Gap Booklet

S2

MP1/2

Return this booklet to your teacher after use

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The Area of a Rhombus and a Kite

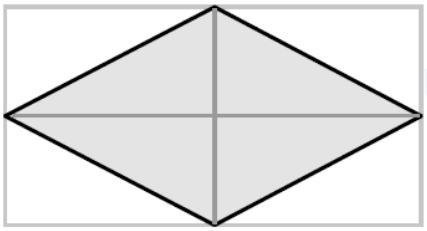
Exercise 3

1. (a) Make an accurate drawing of a rhombus with diagonals measuring 8 cm and 6 cm.
(*Draw the 2 diagonals 8 cm by 6 cm meeting at right angles in the middle.*)

(b) On your diagram, draw a rectangle round the rhombus.

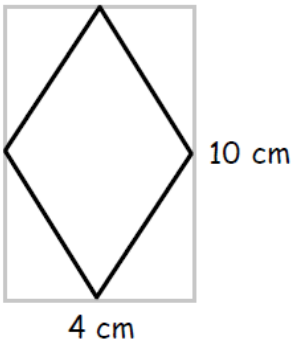
(c) Calculate the area of the rectangle.

(d) Now calculate the area of the rhombus.



2. For each rhombus below :-
(i) sketch it.
(ii) surround it with a rectangle.
(iii) calculate the area of the rectangle.
(iv) calculate the area of the rhombus.

(a)



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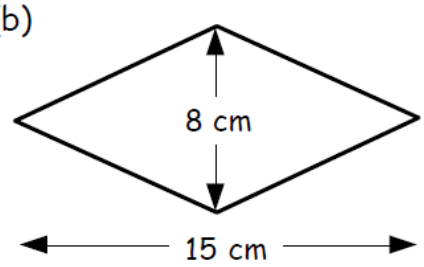

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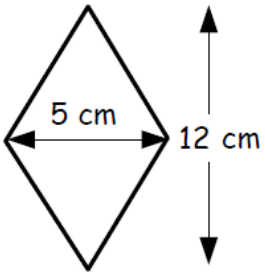

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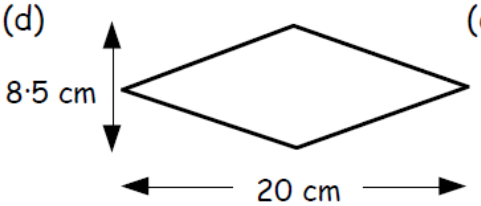
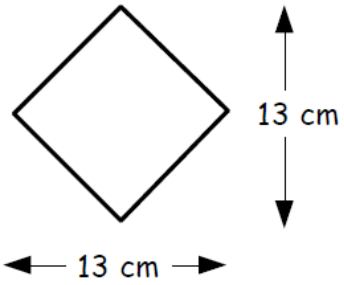


(e)



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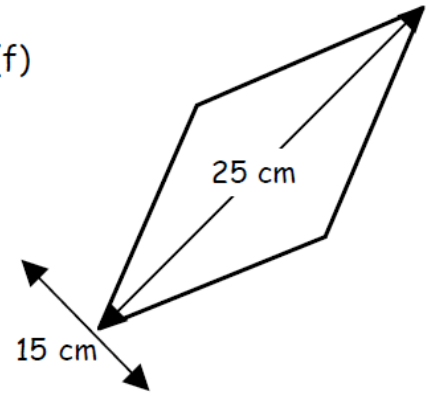
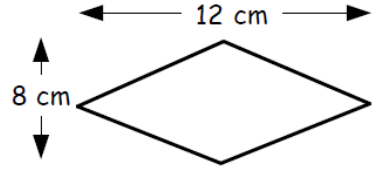


3. Use the formula "Area of Rhombus = $\frac{1}{2}(D \times d)$" to find the areas of these rhombi :-

(a)



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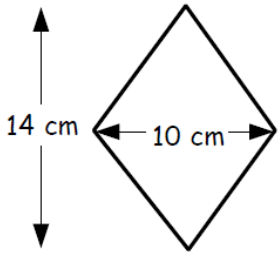

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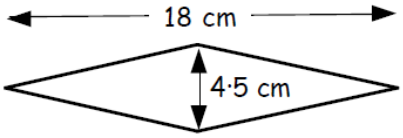

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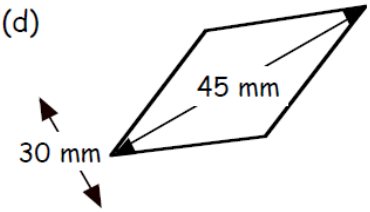

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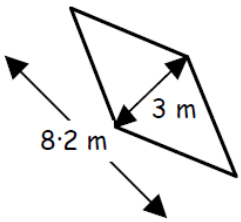

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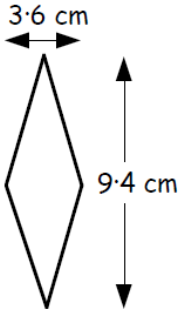
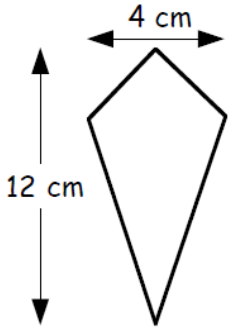
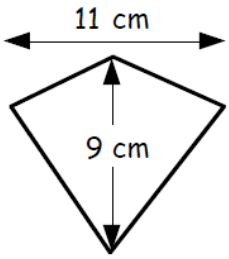


4. Use the formula "Area of Kite = $\frac{1}{2}(D \times d)$" to find the areas of these kites :-

(a)



(b)



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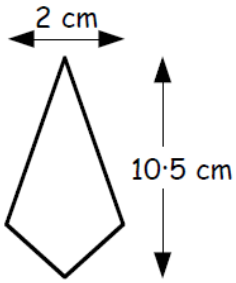

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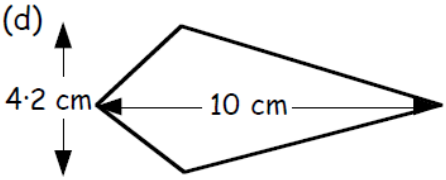

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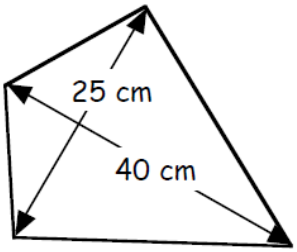

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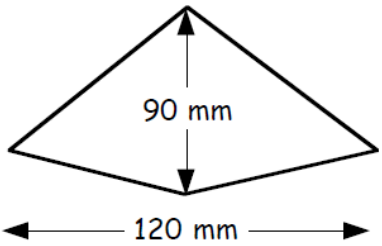
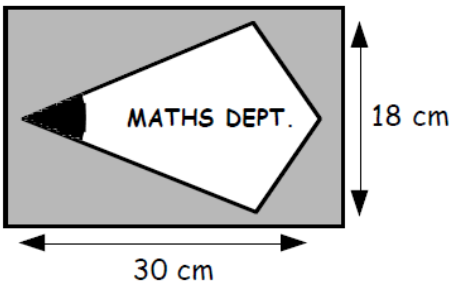


5. On parents' evenings, the maths department put up this wooden sign on the first floor of the school to direct parents to their rooms.

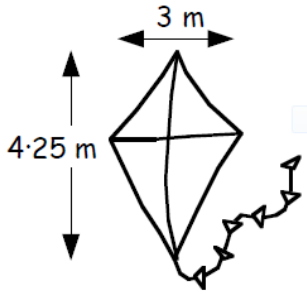
Calculate the area of the wooden kite-shape.

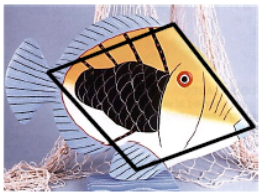


6. A giant polythene kite flew above the marquee at the wedding reception of the managing director of "Kites-R-4-U".

The kite was strengthened by 2 plastic poles measuring 4·2 metres and 3 metres which were fitted as diagonals of the feature.

Calculate the area of the giant kite.



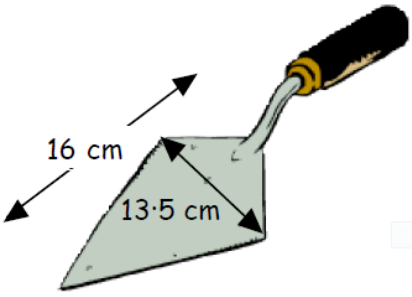
7. 

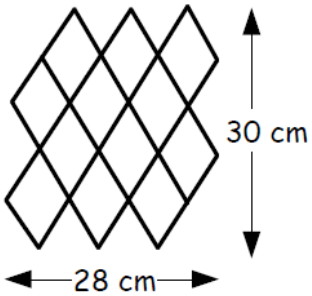
Local fishermen used to nickname this fish "The Rhombus".

Find the approximate area of its body if its measurements are 25 cm long and 9 cm in height.

8. The base of the trowel shown is in the shape of a kite.

Find its area.



9. 

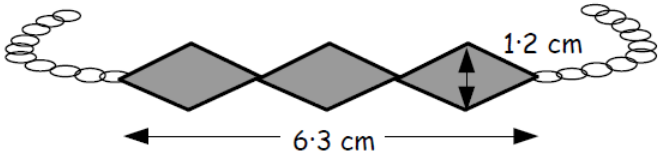
A tiling company glued 12 similar rhombus-shaped tiles onto a plywood board and used this to illustrate how their tiles gelled together to make ideal designs.

Calculate the area covered by ALL the tiles.
(*Hint - calculate the dimensions of one of the rhombi first*)

10. The main design on the pair of cufflinks shown is in the shape of rhombus.
The diagonals of each rhombus are 0·8 centimetres and 1·2 centimetres.

Calculate the total area taken up by the faces of rhombi.

11. Marjorie's necklace was made up with 3 identical golden rhombi on a chain.



The 3 rhombi together measure 6·3 centimetres long and each has a height of 1·2 centimetres.

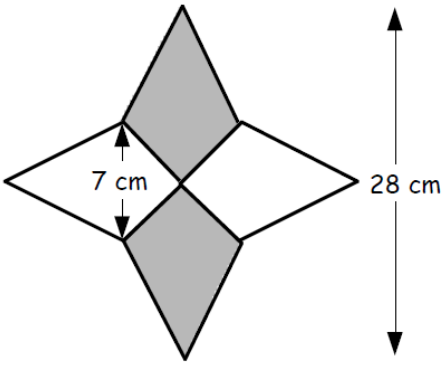
Calculate :-

12. Calculate the area of the star-shape, constructed from 4 identical kites.

Calculate :-

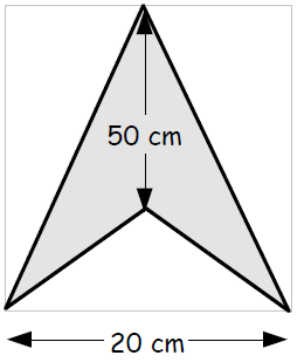
(a) the length of the diagonal of one of the rhombi.

(b) the total area of the 3 golden rhombi.

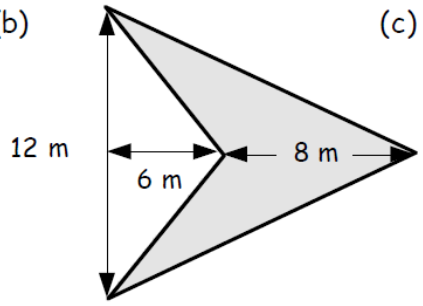


13. Calculate the area of each V-kite.

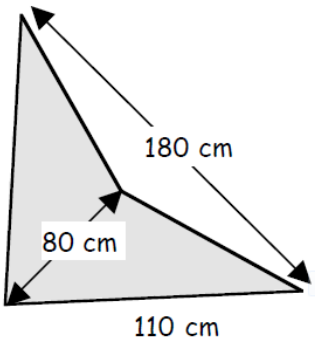
(a)



(b)

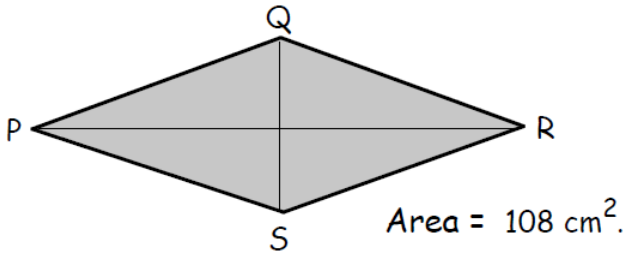


(c)



14. The area of rhombus PQRS is 108 cm^2.
The length of diagonal PR is 24 cm.

Find the length of diagonal QS.

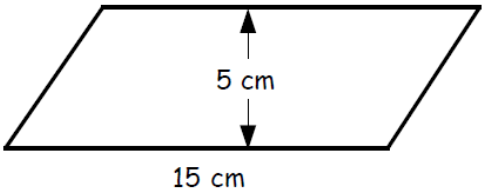


The Area of a Parallelogram

Exercise 4

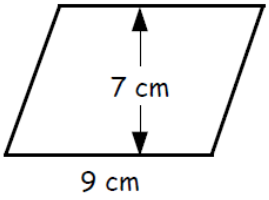
1. This is a sketch of a parallelogram.

Use the formula $A = B \times H$ to find its area.

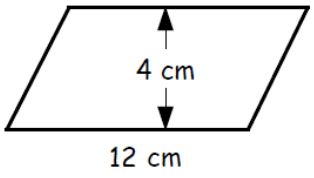


2. Calculate the areas of these parallelograms :-

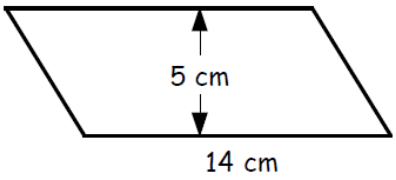
(a)



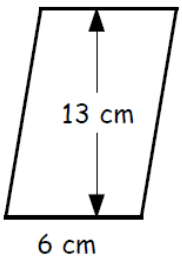
(b)



(c)



(d)



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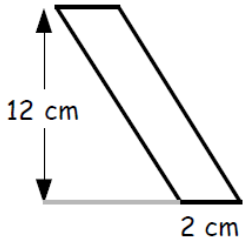

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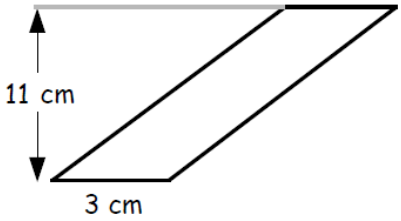

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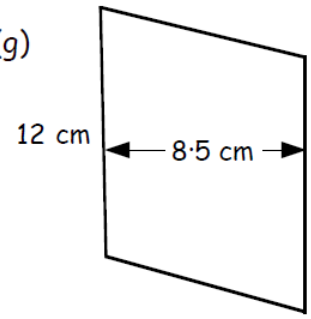
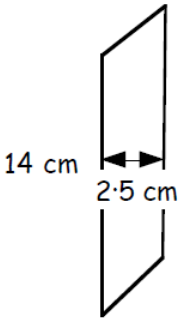
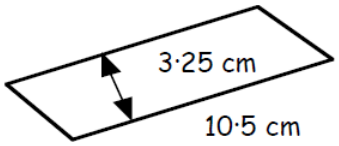


(h)

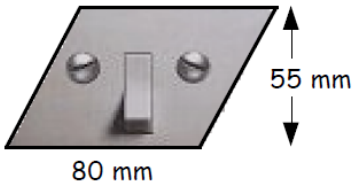


(i)



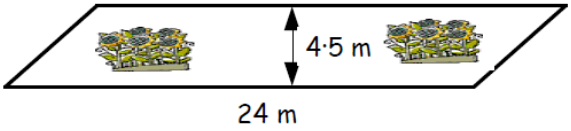
3. This light switch is in the shape of a parallelogram.

Calculate its area.

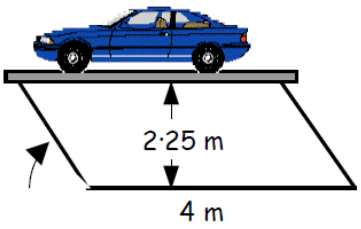


4. Mrs Galbraith made her front garden into a parallelogram shape.

Calculate the area of her garden.



5.

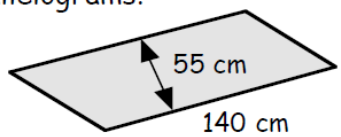


The ramp in the garage is the form of a parallelogram.

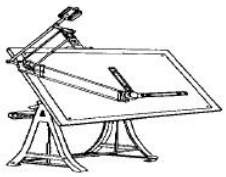
Calculate the area of the gap shown.

6. Council workers use this machine when mending roads.
Many of its moving parts are parallelograms.

Find the area of the one shown.

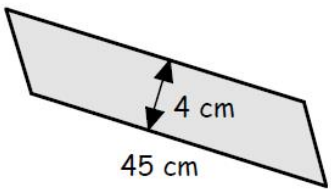


7.



Fraser, an architect, often uses parts of parallelograms when drawing up plans.

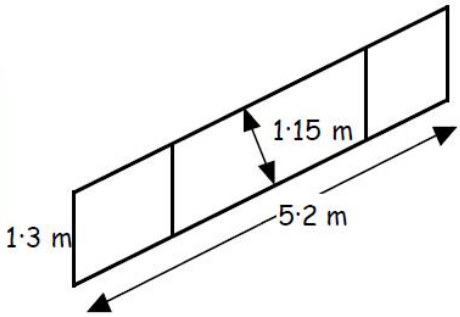
Calculate the area of this part.



8. The movable stairway is used at many older airports to allow passengers to disembo from aircraft.

Again, a parallelogram shape is noticeable.

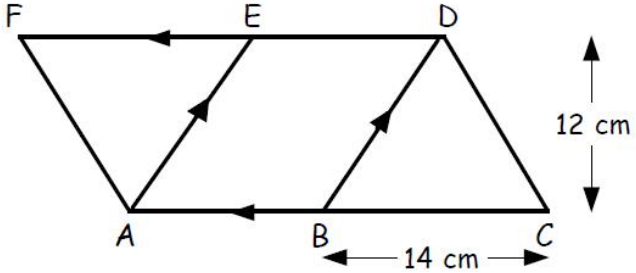
Find the area of the large parallelogram.

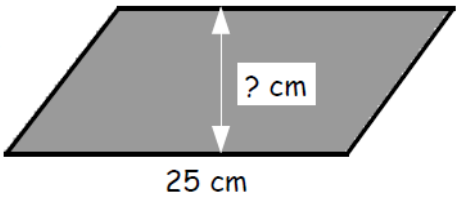


9. Look at the diagram shown and :-

(a) name 2 parallelograms.

(b) calculate the area of each one.



10. 

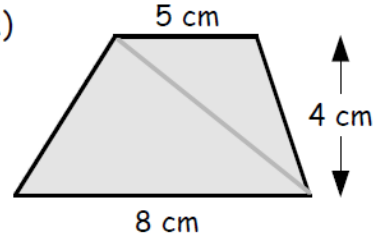
The area of the shaded parallelogram is 350 cm^2.

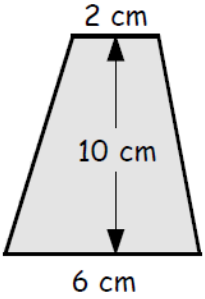
What is its height ?

