experiments

What is it?

Practical experiments to support understanding of possible outcomes and the likelihood of an event occurring.

Previous knowledge and understanding

- Know and understand appropriate vocabulary for likelihood, e.g. impossible, possible, certain
- Understand how to predict probability based on described likelihood of past events
- Know how to explain possible outcomes in the context of probability
- Awareness of desired outcome(s), e.g. picking a red counter from a bag of red, blue and green
- Understand certainty and impossibility

Simple choice
and decision
making

Choice and
decision making

Conducting
chance experiments

Order the chance of
specified outcomes

Applying
knowledge of
probability

Ideas of chance and probability

Simple choice and decision making

Choice and decision making based on likelihood

Why is it important?
Developing an understanding of what will happen will support

Choice and decision making

Conducting chance experiments

Order the chance of specified outcomes

of probability

Order the chance of specified outcomes



What is it?

Use the numerical value to order events from most likely to least likely.

Previous knowledge and understanding

- Know the scale between 0-1
- Know that probability can be represented by a numerical scale from 0 to 1 inclusive, using the appropriate language, e.g. possible, certain, events
- Demonstrate ability to order probabilities of particular events, appropriate to level using appropriate language, e.g possible
- Know and understand place value with especially decimal fractions
- Know the interrelationship between fractions, decimal fractions and percentages

Ideas of chance and uncertainty

Probability

X

Why is it important?

Calculating theoretical probability helps build an understanding of the consequences of events and likelihood of an event occurring.

Probability

Assigning
numerical valuesInterpreting
probability

Notation

Simple choice
and decision
makingApplying
knowledge of
probability

Idea

certainty

Probability



What is it?

The likelihood of an event occurring. Many events cannot be predicted with total certainty.

Previous knowledge and understanding

- Know and understand appropriate vocabulary for probability, e.g. impossible, possible, certain
- Know that probability can be represented by a numerical scale from 0 to 1 inclusive
- Understand the concepts of mathematical certainty and impossibility
- Be able to describe a simple outcome's probability by placing it on the scale, with divisions appropriate to level



build an
vents and likelihood

Simple choice
and decision
making

Probability

Assigning
numerical values

Interpreting
probability

Notation

Applying
knowledge of
probability

Assigning numerical values

What is it?

A probability scale is used to numerically represent the probability of an event occurring. The numerical representation can be in the form of fractions, decimal fractions or percentages within a scale of 0-1 or 0-100%. The probability of any possible mutually exclusive event happening is 1, i.e. certain.

Previous knowledge and understanding

- Know that probability can be represented by a numerical scale from 0 to 1 inclusive
- Be able to describe a simple outcome's probability by placing it on the scale, with divisions appropriate to level
- Know how to construct a numerical representation of probability
- Know and understand appropriate vocabulary for probability, e.g. mutually exclusive
- Relate vocabulary to the probability scale fluently
- Understand and be able to use fractional notation
- Know and understand place value especially decimal fractions
- Know and understand the interrelationship between fractions, decimal fractions and percentages

Simple choice
and decision
making

Probability

Assigning
numerical values

Interpreting
probability

Notation

Applying
knowledge of
probability

Ideas o

Ideas of chance and probability

Simple choice and decision making

Probability

Why is it important?
Calculating theoretical probability and understanding of the likelihood of an event occurring

Interpreting probability

What is it?

Using the numerical representation to determine the likelihood of the event happening to inform decision making.

Previous knowledge and understanding

- Know that probability can be represented by a numerical scale from 0 to 1 inclusive
- Be able to describe a simple outcome's probability by placing it on the scale, with divisions appropriate to level
- Know how to construct a numerical representation of probability
- Awareness that the numerical representation of an outcome, can predict future outcomes

Probability

Assigning numerical values

Interpreting probability

Notation

Applying knowledge of probability



Ideas of chance and uncertainty

Simple
and de
mak

Notation

What is it?

A method of expressing the probability of an event occurring using a mathematical statement.

Previous knowledge and understanding

- Know that probability can be represented by a numerical scale from 0 to 1 inclusive
- Know how to construct a numerical representation of probability
- Know how to order probabilities based on numerical scale 0-1
- Understand place value especially decimal fractions
- Know and understand the interrelationship between fractions, decimal fractions and percentages

Notation

Interpreting
probability

Applying
knowledge of
probability



Ideas of chance and uncertainty

X

Applying knowledge of probability

Why is it important?

Understanding and being able to quantify risks helps us to make more informed decisions.

Applying knowledge
of probability

Formula

Simple choice
and decision
making

Applying
knowledge of
probability

Applying knowledge of probability

What is it?

The ability to assess risk involves considering all the possible outcomes and planning for them. This would include understanding of chance experiments involving repeated trials often with the use of technology.

Previous knowledge and understanding

- Know and understand how to use numerical representations of probability
- Know how to give the probability of an event happening or not occurring
- Demonstrate awareness of how influencing the possible outcomes affects the probability of the desired outcome
- Know the difference between theoretical and experimental probability, e.g. you CAN toss a coin 3 times and get 3 heads.
- Awareness of the concept of risk, and how this affects real life, e.g. insurance
- Understand chance and experiments
- Understand sample size and its relationship to reliability and validity

Applying knowledge
of probability

Formula

Applying
knowledge of
probability

Ideas of c

X

Formula

What is it?

Is used to calculate the probability of an event occurring.

Previous knowledge and understanding

- Know that probability can be represented by a numerical scale from 0 to 1 inclusive
- Be able to describe a simple outcome's probability by placing it on the scale, with divisions appropriate to level
- Know how to construct a numerical representation of probability
- Know and understand appropriate vocabulary for probability, e.g. mutually exclusive
- Relate vocabulary to the probability scale fluently
- Understand sample size and its relationship to reliability and validity

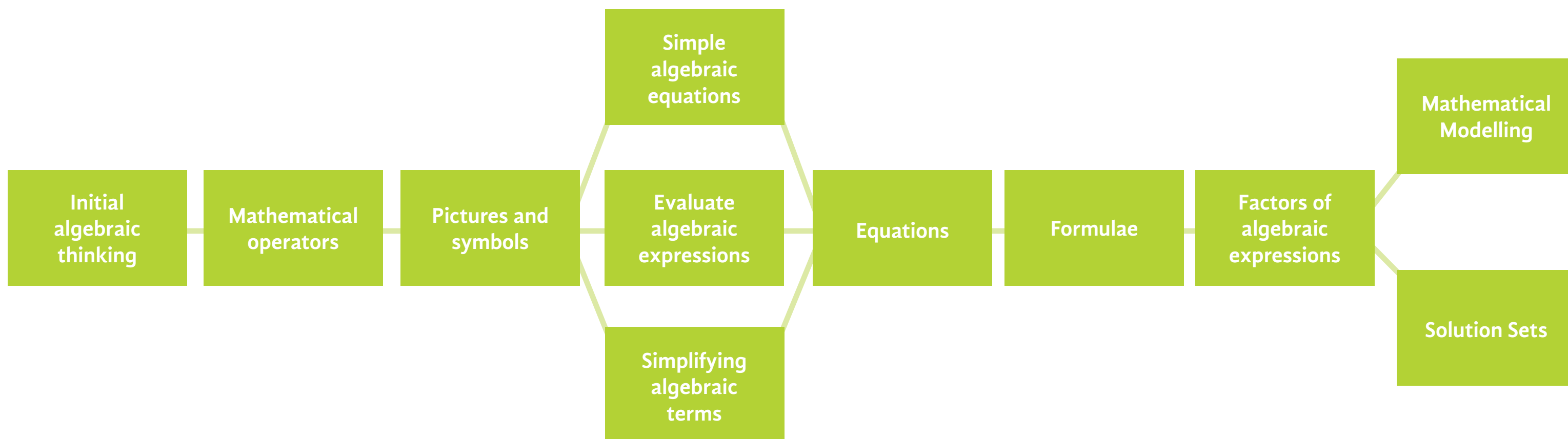
Simple choice
and decision
making

Applying knowledge
of probability

Formula

Applying
knowledge of
probability

Expressions and equations



Expressions and equations pathway showing

Initial algebraic thinking X

Why is it important?

Developing early algebraic thinking will lay the foundations for learners to be more successful in achieving the associated key milestones for the progression pathway in algebra.

Initial algebraic thinking

Initial algebraic thinking

Mathematical operators

Simplifying algebraic terms

Factors of algebraic expressions

Mathematical Modelling

Solution Sets

Expressions and equations pathway showing

Initial algebraic thinking

What is it?

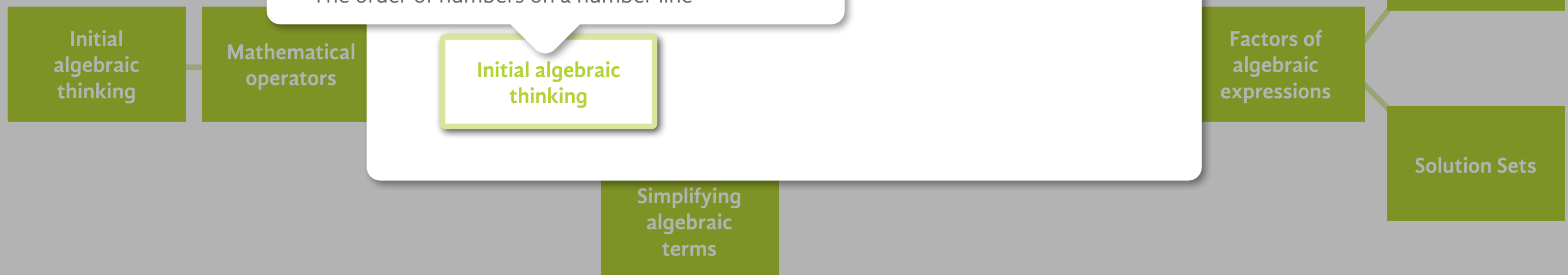
Initial algebraic thinking is understanding the order of numbers, their place on the number line and how they can be combined. This is an essential step to developing algebraic capabilities.

Previous knowledge and understanding

- Basic number bonds
- The concept of the number line
- The order of numbers on a number line



will lay the foundations
in achieving the
progression pathway in



Initial algebraic thinking

Mathematical operators

Initial algebraic thinking

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show

Mathematical operators X

Why is it important?

Being able to use and interpret mathematical symbols is a necessary skill in developing an understanding of algebra.

Initial algebraic thinking

M

Mathematical operators

Equality and balance

Inequality and imbalance

Greater than/less than

Mathematical Modelling

S

Solution Sets

Simplifying algebraic terms

Expressions and equations pathway

sho

Mathematical operators

What is it?

Symbols are part of the universal language of mathematics.

The four operators $+$, $-$, \times , \div are the first set of symbols that learners usually become familiar with. These symbols allow mathematical statements to be expressed in as short and concise a way as possible.



Mathematical symbols is a necessary skill in algebra.

Initial algebraic thinking

M

Mathematical operators

Equality and balance

Inequality and imbalance

Greater than/less than

Simplifying algebraic terms

Mathematical Modelling

Solution Sets

Expressions and equations pathway

show

Mathematical operators



Why is

Equality and balance



Being a
develo

What is it?

The equal sign indicates that one quantity is the same as another. Visualising the equals sign (=) as a balance point is very useful as algebraic operations progress and extend to more challenging equations.

necessary skill in

Mathematical operators

Equality and balance

Inequality and imbalance

Greater than/less than

Simplifying algebraic terms

Initial algebraic thinking

M

Mathematical Modelling

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show

Mathematical operators X

Why is it important?

Being able to use and interpret mathematical operators is essential for developing an understanding of algebraic expressions and equations.

Inequality and imbalance X

What is it?

A symbol for “is not equal to” (\neq) is required when quantities on either side do not have the same value.

Mathematical operators

Equality and balance

Inequality and imbalance

Greater than/less than

Simplifying algebraic terms

Initial algebraic thinking

M

Mathematical Modelling

Solution Sets

Expressions and equations pathway

show

Mathematical operators

Why is it important?

Being able to use and interpret mathematical symbols is essential for developing an understanding of algebra.

Greater than/less than

What is it?

Symbols to represent 'greater than' ($>$), 'less than' ($<$), 'greater than or equal to' (\geq) and 'less than or equal to' (\leq) are also part of the language of algebra.

Previous knowledge and understanding

- Recognising the four operations
- Confidence with number bonds
- The order of numbers on the number line

Initial algebraic thinking

M

Mathematical operators

Equality and balance

Inequality and imbalance

Greater than/less than

S

Mathematical modelling

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Simplifying algebraic terms

Expressions and equations pathway showing

Pictures and symbols X

Why is it important?

Understanding that numbers, and operators, can be replaced by pictures or symbols is fundamental to all algebraic thinking. Introducing the concept of 'finding the unknown quantity', or operator, is an essential step in developing the ability to work with expressions and solve equations.

Pictures and symbols

Abstract Thinking

Initial algebraic thinking

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Expressing and showing relationships pathway

Pictures and symbols

What is it?

A picture or symbol that replaces a certain number, or operator, in one equation or expression can have a completely different value in another equation or expression. A picture or symbol can represent a number or operator but not necessarily the same number all the time. The understanding of variability is important in algebra.

Previous knowledge and understanding

- The concept of greater than and less than when relating to the number line



can be replaced algebraic the unknown developing the equations.

Initial algebraic thinking

Mathematical operators

Pictures and symbols

Abstract Thinking

Simplifying algebraic terms

Factors of algebraic expressions

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Pictures and symbols

Abstract Thinking

Simplifying algebraic terms

Factors of algebraic expressions

Mathematical Modelling

Solution Sets

Pictures and symbols



Why is it important?

Understand...
by pictu...
thinking...
quantit...
ability t...

Abstract Thinking



What is it?

Abstract thinking is about thinking logically without the use of concrete material or visual representations.

Pictures and symbols

Abstract Thinking

Expressions and equations pathway showing

Simple algebraic equations

X

Why is it important?

Moving from pictures or symbols to letters paves the way for solving algebraic equations and evaluating algebraic expressions. This also helps develop an understanding of variables and constants.

Initial algebraic thinking

Mathematical operators

Simple algebraic equations

Developing approaches to solving equations

Simplifying algebraic terms

Factors of algebraic expressions

Mathematical Modelling

Solution Sets

Expressions and equations pathway showing

Simple algebraic equations



Why is it important?

Simple algebraic equations



What is it?

Simple algebraic equations (variables to a power are not included) that have one variable or one letter have one correct solution, e.g. $4 + x = 9$.

paves the way
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erstanding of

Initial algebraic thinking

Mathematical operators

Simple algebraic equations

Developing approaches to solving equations

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Expressions and Equations

showing



Simplifying

Why is it important?

Moving terms from one side of an equation to the other for solving equations with expressions involving variables.

Developing approaches to solving equations

What is it?

A sound knowledge of number facts will support the ability to solve simple algebraic equations. Learners may use their knowledge of inverse operations to find solutions when the equations become progressively more challenging.

Previous knowledge and understanding

- Using pictures to represent numbers
- Number bond problems involving pictures or symbols
- The significance of the = sign and its link to balance

Simple algebraic equations

Developing approaches to solving equations

Simplifying algebraic terms

Initial algebraic thinking

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Expressions and equations pathway showing

Simplifying algebraic terms X

Why is it important?

Many problems involve a number of algebraic terms, some of which have common variables. Being able to simplify this combination of terms makes solving the problem considerably less challenging.

Simplifying algebraic terms

Simplifying algebraic terms

Initial algebraic thinking

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Expressions and equations pathway showing

Simplifying algebraic terms

What is it?

The simplification of like terms, or collecting like terms, is the process of writing a combination of different algebraic terms in as compact a way as possible.

Previous knowledge and understanding

- Familiarity with algebraic conventions, e.g. $a + a = 2a$ and $1a$ is always written as a
- The properties of basic geometric shapes for context

X

X

algebraic terms, some
are used to simplify
the problem

Initial algebraic thinking

Mathematical operators

Simplifying algebraic terms

Simplifying algebraic terms

Factors of algebraic expressions

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Expressions and equations pathway showing

Evaluate algebraic expressions X

Why is it important?

Substituting given values into algebraic expressions and consequently obtaining a value for the expression is important in mathematical modeling. Understanding that the values to be substituted into the expressions can change allows different problems to be solved.

Initial algebraic thinking

Mathematical operators

Evaluate algebraic expressions

Substitution

Variables

Factors of algebraic expressions

Mathematical Modelling

Solution Sets

Simplifying algebraic terms

Expressions and equations pathway showing

Evaluate algebraic expressions



Why is it important?

Evaluate algebraic expressions



What is it?

Evaluating is performing the calculations which are implied in the expression to find the value of an algebraic expression.

Expressions and equations are related. Understanding that expressions can change

Initial algebraic thinking

Mathematical operators

Evaluate algebraic expressions

Substitution

Variables

Factors of algebraic expressions

Mathematical Modelling

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Simplifying algebraic terms

Expressions and equations pathway showing

Evaluate algebraic expressions X

Why is

Substitution
consequence
important
the value
allows

Substitution X

What is it?

