

11P1 & 11Q1



Name: \_\_\_\_\_

## Surds

### Things to remember:

- $\sqrt{\quad}$  means square root;
- To simplify surds, find all its factors;
- To rationalise the denominator, find an equivalent fraction where the denominator is rational.

### Questions:

1. Work out

$$\frac{(5 + \sqrt{3})(5 - \sqrt{3})}{\sqrt{22}}$$

Give your answer in its simplest form.

.....  
(Total 3 marks)

2. (a) Rationalise the denominator of  $\frac{1}{\sqrt{3}}$

.....  
(1)

(b) Expand  $(2 + \sqrt{3})(1 + \sqrt{3})$   
Give your answer in the form  $a + b\sqrt{3}$  where  $a$  and  $b$  are integers.

.....  
(2)  
(Total 3 marks)

4. Expand and simplify  $(\sqrt{3} - \sqrt{2})(\sqrt{3} - \sqrt{2})$

.....  
(Total 2 marks)

5. (a) Write down the value of  $49^{1/2}$

.....  
(1)

- (b) Write  $\sqrt{45}$  in the form  $k\sqrt{5}$ , where  $k$  is an integer.

.....  
(1)  
(Total 2 marks)

6. Write  $\frac{\sqrt{18} + 10}{\sqrt{2}}$  in the form  $a + b\sqrt{3}$  where  $a$  and  $b$  are integers.

$a =$  .....

$b =$  .....

(Total 2 marks)

## Bounds Calculations

### Things to remember:

- Calculating bounds is the opposite of rounding – they are the limits at which you would round up instead of down, and vice versa.
- When dividing bounds,  $UB = UB \div LB$  and  $LB = LB \div UB$

### Questions:

1. A piece of wood has a length of 65 centimetres to the nearest centimetre.

(a) What is the least possible length of the piece of wood?

.....

(1)

(b) What is the greatest possible length of the piece of wood?

.....

(1)

**(Total for Question is 2 marks)**

2. Chelsea's height is 168 cm to the nearest cm.

(a) What is Chelsea's minimum possible height?

..... cm

(1)

(b) What is Chelsea's maximum possible height?

..... cm

(1)

**(Total for Question is 2 marks)**

3.

$$I = \frac{V}{R}$$

$V = 250$  correct to the nearest 5

$R = 3900$  correct to the nearest 100

Work out the lower bound for the value of  $I$ .

Give your answer correct to 3 decimal places.

You must show your working.

.....  
**(Total for question = 3 marks)**

6. The value of  $p$  is 4.3  
 The value of  $q$  is 0.4  
 Both  $p$  and  $q$  are given correct to the nearest 0.1  
 (a) Write down the lower bound for  $p$ .

.....  
 (1)

$$r = p + \frac{1}{q}$$

- (b) Work out the upper bound for  $r$ .  
 You must show all your working.

.....  
 (3)  
 (Total for question = 4 marks)

$$m = \frac{\sqrt{s}}{t}$$

$s = 3.47$  correct to 3 significant figures

$t = 8.132$  correct to 4 significant figures

7. By considering bounds, work out the value of  $m$  to a suitable degree of accuracy.  
 Give a reason for your answer.

(Total for question = 5 marks)

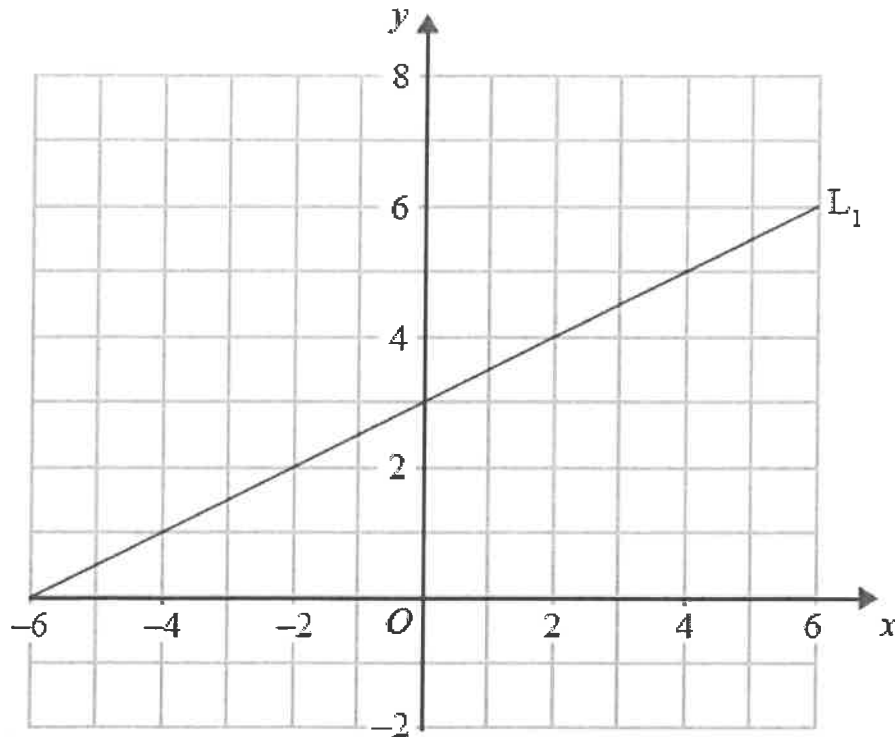
## Parallel and Perpendicular Graphs

### Things to remember:

- The general equation of a linear graph is given by  $y = mx + c$ , where  $m$  is the gradient and  $c$  is the  $y$ -intercept.
- Parallel graphs have the same gradient.
- Gradients of perpendicular graphs have a product of  $-1$ .

### Questions:

1. The diagram shows a straight line,  $L_1$ , drawn on a grid.

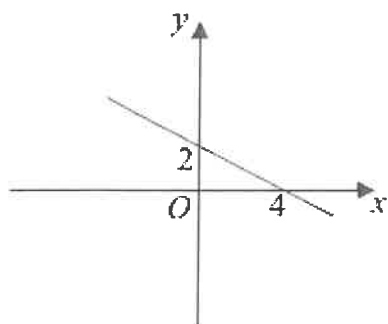


A straight line,  $L_2$ , is parallel to the straight line  $L_1$  and passes through the point  $(0, -5)$ . Find an equation of the straight line  $L_2$ .

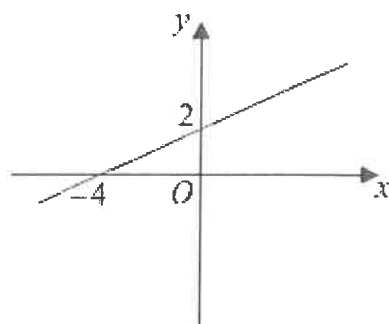
.....  
(Total for Question is 3 marks)

4. Here are the graphs of 6 straight lines.

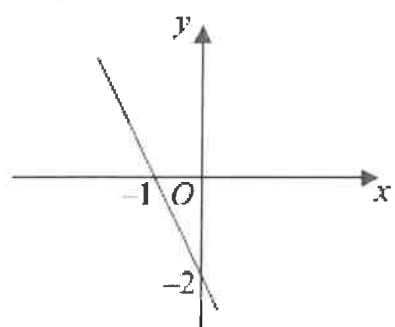
Graph A



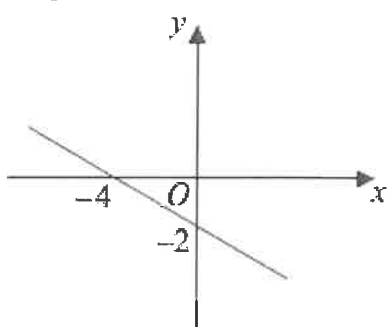
Graph B



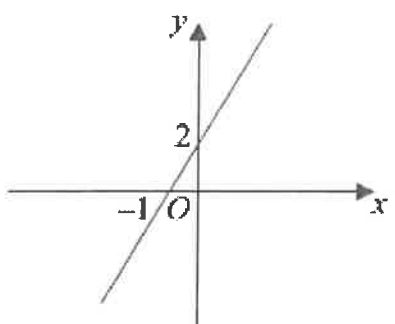
Graph C



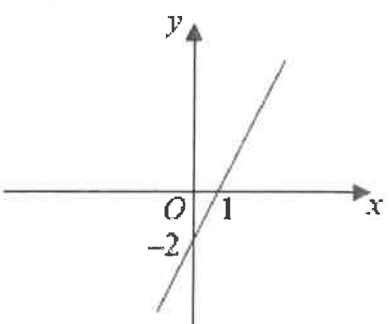
Graph D



Graph E



Graph F



Match each of the graphs **A**, **B**, **C**, **D**, **E** and **F** to the equations in the table.

| Equation | $y = \frac{1}{2}x + 2$ | $y = 2x - 2$ | $y = -\frac{1}{2}x + 2$ | $y = -2x - 2$ | $y = 2x + 2$ | $y = -\frac{1}{2}x - 2$ |
|----------|------------------------|--------------|-------------------------|---------------|--------------|-------------------------|
| Graph    |                        |              |                         |               |              |                         |

(Total for Question is 3 marks)

- \*7.** **A** and **B** are straight lines.  
Line **A** has equation  $2y = 3x + 8$   
Line **B** goes through the points  $(-1, 2)$  and  $(2, 8)$

Do lines **A** and **B** intersect?  
You must show all your working.

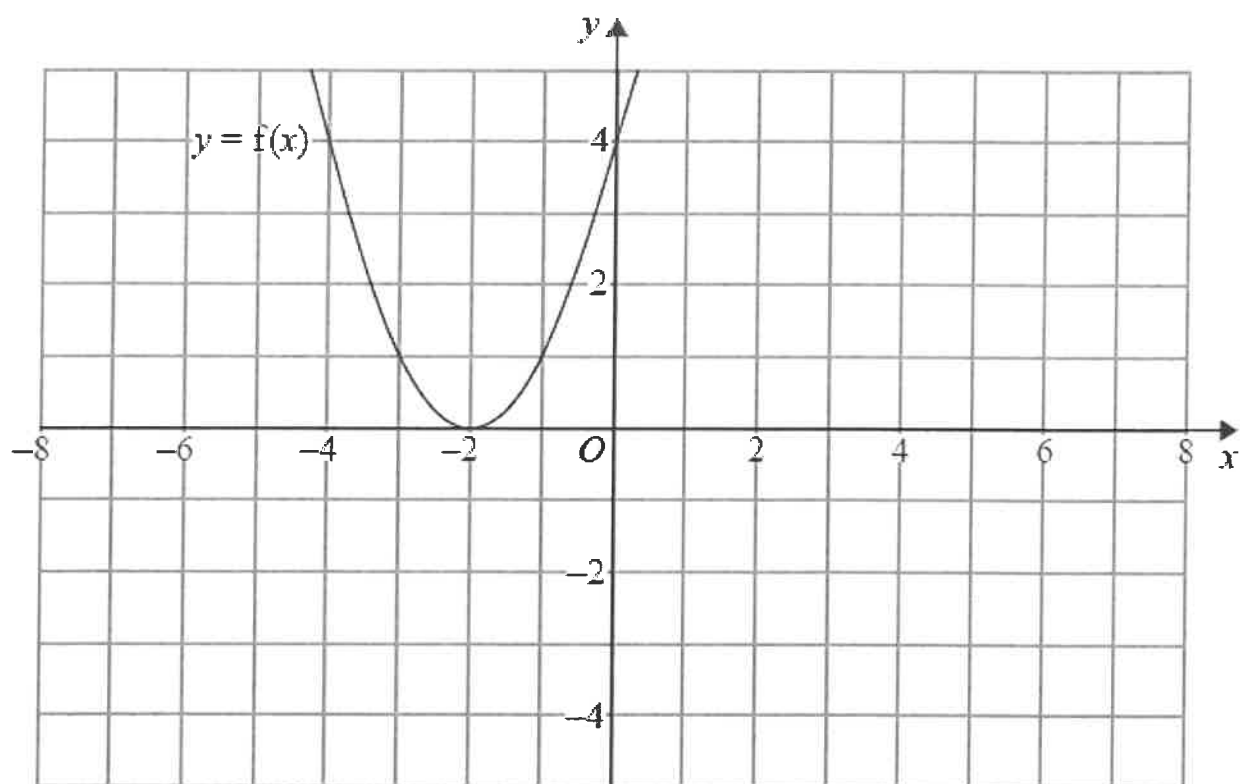
**(Total for Question is 3 marks)**

- 8.** A straight line, **L**, is perpendicular to the line with equation  $y = 1 - 3x$ .  
The point with coordinates  $(6, 3)$  is on the line **L**.  
Find an equation of the line **L**.

.....  
**(Total for Question is 3 marks)**

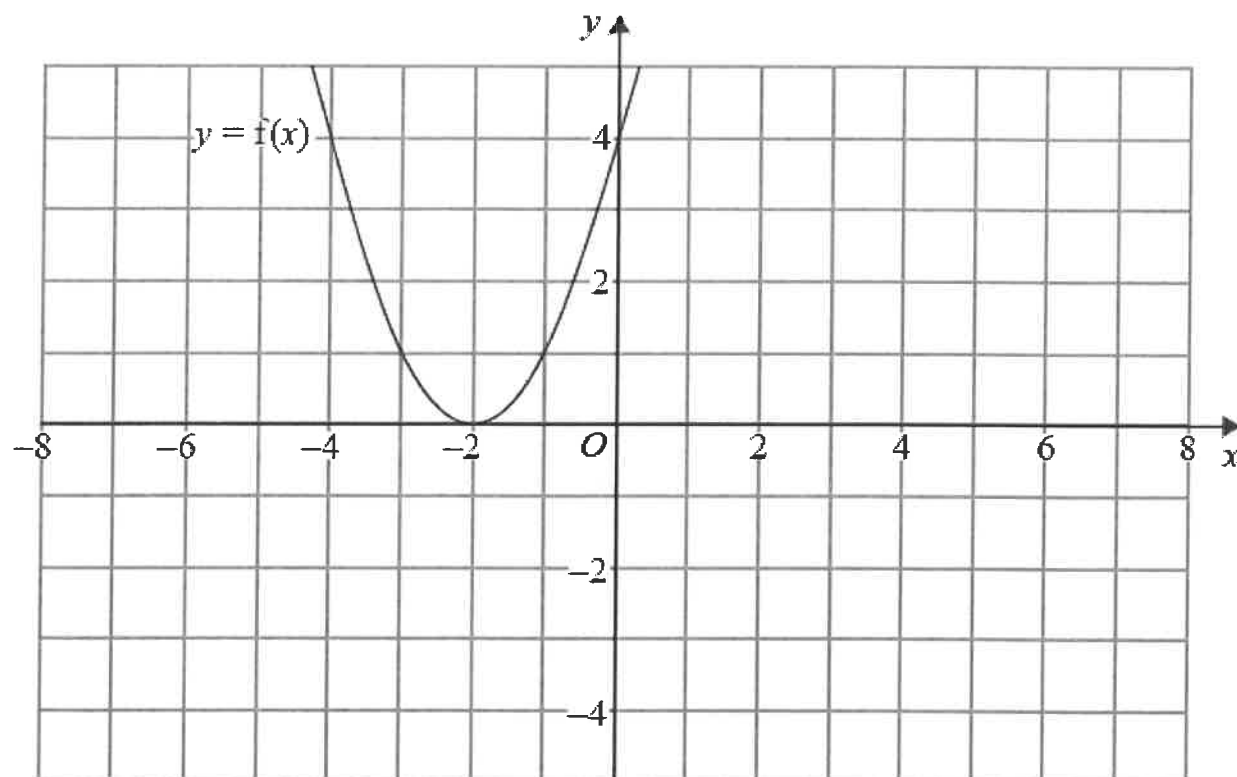


2. The graph of  $y = f(x)$  is shown on both grids below.



- (a) On the grid above, sketch the graph of  $y = f(-x)$

(1)

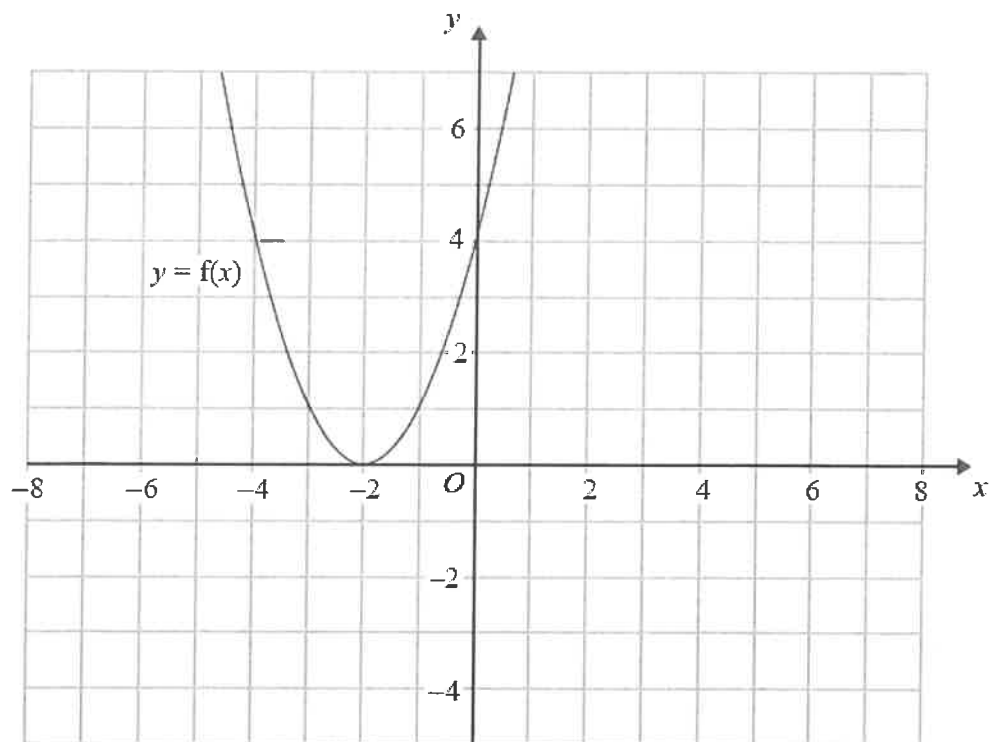


- (b) On this grid, sketch the graph of  $y = -f(x) + 3$

(1)

(Total for question = 2 marks)

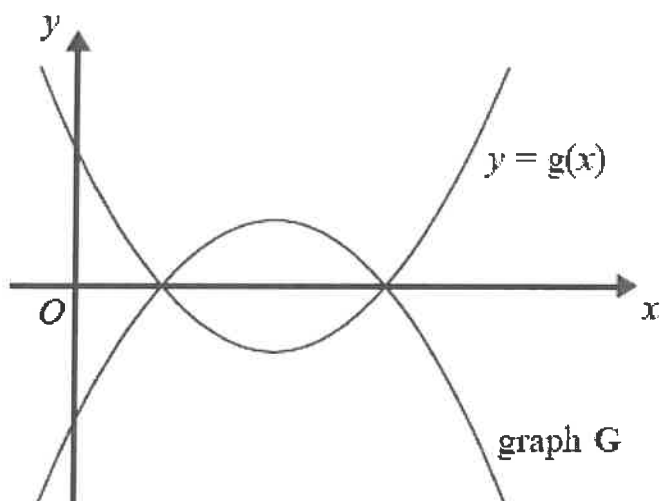
4. The graph of  $y = f(x)$  is shown on the grid.



- (a) On the grid above, sketch the graph of  $y = f(x + 3)$

(2)

The graph of  $y = g(x)$  is shown below.



The graph **G** is the reflection of  $y = g(x)$  in the  $x$ -axis.

- (b) Write down an equation of graph **G**.

(1)

(Total for question = 3 marks)

4. Simplify fully  $\frac{x^2+x-6}{x^2-7x+10}$

/

.....  
(Total 3 marks)

5. Simplify fully  $\frac{x^2-8x+15}{2x^2-7x-15}$

.....  
(Total 3 marks)

6. Simplify fully  $\frac{2x^2+3x+1}{x^2-3x-4}$

.....  
(Total 3 marks)

## Algebraic fractions – solving

### Things to remember:

- Multiply every term by the product of the denominators;
- Solve to find x.

### Questions:

1. Solve  $\frac{5(2x+1)}{3} = 4x + 7$

x = .....  
(Total 3 marks)

2. (a) Show that the equation  $\frac{5}{x+2} = \frac{4-3x}{x-1}$   
can be rearranged to give  $3x^2 + 7x - 13 = 0$

(b) Solve  $3x^2 + 7x - 13 = 0$  (3)  
Give your solutions correct to 2 decimal places.

x = ..... Or x = .....  
(3)  
(Total 6 marks)

5. (a) Solve  $\frac{3}{x} + \frac{3}{2x} = 2$

$x = \dots\dots\dots$  (2)

(b) Using your answer to part (a), or otherwise, solve  $\frac{3}{(y-1)^2} + \frac{3}{2(y-1)^2} = 2$

$y = \dots\dots\dots$  or  $y = \dots\dots\dots$  (3)  
(Total 5 marks)

4. Solve the inequality  $x^2 - 2x + 8 < 0$

.....  
(Total for question = 3 marks)

5. Solve the inequality  $x^2 - x \geq 12$

.....  
(Total for question = 3 marks)

6. Solve the inequality  $x^2 \leq 4(2x + 5)$

.....  
(Total for question = 4 marks)

2.

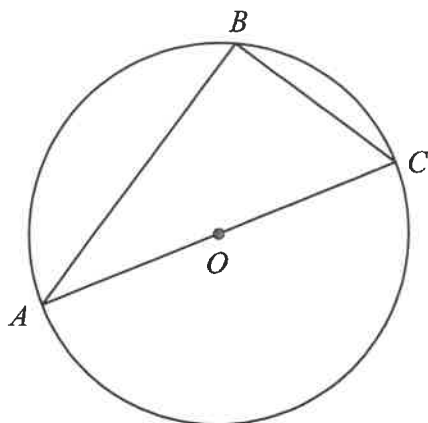


Diagram **NOT** accurately drawn

$A$ ,  $B$  and  $C$  are points on the circumference of a circle, centre  $O$ .

$AC$  is a diameter of the circle.

(a) (i) Write down the size of angle  $ABC$ .

.....°

(ii) Give a reason for your answer.

.....

.....

(2)

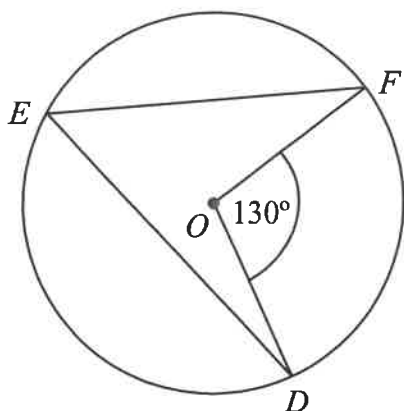


Diagram **NOT** accurately drawn

$D$ ,  $E$  and  $F$  are points on the circumference of a circle, centre  $O$ .

Angle  $DOF = 130^\circ$ .

(b) (i) Work out the size of angle  $DEF$ .

.....°

(ii) Give a reason for your answer.

.....

.....

(2)

(Total 4 marks)

5.

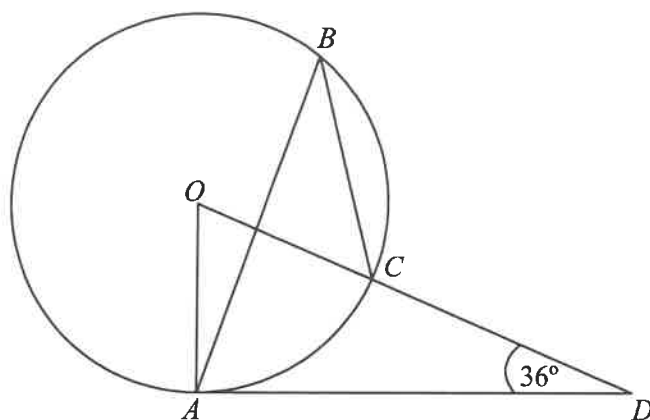


Diagram **NOT** accurately drawn

The diagram shows a circle centre  $O$ .

$A$ ,  $B$  and  $C$  are points on the circumference.

$DCO$  is a straight line.

$DA$  is a tangent to the circle.

Angle  $ADO = 36^\circ$

(a) Work out the size of angle  $AOD$ .

.....<sup>o</sup>

(2)

(b) (i) Work out the size of angle  $ABC$ .

.....<sup>o</sup>

(ii) Give a reason for your answer.

.....

.....

(3)

(Total 5 marks)



2.  $T$  is the point on  $PQ$  for which  $PT : TQ = 2 : 1$ .

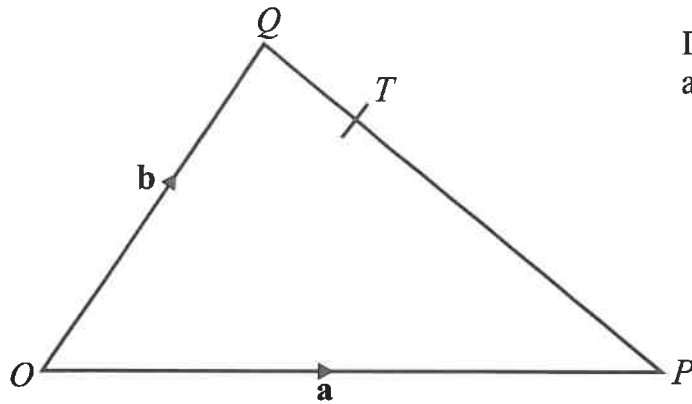


Diagram **NOT**  
accurately drawn

$OPQ$  is a triangle.

$\vec{OP} = \mathbf{a}$  and  $\vec{OQ} = \mathbf{b}$ .

- (a) Write down, in terms of  $\mathbf{a}$  and  $\mathbf{b}$ , an expression for  $\vec{PQ}$ .

$\vec{PQ} = \dots\dots\dots$   
(1)

- (b) Express  $\vec{OT}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .  
Give your answer in its simplest form.

$\vec{OT} = \dots\dots\dots$   
(2)  
(Total 3 marks)

4.  $OPQ$  is a triangle.  
 $R$  is the midpoint of  $OP$ .  
 $S$  is the midpoint of  $PQ$ .  
 $\overrightarrow{OP} = \mathbf{p}$  and  $\overrightarrow{OQ} = \mathbf{q}$

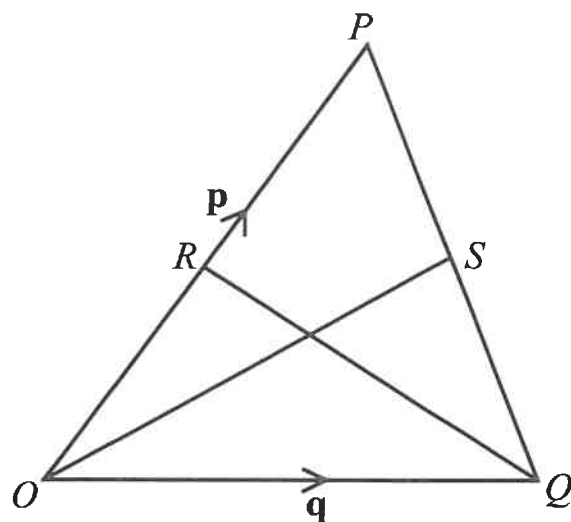


Diagram **NOT**  
accurately drawn

- (i) Find  $\overrightarrow{OS}$  in terms of  $\mathbf{p}$  and  $\mathbf{q}$ .

$$\overrightarrow{OS} = \dots\dots\dots$$

- (ii) Show that  $RS$  is parallel to  $OQ$ .

(Total 5 marks)

6.  $ABCD$  is a straight line.

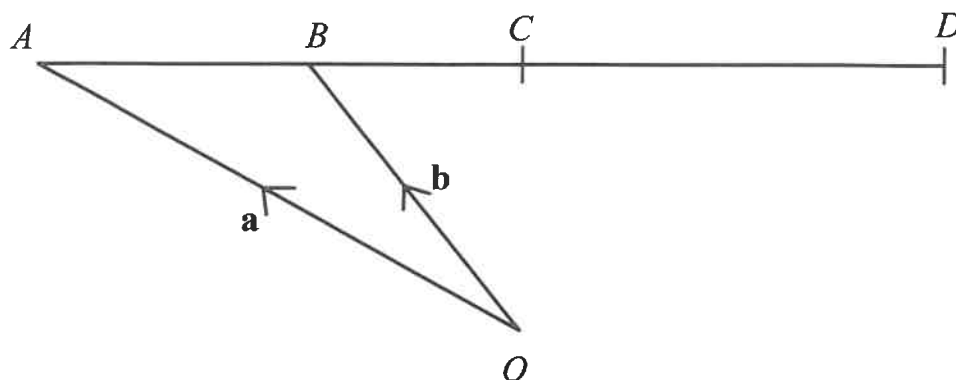


Diagram **NOT**  
accurately drawn

$O$  is a point so that  $\overrightarrow{OA} = \mathbf{a}$  and  $\overrightarrow{OB} = \mathbf{b}$ .

$B$  is the midpoint of  $AC$ .

$C$  is the midpoint of  $AD$ .

Express, in terms of  $\mathbf{a}$  and  $\mathbf{b}$ , the vectors

- (i)  $\overrightarrow{AC}$

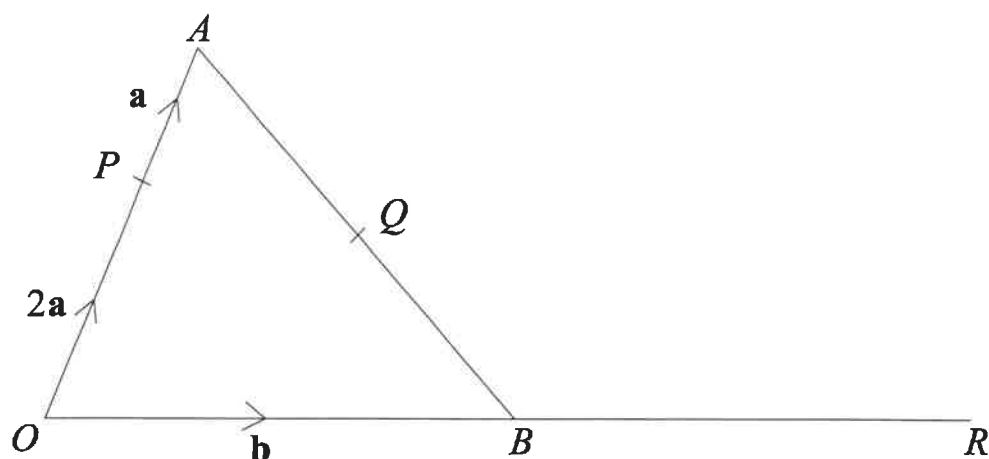
- (ii)  $\overrightarrow{OD}$

.....

.....

(Total 3 marks)

8. Diagram **NOT** accurately drawn  
 $OAB$  is a triangle.  
 $B$  is the midpoint of  $OR$ .  
 $Q$  is the midpoint of  $AB$ .  
 $\overrightarrow{OP} = 2\mathbf{a}$     $\overrightarrow{PA} = \mathbf{a}$     $\overrightarrow{OB} = \mathbf{b}$



- (a) Find, in terms of  $\mathbf{a}$  and  $\mathbf{b}$ , the vectors

(i)  $\overrightarrow{AB}$ ,

(ii)  $\overrightarrow{PR}$ ,

(iii)  $\overrightarrow{PQ}$ .

.....  
 .....  
 .....

(4)

- (b) Hence explain why  $PQR$  is a straight line.

(2)

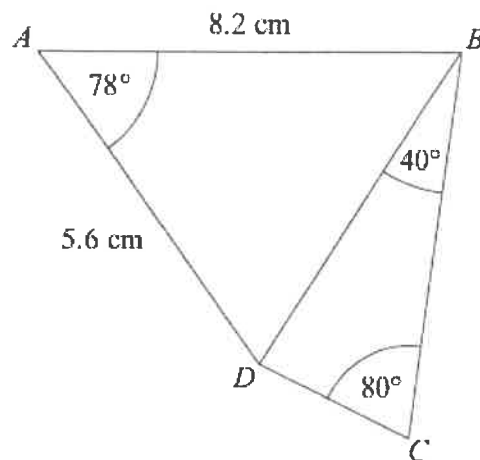
The length of  $PQ$  is 3 cm.

- (c) Find the length of  $PR$ .

..... cm  
 (1)

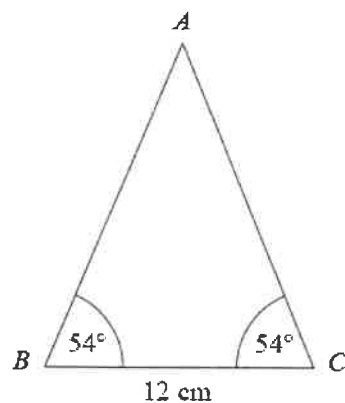
(Total 7 marks)

3.  $ABCD$  is a quadrilateral.  
Diagram **NOT** accurately drawn  
Work out the length of  $DC$ .  
Give your answer correct to 3 significant figures.