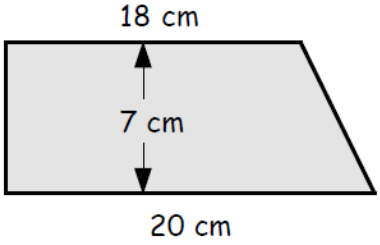
The Area of a Trapezium

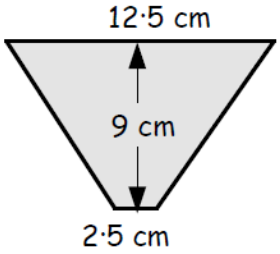
Exercise 5

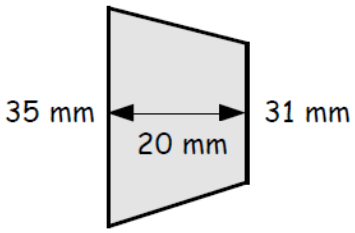
1. For each of the following, sketch and split each trapezium into 2 triangles, and calculate the area :-

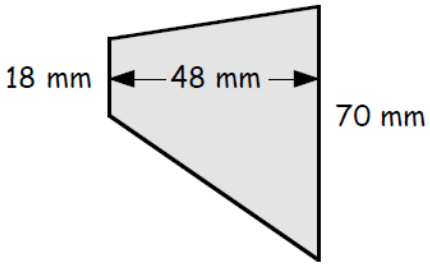
(a) 

(b) 

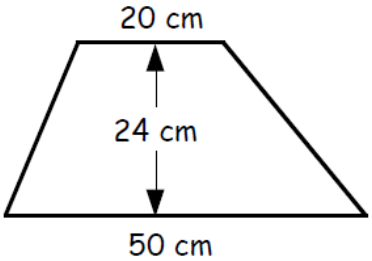
(c) 

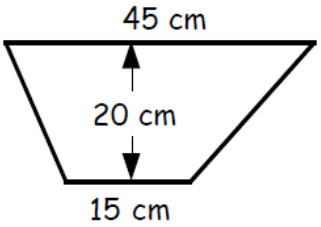
(d) 

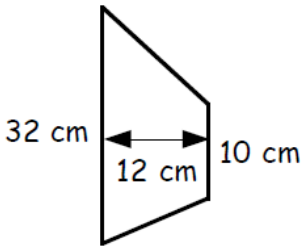
(e) 

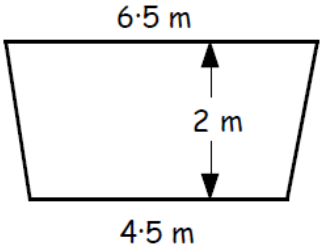
(f) 

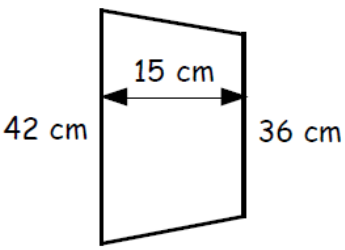
2. Use the formula Area = $\frac{1}{2}(a + b)h$ to calculate the area of each of the trapezia :-

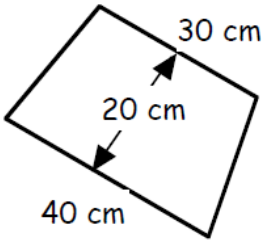
(a) 

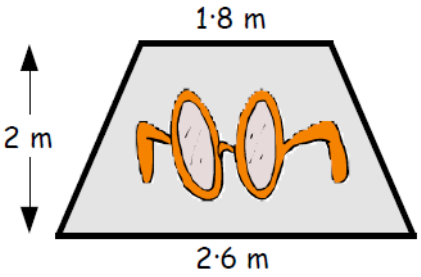
(b) 

(c) 

(d) 

(e) 

(f) 

3. 

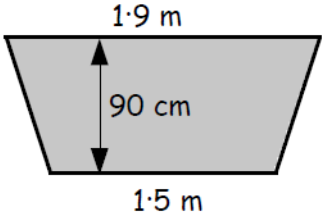
The sign outside "Trapezia Spectacles" is similar to the one shown.

Calculate the area of the trapezium.

4. Calculate out the area of this Malaysian stamp.

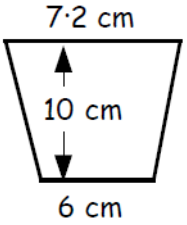
5. The top of this office table is in the shape of a trapezium.

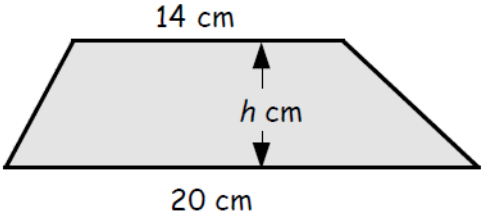
Find its area in cm^2.



6. The gaps in the alloy wheels are trapezium shaped.

Calculate the total area taken up by the 8 gaps in this wheel.



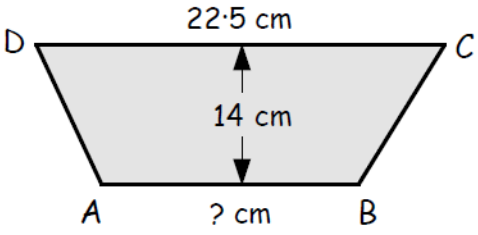
7. 

The area of this trapezium is 136 cm^2.

Calculate its height (h cm).

8. The area of the trapezium ABCD is 273 cm^2.

Calculate the length of the line AB.

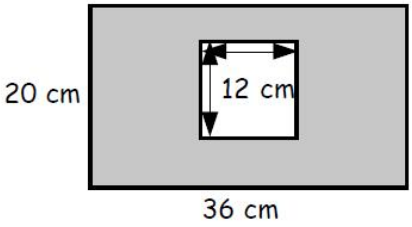


Composite Shapes

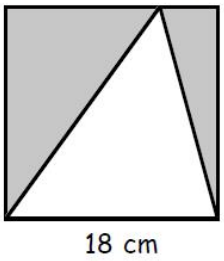
Exercise 6

1. Calculate the shaded areas :-

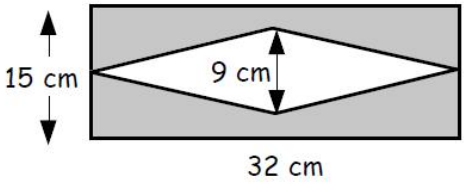
(a) Rectangle & Square



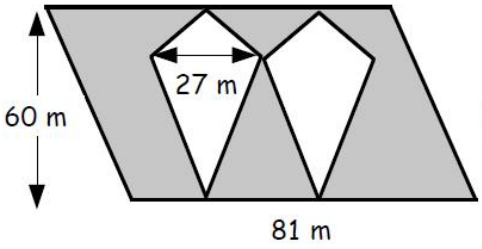
(b) Square & Triangle



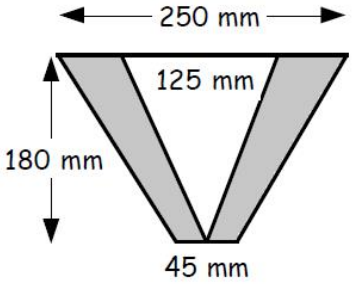
(c) Rectangle & Rhombus



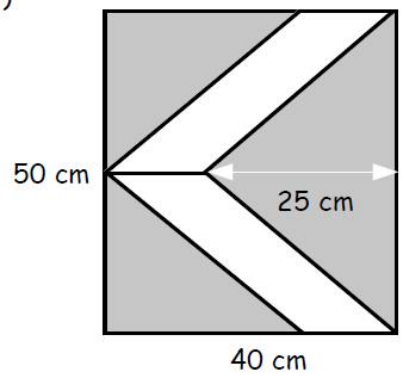
(d) Parallelogram & Identical Kites



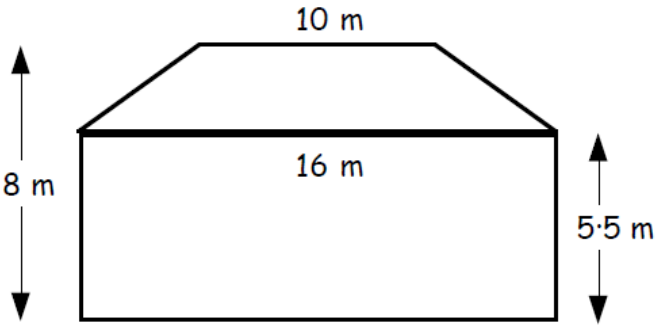
(e) Trapezium & Triangle



(f) Rectangle & Identical Parallelograms

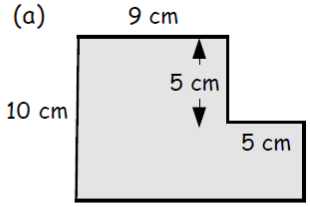


2. Find the area of this house-shape, made up of a rectangle and a trapezium.

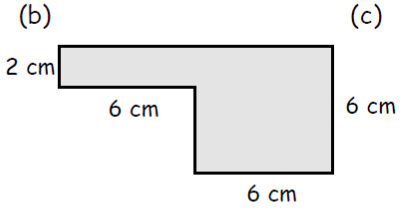


3. Calculate these areas :-

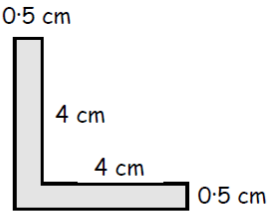
(a)



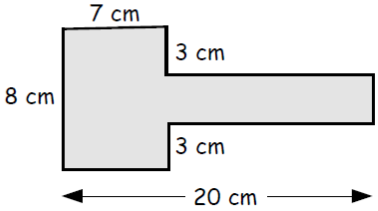
(b)



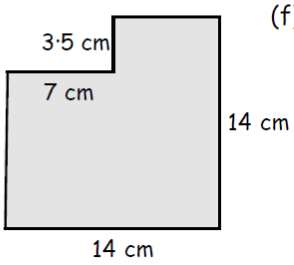
(c)



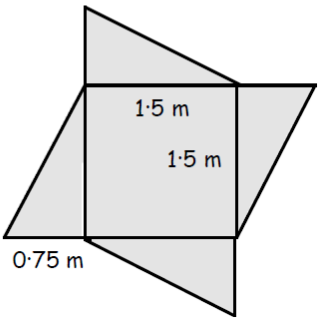
(d)



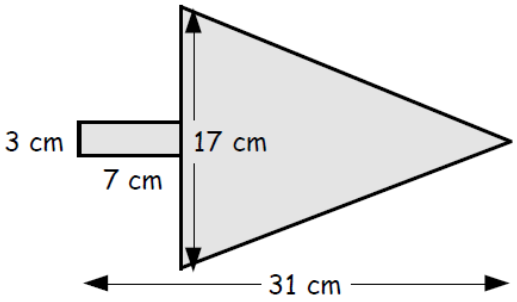
(e)



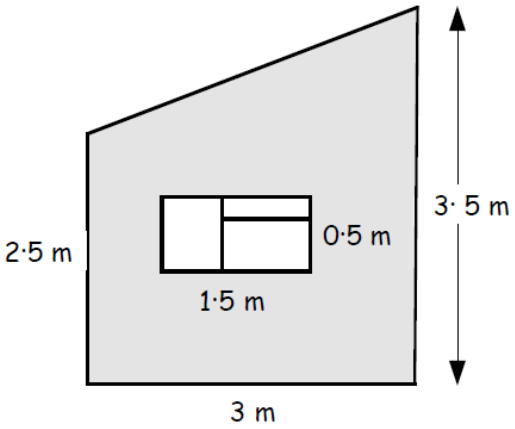
(f)



4. Calculate the area of this arrow, consisting of a triangle and a rectangle :-



5.

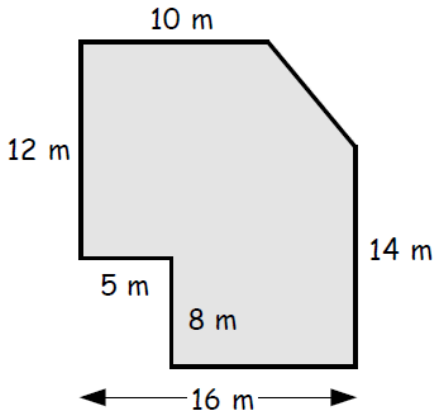


Calculate the painted area of the side of a shed.

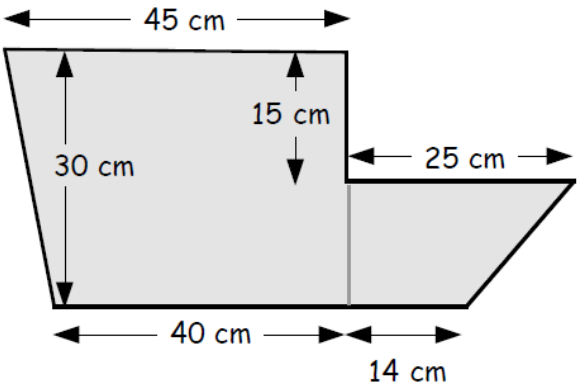
The dimensions of the window are 0·5 m by 1·5 m.

6. Calculate the area of the composite shapes :-

(a)



(b)



Division of Fractions

Exercise 5

1. Copy each of the following and complete :-

(a) $\frac{3}{4} \div \frac{3}{5}$
$= \frac{3}{4} \times \frac{5}{3}$
$= \frac{?}{12} = \frac{?}{4} = 1\frac{?}{4}$

(b) $\frac{5}{6} \div \frac{2}{3}$
$= \frac{5}{6} \times \frac{3}{2}$
$= \frac{?}{12} = 1\frac{?}{?}$

(c) $\frac{3}{4} \div \frac{5}{6}$
$= \frac{3}{4} \times \frac{6}{5}$
$= \frac{?}{20} = \frac{?}{?}$

2. Divide the following fractions and simplify (where possible) :-

(a) $\frac{2}{5} \div \frac{2}{3}$ (b) $\frac{5}{6} \div \frac{7}{12}$ (c) $\frac{3}{7} \div \frac{6}{7}$ (d) $\frac{3}{10} \div \frac{4}{5}$

(e) $\frac{3}{8} \div \frac{5}{6}$ (f) $\frac{7}{12} \div \frac{7}{8}$ (g) $\frac{11}{16} \div \frac{5}{8}$ (h) $\frac{2}{9} \div \frac{1}{6}$

(i) $\frac{7}{10} \div \frac{3}{5}$ (j) $\frac{7}{16} \div \frac{3}{10}$ (k) $\frac{8}{9} \div \frac{3}{4}$ (l) $\frac{1}{5} \div \frac{1}{7}$

3. How many $\frac{2}{5}$'s are there in $\frac{3}{10}$'s ?

4. How many pieces of cloth $\frac{1}{8}$ metre long, can I cut from a piece $\frac{2}{3}$ metre long ?

5. Copy and complete the following :-

(a) $2\frac{1}{4} \div 1\frac{1}{5}$
$= \frac{9}{4} \div \frac{6}{5}$
$= \frac{9}{4} \times \frac{?}{6}$
$= \ldots\ldots = \ldots\ldots$

(b) $4\frac{2}{3} \div 1\frac{2}{5}$
$= \frac{14}{3} \div \frac{7}{5}$
$= \frac{14}{3} \times \frac{?}{?}$
$= \ldots\ldots = \ldots\ldots$

(c) $2\frac{2}{3} \div 3\frac{1}{5}$
$= \frac{?}{3} \div \frac{?}{5}$
$= \ldots.$
$= \ldots\ldots = \ldots\ldots$

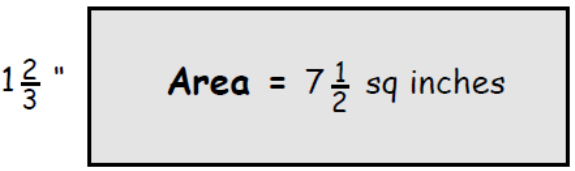
6. Divide the following fractions in the same way (simplify if possible) :-

(a) $3\frac{1}{3} \div 1\frac{1}{2}$ (b) $2\frac{1}{5} \div 1\frac{1}{2}$ (c) $4\frac{1}{3} \div 2\frac{3}{4}$ (d) $1\frac{2}{7} \div 2\frac{2}{3}$

(e) $4\frac{1}{4} \div 3\frac{3}{5}$ (f) $6\frac{1}{2} \div 2\frac{1}{4}$ (g) $1\frac{3}{5} \div 4\frac{2}{3}$ (h) $7\frac{1}{2} \div 1\frac{3}{7}$

(i) $5\frac{1}{3} \div 1\frac{3}{5}$ (j) $4\frac{1}{2} \div 5\frac{1}{4}$ (k) $6 \div 1\frac{1}{2}$ (l) $8 \div 2\frac{2}{3}$

7. The area of this rectangular piece of card is $7\frac{1}{2}$ square inches.
It is $1\frac{2}{3}$ inches wide. Calculate its length.



8. A $4\frac{1}{2}$ metre length of plank weighs $10\frac{1}{8}$ kilograms.

(a) What does 1 metre of the plank weigh ?

(b) What is the weight of a $3\frac{1}{4}$ metre plank of the same type of wood ?

9. Danny's mum found that she was $1\frac{1}{5}$ times as tall as Danny was.

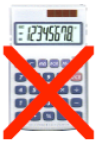
If his mum was $1\frac{3}{4}$ metres tall, how tall was Danny ?

10.

$2\frac{1}{4}$ laps of the park took Tommy Muir, walking his dog, $12\frac{1}{2}$ minutes.

How long, on average, did each lap take ?

Division of Decimals by a Single Decimal Digit



Exercise 6

1. Find :-

(a) $8 \div 0{\cdot}2$	(b) $16 \div 0{\cdot}4$	(c) $25 \div 0{\cdot}5$	(d) $48 \div 0{\cdot}6$
(e) $56 \div 0{\cdot}7$	(f) $81 \div 0{\cdot}9$	(g) $100 \div 0{\cdot}1$	(h) $99 \div 0{\cdot}9$

2. Find :-

(a) $1{\cdot}4 \div 0{\cdot}7$	(b) $2{\cdot}6 \div 0{\cdot}2$	(c) $5{\cdot}6 \div 0{\cdot}8$	(d) $5{\cdot}4 \div 0{\cdot}6$
(e) $2{\cdot}55 \div 0{\cdot}5$	(f) $9{\cdot}24 \div 0{\cdot}6$	(g) $22{\cdot}26 \div 0{\cdot}7$	(h) $37{\cdot}36 \div 0{\cdot}8$

3. Calculate :-

(a) $8 \div 0{\cdot}02$	(b) $40 \div 0{\cdot}08$	(c) $4{\cdot}2 \div 0{\cdot}03$	(d) $6{\cdot}3 \div 0{\cdot}07$
(e) $0{\cdot}024 \div 0{\cdot}08$	(f) $0{\cdot}081 \div 0{\cdot}09$	(g) $0{\cdot}005 \div 0{\cdot}01$	(h) $0{\cdot}015 \div 0{\cdot}05$

4. Calculate :-

(a) $0{\cdot}27 \div 0{\cdot}003$	(b) $0{\cdot}64 \div 0{\cdot}004$	(c) $0{\cdot}48 \div 0{\cdot}006$	(d) $0{\cdot}035 \div 0{\cdot}007$
(e) $0{\cdot}065 \div 0{\cdot}005$	(f) $0{\cdot}008 \div 0{\cdot}002$	(g) $0{\cdot}0153 \div 0{\cdot}003$	(h) $0{\cdot}906 \div 0{\cdot}006$

5. Calculate :-

(a) 42 ÷ 60 (b) 18 ÷ 20 (c) 15 ÷ 500 (d) 12 ÷ 400

(e) 54 ÷ 900 (f) 32 ÷ 8000 (g) 210 ÷ 7000 (h) 350 ÷ 5000

6. 4000 floppy disks can store 6160 megabytes.