Substitution is replacing a letter in an algebraic expression with a numerical value. Different letters can be assigned different numerical values, unless they are constants such as Pi (π). If a letter appears more than once in an expression, the same numerical value is assigned each time.

Evaluate algebraic expressions

Substitution

Variables

Simplifying algebraic terms

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Factors of algebraic expressions

Mathematical Modelling

Solution Sets

Expressions and equations pathway showing

Evaluate algebraic expressions

Why is it important?

Substituting given values into expressions and consequently obtaining a value is an important skill in mathematical modelling. It allows different problems to be solved.

Variables

What is it?

A variable quantity, as its name suggests, can change in value. In algebra, letters can be assigned a number.

Previous knowledge and understanding

- Familiarity with algebraic convention, e.g. $3c = 3 \times c = c + c + c$
- Simplifying groups of like terms
- Using the four operations



Initial algebraic thinking

Mathematical operators

Evaluate algebraic expressions

Substitution

Variables

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Factors of algebraic expressions

Solution Sets

Mathematical Modelling

Expressions and equations pathway showing

Equations

X

Why is it important?

Translating a real problem from words into a simple equation demonstrates the importance and relevance of mathematics. Being able to form equations from written, pictorial or spoken information is fundamental to mathematical modelling.

Initial algebraic thinking

Mathematical operators

Equations

Forming simple equations from statements and problems

Solving equations

Factors of algebraic expressions

Mathematical Modelling

Solution Sets

Simplifying algebraic terms

Expressions and equations pathway showing

Equations

Why is it important?

Equations

What is it?

Equations use letters, numbers, signs and symbols and allow given situations or conditions to be expressed in the most concise way possible.

to a simple and relevance
ions from
fundamental to

Initial algebraic thinking

Mathematical operators

Equations

Forming simple equations from statements and problems

Solving equations

Factors of algebraic expressions

Simplifying algebraic terms

Mathematical Modelling

Solution Sets

Expressions and equations pathway showing

Equations

Why is it important?

Translating mathematical statements into written mathematical notation

Forming simple equations from statements and problems

What is it?

Letters are assigned to each variable and appropriate mathematical signs are used to imply the correct calculation. Simple equations will normally have one variable and one solution. Familiarity with integers and fractions allows scope for forming equations that may not have whole number solutions. The facts and properties of geometric shapes can be used to form simple equations.



Initial algebraic thinking

Mathematical operators

Equations

Forming simple equations from statements and problems

Solving equations

Simplifying algebraic terms

Factors of algebraic expressions

Mathematical Modelling

Solution Sets

Expressions and equations showing

Equations

Why is it important?

Translating a real problem from an equation demonstrates the importance of mathematics. Being able to translate written, pictorial or spoken information into mathematical modelling.

Solving equations

What is it?

An equals symbol (=) and language such as 'solve' would indicate that a numerical value has to be found. An equation can be solved using different procedures. Solutions to equations can be found algebraically or graphically. Solving an equation or inequation can result in a unique solution (one answer), an interval of values or a choice of individual values.

Previous knowledge and understanding

- Solving simple equations
- The properties of geometric shapes for context



Initial algebraic thinking

Mathematical operators

Equations

Forming simple equations from statements and problems

Solving equations

Factors of algebraic expressions

Simplifying algebraic terms

Solution Sets

Mathematical modelling

Expressions and equations pathway showing

Formulae

X

Why is it important?

Being able to use formulae is essential in many areas of the curriculum and beyond. Being able to construct a formula supports the type of problem solving skills needed in many occupations in the modern world.

Initial algebraic thinking

Mathematical operators

Formulae

Creating formulae and generating solutions

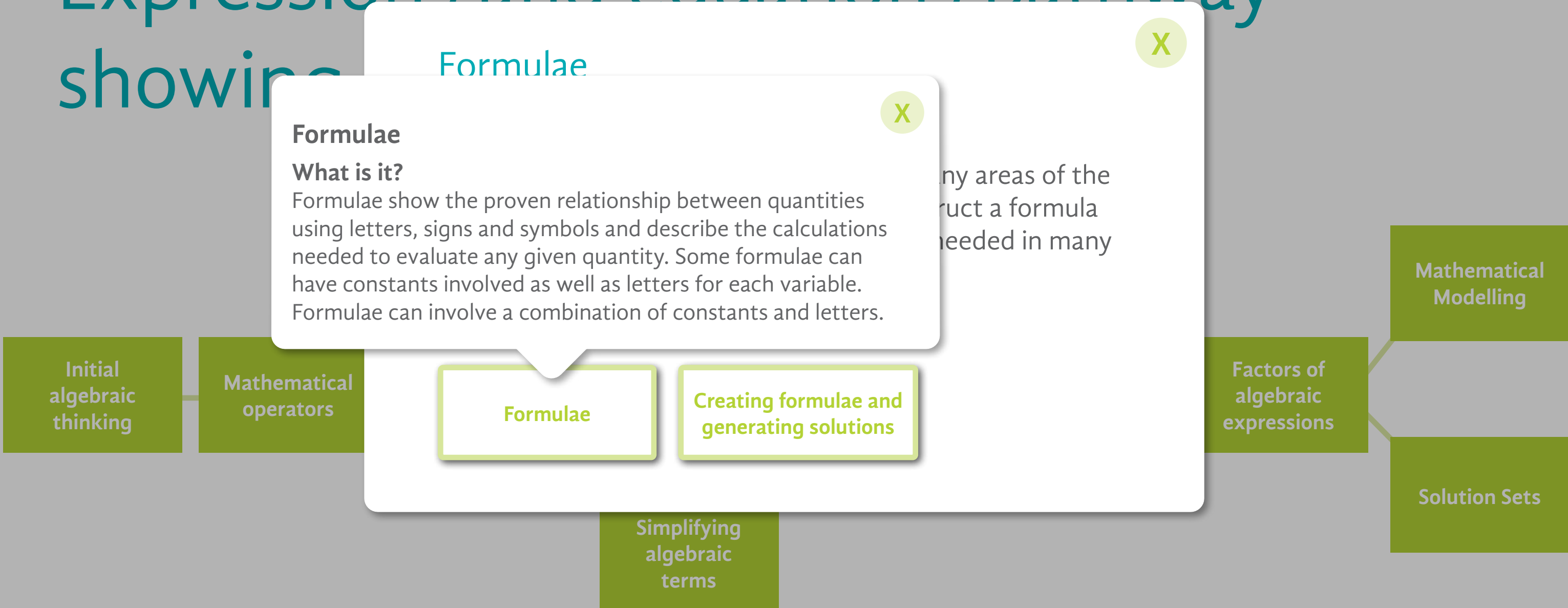
Simplifying algebraic terms

Factors of algebraic expressions

Mathematical Modelling

Solution Sets

Expressions and equations pathway showing



Formulae



Formulae

What is it?

Formulae show the proven relationship between quantities using letters, signs and symbols and describe the calculations needed to evaluate any given quantity. Some formulae can have constants involved as well as letters for each variable. Formulae can involve a combination of constants and letters.



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Formulae

Creating formulae and
generating solutions

Simplifying
algebraic
terms

Factors of
algebraic
expressions

Mathematical
Modelling

Solution Sets

Expressions and Equations

showing



Creating formulae and generating solutions

What is it?

Formulae are created by comparing the relationship between different quantities and obtaining a rule that links these quantities.

Solutions can be found from the calculations involved in using formulae. Formulae are a mechanism for producing different output values dependent on the values substituted in the first place. Simple formulae are ideal for comparing changes in output with changes in input.

Previous knowledge and understanding

- Letters can represent quantities, e.g. P can represent perimeter (important reminder: if the perimeter was 20cm then P would represent 20 and P cm would be 20cm)
- Algebraic conventions, e.g. abc means $a \times b \times c$, $a \times a = a^2$

Form

Why is

Being a
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Formulae

Creating formulae and
generating solutions

Simplifying
algebraic
terms

Factors of
algebraic
expressions

Mathematical
Modelling

Solution Sets

Initial
algebraic
thinking

Mathematical
operators

Expressions and equations pathway showing milestones

Factors of algebraic expressions X

Why is it important?

The ability to factorise algebraic expressions enables more complex equations to be solved in an efficient manner.

Factors of algebraic expressions

Recognising common factors

Understanding the distributive law

Simplifying algebraic terms

Initial algebraic thinking

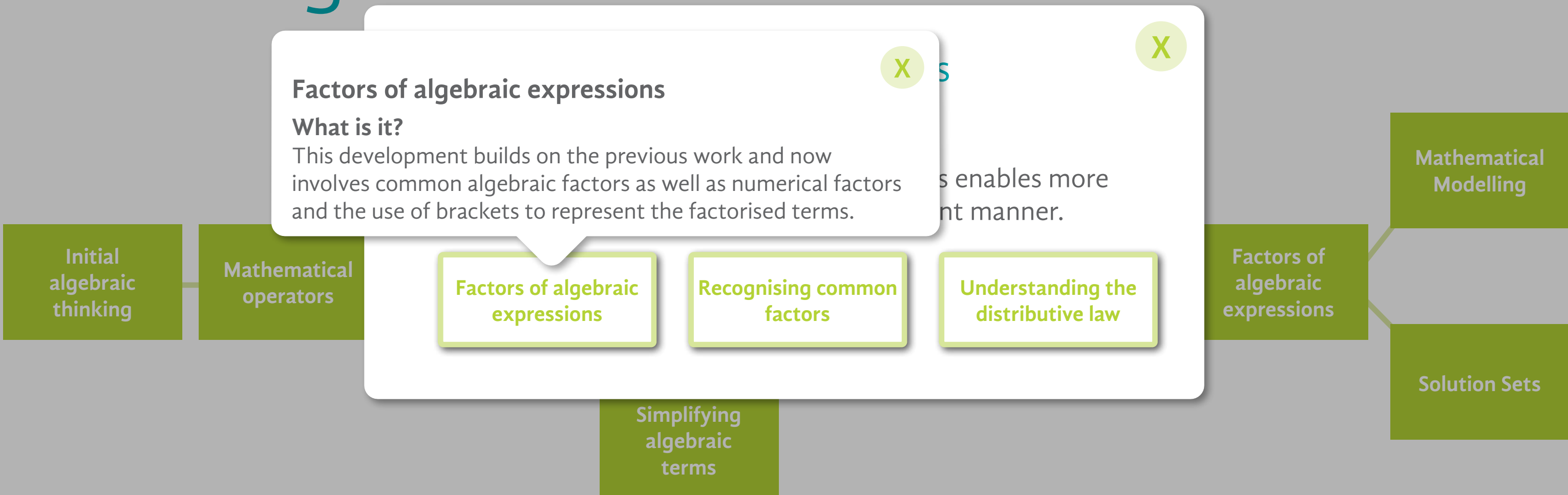
Mathematical operators

Factors of algebraic expressions

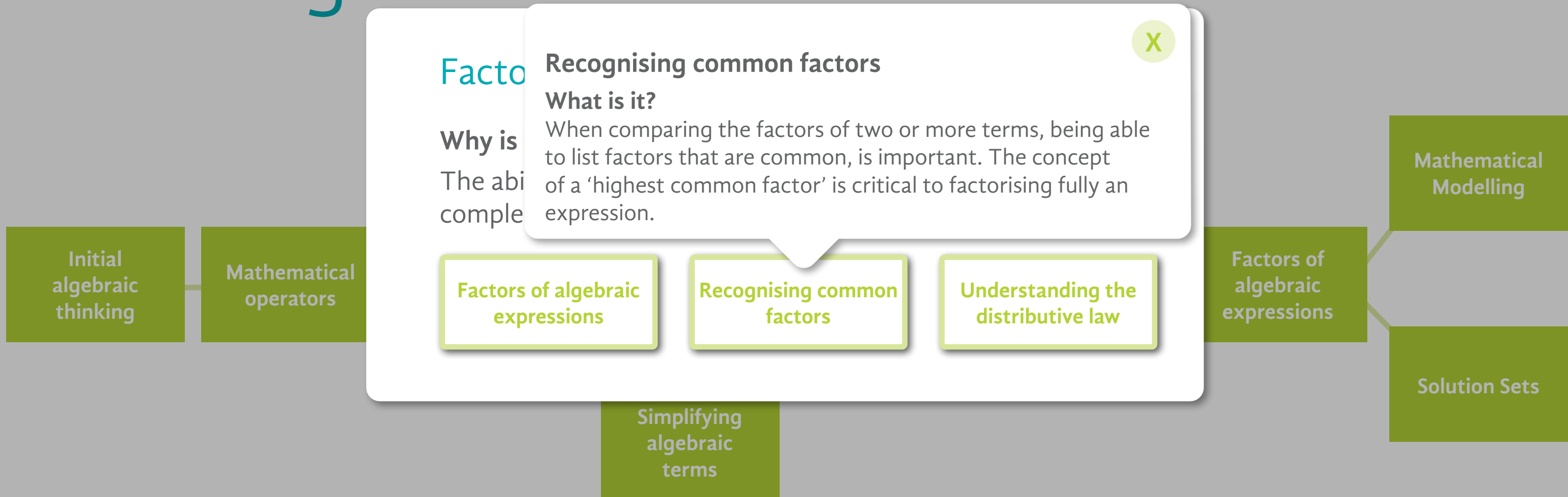
Mathematical Modelling

Solution Sets

Expressions and equations pathway showing milestones



Expressions and equations pathway showing milestones



Expressions and equations showing milestones

Factors of algebraic expressions

Why is it important?

The ability to factorise algebraic expressions and complex equations to be solved

Understanding the distributive law

What is it?

The distributive law highlights a basic mathematical process and its equivalent inverse process. Multiplying the sum of two numbers by a third number is the same as multiplying the two numbers individually by the third number first and then finding the sum of the two new numbers formed. $a(b + c) = ab + ac$

Previous knowledge and understanding

- The factors of a number
- Listing common factors for two or more numbers
- Recognising the highest common factor
- Algebraic convention, e.g. $6a = 3 \times 2a$

Factors of algebraic expressions

Recognising common factors

Understanding the distributive law

Factors of algebraic expressions

Solution Sets

Simplifying algebraic terms

Initial algebraic thinking

Mathematical operators

Mathematical Modelling



Expressions and equations pathway showing

Mathematical modelling

X

Why is it important?

Many problems in manufacturing, engineering, technology and science require the skills involved in mathematical modelling. This ability to construct, interpret and solve equations or inequations that represent a real life, or theoretical, situation are fundamental to the process.

Initial algebraic thinking

Mathematical operators

Mathematical modelling

Solving inequalities

Simplifying algebraic terms

Factors of algebraic expressions

Mathematical Modelling

Solution Sets

Expressions and equations pathway showing

Mathematical modelling

What is it?

Mathematical modelling is a skill that involves translating a complex problem into the most concise algebraic form. It is the ability to read and interpret a problem, to express the information appropriately as an equation, inequation, inequality or formula, to solve it and to be able to communicate the answer using the context of the original information.



Initial algebraic thinking

Mathematical operators

Mathematical modelling

Solving inequalities

Simplifying algebraic terms

Factors of algebraic expressions

Mathematical Modelling

Solution Sets

ing, technology
 mathematical
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 al life, or
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Expressions and Equations

showing

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Solving inequalities



What is it?

Solving inequalities is the idea of a set of possible solutions. An inequality does not have an 'equality' sign but instead uses either 'greater than' sign, 'greater than or equal to' sign, 'less than' sign or 'less than or equal to' sign. The same concepts and skills used to solve equations can help to solve inequalities. It is important to stress that attention should be paid to the conditions that are applied to the inequality as this will impact on what is permitted in the solution set.

e.g. $x \geq 5$, where x is a single digit whole number

Previous knowledge and understanding

- Changing words and diagrams into algebraic form
- The properties of geometric shapes for context
- Angle classifications, e.g. complementary and supplementary angles

Maths

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Mathematical modelling

Solving inequalities

Simplifying algebraic terms

Initial algebraic thinking

Mathematical operators

Factors of algebraic expressions

Mathematical Modelling

Solution Sets

Expressions and equations pathway showing milestones

Solution sets

X

Why is it important?

Many mathematical problems can have more than one solution. The ability to list all possible solutions is essential in mathematical problems of this type.

Solution sets

Initial
algebraic
thinking

Mathematical
operators

Simplifying
algebraic
terms

Factors of
algebraic
expressions

Mathematical
Modelling

Solution Sets

Expressing solutions pathway

Solution sets

What is it?

A solution set is a set of numbers that lists all possible solutions to a given mathematical problem. In many cases the solution lies within defined mathematical sets.