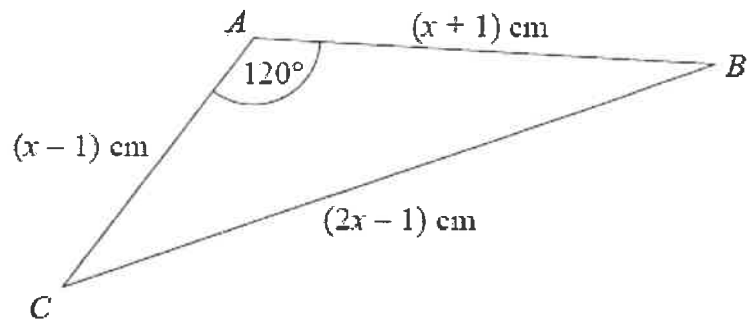
..... cm  
(Total for Question is 6 marks)

4. Diagram **NOT** accurately drawn  
 $ABC$  is an isosceles triangle.  
Work out the area of the triangle.  
Give your answer correct to 3 significant figures.



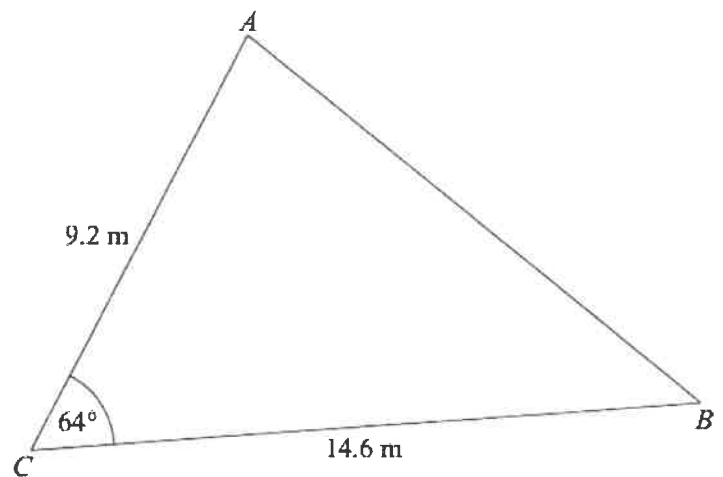
.....  $\text{cm}^2$   
(Total for Question is 4 marks)

7. The diagram shows triangle  $ABC$ .  
The area of triangle  $ABC$  is  $k\sqrt{3}$   $\text{cm}^2$ .  
Find the exact value of  $k$ .



$k = \dots\dots\dots$   
(Total for question = 7 marks)

8. Diagram **NOT** accurately drawn  
 $AC = 9.2$  m  
 $BC = 14.6$  m  
Angle  $ACB = 64^\circ$   
(a) Calculate the area of the triangle  $ABC$ .  
Give your answer correct to 3 significant figures.



$\dots\dots\dots \text{m}^2$   
(2)

- (b) Calculate the length of  $AB$ .  
Give your answer correct to 3 significant figures.

$\dots\dots\dots$   
(3)  
(Total for Question is 5 marks)

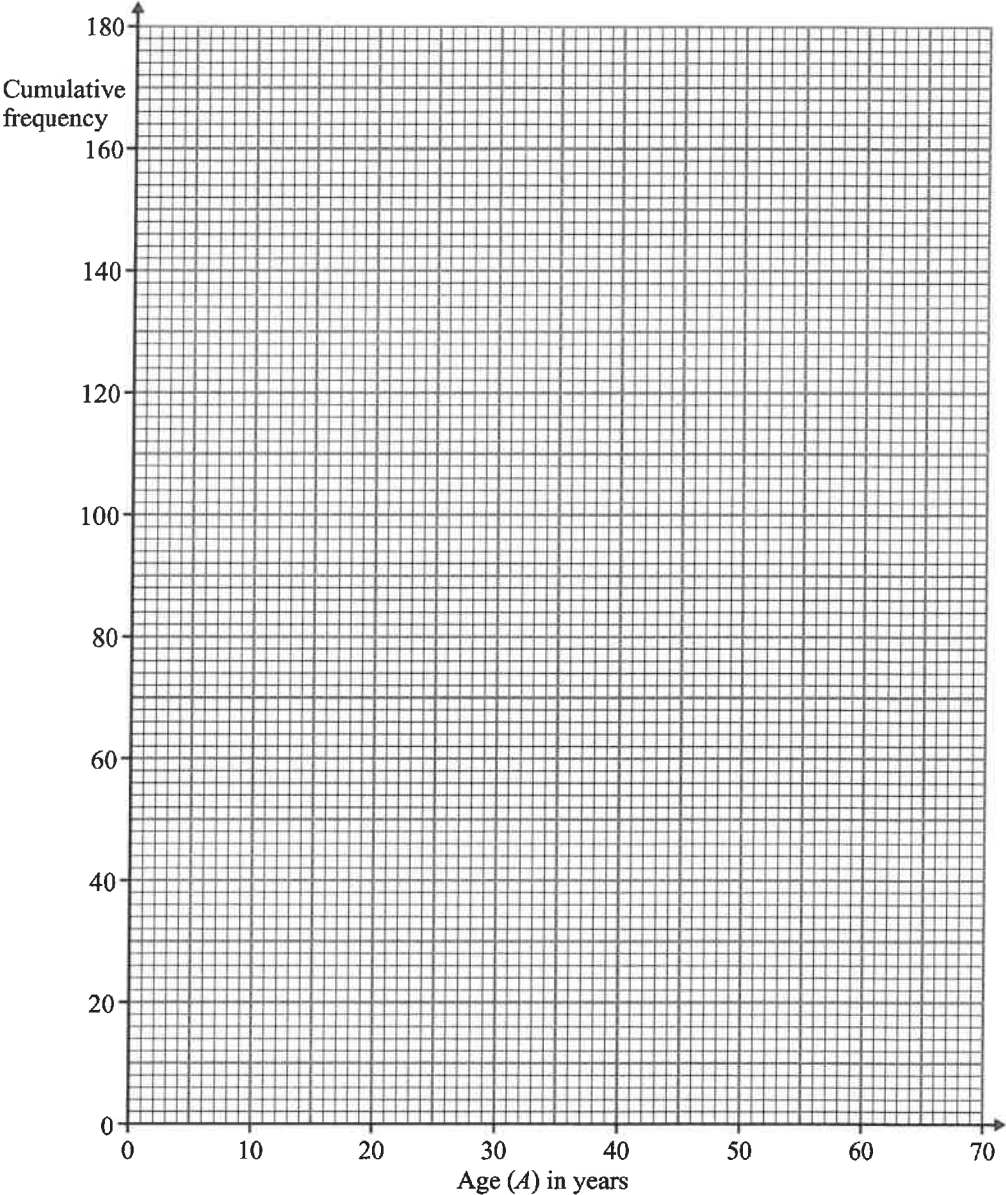
2. The table gives information about the ages of 160 employees of an IT company.

| Age ( <i>A</i> ) in years | Frequency | Cumulative Frequency |
|---------------------------|-----------|----------------------|
| $15 < A \leq 25$          | 44        |                      |
| $25 < A \leq 35$          | 56        |                      |
| $35 < A \leq 45$          | 34        |                      |
| $45 < A \leq 55$          | 19        |                      |
| $55 < A \leq 65$          | 7         |                      |

(a) Write down the modal class interval. .... (1)

(b) Complete the cumulative frequency table. (1)

(c) On the grid below, draw a cumulative frequency graph for your table. (2)



(d) Use your graph to find an estimate for

(i) the median age of the employees, ..... years

(i) the interquartile range of the ages of the employees. .... years (3)

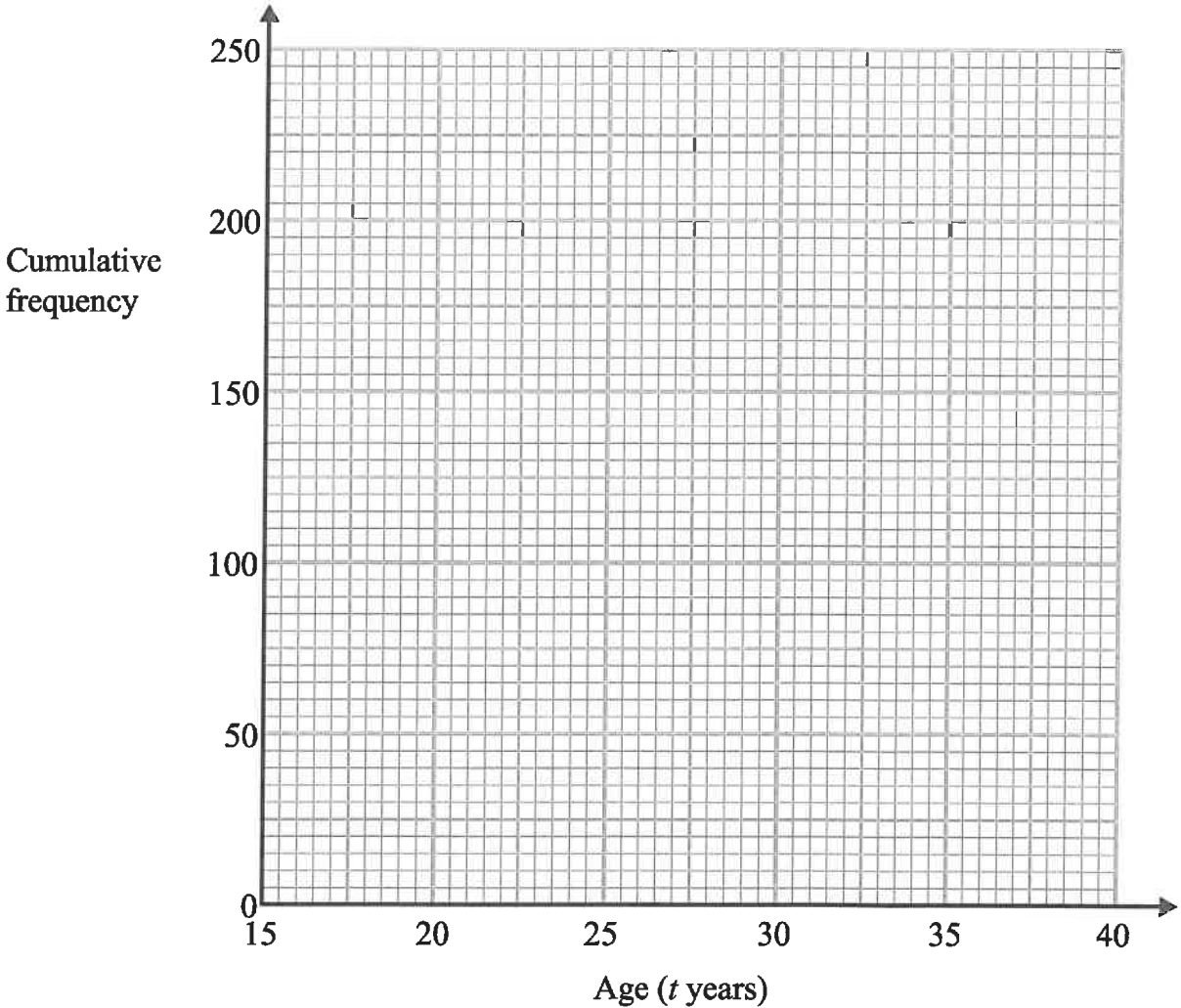
4. The table shows information about the ages of the 240 people at a club.

| Age ( $t$ years) | Frequency | Cumulative Frequency |
|------------------|-----------|----------------------|
| $15 \leq t < 20$ | 95        |                      |
| $20 \leq t < 25$ | 90        |                      |
| $25 \leq t < 30$ | 35        |                      |
| $30 \leq t < 35$ | 15        |                      |
| $35 \leq t < 40$ | 5         |                      |

(a) Complete the cumulative frequency table.

(1)

(b) On the grid, draw the cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median age of the people.

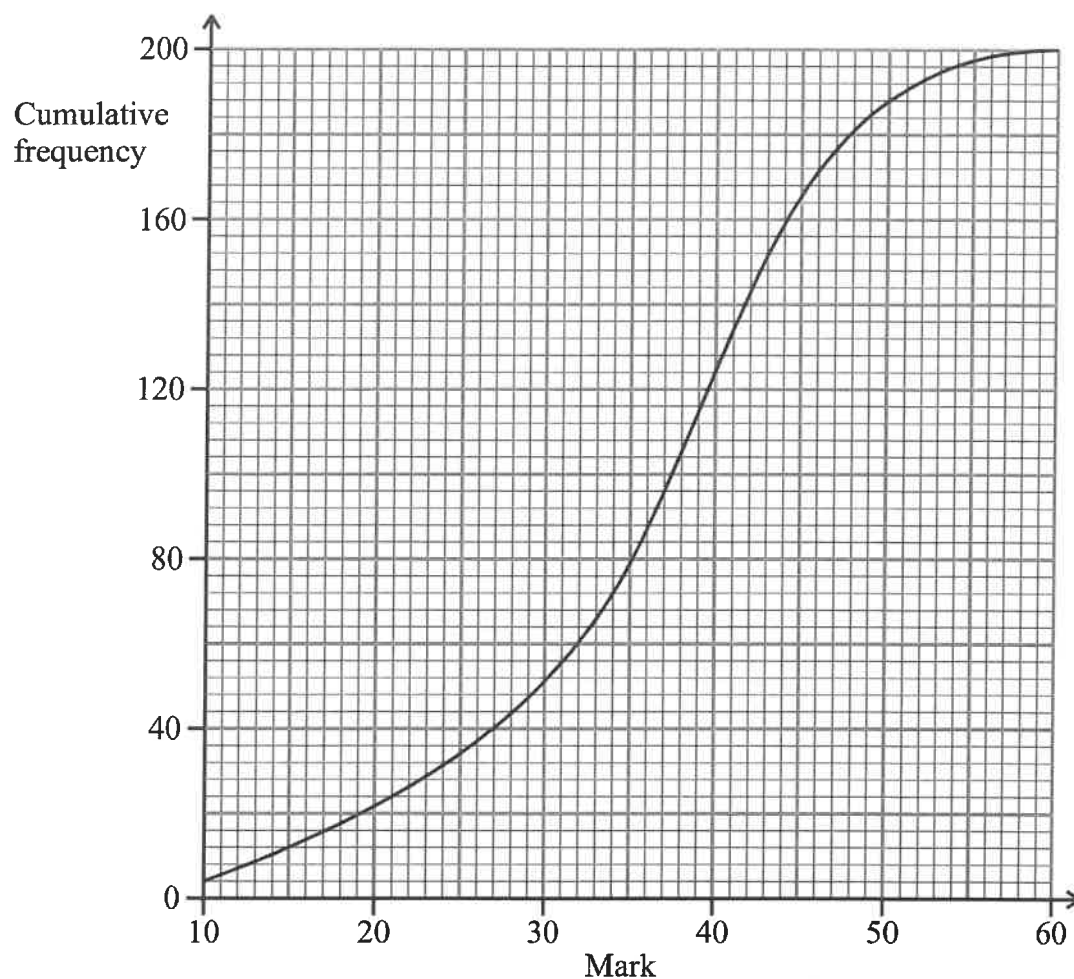
..... years

(1)

(Total 4 marks)



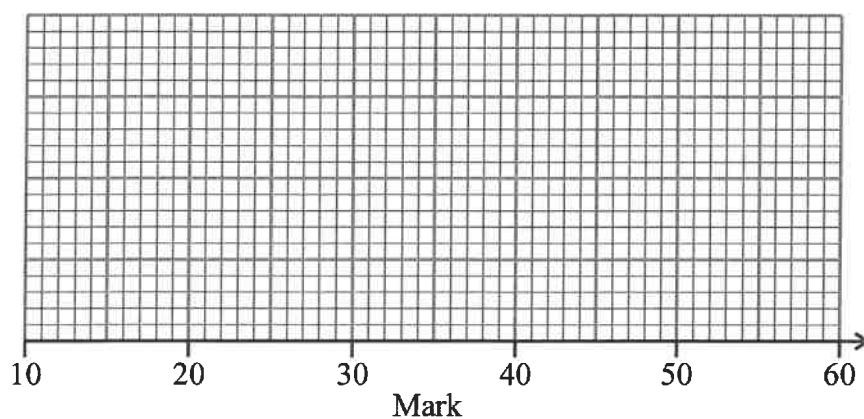
6. 200 students took a test. The cumulative frequency graph gives information about their marks.



The lowest mark scored in the test was 10.

The highest mark scored in the test was 60.

Use this information and the cumulative frequency graph to draw a box plot showing information about the students' marks.



(Total 3 marks)

## Histograms

### Things to remember:

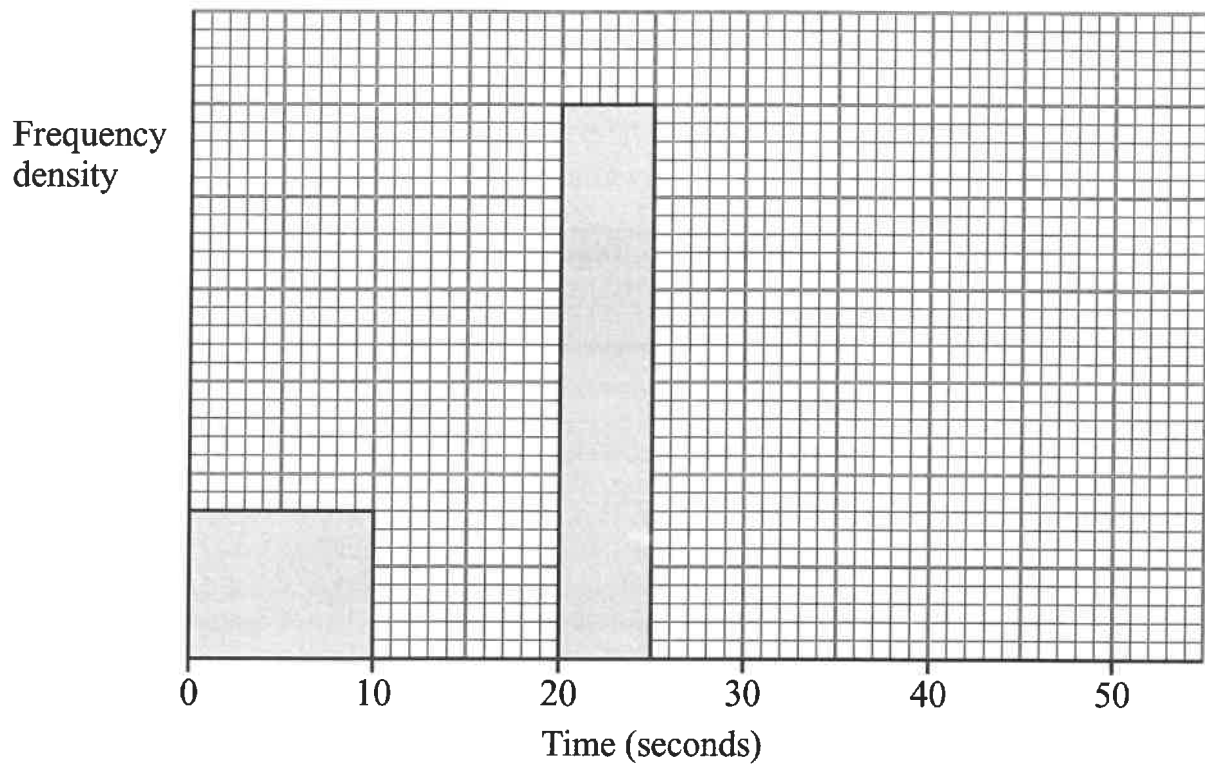
- Frequency = Frequency Density  $\times$  Class Width;
- The y-axis will always be labelled "frequency density";
- The x-axis will have a continuous scale.

### Questions:

1. One Monday, Victoria measured the time, in seconds, that individual birds spent on her bird table. She used this information to complete the frequency table.

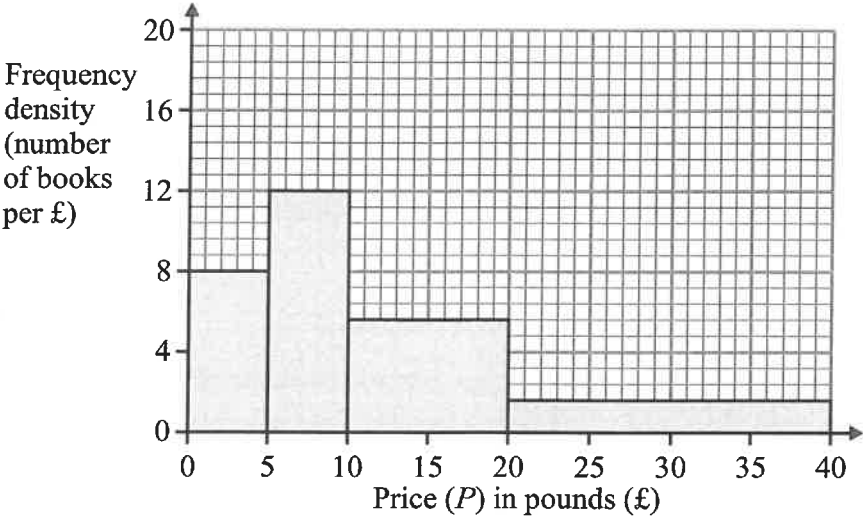
| Time ( $t$ seconds) | Frequency |
|---------------------|-----------|
| $0 < t \leq 10$     | 8         |
| $10 < t \leq 20$    | 16        |
| $20 < t \leq 25$    | 15        |
| $25 < t \leq 30$    | 12        |
| $30 < t \leq 50$    | 6         |

- (a) Use the table to complete the histogram.



(3)

2. This histogram gives information about the books sold in a bookshop one Saturday.



(a) Use the histogram to complete the table.

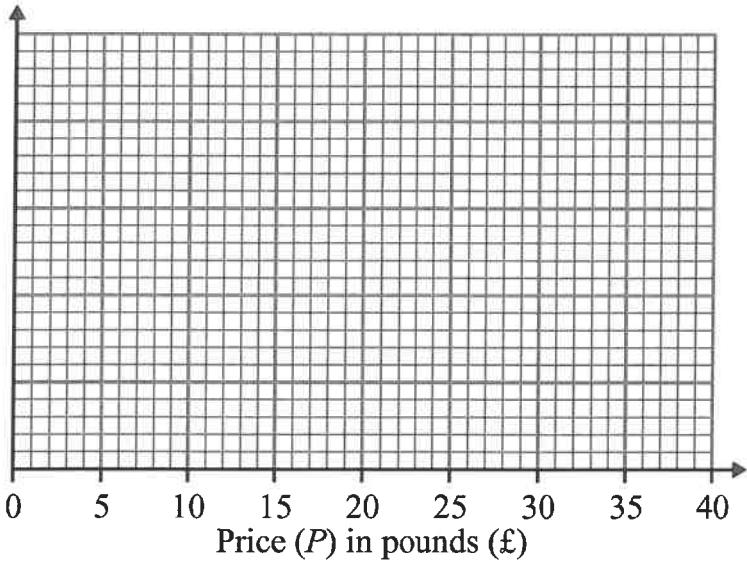
| Price ( <i>P</i> ) in pounds (£) | Frequency |
|----------------------------------|-----------|
| $0 < P \leq 5$                   |           |
| $5 < P \leq 10$                  |           |
| $10 < P \leq 20$                 |           |
| $20 < P \leq 40$                 |           |

(2)

The frequency table below gives information about the books sold in a second bookshop on the same Saturday.

| Price ( <i>P</i> ) in pounds (£) | Frequency |
|----------------------------------|-----------|
| $0 < P \leq 5$                   | 80        |
| $5 < P \leq 10$                  | 20        |
| $10 < P \leq 20$                 | 24        |
| $20 < P \leq 40$                 | 96        |

(b) On the grid below, draw a histogram to represent the information about the books sold in the second bookshop.



(3)

(Total 5 marks)

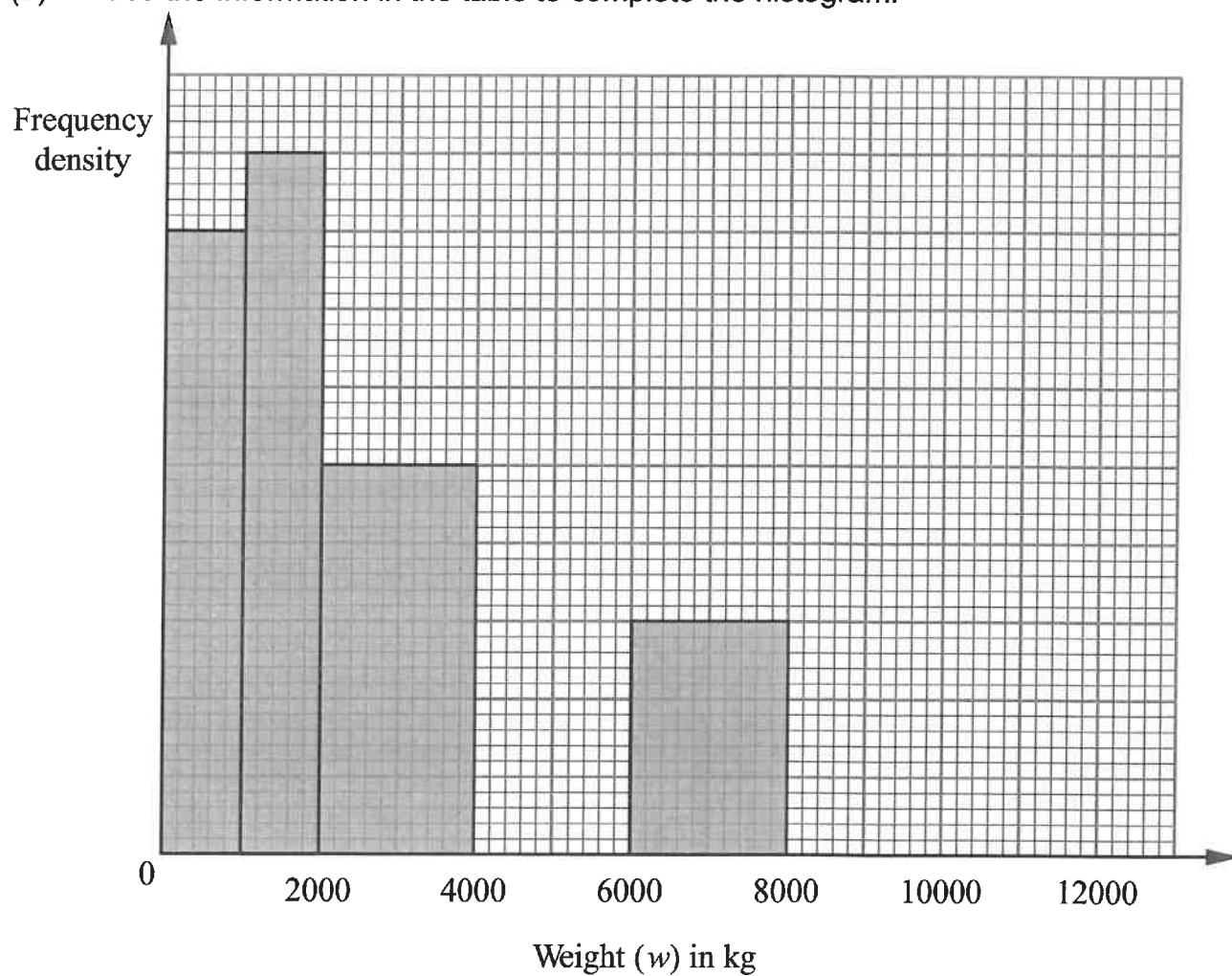
4. The incomplete histogram and table show information about the weights of some containers.

| Weight ( $w$ ) in kg  | Frequenc<br>$y$ |
|-----------------------|-----------------|
| $0 < w \leq 1000$     | 16              |
| $1000 < w \leq 2000$  |                 |
| $2000 < w \leq 4000$  |                 |
| $4000 < w \leq 6000$  | 16              |
| $6000 < w \leq 8000$  |                 |
| $8000 < w \leq 12000$ | 8               |

(a) Use the information in the histogram to complete the table.

(2)

(b) Use the information in the table to complete the histogram.



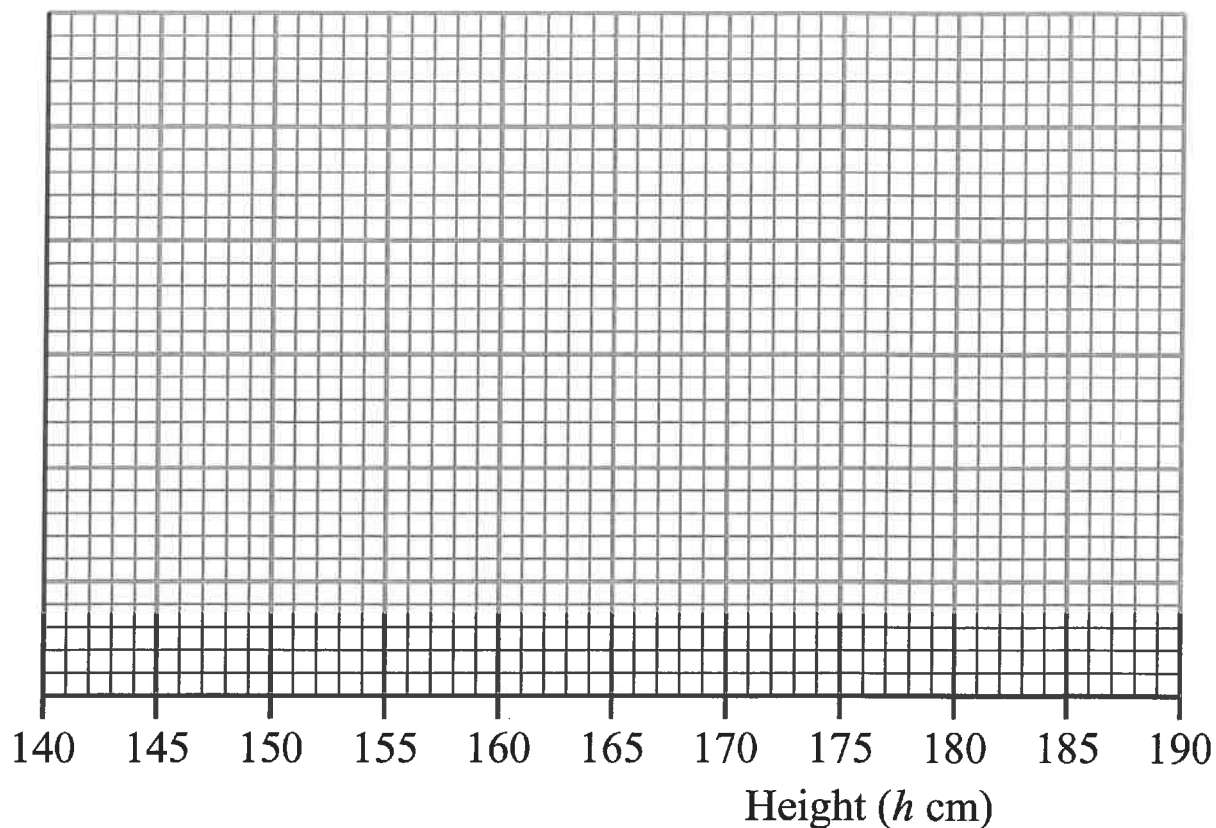
(2)

(Total 4 marks)

6. The table gives information about the heights, in centimetres, of some 15 year old students.

|                  |                    |                    |                    |
|------------------|--------------------|--------------------|--------------------|
| Height ( $h$ cm) | $145 < h \leq 155$ | $155 < h \leq 175$ | $175 < h \leq 190$ |
| Frequency        | 10                 | 80                 | 24                 |

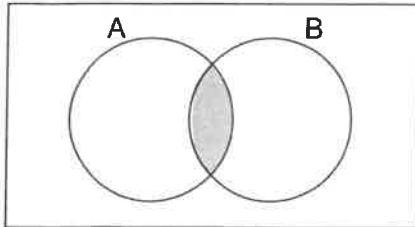
Use the table to draw a histogram.



(Total 3 marks)

## Set Theory

Things to remember:

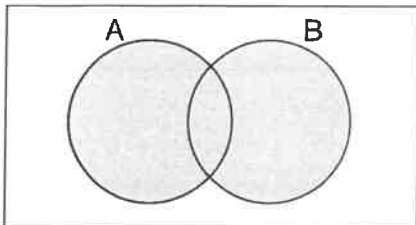


The **intersection** is where two sets overlap.

$$A \cap B$$

This means **A and B**.