How many megabytes can be stored on one such disk ?

7. A small paint pen for colour testing holds 0·08 litres of paint.

How many pens can be filled from a drum which contains :-

(a) 1·6 litres (b) 40 litres (c) 100 litres (d) 0·72 litres ?

8. A box of 2000 large envelopes weighs 1·4 kg, not including the weight of the box itself.

Work out the weight of one envelope, (a) in kg's. (b) in grams.

9. Try these :-

(a) 10 ÷ 0·0002 (b) 50 ÷ 0·0005 (c) 3·33 ÷ 0·0003 (d) (-0·42) ÷ 0·7

(e) 0·18 ÷ (-0·6) (f) (-0·24) ÷ (-0·4) (g) 0·0001 ÷ 0·001 (h) 0·0005 ÷ 0·005

Removing Brackets

Remove these brackets :-

1. (a) -2(3x + 5) (b) -3 (4x - 1) (c) -6(5x + 7) (d) -4(4x - 8)

(e) –7(4-2x) (f) -8(3 + 9x) (g) –(5x+9) (h) -(3x – 6) (i) -(x + 1)

2. (a) 3 -2(4x + 1) (b) 8 - 4(3x - 1) (c) 10 - 5(5x - 3) (d) 9 – 4(6x +2)

3. (a) $-2(a + 1)$ (b) $-3(x - 2)$ (c) $-5(3 + d)$ (d) $-4(5 - c)$

(e) $-(p + q)$ (f) $-(p - q)$ (g) $-6(d + e)$ (h) $-5(d - e)$

(i) $-p(p + 4)$ (j) $-h(h - 1)$ (k) $-x(1 + x)$ (l) $-2m(m + 3)$

(m) $-a(4a - 1)$ (n) $-h(5h + 4k)$ (o) $-x(5y - 4x)$ (p) $-2x(x - 3k)$

4. (a) $4(x+1)-2(x+2)$ (b) $5(a+2)-4(a+2)$ (c) $3(b+5)-2(b+7)$

(d) $3(2c+4)-2(c+5)$ (e) $6(3p+2)-4(p+3)$ (f) $4(x+3)-2(x-3)$

(g) $5(x+1)-3(x-2)$ (h) $6(1+2e)-2(1-e)$ (i) $10(2-v)-12(1-v)$

(j) $x(x+1)+2(x-1)$ (k) $n(n+6)-4(n+1)$ (l) $w(3w-1)-2(3w-8)$

(a) $7-2(y+3)$ (b) $5-2(p-1)$ (c) $3-3(d-1)$

(d) $4+3(h+1)$ (e) $2+8(2-c)$ (f) $4-2(1-u)$

(g) $9(b-2)-8$ (h) $-2(n-1)+3$ (i) $m+3(m-4)$

(j) $x-(3-x)$ (k) $9k-3(k+6)$ (l) $3w-2(2-3w)$

Equations with Brackets

1 $5(2x+3)-3(2x+4)=15$

2 $2(4x+2\frac{1}{2})-2(2x+1)=11$

3 $3(3x+4)-2(2x+1)=30$

4 $5(6x+3)-4(5x+1)=41$

5 $3(6x+1)-2(7x-4)=43$

6 $5(4x+1)-9(2x-3)=38$

7 $9(2x-1)-3(5x-3)=18$

8 $3(4x-2)-2(5x-7)=20$

9 $5(x-3)-2(x-3)=9$

10 $3(2+4x)+3(5-x)=30$

11 $3x+4+2(x-3)=8$

12 $3x+4-2(x-3)=8$

13 $2(x-1)-4+x=12$

14 $4(x+1)-2x+7=11$

15 $3(2x+7)-2(x-1)=19$

16 $6(x+1)-4(x+1)=0$

17 $3(2x+5)-2(2x-3)=27$

18 $5(8x-4)-7(5x-2)=14$

19 $7(5x+2)+4(8-7x)=60$

20 $3(9x-2)+2(7-12x)=20$

21 $8(x-5)+2(9-2x)=2$

22 $7(3x-4)-4(3-x)=10$

23 $4x-3-7(6-x)=10$

24 $6x+8-2(2x-9)=31$

25 $13x-2(4+5x)-2=2$

26 $8-3(7-2x)+4x=12$

27 $5(4x+1)-3(6x+1\frac{1}{2})=0$

28 $6x+3+2(4-x)=3$

29 $5(3-2x)-4(1-2x)=12$

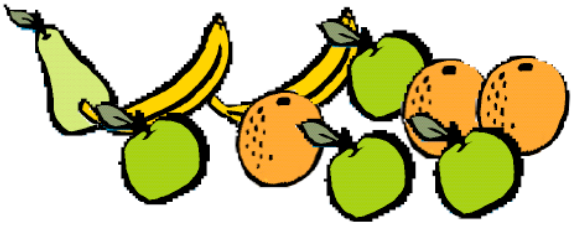
30 $0.3(4+2x)-0.1(x+2)=0$

Ratio

Exercise 1 (Oral Exercise)

1. Look at the picture.
   Write down the ratio of : -

   (a) cars : buses (b) buses : cars



2. Look at this picture.
   Write down the ratio of : -

   (a) apples : oranges (b) apples : pears

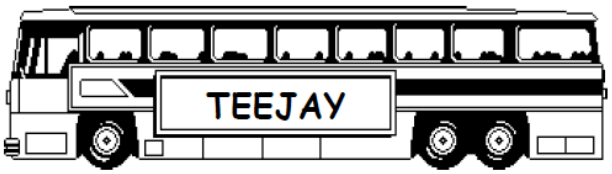
   (c) oranges : pears (d) bananas : apples

   (e) pears : bananas (f) bananas : pears.

3. In a baker shop there are 122 loaves, 169 rolls and 59 baguettes.
   Write down the ratio of : -

   (a) loaves : baguettes (b) baguettes : rolls

   (c) rolls : baguettes (d) rolls : loaves.

4. 

   On a school trip there are 21 girls,
   19 boys and 11 adults.

   Write down the ratio of : -

   (a) boys : girls (b) adults : girls

   (c) children : adults (d) adults : people.

5. An accurately drawn rectangle has its dimension as shown. Write down the ratio of :-

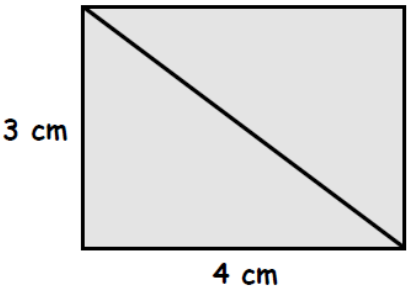
   (a) length : breadth

   (b) length : perimeter

   (c) length : area (*ignore units*)

   (d) area : perimeter (*ignore units*)

   (e) length : diagonal length



Exercise 2 (no calculator)

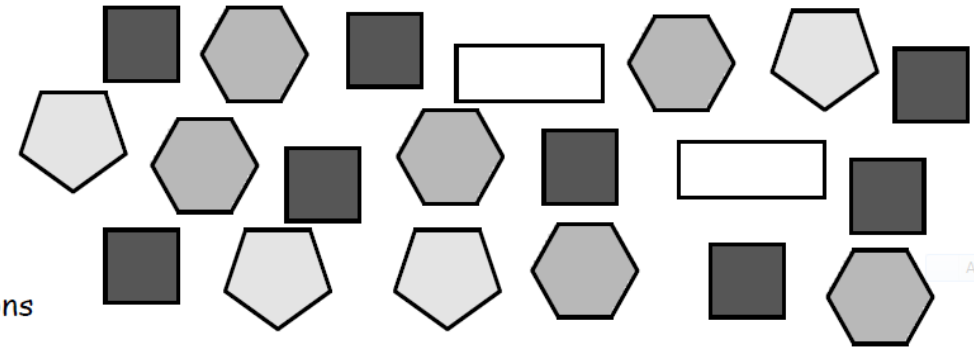
1. Simplify each ratio by dividing each value by 3 : -

   (a) 6 : 9 (b) 15 : 21 (c) 30 : 33 (d) 3 : 27 (e) 300 : 663

2. Copy the ratios and simplify each as far as possible : -

(a) 3 : 36	(b) 12 : 48	(c) 30 : 180	(d) 7 : 56
(e) 11 : 121	(f) 33 : 12	(g) 22 : 99	(h) 17 : 51
(i) 26 : 130	(j) 57 : 171	(k) 33 : 242	(l) 15 : 615
(m) 25 : 90	(n) 3 : 27	(o) 25 : 1250	(p) 24 : 144
(q) 10000 : 200	(r) 30000 : 6000	(s) 2 : 4 : 10	(t) 14 : 84 : 21

3. Write down each ratio in its simplest from : -



   (a) pentagons : hexagons

   (b) squares : pentagons

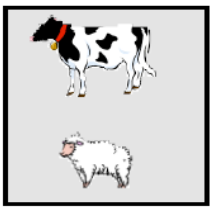
   (c) rectangles : squares

   (d) quadrilaterals : hexagons

   (e) quadrilaterals : (pentagons + hexagons).

4. (a) A farmer has 18 sheep and 32 cows in a field.

   Write down the ratio of cows : sheep in its simplest form.



   (b) The farmer's field measures 20 metres by 35 metres.

   Write down the ratio of area : perimeter in its simplest form. (*ignore units*).

5. A large container has dimensions 4 by 3 by 2 metres.
   A small container has dimensions 2 by 2 by 1 metres.

   Write down the ratio of **volumes** (small : large) in its simplest form.

6. In a week Barry earns £250, Sharon earns £300 and Del earns £450.

   Write down the following ratios of wages in their simplest forms : -

   (a) Del : Barry (b) Sharon : total wages (c) Del : Sharon : Barry.

7. Simplify the following to a unitary ratio each time : -

(a) $\frac{1}{3} : 2$ (b) $\frac{1}{3} : 5$ (c) $\frac{1}{2} : 6$ (d) $\frac{1}{2} : 2$ (e) $\frac{1}{4} : 9$ (f) $\frac{1}{4} : 12$

(g) $\frac{1}{5} : 15$ (h) $\frac{1}{8} : 8$ (i) $\frac{1}{7} : 13$ (j) $\frac{1}{15} : 20$ (k) $\frac{1}{4} : \frac{1}{2}$ (l) $\frac{1}{2} : \frac{1}{8}$

8. Write each of the following in its simplest form (not all give unitary ratios) : -

(a) $\frac{2}{3} : 4$ (b) $\frac{2}{3} : 5$ (c) $\frac{3}{4} : 15$ (d) $\frac{2}{5} : 10$ (e) $\frac{4}{7} : 2$ (f) $\frac{9}{10} : \frac{1}{2}$

(g) $\frac{7}{10} : 0{\cdot}6$ (h) $\frac{5}{6} : 5{\cdot}4$ (i) $\frac{3}{5} : 50$ (j) $\frac{3}{4} : 11$ (k) $\frac{9}{10} : 180$ (l) $\frac{2}{5} : \frac{1}{2}$

9. A recipe needs $\frac{1}{2}$ kilogram of butter, $\frac{1}{4}$ kilogram of flour and $\frac{1}{10}$ kilogram of sugar.

Write in its simplest form the ratio of : -

(a) butter : flour (b) flour : butter

(c) sugar : butter (d) flour : sugar.

When working with ratios, the two units **must** be the same.

10. Write down each ratio in its simplest form : -

(a) $\frac{1}{4}$ of an hour : 30 minutes (*hint : - change both to minutes*)

(b) $\frac{1}{4}$ kg : 150 g (c) $\frac{1}{4}$ litres : 25 ml (d) $\frac{1}{2}$ metre : 200 cm

(e) 20 kg : 200 g (f) 10 litres : 100 ml (g) 3 kilometres : 200 m

(h) 1 km : 10 cm (i) 2 tonnes : 100 g (j) 30 minutes : 1 day

(k) 1 week : days in April (l) one million millimetres : one kilometre.

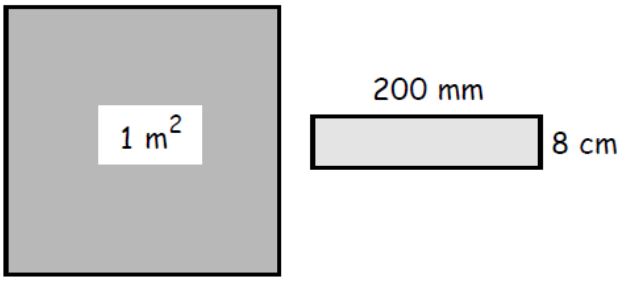
11. A rectangle has length 200 mm and breadth 8 cm.

A square has an area of 1 m^2.

Write in its simplest form the ratio of : -

(a) area of rectangle : area of square.

(b) length of rectangle : length of square.



Ratio Calculations

Exercise 3 (no calculator)

1. (a) On a train the ratio of men to women is 3 : 4.

If there are 27 men on the train, how many women are there ?

men		women
× 9	3	4
	27	...

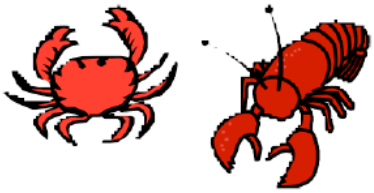
(b) In a Cat & Dog home the ratio of cats to dogs is 4 : 7.

If there are 35 dogs in the home , how many cats are there ?

cats		cogs
× ?	4	7
	...	35

(c) In an orchard the ratio of apple trees to pear trees is 9 : 11.

If there are 27 apple trees, how many pear trees are there ?

2. 

In a large aquarium the ratio of crabs to lobsters is 3 : 5.

(a) If there are 12 crabs, how many lobsters are there ?

(b) If there are 30 lobsters, how many crabs are there ?

3. The ratio of Bob's weekly wage to Janet's weekly wage is 5 : 7.

(a) If Bob earns £250, how much would Janet earn ?

(b) If Janet earns £210, how much would Bob earn ?

4.

In a school the ratio of girls to boys is 8 : 7.

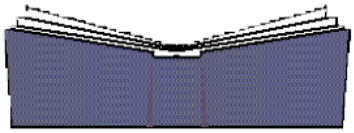
(a) If there are 400 girls, how many boys are there ?

(b) If there are 651 boys, how many girls are there ?

5. The ratio of vowels to consonants in a book was 11 : 23.

(a) If there are 13 200 vowels, how many consonants are there ?

(b) If there are 690 000 consonants, how many vowels are there ?



6.

A model aeroplane has a scale of 1 : 40.

(a) If the wing span on the model is 25 centimetres, what would be the wingspan of the real aeroplane ?

(b) If the real aeroplane has length 8 metres, what is the length of the model aeroplane ?

7. The table shows the ratios of blue and red paint for making different shades of purple.

Which shade of purple will I get if I mix : -

(a) 300 ml of blue and 500 ml of red ?

(b) 1·8 litres of blue and 200 ml of red ?

(c) 900 ml of blue and 1·5 litres of red ?

(d) 1 litre of blue and 300 ml of red ?

(e) 500 ml of red and 0·7 litres of blue ?

(f) 2·25 litres of red and 1·35 litres of blue ?

Mix in the ratio			
Colour	***Blue***	**:**	***Red***
Very dark purple	9	:	1
Dark purple	10	:	3
Purple	7	:	5
Light purple	3	:	5
Very light purple	2	:	9

Adding and Subtracting Integers

Write down each question first, then the answer :-

1. (a) 6 + 9 (b) 2 + 11 (c) 0 + 23 (d) 10 + (-7)
   (e) 8 + (-2) (f) 7 + (-7) (g) 2 + (-6) (h) 3 + (-13)
   (i) 0 + (-20) (j) (-5) + 11 (k) (-6) + 6 (l) (-3) + 15
   (m) (-9) + 5 (n) (-11) + 4 (o) 1 + (-17) (p) (-8) + (-5)
   (q) (- 9) + (- 9) (r) (-13) + (-17) (s) (-15) + 7 (t) (-21) + (-19)
   (u) (-80) + 60 (v) (-35) + (-55) (w) 10 + (-45) (x) (-3·6) + (-2·4)

2. (a) 9 - 3 (b) 10 - 10 (c) 4 - 1 (d) 3 - 5
   (e) 5 - 10 (f) 2 - 12 (g) 0 - 15 (h) (-1) - 4
   (i) (-7) - 3 (j) (-11) - 5 (k) (-1) - 21 (l) 0 - 35
   (m) 19 - 39 (n) (-15) - 25 (o) 100 - 300 (p) (-71) - 29
   (q) 0 - 22 (r) (-10) - 10 (s) 6 - 22 (t) (-25) - 35
   (u) (-1) - 1 (v) (-63) - 27 (w) (-13) - 13 (x) (-2·5) - 3·5

3. (a) 2 + 8 (b) 3 + (-10) (c) 1 - 11 (d) (-5) + 15
(e) -7 + (-8) (f) 6 - 14 (g) (-5) - 7 (h) (-40) + (-60)
(i) (-20) + 35 (j) 0 - 27 (k) 0 + (-27) (l) (-18) + (-12)
(m) 22 + (-15) (n) (-10) + 3 (o) (-41) + 41 (p) 45 - 75
(q) (-27) + 14 (r) 0 + (-35) (s) (-101) + 99 (t) 19 + (-21)

Exercise 4

1. Copy and complete the following :-

(a) 8 - (-3) = 8 + 3 = ...
(b) 11 - (-9) = 11 + 9 = ...
(c) 6 - (-5) = 6 + ... = ...
(d) 30 - (-20) = 30 + ... = ...
(e) 13 - (-6) = ... + ... = ...
(f) 4 - (-4) = ... + ... = ...

2. Show your steps in finding the following :-

(a) 6 - (-9) (b) 12 - (-13) (c) 0 - (-11) (d) 4 - (-16)
(e) 15 - (-7) (f) 35 - (-15) (g) 7 - (-7) (h) 600 - (-400)
(i) 23 - (-37) (j) 6·5 - (-3·5) (k) 2·1 - (-3·2) (l) $\frac{1}{2}$ - ($-\frac{1}{2}$)

3. Copy and complete :- (*Remember to use a thermometer scale if it helps*)

(a) -4 - (-6) = -4 + 6 = ...
(b) (-2) - (-7) = -2 + 7 = ...
(c) (-10) - (-15) = -10 + ... = ...
(d) (-8) - (-12) = -8 + ... = ...
(e) (-40) - (-30) = ... + ... = ...
(f) (-5) - (-5) = ... + ... = ...

