

**East Renfrewshire Council: Education Department
Practitioner Moderation Template**



Prior to the moderation exercise, please complete the following information and submit it to your facilitator with assessment evidence from one learner that you judge to have successfully attained the Es' and Os'.

Experiences and Outcomes:

Ideas of chance and uncertainty

I can find the probability of a simple event happening and explain why the consequences of the event, as well as its probability, should be considered when making choices.

MNU 3-22a

Learning Intentions:

Understand that probabilities range from 0 (impossible) to 1 (certain).

Use appropriate language and notation to describe probability.

Find the probability of a simple event happening.

Find the probability of a simple event not happening.

Explain why the consequences of an event as well as its probability, should be considered when making choices.

Success Criteria:

1. Make sensible decisions on the likelihood of an event happening.
2. Demonstrates understanding of the relationship between the frequency of an event happening and the probability of it happening.
3. Use the probability scale of 0 to 1 showing probability as a fraction, decimal or percentage.
4. State that the probability of a certain event is 1.
5. State that the probability of an impossible event is 0.
6. Use the formula $P(\text{event}) = \text{number of favourable outcomes} / \text{number of possible outcomes}$ to find the probability of an event happening.
7. Find the probability of an event not happening by calculating $1 - \text{probability of event happening}$.
8. Express a probability as a decimal fraction or percentage.
9. Identifies all the mutually exclusive outcomes of a single event and calculates the probability of each.
10. Investigates real-life situations which involve making decisions on the likelihood of events occurring and the consequences involved.

Briefly outline the context and range of quality learning experiences that have been provided making reference to the chosen design principles.

Lesson 1

Assessed previous knowledge by questioning.

Class discussion on what is probability. Pupils gave examples of probability and where it is used. From discussion it was established that probabilities ranged from impossible (0) to certain (1).

Class activity followed using activotes to record the decisions made on the likelihood of an event happening.

Next there was a paired activity.

Pupils first stated how many heads they would expect if a coin was tossed 10, 20 and 30 times. They then carried out an experiment, recorded their results and made a comment on what they found. The class results were then collated and further comments made. Link was made with expected frequency and probability.

Lesson 2

Whole class activity.

Pupils put their names in a hat. They were then asked for the probability of different events happening, such as choosing a female. Pupils wrote their answers on show me boards.

This activity led to talking about favourable outcomes and possible outcomes and how probability can be calculated. The notation $P(\text{event})$ was introduced.

Class did some further worked examples on probability using probability notation and expressing answers as fractions. The probability of an event not happening was considered at this point as was the probability of mutually exclusive outcomes.

Pupils then worked on probability questions individually and checked their answers.

Lesson 3

Starter question: Two coins are tossed at the same time. List possible outcomes and state probability of 2 heads. Repeat for 3 coins.

Re-capped on previous lesson using the starter question to find the probability of different events. Used this opportunity to discuss giving answers as decimals or percentages.

Class did some worked examples where the probability of an event was given as a decimal. Pupils then worked on probability questions individually and checked their answers.

Class was given homework, which was to find real-life examples of where probability is used.

Lesson 4

Pupils discussed their examples of real-life situations where probability is used.

Pupils then completed an evaluation sheet using 'traffic lights'.

Record the range of assessment evidence that was gathered to meet the success criteria (Say, Write, Make, and Do) considering breadth, challenge and application.

1. Make sensible decisions on the likelihood of an event happening.
Do Used activotes to select probability. (Pupil Evidence Sheet 1)
2. Demonstrates understanding of the relationship between the frequency of an event happening and the probability of it happening.
Do/Write Experiment Tossing A Coin (Pupil Evidence Sheet 2)
3. Use the probability scale of 0 to 1 showing probability as a fraction.
Make/Do/Write Made up their own examples of probability and placed them on a probability scale. (Pupil Evidence Sheet 3)
4. State that the probability of a certain event is 1.
Write (Pupil Evidence Sheets 3 & 7)
5. State that the probability of an impossible event is 0.
Write (Pupil Evidence Sheets 3, 5 & 7)
6. Use the formula $P(\text{event}) = \text{number of favourable outcomes} / \text{number of possible outcomes}$ to find the probability of an event happening.
Say/Write Answered probability questions both orally and written. (Pupil Evidence Sheets 4 & 5)
7. Find the probability of an event not happening by calculating, $1 - \text{probability of event happening}$.
Say/Write Answered probability questions (Pupil Evidence Sheets 4 & 8)
8. Express a probability as a decimal fraction or percentage.
Write Answered probability questions. (Pupil Evidence Sheet 8)
9. Identifies all the mutually exclusive outcomes of a single event and calculates the probability of each.
Say/Write Answered probability questions. (Pupil Evidence Sheets 6 & 7)
10. Investigates real-life situations which involve making decisions on the likelihood of events occurring and the consequences involved.
Make Researched real-life examples and made an information sheet.(Pupil Evidence Sheet 9)