AND  
rule

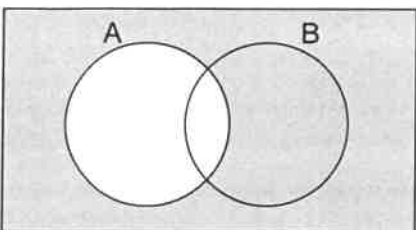


If you put two sets together, you get the **union**.

$$A \cup B$$

This means **A or B**.

OR  
rule



The **complement of A** is the region that is not A.

$$A'$$

This means **not A**.

Questions:

1.

$$\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

$$A = \{\text{multiples of 2}\}$$

$$A \cap B = \{2, 6\}$$

$$A \cup B = \{1, 2, 3, 4, 6, 8, 9, 10\}$$

Draw a Venn diagram for this information.

(Total for question is 4 marks)

4. Sami asked 50 people which drinks they liked from tea, coffee and milk.  
All 50 people like at least one of the drinks  
19 people like all three drinks.  
16 people like tea and coffee but do not like milk.  
21 people like coffee and milk.  
24 people like tea and milk.  
40 people like coffee.  
1 person likes only milk.  
Sami selects at random one of the 50 people.  
(a) Work out the probability that this person likes tea.

- .....  
(b) Given that the person selected at random from the 50 people likes tea, find the probability that this person also likes exactly one other drink. (4)

.....  
(2)  
(Total for question = 6 marks)

3.  $d$  is directly proportional to the square of  $t$ .

$d = 80$  when  $t = 4$

- (a) Express  $d$  in terms of  $t$ .

.....  
..... (3)

- (b) Work out the value of  $d$  when  $t = 7$

$d =$  .....  
..... (1)

- (c) Work out the positive value of  $t$  when  $d = 45$

$t =$  .....  
..... (2)

**(Total 6 marks)**

4. The distance,  $D$ , travelled by a particle is directly proportional to the square of the time,  $t$ , taken. When  $t = 40$ ,  $D = 30$

- (a) Find a formula for  $D$  in terms of  $t$ .

$D =$  .....  
..... (3)

- (b) Calculate the value of  $D$  when  $t = 64$

.....  
..... (1)

- (c) Calculate the value of  $t$  when  $D = 12$   
Give your answer correct to 3 significant figures.

.....  
..... (2)  
**(Total 6 marks)**



7. In a spring, the tension ( $T$  newtons) is directly proportional to its extension ( $x$  cm). When the tension is 150 newtons, the extension is 6 cm.  
 (a) Find a formula for  $T$  in terms of  $x$ .

$$T = \dots\dots\dots$$

**(3)**

- (b) Calculate the tension, in newtons, when the extension is 15 cm.

$$\dots\dots\dots \text{newtons}$$

**(1)**

- (c) Calculate the extension, in cm, when the tension is 600 newtons.

$$\dots\dots\dots \text{cm}$$

**(1)**  
**(Total 5 marks)**

8.  $f$  is inversely proportional to  $d$ .  
 When  $d = 50$ ,  $f = 256$   
 Find the value of  $f$  when  $d = 80$

$$f = \dots\dots\dots$$

**(Total 3 marks)**

5. Toby invested £4500 for 2 years in a savings account.  
He was paid 4% per annum compound interest.  
(a) How much did Toby have in his savings account after 2 years?

£ .....

(3)

Jaspir invested £2400 for  $n$  years in a savings account.  
He was paid 7.5% per annum compound interest.  
At the end of the  $n$  years he had £3445.51 in the savings account.  
(a) Work out the value of  $n$ .

.....

(2)

(Total 5 marks)

6. Mario invests £2000 for 3 years at 5% per annum **compound** interest.  
Calculate the value of the investment at the end of 3 years.

£ .....

(Total 3 marks)

7. Toby invested £4500 for 2 years in a savings account.  
He was paid 4% per annum compound interest.  
How much did Toby have in his savings account after 2 years?

£ .....

(Total 3 marks)

4. The price of all rail season tickets to London increased by 4%.  
(a) The price of a rail season ticket from Cambridge to London increased by £121.60  
Work out the price before this increase.

£ .....  
(2)

- (b) After the increase, the price of a rail season ticket from Brighton to London was  
£2828.80  
Work out the price before this increase.

£ .....  
(3)  
(Total 5 marks)

5. In a sale, normal prices are reduced by 25%.  
The sale price of a saw is £12.75  
Calculate the normal price of the saw.

£ .....  
(Total 3 marks)

6. In a sale, normal prices are reduced by 12%.  
The sale price of a DVD player is £242.  
Work out the normal price of the DVD player.

£ .....  
(Total 3 marks)

7. A garage sells cars.  
It offers a discount of 20% off the normal price for cash.  
Dave pays £5200 cash for a car.  
Calculate the normal price of the car.

£ .....  
(Total 3 marks)

11P2 & 11Q2

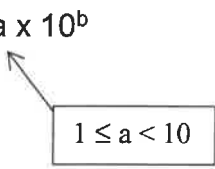


Name: \_\_\_\_\_

## Standard Form

### Things to remember:

- $a \times 10^b$


$$1 \leq a < 10$$

1. A floppy disk can store 1 440 000 bytes of data.

(a) Write the number 1 440 000 in standard form.

.....  
(1)

A hard disk can store  $2.4 \times 10^9$  bytes of data.

(b) Calculate the number of floppy disks needed to store the  $2.4 \times 10^9$  bytes of data.

.....  
(3)

(Total 4 marks)

2. A nanosecond is 0.000 000 001 second.

(a) Write the number 0.000 000 001 in standard form.

.....  
(1)

A computer does a calculation in 5 nanoseconds.

(b) How many of these calculations can the computer do in 1 second?  
Give your answer in standard form.

.....  
(2)

(Total 3 marks)

3. (a) (i) Write 40 000 000 in standard form.

(ii) Write  $3 \times 10^{-5}$  as an ordinary number.

.....  
(2)

- (b) Work out the value of

$$3 \times 10^{-5} \times 40\,000\,000$$

Give your answer in standard form.

.....  
(2)

(Total 4 marks)

8. (a) Write 30 000 000 in standard form.

.....  
(1)

(b) Write  $2 \times 10^{-3}$  as an ordinary number.

.....  
(1)

(Total 2 marks)

9. (a) (i) Write 7900 in standard form.

.....

(ii) Write 0.00035 in standard form.

.....  
(2)

(b) Work out  $\frac{4 \times 10^3}{8 \times 10^{-5}}$   
Give your answer in standard form.

.....  
(2)

(Total 4 marks)

10. Work out

$$\frac{2 \times 2.2 \times 10^{12} \times 1.5 \times 10^{12}}{2.2 \times 10^{12} - 1.5 \times 10^{12}}$$

Give your answer in standard form correct to 3 significant figures.

.....  
(Total 3 marks)

11. (a) Write  $6.4 \times 10^4$  as an ordinary number.

.....  
(1)

(b) Write 0.0039 in standard form.

.....  
(1)

(c) Write  $0.25 \times 10^7$  in standard form.

.....  
(1)

(Total 3 marks)

5. (a) Find the value of  $5^0$

.....  
(1)

(b) Find the value of  $27^{1/3}$

.....  
(1)

(c) Find the value of  $2^{-3}$

.....  
(1)  
(Total for Question is 3 marks)

6. (a) Write down the value of  $27^{1/3}$

.....  
(1)

(b) Find the value of  $25^{-1/2}$

.....  
(2)  
(Total for Question is 3 marks)

7. (a) Write down the value of  $64^{1/2}$

.....  
(1)

(b) Find the value of  $\left(\frac{8}{125}\right)^{-2/3}$

.....  
(2)  
(Total for question = 3 marks)

8. (a) Write down the value of  $6^0$

.....  
(1)

(b) Work out  $64^{2/3}$

.....  
(2)  
(Total for question = 3 marks)

4. Work out an estimate for  $\sqrt{4.98 + 2.16 \times 7.35}$

.....  
(Total for question = 3 marks)

5. A ticket for a seat at a school play costs £2.95  
There are 21 rows of seats.  
There are 39 seats in each row.  
The school will sell all the tickets.  
Work out an estimate for the total money the school will get.

£ .....  
(Total for Question is 3 marks)

6. Jayne writes down the following

$$3.4 \times 5.3 = 180.2$$

Without doing the exact calculation, explain why Jayne's answer cannot be correct.

.....  
.....  
.....

(Total for question is 1 mark)



5. Jim rounds a number,  $x$ , to one decimal place.  
The result is 7.2  
Write down the error interval for  $x$ .

.....  
**(Total for question = 2 marks)**

6. A pencil has a length of 17 cm measured to the nearest centimetre.  
(a) Write down the least possible length of the pencil.

.....  
**(1)**

- (b) Write down the greatest possible length of the pencil.

.....  
**(1)**  
**(Total for Question is 2 marks)**

4. Factorise  $x^2 + 3x - 4$

.....  
(Total for question is 2 marks)

5. Write  $x^2 + 2x - 8$  in the form  $(x + m)^2 + n$  where  $m$  and  $n$  are integers.

.....  
(Total for question is 2 marks)

6. (a) Expand  $4(3x + 5)$

.....  
(1)

(b) Expand and simplify  $2(x - 4) + 3(x + 5)$

.....  
(2)

(c) Expand and simplify  $(x + 4)(x + 6)$

.....  
(2)  
(Total for Question is 5 marks)

7. (a) Factorise  $x^2 + 5x + 4$

.....  
(2)

(b) Expand and simplify  $(3x - 1)(2x + 5)$

.....  
(2)  
(Total for Question is 4 marks)

## Rearranging Formulae

### Things to remember:

- Firstly decide what needs to be on its own.
- Secondly move all terms that contain that letter to one side. Remember to move all terms if it appears in more than one.
- Thirdly separate out the required letter on its own.

### Questions:

7. Make  $u$  the subject of the formula  
 $D = ut + kt^2$

$$u = \dots\dots\dots$$

**(Total 2 marks)**

2. (a) Solve  $4(x + 3) = 6$

$$x = \dots\dots\dots$$

**(3)**

- (b) Make  $t$  the subject of the formula  $v = u + 5t$

$$t = \dots\dots\dots$$

**(2)**  
**(Total 5 marks)**

3. (a) Expand and simplify  
 $(x - y)^2$

$$\dots\dots\dots$$

**(2)**

- (b) Rearrange  $a(q - c) = d$  to make  $q$  the subject.

$$Q = \dots\dots\dots$$

**(3)**  
**(Total 5 marks)**

## Linear Simultaneous Equations

### Things to remember:

1. Scale up (if necessary)
2. Add or subtract (to eliminate)
3. Solve (to find x)
4. Substitute (to find y) (or the other way around)

### Questions:

- \*1. The Singh family and the Peterson family go to the cinema.  
The Singh family buy 2 adult tickets and 3 child tickets.  
They pay £28.20 for the tickets.  
The Peterson family buy 3 adult tickets and 5 child tickets.  
They pay £44.75 for the tickets.  
Find the cost of each adult ticket and each child ticket.

(Total for question = 5 marks)

2. Solve the simultaneous equations

$$3x + 4y = 5$$

$$2x - 3y = 9$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question is 4 marks)

7. Solve the simultaneous equations

$$4x + y = 25$$

$$x - 3y = 16$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

**(Total for Question is 3 marks)**

7. Solve the simultaneous equations

$$3x - 2y = 7$$

$$7x + 2y = 13$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

**(Total for Question is 3 marks)**

## Graphical Inequalities

### Things to remember:

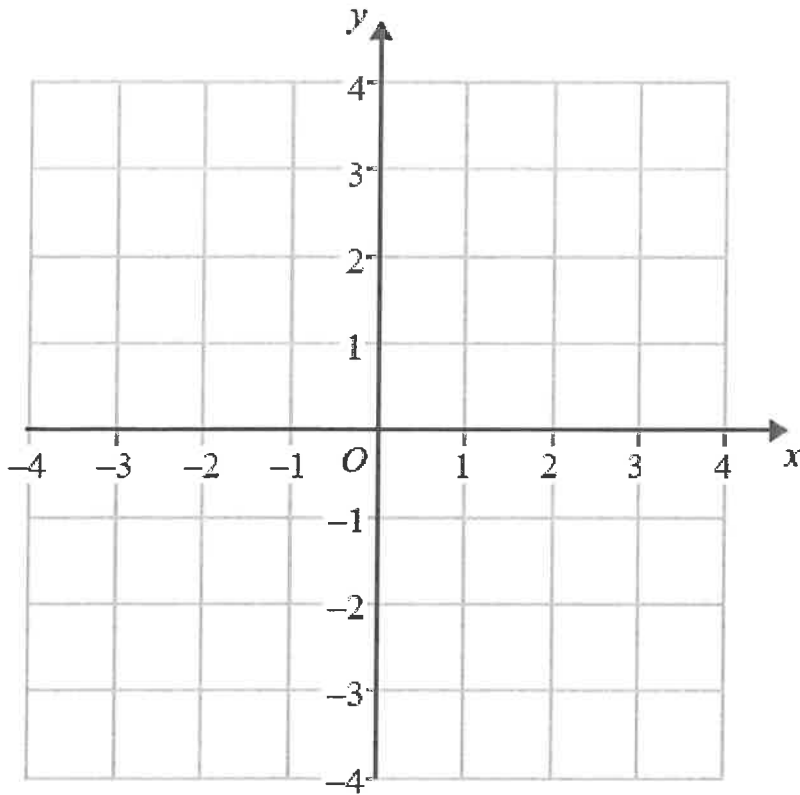
- Use a table of values if you need to help you draw the linear graphs.
- Use a solid line for  $\geq$  or  $\leq$ , and a dotted line for  $>$  or  $<$ .
- Test a coordinate ((0, 0) is easiest) to work out which side of the line to shade.

### Questions:

1. (a) Solve the inequality  $5e + 3 > e + 12$

.....  
(2)

(b) On the grid, shade the region defined by the inequality  $x + y > 1$



(2)

(Total for Question is 4 marks)

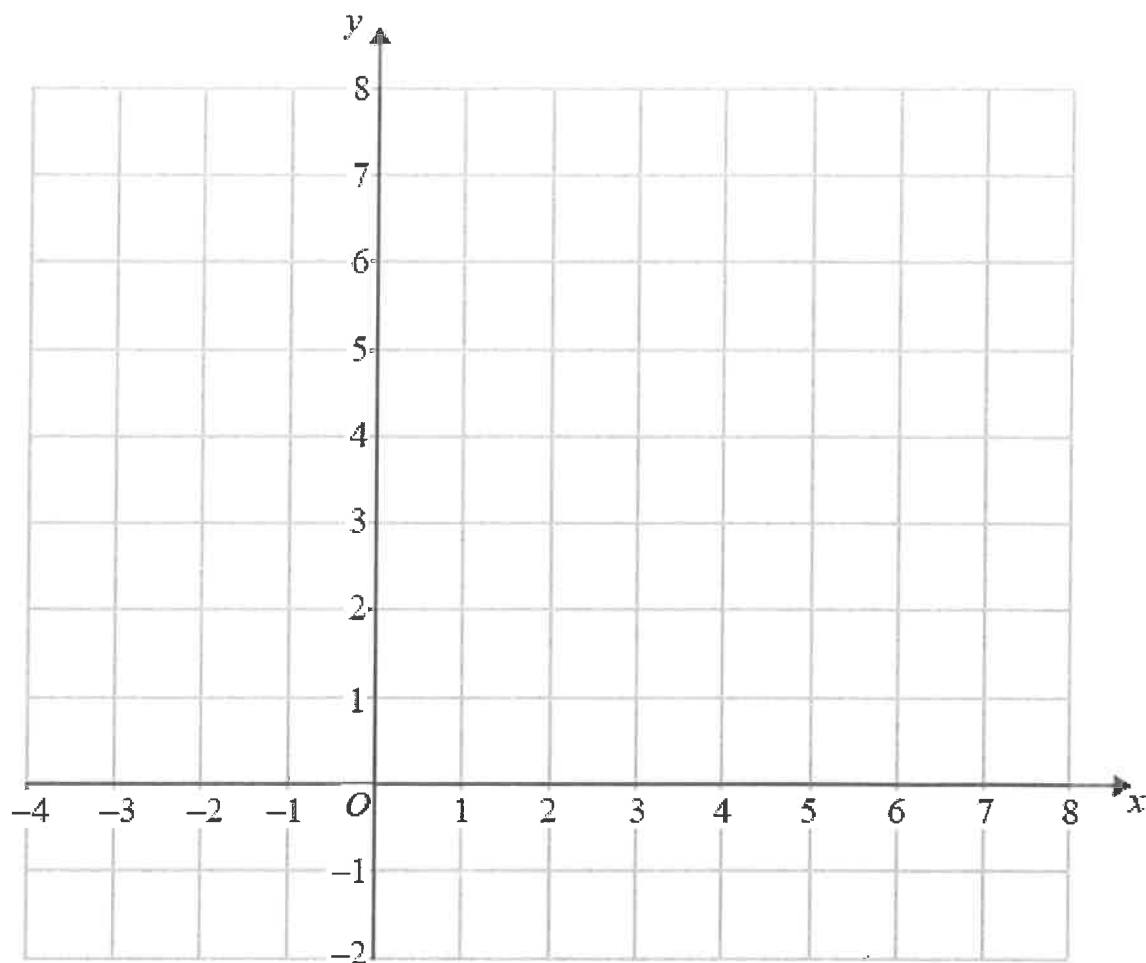
3. On the grid below, show by shading, the region defined by the inequalities

$$x + y < 6$$

$$x > -1$$

$$y > 2$$

Mark this region with the letter R.



(Total for Question is 4 marks)

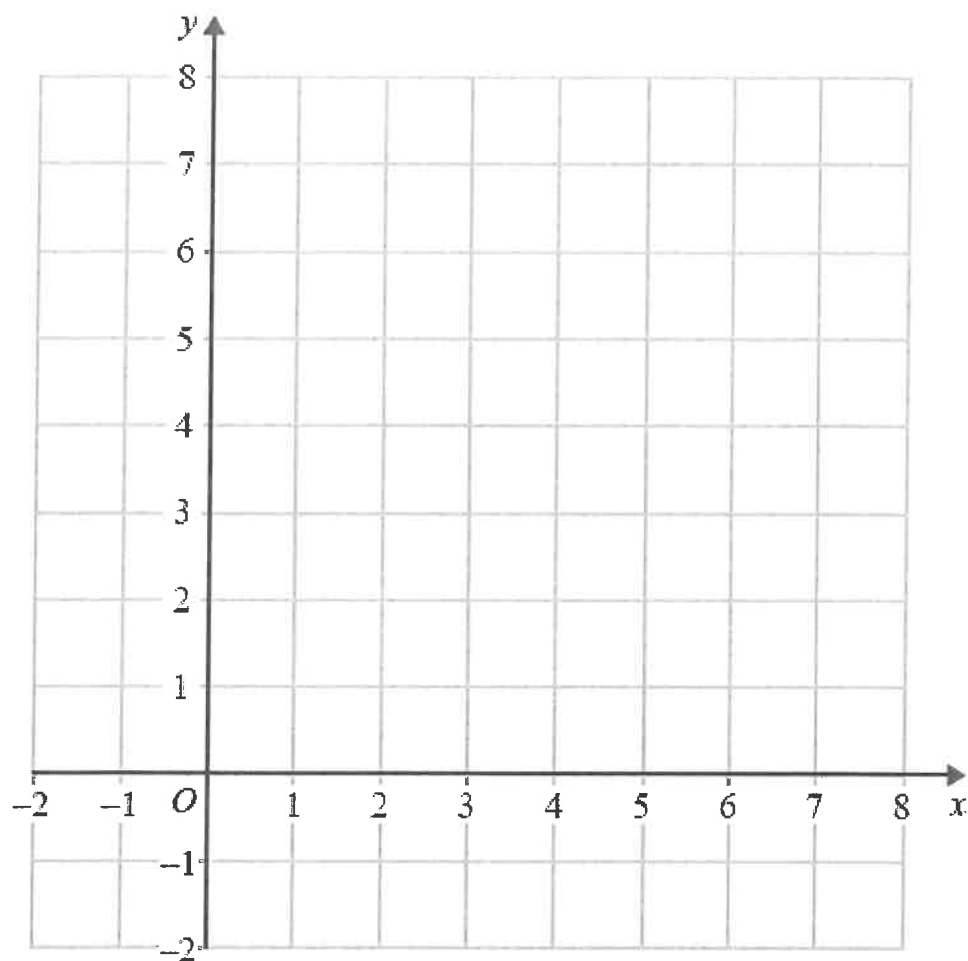
5. On the grid show, by shading, the region that satisfies all three of the inequalities

$$x + y < 7$$

$$y < 2x$$

$$y > 3$$

Label the region **R**.



(Total for question = 4 marks)



2. Triangle  $ABC$  is isosceles, with  $AC = BC$ .  
 Angle  $ACD = 62^\circ$ .  
 $BCD$  is a straight line.

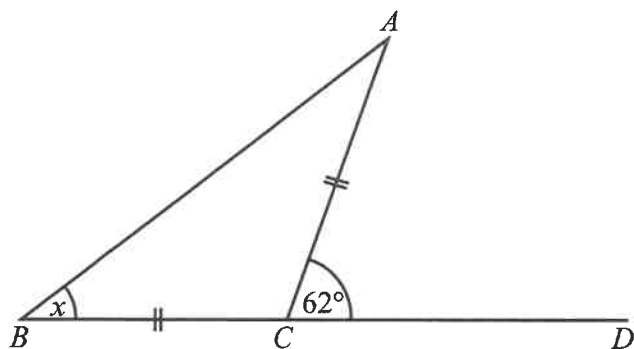


Diagram **NOT**  
 accurately drawn

- (a) Work out the size of angle  $x$ .

$$x = \dots\dots\dots^\circ$$

(2)

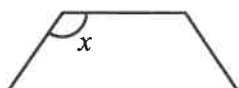


Diagram **NOT**  
 accurately drawn

The diagram shows part of a **regular** octagon.

- (b) Work out the size of angle  $x$ .

$$x = \dots\dots\dots^\circ$$

(3)  
 (Total 5 marks)

3.

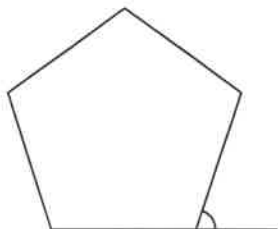


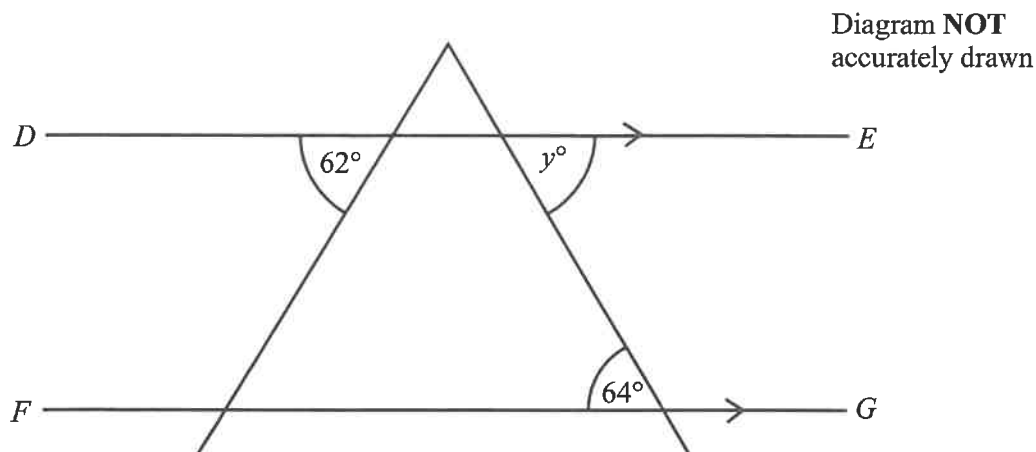
Diagram **NOT**  
 accurately drawn

- (a) Work out the size of an exterior angle of a regular pentagon.

$$\dots\dots\dots^\circ$$

(Total 2 marks)

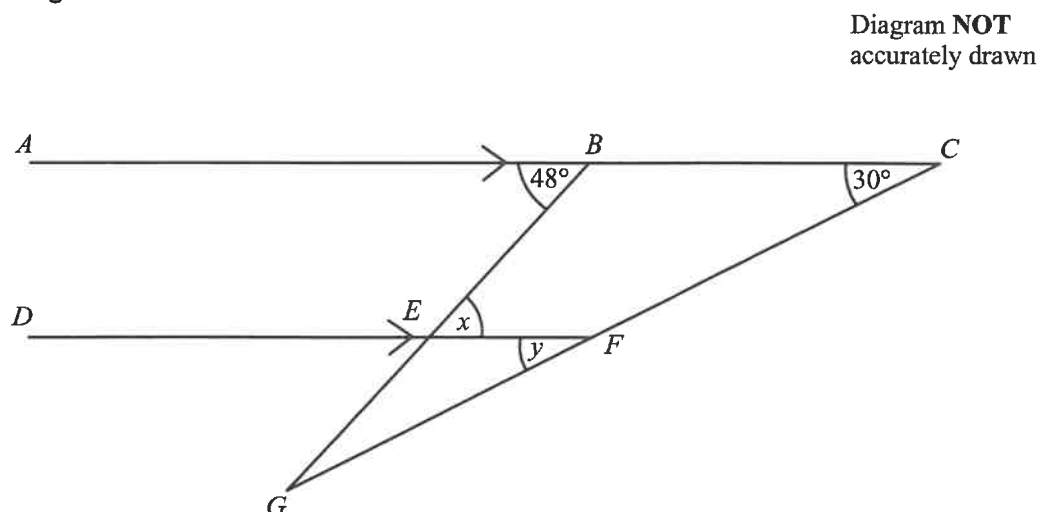
6.  $DE$  is parallel to  $FG$ .



Find the size of the angle marked  $y^\circ$ .

.....<sup>°</sup>  
(Total 1 mark)

7.  $BEG$  and  $CFG$  are straight lines.  
 $ABC$  is parallel to  $DEF$ .  
 Angle  $ABE = 48^\circ$ .  
 Angle  $BCF = 30^\circ$ .



- (a) (i) Write down the size of the angle marked  $x$ .

$x =$  .....<sup>°</sup>

- (ii) Give a reason for your answer.

.....  
(2)

- (b) (i) Write down the size of the angle marked  $y$ .

$y =$  .....<sup>°</sup>

- (ii) Give a reason for your answer.

.....  
(2)

(Total 4 marks)

## Loci and Construction

### Things to remember:

- The question will always say “use ruler and compasses” – if you don’t you will lose marks.
- Sometimes there are marks for drawing something that is almost right, so always have a guess if you can’t remember.
- Bisector means “cut in half”

### Questions:

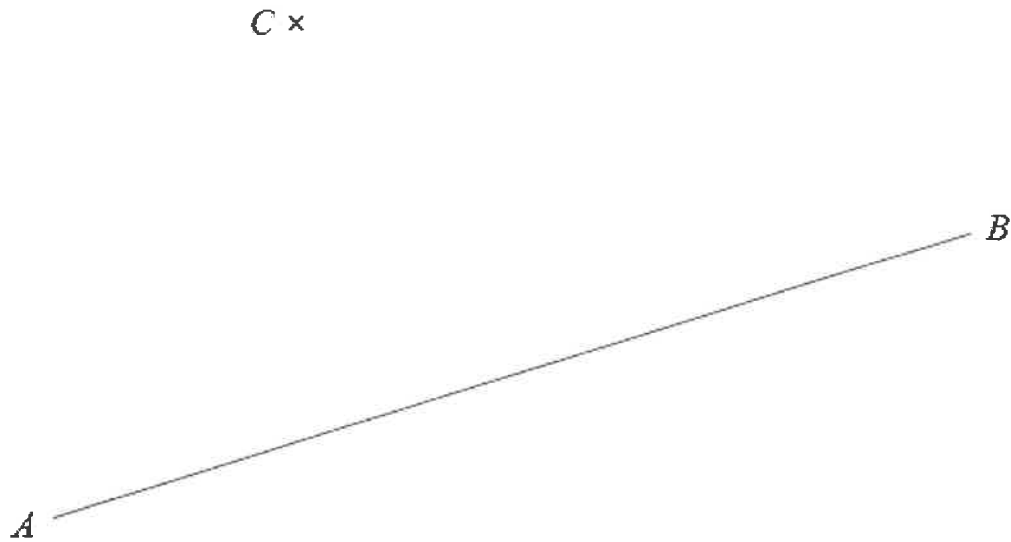
1.



Use ruler and compasses to **construct** the perpendicular bisector of the line segment  $AB$ .  
You must show all your construction lines.

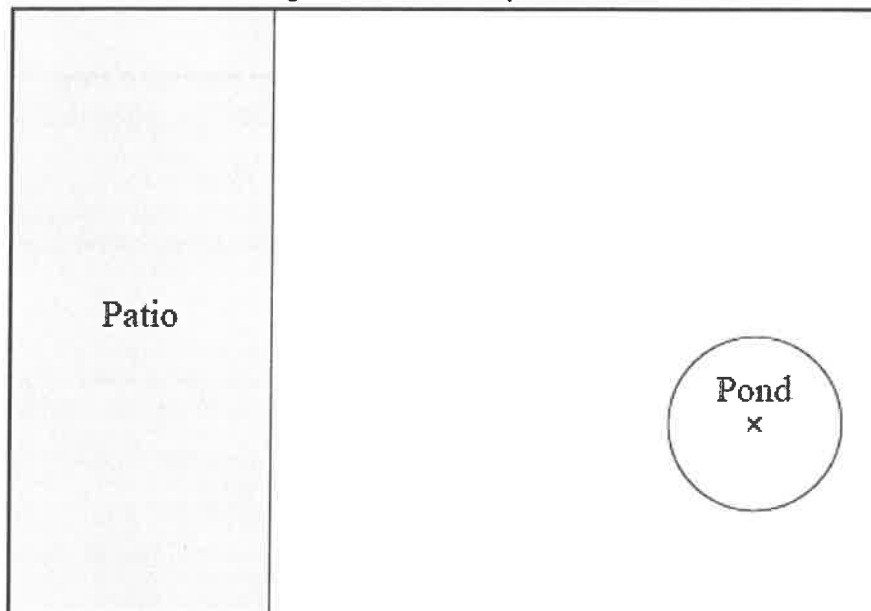
**(Total for question = 2 marks)**

4. Use ruler and compasses to **construct** the perpendicular from point  $C$  to the line  $AB$ . You must show all your construction lines.



(Total for Question is 2 marks)

5. The diagram shows a garden in the shape of a rectangle. The scale of the diagram is 1 cm represents 2 m.



Scale: 1 cm represents 2 m

Irfan is going to plant a tree in the garden.

The tree must be

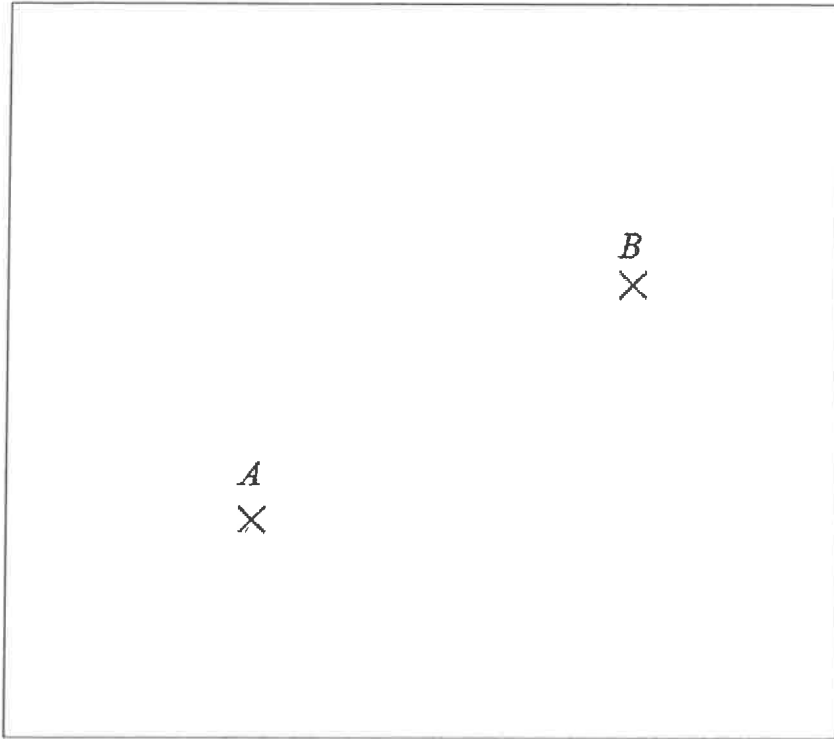
more than 3 metres from the patio

**and** more than 6 metres from the centre of the pond.

On the diagram, shade the region where Irfan can plant the tree.