E.g. Whole numbers $\{0, 1, 2, 3, \dots\}$, Natural numbers $\{1, 2, 3, \dots\}$, Integers $\{\dots, -2, -1, 0, 1, 2, \dots\}$ and Real numbers $\{\text{all points on an infinitely long number line (e.g. fractions, decimal fractions, roots, } \pi, \dots)\}$

Previous knowledge and understanding

- Equations, inequations and formulae



Initial algebraic thinking

Mathematical operators

Solution sets

Simplifying algebraic terms

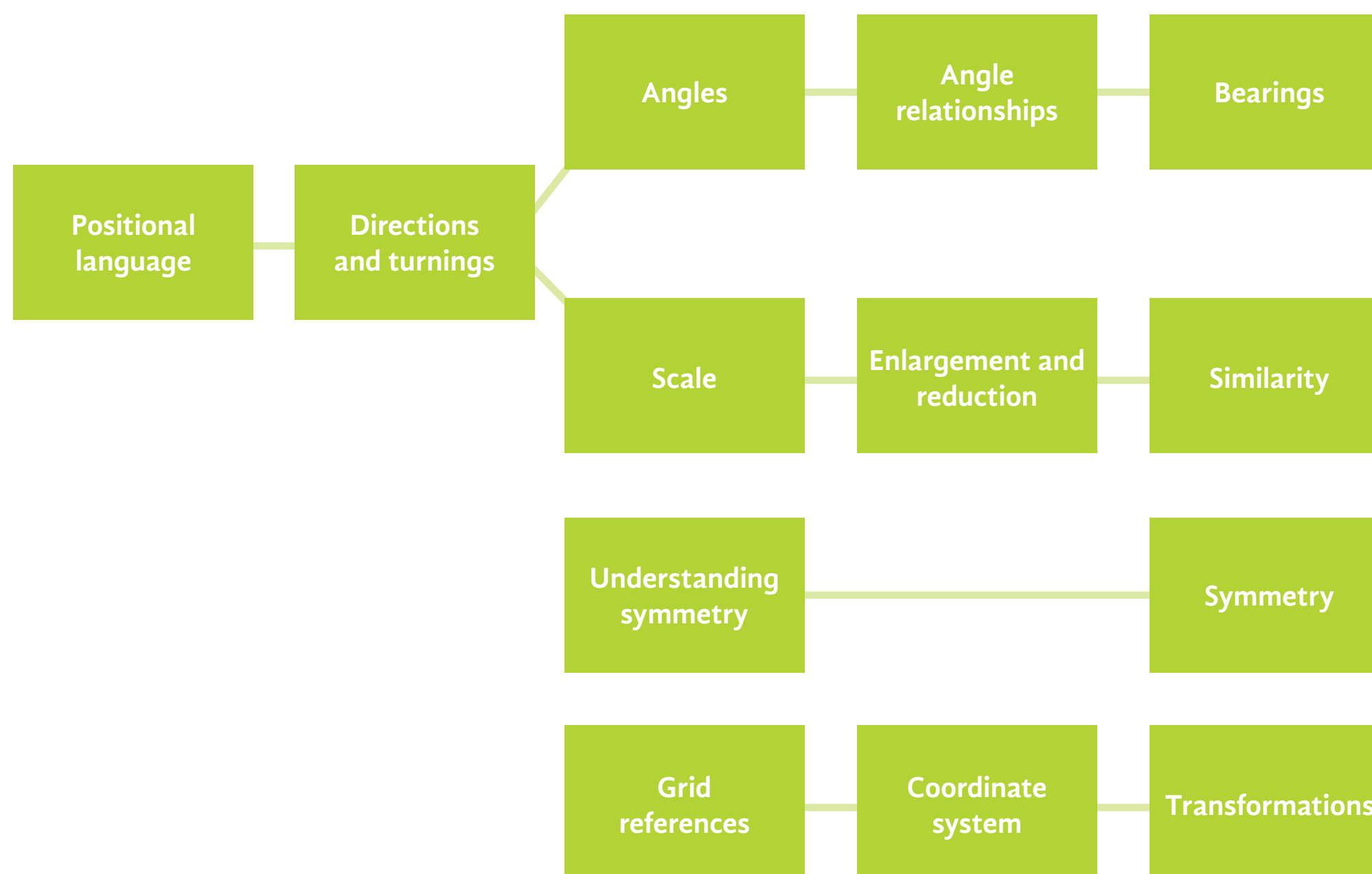
Factors of algebraic expressions

Mathematical Modelling

Solution Sets

More than one solutions is essential in

Angles, symmetry and transformation



Angles, symmetry and transformation

Positional
language

Positional language

X

Why is it important?

The use of positional language is one of the first steps in understanding spatial awareness.

Positional language

symmetry

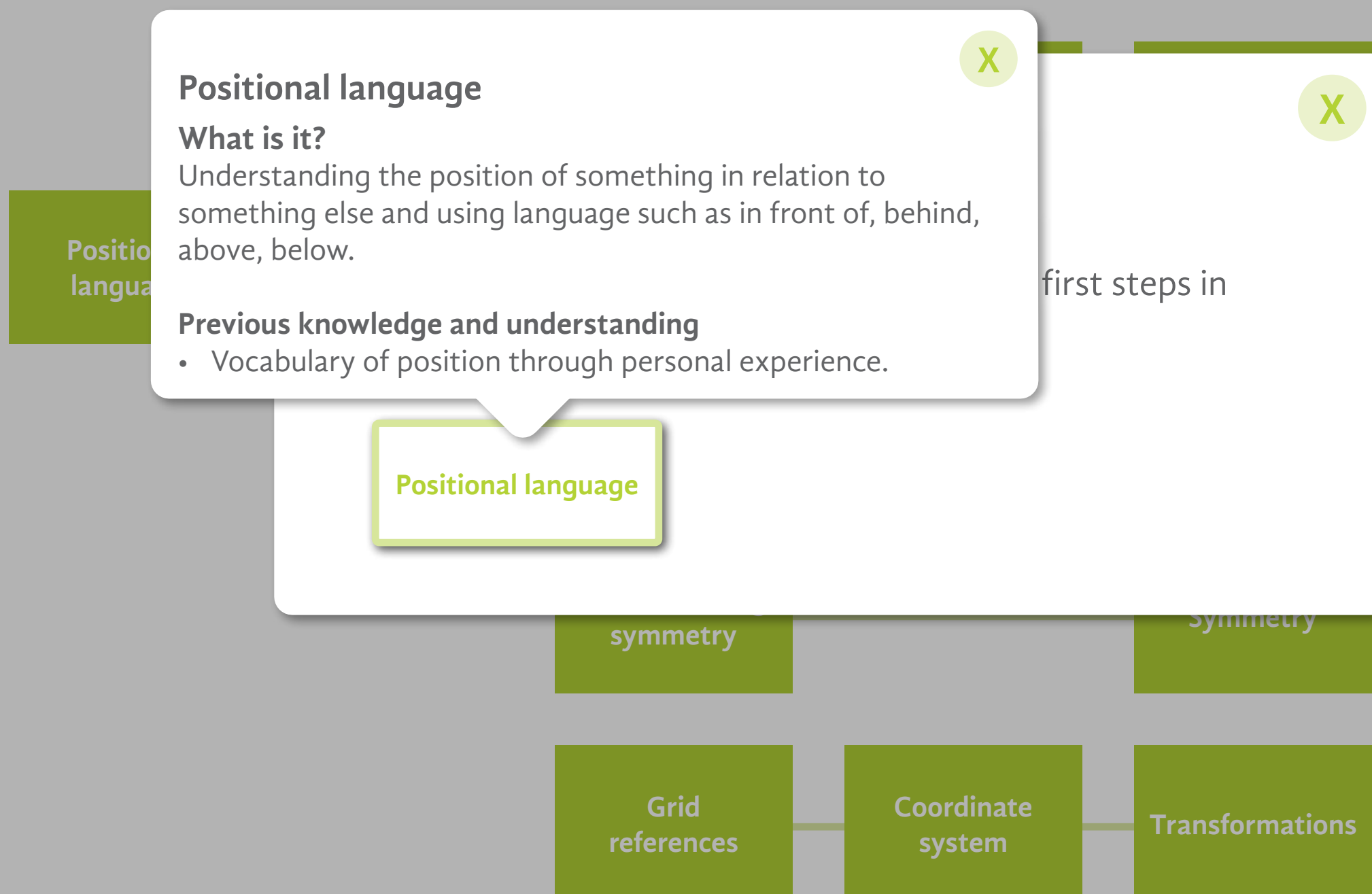
symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation



Angles, symmetry and transformation

Positional
language

Directions & turnings

X

Why is it important?

Being able to follow and give directions is a necessary life skill that allows local areas to be efficiently navigated. It also develops basic map reading skills.

Directions & turnings

Cardinal compass
points

symmetry

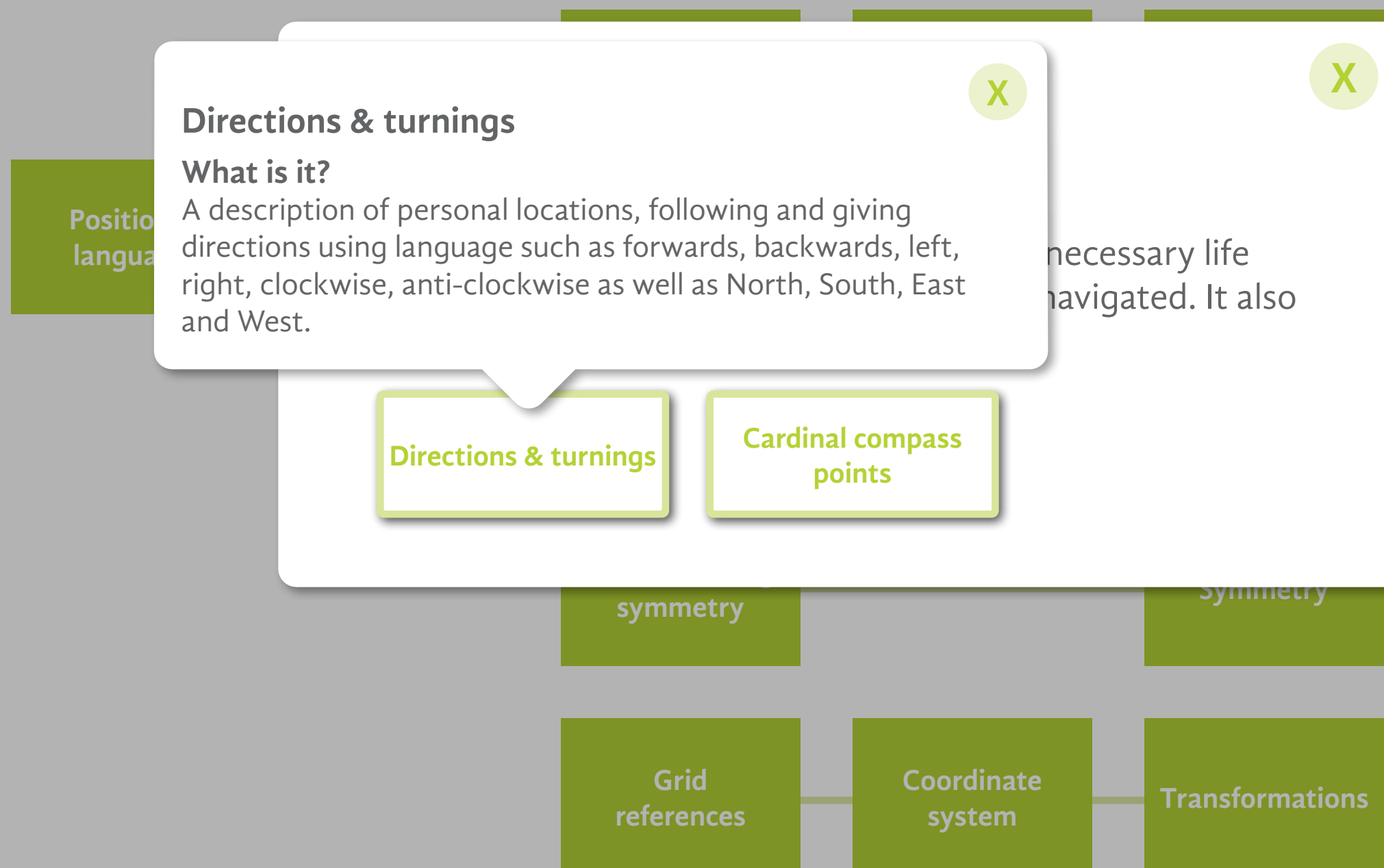
symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation



Position language

Directions & turnings

What is it?

A description of personal locations, following and giving directions using language such as forwards, backwards, left, right, clockwise, anti-clockwise as well as North, South, East and West.



Directions & turnings

Cardinal compass points

symmetry

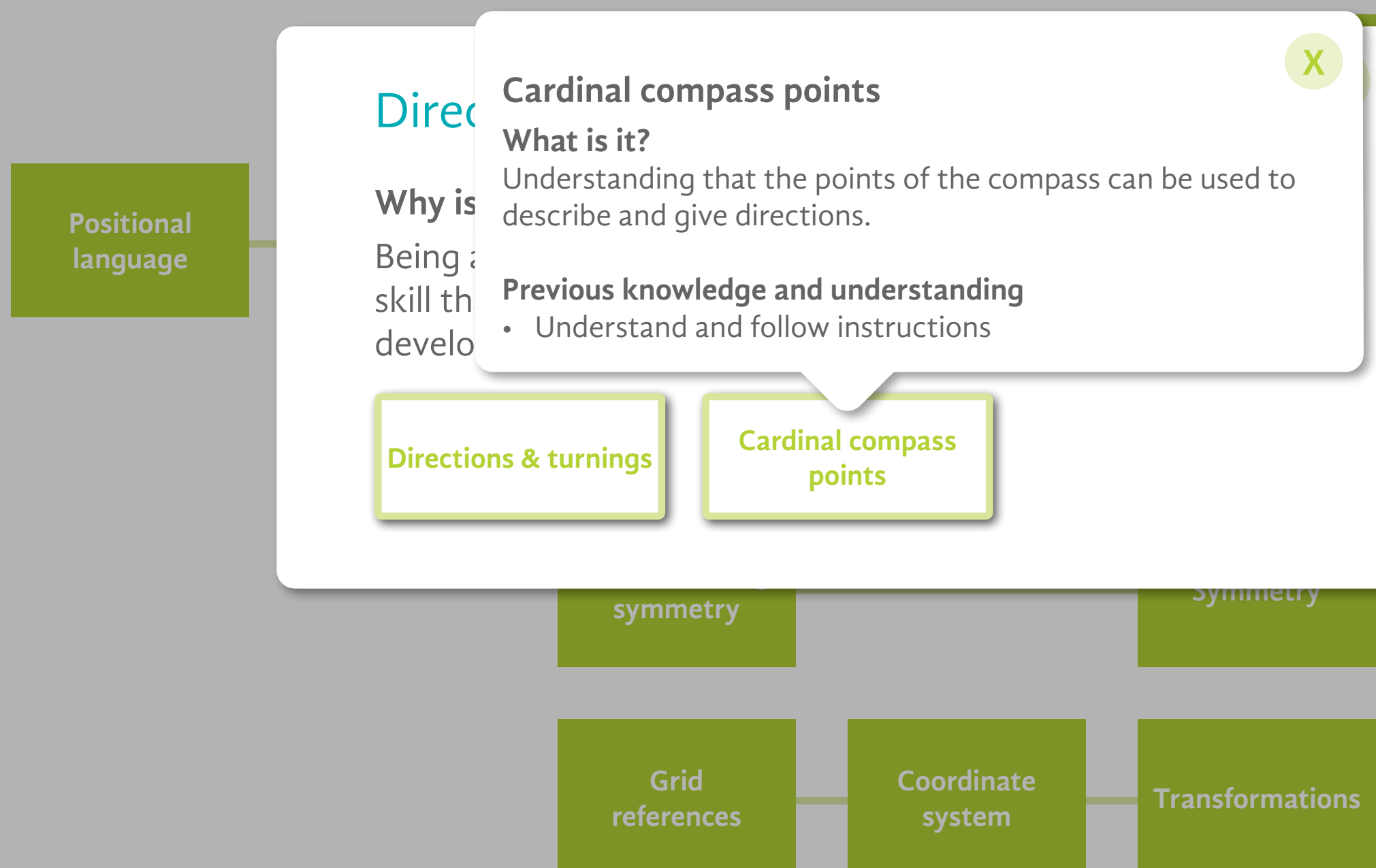
symmetry

Grid references

Coordinate system

Transformations

Angles, symmetry and transformation



Angles, symmetry and transformation

Angles

X

Why is it important?

A knowledge of angles is required for the understanding of position and geometrical properties of shapes.

Angles

Classifying angles

Measuring Angles

Drawing Angles

Compass points and angles

symmetry

Symmetry

Grid references

Coordinate system

Transformations

Angles, symmetry and transformation

Angles

What is it?

An angle measures amount of turning. Understanding the relationship between the vocabulary of direction and the associated angle, e.g. $\frac{1}{4}$ turn = 90° .

Previous knowledge and understanding

- Vocabulary associated with position: to the right of etc.



Angles

Classifying angles

Measuring Angles

Drawing Angles

Compass points and angles

symmetry

symmetry

Grid references

Coordinate system

Transformations

Angles, symmetry and transformation

Angles

X

Why is
A know
positio

Classifying angles

X

What is it?

Angles can be classified depending on their size, e.g. acute is less than 90° .