Briefly outline the oral/written feedback given to the pupil on progress and next steps, referring to the learning intention and success criteria.

Pupil correctly answered both oral and written questions, demonstrating a very high level of understanding of probability. He was given positive feedback throughout the topic informing him that he was making very good progress. He was told that his work not only showed understanding of his new learning but also demonstrated his mathematical knowledge of factors, multiples, primes and fractions. Due to the pupils excellent understanding he was directed towards differentiated learning tasks, such as finding a formula for the probability of two independent events occurring and finding a formula for the probability of two dependant events occurring.

Pupil Voice:

What have you learned? How did you learn? What skills have you developed?

See Pupil Evidence Sheets 10 & 11

Did the learner successfully attain the outcomes? Yes.

★ Tomorrow is Tuesday.

- A impossible
- B less than likely
- C even
- D more than likely
- E cert.

Option	Votes
A	20
B	1
C	1
D	1
E	1

★ Roll a dice and get a six

- A impossible
- B less than likely
- C even
- D more than likely
- E certain

Option	Votes
A	1
B	22
C	1
D	1
E	1

sci

★ Choose a card from a pack and it's a red.

- A impossible
- B less than likely
- C even
- D more than likely
- E certain

Option	Votes
A	1
B	1
C	23
D	1
E	1

★ If I choose a pupil at random from this class, it will be a boy.

- A impossible
- B less than likely
- C evens
- D more than likely
- E certain

Option	Votes
A	1
B	20
C	3
D	1
E	1

★ If I choose a pupil at random from this class, it will be Tegyn.

- A impossible
- B less than likely
- C evens
- D more than likely
- E certain

Option	Votes
A	1
B	22
C	1
D	1
E	1

★ If I choose a bead at random from a bag containing 8 blue beads and 3 yellow beads, the bead will be blue.

- A impossible
- B less than likely
- C even
- D more than likely
- E certain

Option	Votes
A	1
B	1
C	1
D	22
E	1

Predicting Patterns and Probability

Tossing a coin

SC 2

10 Tosses = 5 heads
 20 Tosses = 10 heads
 30 Tosses = 15 heads

10 Tosses		20 Tosses	
Tally	Number	Tally	Number
Heads IIII	5	IIIIIIII	9
Tails IIII	5	IIIIIIII	11

Tally	Number
Heads IIIIIIIII	13
Tails IIIIIIIII	17

30 Tosses

60 Tosses

	Heads	Tails
10	5	5
20	9	11
30	13	17
Total	27	33

Class Results

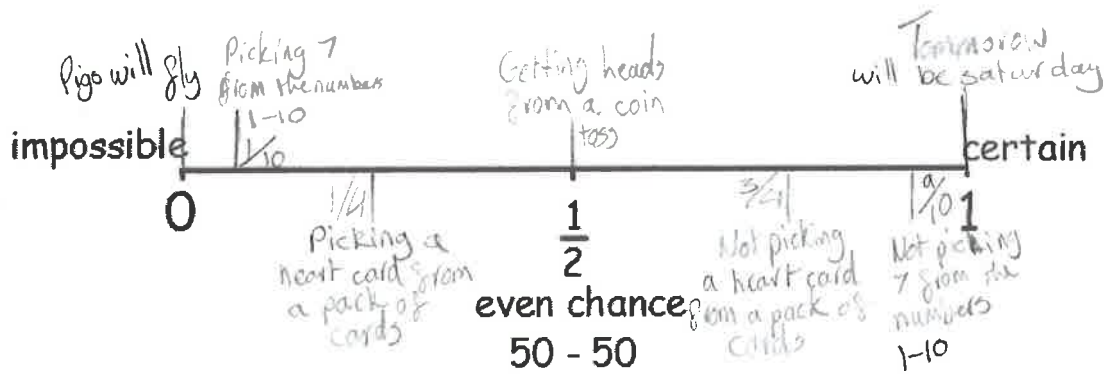
The more times we toss a coin the closer we get to the probability of a head

662 Tosses
 334 Heads
 328 Tails

Probabilities can range from 0 (impossible) to 1(certain).