4. Show your steps in finding the following :-

(a) (-2) - (-6) (b) (-3) - (-9) (c) (-8) - (-11) (d) (-9) - (-6)
(e) (-1) - (-2) (f) (-13) - (-7) (g) (-14) - (-14) (h) (-50) - (-120)
(i) (-24) - (-4) (j) (-2·5) - (-4·5) (k) (-0·9) - (-0·4) (l) ($-\frac{1}{2}$) - ($-\frac{1}{2}$)

5. The same idea works with algebraic expressions. Find :-

(a)	$4x - (-3x)$	(b)	$8x - (-10x)$	(c)	$0 - (-5x)$	(d)	$4a - (-9a)$
(e)	$5p - (-8p)$	(f)	$7w - (-13w)$	(g)	$8g - (-12g)$	(h)	$60f - (-20f)$
(i)	$(-3m) - (-7m)$	(j)	$(-9k) - (-4k)$	(k)	$(-5n) - (-5n)$	(l)	$(-b) - (-2b)$
(m)	$(-6q) - (q)$	(n)	$(-11z) - (-15z)$	(o)	$(-6c) - (-12c)$	(p)	$(-23g) - (-23g)$

6. A great big **MIXTURE**.

Find :-

(a)	$(-3) + 8$	(b)	$(-4) - 6$	(c)	$2 - (-9)$	(d)	$(-11) + 15$
(e)	$(-17) + 17$	(f)	$8 - 22$	(g)	$0 - 13$	(h)	$(-7) + 17$
(i)	$8 - (-12)$	(j)	$(-3) - (-4)$	(k)	$7 - (-7)$	(l)	$(-22) + 42$
(m)	$3x - (-4x)$	(n)	$(-5p) + 11p$	(o)	$10a - (-2a)$	(p)	$(-3g) - 12g$
(q)	$a - (-a)$	(r)	$0 - (-5p)$	(s)	$101 - (-99)$	(t)	$65f - 95f$
(u)	$2a^2 - 5a^2$	(v)	$(-7t^2) + 15t^2$	(w)	$(-1000) + 3000$	(x)	$(-2\frac{1}{2}) - 3\frac{1}{2}$

Multiplication and Division of Integers

Exercise 5 (no calculator)

1. Write down each of the following and find the answers :-

(a)	$4 \times (-5)$	(b)	$6 \times (-7)$	(c)	$2 \times (-9)$	(d)	$5 \times (-5)$
(e)	$(-8) \times 3$	(f)	$(-9) \times 4$	(g)	$(-11) \times 2$	(h)	$(-10) \times 7$
(i)	$6 \times (-8)$	(j)	$8 \times (-3)$	(k)	$4 \times (-12)$	(l)	$7 \times (-7)$
(m)	$9 \times (-1)$	(n)	$(-9) \times 3$	(o)	$(-2) \times 10$	(p)	$(-9) \times 5$

2. Write down each of the following and find the answers :-

(a)	$(-30) \div 6$	(b)	$(-20) \div 5$	(c)	$(-56) \div 7$	(d)	$(-63) \div 9$
(e)	$(-40) \div 2$	(f)	$(-90) \div 10$	(g)	$(-33) \div 3$	(h)	$(-32) \div 4$
(i)	$(-8) \div 8$	(j)	$(-5) \div 1$	(k)	$(-54) \div 6$	(l)	$(-100) \div 5$

3. Find the answers to the following :-

(a)	$(4 \times 9) \div 6$	(b)	$(2 \times (-10)) \div 5$	(c)	$3 \times (-2) \times 4$	(d)	$5 \times (-1) \times 6$
(e)	$3 \times (-8) \div 6$	(f)	$(-6) \times 6 \div 4$	(g)	$6 \times (-4) \div 2$	(h)	$10 \times (-10) \div 5$

4. Find the following :- (*hint : find the bit in brackets first*)

(a) $(8 + (-5)) \times 7$ (b) $6 \times (4 - 7)$ (c) $((-10) + 2) \times 2$

(d) $((-4) - 8) \div 2$ (e) $10 \times (12 - 14)$ (f) $(8 - 3) \times (-5)$

(g) $((-3) - 4) \times 5$ (h) $(6 + (-12)) \div 3$ (i) $((-9) - 11) \div 5$

5. (a) What do you think the answer to $10 \div (-2)$ will be ? 5 or -5 ?

(b) If you think 5, check if $5 \times (-2)$ really takes you back to the original 10.

(c) If it doesn't, then the answer must be **-5** !

6. Write down each of the following and find the answers :-

(a) $20 \div (-5)$ (b) $24 \div (-6)$ (c) $18 \div (-9)$ (d) $25 \div (-5)$

(e) $36 \div (-4)$ (f) $40 \div (-8)$ (g) $7 \div (-1)$ (h) $42 \div (-3)$

(i) $96 \div (-8)$ (j) $100 \div (-5)$ (k) $120 \div (-6)$ (l) $49 \div (-7)$

(m) $1 \div (-1)$ (n) $7 \div (-2)$ (o) $30 \div (-4)$ (p) $3 \div (-6)$

7. Write down each of the following and find the answers :-

(a) $(-4) \times (-3)$ (b) $(-5) \times (-2)$ (c) $(-7) \times (-9)$ (d) $(-8) \times (-4)$

(e) $(-7) \times (-8)$ (f) $(-8) \times (-8)$ (g) $(-1) \times (-14)$ (h) $(-10) \times (-9)$

(i) $(-5) \times (-5)$ (j) $(-20) \times (-3)$ (k) $(-4) \times (-50)$ (l) $(-400) \times (-10)$

8. Find the answers to the following :-

(a) $(-20) \div (-5)$ (b) $(-18) \div (-3)$ (c) $(-32) \div (-4)$ (d) $(-22) \div (-2)$

(e) $(-36) \div (-9)$ (f) $(-40) \div (-8)$ (g) $(-54) \div (-6)$ (h) $(-80) \div (-4)$

(i) $(-84) \div (-7)$ (j) $(-120) \div (-6)$ (k) $(-200) \div (-10)$ (l) $(-168) \div (-3)$

9. (a) $(4 \times (-9)) \div 6$ (b) $((-2) \times (-10)) \div 5$ (c) $3 \times (-2) \times (-4)$

(d) $3 \times (-8) \div (-6)$ (e) $(-8) \times (-3) \div (-4)$ (f) $(-5) \times 6 \div (-2)$

(g) $(5 + (-8)) \times (-6)$ (h) $(-7) \times (3 - 9)$ (i) $((-10) + (-2)) \div (-3$

10. (a) $(-2) \times (-3) \times (-4)$ (b) $(-3) \times (-4) \times (-5)$ (c) $(-4) \times (-5) \times (-6)$

(d) $(-3)^2$ (e) $(-5)^2$ (f) $(-10)^2$

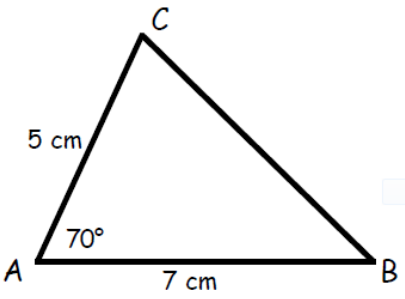
(g) $(-1)^2$ (h) $(-1)^3$ (i) $(-1)^4$

Drawing Triangles

Exercise 2

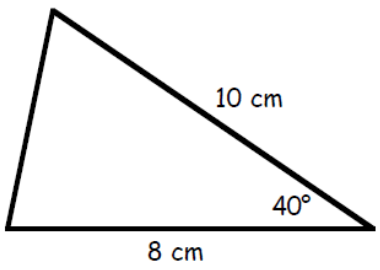
1. On the right is a sketch of ΔABC.
Follow the instructions to draw it accurately :-

Step 1 :-	Draw line AB = 7 cm
Step 2 :-	Put your protractor at A and mark (with an X) an angle of 70°.
Step 3 :-	Draw line AC, from A through the X, to point C. (*Make sure it is 5 centimetres long*).
Step 4 :-	Join C to B to complete the triangle.

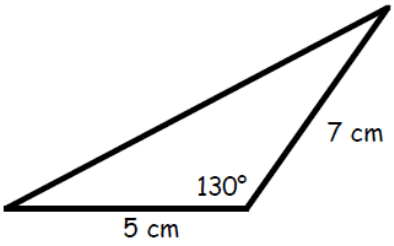


2. Make accurate drawings of the following triangles :-

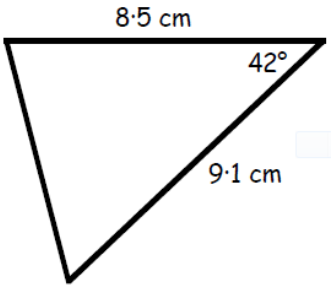
(a)



(b)



(c)



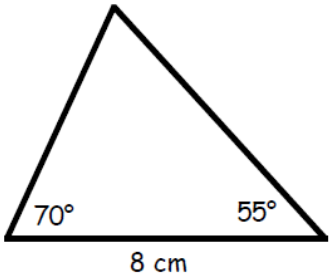
3. Make accurate drawings of the following triangles :-
(*Make rough sketches of the triangles first before drawing them accurately*).

(a) Draw ΔPQR where PQ = 11 cm, QR = 9 cm and $\angle PQR = 60°$.

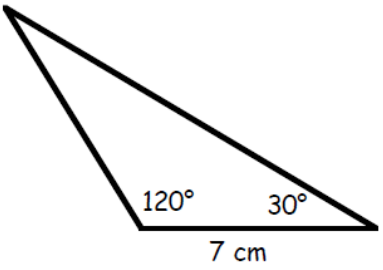
(b) Draw ΔTAN where AN = 12 cm, AT = 7·5 cm and $\angle TAN = 110°$.

5. Make accurate drawings of the following triangles :-

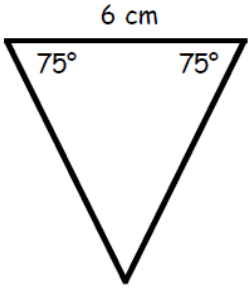
(a)



(b)



(c)

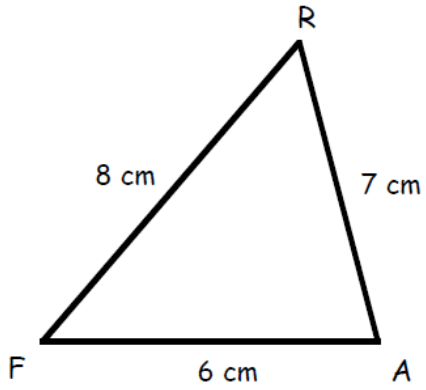


6. Make accurate drawings of the following triangles :-
(*Make rough sketches of the triangles first before drawing them accurately*).

(a) Draw ΔABC where $AB = 10$ cm, $\angle CAB = 50°$ and $\angle CBA = 65°$.

(b) Draw ΔRYT where $RY = 5$ cm, $\angle TRY = 35°$ and $\angle TYR = 125°$.

7.

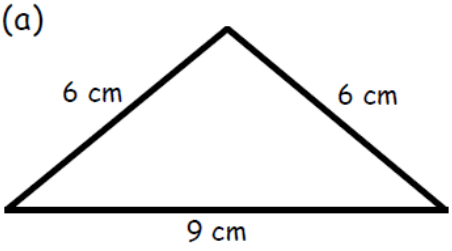


Shown is a sketch of ΔFAR.
Draw it accurately using the following instructions :-

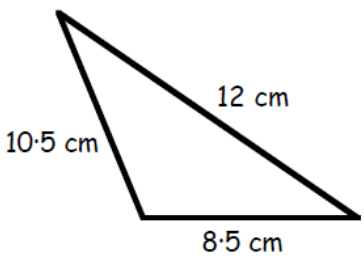
Step 1 :-	Draw line FA = 6 cm
Step 2 :-	Set your compasses to 8 cm, place the compass point on F and draw a light arc.
Step 3 :-	Now set your compasses to 7 cm, place the compass point on A and draw a 2nd arc.
Step 4 :-	Call this point where the arcs meet R and join R to F and to A.

8. Make accurate drawings of the following triangles :-

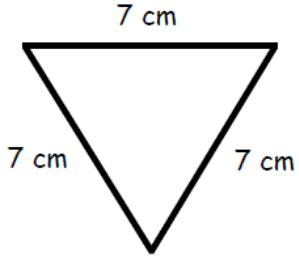
(a)



(b)



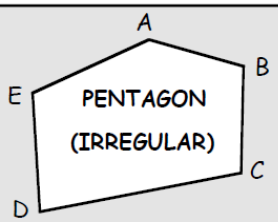
(c)



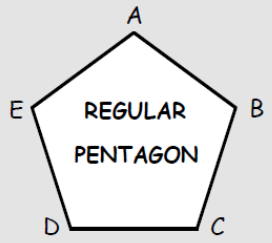
Polygons

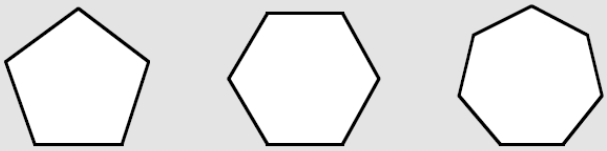
A polygon is a "many-sided closed straight-lined figure".

This 5-sided (polygon) is called a **PENTAGON**.



If all the angles are the same size and all the sides are the same length, it is referred to as a **REGULAR PENTAGON**.





pentagon **hex**agon **hept**agon

Exercise 2

1. (a) Trace, or copy the above 3 polygons and write their names below them

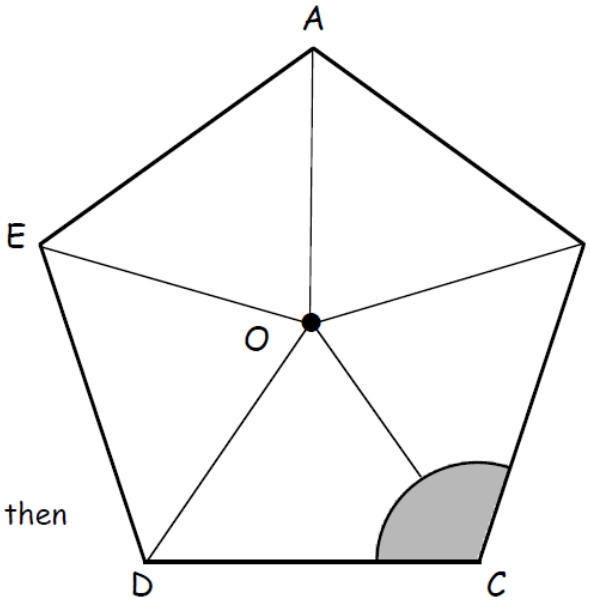
   (b) Make a sketch of an regular 8 sided polygon. What is its special name ?

   (c) Repeat for a regular 9 sided polygon.

   (d) Repeat for the regular 10 sided polygon. (*learn the names of these polygons*)

2. Look at this regular **pentagon** with centre O.

   Trace it into your jotter.



   (a) Copy and complete :-

   "Since a whole turn is 360°, the size of ∠DOC must be (360° ÷ 5) = ...°".

   (b) Copy and complete :-

   "Since DOC is an isosceles triangle, both ∠OCD and ∠ODC must be .....°".

   (c) Copy and complete :-

   "Since ∠OCD and ∠OCB are the same size, then the **Interior** (shaded) ∠BCD must = ...°".

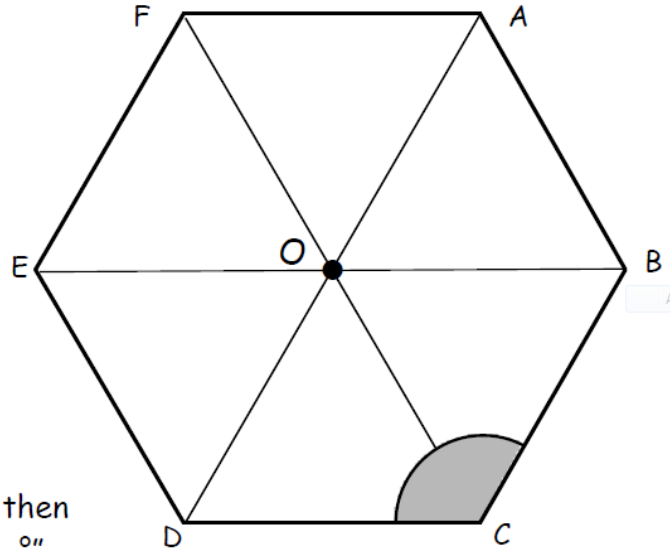
   (d) Copy and complete :-

   "Since the five angles of the polygon are the same size, then :-

   THE FIVE ANGLES OF A PENTAGON ADD TO GIVE .....°".

3. Look at this regular **hexagon** with centre O.

Trace it into your jotter.



(a) Copy and complete :-

"Since a whole turn is 360°, the size of ∠DOC must be (360° ÷ 6) = ...°".

(b) Copy and complete :-

"Since DOC is an isosceles triangle, both ∠OCD and ∠ODC must each be .....°".

(c) Copy and complete :-

"Since ∠OCD and ∠OCB are the same size, then the **Interior** (shaded) angle ∠BCD must = ...°".

(d) Copy and complete :-

"Since the six angles of the polygon are the same size, then

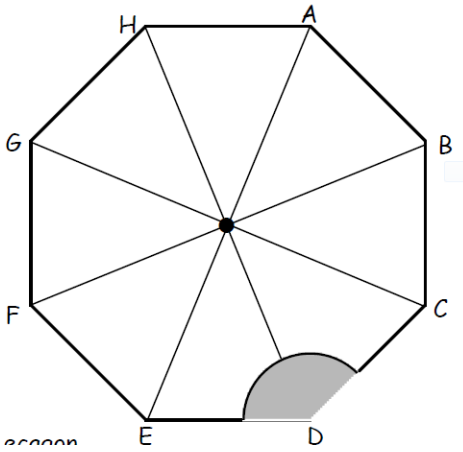
THE SIX ANGLES OF A HEXAGON ADD TO GIVE .....°".

4. The polygon this time is an **octagon**.

Go through the same 4 steps as shown in Questions 2 and 3 to find :-

(a) the size of each of the eight **interior** angles of the octagon.

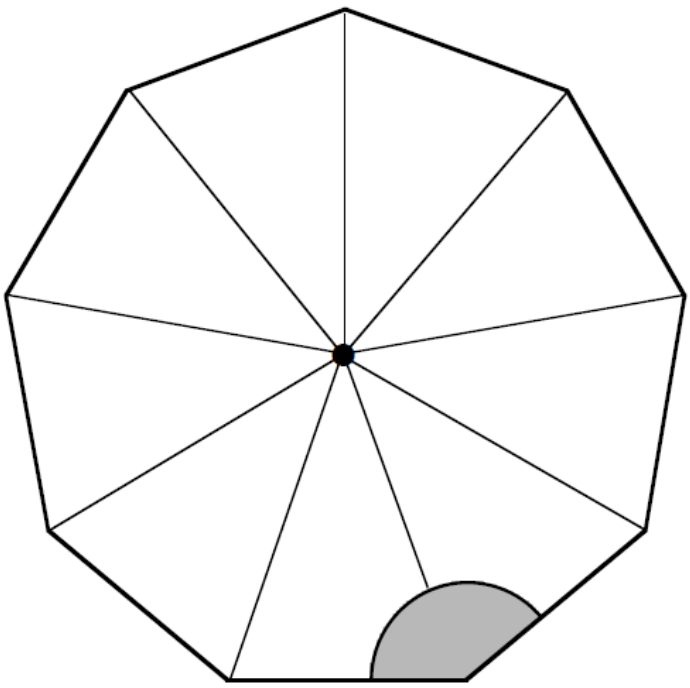
(b) the **sum** of all eight angles of the octagon.