Angles

Classifying angles

Measuring Angles

Drawing Angles

Compass points and angles

symmetry

symmetry

Grid references

Coordinate system

Transformations

Angles, symmetry and transformation

Angles

Why is it important?

A knowledge of angles is required for many positions and geometrical problems.

Measuring Angles

What is it?

Angles are measured in degrees ($^{\circ}$) using a protractor.

Angles

Classifying angles

Measuring Angles

Drawing Angles

Compass points and angles

symmetry

symmetry

Grid references

Coordinate system

Transformations

Angles, symmetry and transformation

Angles

Why is it important?

A knowledge of angles is required for the understanding of the position and geometrical properties of shapes.

Drawing Angles

What is it?

Making use of ruler and protractor to accurately measure and draw a given angle.

Angles

Classifying angles

Measuring Angles

Drawing Angles

Compass points and angles

symmetry

symmetry

Grid references

Coordinate system

Transformations

Angles, symmetry and transformation

Angles

Why is it important?

A knowledge of angles is required for the understanding of position and geometrical properties of shapes.

Compass points and angles

What is it?

Investigate the angle between two compass points.

Angles

Classifying angles

Measuring Angles

Drawing Angles

Compass points and angles

symmetry

symmetry

Grid references

Coordinate system

Transformations

Angles, symmetry and transformation

Angle Relationships

X

Why is it important?

An understanding of the angle relationships in 2D diagrams allows for the calculation of missing angles.

Angle Relationships

Naming angles

Angles in geometric shapes and intersecting lines

Angles and circles

symmetry

Symmetry

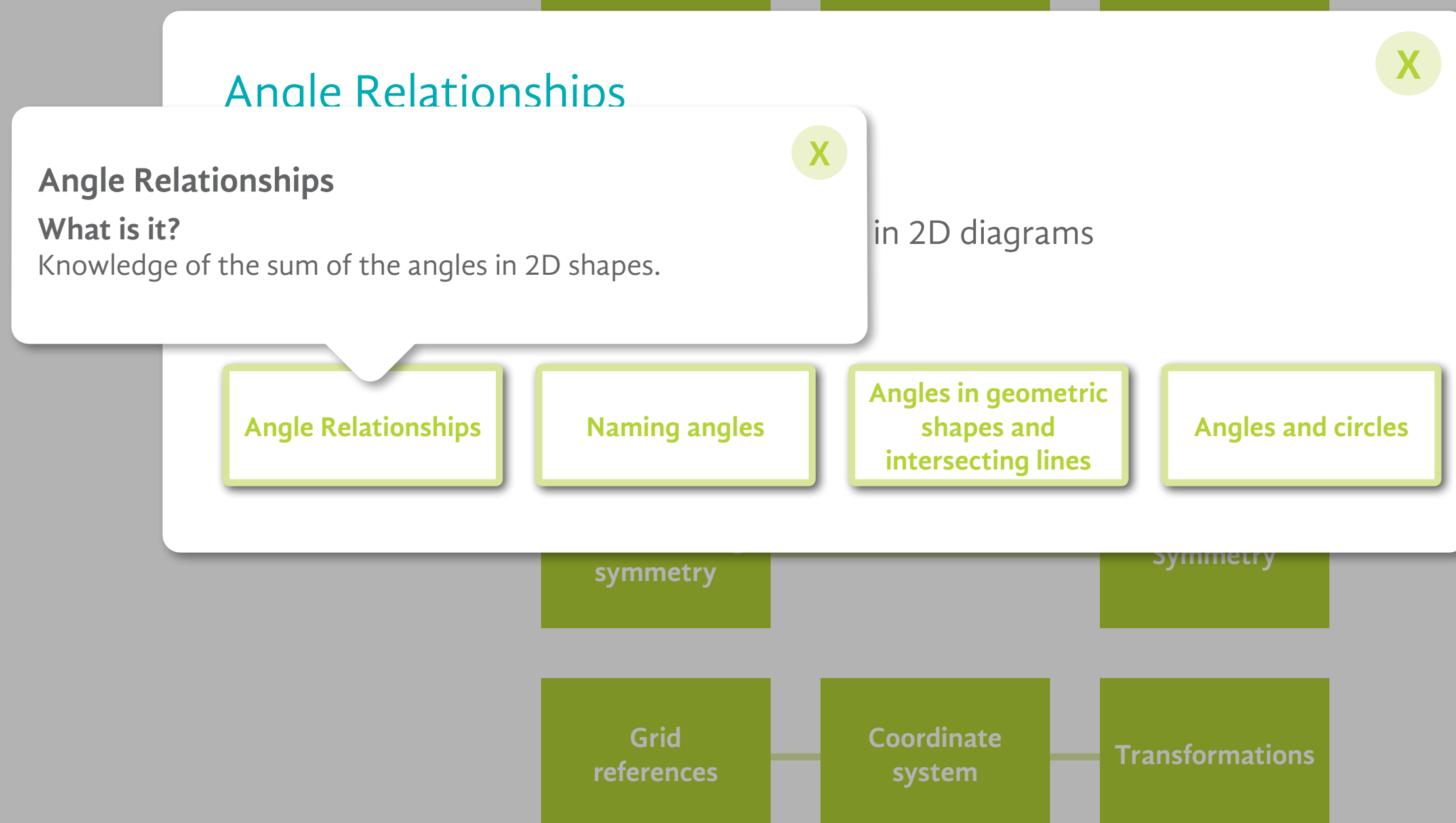
Grid references

Coordinate system

Transformations

Position
language

Angles, symmetry and transformation



Angles, symm

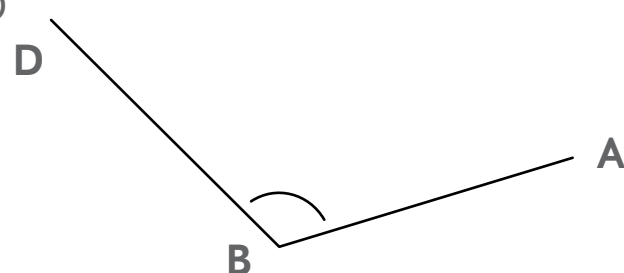
Naming angles

What is it?

Angles are named using three letters. These are written at the vertex and at the ends of the two arms that form the angle. The vertex is always the middle of the three letters.

Angle

This angle is made from two arms, AB and BD, with vertex at B.
 $\angle DBA$ or $\angle ABD$



Why is

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Angle Relationships

Naming angles

Angles in geometric
shapes and
intersecting lines

Angles and circles

symmetry

symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and

Position
language

Angle Relationships

Why is it important?

An understanding of the angles allows for the calculation of

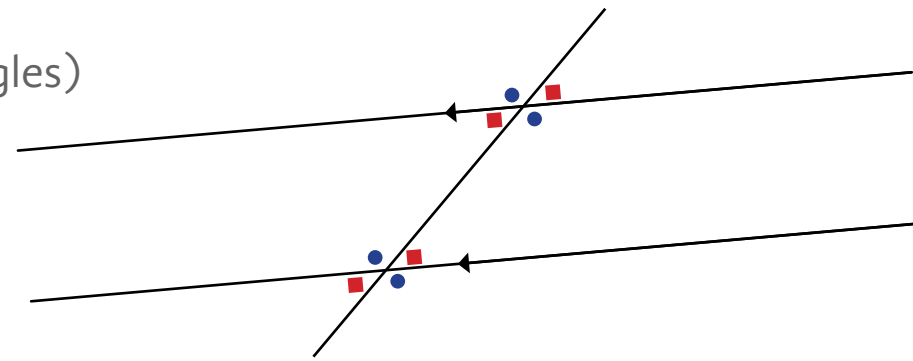
Angles in geometric shapes and intersecting lines



What is it?

- Knowledge of the sum of the angles in 2D shapes.
- The conditions for complementary (add up to 90°) and supplementary (add up to 180°) angles.
- The occurrence of corresponding and alternate angles in parallel lines.
- The occurrence of vertically opposite angles.

(F, Z and X angles)



Angle Relationships

Naming angles

Angles in geometric shapes and intersecting lines

Angles and circles

symmetry

symmetry

Grid references

Coordinate system

Transformations

Angles, symmetry and transfo

Position
language

Angle Relationships

Why is it important?

An understanding of the angle relationships in 2D allows for the calculation of missing angles.

Angle Relationships

Naming angles

Angles in geometric shapes and intersecting lines

Angles and circles

symmetry

symmetry

Grid references

Coordinate system

Transformations

Angles and circles

X

What is it?

A tangent is a straight line that touches the diameter of a circle at one point only. If a radius is also drawn to this point then the resulting angle between radius and tangent is right-angled and so the tangent is perpendicular to the radius at the point of contact. Understand that a triangle formed using the end-points of the diameter of a circle and the third point rests on the circumference of the circle will always be right-angled.

Previous knowledge and understanding

- The meaning of perpendicular

Angles, symmetry and transformation

Positional
language

Bearings

X

Why is it important?

Understanding bearings is essential for the daily safety of millions when travelling on planes or ships at sea.

Bearings

symmetry

symmetry

Grid
references

Coordinate
system

Transformations

Angles,

nation

Bearings

What is it?

Understanding the convention used when describing a bearing. Being able to link all standard compass points with their associated bearings. Being able to construct accurate scale drawings for journeys involving distances and bearings.

Previous knowledge and understanding

- Scale drawing
- Points on a compass
- Measuring angles
- Complimentary and supplementary angles

Position
language

daily safety of
t sea.

Bearings

symmetry

symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation

Positional
language

Scale

X

Why is it important?

Scale is essential for regularly encountered contexts such as maps, plans and modelling.

Scale

symmetry

symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation

Scale

What is it?

Understanding scale factors and using them to solve problems that relate to similar objects, shapes, maps and plans. Choose an appropriate scale to draw journeys where all actual information is given.

Previous knowledge and understanding

- Ratio
- Measuring and drawing angles

Position
language

context such as

Scale

symmetry

symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation

Positional
language

Enlargement and Reduction

X

Why is it important?

Enlargement of molecular structures assists with investigations into cells and supports medical advancements. Reduced scale models are commonly used in wind tunnels to determine wind resistance etc.

Enlargement and
reduction

symmetry

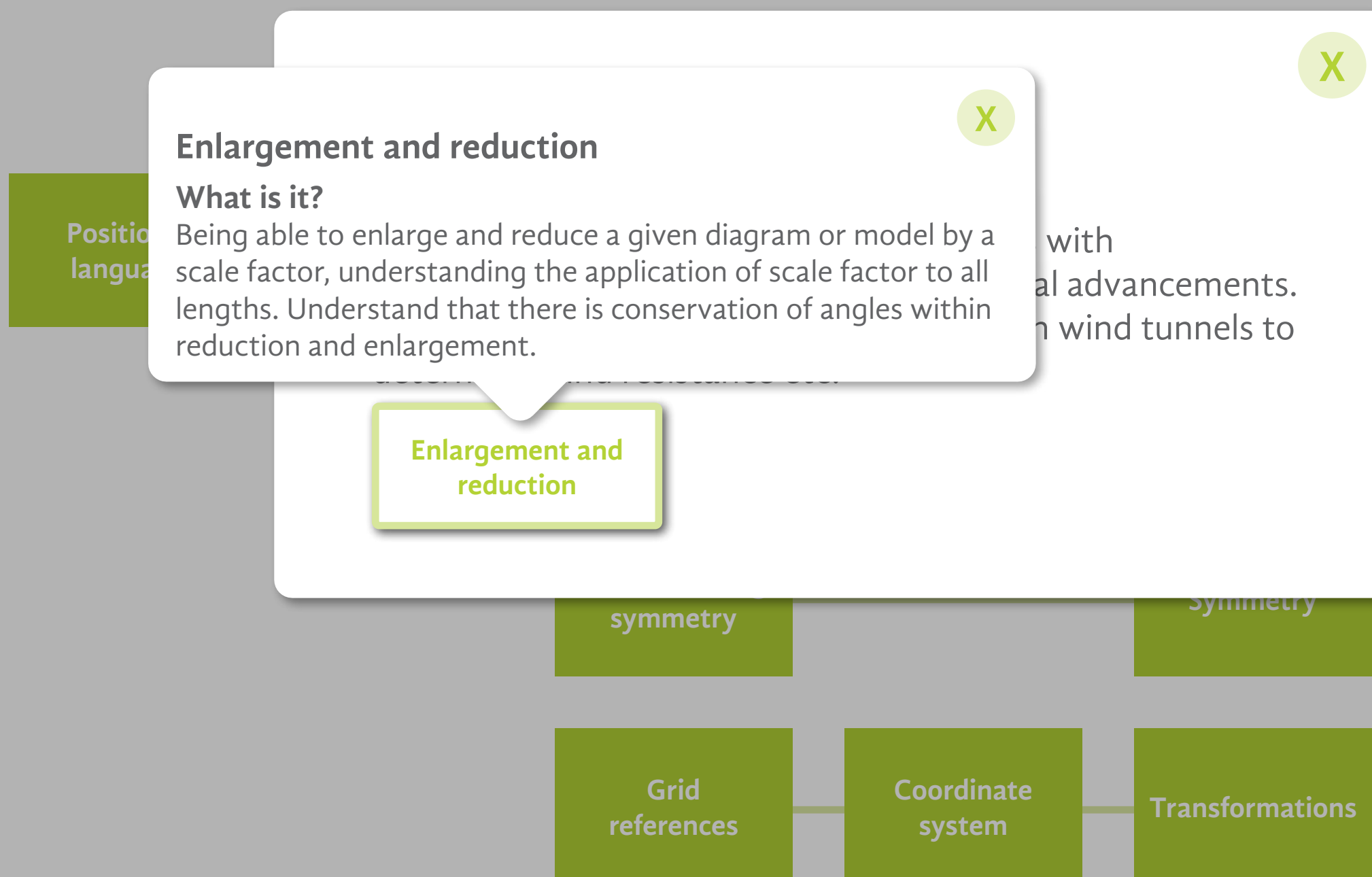
symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation



Angles, symmetry and transformation

Positional
language

Similarity

X

Why is it important?

Appreciating that two objects which are similar will share key properties, underpins the practice of modelling. This allows wind tunnels, wave tanks etc. to be used on scaled down models knowing results obtained will mirror real-life outcomes.

Similarity

symmetry

symmetry

Grid
references

Coordinate
system

Transformations

Angles,

nation

Similarity

What is it?

Being able to calculate and use a scale factor that connects two similar figures.

Understand that problems involving the area of similar figures requires the scale factor to be squared. Possible extension: problems that compare the volumes of two similar objects require the scale factor to be cubed.

Previous knowledge and understanding

- Ratio
- Scale factors
- Solving basic scale problems
- Squaring and cubing fractions

Position
language

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caled down
real-life outcomes.

Similarity

symmetry

symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation

Positional
language

Understanding symmetry

X

Why is it important?

Interpreting and drawing symmetrical patterns, shapes and pictures develops an understanding of the relationship between reflection and symmetry.

Understanding
symmetry

symmetry

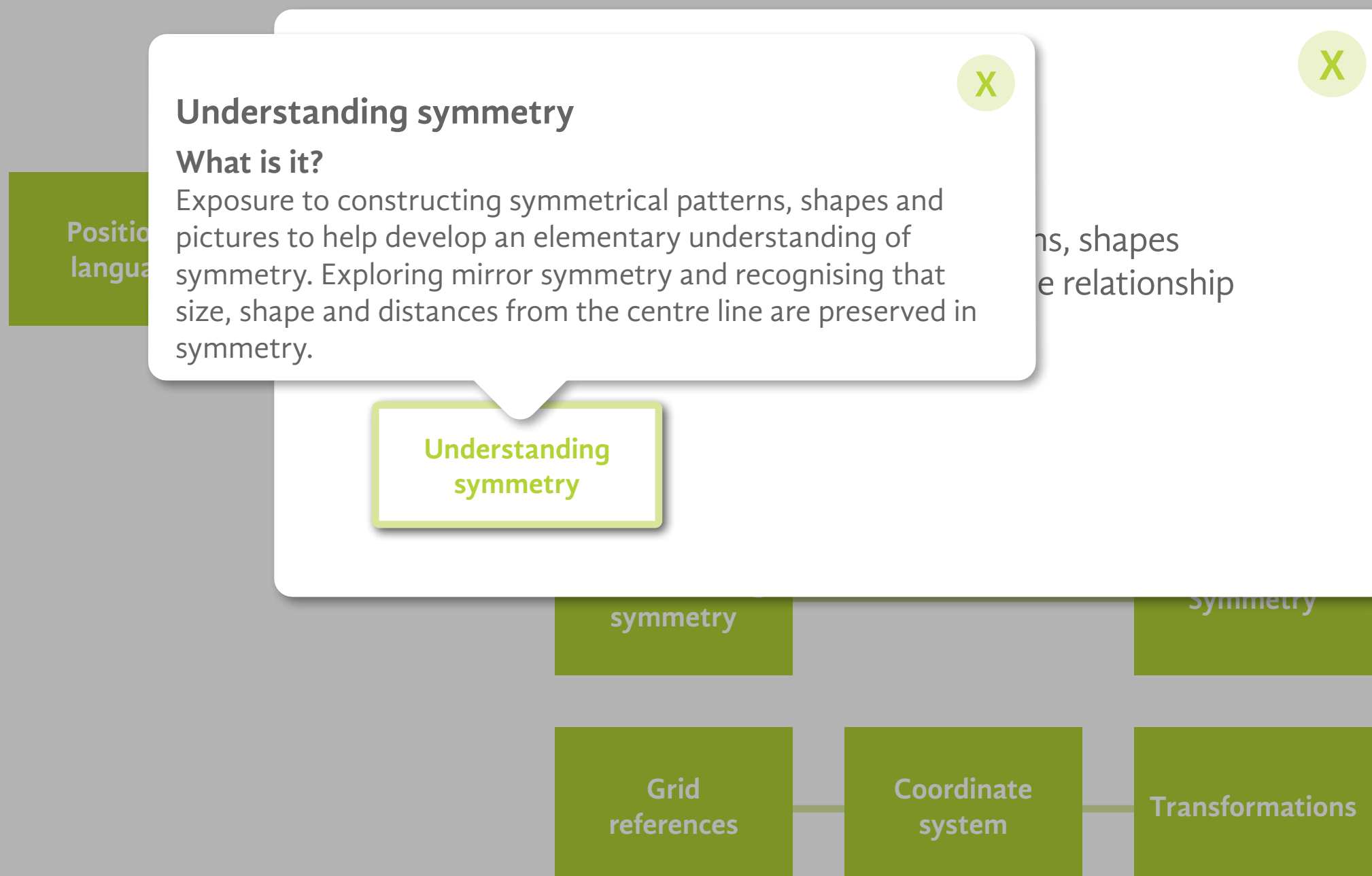
symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation



Angles, symmetry and transformation

Positional
language

Symmetry

X

Why is it important?