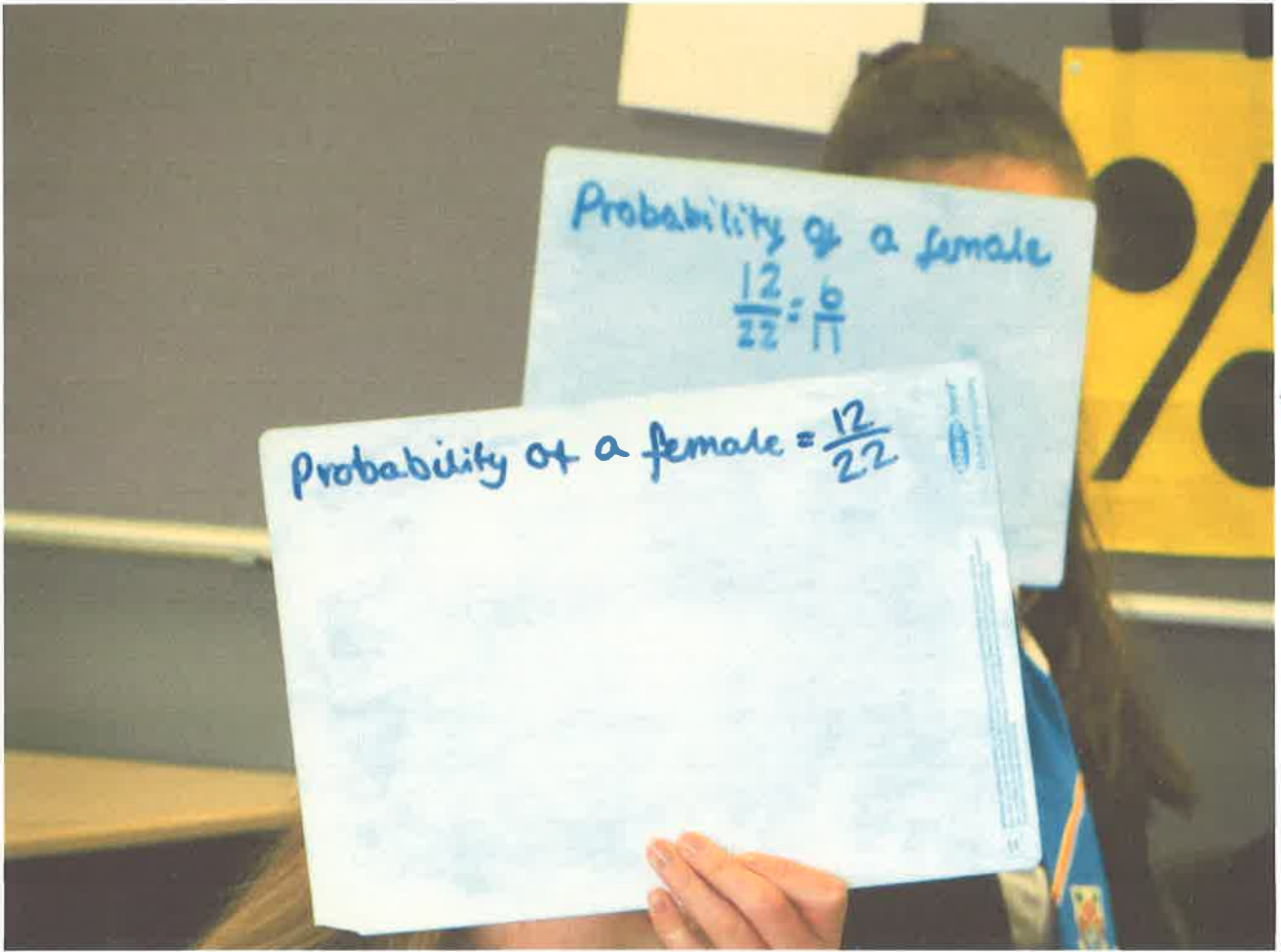
SC 3

Show some examples on the probability scale.