(Total for Question is 3 marks)

7. The diagram shows the positions of two shops, *A* and *B*, on a map.



The scale of the map is 1 cm represents 5 km.

Yannis wants to build a warehouse.

The warehouse needs to be

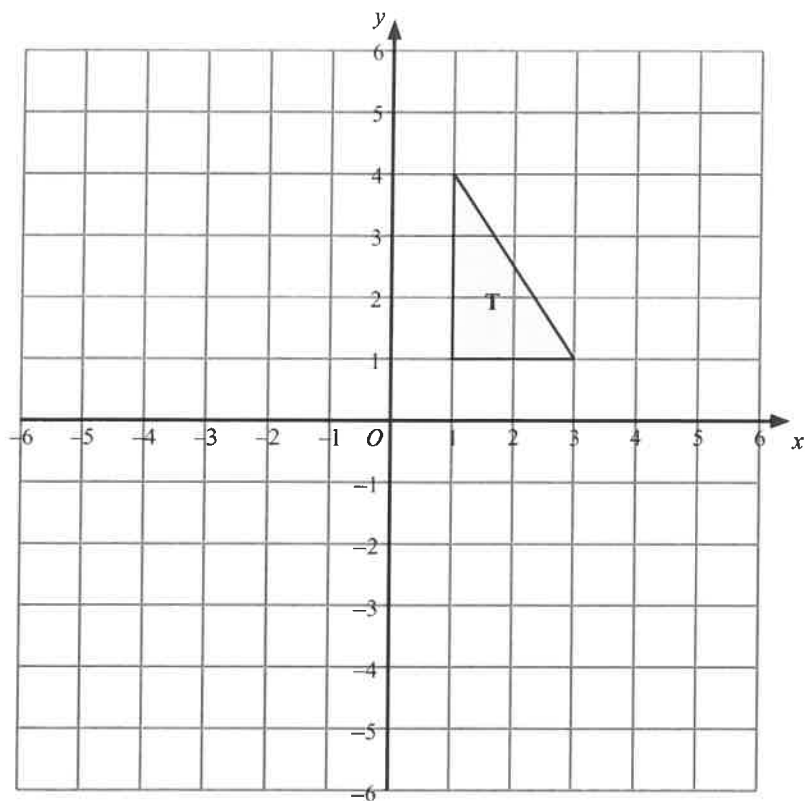
less than 10 km from *A*,

less than 20 km from *B*.

Show by shading where Yannis can build the warehouse.

**(Total for Question is 3 marks)**

2.

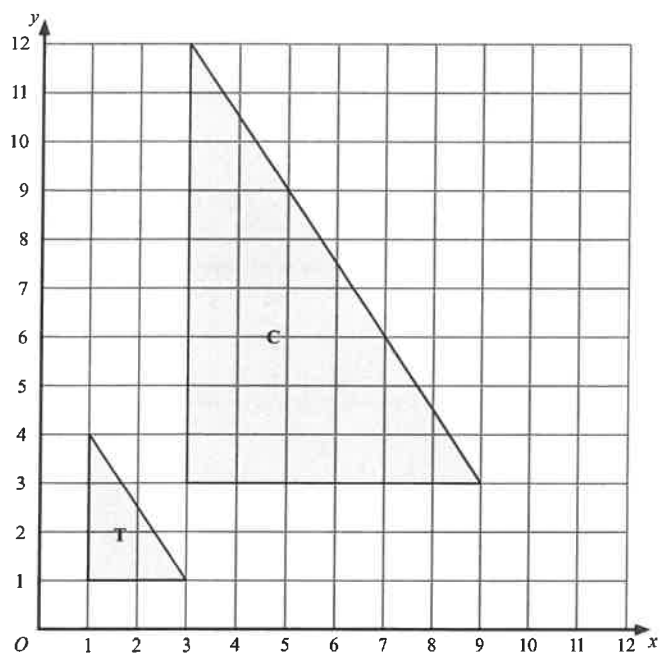


Triangle **T** has been drawn on the grid.

- (a) Reflect triangle **T** in the  $y$ -axis.  
Label the new triangle **A**.
- (b) Rotate triangle **T** by a half turn, centre  $O$ .  
Label the new triangle **B**.

(1)

(2)



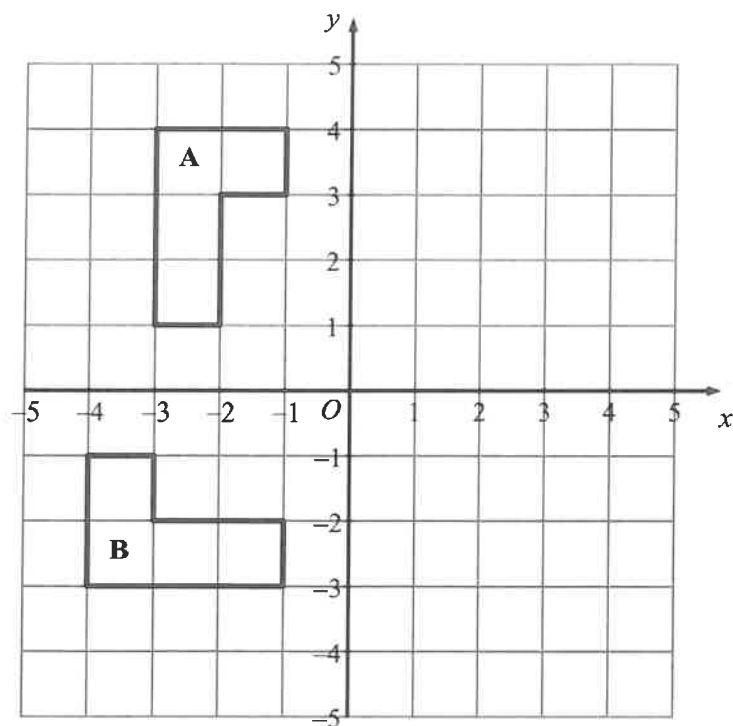
- (a) Describe fully the single transformation which maps triangle **T** onto triangle **C**.

.....

(3)

(Total 6 marks)

4.

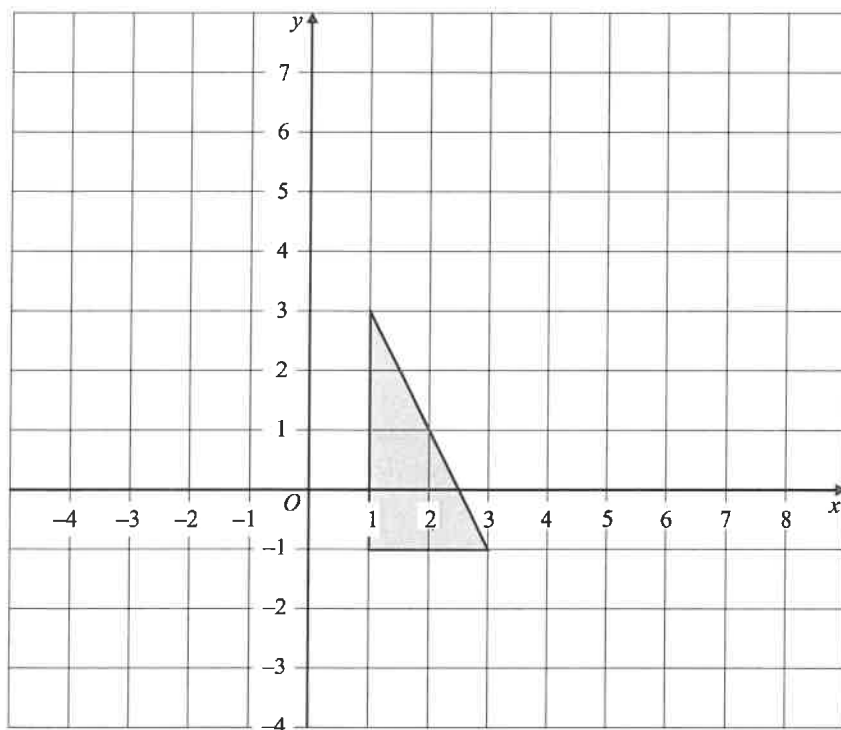


- (a) Reflect shape **A** in the  $y$  axis. (2)
- (b) Describe fully the **single** transformation which takes shape **A** to shape **B**. (3)

.....

(Total 5 marks)

5.



Enlarge the shaded triangle by a scale factor 2, centre 0.

(Total 3 marks)

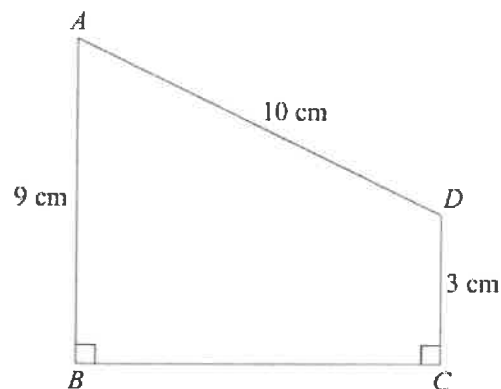
## Pythagoras' Theorem

### Things to remember:

- $a^2 + b^2 = c^2$
- First you've got to square both sides of the triangle.
- Then decide whether to add or subtract.
- Finish off with a square root.
- Make sure you round your answer correctly.

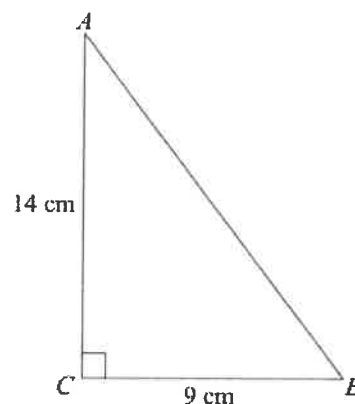
### Questions:

1.  $ABCD$  is a trapezium.  
Diagram NOT accurately drawn  
 $AD = 10$  cm  
 $AB = 9$  cm  
 $DC = 3$  cm  
Angle  $ABC = \text{angle } BCD = 90^\circ$   
Calculate the length of  $AC$ .  
Give your answer correct to 3 significant figures.



..... cm  
(Total for Question is 5 marks)

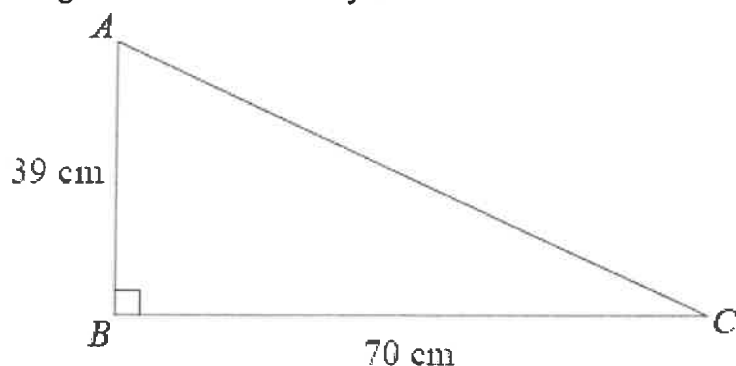
2. Diagram NOT accurately drawn  
Calculate the length of  $AB$ .  
Give your answer correct to 1 decimal place.



..... cm  
(Total for Question is 3 marks)



5. Here is a right-angled triangle.  
Diagram NOT accurately drawn



Work out the length of  $AC$ .  
Give your answer correct to 1 decimal place.

..... cm  
(Total for Question is 3 marks)

6.  $ABC$  is a right-angled triangle.  
 $AC = 6$  cm  
 $AB = 13$  cm

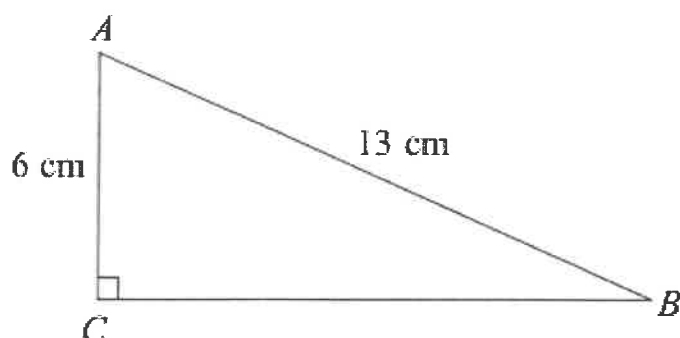


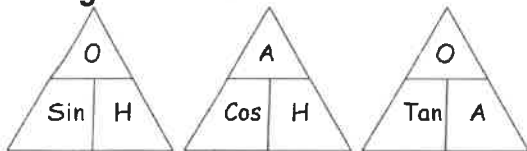
Diagram NOT  
accurately drawn

Work out the length of  $BC$ .  
Give your answer correct to 3 significant figures.

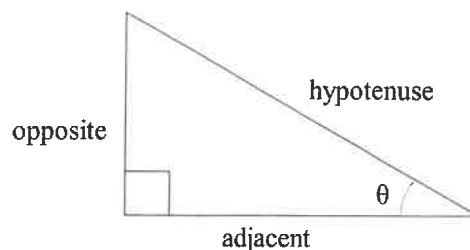
..... cm  
(Total for Question is 3 marks)

## Trigonometry – SOH CAH TOA

### Things to remember:



1. Label your sides first, you'll need O, H and A...
2. Choose if you need SOH, CAH or TOA...
3. Cover the one you need with your thumb,
4. Write the equation,
5. Solve it, then you're done!



### Questions:

1. The diagram shows triangle  $ABC$ .  
 $BC = 8.5$  cm.  
 $\text{Angle } ABC = 90^\circ$ .  
 $\text{Angle } ACB = 38^\circ$ .  
 Work out the length of  $AB$ .  
 Give your answer correct to 3 significant figures.

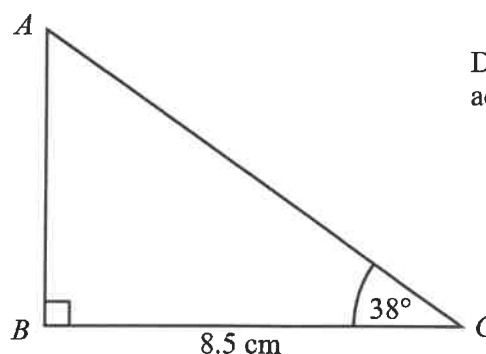


Diagram NOT  
accurately drawn

..... cm  
(Total 3 marks)

2.  $PQR$  is a triangle.  
 $\text{Angle } PQR = 90^\circ$ .  
 $PQ = 12.5$  cm.  
 $QR = 5$  cm.  
 Calculate the value of  $x$ .  
 Give your answer correct to 1 decimal place.

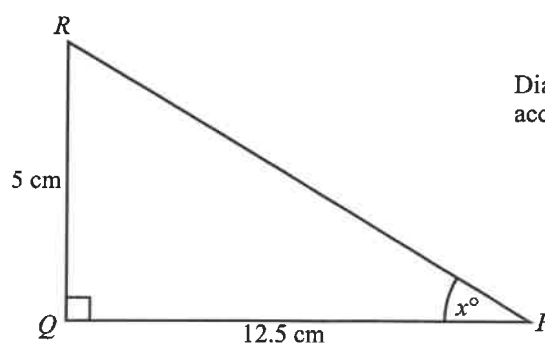
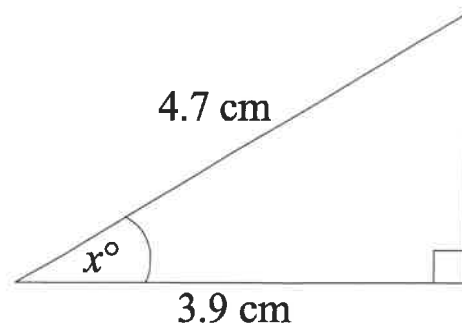


Diagram NOT  
accurately drawn

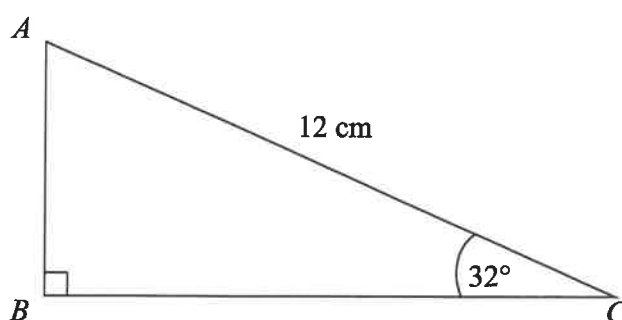
.....  
(Total 3 marks)

5. Diagram **NOT** accurately drawn  
Work out the value of  $x$ .  
Give your answer correct to 1 decimal place.



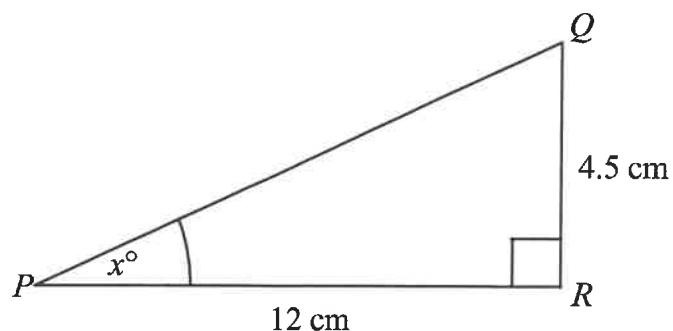
..... °  
(Total 3 marks)

6. Diagram **NOT** accurately drawn  
 $AC = 12$  cm.  
Angle  $ABC = 90^\circ$ .  
Angle  $ACB = 32^\circ$ .  
Calculate the length of  $AB$ .  
Give your answer correct to 3 significant figures.



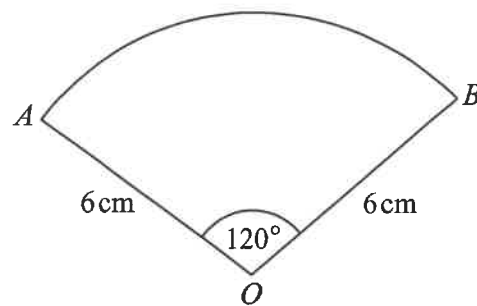
..... cm  
(Total 3 marks)

7. Diagram **NOT** accurately drawn  
 $PQR$  is a right-angled triangle.  
 $PR = 12$  cm.  
 $QR = 4.5$  cm.  
Angle  $PRQ = 90^\circ$ .  
Work out the value of  $x$ .  
Give your answer correct to one decimal place.



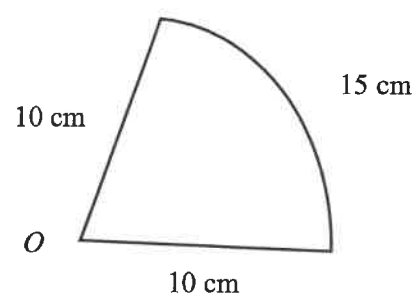
..... °  
(Total 3 marks)

4. Diagram NOT accurately drawn  
 The diagram shows a sector of a circle, centre  $O$ .  
 The radius of the circle is 6 cm.  
 Angle  $AOB = 120^\circ$ .  
 Work out the perimeter of the sector.  
 Give your answer in terms of  $\pi$  in its simplest form.



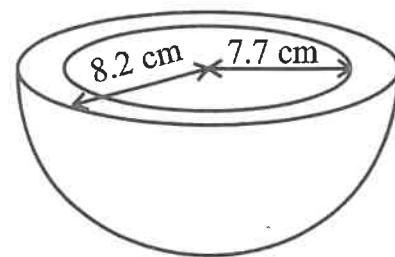
..... cm  
 (Total 3 marks)

5. Diagram NOT accurately drawn  
 The diagram shows a sector of a circle, centre  $O$ , radius 10 cm.  
 The arc length of the sector is 15 cm.  
 Calculate the area of the sector.



..... cm<sup>2</sup>  
 (Total 4 marks)

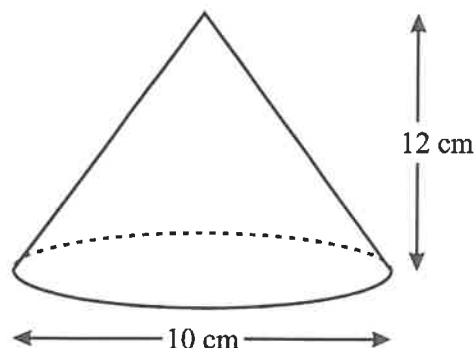
2. A clay bowl is in the shape of a hollow hemisphere.  
 Diagram **NOT** accurately drawn  
 The external radius of the bowl is 8.2 cm.  
 The internal radius of the bowl is 7.7 cm.  
 Both measurements are correct to the nearest 0.1 cm.  
 The upper bound for the volume of clay is  $k\pi$  cm<sup>3</sup>.  
 Find the exact value of  $k$ .



$k = \dots\dots\dots$

(Total 4 marks)

3. Diagram **NOT** accurately drawn  
 The diagram represents a cone.  
 The height of the cone is 12 cm.  
 The diameter of the base of the cone is 10 cm.  
 Calculate the curved surface area of the cone.  
 Give your answer as a multiple of  $\pi$ .



$\dots\dots\dots$  cm<sup>2</sup>

(Total 3 marks)

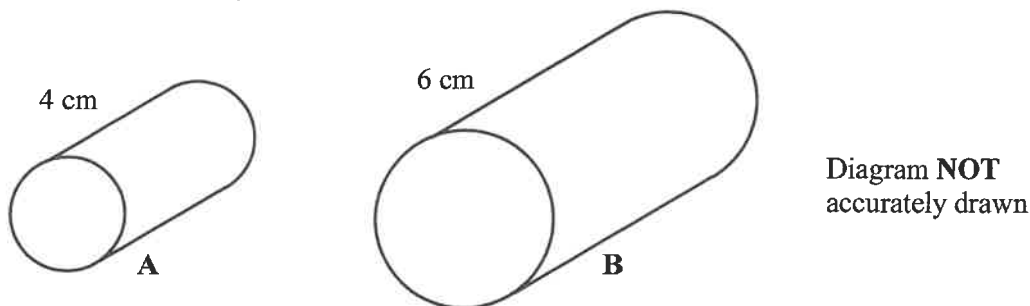
## Similar Length, Area and Volume (LAV)

### Things to remember:

- Linear scale factor =  $x$
- Area scale factor =  $x^2$
- Volume scale factor =  $x^3$

### Questions:

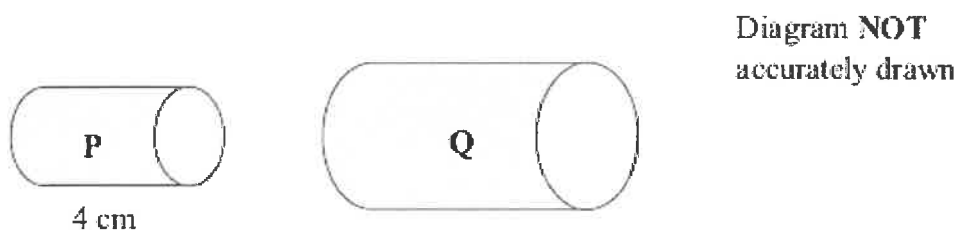
1. Cylinder **A** and cylinder **B** are mathematically similar.  
The length of cylinder **A** is 4 cm and the length of cylinder **B** is 6 cm.  
The volume of cylinder **A** is  $80 \text{ cm}^3$ .



Calculate the volume of cylinder **B**.

.....  $\text{cm}^3$   
(Total 3 marks)

2. Two cylinders, **P** and **Q**, are mathematically similar.  
The total surface area of cylinder **P** is  $90\pi \text{ cm}^2$ . The total surface area of cylinder **Q** is  $810\pi \text{ cm}^2$ . The length of cylinder **P** is 4 cm.



- (a) Work out the length of cylinder **Q**.

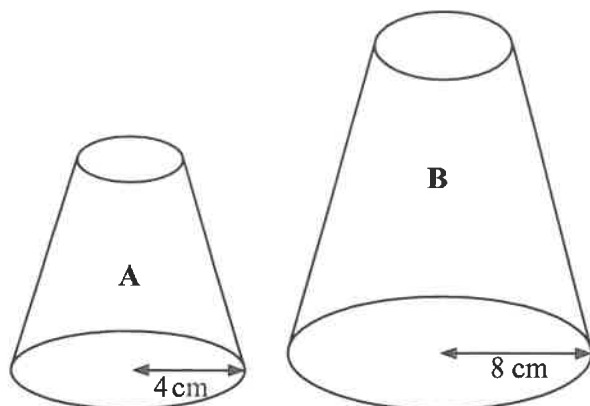
..... cm  
(3)

The volume of cylinder **P** is  $100\pi \text{ cm}^3$ .

- (b) Work out the volume of cylinder **Q**.  
Give your answer as a multiple of  $\pi$

.....  $\text{cm}^3$   
(2)  
(Total 5 marks)

5. Diagram **NOT** accurately drawn  
Two solid shapes, **A** and **B**, are mathematically similar. The base of shape **A** is a circle with radius 4 cm. The base of shape **B** is a circle with radius 8 cm. The surface area of shape **A** is 80 cm<sup>2</sup>.



- (a) Work out the surface area of shape **B**.

..... cm<sup>2</sup>  
(2)

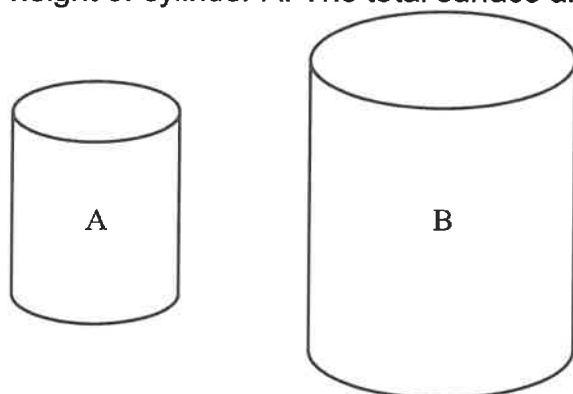
The volume of shape **B** is 600 cm<sup>3</sup>.

- (b) Work out the volume of shape **A**.

..... cm<sup>3</sup>  
(2)

(Total 4 marks)

6. Diagram **NOT** accurately drawn  
The two cylinders, **A** and **B**, are mathematically similar. The height of cylinder **B** is twice the height of cylinder **A**. The total surface area of cylinder **A** is 180 cm<sup>2</sup>.



Calculate the total surface area of cylinder **B**.

.....  
(Total 3 marks)

3. Josh asked 30 adults how many cups of coffee they each drank yesterday. The table shows his results.

| Number of cups | Frequency |  |
|----------------|-----------|--|
| 0              | 5         |  |
| 1              | 9         |  |
| 2              | 7         |  |
| 3              | 4         |  |
| 4              | 3         |  |
| 5              | 2         |  |

Work out the mean.

.....  
(Total 3 marks)

4. Majid carried out a survey of the number of school dinners 32 students had in one week. The table shows this information.

| Number of school dinners | Frequency |  |
|--------------------------|-----------|--|
| 0                        | 0         |  |
| 1                        | 8         |  |
| 2                        | 12        |  |
| 3                        | 6         |  |
| 4                        | 4         |  |
| 5                        | 2         |  |

Calculate the mean.

.....  
(Total 3 marks)

5. Fred did a survey on the areas of pictures in a newspaper. The table gives information about the areas.

| Area ( $A \text{ cm}^2$ ) | Frequency |
|---------------------------|-----------|
| $0 < A \leq 10$           | 38        |
| $10 < A \leq 25$          | 36        |
| $25 < A \leq 40$          | 30        |
| $40 < A \leq 60$          | 46        |

Work out an estimate for the mean area of a picture.

.....  $\text{cm}^2$   
(Total 4 marks)



## Sampling

### Things to remember:

- Random sampling is where every member of the population has an equal chance of being chosen, which makes it fair.
- With systematic sampling you are unlikely to get a biased sample.
- Stratified sampling is the best way to reflect the population accurately.
- Stratified sample =  $\frac{\text{total in group}}{\text{total in population}} \times \text{sample size}$

### Questions:

1. In Holborn School there are  
460 students in Key Stage 3  
320 students in Key Stage 4  
165 students in Key Stage 5

Nimer is carrying out a survey.

He needs a sample of 100 students stratified by Key Stage.

Work out the number of students from Key Stage 3 there should be in the sample.

.....  
(Total for Question is 2 marks)

2. Henri is carrying out a survey of the people aged 65 and over in his village.  
The table shows information about these people.

| Age     | Male | Female |
|---------|------|--------|
| 65 – 69 | 20   | 22     |
| 70 – 74 | 18   | 21     |
| 75 – 79 | 15   | 18     |
| 80 – 84 | 8    | 16     |
| 85 – 89 | 5    | 10     |
| 90+     | 2    | 5      |
| Total   | 68   | 92     |

Henri is going to take a sample of 30 people stratified by age.

How many people aged 75 – 79 should be in the sample?

.....  
(Total for Question is 3 marks)

5. There are a total of 300 students in Year 7, Year 8 and Year 9 at Mathsville High School. The table shows information about the students.

|        | Boys | Girls |
|--------|------|-------|
| Year 7 | 60   | 45    |
| Year 8 | 55   | 40    |
| Year 9 | 41   | 59    |

The Headteacher takes a sample of 50 students.  
His sample is stratified by year and by gender.  
Work out the number of girls from Year 9 in the Headteacher's sample.

.....  
(Total for Question is 2 marks)

6. There are 1200 students at a school.  
Kate is helping to organise a party.  
She is going to order pizza.  
Kate takes a sample of 60 of the students at the school.  
She asks each student to tell her **one** type of pizza they want.  
The table shows information about her results.

| Pizza      | Number of students |
|------------|--------------------|
| ham        | 20                 |
| salami     | 15                 |
| vegetarian | 8                  |
| margherita | 17                 |

Work out how much ham pizza Kate should order.  
Write down any assumption you make **and** explain how this could affect your answer.

.....  
.....  
(Total for question = 3 marks)

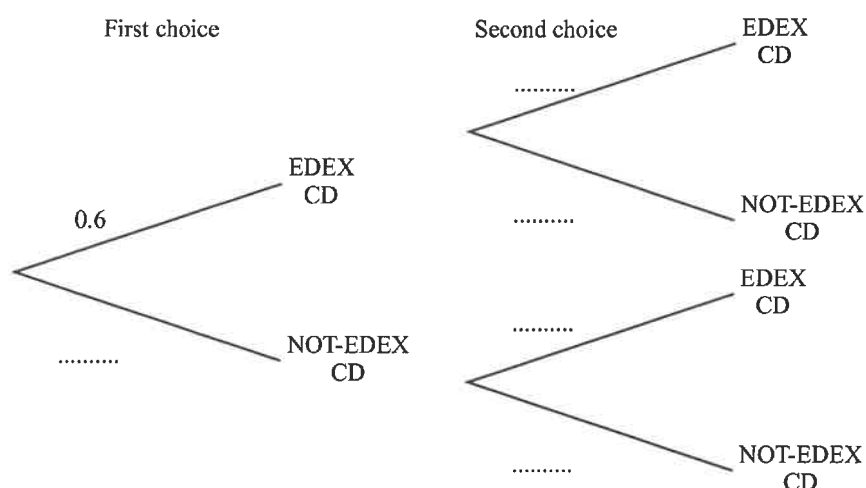
## Probability Trees

### Things to remember:

- The branches must sum to 1;
- Read the question carefully to decide if it is with replacement or without replacement;
- AND means  $\times$  and OR means  $+$ .

### Questions:

- Amy has 10 CDs in a CD holder.  
Amy's favourite group is Edex.  
She has 6 Edex CDs in the CD holder.  
Amy takes one of these CDs at random.  
She writes down whether or not it is an Edex CD.  
She puts the CD back in the holder.  
Amy again takes one of these CDs at random.  
(a) Complete the probability tree diagram.



(2)

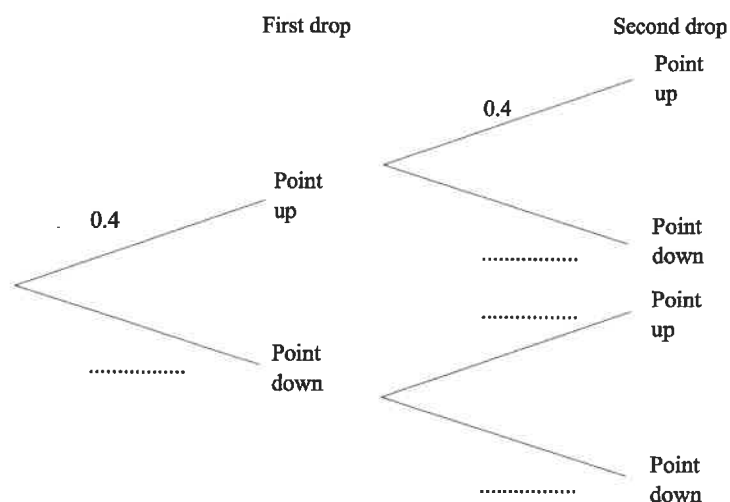
- Amy had 30 CDs.  
The mean playing time of these 30 CDs was 42 minutes.  
Amy sold 5 of her CDs.  
The mean playing time of the 25 CDs left was 42.8 minutes.  
(b) Calculate the mean playing time of the 5 CDs that Amy sold.