Investigating symmetrical patterns and designs enhances an understanding and appreciation of the natural world and art. It is also fundamental to developing skills associated with geometrical reasoning.

Symmetry

Line symmetry

Rotational symmetry

symmetry

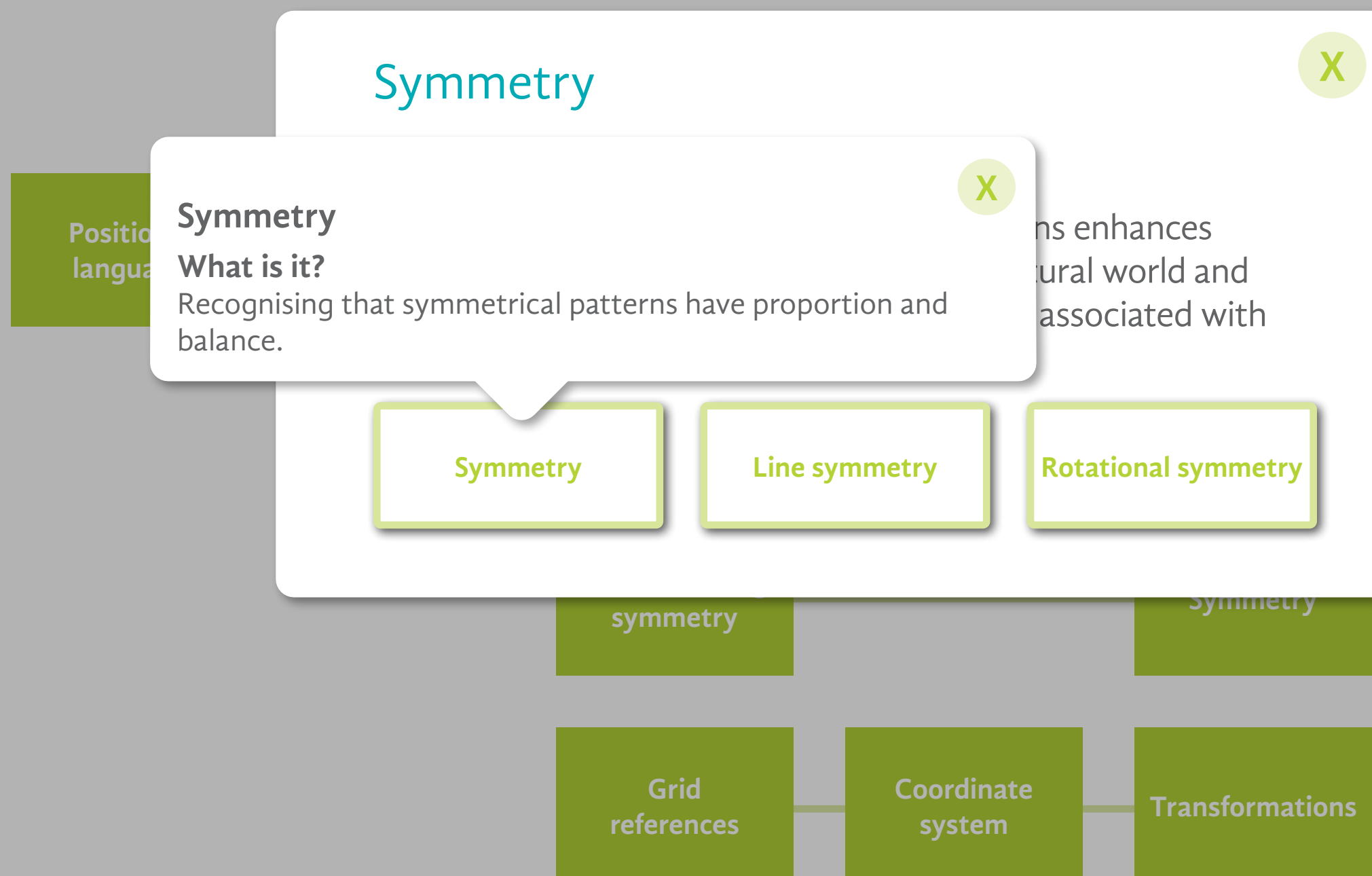
symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation



Angles, symmetry and transformation

Positional language

Symmetry

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geome

Line symmetry

What is it?

Recognising that a line of symmetry divides a shape into two congruent parts, each of which is the mirror image of the other. The line of symmetry can be horizontal, vertical or inclined.



Symmetry

Line symmetry

Rotational symmetry

symmetry

symmetry

Grid references

Coordinate system

Transformations

Angles, symmetry and transformation

Positional language

Symmetry

Why is it important?

Investigating symmetrical patterns leads to an understanding and appreciation of art. It is also fundamental to coordinate geometry and geometrical reasoning.

Rotational symmetry

What is it?

A shape has rotational symmetry if it can be rotated through an angle to fit exactly on to its original outline. The order of rotational symmetry is the number of times a shape can be rotated and fit exactly on top of its original position within a complete turn. The centre of symmetry is the fixed point about which the shape is rotated.



Symmetry

Line symmetry

Rotational symmetry

symmetry

symmetry

Grid references

Coordinate system

Transformations

Angles, symmetry and transformation

Positional
language

Grid References

X

Why is it important?

Understanding how different grids operate is essential when locating seats on planes or trains, participating in games such as battleships or locating buildings in cities, such as New York.

Grid References

symmetry

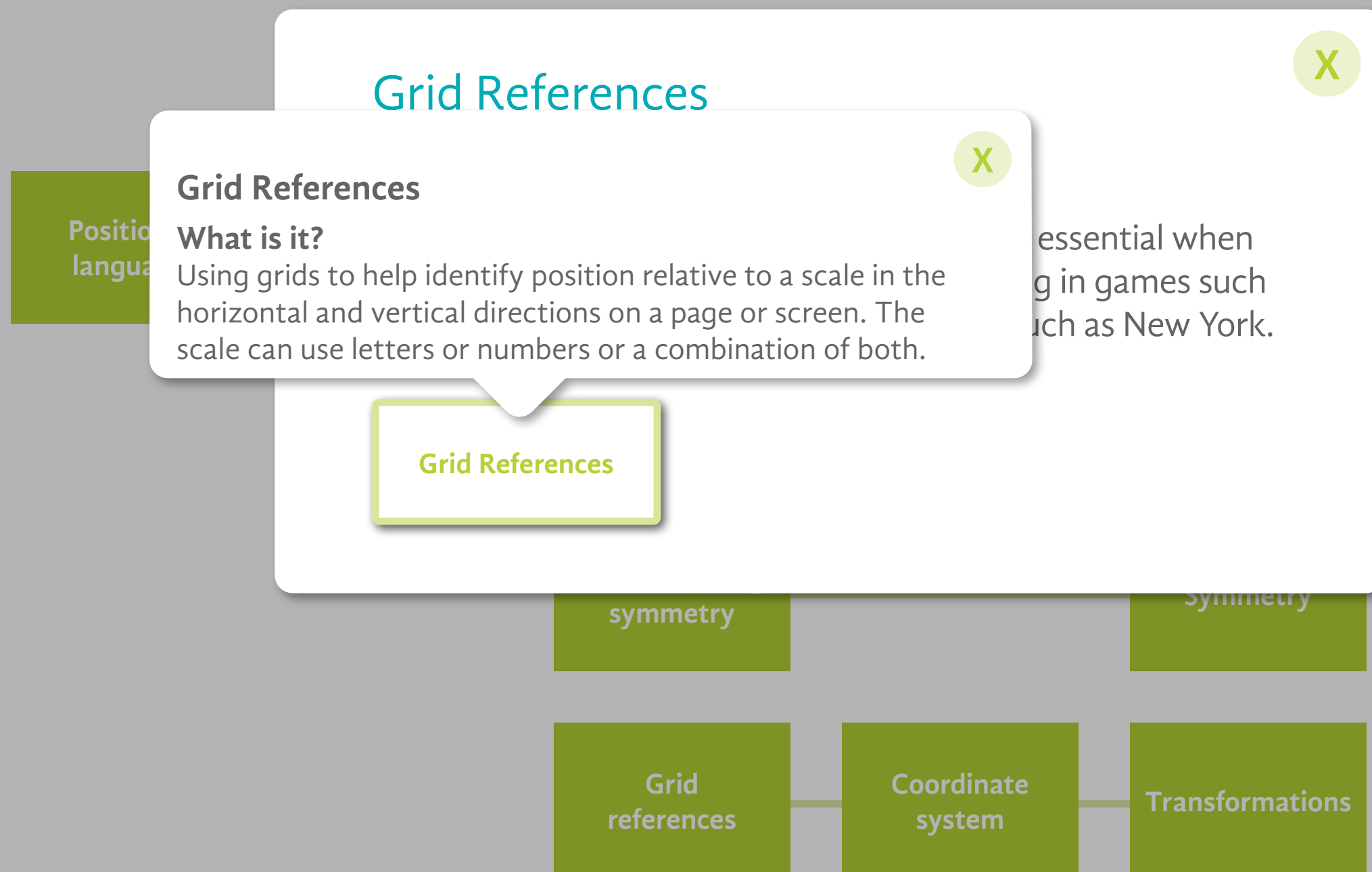
symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation



Position
language

essential when
g in games such
uch as New York.

Angles, symmetry and transformation

Positional
language

Co-ordinate system

X

Why is it important?

Co-ordinate grids provide the foundation for describing a unique point and are essential for graphing and transforming geometrical shapes.

Co-ordinate system

symmetry

symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation

Co-ordinate system

What is it?

Labeling and numbering axes. Emphasise the numbering of lines and not spaces in-between. Be able to plot points and give the co-ordinates of a group of points. Be able to extend a one quadrant grid to one with four quadrants.

Previous knowledge and understanding

- Understanding grids
- Know the numbers on the number line
- Understand negative numbers

Position
language

describing a
and transforming

Co-ordinate system

symmetry

symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation

Positional
language

Transformations

X

Why is it important?

Transformation of points and 2D shapes is key to integrating all previous geometrical skills and knowledge.

Transformations

symmetry

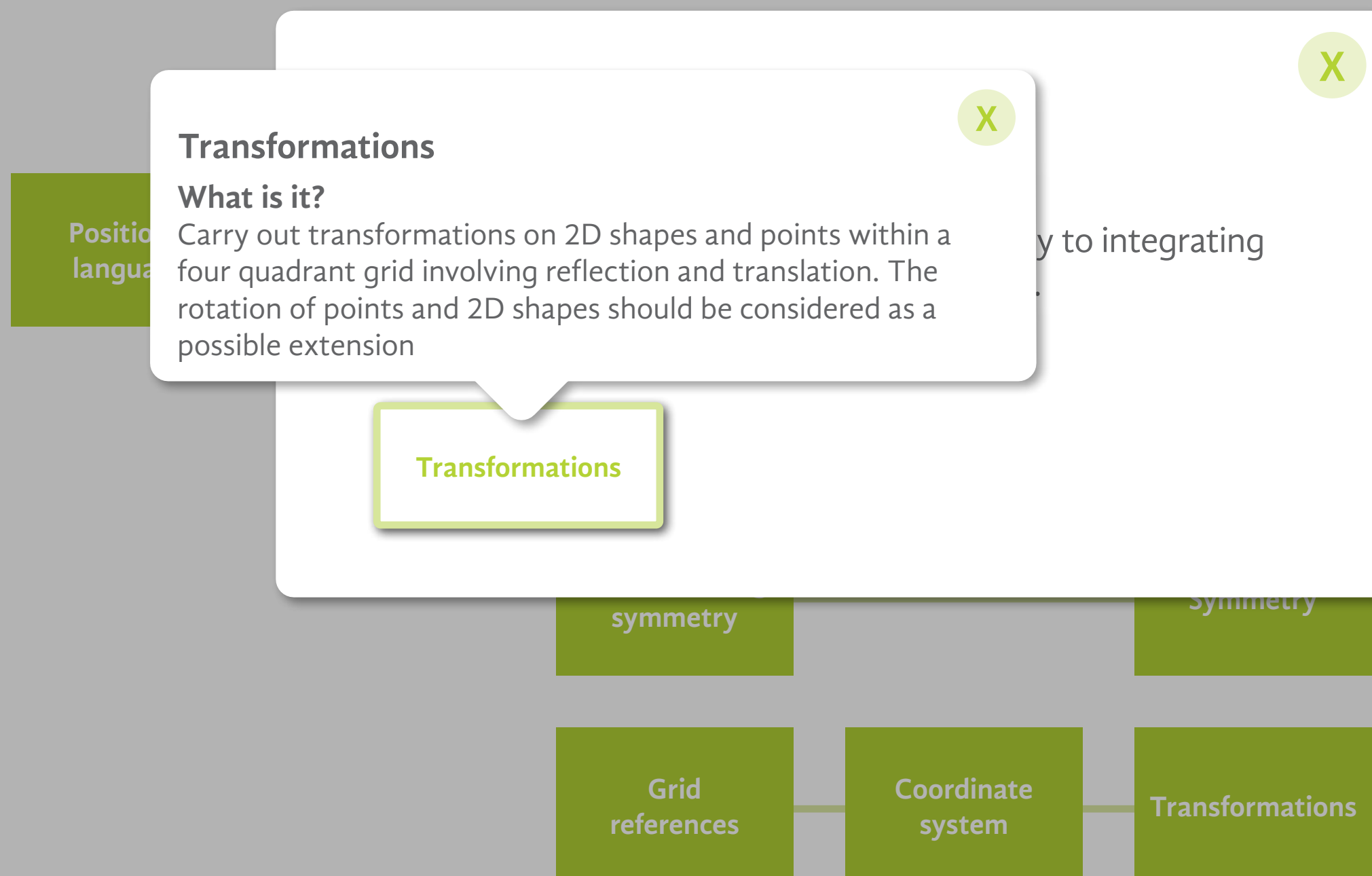
symmetry

Grid
references

Coordinate
system

Transformations

Angles, symmetry and transformation



Positional language

Transformations

What is it?

Carry out transformations on 2D shapes and points within a four quadrant grid involving reflection and translation. The rotation of points and 2D shapes should be considered as a possible extension

Transformations

symmetry

symmetry

Grid references

Coordinate system

Transformations

Multiples, factors and primes

Multiples and
factors

Common
multiples and
factors

Prime
numbers

Multiples, factors and primes

Multiples and Factors

X

Why is it important?

Understanding of multiples and factors is essential to support work in fractions. A clear understanding of the links within the multiplication tables and the use of inverse processes are essential.

Multiples and
Factors

Multiples, factors and primes

Multiple and factors

What is it?

A multiple can be found in the multiplication tables eg the multiples of 7 are 14, 21, 28... The multiples are never ending. The factors of a number are any numbers that divide exactly into a larger number.

Previous knowledge and understanding

- Multiplication tables
- Division with or without a remainder

Multiples and
Factors

X

X

potential to support
the links within
these processes are

Multiples, factors and primes

Common multiples and factors X

Why is it important?

Common multiples and factors help and support learners when working with fractions and algebraic manipulations.

Common multiples
and factors

Lowest common
multiple

Highest common
factor

Multiples, factors and primes

Common multiples and factors

X

Common multiples and factors

X

What is it?

A common multiple is a number that is a multiple of two or more numbers. If numbers share one or more factors, then they are called the common factors of those numbers.

Support learners
manipulations.