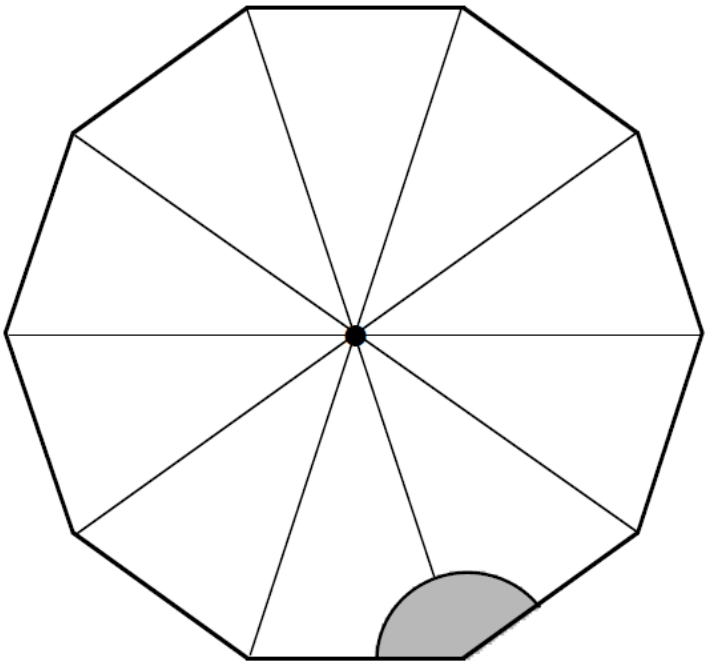


5. Repeat for the :-

(a) nonagon

(b) decagon.





6. Copy and complete this table, filling in the values for a 4, 7, 9, 10, 11 and 12 sided polygon.

Polygon sides	4	5	6	7	8	9	10	11	12
Sum of all angles	....	540°	720°	....	1080°	....	....	....	....
Size of each **interior** angle *	....	108°	....	....	....	....	....	....	....

(* this can be found by dividing the sum of all angles by the actual number of angles, e.g. 540° ÷ 5 = 108°)

A rule :- If the number of sides in the polygon is ***n***, the size of the **interior** angle is found by :-

interior angle = 180 – (360 ÷ ***n***).

Example :- For a hexagon (n = 6) => interior angle = 180 – (360 ÷ 6) = 180 – 60 = 120°.

7. Check the above rule works for a pentagon, heptagon, octagon and nonagon.

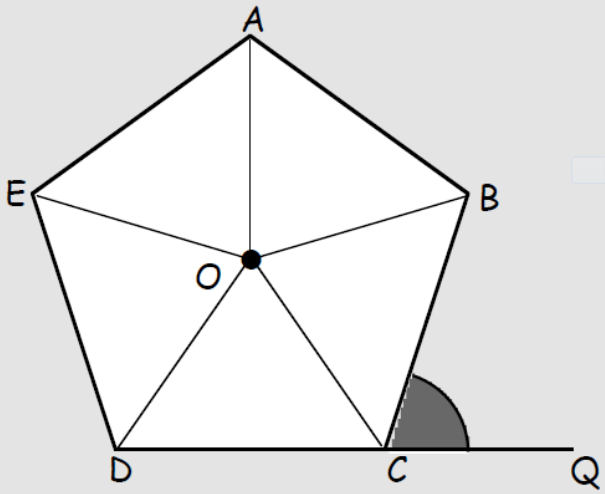
The **exterior** angles of a Polygon :-

From questions 2 and 7, you should have discovered that the **INTERIOR** angles of a regular PENTAGON were each 108°.

The diagram shows the **exterior** angle is found by :-

exterior angle = 180° – **interior** angle

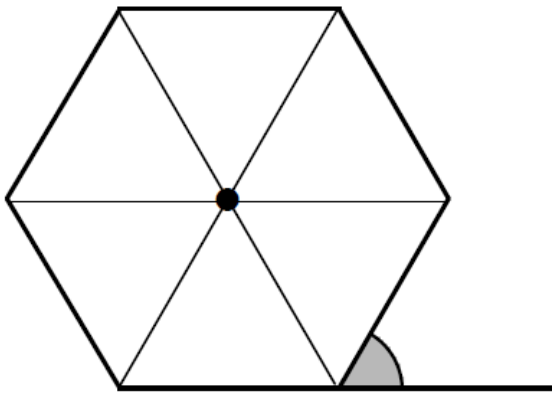
=> **exterior** angle of pentagon = 180° – 108° = 72°.



8. (a) Calculate the size of the exterior angles of a regular hexagon.

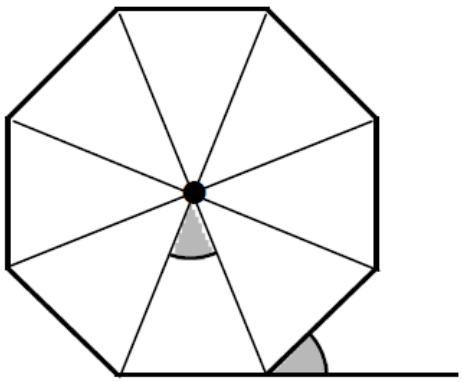
(b) Calculate the size of the exterior angles of a regular octagon.

(c) Calculate the size of the exterior angles of a regular decagon.



9. Can you see a connection between the size of the **external** angle of a polygon, (say an octagon), and the **angle at the centre** between any 2 adjacent "spokes" ?

(Try to explain why this should be so)



Class Intervals

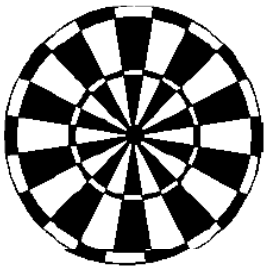
Exercise 2

1. (a) Copy and complete the frequency table above.

   (b) How many students scored over 49 ?

   (c) Draw a neat labelled **bar graph** to show this information.

2. Each number below shows the score of 3 darts thrown by each member of class $1A_3$.



15	13	31	42	64	34	32	20	11	8	21
55	19	51	45	64	35	75	50	46	55	67
21	33	12	6	40	79	76	47	29	10	15

(a) How many numbers are in each interval ?

(b) How many intervals will there be in the table ?

(c) Copy and complete the table.

(d) How many pupils are in class $1A_3$?

(e) How many pupils scored under 30 ?

(f) Draw a neat labelled bar graph showing this information.

Class Intervals	Tally	Frequency
0 - 9		
10 - 19		
20 - 29		
30 - 39		
40 -		

3. The number of pets in each class in a school is shown below.

1	14	8	27	16	7	12	15	21	20	17	0	11	15	10
12	14	4	5	10	14	11	9	19	15	21	13	4	11	16

Show this information on a frequency table. (*Use class intervals of 0 - 4, 5 - 9, 10 - 14, etc*)

4. A class were asked to tidy their bedrooms and say how many coins they found !

The number of coins found by each pupil is shown.

4	3	18	15	31	9	0	2
11	6	27	15	12	11	15	4
22	15	16	26	25	17	13	3
9	7	1	9	16	7	21	10
12	20	1	14	19	3	0	12

(a) Find the range.

(b) Which of these would be the best class interval to start with : -

(0 - 9) or (0 - 3) or (0 - 4) or (0 - 2) ?

(c) Construct a frequency table using your chosen class interval.

(d) Draw a neat labelled bar graph to show this information.

5. A list of waiting times (in minutes) in a doctors surgery are shown.

0	4	22	11	11	19	10	12
5	8	26	25	15	17	18	2
20	13	19	21	22	13	23	13
8	9	1	6	26	8	18	10
14	10	3	24	17	5	3	22

(a) Find the range.

(b) Which of these would be the best class interval to use : -

(0 - 9) or (0 - 1) or (0 - 4) or (0 - 3) ?

(c) Construct a frequency table showing this information.

6. For each table below, construct a frequency table using an appropriate class interval.

(a)

14	13	18	15	11	9	4	1
15	34	32	25	12	16	15	14
9	15	18	25	25	19	14	3
9	8	2	7	16	27	23	20
22	20	11	13	16	30	4	22

(b)

10	35	28	45	71	69	50	42
11	36	27	15	62	72	65	54
42	35	26	16	25	37	43	53
69	52	47	31	29	19	47	31
20	12	60	51	24	49	43	40

(c)

127	152	163	174	101	133	167	155	171	110	117	129
111	134	125	164	115	122	150	160	129	144	141	153
130	128	166	154	122	169	140	151	163	162	100	174

(d)

3·6	2·3	4·6	1·7	5·6	4·2	1·1	4·0	5·2	6·3	6·9	4·1
2·5	2·8	1·3	2·5	6·6	5·1	1·4	4·6	2·2	3·3	5·1	0·4
5·0	2·9	4·3	2·1	5·4	4·6	5·3	6·1	2·2	5·7	5·8	1·3

Stem-and-leaf Graphs

Exercise 6

1. The 2nd line of the above graph reads 30, 31 and 33 years of age.

   (a) Write the ages given by each line in the graph above.

   (b) (i) What age was the youngest person in the queue ?

   (ii) What age was the oldest person in the queue ?

   (c) How many people were in the queue ?

2. The ages of a group of people waiting in a queue at a bank were recorded and put into the stem and leaf graph shown.

   (a) The first line (level 2) reads 21 years, 22 years, 24 years and 27 years.

   Write out the ages in level 3.

   (b) Write out the ages of level 4.

   (c) What age was the :-

   (i) youngest person (ii) oldest person ?

   (d) Were most of the people in their 20's, 30's or 40's ?

Age in years

2	1 2 4 7
3	1 7 9
4	2 2 3 6 8 8
5	3 3 3 5
6	0 8

Key : 2 | 4 means 24

3. Some pupils were asked how much money they had. The results are shown in the stem and leaf graph.

   (a) List the amount of money each pupil had.

   (b) Which level has the most data ?

   (c) Which amount of money appears the most often (mode) ?

   (d) How many pupils were asked in the survey ?

Pupil's money

1	1 2 5 7 8
2	0 1 2 6
3	4 4 4 5 8 8
4	9
5	0 3

Key : 1 | 2 means £1·20

4. The table shows the time it took in seconds for a puzzle to be solved by some students.

Puzzle Time

0	9
1	6 8 9
2	0 1 1 1 1 4
3	
4	1 7

(a) Write a key for this stem and leaf graph.

(b) State what was the :-

(i) fastest time (ii) slowest time,

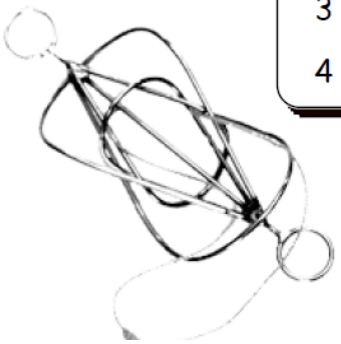
taken for the puzzle.

(c) How many pupils tried the puzzle.

(d) How many pupils took more than 22 seconds to complete the puzzle ?

(e) Find the modal time (mode).

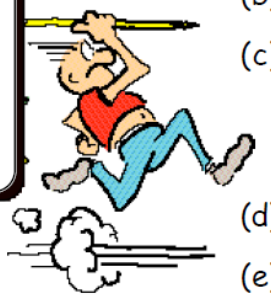
(f) Work out the median (middle) time.



5. This stem and leaf graph has not been put in order.

Javelin throw

0	9
1	
2	7 2 6 8 2
3	9 6 1 9 2 9
4	2 1 5 0



The graph shows the lengths (in metres) thrown in a javelin competition.

(a) Copy the graph, but this time show the distances in order.

(b) Write a key for this graph.

(c) What was the :-

(i) greatest distance thrown ?

(ii) least distance thrown ?

(d) What does the empty space at "1" mean ?

(e) Find the :- (i) mode

(ii) median.

6. For each set of data :-

(i) Construct an ordered stem and leaf graph with a key.

(ii) Find the mode and median.

(a)

14	13	18	15	11	9	4	1
15	34	32	25	12	16	15	14
9	15	18	25	25	19	14	3
9	8	2	7	16	27	23	20
22	20	11	13	16	30	4	22

(b)

11	22	27	49	61	68	60	52
45	34	47	25	52	62	65	45
24	52	62	61	52	31	63	33
59	42	37	21	29	19	47	34
30	22	60	41	34	59	53	10

(c)

137	142	153	164	111	123	157	165	161	104	107	119
101	124	135	154	125	132	140	160	139	154	151	123
140	138	156	164	132	159	160	111	143	152	110	164

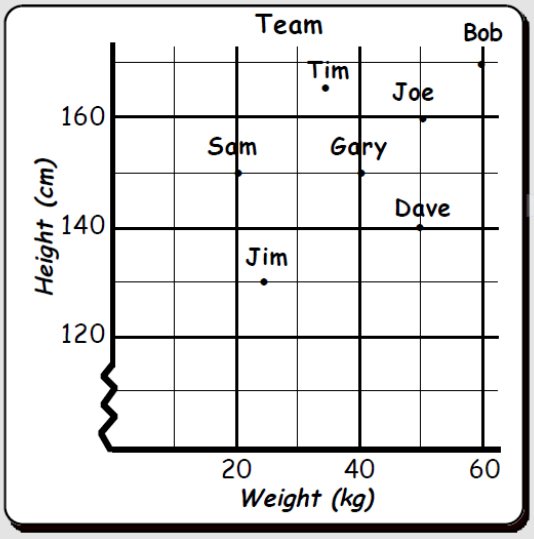
Scattergraphs

This scattergraph displays the **heights** and **weights** of a sevens football team.

Gary weighs 40 kg.

Joe is 160 cm tall.

Jim is 130 cm tall and weighs approximately 25 kg.



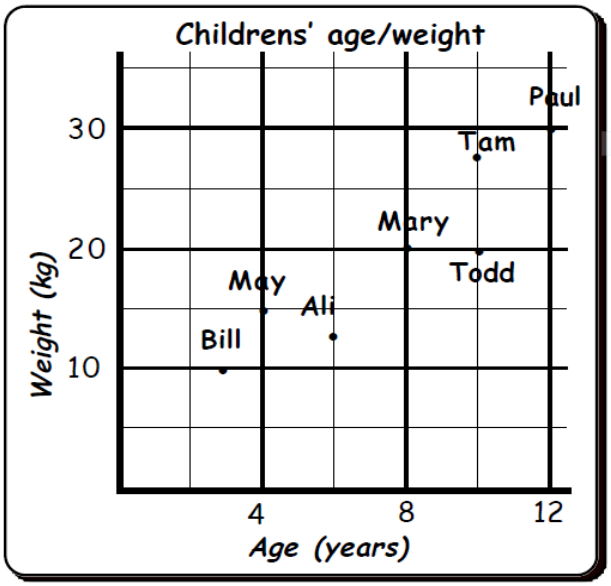
Exercise 7

1. For the scattergraph above, write down the height and weight of each player.

2. This scattergraph shows the ages and weights of several children.

   (a) Who is :- (i) the youngest
   (ii) the lightest
   (iii) the oldest
   (iv) the heaviest child ?

   (b) Write down the age and weight of each child.



When two quantities are strongly connected, we say there is a strong **correlation** between them.

3. Say whether you think there will be a **correlation** between :-

(a) the temperature and the sales of ice-cream.

(b) the temperature and the amount of people on a beach.

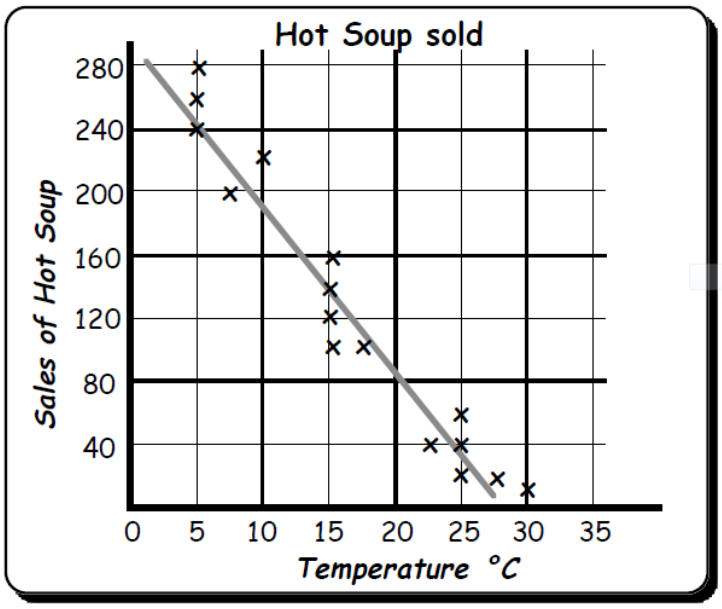
(c) the amount of rain and the sales of umbrellas.

(d) the distance a taxi travels and the fare.

(e) the temperature and the sales of gloves.

(f) the number of workmen and the time taken to build a wall.

4. This scattergraph shows the sales of cups of hot soup at a football ground.



This would be called a strong **negative correlation** since all the points lie roughly on a straight line going downwards from left to right.

The line is called a **line of best fit**.

Use the line of best fit to estimate :-

(a) the sales at 20°C.

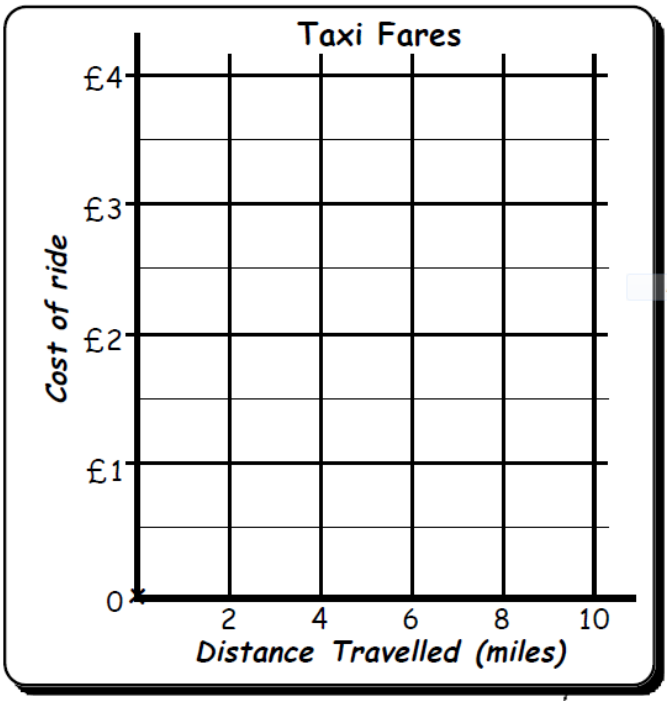
(b) the temperature when the sales were approximately 240 cups.

5. This graph represents the cost of different taxi fares and the distances travelled.

(a) Copy the graph.

(b) Use the table below to plot the points on the graph.

Distance (km)	Cost (£)
2	1·50
3	2·50
2	1·75
5	3·25
5	3·50
6	4·00



(c) Does this graph show a strong negative or positive correlation ?