..... minutes

(3)

(Total 5 marks)

4. Mary has a drawing pin.  
When the drawing pin is dropped it can land either 'point up' or 'point down'.  
The probability of it landing 'point up' is 0.4  
Mary drops the drawing pin twice.  
(a) Complete the probability tree diagram.

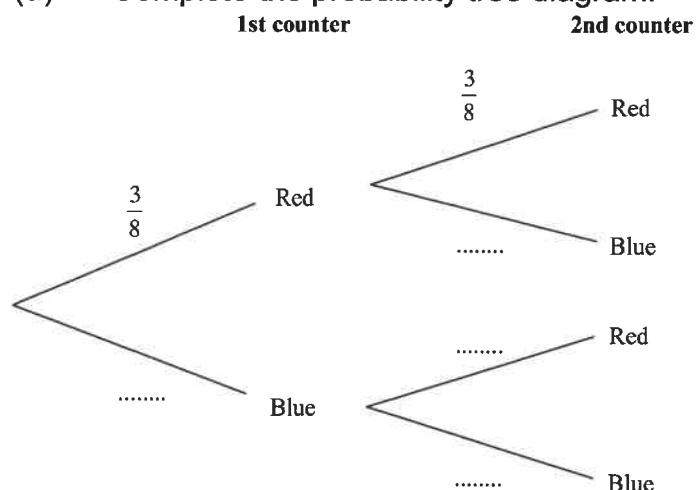


- (b) Work out the probability that the drawing pin will land 'point up' both times.

(2)

.....  
(2)  
(Total 4 marks)

5. Matthew puts 3 red counters and 5 blue counters in a bag. He takes at random a counter from the bag. He writes down the colour of the counter. He puts the counter in the bag again. He then takes at random a second counter from the bag.  
(a) Complete the probability tree diagram.



- (b) Work out the probability that Matthew takes two red counters.

(2)

.....  
(2)  
(Total 4 marks)

## Proportion

### Things to remember:

- Start by checking the question for squares, cubes and roots;
- "x is directly proportional to y" looks like  $x \propto y$  or  $x = ky$
- "x is inversely proportional to y" looks like  $x \propto \frac{1}{y}$  or  $x = \frac{k}{y}$

### Questions:

1. The shutter speed,  $S$ , of a camera varies inversely as the square of the aperture setting,  $f$ .  
When  $f = 8$ ,  $S = 125$

(a) Find a formula for  $S$  in terms of  $f$ .

(b) Hence, or otherwise, calculate the value of  $S$  when  $f = 4$

(3)

$S = \dots\dots\dots$   
(1)

(Total 4 marks)

2. In a factory, chemical reactions are carried out in spherical containers.  
The time,  $T$  minutes, the chemical reaction takes is directly proportional to the square of the radius,  $R$  cm, of the spherical container.

When  $R = 120$ ,  $T = 32$

Find the value of  $T$  when  $R = 150$

$T = \dots\dots\dots$   
(Total 4 marks)

5. The time,  $T$  seconds, it takes a water heater to boil some water is directly proportional to the mass of water,  $m$  kg, in the water heater. When  $m = 250$ ,  $T = 600$   
 (a) Find  $T$  when  $m = 400$

$$T = \dots\dots\dots (3)$$

The time,  $T$  seconds, it takes a water heater to boil a constant mass of water is inversely proportional to the power,  $P$  watts, of the water heater.  
 When  $P = 1400$ ,  $T = 360$

- (b) Find the value of  $T$  when  $P = 900$

$$T = \dots\dots\dots (3)$$

(Total 6 marks)

6. A ball falls vertically after being dropped.  
 The ball falls a distance  $d$  metres in a time of  $t$  seconds.  
 $d$  is directly proportional to the square of  $t$ .  
 The ball falls 20 metres in a time of 2 seconds.  
 (a) Find a formula for  $d$  in terms of  $t$ .

$$d = \dots\dots\dots (3)$$

- (b) Calculate the distance the ball falls in 3 seconds.

$$\dots\dots\dots \text{ m} (1)$$

- (c) Calculate the time the ball takes to fall 605 m.

$$\dots\dots\dots \text{ seconds} (3)$$

(Total 7 marks)

## Calculating with Fractions

### Things to remember:

- If you have a mixed number, start by converting it to an improper fraction.
- Multiply fractions is easy – just multiply the numerators and multiply the denominators.
- To divide fractions, flip the second fraction upside-down and multiply instead.
- If you need to add or subtract fractions, you will need to start by finding equivalent fractions with a common denominator.
- Make sure you leave your answer in its simplest form.
- To convert a recurring decimal to a fraction you will need to multiply by  $10^n$ , where  $n$  is the number of recurring digits. Then subtract the original number from the new one. Rearrange to find the fraction.

### Questions:

1. (a) Work out  $1\frac{3}{4} + 3\frac{1}{2}$

.....  
(2)

(b) Work out  $\frac{3}{7} \times £28$

£.....  
(2)

(Total for question = 4 marks)

2. Work out  $3\frac{4}{5} + \frac{3}{7}$

Give your answer as a mixed number in its simplest form.

.....  
(Total for question = 3 marks)

5. Work out  $3\frac{1}{3} \times 4\frac{2}{5}$   
Give your answer as a mixed number in its simplest form.

.....  
(Total for question = 3 marks)

6. Work out  $\frac{3}{8} + \frac{1}{3}$

.....  
(Total for Question is 2 marks)

7. Express the recurring decimal  $0.7\dot{5}\dot{0}$  as a fraction.

.....  
(Total for Question is 3 marks)



## Percentages – compound interest

### Things to remember:

- New amount = original amount  $\times$  multiplier <sup>$n$</sup>

Number of years

### Questions:

1. Henry invests £4500 at a compound interest rate of 5% per annum.  
At the end of  $n$  complete years the investment has grown to £5469.78.  
Find the value of  $n$ .

.....  
(Total 2 marks)

2. Bill buys a new machine.  
The value of the machine depreciates by 20% each year.  
(a) Bill says 'after 5 years the machine will have no value'.  
Bill is **wrong**. Explain why.

.....  
.....  
.....  
(1)

Bill wants to work out the value of the machine after 2 years.

- (b) By what single decimal number should Bill multiply the value of the machine when new?

.....  
(2)  
(Total 3 marks)

3. Gwen bought a new car. Each year, the value of her car depreciated by 9%.  
Calculate the number of years after which the value of her car was 47% of its value when new.

.....  
(Total 3 marks)

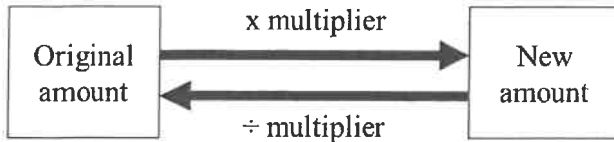
4. The value of a car depreciates by 35% each year.  
At the end of 2007 the value of the car was £5460  
Work out the value of the car at the end of 2006

£ .....  
(Total 3 marks)

## Percentages – reverse

### Things to remember:

- Work out what the multiplier would have been;



### Questions:

1. Loft insulation reduces annual heating costs by 20%.  
**After** he insulated his loft, Curtley's annual heating cost was £520.  
Work out Curtley's annual heating cost would have been, if he had not insulated his loft.

£ .....  
(Total 3 marks)

2. In a sale, normal prices are reduced by 20%.

SALE  
20% OFF

Andrew bought a saddle for his horse in the sale.  
The sale price of the saddle was £220.  
Calculate the normal price of the saddle.

£ .....  
(Total 3 marks)

3. Hajra's weekly pay this year is £240  
This is 20% more than her weekly pay last year.  
Bill says 'This means Hajra's weekly pay last year was £192'.  
Bill is wrong,  
(a) Explain why.

.....

.....

(1)

- (b) Work out Hajra's weekly pay last year.

£ .....  
(2)  
(Total 3 marks)



# 11P3, 11P4, 11Q3 & 11Q4

Name: \_\_\_\_\_

## HCF and LCM

### Things to remember:

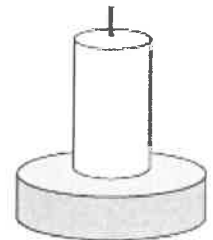
- A factor is a whole number that divides exactly into another number.
- A multiple is a number that may be divided by another a certain number of times without a remainder.
- A prime number only has 2 factors – 1 and itself.
- HCF is an abbreviation of Highest Common Factor and LCM of Lowest Common Multiple.

### Questions:

1. Tom and Amy set the alarms on their phones to sound at 6.45 am.  
Both alarms sound together at 6.45 am.  
Tom's alarm then sounds every 9 minutes.  
Amy's alarm then sounds every 12 minutes.  
At what time will both alarms next sound together?

.....  
(Total for question = 3 marks)

2. Caroline is making some table decorations.  
Each decoration is made from a candle and a holder.  
Caroline buys some candles and some holders each in packs.  
There are 30 candles in a pack of candles.  
There are 18 holders in a pack of holders.  
Caroline buys exactly the same number of candles and holders.  
(i) How many packs of candles and how many packs of holders does Caroline buy?



candle and  
holder

..... packs of candles

..... packs of holders

Caroline uses all her candles and all her holders.

- (ii) How many table decorations does Caroline make?

..... table decorations

(Total for question = 5 marks)

5. Veena bought some food for a barbecue.  
 She is going to make some hot dogs.  
 She needs a bread roll and a sausage for each hot dog.  
 There are 40 bread rolls in a pack.  
 There are 24 sausages in a pack.  
 Veena bought exactly the same number of bread rolls and sausages.  
 (i) How many packs of bread rolls and packs of sausages did she buy?

..... packs of bread rolls

..... packs of sausages.

- (ii) How many hot dogs can she make?

.....  
**(Total for Question is 5 marks)**

6. Find the highest common factor (HCF) of 32, 48 and 72

.....  
**(Total for question = 2 marks)**

## Laws of Indices

### Things to remember:

- The exam question will use the word “simplify”
- When multiplying, add the indices
- When dividing, subtract the indices
- With brackets, multiply the indices
- If the exam question has the words “work out the value of”, or “evaluate” it means the answer is a number.
- Anything to the power zero is 1
- Anything to the power one is itself
- Anything to a negative power becomes a reciprocal

### Questions:

1. (a) Write down the reciprocal of 5

.....  
(1)

- (b) Evaluate  $3^{-2}$

.....  
(1)

**(Total for Question is 2 marks)**

2. (a) Write down the value of  $\sqrt{81}$

.....  
(1)

- (b) Work out the value of  $5^2 + 2^3$

.....  
(2)

**(Total for Question is 3 marks)**

3. Write these numbers in order of size. Start with the smallest number.

$5^{-1}$                   0.5                  -5                   $5^0$

.....  
**(Total for Question is 2 marks)**

4. (a) Solve  $3x^2 = 147$

.....  
(2)

- (b) Work out the value of  $2^{-3}$

.....  
(1)

- (c) Simplify  $(3x^2)^3$

.....  
(2)

**(Total for question = 5 marks)**

## Rounding

### Things to remember:

- If the next number is less than 5, round down.
- If the next number is 5 or more, round up.

### Questions:

1. Write the number 2.738 correct to 2 decimal places.

.....  
(Total for Question is 1 mark)

2. Write the number **7378** to the nearest hundred.

.....  
(Total for Question is 1 mark)

3. 28569 people watch a football match. Write 28569 to the nearest hundred.

.....  
(Total for Question is 1 mark)

4. (a) Write 5643 to the nearest hundred.

.....  
(1)

- (b) Write 197 768 to the nearest thousand.

.....  
(1)  
(Total for Question is 2 marks)

5. (a) Write the number 28.75 to the nearest whole number.

.....  
(1)

- (b) Write the number 7380 to the nearest thousand.

.....  
(1)  
(Total for Question is 4 marks)

6. Write down 157 correct to the nearest 10

.....  
(Total for Question is 1 mark)

7. Write 6431 to the nearest thousand.

.....  
(Total for Question is 1 mark)

8. Write 6718 correct to the nearest hundred.

.....  
(Total for Question is 1 mark)



4. (a) Work out  $2 \times (11 + 9)$

.....  
(1)

(b) Work out  $3 \times 5 + 4$

.....  
(1)

(c) Work out  $20 - 5 \times 3$

.....  
(1)

(Total 3 marks)

5. (a) Work out  $4 \times 5 - 8$

.....  
(1)

(b) Work out  $18 + 2 \times 3$

.....  
(1)

(c) Work out  $(4 + 3) \times 7$

.....  
(1)

(Total 3 marks)

6. (a) Work out the value of  $(2 + 3) \times 4 + 5$

.....  
(1)

(b) Add brackets ( ) to make each statement correct.  
You may use more than one pair of brackets in each statement.

(i)  $2 + 3 \times 4 + 5 = 29$

(ii)  $2 + 3 \times 4 + 5 = 45$

(2)  
(Total 3 marks)

3. Here are the first four terms of a number sequence.

3      7      11      15

(2) Write down the next term of this sequence.

.....  
(1)

The 50<sup>th</sup> term of this number sequence is 199

(b) Write down the 51<sup>st</sup> term of this sequence.

.....  
(1)

The number 372 is **not** a term of this sequence.

(c) Explain why.

.....  
.....  
(1)

(Total for Question is 3 marks)

4. Here are the first 5 terms of an arithmetic sequence.

6,    11,    16,    21,    26

Find an expression, in terms of  $n$ , for the  $n$ th term of the sequence.

.....  
(Total 2 marks)

5. Here are the first five terms of a number sequence.

3      7      11      15      19

(a) Work out the 8th term of the number sequence.

.....  
(1)

(b) Write down an expression, in terms of  $n$ , for the  $n$ th term of the number sequence.

.....  
(2)  
(Total 3 marks)

6. The first five terms of an arithmetic sequence are

2      9      16      23      30

Find, in terms of  $n$ , an expression for the  $n$ th term of this sequence.

.....  
(Total 2 marks)

## Sketching Linear Graphs

### Things to remember:

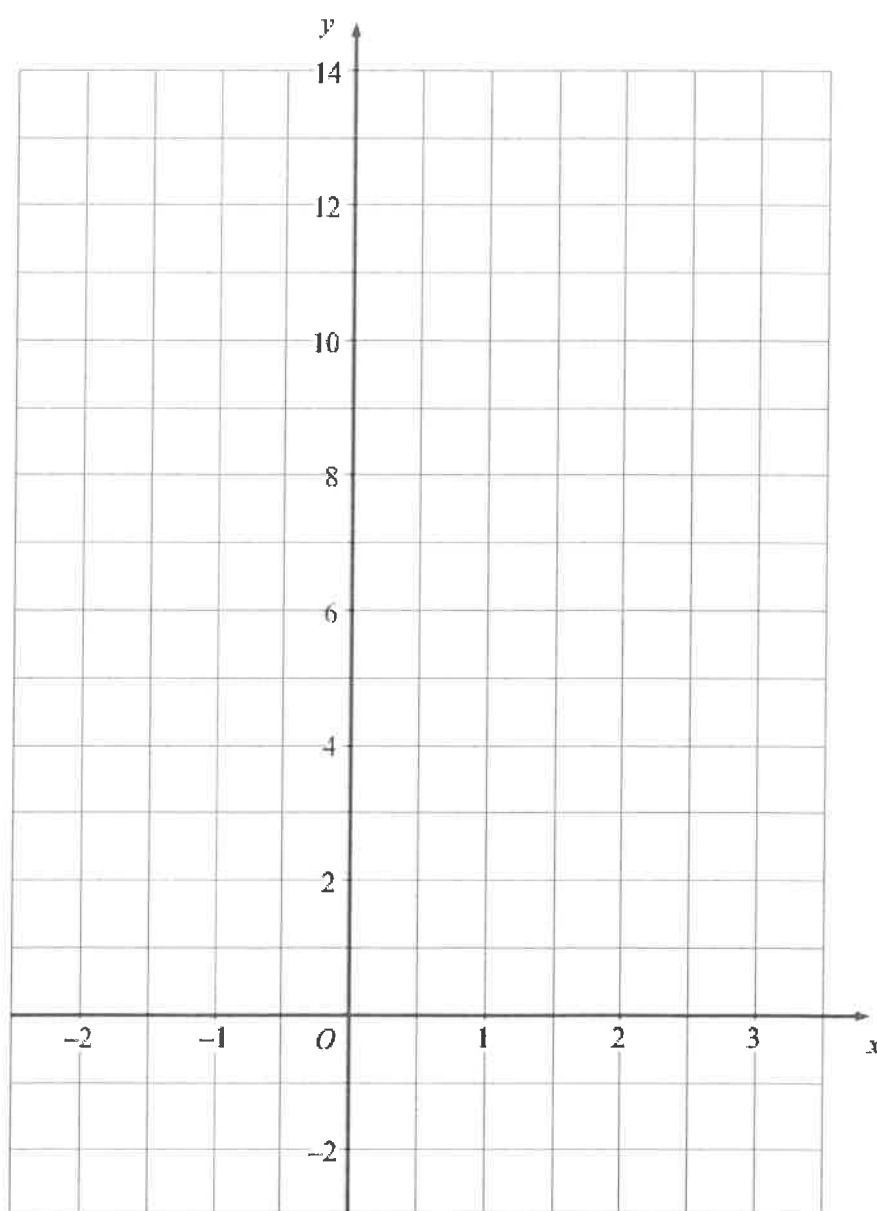
- Draw a table of values with  $x$  and  $y$ .
- Work out the value of  $y$  when  $x = 0$ ,  $x = 1$ ,  $x = 2$ , then use the pattern to work out the rest.
- Don't forget to connect the coordinates with a straight line.

### Question:

1. (a) Complete the table of values for  $y = 3x + 4$

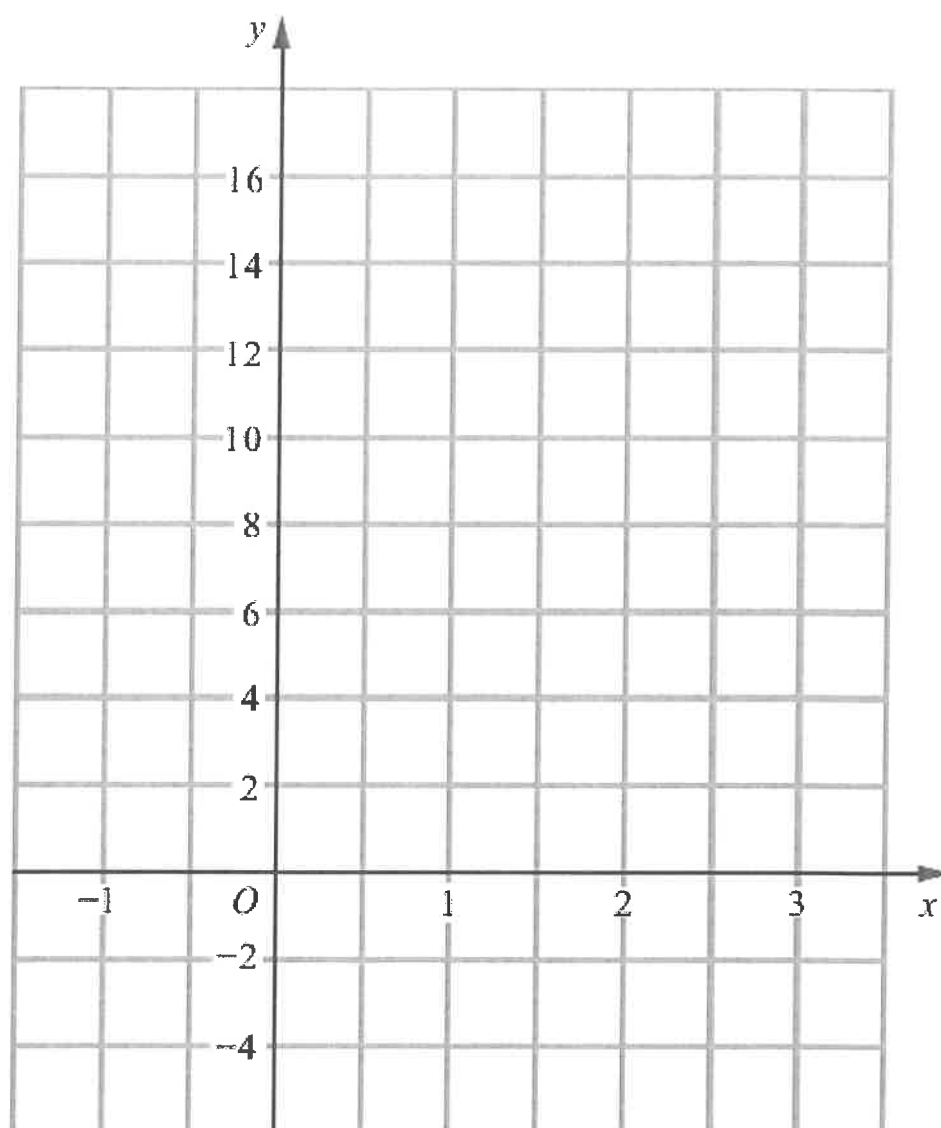
|     |    |    |   |   |   |    |
|-----|----|----|---|---|---|----|
| $x$ | -2 | -1 | 0 | 1 | 2 | 3  |
| $y$ |    | 1  |   |   |   | 13 |

- (b) On the grid, draw the graph of  $y = 3x + 4$



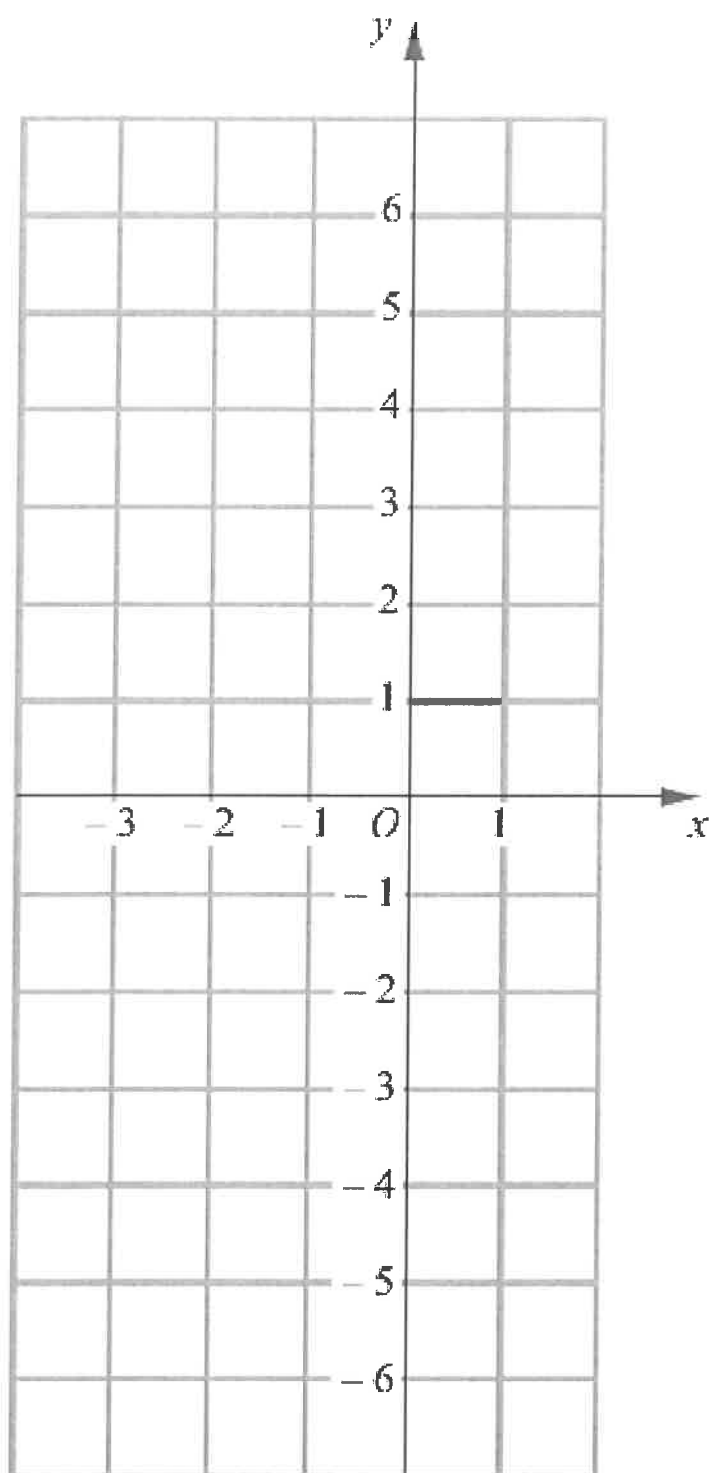
(2)  
(Total for Question is 4 marks)

3. On the grid, draw the graph of  $y = 4x + 2$  from  $x = -1$  to  $x = 3$



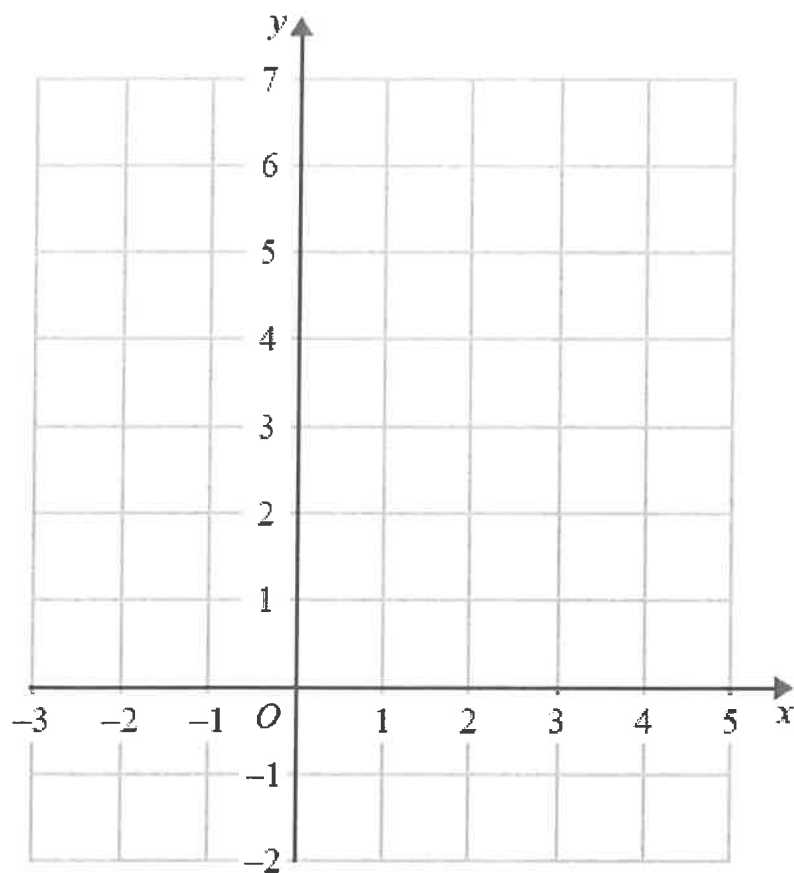
(Total for Question is 3 marks)

5. On the grid, draw the graph of  $y = 2x + 3$  for values of  $x$  from  $x = -3$  to  $x = 1$



(Total for Question is 3 marks)

7. On the grid, draw the graph of  $y = \frac{1}{2}x + 3$  for values of  $x$  from  $-2$  to  $4$



(Total for question = 3 marks)

## Expanding and Factorising (Single Brackets)

### Things to remember:

- Expand brackets means to multiply what is outside the bracket with everything inside the bracket.
- Factorising is the opposite of expanding – put the HCF outside the brackets to factorise fully.

### Questions:

1. (a) Expand  $5(m + 2)$

.....  
(1)

(b) Factorise  $y^2 + 3y$

.....  
(1)

(c) Simplify  $a^5 \times a^4$

.....  
(1)  
(Total for Question is 3 marks)

2. (a) Expand  $2m(m + 3)$

.....  
(1)

(b) Factorise fully  $3xy^2 - 6xy$

.....  
(2)  
(Total for Question is 3 marks)

3. (a) Expand  $3(x + 4)$

.....  
(1)

(b) Expand  $x(x^2 + 2)$

.....  
(2)

(c) Factorise  $x^2 - 6x$

.....  
(1)  
(Total for Question is 4 marks)

## Solving Equations

### Things to remember:

- “Solve” means to find the value of the variable (what number the letter represents).
- The inverse of  $+$  is  $-$  and the inverse of  $\times$  is  $\div$
- Work one step at a time, keeping your  $=$  signs in line on each new row of working.

### Questions:

1. Solve  $4x + 3 = 19$

$x = \dots\dots\dots$   
(Total 2 marks)

2. (a) Solve  $6x - 7 = 38$

$x = \dots\dots\dots$   
(2)

(b) Solve  $4(5y - 2) = 40$

$y = \dots\dots\dots$   
(3)  
(Total 5 marks)

3. Solve  $5(2y + 3) = 20$

$y = \dots\dots\dots$   
(Total 3 marks)



4. (a) Solve  $7x + 18 = 74$

$x = \dots\dots\dots$   
(2)

(b) Solve  $4(2y - 5) = 32$

$y = \dots\dots\dots$   
(2)

(c) Solve  $5p + 7 = 3(4 - p)$

$p = \dots\dots\dots$   
(3)  
(Total 7 marks)

5. (a) Solve  $7p + 2 = 5p + 8$

$p = \dots\dots\dots$   
(2)

(b) Solve  $7r + 2 = 5(r - 4)$

$r = \dots\dots\dots$   
(2)  
(Total 4 marks)

6. Solve  
 $4y + 1 = 2y + 8$

$y = \dots\dots\dots$   
(Total 2 marks)

7. Solve  $4y + 3 = 2y + 8$

$y = \dots\dots\dots$   
(Total 2 marks)

## Inequalities

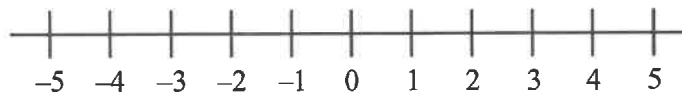
### Things to remember:

- $<$  means less than
- $>$  means greater than
- $\leq$  means less than or equal to
- $\geq$  means greater than or equal to
- An integer is a whole number
- On a number line, use a full circle to show a value can be equal, and an empty circle to show it cannot.

### Questions:

1. (i) Solve the inequality  
 $5x - 7 < 2x - 1$

- (ii) On the number line, represent the solution set to part (i).



(Total 3 marks)

2. (a) List all the possible integer values of  $n$  such that  
 $-2 \leq n < 3$

(2)

- (b) Solve the inequality  
 $4p - 8 < 7 - p$

(2)

(Total 4 marks)

3. (a)  $-3 \leq n < 2$   
 $n$  is an integer.  
Write down all the possible values of  $n$ .

(2)

- (b) Solve the inequality  
 $5x < 2x - 6$

(2)

(Total 4 marks)

4. (a) Solve the inequality  
 $3t + 1 < t + 12$

.....  
(2)

- (b)  $t$  is a whole number.  
Write down the largest value of  $t$  that satisfies  
 $3t + 1 < t + 12$

.....  
(1)  
(Total 3 marks)

5. Solve  $4 < x - 2 \leq 7$

.....  
(Total 3 marks)

6. Solve  $5x + 3 > 19$

.....  
(Total 2 marks)

## Substitution

### Things to remember:

- There is always 1 mark just for writing down the numbers you have had to put into the expression.
- Your answer must be a number – don't forget to finish the sum
- The question will always use the words "Work out the value of"

### Questions:

1. (a) Work out the value of  $3x - 4y$  when  $x = 3$  and  $y = 2$

.....  
(2)

- (b) Work out the value of  $\frac{p(q-3)}{4}$  when  $p = 2$  and  $q = -7$

.....  
(3)  
(Total 5 marks)

2. Find the value of  $t^2 - 4t$  when  $t = -3$

.....  
(Total 2 marks)

3.  $P = x^2 - 7x$   
Work out the value of  $P$  when  $x = -5$

$P =$  .....  
(Total 2 marks)

4.  $T$ ,  $x$  and  $y$  are connected by the formula  
 $T = 5x + 2y$   
 $x = -3$  and  $y = 4$   
 (a) Work out the value of  $T$ .

$$T = \dots\dots\dots (2)$$

- $T = 16$  and  $x = 7$   
 (b) Work out the value of  $y$ .

$$y = \dots\dots\dots (3)$$

**(Total 5 marks)**

5.  $P = 4k - 10$   
 $P = 50$   
 (a) Work out the value of  $k$ .

$$\dots\dots\dots (2)$$

- $y = 4n - 3d$   
 $n = 2$   
 $d = 5$   
 (b) Work out the value of  $y$ .

$$\dots\dots\dots (2)$$

**(Total 4 marks)**

6.  $h = 5t^2 + 2$   
(i) Work out the value of  $h$  when  $t = -2$

- (ii) Work out a value of  $t$  when  $h = 47$

.....  
.....  
**(Total 3 marks)**

## Angle Rules

### Things to remember:

- Angles in a triangle sum to  $180^\circ$
- Angles on a straight line sum to  $180^\circ$
- Angles around a point sum to  $360^\circ$
- Vertically opposite angles are equal
- Alternate angles are equal
- Corresponding angles are equal
- Supplementary angles sum to  $180^\circ$

### Questions:

\*1.  $ABC$  is parallel to  $EFGH$ .