Common multiples
and factors

Lowest common
multiple

Highest common
factor

Multiples, factors and primes

Common multiples and factors

X

Why is it called the lowest common multiple?

Common multiples
when we

What is it?

The lowest common multiple (LCM) is the lowest multiple which two or more numbers have in common.

X

Common multiples
and factors

Lowest common
multiple

Highest common
factor

Multiples, factors and primes

Common multiples and factors

X

Why is it important?

Common multiples and factors are important when working with fractions and

Highest common factor

X

What is it?

The largest common factor of two or more numbers is called the highest common factor (HCF).

Common multiples
and factors

Lowest common
multiple

Highest common
factor

Multiples, factors and prime numbers

Prime numbers

X

Why is it important?

Prime numbers are the building blocks of the number system. The link with factors will establish that every whole number greater than 1 is either prime or is a product of prime numbers. This is the Fundamental Theorem of Arithmetic. Prime numbers are used to encrypt information through communication networks utilised by mobile phones and the internet.

Prime numbers

Multiples, factors and prime numbers

Prime numbers

X

Prime Numbers

X

What is it?

Prime numbers have only two distinct factors. Prime numbers are whole numbers greater than 1. A prime number can only be divided by itself and 1 to give a whole number solution.

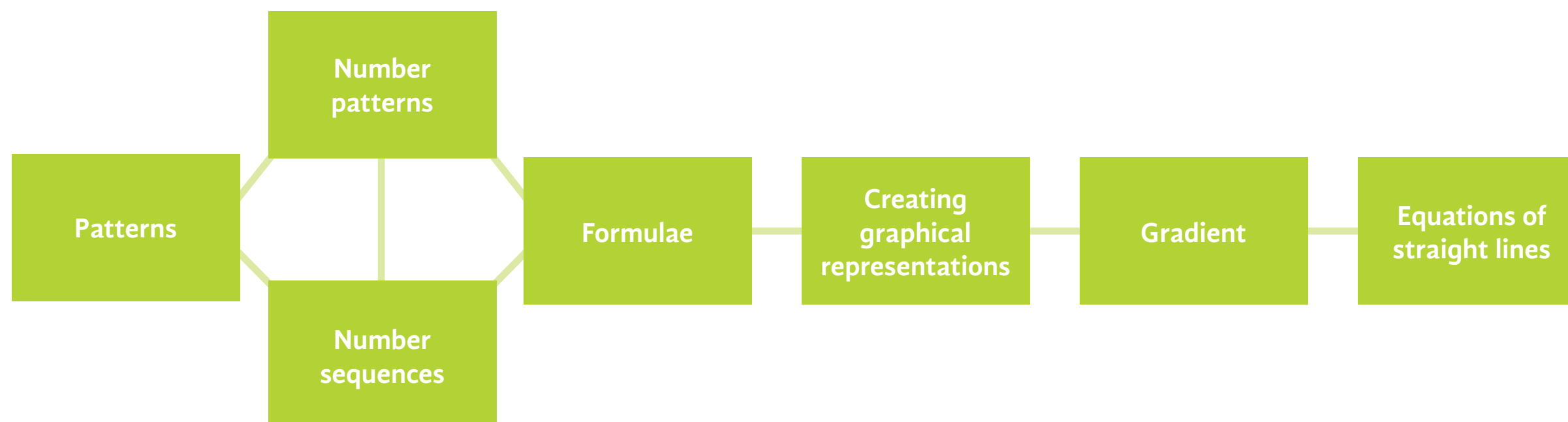
Previous knowledge and understanding

- Being able to list all the factors of a number

number system.
whole number
ct of prime
of Arithmetic.
on through
phones and the

Prime numbers

Patterns and relationships



Patterns and relationships

Patterns

X

Why is it important?

Recognising and using patterns is an essential building block for algebraic thinking and understanding numbers.

Patterns

Patterns

Equations of
straight lines

sequences

Patterns

Patterns



What is it?

A pattern is a repetitive sequence of events, shapes or numbers which can be continued.

Previous knowledge and understanding

- Personal experiences of looking for patterns in the environment
- Vocabulary of next, before, after
- Knowledge of colour and simple shapes
- Able to count in order



building block numbers.

Patterns

Patterns

Equations of straight lines

sequences

Patterns and relationships

Number Patterns

X

Why is it important?

Recognising and using number patterns is an essential building block for algebraic thinking, algebraic sequencing, generating formulae and graphical representation.

[Number pattern](#)[Exploring number patterns](#)[Patterns](#)[Equations of straight lines](#)[sequences](#)

Patterns

Number pattern

What is it?

A number pattern is a set of numbers that is governed by a rule which makes the pattern predictable, e.g. odds and evens, times tables etc.

Previous knowledge and understanding

- Know odd and even numbers
- Able to add, subtract, multiply and divide
- Multiples



essential building
 cing, generating

Patterns

Number pattern

Exploring number
 patterns

Equations of
 straight lines

sequences

Patterns and relationships

Patterns

Number Patterns X

Why is it important?
 Recognising patterns is a key skill in mathematics. It helps you to see the structure of a problem and to find a way to solve it. It is also a good way to check your answers.

Exploring number patterns X

What is it?
 Explore and extend prominent number patterns, such as square, triangular and Fibonacci numbers.

Number pattern

Exploring number patterns

Equations of straight lines

sequences

Patterns and relationships

Number sequences

X

Why is it important?

Understanding number sequences allows us to generate algebraic formulae either pictorially, orally or using algebraic notation

Number sequences

Modelling

Patterns

Equations of
straight lines

sequences

Patterns

Number sequences

What is it?

A number sequence has a rule, which can be used to find the value of each term. It is important to understand and explain the rule associated with a number sequence and use the rule to predict any number in the sequence. This is usually developed pictorially, orally or using algebraic notation.

Previous knowledge and understanding

- Able to spot and continue number patterns
- Confidence in using the 4 operations



to generate
using algebraic

Patterns

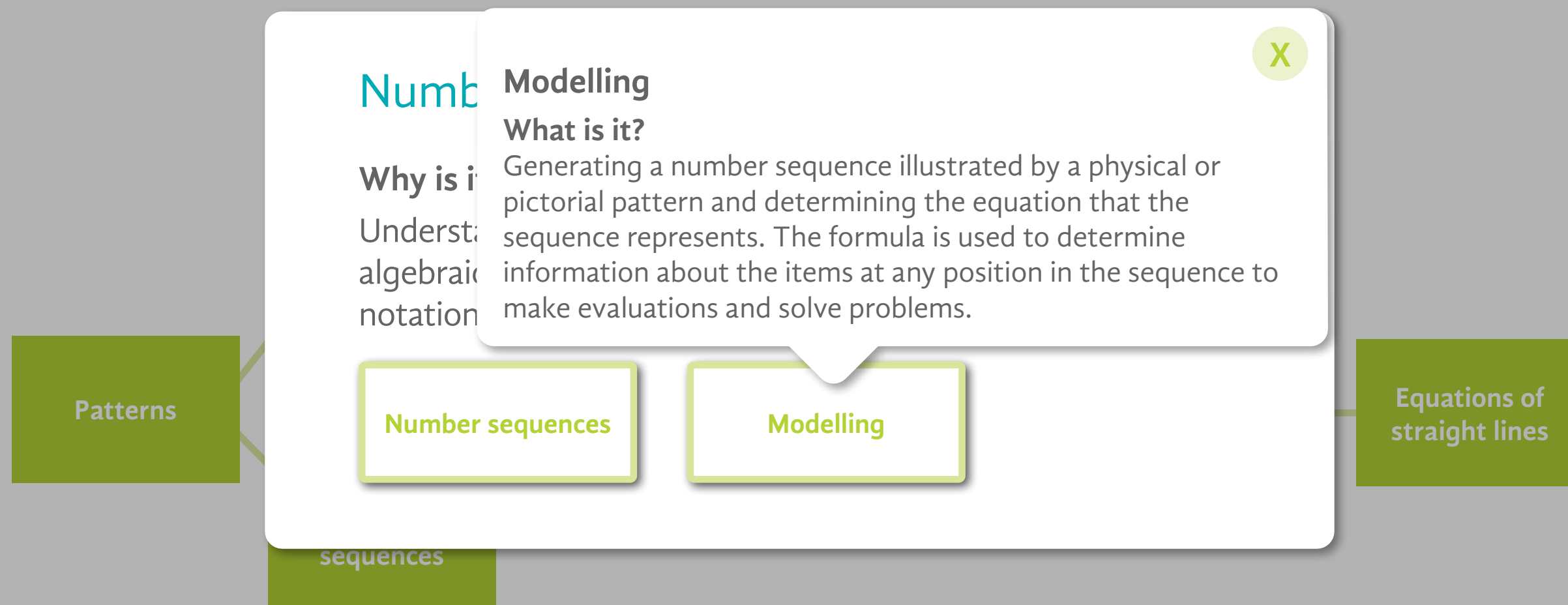
Number sequences

Modelling

Equations of
straight lines

sequences

Patterns and relationships



Number

Modelling



Why is it

Understa
algebraic
notation

Generating a number sequence illustrated by a physical or pictorial pattern and determining the equation that the sequence represents. The formula is used to determine information about the items at any position in the sequence to make evaluations and solve problems.

Number sequences

Modelling

Equations of
straight lines

sequences

Patterns and relationships

Formulae

X

Why is it important?

Formulae are fundamental in developing mathematical modelling and underpin all graphical representation.

Patterns

Formulae

Generating a set
of outputs using a
formulaDetermining a
formula from a table
of valuesEquations of
straight lines

sequences

Patterns

Formulae

What is it?

A formula is a special type of equation that shows the relationship between different variables. Using a formula is the most efficient way of solving problems that compare different sets of variables.

e.g. Area of rectangle = length \times breadth,
Volume of a cuboid = $l \times b \times h$

Previous knowledge and understanding

- Knowing the convention of algebra, e.g. ab means $a \times b$, a^2 means $a \times a$

X

X

Patterns

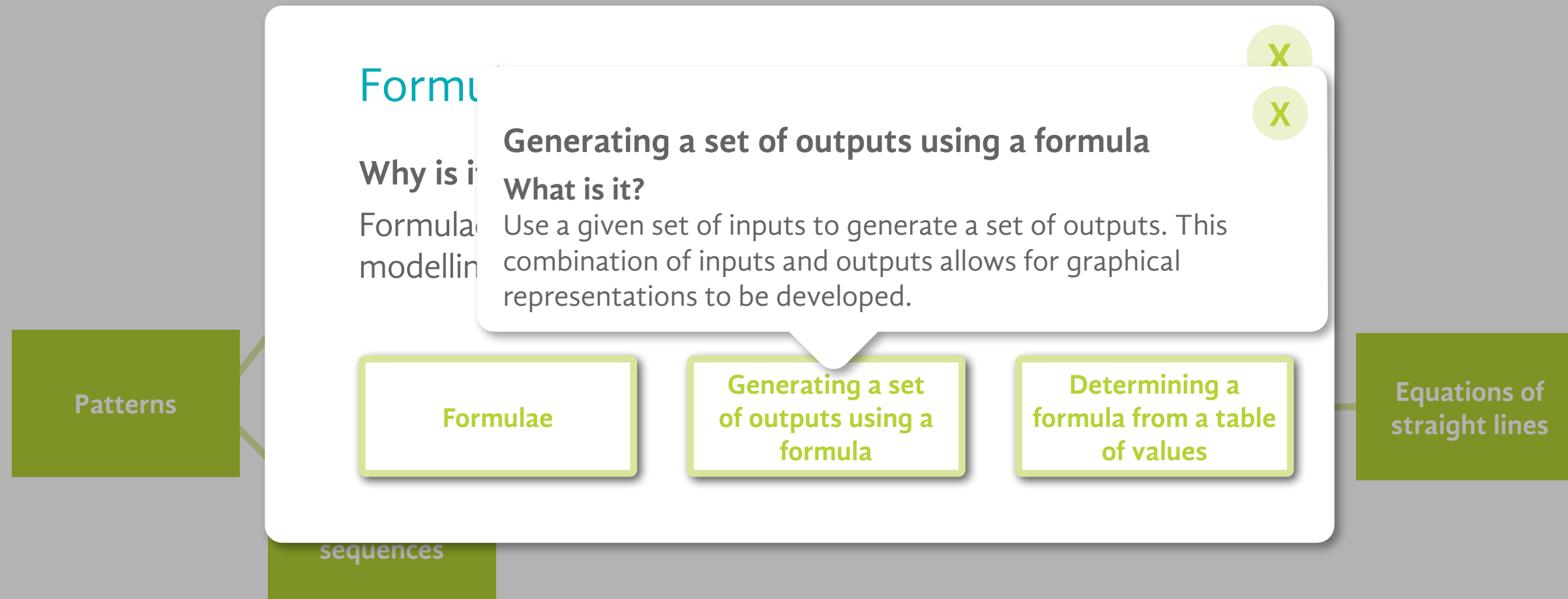
Formulae

Generating a set
of outputs using a
formulaDetermining a
formula from a table
of valuesEquations of
straight lines

sequences

Mathematical
notation.

Patterns and relationships



Patterns and relationships

Formulae

Why is it important?

Formulae are fundamental in de
modelling and underpin all grap

Determining a formula from a table of values

What is it?

Being able to construct a formula is a fundamental algebraic
process and permits the expansion of any input/output.

Patterns

Formulae

Generating a set
of outputs using a
formula

Determining a
formula from a table
of values

Equations of
straight lines

sequences

Patterns and relationships

Creating graphical representations X

Why is it important?

Creating graphical representations is the most efficient way of representing the comparison between two variables and presenting it in a visual form. It helps develop the fundamental skills of interpolation and extrapolation.

Creating graphical representations

Determining a general formula

Patterns

Equations of straight lines

Patterns and relationships

Creating graphical representations

What is it?

It is the most efficient method of comparing two related variables, in a visual way.

Previous knowledge and understanding

- Plotting points
- Constructing appropriate formulae

Patterns

Creating graphical representations

Determining a general formula

Equations of straight lines

X

X

ions

st efficient way
o variables and
o the fundamental

Patterns and relationships

Patterns

Creating graphical representations X

Why is
Creating
of repre
present
skills of

Determining a general formula X

What is it?

The ability to generate a formula for a given sequence of numbers allows any number in the sequence to be determined without having to calculate all previous numbers

Creating graphical representations

Determining a general formula

Equations of straight lines

Patterns and relationships

Gradient

X

Why is it important?

Through the ability of allocating a numerical value to a slope, it allows limits to be placed for design and safety considerations, e.g. a mobility ramp access to buildings, slopes of roofs, incline of roads.

Patterns

Gradient

Equations of
straight lines

Pattern

Gradient

X

What is it?

The rate at which vertical height changes with respect to horizontal distance covered, numerically represented as a fraction, decimal fraction or percentage. The gradient can be found by inspection of co-ordinate diagrams or the gradient formula. Understand that a straight line that rises from left to right has a positive gradient and a straight line that falls from left to right has a negative gradient. It should be understood that a horizontal line has a gradient of zero whereas the gradient of a vertical line is undefined.

Previous knowledge and understanding

- Be able to calculate the change between two values
- Be able to plot given points

Patterns

Gradient

value to a slope, it
ty considerations
es of roofs, incline

X

Equations of
straight lines

Patterns and relationships

Equations of straight lines X

Why is it important?

Understanding equations of straight lines enables comparisons to be made using graphical representations and allows for informed decisions. Familiarisation with linear equations enables more complicated equations to be investigated.

Equations of
straight lines

Locus

Patterns

Equations of
straight lines

Pattern

Equations of straight lines

What is it?

A form of the equation of the straight line is $y = mx + c$.
Graphically, m represents the gradient and c represents the 'point where the line intercepts the y-axis' (y-intercept).
Horizontal and vertical lines are special cases of $y = mx + c$

Previous knowledge and understanding

- Be able to calculate the gradient between 2 points
- Understand the vocabulary of intercept on the x-axis and y-axis

X

X

ables comparisons
and allows for
r equations
investigated.

Patterns

Equations of
straight lines

Locus

Equations of
straight lines

Patterns and relationships

Equations of straight lines X

Why is it

Understand
to be made
informed
enables

Locus

What is it?

Determining a few points from the equation of a straight line allows us to join these points and therefore identify the locus of all points that conform to the formula.

Equations of
straight lines

Locus

Patterns

Equations of
straight lines

Powers and roots



Powers and roots

Powers

X

Why is it important?

Powers enable large numbers to be expressed more concisely.

Powers

Powers

Powers

X

What is it?

Understanding that the shorthand notation for repeated multiplication can be expressed in power notation.

Possible extension work could include:

- Fractions to whole number powers
- Negative numbers to whole numbers powers, e.g. $(-2)^3 = -8$
- Negative powers, for example, $4^{-2} = \frac{1}{16}$
- The concept of a zero power, e.g. $5^0 = 1$
- Introducing the laws of indices

Previous knowledge and understanding

- Knowledge of square numbers, noting the link to area
- The concept of repeatedly multiplying the same number, e.g. $8 \times 8 \times 8 = 8^3 = 512$, noting the link to volume
- Knowledge of place value and multiplication by 10

X

and more concisely.