(d) Draw a best line of fit on your graph.

(e) Estimate how much a 4 kilometre journey would cost.

6. For each data set below, construct a scattergraph and show a best line of fit.

(a)

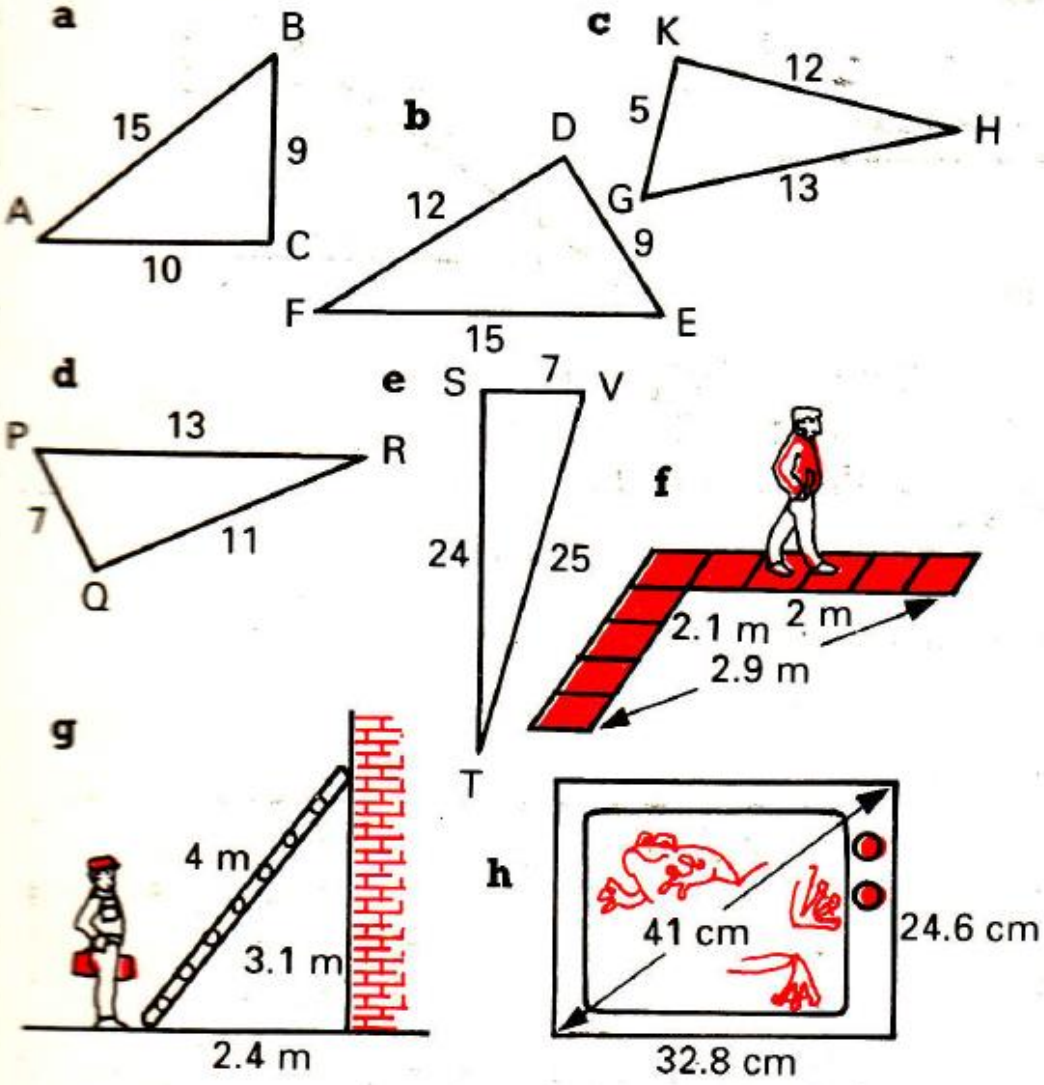
Age (years)	0	1	1	2	3	3	3	4	4	5	6	7	8	8	9	9	10	10
Car price (£1000)	10	9	8	8	7	6	5	5	4	2	3	3	3	2	2	1	2	1

(b)

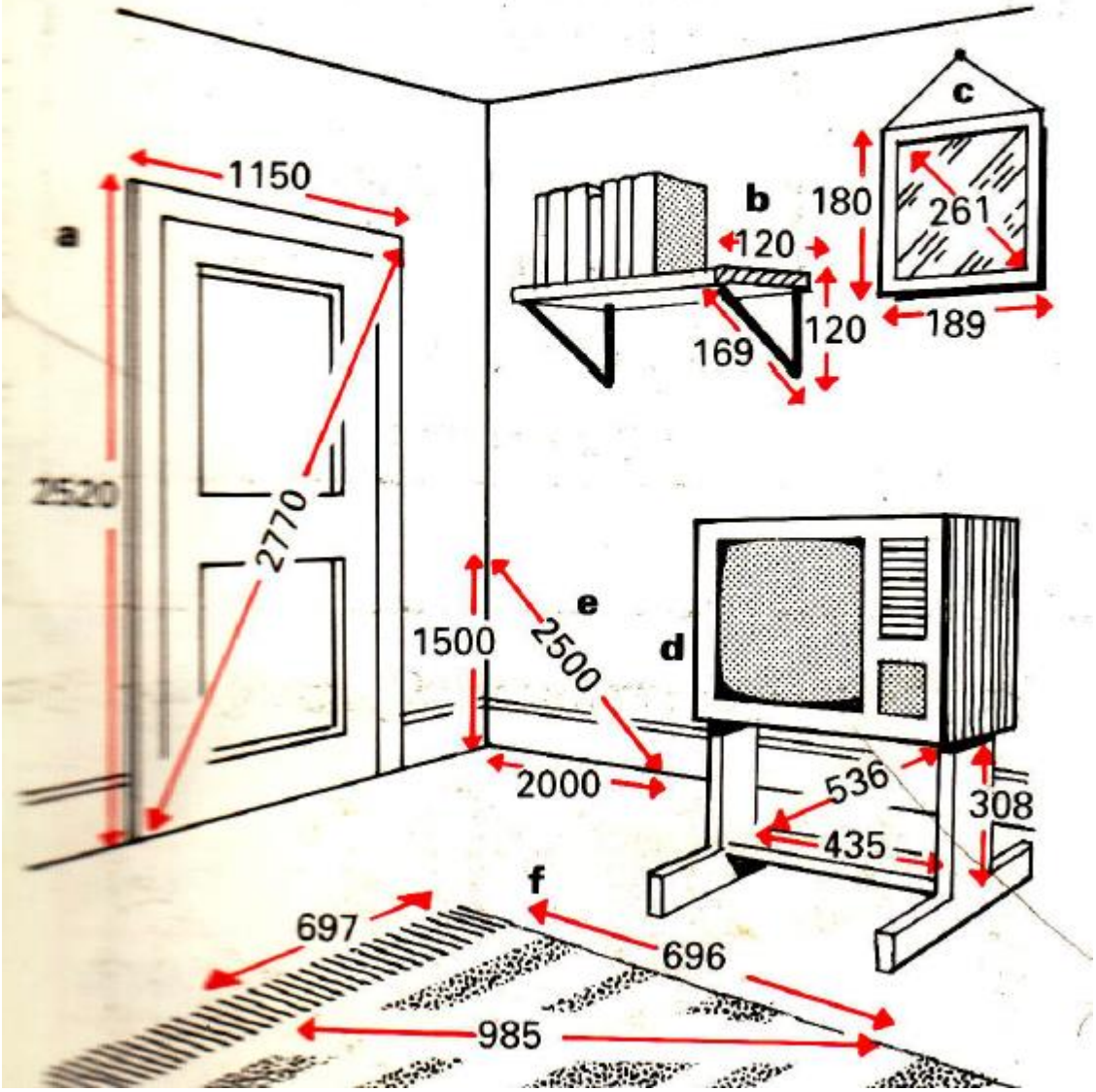
Temp. (°C)	0	5	5	5	10	15	20	20	20	25	25	30	30	25	20
No. of People in the park	1	3	5	5	10	15	25	35	20	40	50	60	55	35	30

Converse of Pythagoras

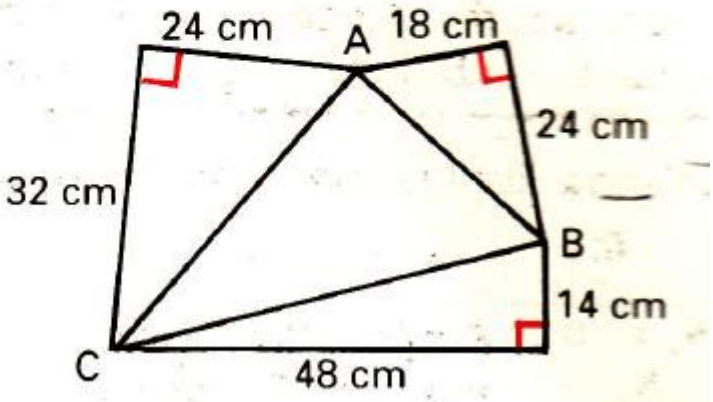
1 Use the converse of Pythagoras' Theorem to decide which of these triangles are right-angled.



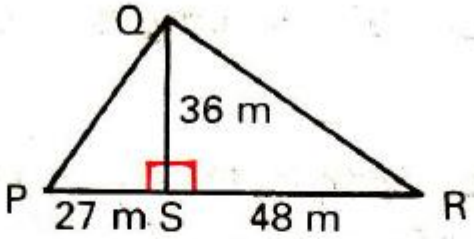
2 Many angles which look like right angles are not. Which ones in this picture are right angles, and which are not? All the measurements are in millimetres.



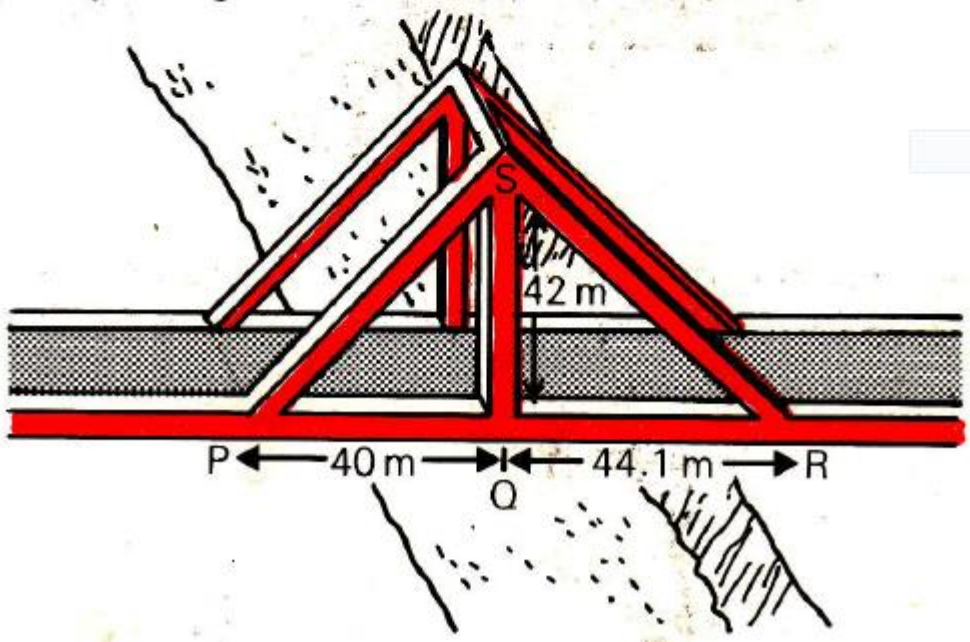
3 **a** Calculate the length of:
(i) AC (ii) AB (iii) BC.
b Is △ABC right-angled?



4 **a** Calculate the length of:
(i) PQ (ii) QR.
b Prove that △PQR is right-angled.



5 This diagram shows part of a bridge.
a Calculate the length of each sloping girder.
b Prove that ∠PSR between these girders is a right angle.

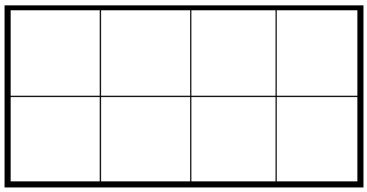


Enlargement and Reduction

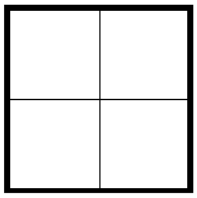
Exercise 1

1. Make a neat "two-times" enlargement of each of these shapes :- (each box = 1 cm long)

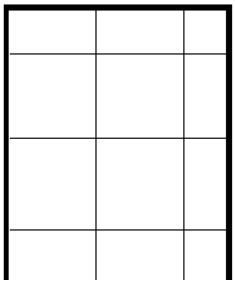
(a)



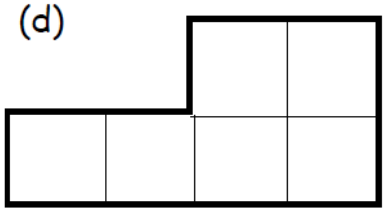
(b)



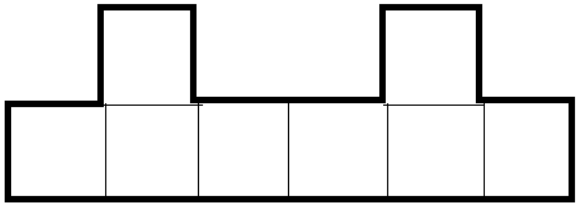
(c)



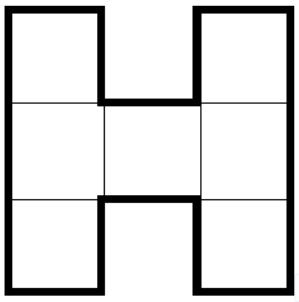
(d)



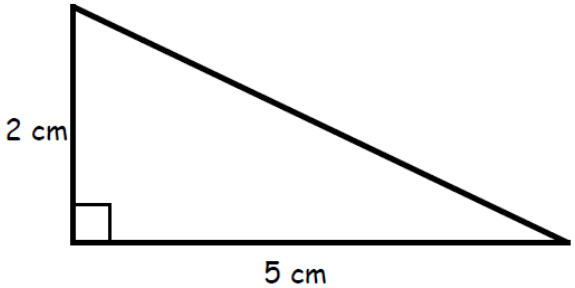
(e)



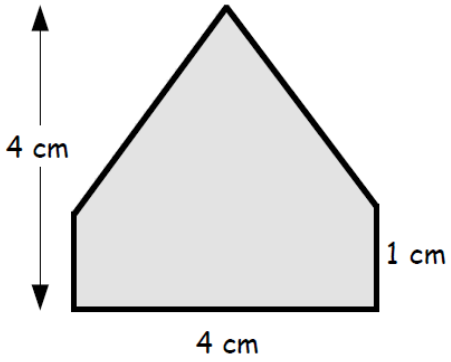
(f)



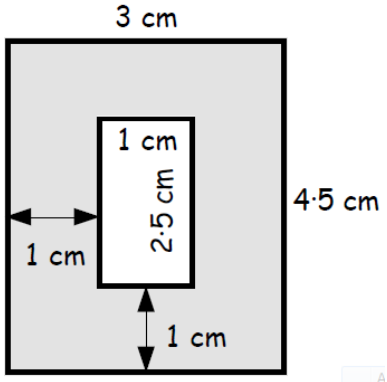
(g)



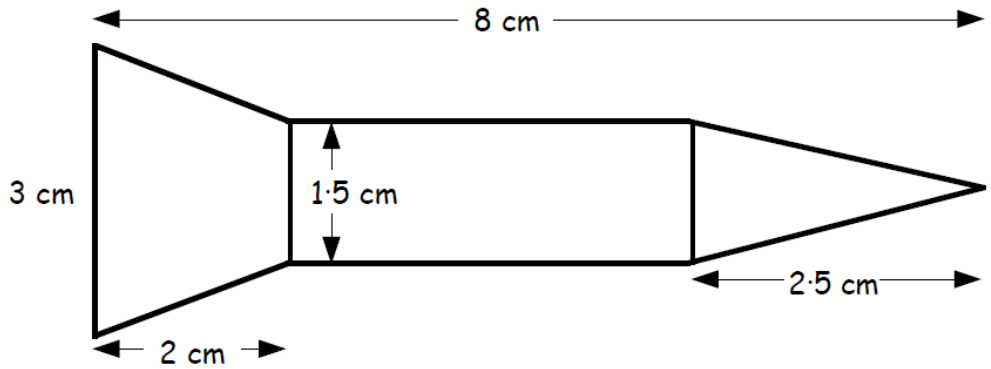
(h)



(i)



(j)

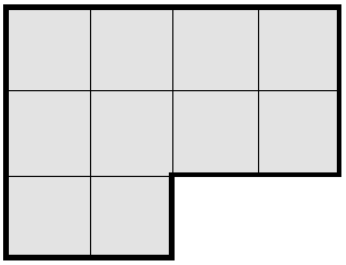


2. Make enlargements OR reductions of the following shapes using the given scales :-

(a)

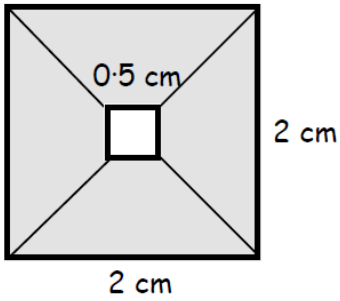
make a **three times** enlargement.

(b)



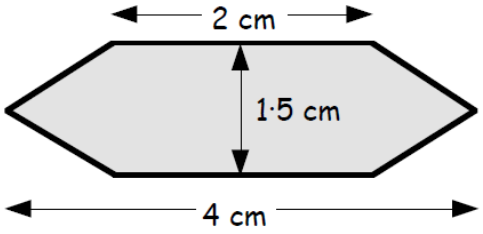
make a **four times** enlargement.

(c)



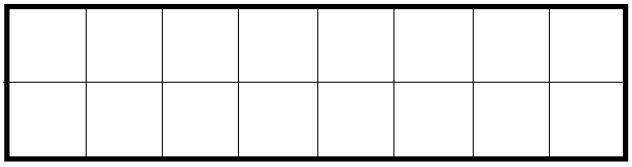
make a **six times** enlargement.

(d)



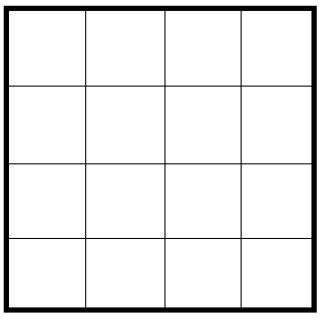
make a **four times** enlargement.

(e)



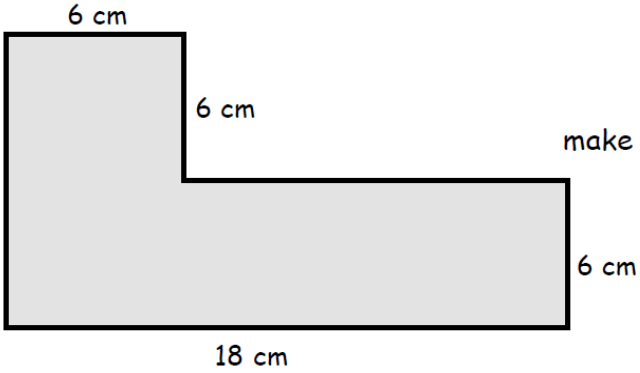
reduce this shape to **half** its size.