$GB = GF$

Angle  $ABF = 65^\circ$

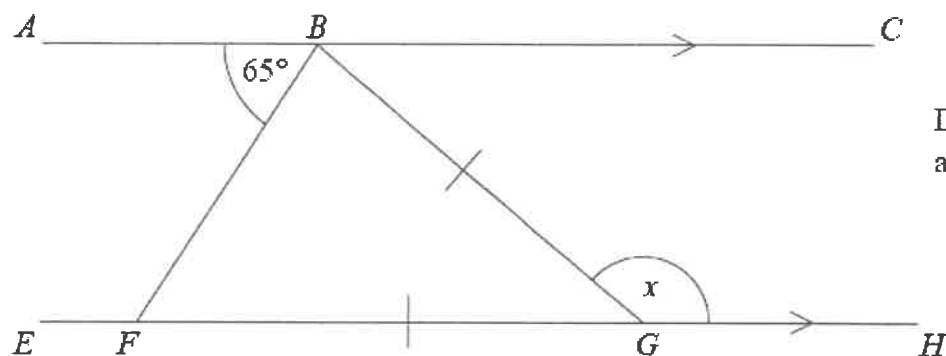


Diagram NOT  
accurately drawn

Work out the size of the angle marked  $x$ .  
Give reasons for your answer.

(Total for Question is 4 marks)



\*2.  $ABCD$  and  $EFG$  are parallel lines.

$BC = CF$

Angle  $BFE = 70^\circ$

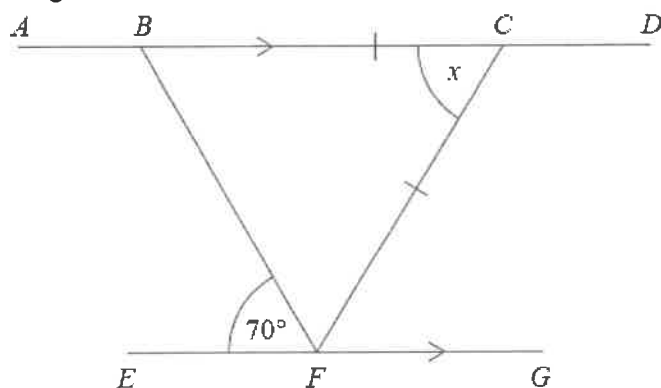


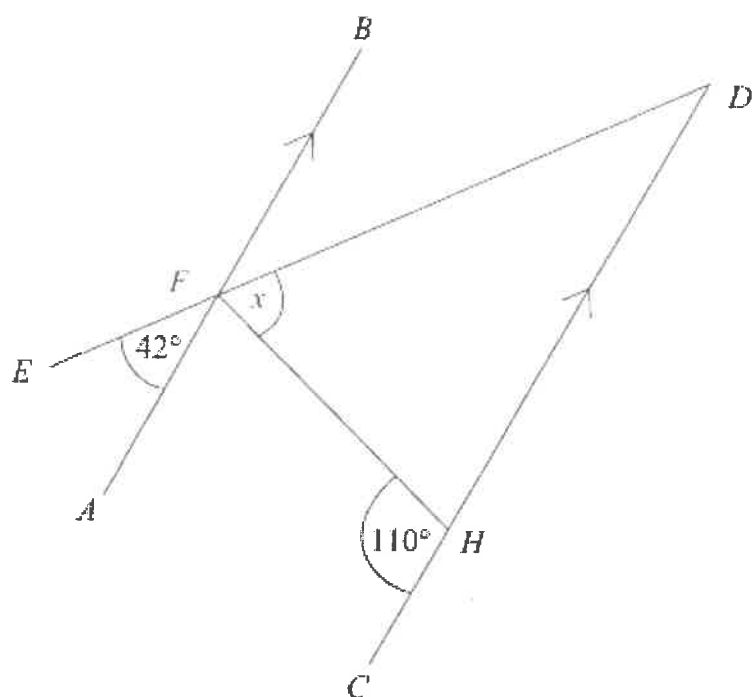
Diagram NOT  
accurately drawn

Work out the size of the angle marked  $x$ .

Give reasons for each stage of your working.

(Total for question = 4 marks)

3.  $AFB$  and  $CHD$  are parallel lines.  
 $EFD$  is a straight line.



Work out the size of the angle marked  $x$ .

Diagram NOT accurately drawn

$x =$  .....  
(Total for Question is 3 marks)

- \*4.  $ABC$  is a straight line.  
 $DEFG$  is a straight line.  
 $AC$  is parallel to  $DG$ .  
 $EF = BF$ .  
Angle  $BEF = 50^\circ$ .

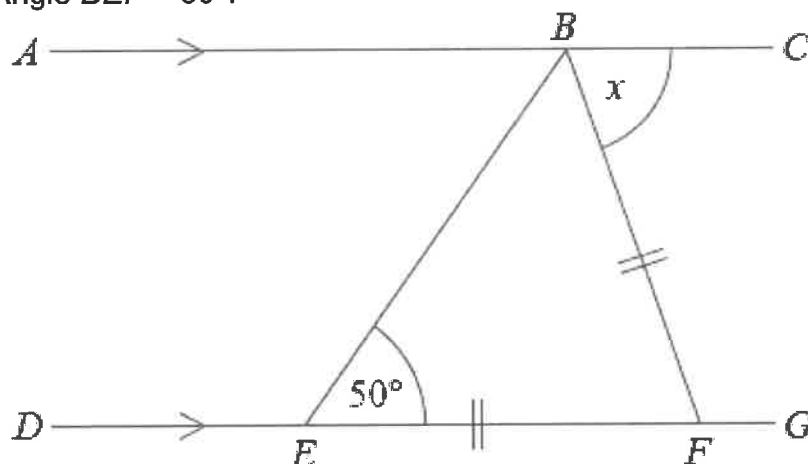


Diagram **NOT**  
accurately drawn

Work out the size of the angle marked  $x$ .  
Give reasons for your answer.

.....°  
(Total for Question is 4 marks)

5.

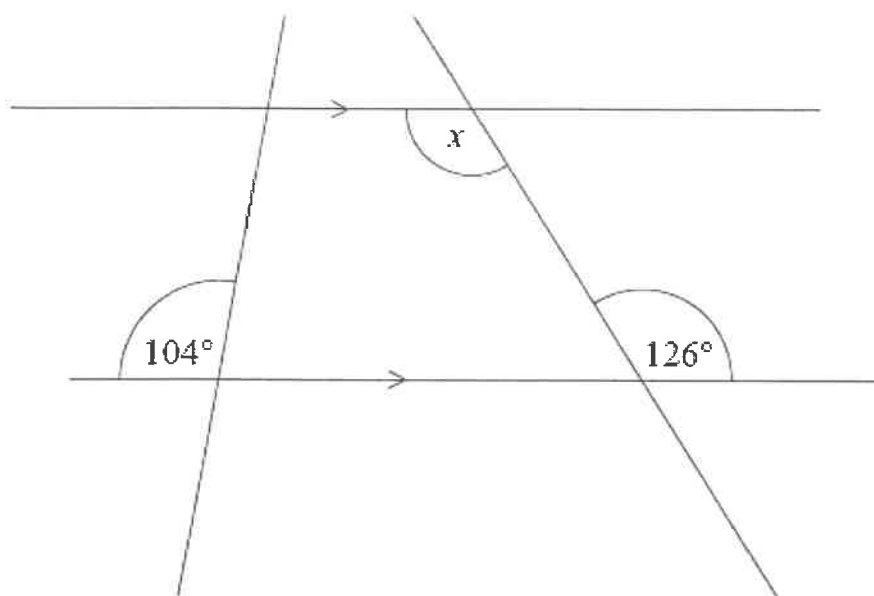


Diagram **NOT**  
accurately drawn

- (i) Find the size of the angle marked  $x$ .

.....°

- (ii) Give a reason for your answer.

.....

.....

**(Total for Question is 2 marks)**

6.  $ABC$  and  $DEF$  are parallel lines.  
 $BEG$  is a straight line.  
Angle  $GEF = 47^\circ$ .

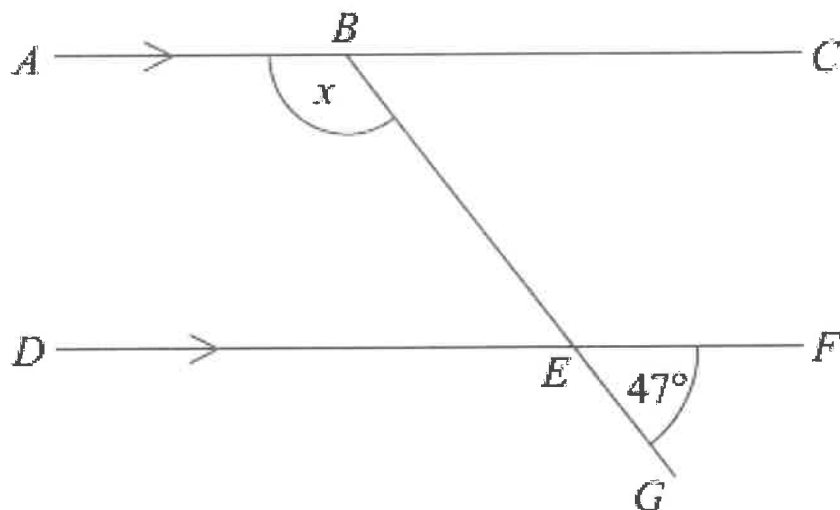


Diagram NOT accurately drawn  
Work out the size of the angle marked  $x$ .  
Give reasons for your answer.

.....  
(Total for Question is 3 marks)

## Constructing Triangles

### Things to remember:

- If you are given angles, you can use a protractor.
- If you are not given angles, you will need to use compasses.

### Questions:

1. In the space below, use ruler and compasses to **construct** an equilateral triangle with sides of length 8 cm.  
You must show all your construction lines.  
One side of the triangle has already been drawn for you.

---

(Total for Question is 2 marks)

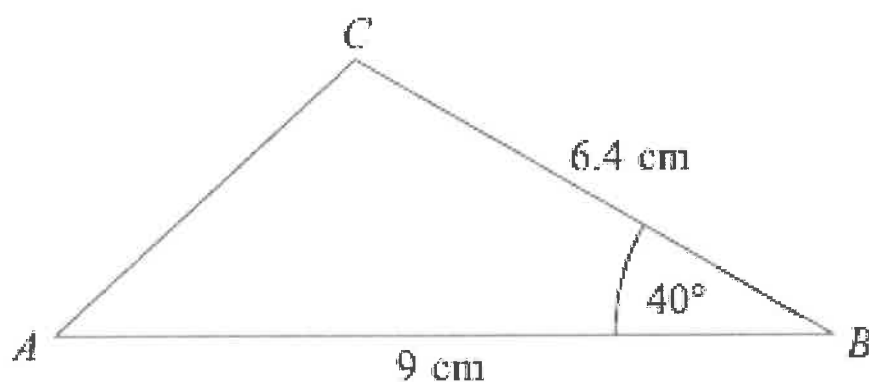
2. In the space below, use a ruler and compasses to construct an equilateral triangle with sides of length 5 cm.  
You must show all your construction lines.  
One side of the triangle has been drawn for you.

---

(Total for question = 2 marks)

3. Here is a triangle.

Diagram **NOT**  
accurately drawn



Make an accurate drawing of triangle  $ABC$ .  
The line  $AB$  has already been drawn for you.



(Total for Question is 2 marks)

## **Bearings**

### **Things to remember:**

- Always measure bearing clockwise from the North line and give your answer 3 digits.
- If the diagram is drawn accurately, use the given scale.
- If the diagram is not drawn accurately, use the fact that the North lines are all parallel.

### **Questions:**

1. Martin and Janet are in an orienteering race.  
Martin runs from checkpoint *A* to checkpoint *B*, on a bearing of  $065^\circ$   
Janet is going to run from checkpoint *B* to checkpoint *A*.  
Work out the bearing of *A* from *B*.

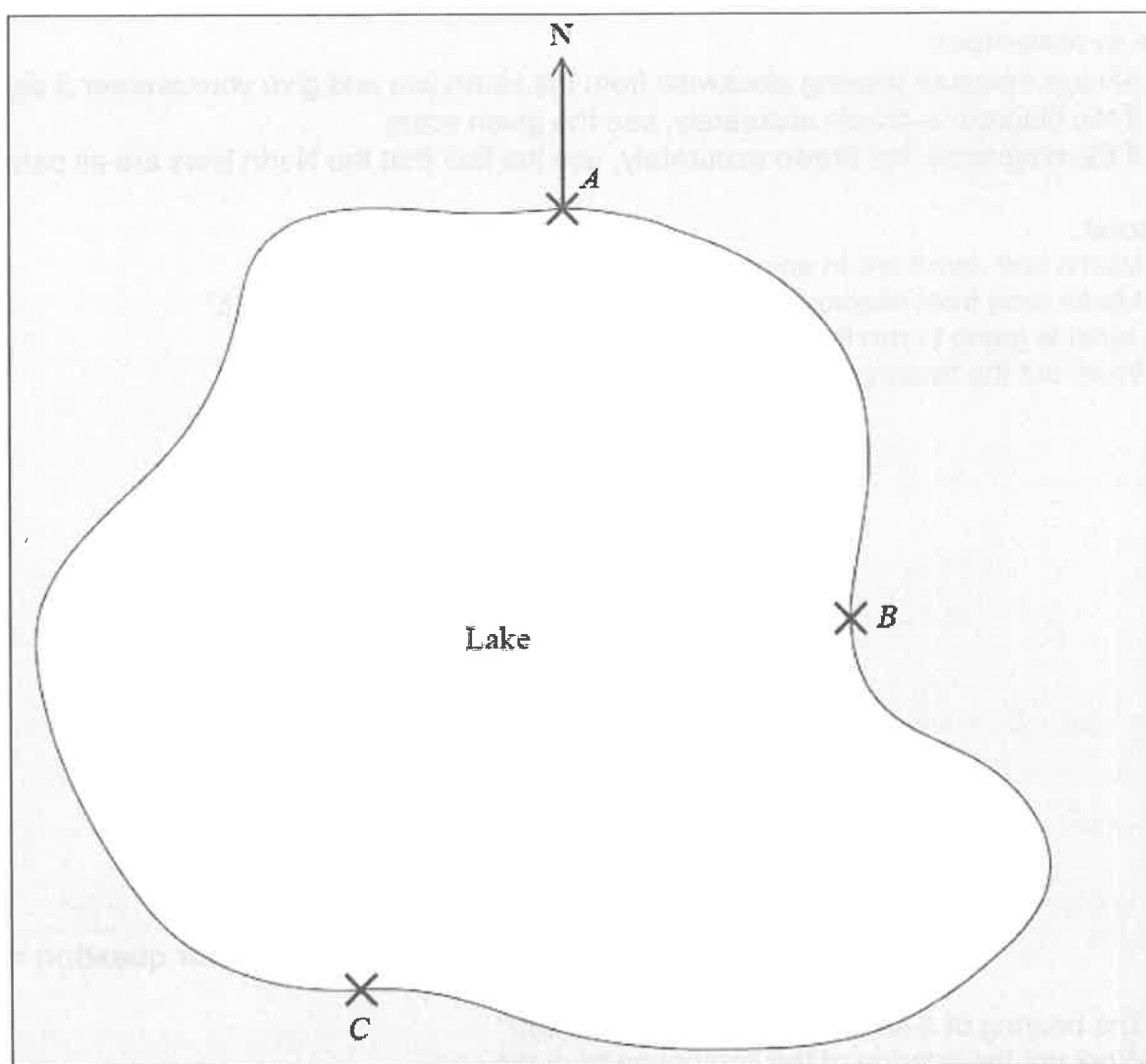
.....°  
(Total for question = 2 marks)

2. The bearing of a ship from a lighthouse is  $050^\circ$   
Work out the bearing of the lighthouse from the ship.

.....°  
(Total for Question is 2 marks)



3. The map shows the positions of three places  $A$ ,  $B$  and  $C$  on the edge of a lake.



Scale 1 cm represents 2 km

- (a) Find the bearing of  $B$  from  $A$ .

.....°  
(1)

A ferry travels in a straight line from  $A$  to  $B$ .  
It then travels in a straight line from  $B$  to  $C$ .  
A speedboat travels in a straight line from  $A$  to  $C$ .

- (b) How many more kilometres does the ferry travel than the speedboat?  
You must show your working.

..... km  
(4)

(Total for Question is 5 marks)

4. The diagram shows part of a map.

- (a) Find the bearing of the church from the tower.

..... °  
(1)

The scale of the map is 1 cm represents 2.5 km.

- (b) Work out the real distance between the tower and the church.



×  
church

..... km  
(2)

A school is 15 km due North of the church.

- (c) On the diagram, mark with a cross (×) the position of the school. Label your cross S.

(2)

(Total for Question is 5 marks)

5. The diagram shows the positions of a lighthouse and a harbour on a map.

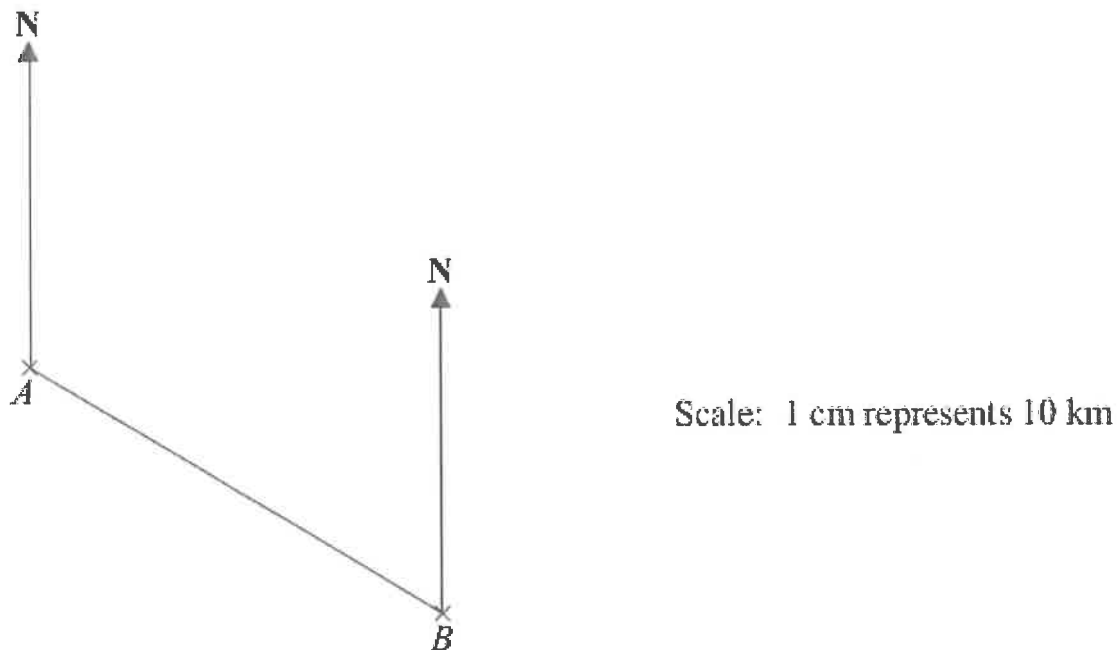


A boat is on a bearing of 300° from the lighthouse  
040° from the harbour.

On the diagram, mark with a cross (×) the position of the boat.  
Label the boat B.

(Total for question = 3 marks)

6. The scale diagram shows the positions of two towns, A and B.



- (a) Measure and write down the bearing of town B from town A.  
 .....°  
 (1)
- (b) What is the real distance from town A to town B?  
 Give your answer in km.

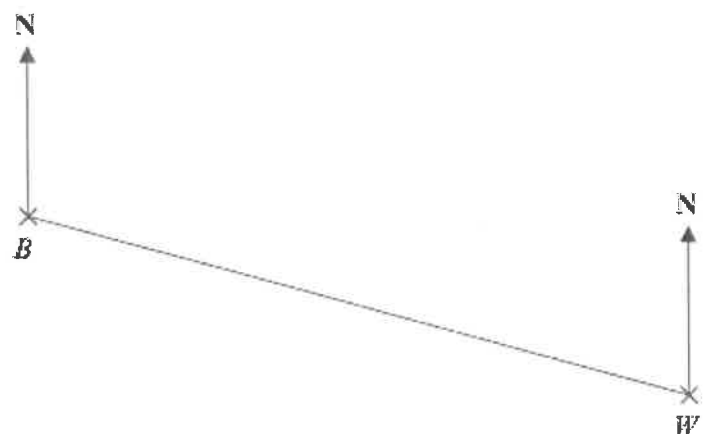
..... km  
 (3)

**(Total for Question is 4 marks)**

7. The diagram shows the positions of two villages, Beckhampton (B) and West Kennett (W).  
 Scale: 4 cm represents 1 km.

- (a) Work out the real distance, in km, of Beckhampton from West Kennett.

..... km  
 (2)



The village, Avebury (A), is on a bearing of  $038^\circ$  from Beckhampton.

On the diagram, A is 6 cm from B.

- (b) On the diagram, mark A with a cross (x).  
 Label the cross A.

(2)

**(Total for Question is 4 marks)**

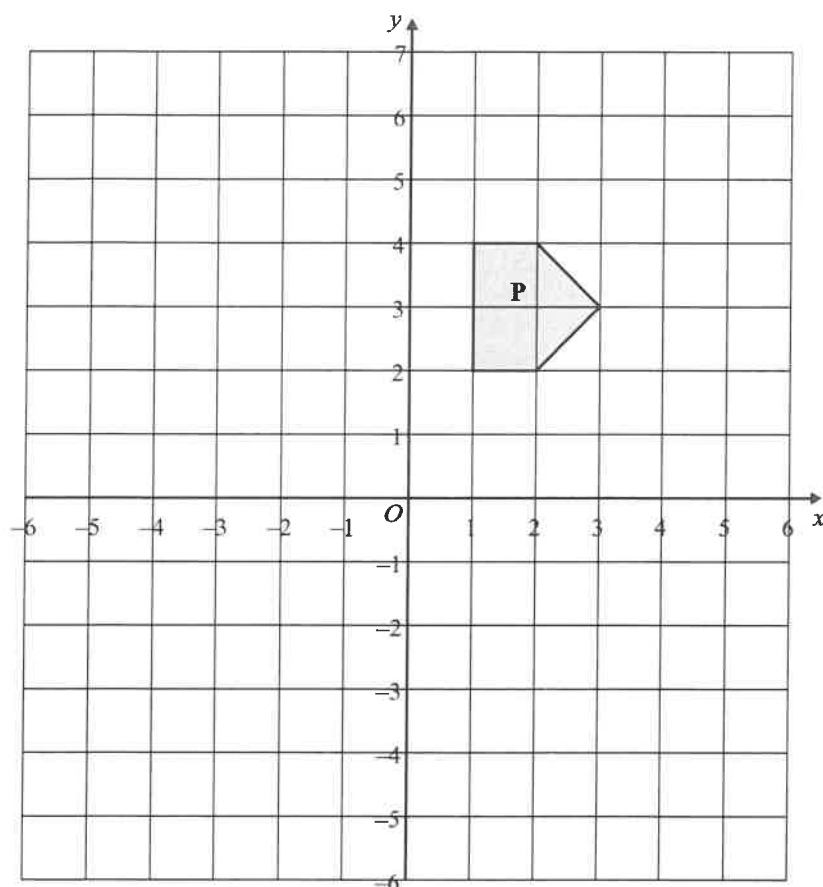
## Transformations

### Things to remember:

- Reflection – the shape is flipped in a mirror line
- Rotation – the shape is turned a number of degrees, around a centre, clockwise or anti-clockwise
- Translation – the shape is moved by a vector  $\begin{pmatrix} x \\ y \end{pmatrix}$
- Enlargement – the shape is made bigger or smaller by a scale factor from a centre.

### Questions:

1.



(a) On the grid, rotate the shaded shape **P** one quarter turn anticlockwise about **O**. Label the new shape **Q**.

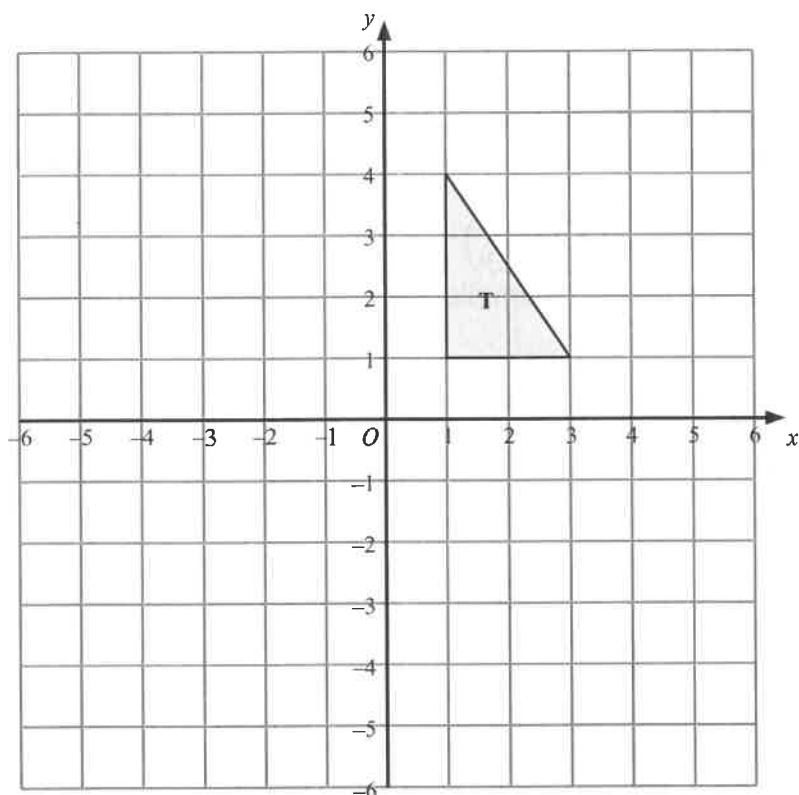
(3)

(b) On the grid, translate the shaded shape **P** by 2 units to the right and 3 units up. Label the new shape **R**.

(1)

(Total 4 marks)

2.

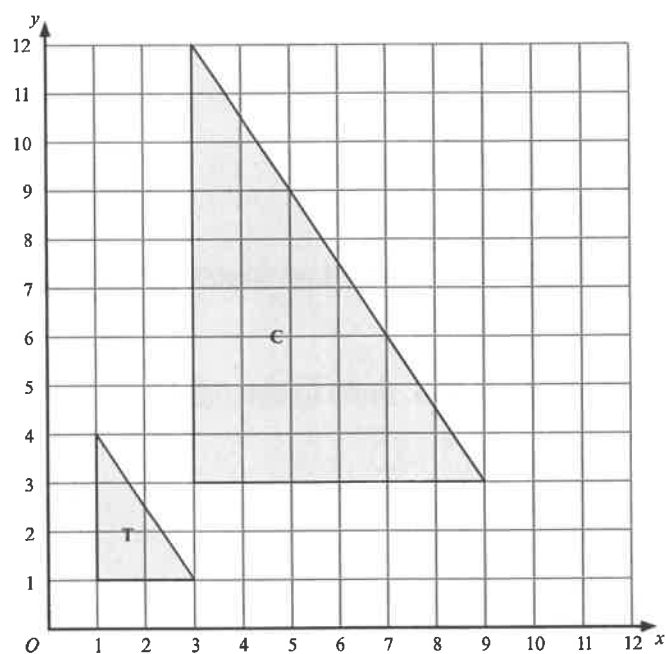


Triangle **T** has been drawn on the grid.

- (a) Reflect triangle **T** in the  $y$ -axis.  
Label the new triangle **A**.
- (b) Rotate triangle **T** by a half turn, centre  $O$ .  
Label the new triangle **B**.

(1)

(2)



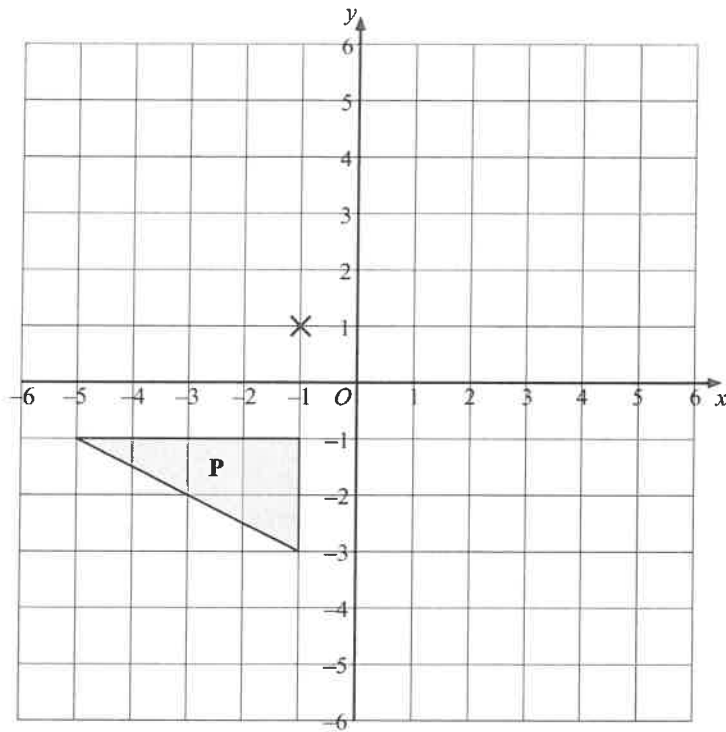
- (c) Describe fully the single transformation which maps triangle **T** onto triangle **C**.

.....

(3)

(Total 6 marks)

3.

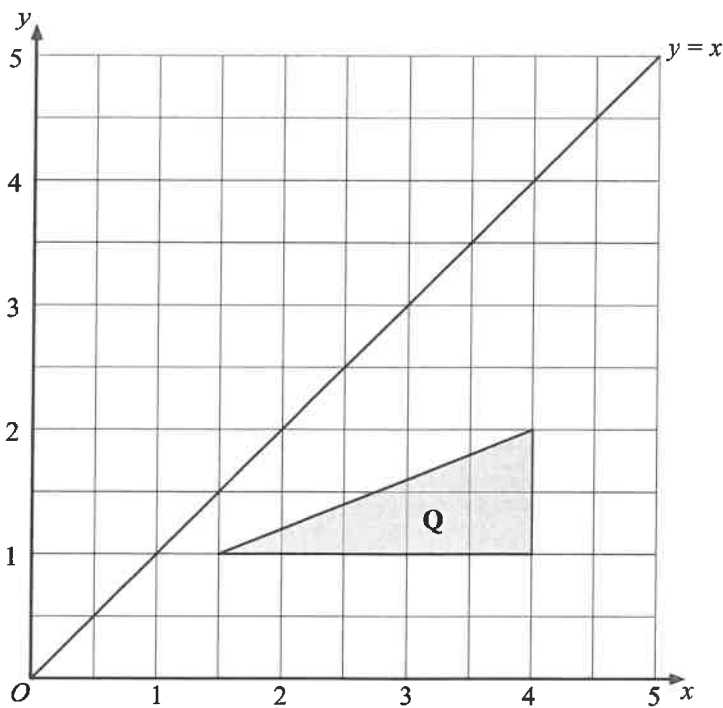


- (a) Rotate triangle **P**  $180^\circ$  about the point  $(-1, 1)$ .  
Label the new triangle **A**.

(2)

- (b) Translate triangle **P** by the vector  $\begin{pmatrix} 6 \\ -1 \end{pmatrix}$ .  
Label the new triangle **B**.