Powers

Powers and roots

Scientific Notation

X

Why is it important?

Scientific notation enables large and small numbers to be written in a shorter form. Problems involving multiplication and division of large or small numbers become more manageable through the use of scientific notation. It also allows very large or very small numbers to be displayed on calculator screens when they would otherwise overflow.

[Scientific Notation](#)[Calculations involving scientific notation](#)

Powers and roots

Scientific Notation

X

Why is it important?

Scientific Notation

What is it?

Scientific notation is a standardised method of writing numbers in the form $a \times 10^n$ Where $1 \leq a < 10$ and n is an integer.

X

Numbers to be multiplied together are more easily displayed on a calculator to avoid overflow.

[Scientific Notation](#)[Calculations involving scientific notation](#)

Powers and roots

Scientific Notation

Why is it used?

Scientific notation is used to write very large and very small numbers in a compact and easy-to-read form. It is also used to manage calculations involving these numbers.

Calculations involving scientific notation

What is it?

Undertake calculations with numbers written in scientific notation.

Previous knowledge and understanding

- Place value
- Multiplying by powers of 10
- Dividing by powers of 10

Scientific Notation

Calculations involving scientific notation

Powers and roots

Roots

X

Why is it important?

Roots are an essential tool when performing calculations and develop the understanding of the inverse operation of powers.

[Roots](#)[Square roots](#)[Cube roots](#)[Higher roots](#)

Powers and roots

Roots

What is it?

Roots are the inverse process of powers.

Previous knowledge and understanding

- The concept of powers
- The concept of inverse operations

g calculations and
operation of powers.

Roots

Square roots

Cube roots

Higher roots

Powers and roots

Roots

Why is

Roots a
develop

Square roots

What is it?

Finding the square root is the inverse process of squaring a number. The square root of all positive numbers has two solutions, one negative and one positive. Square roots can be evaluated mentally within the commonly known multiplication tables.

Previous knowledge and understanding

- Knowledge of square numbers

Roots

Square roots

Cube roots

Higher roots

Powers and roots

Roots

Why is it important?

Roots are an essential tool to develop the understanding of powers and roots.

Cube roots

What is it?

Finding the cube root is the inverse process of cubing a number.

Previous knowledge and understanding

- Knowledge of trial and improvement as a strategy, e.g. 64, student could try $2 \times 2 \times 2 \neq 64$, $3 \times 3 \times 3 \neq 64$

[Roots](#)[Square roots](#)[Cube roots](#)[Higher roots](#)

Powers and roots

Roots

Why is it important?

Roots are an essential tool when performing calculations. They help to develop the understanding of the inverse operation of powers.

Roots

Square roots

Cube roots

Higher roots

Higher roots

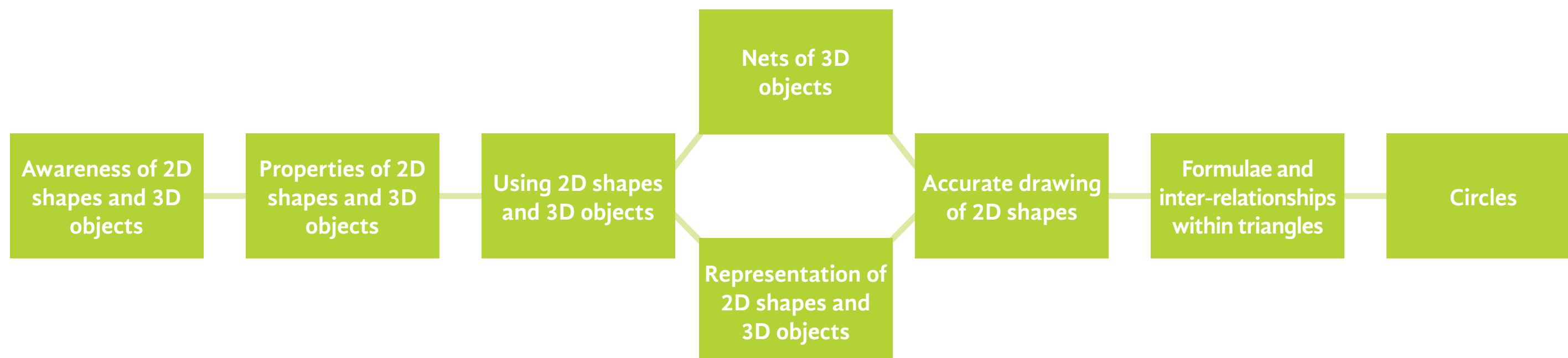
What is it?

Higher roots work in the same way as cube roots and common roots can be evaluated within the commonly known multiplication tables.

Previous knowledge and understanding

- Knowledge of trial and improvement as a strategy
- Use of a calculator

Properties of 2D shapes and 3D objects



Properties of 2D shapes and 3D objects

Awareness of 2D shapes and 3D objects X

Why is it important?

It links personal experiences and observations with a more structured way of investigating 2D shapes and 3D objects.

Awareness of 2D shapes and 3D objects

2D shapes

3D objects

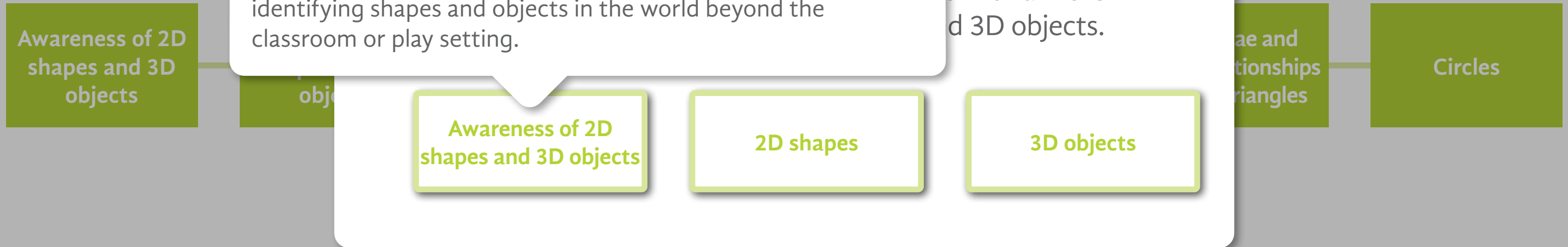
Awareness of 2D shapes and 3D objects

Properties of 2D shapes and 3D objects

Area and Perimeter of 2D shapes and 3D objects

Circles

Properties of 2D shapes and 3D objects



Awareness of 2D shapes and 3D objects
What is it?
Awareness of 2D shapes and 3D objects is the informal and experiential aspect of learning. It involves naming and identifying shapes and objects in the world beyond the classroom or play setting.



2D objects

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d 3D objects.

Awareness of 2D shapes and 3D objects

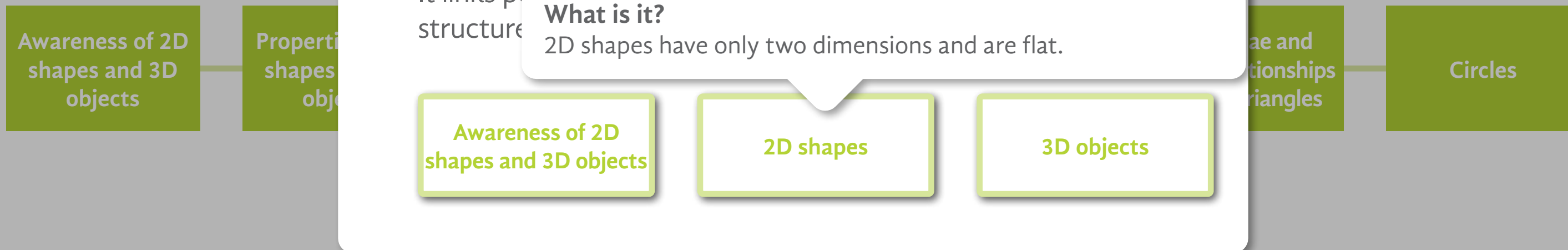
2D shapes

3D objects

Area and relationships triangles

Circles

Properties of 2D shapes and 3D objects



Properties of 2D shapes and 3D objects

Awareness of 2D shapes and 3D objects

Properties of 2D shapes and 3D objects

Awareness of 2D shapes and 3D objects

Why is it important?

It links personal experiences and a structured way of investigating

Awareness of 2D shapes and 3D objects

2D shapes

3D objects

Triangles

3D objects

What is it?

3D objects have three dimensions. The sides, or faces, of many 3D objects are made up of 2D shapes. 3D objects can be stacked or rolled and items can be put inside some 3D objects. They can also be combined to make models.

Previous knowledge and understanding

- Experience of outdoor learning
- Observational skills
- Basic vocabulary



Properties of 2D shapes and 3D objects

Properties of 2D shapes and 3D objects X

Why is it important?

Understanding the properties of 2D shapes and 3D objects enables more sophisticated identification and sorting by their features. An understanding of the properties of 2D shapes and 3D objects will enable learners to appreciate how they fit together and how they are used in everyday life.

Properties of 2D
shape and 3D objects

Tiling

Awareness of 2D
shapes and 3D
objects

Properti
shapes
obj

ae and
relationships
triangles

Circles

Properties of 2D shapes and 3D objects

Properties of 2D shape and 3D objects

What is it?

Knowing the properties of 2D shapes and 3D objects develops a problem solving approach to solving many geometric problems.

Previous knowledge and understanding

- Name 2D shapes and 3D objects
- Recognise 2D shapes and 3D objects in the environment

Awareness of 2D shapes and 3D objects

obj

Properties of 2D shape and 3D objects

Tiling

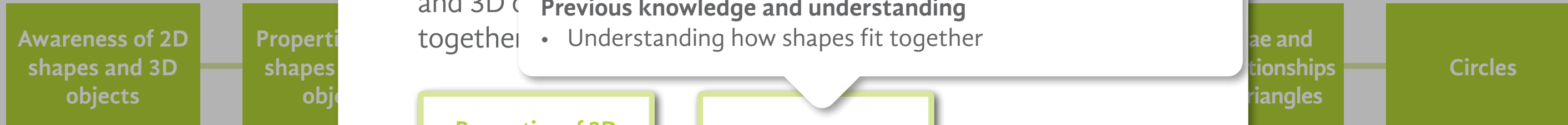
3D objects

and 3D objects sorting by their of 2D shapes ate how they fit life.

ae and tionships rangles

Circles

Properties of 2D shapes and 3D objects



Properties of 2D shapes and 3D objects



Why is it important?

Understanding the properties of 2D shapes and 3D objects enables students to identify their features and relationships, and to apply this knowledge together.

Tiling

What is it?

Determining which 2D shapes are suitable for tiling is a key step in extending geometrical knowledge of 2D shapes.

Previous knowledge and understanding

- Understanding how shapes fit together



Properties of 2D shape and 3D objects

Tiling

Properties of 2D shapes and 3D objects

Using 2D shapes and 3D objects X

Why is it important?

Understanding why certain shapes and objects are more suited to specific areas of use helps link the main properties of the shapes and objects with the key requirements of their usage. This has major implications in product design and efficient use of resources.

Using 2D shapes
and 3D objects

Properties of
triangles

Awareness of 2D
shapes and 3D
objects

Properti
shapes
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ae and
relationships
triangles

Circles

Properties of 2D shapes and 3D objects

Using 2D shapes and 3D objects

X

Using 2D shapes and 3D objects

X

What is it?

Determining when and where triangles are used in the construction of buildings links the properties of triangles with the strength of triangular frames. Understanding why cuboids are more commonly used in packaging than spheres recognises that the ability to stack objects is crucial in the retail business.

ts are more suited
roperties of the
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and efficient use

Awareness of 2D shapes and 3D objects

obj

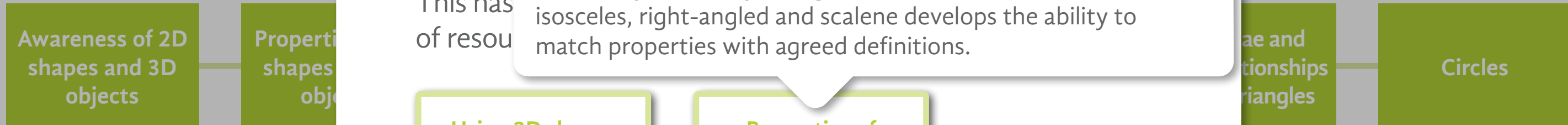
Using 2D shapes and 3D objects

Properties of triangles

ae and relationships triangles

Circles

Properties of 2D shapes and 3D objects



Using 2D shapes and 3D objects X

Why is it important?

Understand
to specify
shapes and
This has
of resources

Properties of triangles X

What is it?

The ability to classify triangles as acute, obtuse, equilateral, isosceles, right-angled and scalene develops the ability to match properties with agreed definitions.

Using 2D shapes
and 3D objects

Properties of
triangles

Properties of 2D shapes and 3D objects

Nets of 3D Objects

X

Why is it important?

Develops the spacial awareness that allows a 3D object to be unpacked to form a combination of 2D surfaces. This has important applications in the packaging industry.

Awareness of 2D
shapes and 3D
objects

Properti
shapes
obj

Nets of 3D Objects

ae and
relationships
triangles

Circles

Properties of 2D shapes and 3D objects

Awareness of 2D shapes and 3D objects

Nets of 3D objects

What is it?

A net is the 2D representation of an unpacked 3D object. The lengths and angles in the 3D object are conserved within the net.

Previous knowledge and understanding

- Properties of 2D shapes
- Understanding edges, faces and vertices

3D object to surfaces. This has strategy.

Nets of 3D Objects

Relationships and triangles

Circles

Properties of 2D shapes and 3D objects

Representation of 2D shapes and 3D objects

X

Why is it important?

This develops spacial awareness and promotes the concepts of equal lengths and angles when they are distorted in the 2D representations.

Representation of 2D shapes and 3D objects

Awareness of 2D shapes and 3D objects

Properties of 2D shapes and 3D objects

Relationships between shapes and triangles

Circles

Properties of 2D shapes and 3D objects

Awareness of 2D shapes and 3D objects

Representation of 2D shapes and 3D objects

What is it?

Using sketches, isometric paper or computer packages to draw 3D objects on a 2D plane.

Previous knowledge and understanding

- Familiarity with the properties of 3D objects
- Properties of 2D shapes
- Experience of perspective in art (drawing)

...es the concepts
...started in the 2D

Representation of 2D shapes and 3D objects

...ae and
...tionships
...riangles

Circles

Properties of 2D shapes and 3D objects

Accurate drawing of 2D shapes X

Why is it important?

Drawing accurately develops dexterity, reading scales and the ability to follow instructions. It is an essential life skill in architecture and many areas of the construction industry.

Awareness of 2D shapes and 3D objects

Properties of 2D shapes and 3D objects

Accurate drawing of 2D shapes

Drawing triangles and quadrilaterals

Regular and irregular polygons

Area and perimeter of triangles

Circles

Properties of 2D shapes and 3D objects

Awareness of 2D shapes and 3D objects

Accurate drawing of 2D shapes

What is it?
This requires the scaling of the lengths and the conservation of the angles.

Previous knowledge and understanding

- Measure lengths accurately
- Know how to name angles
- Measure angles accurately

Using scales and
in architecture

Accurate drawing of 2D shapes

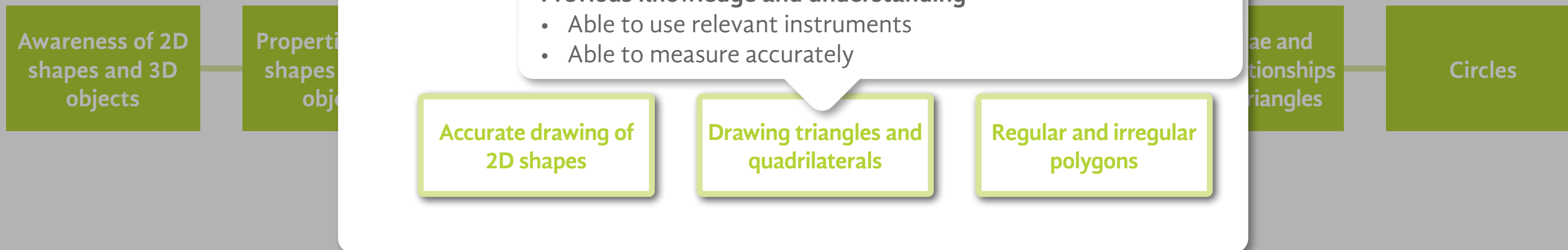
Drawing triangles and quadrilaterals

Regular and irregular polygons

Area and relationships triangles

Circles

Properties of 2D shapes and 3D objects



Accurate drawing of 2D shapes

Why is it important?

Drawing a range of triangles with different properties and investigating how the diagonals intersect.

Drawing triangles and quadrilaterals

What is it?

Drawing a range of triangles with different properties.

Drawing a range of quadrilaterals with different properties and investigating how the diagonals intersect.