(f)



make this a **quarter** of its size here

(g)

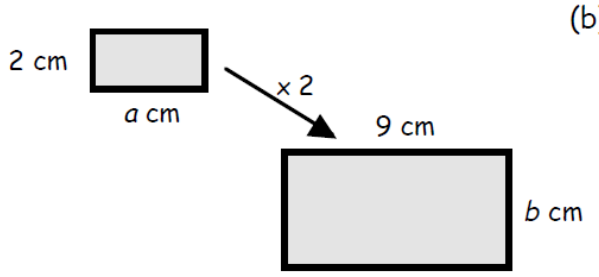


make this **one third** of its size.

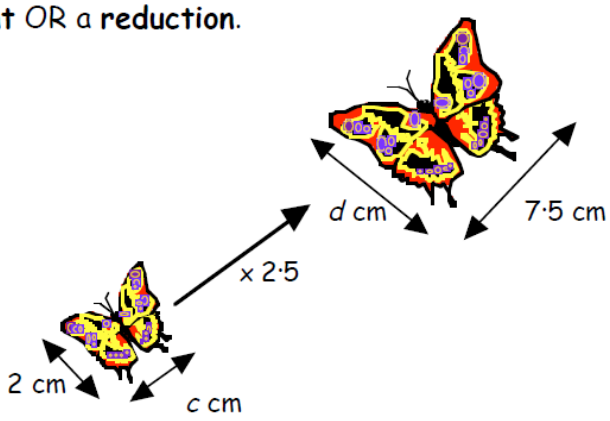
3. Each pair of pictures shows either an **enlargement** OR a **reduction**.

Calculate the unknown sizes. (Do not measure).

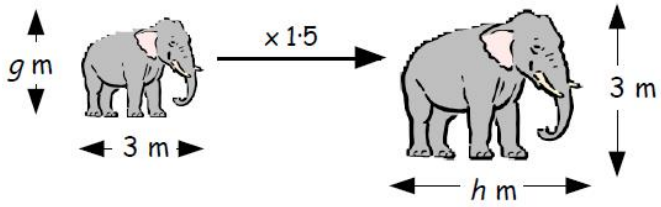
(a)



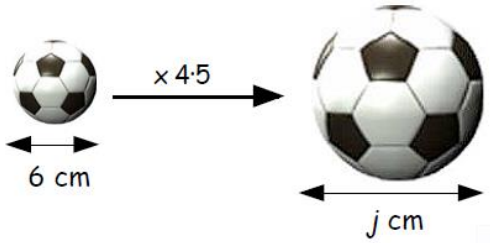
(b)



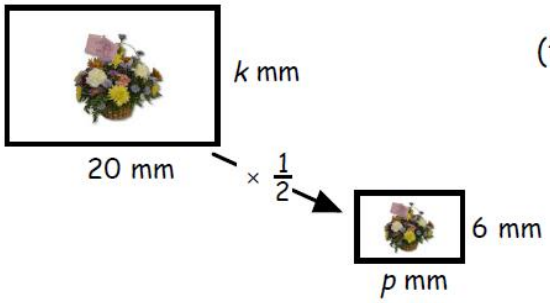
(c)



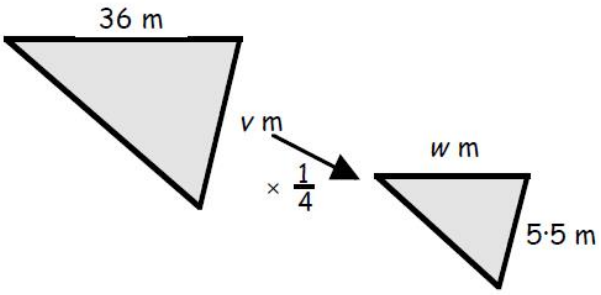
(d)



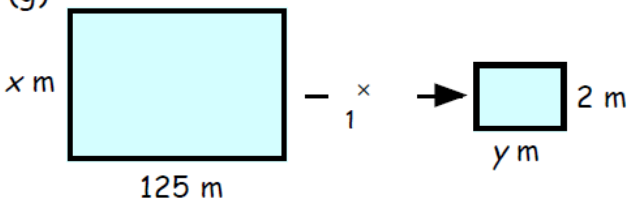
(e)



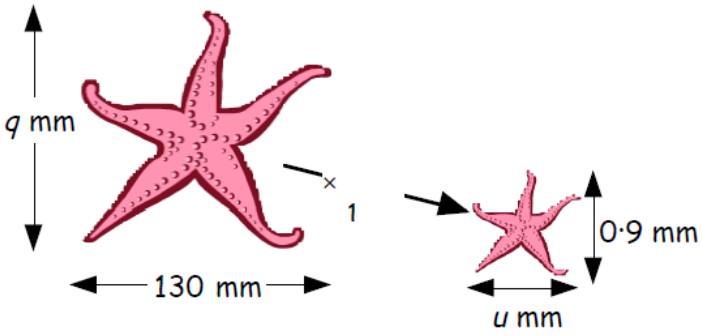
(f)



(g)



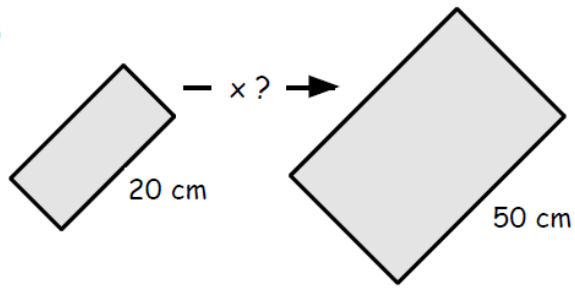
(h)



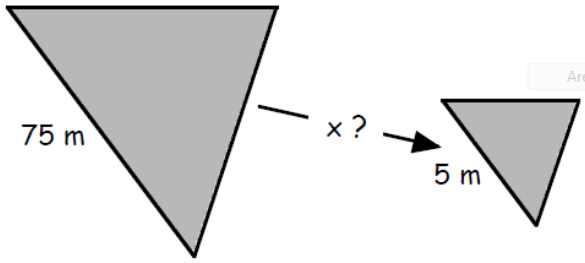
4. Each pair of pictures below shows either an **enlargement** OR a **reduction**.

In each case below, find the **enlargement factor** or the **reduction factor**.

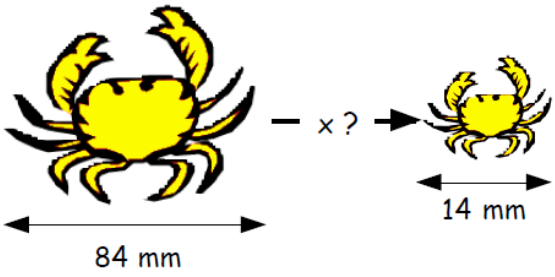
(a)



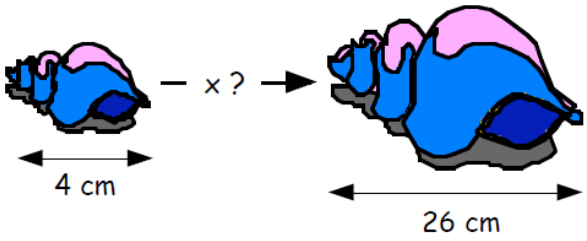
(b)



(c)



(d)



Scale, Reading Maps and Interpreting Distances

Exercise 4

1. Measure the length of each line (in cm) and calculate the length it really represents.

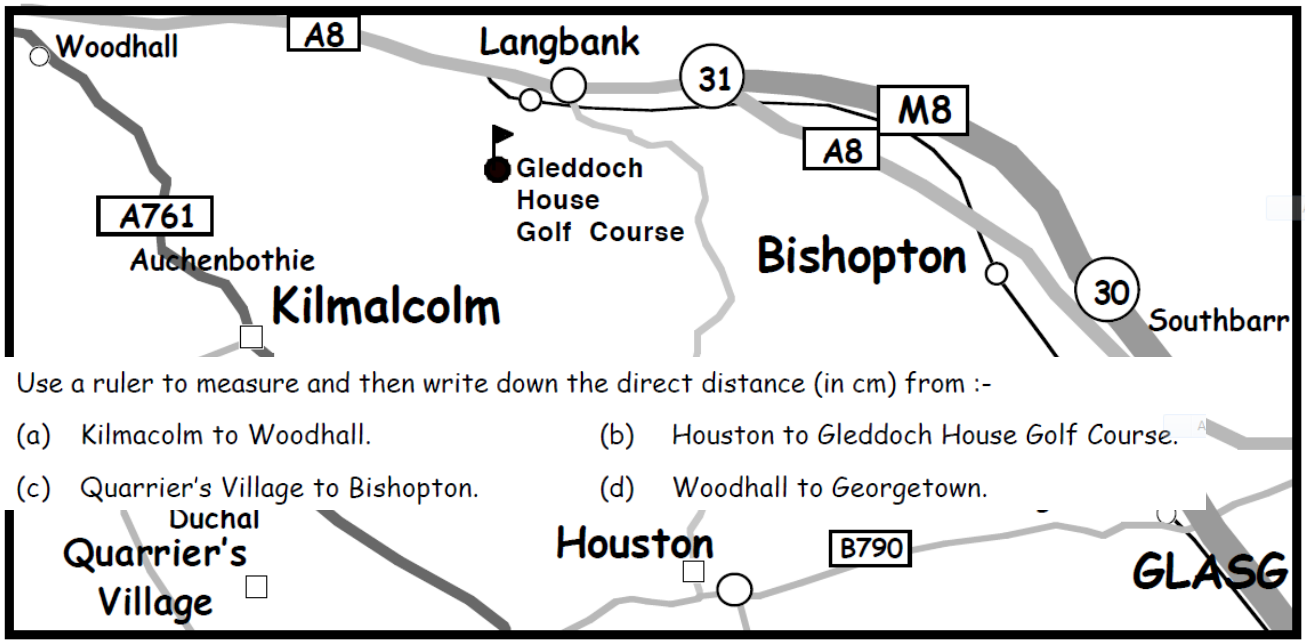
(a) scale 1 : 10

(b) scale 1 : 50

(c) scale 1 : 1000

(d) scale 1 : 50 000

2. The map below shows an area in the West of Scotland. Its scale is 1 : 50000.



Use a ruler to measure and then write down the direct distance (in cm) from :-

(a) Kilmacolm to Woodhall.

(b) Houston to Gleddoch House Golf Course.

(c) Quarrier's Village to Bishopton.

(d) Woodhall to Georgetown.

3. Now calculate the real direct distance (in km) from :-

(a) Kilmacolm to Woodhall.

(b) Houston to Gleddoch House Golf Course.

(c) Quarrier's Village to Bishopton.

(d) Woodhall to Georgetown.

4. Jack is planning a skiing trip. On his map he measures that the distance from his home to the best ski slope is 18·3 cm.

If the scale of his map is 1 : 25000, find how far away Jack lives from this ski slope.

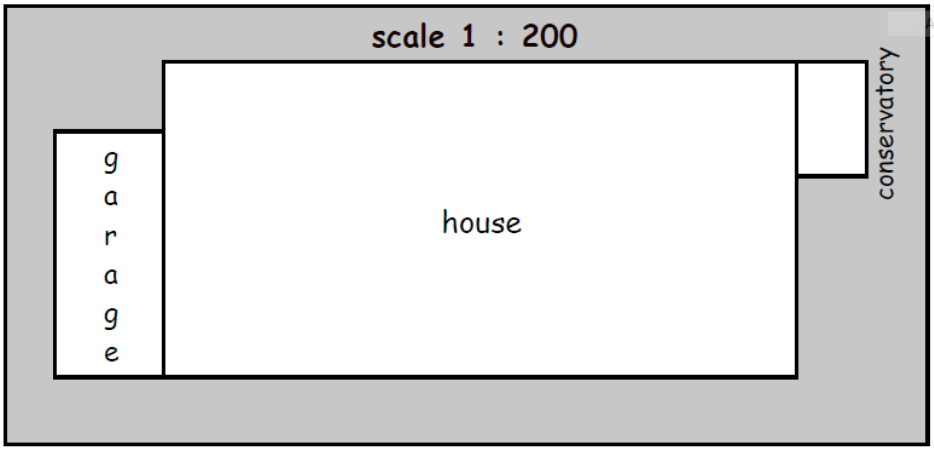
5. The distance from Golding to Beachhead is 10·7 cm on a map which has a scale of 1 : 20000. Calculate the real distance between the two towns.

6.

On an architect's plan the height of the lighthouse is measured as 8·5 cm.

If the scale of his plan is 1 : 500, find the real height of the lighthouse, in metres.

7. This is a plan of Jamie's house and garden.



(a) Measure and write down the dimensions (length and breadth) of :-

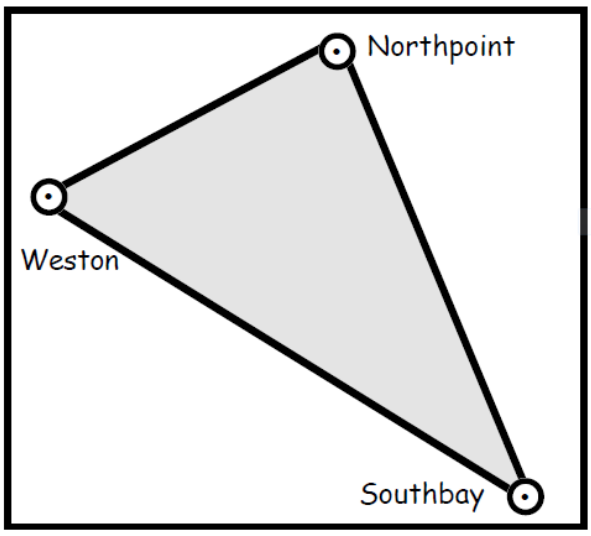
(i) the house,

(ii) the garage,

(iii) the conservatory.

(b) Calculate the real dimensions of the three buildings in metres.

8. This map shows the railway lines which link the 3 busiest towns on a holiday island. The actual distance from Northpoint to Southbay is 12 km.



(a) Measure and write down the distance from Northpoint to Southbay.

(b) Calculate the scale of the map.

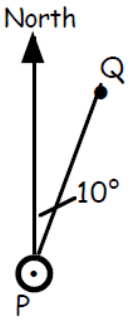
(c) Calculate the real distance from Southbay to Weston.

Bearings (Problems)

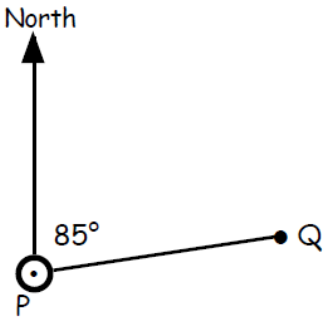
Exercise 5

1. Calculate (do not measure) the bearing of P **from** Q in the diagrams below

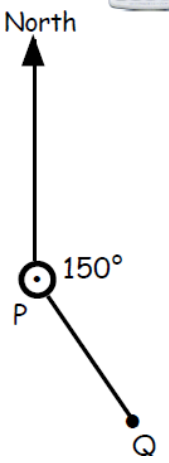
(a)



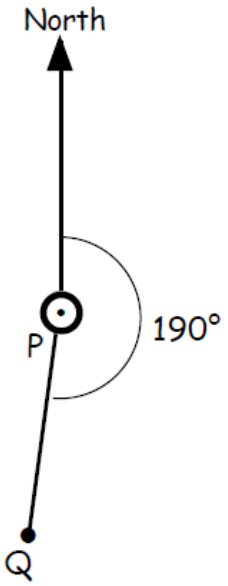
(b)



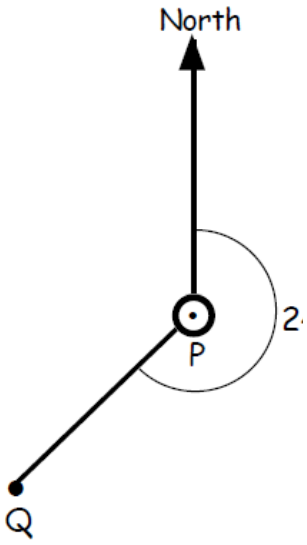
(c)



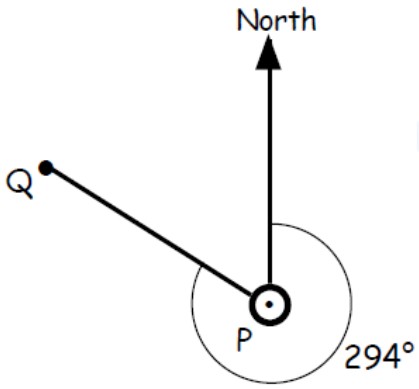
(d)



(e)



(f)



2. The scaled plan shows the position of three towns in central Dreamland.

The scale of the plan is 1 : 50 000.

(a) **Calculate** the **real** distances between the towns in kilometres.

(b) Use a protractor to measure the bearing of :-

(i) Elfton from Fairytown.

(ii) Twinkleton from Elfton.

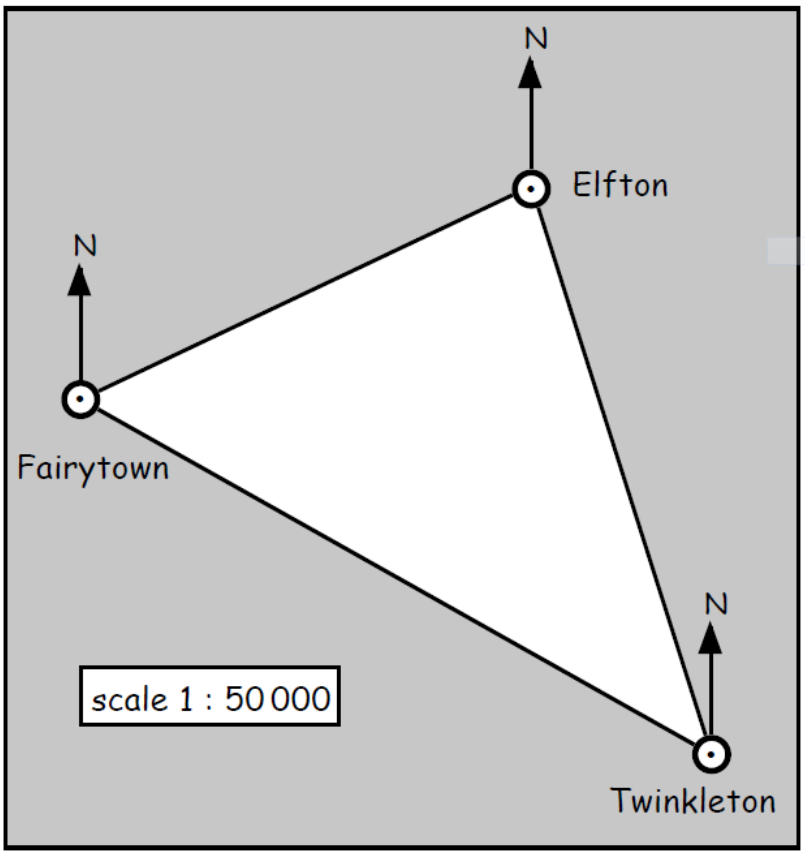
(iii) Twinkleton from Fairytown.