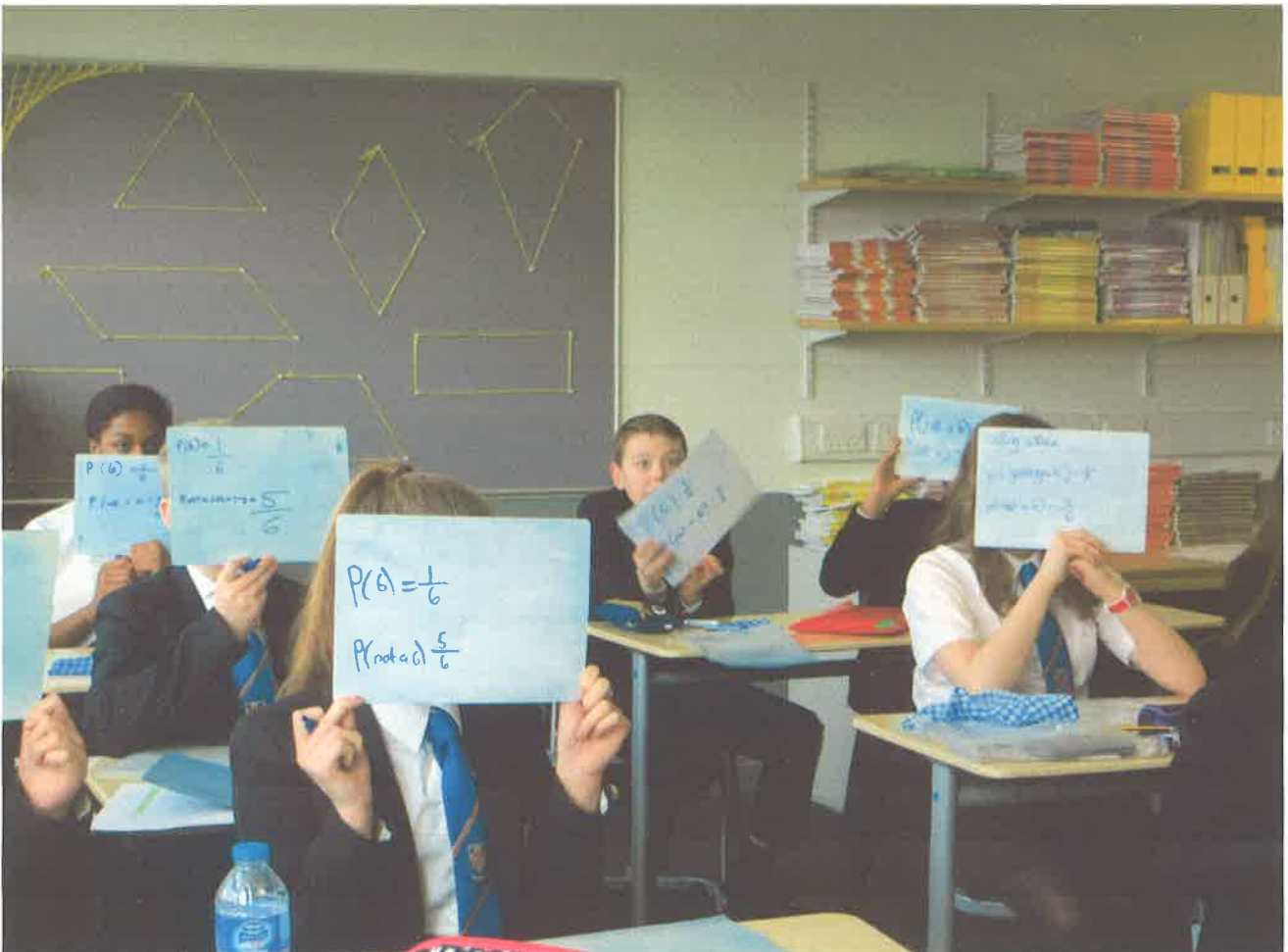


✓
Very good

Pupil Evidence Sheet 4



SC3



SC6-T

Pupil Evidence Sheet 5

1. A bag contains 6 black balls and 12 white balls

$P(\text{white}) = \frac{12}{18} = \frac{2}{3}$ ✓

2. A bag has 3 red sweets, 6 green sweets & 9 blue sweets

(a) Red = $P(\text{Red}) = \frac{3}{18} = \frac{1}{6}$ ✓

(b) Green = $P(\text{Green}) = \frac{6}{18} = \frac{1}{3}$ ✓

SC 6

(c) Blue = $P(\text{Blue}) = \frac{9}{18} = \frac{1}{2}$ ✓

(d) Orange = $P(\text{Orange}) = 0$ ✓

SC 5

3. A number card 1 - 6 is used

$P(5) = \frac{1}{6}$ ✓

(i) $P(3) = \frac{1}{6}$ ✓

(ii) $P(\text{odd}) = \frac{3}{6} = \frac{1}{2}$ ✓

(iii) $P(5) = 0$ ✓

(iv) $P(< 2) = \frac{1}{6}$ ✓

4. A double spinner (12 sides) spinner is spun and the number is noted

(a) $P(1) = \frac{1}{12} = \frac{1}{12}$ ✓

(b) $P(\text{odd}) = \frac{6}{12} = \frac{1}{2}$ ✓

(c) $P(\text{multiple of 2}) = \frac{6}{12} = \frac{1}{2}$ ✓

(d) $P(\text{prime}) = \frac{4}{12} = \frac{1}{3}$ ✓

✓ Good Work

Pupil Evidence Sheet 6

01/1/17 Ex 212 pg 201

6. A garage forecourt has the following colours of cars

12 blue
8 green
6 silver
4 white
3 black
2 red
1 yellow

SC 9

a) $P(\text{blue}) \frac{12}{36} = \frac{1}{3}$ ✓

b) $P(\text{green}) \frac{8}{36} = \frac{2}{9}$ ✓

c) $P(\text{silver}) \frac{6}{36} = \frac{1}{6}$ ✓

d) $P(\text{white}) \frac{4}{36} = \frac{1}{9}$ ✓

e) $P(\text{black}) \frac{3}{36} = \frac{1}{12}$ ✓

f) $P(\text{red}) \frac{2}{36} = \frac{1}{18}$ ✓

g) $P(\text{yellow}) \frac{1}{36}$ ✓

h) $P(\text{red or blue}) \frac{14}{36} = \frac{7}{18}$ ✓

i) $P(\text{not red or blue}) \frac{22}{36} = \frac{11}{18}$ ✓