Previous knowledge and understanding

- Able to use relevant instruments
- Able to measure accurately

Accurate drawing of 2D shapes

Drawing triangles and quadrilaterals

Regular and irregular polygons

Properties of 2D shapes and 3D objects

Awareness of 2D shapes and 3D objects

Properties of 2D shapes and 3D objects

Accurate drawing of 2D shapes

Why is it important?

Drawing accurately develops drawing skills. It is an essential skill in many areas of the construction industry.

Regular and irregular polygons

What is it?

Understanding the difference between regular and irregular polygons. Demonstrating the properties of regular polygons to draw accurate representations. Understand that all polygons can be constructed through a summation of triangles.

Previous knowledge and understanding

- Understand the term 'regular' when describing 2D shapes
- Accurately measure angles

Accurate drawing of 2D shapes

Drawing triangles and quadrilaterals

Regular and irregular polygons

Triangles



Properties of 2D shapes and 3D objects

Formulae and inter-relationships within triangles

X

Why is it important?

This milestone develops the mathematical concepts associated with Pythagoras' Theorem and trigonometry. These concepts are fundamental, as much of the mathematics encountered after this will be built upon these foundations.

Formulae and inter-relationships within triangles

Pythagoras' theorem and Converse of Pythagoras

Trigonometry within right-angled triangles

Awareness of 2D shapes and 3D objects

Properties of 2D shapes and 3D objects

Formulae and inter-relationships within triangles

Circles

Properties of 2D shapes and 3D objects

Awareness of 2D shapes and 3D objects

Formulae and inter-relationships within triangles

What is it?

Through investigating the lengths of sides in right-angled triangles the theorem and converse of Pythagoras are developed. Building on similar triangles and investigating ratios of different pairs of sides leads to right-angled trigonometry.

Previous knowledge and understanding

- Name and identify different triangles
- Know the properties of different types of triangles

Formulae and inter-relationships within triangles

Pythagoras' theorem and Converse of Pythagoras

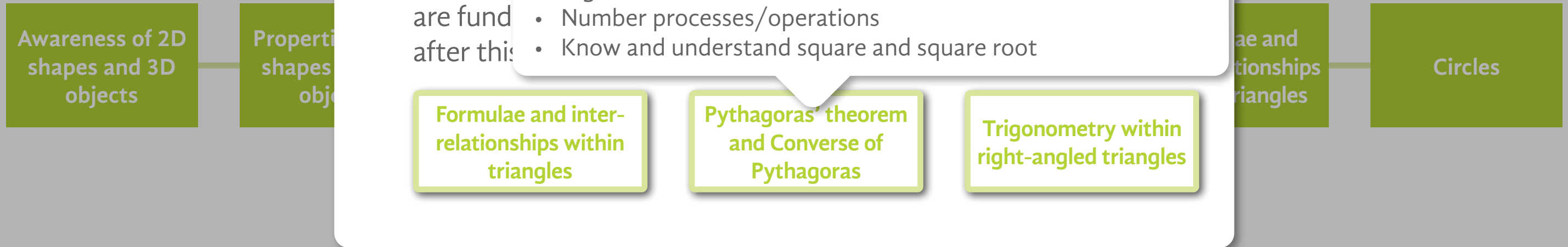
Trigonometry within right-angled triangles

Formulae and inter-relationships within triangles

Circles



Properties of 2D shapes and 2D objects



Formulae and inter-relationships within triangles

Why is it important?

This milestone is important as it builds on the knowledge of properties of triangles and introduces the use of formulae. The formulae are fundamental to the study of geometry and are used in many practical applications.

Pythagoras' theorem and Converse of Pythagoras

What is it?

Applying Pythagoras' Theorem enables the length of one side of a right-angled triangle to be calculated, given the lengths of the other two sides. The converse can also be used to establish if a triangle is right-angled.

Previous knowledge and understanding

- Algebra
- Number processes/operations
- Know and understand square and square root

Formulae and inter-relationships within triangles

Pythagoras' theorem and Converse of Pythagoras

Trigonometry within right-angled triangles



Properties of 2D shapes and



Trigonometry within right-angled triangles

What is it?

Enables the length of a side to be calculated, given the length of another side and the size of either of the acute angles. It also enables the calculation of an angle, given the length of any two of the triangle's sides.

Previous knowledge and understanding

- Algebraic manipulation
- Number processes/operations
- Similar triangles

Possible Extension

- Although this building block concentrates on trigonometry within right-angled triangles, students can be encouraged to investigate trigonometry within all triangles. This naturally leads on to problems involving the sine and cosine rule.

Formulae and inter-relationships within triangles

Why is it important?

This milestone develops the material with Pythagoras' Theorem and are fundamental, as much of the after this will be built upon these

Awareness of 2D shapes and 3D objects

Properties of 2D shapes and 3D objects

Formulae and inter-relationships within triangles

Pythagoras' theorem and Converse of Pythagoras

Trigonometry within right-angled triangles

Triangles

Properties of 2D shapes and 3D objects

Circles

X

Why is it important?

The circle is a commonly used shape that occurs both in nature and everyday life. Its importance is based on the fact that a circle encloses the maximum area for a given perimeter. The circle, despite being one of the simplest shapes, has numerous geometric properties. An understanding of these properties, and associated formulae, provides a foundation for further learning in geometry.

Circles

Circumference
and arcs

Area and sectors

Awareness of 2D
shapes and 3D
objectsProperties of
2D shapes and
3D objectsArea and
relationships
of triangles

Circles

Properties of 2D shapes and 3D objects

Circles



Circles



What is it?

Circle calculations are interrelated. Given any one of radius, diameter, circumference or area all the others can be calculated.

Previous knowledge and understanding

- Vocabulary: radius, diameter, circumference and area
- Know the relationship between a radius and a diameter

Occurs both in nature
the fact that a
perimeter. The
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ese properties,
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Awareness of 2D
shapes and 3D
objects

obj

Circles

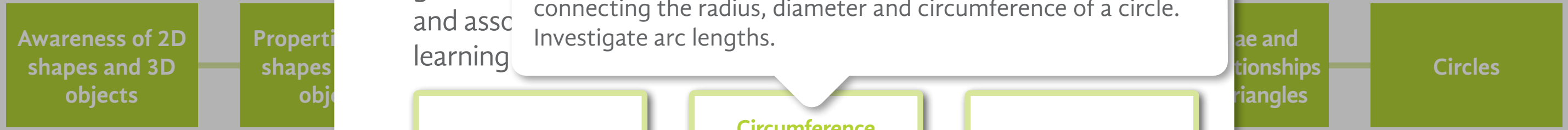
Circumference
and arcs

Area and sectors

ae and
relationships
triangles

Circles

Properties of 2D shapes and 3D objects



Circles



Why is it important?

The circle is a commonly used shape that occurs both in nature and everyday life. It is a closed curve that has no corners and every point on the circle is equidistant from the center. The circle is a fundamental shape in geometry and has many important properties and associated formulas. Investigate the significance of π and establish the formula connecting the radius, diameter and circumference of a circle. Investigate arc lengths.

Circumference and arcs



What is it?

Investigate the significance of π and establish the formula connecting the radius, diameter and circumference of a circle. Investigate arc lengths.

Circles

Circumference and arcs

Area and sectors

Properties of 2D shapes and 3D objects

Awareness of 2D shapes and 3D objects

Properties of 2D shapes and 3D objects

Circles



Why is it important?

The circle is a commonly used shape that occurs both in nature and everyday life. Its importance is that a circle encloses the maximum area for a given perimeter. A circle, despite being one of the simplest geometric shapes, has many interesting geometric properties. An understanding of these properties and associated formulae, provides a foundation for further learning in geometry.

Area and sectors



What is it?

Investigate the significance of π and establish the formula connecting the radius, diameter and area of a circle. Investigate the area of sectors of circles.

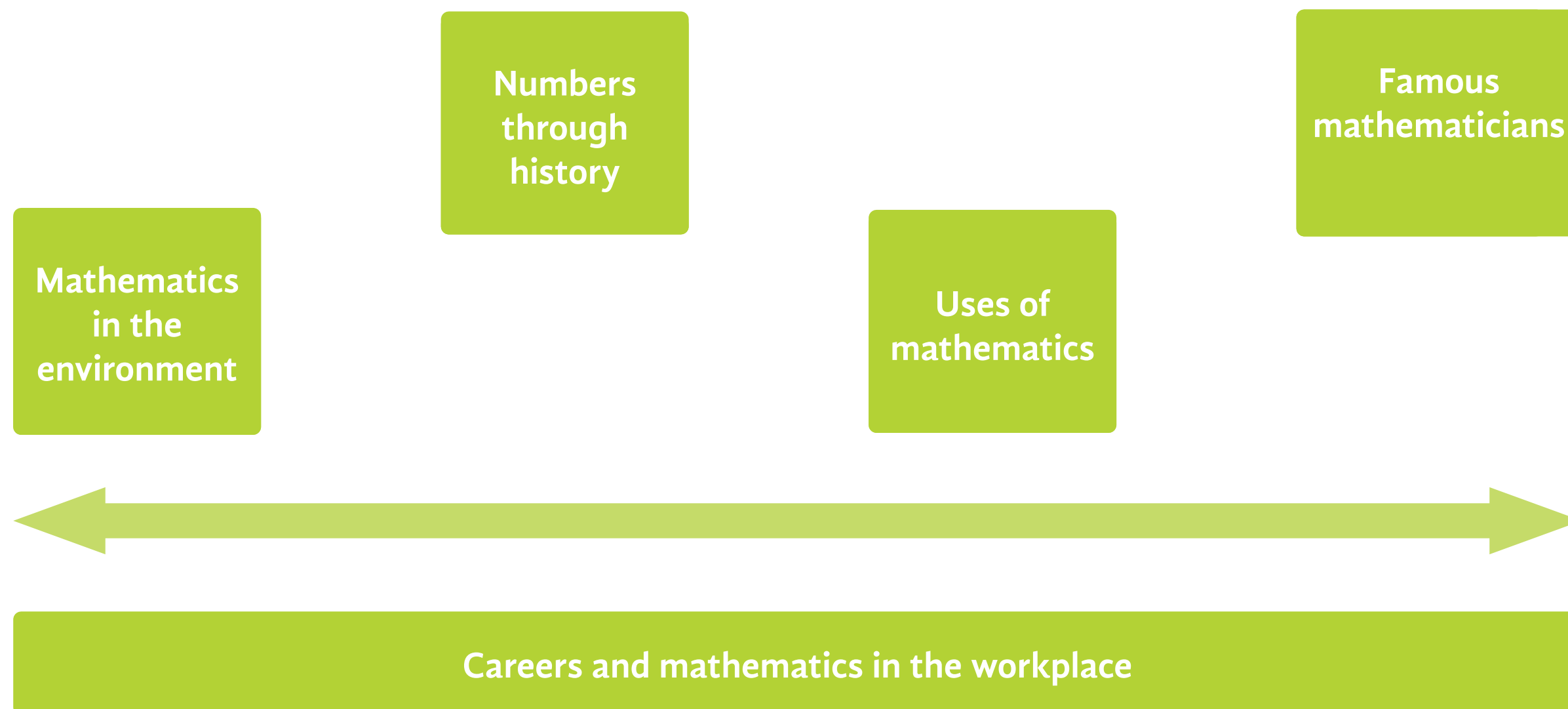
Circles

Circumference and arcs

Area and sectors

Triangles

Mathematics—its impact on the world past, present and future



Mathematics—its impact on the world past, present and

Mathematics in the environment



Why is it important?

It is important that learners recognise mathematics in their environment as it provides the foundations for exploring the use of mathematics in their everyday lives.

Mathematics
in the
environment

Mathematics in the
environment

Famous
mathematicians

Careers and mathematics in the workplace

Mathematics—its impact on the world past, present and future

Mathematics in the environment



Mathematics in the environment



What is it?

This is the awareness of the vast amount of mathematics and mathematical information in the environment which provides information to help with real-life, everyday situations. It also reinforces the concept of mathematics being relevant and important to future learning.

Mathematics in the environment

Mathematics in the environment

Mathematics in their
or exploring the

Famous
mathematicians



Careers and mathematics in the workplace

Mathematics—its impact on the world past, present and

Numbers through history

X

Why is it important?

It is important learners know the origins of their own number system through exploring those from the past to understand how they have evolved, changed and improved. It also highlights the multi-cultural nature of mathematical development and how other great civilisations contribute.

Mathematics
in the
environment

Numbers through
history

Decimal number
system

Famous
mathematicians

Careers and mathematics in the workplace

Mathematics—its impact on the world past, present and

Numbers through history

Why is it important?

It is important learners know the origins of their own number systems and how they have evolved over time. It is important to know how number systems have evolved from the past to the present and improved. This includes number systems used in the computer age, such as binary. Famous mathematicians contribute.

Numbers through history

What is it?

Number systems from around the world have evolved over time and become more efficient. This includes number systems used in the computer age, such as binary.

Mathematics in the environment

Numbers through history

Decimal number system

Famous mathematicians

Careers and mathematics in the workplace

Mathematics—its impact on the world past, present and

Numbers through history



Why is it important?

It is important to understand numbers and how they are used in the world around us. It also helps in the development of mathematics.

Decimal number system



What is it?

Based on 10 digits (0, 1, 2, 3, 4, 5, 6, 7, 8, 9). It is the place of the digit(s) which makes the difference to the value of the number, both in whole numbers and decimal fractions. Zero is important as a placeholder.

Mathematics in the environment

Famous mathematicians

Numbers through history

Decimal number system

Careers and mathematics in the workplace

Mathematics—its impact on the world past, present and

Uses of mathematics



Why is it important?

It is important learners understand the vast uses of mathematics in their everyday lives. This should ensure their learning is relevant and purposeful.

Mathematics
in the
environment

Uses of
mathematics

Famous
mathematicians

Careers and mathematics in the workplace

Mathematics—its impact on the world past, present and future

Uses of mathematics



Uses of mathematics



What is it?

Mathematics enables learners to model real-life situations and make connections and informed predictions. It also equips learners with the skills needed to interpret and analyse information, simplify and solve problems, assess risk and make informed decisions.

Mathematics in the environment

Uses of mathematics

Uses of mathematics should ensure their

Famous mathematicians

Careers and mathematics in the workplace

Mathematic
present and

X

Famous mathematicians

Why is it important?

Learners should understand how a large number of mathematicians have contributed to the present reservoir of mathematical knowledge. It is important to evaluate how mathematical discoveries were, and still are, important in daily life. To motivate the learners of today, it is also important to stress that many new mathematical discoveries will happen in the future and they could contribute to new discoveries. Chaos theory, string theory and fuzzy logic are recent developments that have been taken forward by creative, young mathematicians.

Famous
mathematicians

Mathematics
in the
environment

Famous
mathematicians

Careers and mathematics in the workplace

Mathematic
present and



Famous mathematicians

Why is it important?

Learners should understand how a large number of mathematicians have contributed to the present reservoir



Famous mathematicians

What is it?

Famous mathematicians are recognised for their special aptitude and creativity in mathematics and have used this to contribute significantly to society. Investigations into famous mathematicians should be linked to areas of the curriculum being studied.

Famous mathematicians

Mathe
in t
enviro

Famous mathematicians



Careers and mathematics in the workplace

Mathematics—its impact on the world past, present and

Careers and mathematics in the workplace



Why is it important?

Mathematics plays an important role in the fields of science and technologies, and is vital to research and development in engineering, computing science, medicine and finance. Promoting awareness and interest in such careers is of vital importance for economic development.

Careers and mathematics in the workplace

Careers in mathematics

Workplace mathematics

Mathematics in the environment

Famous mathematicians

Careers and mathematics in the workplace

Mathematics—its impact on the world past, present and future

Careers and mathematics in the workplace

Careers and mathematics in the workplace

What is it?

Standard algorithms, formulae, problem solving and teamwork are generic transferrable mathematical skills which have important practical applications in many careers, particularly science, technology and engineering.

Fields of science and development and finance. Careers is of vital

Famous mathematicians

Mathematics in the environment

Careers and mathematics in the workplace

Careers in mathematics

Workplace mathematics

Careers and mathematics in the workplace

Mathematics—its impact on the world past, present and future

Mathematics in the environment

Careers and mathematics in the workplace



Why is it important?
Mathematics and technology are essential in engineering and science. Promoting mathematics is important.

Careers in mathematics



What is it?

Understanding which careers depend on mathematical skills. Obvious ones such as the STEM subjects should be investigated as well as less obvious career paths in the arts, business and climatology.

Famous mathematicians

Careers and mathematics in the workplace

Careers in mathematics

Workplace mathematics



Careers and mathematics in the workplace

Mathematics—its impact on the world past, present and

Careers and mathematics in the workplace



Why is it important?

Mathematics plays an important role in science and technologies, and is vital to many careers in engineering, computing science, and business. Promoting awareness and understanding of the importance of mathematics for economic development.

Workplace mathematics

What is it?

Discussing different workplace situations and identifying the mathematical skills regularly used, e.g. hairdressers use ratio when mixing hair dyes.



Mathematics in the environment

Careers and mathematics in the workplace

Careers in mathematics

Workplace mathematics

Careers and mathematics in the workplace