(c) **Calculate** the bearing of :-

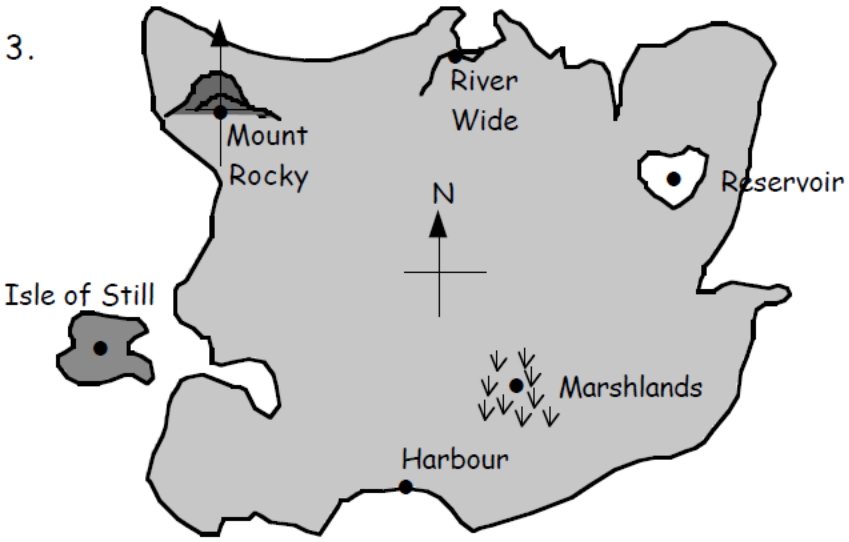
(i) Fairytown from Elfton.

(ii) Elfton from Twinkleton.

(iii) Fairytown from Twinkleton.



3.



scale 1 : 15000

(a) Find the **real** distance in km from :-

(i) River Wide to the Harbour.

(ii) Isle of Still to the Reservoir.

(b) How far is it from Mount Rocky to the Marshlands ?

(c) Now measure the bearing from Mount Rocky to the Marshlands.

(d) **Calculate** the bearing from the Marshlands to Mount Rocky.

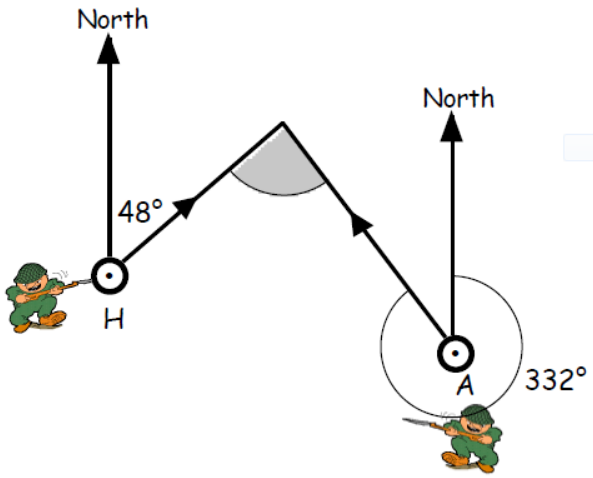
4. As part of a military training exercise, two teams of cadets are marching to a rendezvous point.

The Highlanders (H) are travelling on a bearing of 048°.

The Argyllans (A) are on a course of 332°.

At what angle (shaded) will their courses meet ?

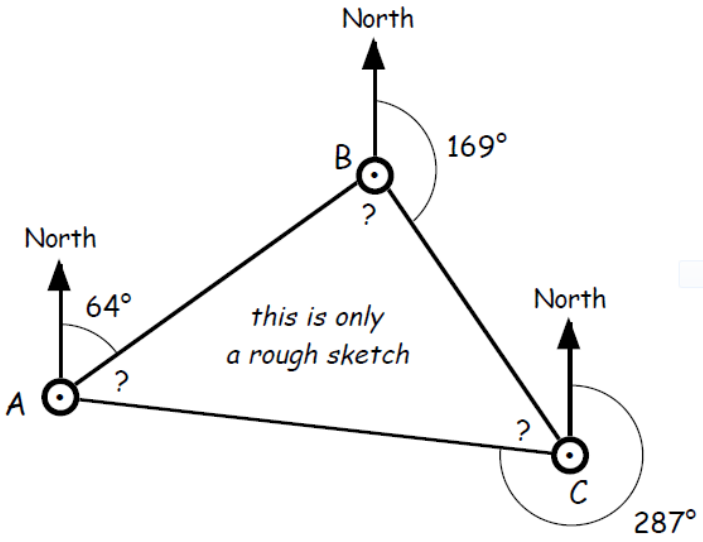
Calculate - do NOT measure.



5. The vertices of triangle ABC are shown, together with bearings from A to B, B to C and C back to A.

Calculate the sizes of :-

∠ABC, ∠ACB and ∠BAC.

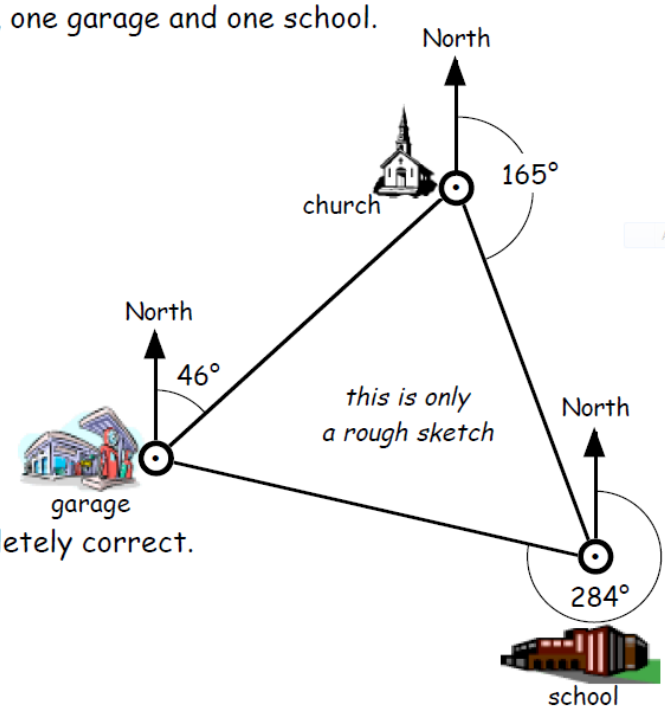


6. The small village of Adensport has one church, one garage and one school.

On a map of the village, the bearing of :-

- the church from the garage is 046°.
- the school from the church is 165°.
- the garage from the school is 284°.

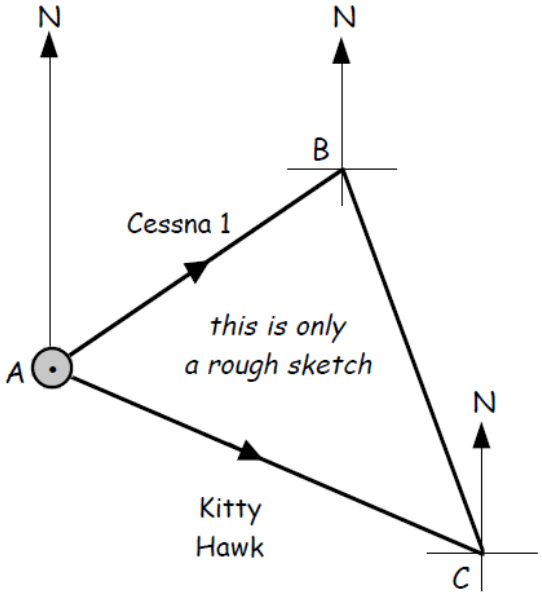
A visitor to the village looks at the map and thinks that the distance from the garage to the church looks the same as the distance from the garage to the school.



Prove that in fact, the visitor's idea is completely correct.

Calculations, no measuring !

7.



Two aeroplanes leave an airport (A) at the same time.

The Cessna 1 flies on a bearing 068° to B.

The Kitty Hawk flies on a bearing 115° to C.

From B, the bearing of the Kitty Hawk is 160°.

Make a neat **sketch** of the journeys.

Calculate, and mark on your sketch :-

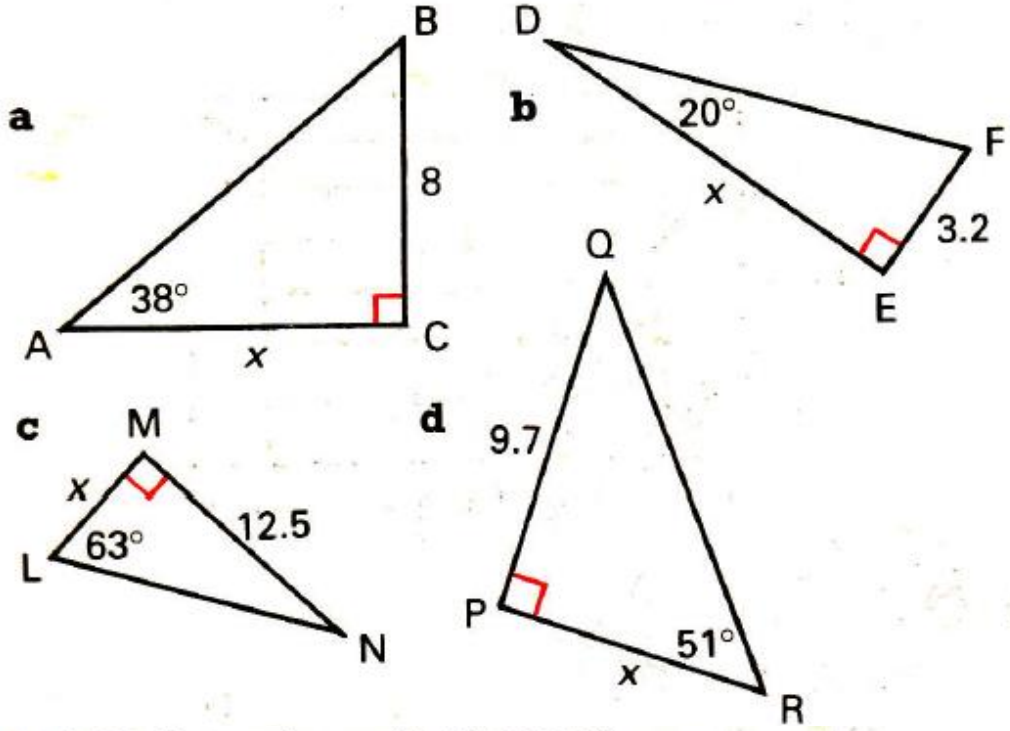
(a) the bearing of A from B.

(b) the bearing of B from C.

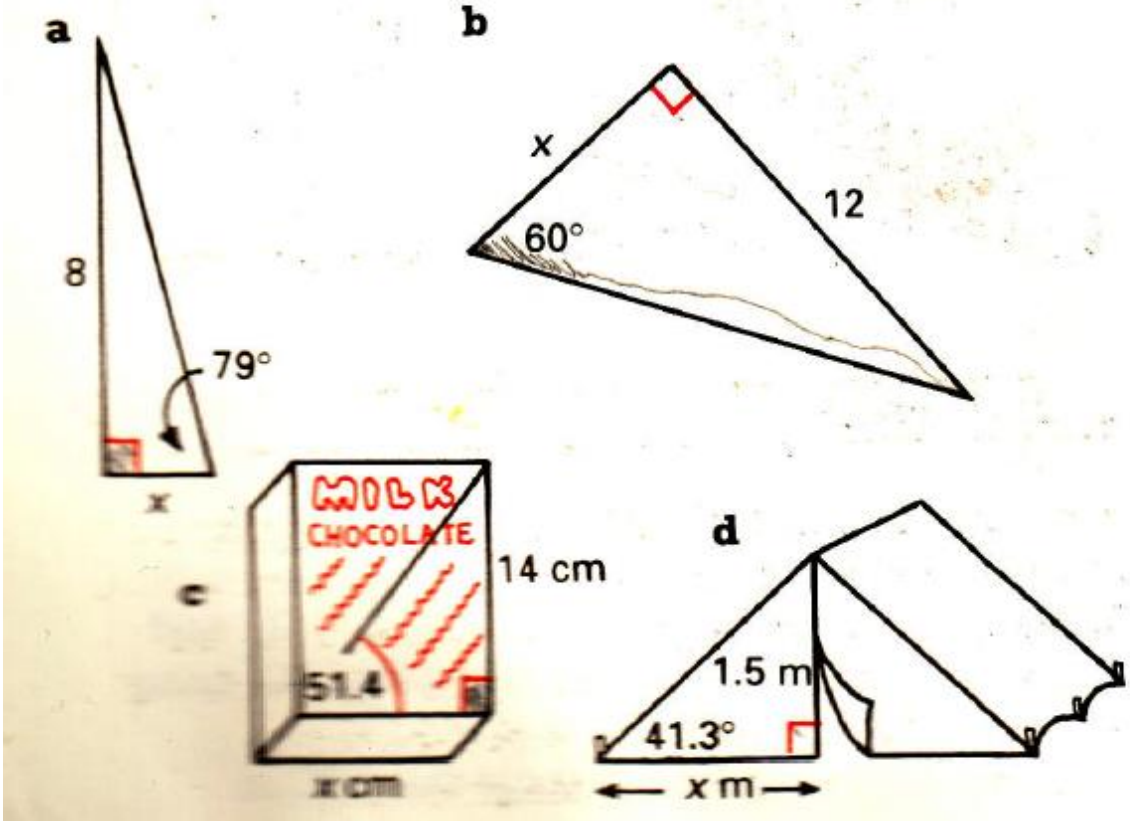
(c) the bearing of A from C.

TRIGONOMETRY Finding the Adjacent

1 Calculate x in each triangle.



2 Calculate x in each diagram.



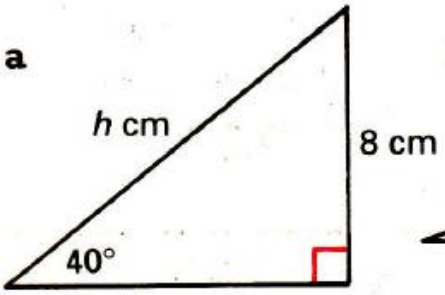
TRIGONOMETRY

Finding the Hypotenuse

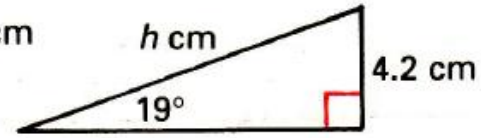
EXERCISE 6B

Calculate h, correct to 1 decimal place, in each triangle.

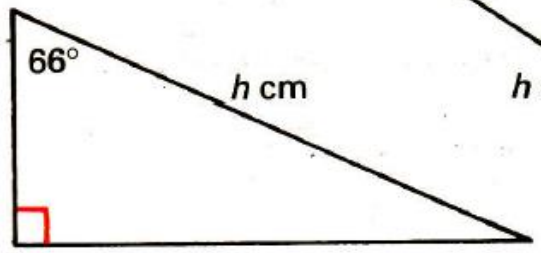
a



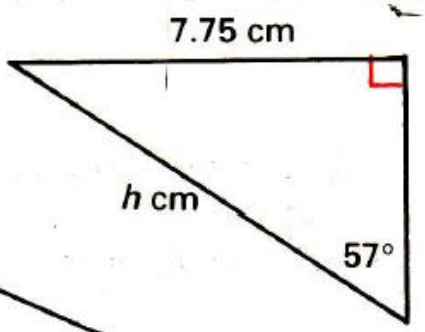
b



c

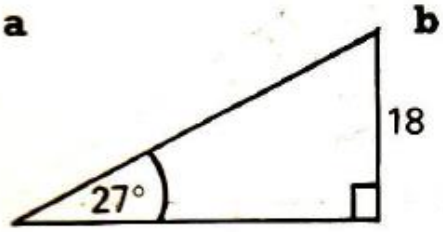


d

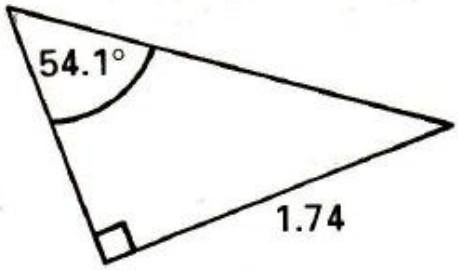


2 Calculate the length of the hypotenuse of each right-angled triangle.

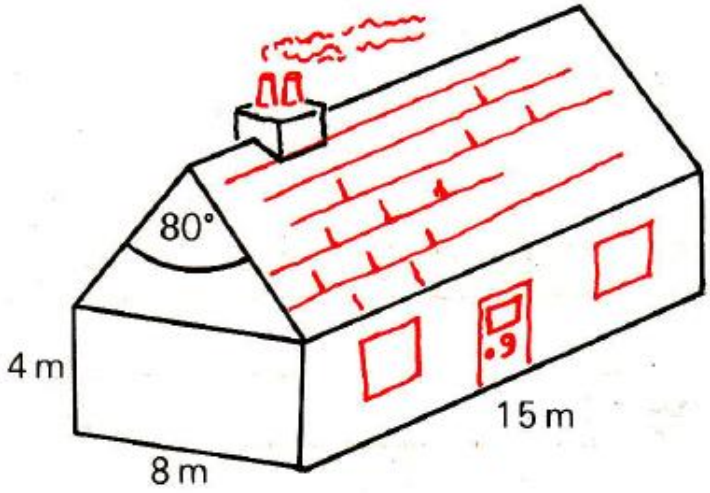
a



b



3 Number 9 Tay View is a small bungalow.

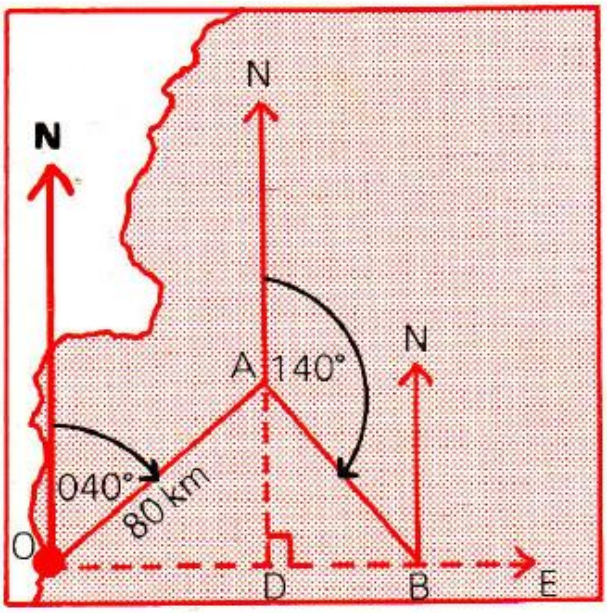


Calculate, to the nearest centimetre:

a the length of the sloping edge of the roof

b the height of the roof ridge above the ground.

4 The *Mary Anne* sets course from her harbour, O, on a bearing of 040°, and sails for 80 km. She then changes course to 140° and sails until she is due east of the harbour.



a What is the furthest north the *Mary Anne* goes from the harbour?

b What is the length of her journey from A to B?

c How far is she from the harbour at B?