Starter

A bag contains 8 yellow and 10 red beads.
If a bead is chosen at random what is the probability that the bead will be:

SC 9
SC 4-5

- (a) yellow $P(\text{yellow}) = \frac{8}{18} = \frac{4}{9}$
- (b) red $P(\text{Red}) = \frac{10}{18} = \frac{5}{9}$
- (c) blue $P(\text{Blue}) = 0$
- (d) red or yellow? $P(\text{Red or yellow}) = 1$

$$P(\text{yellow}) + P(\text{Red})$$

$$= \frac{4}{9} + \frac{5}{9}$$

$$= 1$$

12. The weathermen reckon that the probability of rain in Perth is 0.25

$$P(\text{no rain}) = 1 - 0.25 = 0.75$$

SC 7

13. After counting the number of boys in girls in a 3rd year group, the probability of picking a name at random is $\frac{3}{5}$ will be male

Boys

Girls

$$\frac{3}{5} \times 60 = \frac{36}{60} = 36 \text{ boys}$$

$$60 - 36 = 24 \text{ girls}$$

14. (a) P(Red card) = $\frac{26}{52} = \frac{1}{2}$

(b) P(spade) = $\frac{13}{52} = \frac{1}{4}$

SC 6

(c) P(Ace) = $\frac{4}{52} = \frac{1}{13}$

(d) P(King of hearts) = $\frac{1}{52}$

(e) P(face card) = $\frac{12}{52} = \frac{3}{13}$

16. (a) (i) $0.163 = 16.3\% = 16.4\%$

SC 8

(ii) $0.160 = 16.0\% = 16\%$

(d) Dheena has a better chance at winning

17. Celia

Daria

$\frac{2}{17}$ chance at reaching target weight

$\frac{9}{49}$ chance at reaching target weight

0.117...

0.183...

11.764... %
11.8%

18.367... %
18.4%

Daria has a better chance at reaching her target weight than Celia because Daria has a 18.4% and Celia has a 11.8% and $18.4\% > 11.8\%$

18. Rain

Snow

$\frac{6}{38}$ chance of happening

$\frac{5}{32}$ chance of happening

SC 8

0.157...

0.156...