(1)

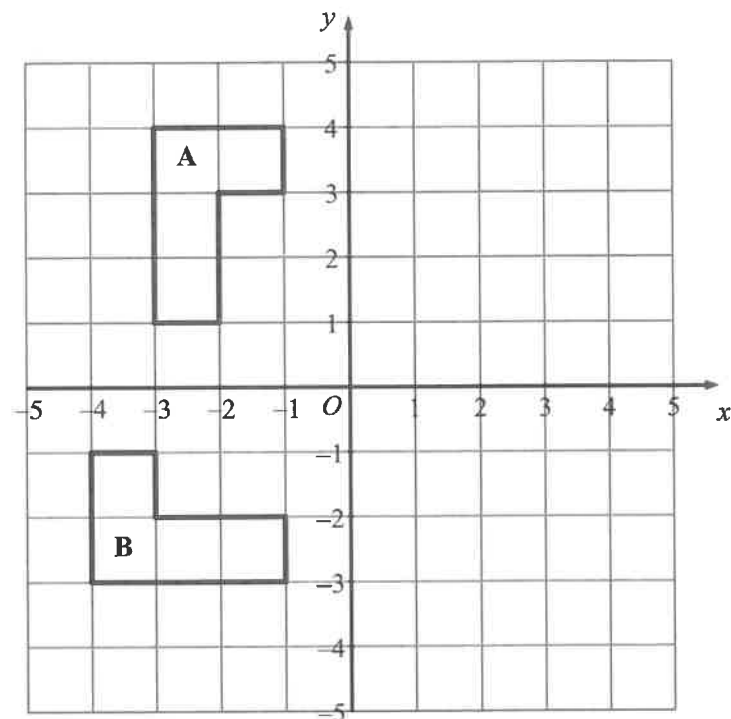


- (c) Reflect triangle **Q** in the line  $y = x$ .  
Label the new triangle **C**.

(2)

(Total 5 marks)

4.



(a) Reflect shape **A** in the  $y$  axis.

(2)

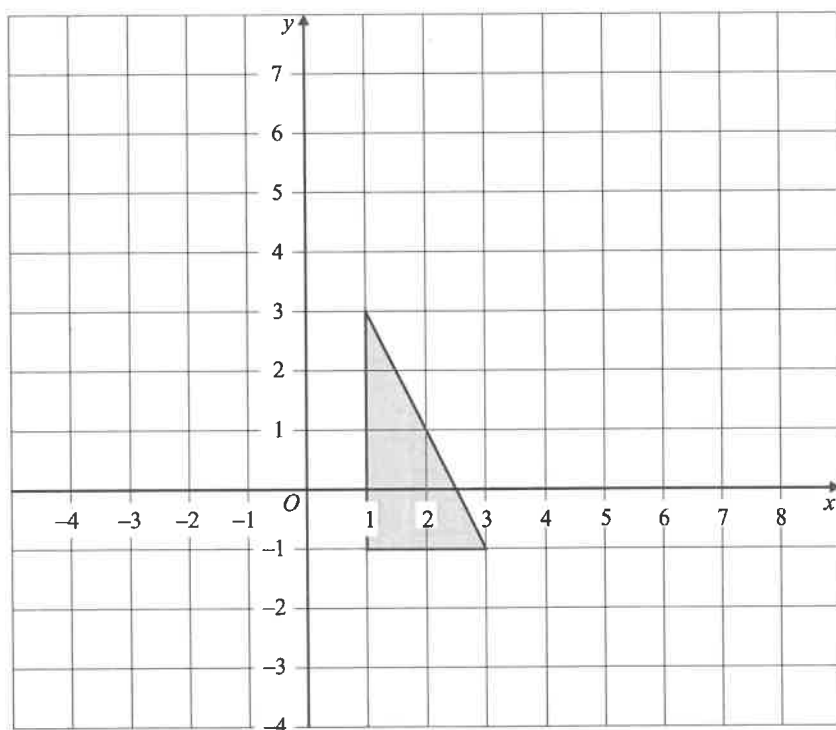
(b) Describe fully the **single** transformation which takes shape **A** to shape **B**.

.....

(3)

(Total 5 marks)

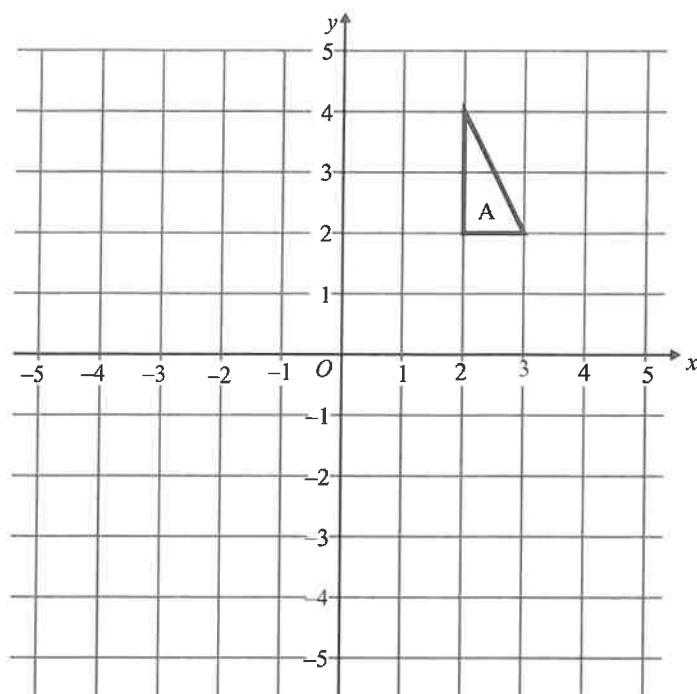
5.



Enlarge the shaded triangle by a scale factor 2, centre 0.

(Total 3 marks)

6.



- (a) On the grid, rotate triangle **A**  $180^\circ$  about **O**.  
Label your new triangle **B**.

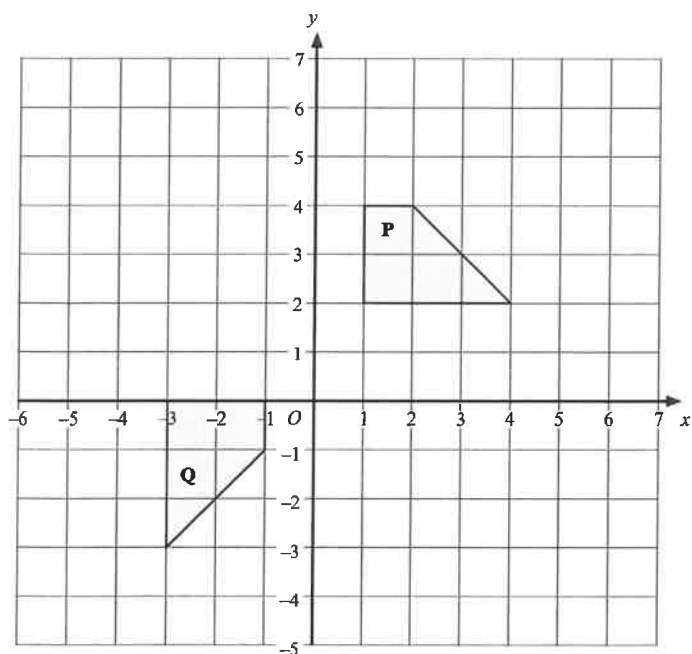
(2)

- (b) On the grid, enlarge triangle **A** by scale factor  $\frac{1}{2}$ , centre **O**.  
Label your new triangle **C**.

(3)

(Total 5 marks)

7.



Describe fully the single transformation that will map shape **P** onto shape **Q**.

.....

.....

(Total 3 marks)



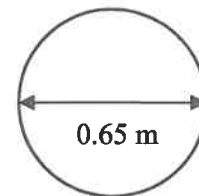
## Circles

### Things to remember:

- $\pi r^2$  sounds like area to me, when I need the circumference I'll just use  $\pi D$ .
- Read the question carefully and check if you are being asked to find circumference or area and whether they have given you the radius or the diameter.
- Remember the diameter is twice the radius.

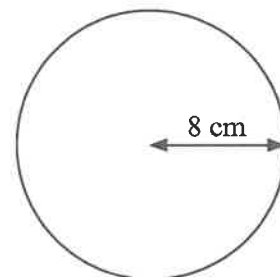
### Questions:

1. The diameter of a wheel on Harry's bicycle is 0.65 m.  
Calculate the circumference of the wheel.  
Give your answer correct to 2 decimal places.  
Diagram NOT accurately drawn



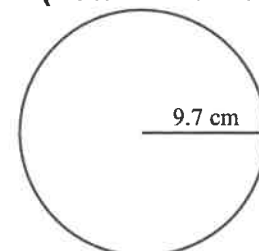
..... m  
(Total 2 marks)

2. Diagram NOT accurately drawn  
The radius of this circle is 8 cm.  
Work out the circumference of the circle.  
Give your answer correct to 2 decimal places.



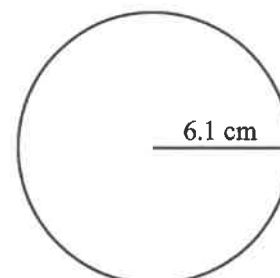
..... cm  
(Total 2 marks)

3. Diagram NOT accurately drawn  
The radius of the circle is 9.7 cm.  
Work out the area of the circle.  
Give your answer to 3 significant figures.



..... cm<sup>2</sup>  
(Total 2 marks)

4. A circle has a radius of 6.1 cm.  
Work out the area of the circle.



.....  
(Total 3 marks)

5. The top of a table is a circle.  
The radius of the top of the table is 50 cm.  
(a) Work out the area of the top of the table.

.....cm<sup>2</sup>



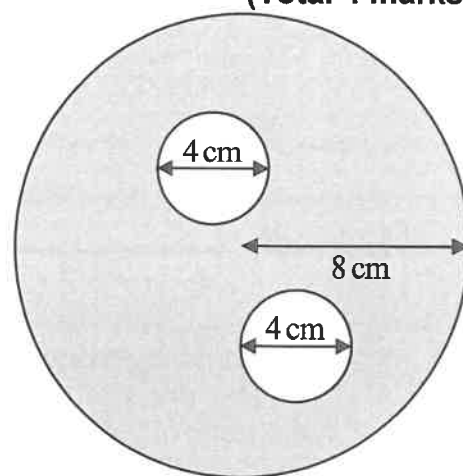
(2)

- The base of the table is a circle.  
The diameter of the base of the table is 40 cm.  
(b) Work out the circumference of the base of the table.

.....cm  
(2)  
(Total 4 marks)

6. The diagram shows two small circles inside a large circle.  
The large circle has a radius of 8 cm.  
Each of the two small circles has a diameter of 4 cm.  
(a) Write down the radius of each of the small circles.

..... cm  
(1)



- (b) Work out the area of the region shown shaded in the diagram.  
Give your answer correct to one decimal place.

..... cm<sup>2</sup>  
(4)  
(Total 5 marks)

## Area Problems

### Things to remember:

- Area of a rectangle = base  $\times$  height
- Area of a triangle =  $\frac{1}{2} \times$  base  $\times$  height
- Area of a parallelogram = base  $\times$  height
- Area of a trapezium =  $\frac{1}{2} (a + b) h$ , where  $a$  and  $b$  are the parallel sides and  $h$  is the height
- The perimeter is the distance around the edge of the shape

### Questions:

- \*1. The diagram shows the floor plan of Mary's conservatory.

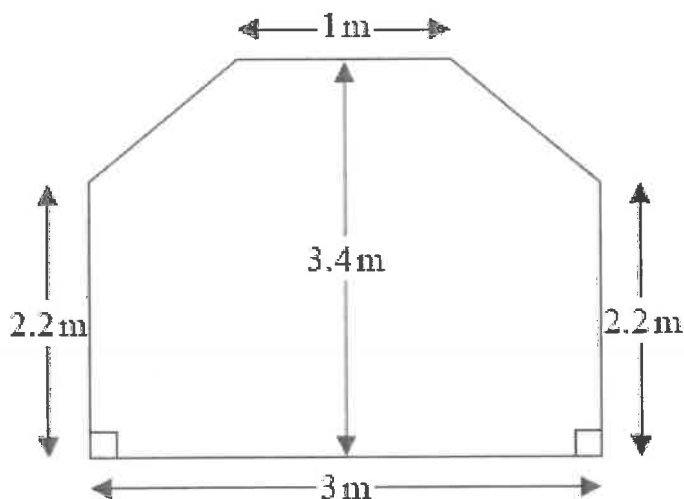


Diagram NOT  
accurately drawn

Mary is going to cover the floor with tiles.  
The tiles are sold in packs.  
One pack of tiles will cover  $2\text{m}^2$   
A pack of tiles normally costs £24.80  
Mary gets a discount of 25% off the cost of the tiles.  
Mary has £100  
Does Mary have enough money to buy all the tiles she needs?  
You must show all your working.

(Total for question = 5 marks)

- \*2. Mr Weaver's garden is in the shape of a rectangle.  
In the garden there is a patio in the shape of a rectangle and two ponds in the shape of circles with diameter 3.8 m.  
The rest of the garden is grass.

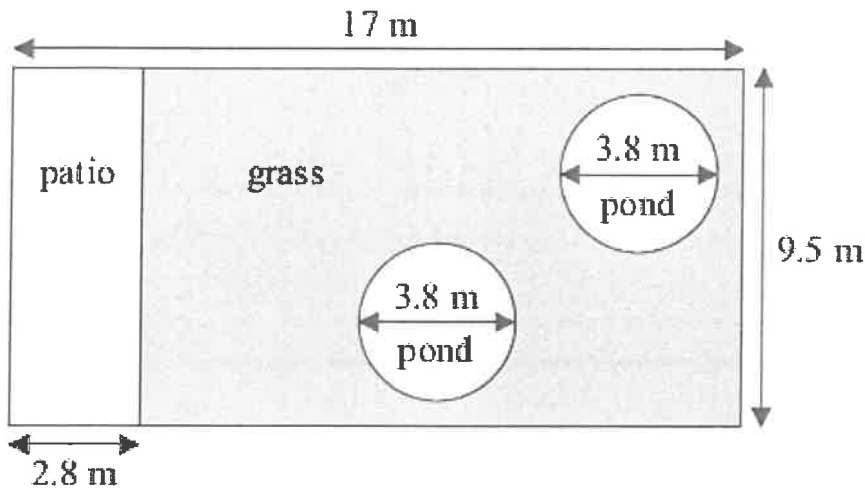


Diagram **NOT** accurately drawn

Mr Weaver is going to spread fertiliser over all the grass.  
One box of fertiliser will cover  $25 \text{ m}^2$  of grass.  
How many boxes of fertiliser does Mr Weaver need?  
You must show your working.

(Total for Question is 5 marks)

- \*3. The diagram shows the plan of Mrs Phillips' living room.

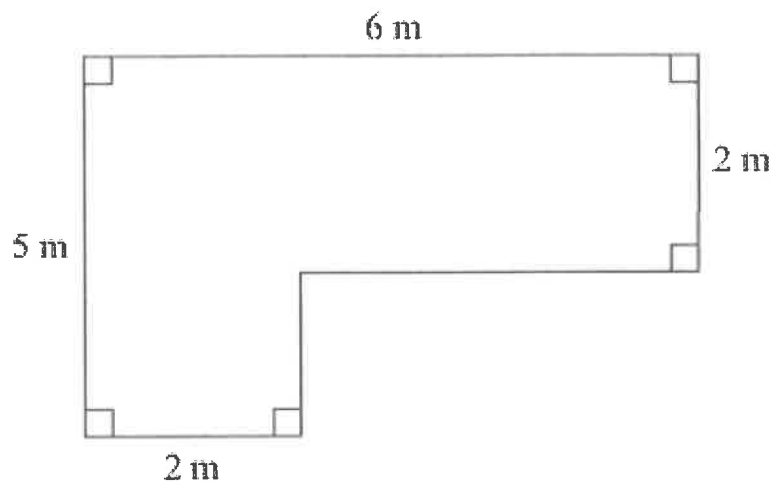


Diagram **NOT**  
accurately drawn

Mrs Phillips is going to cover the floor with floor boards.  
One pack of floor boards will cover  $2.5 \text{ m}^2$ .  
How many packs of floor boards does she need?  
You must show your working.

(Total for Question is 4 marks)

4. A piece of card is in the shape of a trapezium.

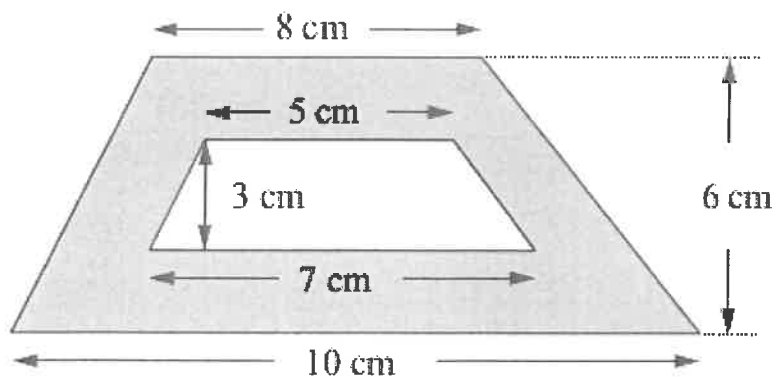


Diagram **NOT** accurately drawn

A hole is cut in the card.  
The hole is in the shape of a trapezium.  
Work out the area of the shaded region.

..... cm<sup>2</sup>  
(Total for Question is 3 marks)

5. Mrs Kunal's garden is in the shape of a rectangle. Part of the garden is a patio in the shape of a triangle. The rest of the garden is grass.

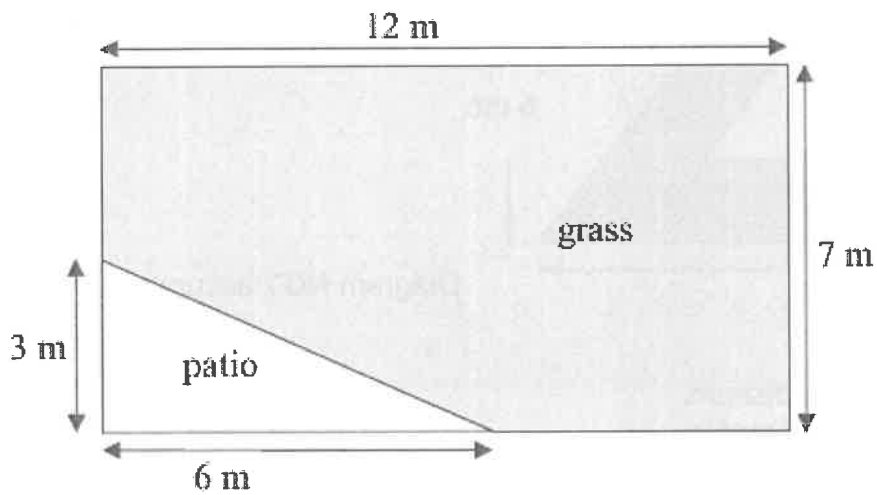


Diagram **NOT**  
accurately drawn

Mrs Kunal wants to spread fertiliser over all her grass.  
One box of fertiliser is enough for  $32 \text{ m}^2$  of grass.  
How many boxes of fertiliser will she need?  
You must show your working.

.....  
(Total for Question is 4 marks)

- \*6. The diagram shows a flower bed in the shape of a circle.

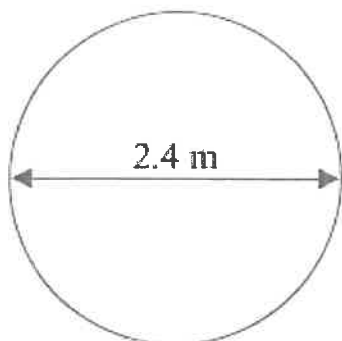


Diagram **NOT**  
accurately drawn

The flower bed has a diameter of 2.4 m.  
Sue is going to put a plastic strip around the edge of the flower bed.  
The plastic strip is sold in 2 metre rolls.  
How many rolls of plastic strip does Sue need to buy?  
You must show all your working.

**(Total for Question is 4 marks)**



# Volume and Surface Area of Prisms

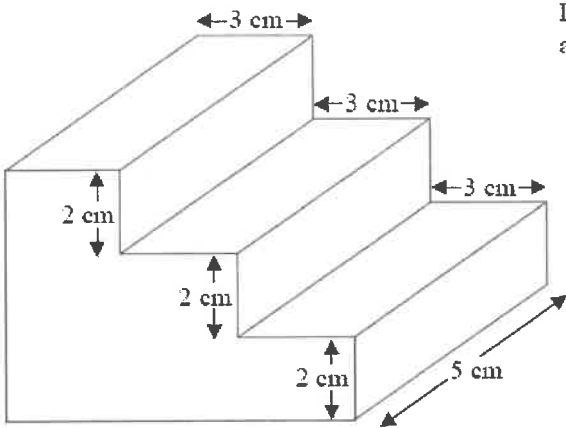
## Things to remember:

- Volume of a prism = area of cross section x length
- The surface area is the area of the surface (calculate the area of each face then add together)

## Questions:

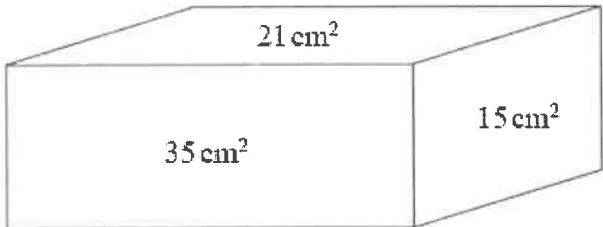
1. The diagram shows a prism.

All the corners are right angles.  
Work out the volume of the prism.



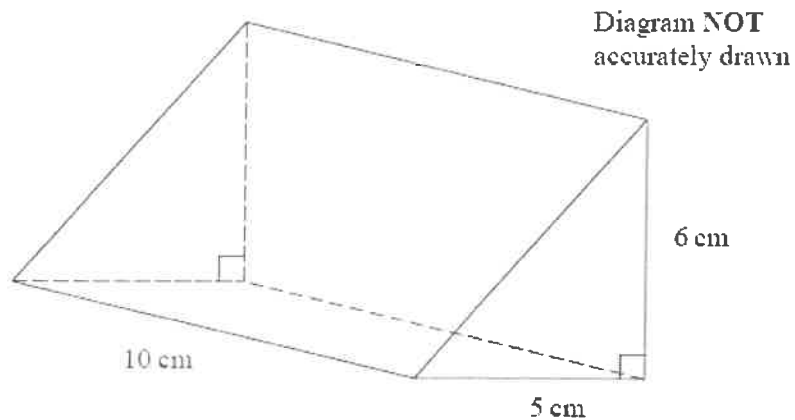
.....cm<sup>3</sup>  
(Total for question = 3 marks)

2. The diagram shows the area of each of three faces of a cuboid.  
Diagram **NOT** accurately drawn  
The length of each edge of the cuboid is a whole number of centimetres.  
Work out the volume of the cuboid.



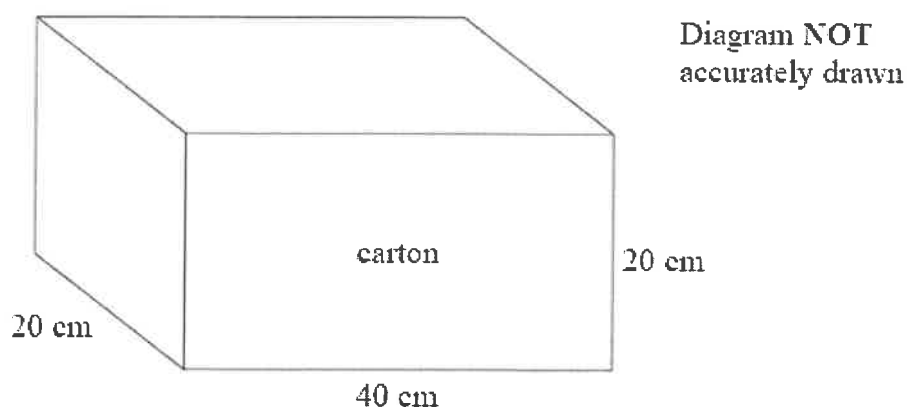
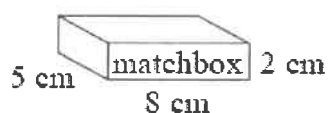
.....cm<sup>3</sup>  
(Total for question = 4 marks)

3. The diagram shows a triangular prism.  
Work out the volume of the prism.



.....  
(Total for question = 3 marks)

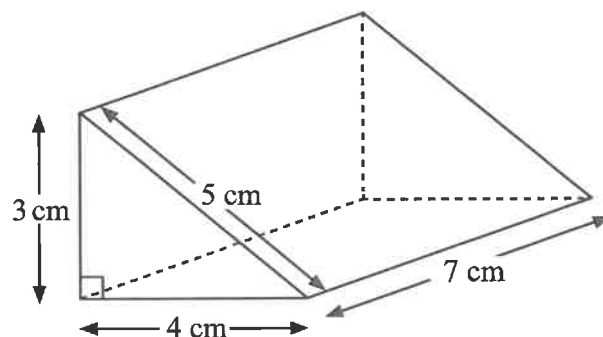
4. A matchbox is 5 cm by 8 cm by 2 cm.  
A carton is 20 cm by 40 cm by 20 cm.  
The carton is completely filled with matchboxes.



Work out the number of matchboxes in the carton.

.....  
(Total for Question is 3 marks)

5. Diagram **NOT** accurately drawn  
Work out the total surface area of the triangular prism.



.....  $\text{cm}^2$   
(Total 3 marks)

6. The diagram shows a prism.

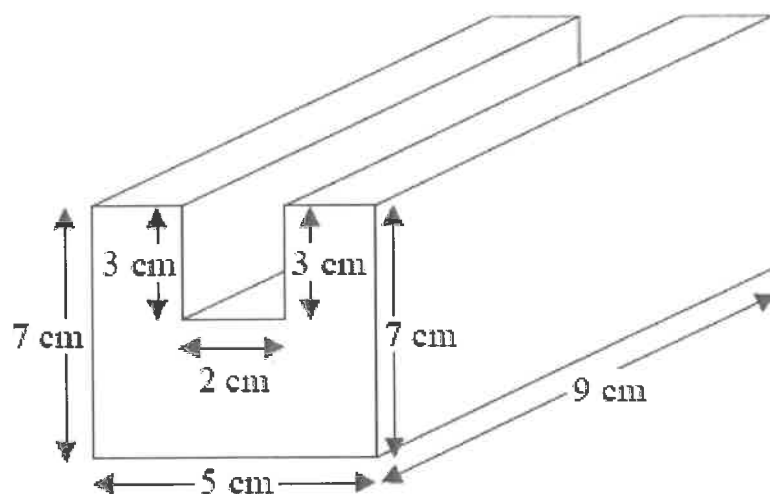
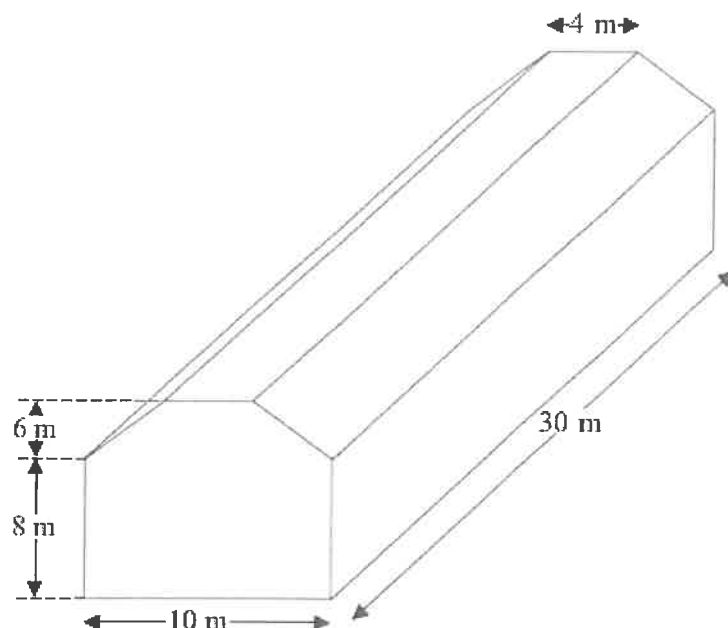


Diagram **NOT**  
accurately drawn

All the corners are right angles.  
Work out the volume of the prism.

.....  $\text{cm}^3$   
(Total for question = 4 marks)

7. Diagram **NOT** accurately drawn  
 The diagram represents a shed.  
 The shed is in the shape of a prism.  
 The cross section of the prism is a hexagon.  
 The hexagon has one line of symmetry.  
 The walls of the shed are vertical.  
 Calculate the volume of the shed.

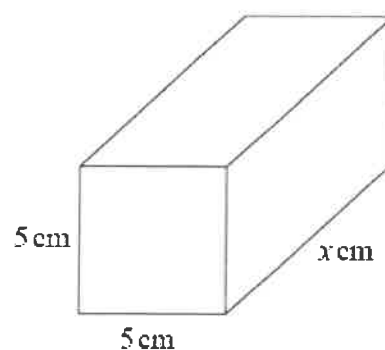
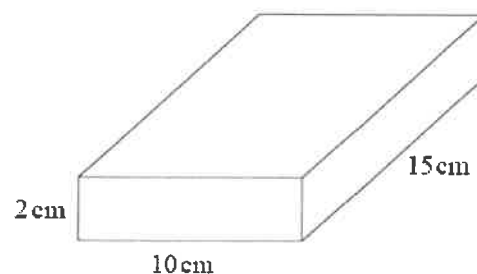


.....m<sup>3</sup>  
 (Total for Question is 4 marks)

8. Jane makes cheese.  
 The cheese is in the shape of a cuboid.

Jane is going to make a new cheese.  
 The new cheese will also be in the shape of a cuboid.  
 The cross section of the cuboid will be a 5cm by 5cm square.

Jane wants the new cuboid to have the same volume as the  
 2cm by 10cm by 15cm cuboid.  
 Work out the value of  $x$ .



..... cm  
 (Total for question = 3 marks)

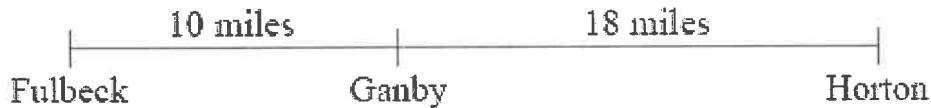
## Speed, Distance and Time

### Things to remember:

- There are 60 seconds in a minute and 60 minutes in an hour.
- 5 miles = 8 km

### Questions:

1. The distance from Fulbeck to Ganby is 10 miles.  
The distance from Ganby to Horton is 18 miles.



Raksha is going to drive from Fulbeck to Ganby.

Then she will drive from Ganby to Horton.

Raksha leaves Fulbeck at 10 00

She drives from Fulbeck to Ganby at an average speed of 40mph.

Raksha wants to get to Horton at 10 35

Work out the average speed Raksha must drive at from Ganby to Horton.

..... mph  
(Total for question = 3 marks)

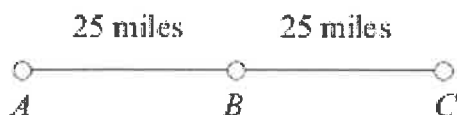
2. A London airport is 200 miles from Manchester airport.  
A plane leaves Manchester airport at 10 am to fly to the London airport.  
The plane flies at an average speed of 120 mph.  
What time does the plane arrive at the London airport?

.....  
(Total for question = 4 marks)

- \*3. The world speed record for a train is 360 mph.  
It takes Malcolm 6 seconds to drive a train 1 kilometre.  
Has the train broken the world speed record?  
Use 5 miles = 8 km.

(Total for question = 5 marks)

4. *A*, *B* and *C* are 3 service stations on a motorway.  
*AB* = 25 miles and *BC* = 25 miles



Aysha drives along the motorway from *A* to *C*.  
Aysha drives at an average speed of 50 mph from *A* to *B*.  
She drives at an average speed of 60 mph from *B* to *C*.  
Work out the difference in the time Aysha takes to drive from *A* to *B* and the time Aysha takes to drive from *B* to *C*.  
Give your answer in minutes.

..... minutes  
(Total for Question is 3 marks)

5. Peter goes for a walk.  
He walks 15 miles in 6 hours.  
(a) Work out Peter's average speed.  
Give your answer in miles per hour.

..... mph  
(2)

5 miles = 8 km.

Sunita says that Peter walked more than 20 km.

- \*(b) Is Sunita right?  
You must show all your working.

(2)  
(Total for Question is 4 marks)

## Averages

### Things to remember:

- Mode is most – the number that occurs the most frequently.
- Median is middle – put the numbers in order then identify the middle number.
- Mean is mean to work out – add all the numbers together and divide by the quantity in the list.
- Range is the difference from the biggest to the smallest.

### Questions:

1. Mrs Smith asked each student in her class to record the numbers of times they used their mobile phone last Saturday.

Here are the results for the boys.

Boys            8            10            8            9            7            9            8            13            14

(a) Work out the median.

.....  
(2)

Here are the results for the girls.

Girls            6            8            9            9            10            14            14

\*(b) Compare the numbers of times the boys used their mobile phones with the numbers of times the girls used their mobile phones.

(4)

(Total for question = 6 marks)

2. There are 18 packets of sweets and 12 boxes of sweets in a carton.  
The mean number of sweets in all the 30 packets and boxes is 14  
The mean number of sweets in the 18 packets is 10  
Work out the mean number of sweets in the boxes.