15.789... %
15.8%

15.625... %
15.6%

There is a higher chance of rain than snow because $15.8\% > 15.6\%$

Probability in Real-life

Planning Around the Weather

SC 10

Nearly every day you use probability to plan around the weather. Meteorologists can't predict exactly what the weather will be, so **they use tools and instruments to determine the likelihood that it will rain, snow or hail.** For example, if there's a 60-percent chance of rain, then the weather conditions are such that 60 out of 100 days with similar conditions, it has rained. You may decide to wear closed-toed shoes rather than sandals or take an umbrella to work. Meteorologists also examine historical data bases to guesstimate high and low temperatures and probable weather patterns for that day or week.

Sports Strategies

Athletes and coaches use probability to determine the best sports strategies for games and competitions. A baseball coach evaluates a player's batting average when placing him in the lineup. For example, a player with a .200 batting average means he's gotten a base hit two out of every 10 at bats. A player with a .400 batting average is even more likely to get a hit – four base hits out of every 10 at bats. Or, if a high-school football kicker makes nine out of 15 field goal attempts from over 40 yards during the season, he has a 60 percent chance of scoring on his next field goal attempt from that distance. The equation is:

$$9 / 15 = 0.60 \text{ or } 60 \text{ percent}$$

Insurance Options

Probability plays an important role in **analyzing insurance policies to determine which plans are best** for you or your family and what deductible amounts you need. For example, when choosing a car insurance policy, you use probability to determine how likely it is that you'll need to file a claim. For example, if 12 out of every 100 drivers -- or 12 percent of drivers -- in your community have hit a deer over the past year, you'll likely want to consider comprehensive -- not just liability -- insurance on your car. You might also consider a lower deductible if average car repairs after a deer-related incident run \$2,800 and you don't have out-of-pocket funds to cover those expenses.

Games and Recreational Activities

You use probability when you play board, card or video games that involve luck or chance. You must weigh the odds of getting the cards you need in poker or the secret weapons you need in a video game. The likelihood of getting those cards or tokens will determine how much risk you're willing to take. For example, the odds are 46.3-to-1 that you'll get three of a kind in your poker hand -- approximately a 2-percent chance -- according to Wolfram Math World. But, the odds are approximately 1.4-to-1 or about 42 percent that you'll get one pair. **Probability helps you assess what's at stake and determine how you want to play the game.**

Are we likely to be struck by lightning?

In the United States, an average of 80 people are killed by lightning each year. Considering being killed by lightning to be our 'favorable outcome' (not such a favorable outcome!), the sample space contains the entire population of the United States (about 250 million).

If we assume that all the people in our sample space are equally likely to be killed by lightning (so people who never go outside have the same chance of being killed by lightning as those who stand by flagpoles in large open fields during thunderstorms), the chance of being killed by lightning in the United States is equal to $80/250$ million, or a probability of about .00032%.

Clearly, you are much more likely to die in a car accident than by being struck by lightning.

Well researched - how about adding some pictures next time?

Pupil Evidence Sheet 10

In Probability, we have learned that:

- Probability is the study of chance.
- Probability can range from 0 (impossible) to 1 (certain).
- Probability of an event happening:

$$P(\text{Event}) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}} \quad \left| \text{And many more}$$

We learned this by:

- Finding the probability of heads when a coin is tossed
- The probability of picking a boy's name out of a hat in our class
- The probability of a prime number when a die is rolled
- The probability of an even number when a 12 sided die is rolled

And many more.

The skills that we have developed are:

- Being able to find out the probability of something
- Being able to change the probability from a fraction to a decimal
- Being able to change the probability from a fraction/decimal to a percentage

Evaluation Sheet

I am able to:	Self	Peer	T
Make sensible decisions on the likelihood of an event happening.			✓
Use the probability scale of 0 to 1 showing probability as a fraction, decimal or percentage.			✓
State that the probability of a certain event is 1.			✓
State that the probability of an impossible event is 0.			✓
Use the formula $P(\text{event}) = \text{number of favourable outcomes} / \text{number of possible outcomes}$ to find the probability of an event happening.			✓
Find the probability of an event not happening by calculating, $1 - \text{probability of event happening}$.			✓
Express a probability as a decimal fraction or percentage.			✓
Identify all the mutually exclusive outcomes of a single event and calculates the probability of each.			✓
Give examples of real-life situations which involve making decisions on the likelihood of events occurring and the consequences involved.			✓

You have shown excellent understanding of probability.
Well done