.....  
(Total for question = 3 marks)



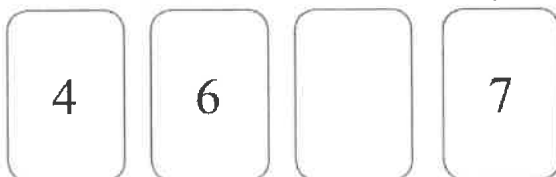
3. 25 students in class A did a science exam.  
30 students in class B did the same science exam.  
The mean mark for the 25 students in class A is 67.8  
The mean mark for all the 55 students is 72.0  
Work out the mean mark for the students in class B.

.....  
(Total for Question is 3 marks)

4. There are 10 boys and 20 girls in Mrs Brook's class.  
Mrs Brook gave all the class a test.  
The mean mark for all the class is 60  
The mean mark for the girls is 56  
Work out the mean mark for the boys.

.....  
(Total for Question is 3 marks)

5. Here are four number cards.  
One of the cards is turned over so you cannot see the number on it.



The mean of the four numbers is 6  
Work out the number you **cannot** see.

.....  
(Total for Question 10 is 3 marks)

- \*6. There are two trays of plants in a greenhouse.  
 The first tray of plants was given fertiliser.  
 The second tray of plants was not given fertiliser.  
 On Monday the heights of the plants were measured in centimetres.  
 The boxes show some information about the heights of the plants.

| Heights of the plants given fertiliser |    |    |    |    |    |    |    |
|--|----|----|----|----|----|----|----|
| 22                                     | 29 | 30 | 35 | 37 | 40 | 44 | 47 |
| 48                                     | 48 | 54 | 56 | 59 | 66 | 72 |    |

| Information about the heights of plants not given fertiliser |    |                |    |
|--|----|----------------|----|
| Smallest   | 18 | Lower quartile | 26 |
| Largest  | 64 | Upper quartile | 47 |
| Median   | 44 |                |    |

Compare the distribution of the heights of the plants given fertiliser to the distribution of the heights of the plants not given fertiliser.

(Total for Question is 4 marks)

7. 23 girls have a mean height of 153 cm.  
 17 boys have a mean height of 165 cm.  
 Work out the mean height of all 40 children.

..... cm  
 (Total for Question is 3 marks)

8. Hertford Juniors is a basketball team.  
 At the end of 10 games, their mean score is 35 points per game.  
 At the end of 11 games, their mean score has gone down to 33 points per game.  
 How many points did the team score in the 11th game?

.....  
**(Total for Question is 3 marks)**

9. Mr Brown gives his class a test.  
 The 10 girls in the class get a mean mark of 70%  
 The 15 boys in the class get a mean mark of 80%

Nick says that because the mean of 70 and 80 is 75 then the mean mark for the whole class in the test is 75%  
 Nick is not correct.

Is the correct mean mark less than or greater than 75%?  
 You must justify your answer.

.....  
 .....  
 .....

**(Total for question = 2 marks)**

10. Walkden Reds is a basketball team.  
 At the end of 11 games, their mean score was 33 points per game.  
 At the end of 10 games, their mean score was 2 points higher.

Jordan says,  
 "Walkden Reds must have scored 13 points in their 11th game."

Is Jordan right?  
 You must show how you get your answer.

.....  
**(Total for question is 3 marks)**

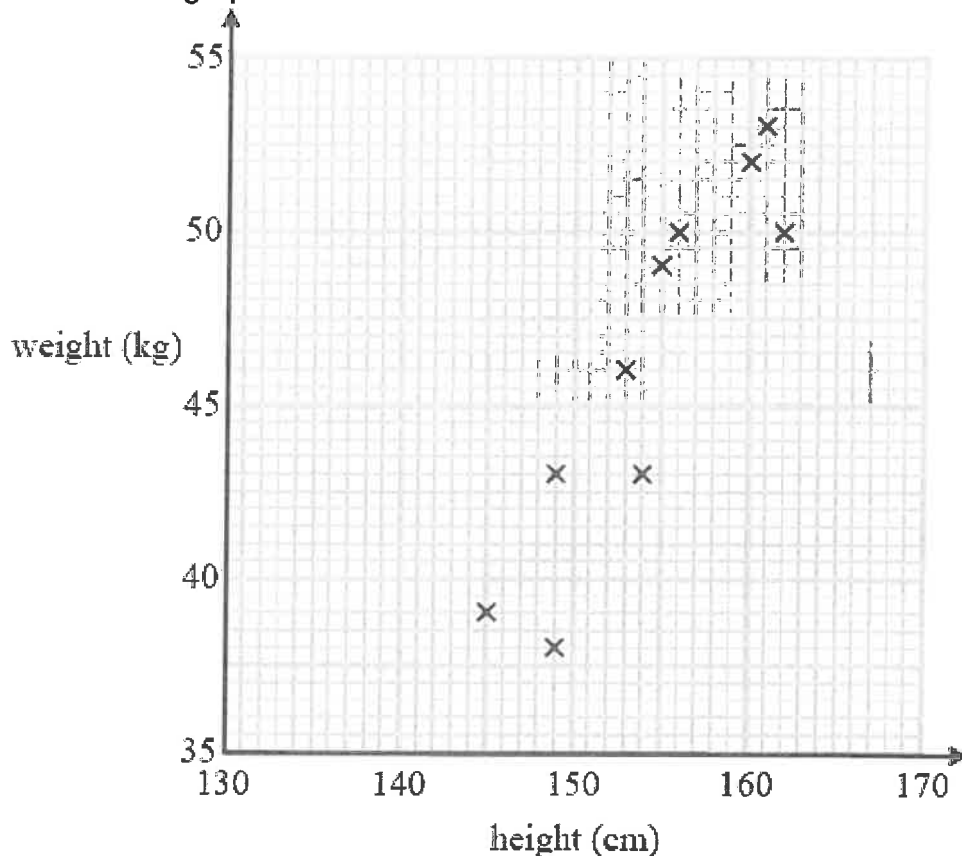
## Scatter Graphs

### Things to remember:

- Check the scale carefully when plotting points. If it helps, write in more numbers on the scale.
- Always draw a line of best fit
- When estimating a value show lines on your graph.
- You can describe a relationship by using the words “positive correlation” or “negative correlation.” Make sure you include the word correlation.

### Questions:

1. Leon recorded the height, in cm, and the weight, in kg, of each of ten students. The scatter graph shows information about his results.



A different student has a height of 146 cm and a weight of 41 kg.

- (a) Plot this information on the scatter graph.

(1)

- (b) Describe the relationship between the height and the weight of these students.

(1)

A student has a weight of 47.5 kg.

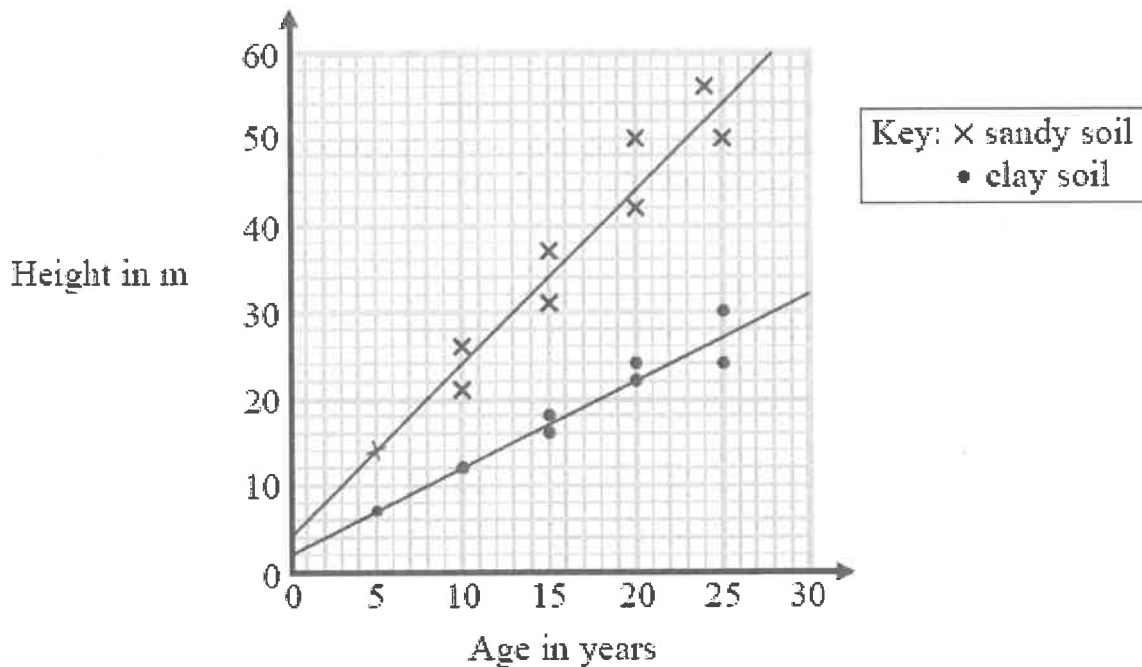
- (c) Use the scatter graph to estimate the height of this student.

..... cm

(2)

(Total for question = 4 marks)

2. Bill wants to compare the heights of pine trees growing in sandy soil with the heights of pine trees growing in clay soil. The scatter diagram gives some information about the heights and the ages of some pine trees.



- (a) Describe the relationship between the height of pine trees and the age of pine trees growing in sandy soil.

.....m  
(1)

A pine tree growing in clay soil is 18 years old.

- (b) Find an estimate for the height of this tree.

.....m  
(1)

A pine tree is growing in sandy soil.

- (c) Work out an estimate for how much the height of this tree increases in a year.

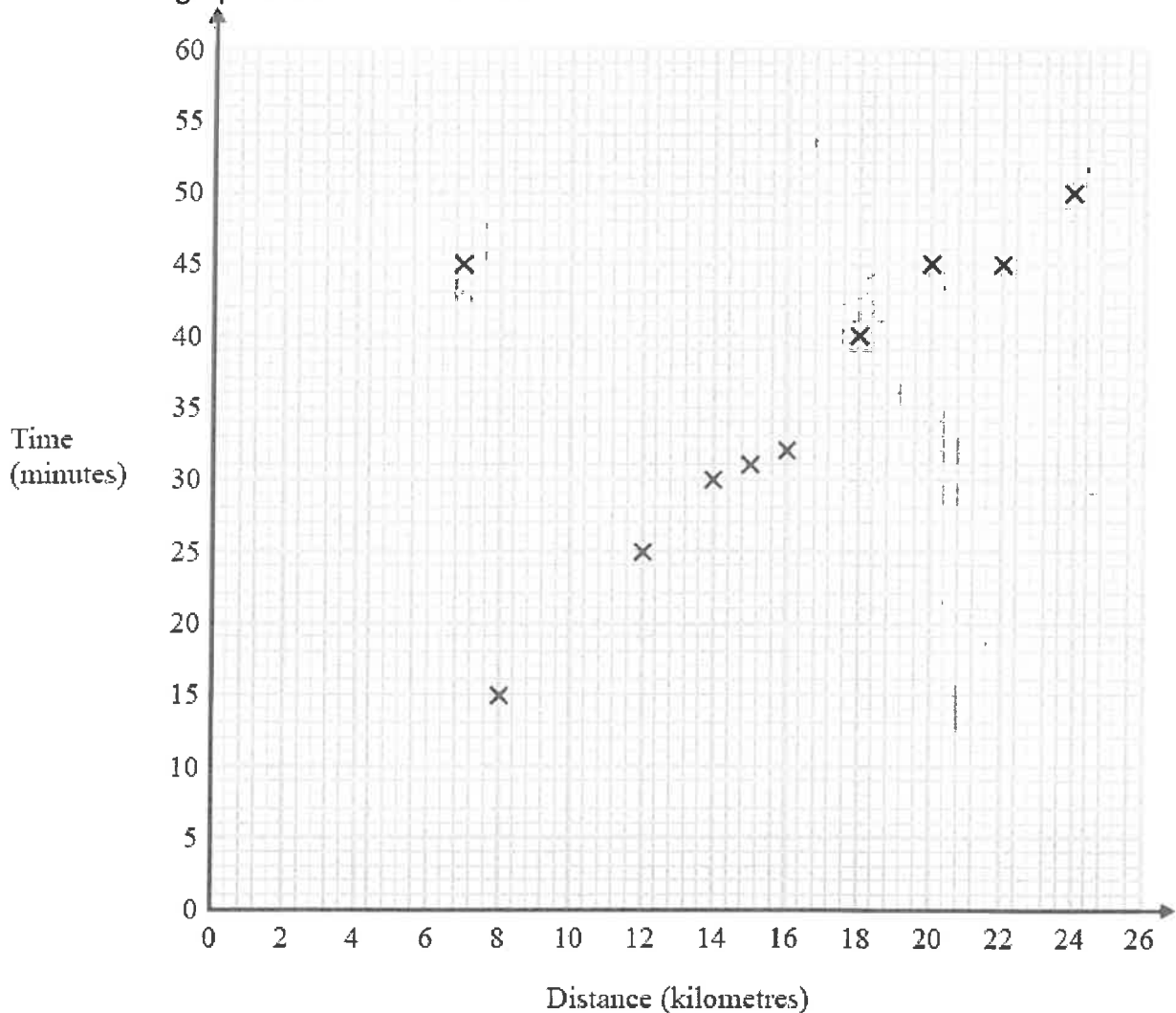
.....m  
(2)

- (d) Compare the rate of increase of the height of trees growing in clay soil with the rate of increase of the height of trees growing in sandy soil.

.....  
.....  
(2)

(Total for question = 6 marks)

3. A delivery driver records for each delivery the distance he drives and the time taken. The scatter graph shows this information.



For another delivery he drives 22 kilometres and takes 50 minutes.

- (a) Show this information on the scatter graph.

(1)

- (b) What type of correlation does the scatter graph show?

(1)

The driver has to drive a distance of 10km for his next delivery.

- (c) Estimate the time taken for this delivery.

..... minutes  
(2)

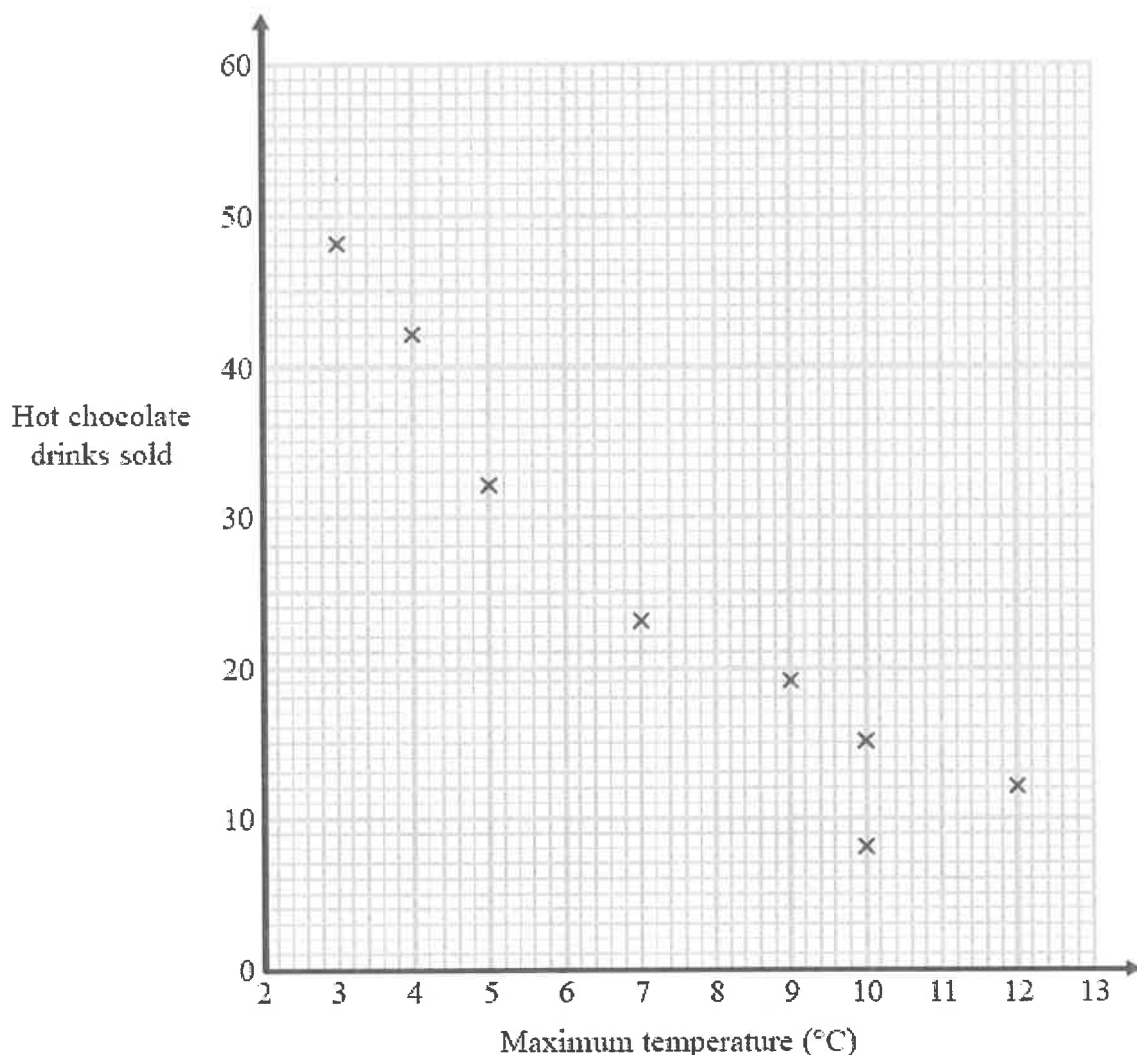
During one of the deliveries, the driver was delayed by road works.

- (d) Using the graph write down the time taken for this delivery.

..... minutes  
(1)

(Total for question = 5 marks)

4. Carlos has a cafe in Clacton.  
Each day, he records the maximum temperature in degrees Celsius ( $^{\circ}\text{C}$ ) in Clacton and the number of hot chocolate drinks sold.  
The scatter graph shows this information.



On another day the maximum temperature was  $6^{\circ}\text{C}$  and 35 hot chocolate drinks were sold.

- (a) Show this information on the scatter graph. (1)
- (b) Describe the relationship between the maximum temperature and the number of hot chocolate drinks sold.

.....  
 ..... (1)

- (c) Draw a line of best fit on the scatter diagram. (1)

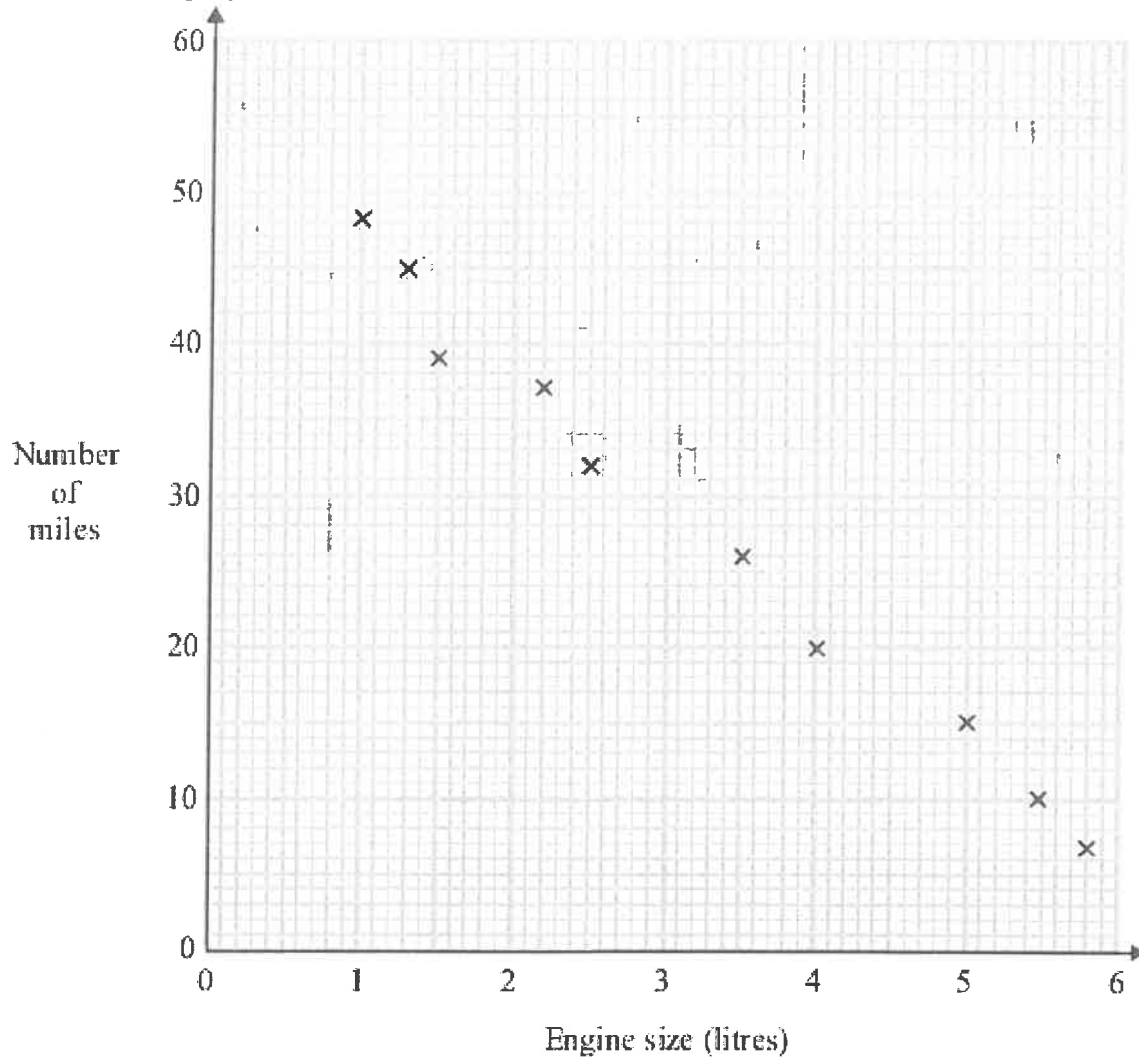
One day the maximum temperature was  $8^{\circ}\text{C}$ .

- (d) Use your line of best fit to estimate how many hot chocolate drinks were sold.

.....  
 (1)

(Total for Question is 4 marks)

5. A car company records the number of miles cars of different engine sizes, in litres, travel using one gallon of fuel.  
The scatter graph shows this information.



Another car has an engine size of 1.8 litres and travels 42 miles using one gallon of fuel.

- (a) Plot this information on the scatter graph. (1)
- (b) What type of correlation does this scatter graph show? (1)

- ..... (1)
- (c) Draw a line of best fit. (1)

A car has an engine size of 2.8 litres.

- (d) Find an estimate for the number of miles this car travels using one gallon of fuel.

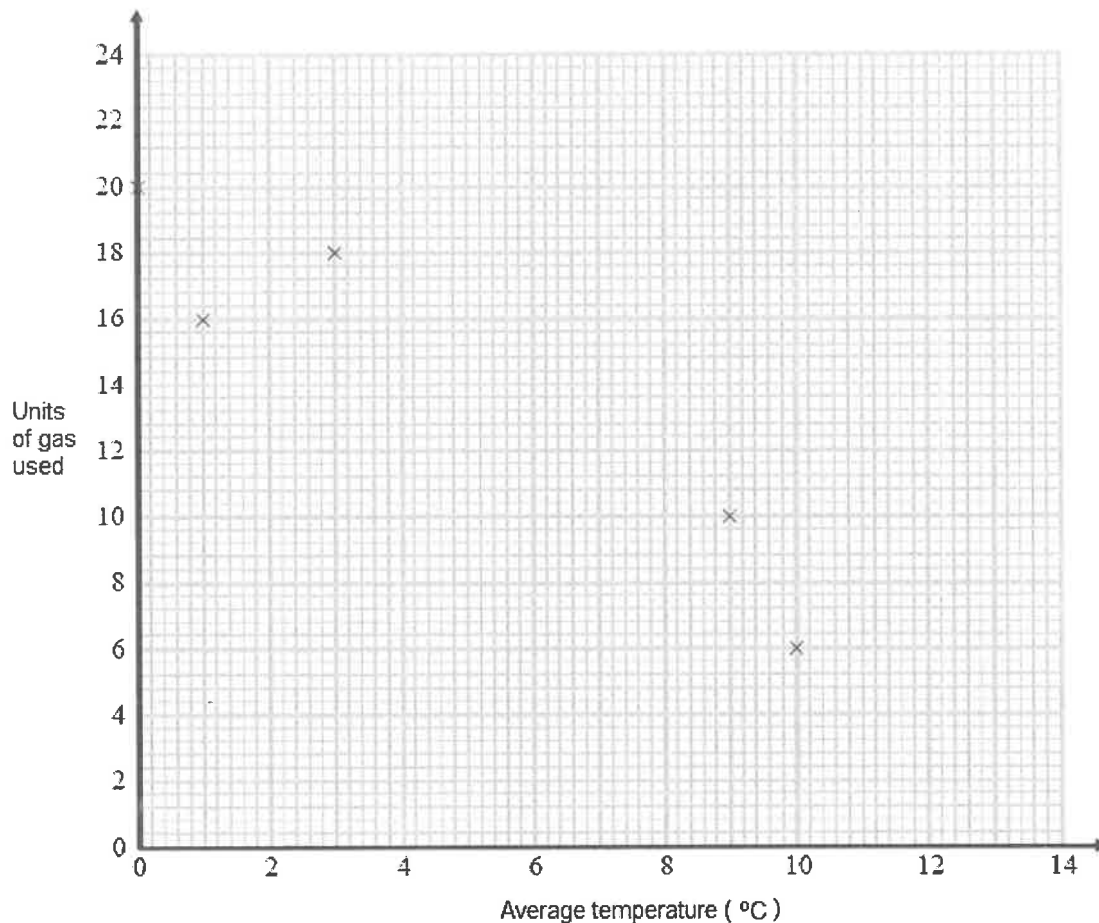
..... miles (1)

(Total for Question is 4 marks)



6. The table shows the average temperature on each of seven days and the number of units of gas used to heat a house on these days.

|  |    |    |    |    |    |    |    |
|--|----|----|----|----|----|----|----|
| Average temperature ( $^{\circ}\text{C}$ ) | 0  | 1  | 3  | 9  | 10 | 12 | 13 |
| Units of gas used                          | 20 | 16 | 18 | 10 | 6  | 6  | 2  |



- (a) Complete the scatter graph to show the information in the table.  
The first 5 points have been plotted for you. (1)
- (b) Describe the relationship between the average temperature and the number of units of gas used. (1)
- .....
- .....
- (c) Estimate the average temperature on a day when 12 units of gas are used. (1)

..... $^{\circ}\text{C}$   
(2)

(Total for Question is 4 marks)

## Relative Frequency

### Things to remember:

- Probabilities of exhaustive events sum to 1
- To calculate relative frequency, multiply the number of trials by the given probability

### Questions:

1. An electronic game can show red or blue or green or yellow.  
The table shows the probabilities that the colour shown will be red or will be green or will be yellow.

| Colour      | red  | blue | green | yellow |
|-------------|------|------|-------|--------|
| Probability | 0.15 |      | 0.41  | 0.24   |

Arthur plays the game.

- (a) Work out the probability that the colour shown will be blue.

.....  
(2)

Janice is going to play the game 50 times.

- (b) Work out an estimate for the number of times the colour shown will be yellow.

.....  
(2)

(Total for question = 4 marks)

2. Karl wants to raise money for charity.  
He designs a game for people to play.  
Karl uses a fair 10-sided dice for the game.  
The dice is numbered from 1 to 10  
Each person will roll the dice once. A person wins the game if the dice lands on a multiple of 4  
Ali plays the game once.  
(a) Work out the probability that Ali will win the game.

.....  
(2)

Each person pays 30p to play the game once.

The prize for a win is £1

Karl thinks that the game will be played 100 times.

- (b) Work out an estimate for how much money Karl will raise for charity.

.....  
(3)

(Total for question = 5 marks)

3. Ali throws a biased dice 200 times.  
The table shows information about his results.

| Score | Frequency |
|-------|-----------|
| 1     | 47        |
| 2     | 4         |
| 3     | 25        |
| 4     | 56        |
| 5     | 38        |
| 6     | 30        |

Charlie throws the dice 550 times.

Work out an estimate for the total number of times that Charlie will get a score of 4

.....  
(Total for Question is 3 marks)

4. The probability that a pea plant will grow from a seed is 93%.  
Sarah plants 800 seeds.  
Work out an estimate for the number of seeds that will grow into pea plants.

.....  
(Total for Question is 2 marks)

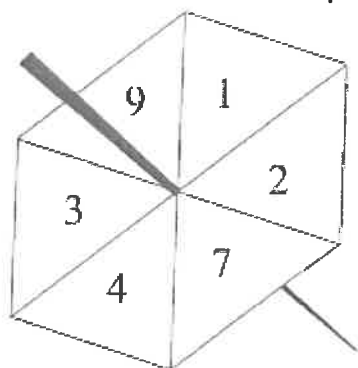
5. Rhiana plays a game.  
The probability that she will lose the game is 0.32  
The probability that she will draw the game is 0.05  
Rhiana is going to play the game 200 times.  
Work out an estimate for the number of times Rhiana will win the game.

.....  
(Total for Question is 3 marks)

6. The probability that a biased dice will land on a five is 0.3  
Megan is going to roll the dice 400 times.  
Work out an estimate for the number of times the dice will land on a five.

.....  
(Total for Question is 2 marks)

7. Here is a fair 6-sided spinner.



Jake is going to spin the spinner once.

- (a) Write down the probability that the spinner will land

(i) on 4

(ii) on a number greater than 10

.....

.....

(2)

Liz is going to spin the spinner 120 times.

- (b) Work out an estimate for the number of times the spinner will land on 7

.....

(2)

(Total for Question is 4 mark)

8. There are only red counters, blue counters, white counters and black counters in a bag. The table shows the probability that a counter taken at random from the bag will be red or blue.

| Colour      | red | blue | white | black |
|-------------|-----|------|-------|-------|
| Probability | 0.2 | 0.5  |       |       |

The number of white counters in the bag is the same as the number of black counters in the bag.

Tania takes at random a counter from the bag.

- (a) Work out the probability that Tania takes a white counter.

.....

(2)

There are 240 counters in the bag.

- (c) Work out the number of red counters in the bag.

.....

(2)

(Total for Question is 4 marks)

## Dividing into a Ratio

### Things to remember:

- Start by dividing the quantity by the total number of parts, then multiply by each share.
- Don't forget to include units throughout your working.

### Questions:

1. Keith and Graham share £105 in the ratio 4:3  
Work out how much Keith gets.

.....  
(Total for Question is 2 marks)

- \*2. Talil is going to make some concrete mix.  
He needs to mix cement, sand and gravel in the ratio 1 : 3 : 5 by weight.  
Talil wants to make 180 kg of concrete mix.  
Talil has  
    15 kg of cement  
    85 kg of sand  
    100 kg of gravel  
Does Talil have enough cement, sand and gravel to make the concrete mix?

(Total for Question is 4 marks)

3. Liam, Sarah and Emily shared some money in the ratio 2 : 3 : 7  
Emily got £80 more than Liam.  
How much money did Sarah get?

.....  
(Total for question = 3 marks)

4. A pile of sand has a weight of 60 kg.  
The sand is put into a small bag, a medium bag and a large bag in the ratio 2 : 3 : 7  
Work out the weight of sand in each bag.

small bag ..... kg

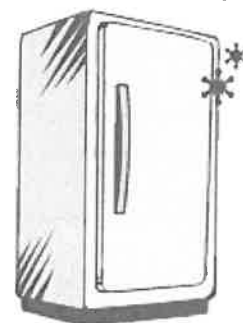
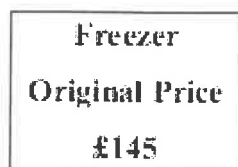
medium bag ..... kg

large bag ..... kg

**(Total for Question is 3 marks)**

5. A shop sells freezers and cookers.  
The ratio of the number of freezers sold to the number of cookers sold is 5 : 2  
The shop sells a total of 140 freezers and cookers in one week.  
\*(a) Work out the number of freezers and the number of cookers sold that week.

Jake buys this freezer in a sale.  
The price of the freezer is reduced by 20%.  
(b) Work out how much Jake saves.



**(3)**

£ .....

**(2)**

**(Total for Question is 5 marks)**

6. Graham and Michael share £35 in the ratio 5 : 2  
Work out the amount of money that Graham gets.

£.....

**(Total for Question is 2 marks)**

7. 5 schools sent some students to a conference.  
One of the schools sent both boys and girls.  
This school sent 16 boys.  
The ratio of the number of boys it sent to the number of girls it sent was 1 : 2  
The other 4 schools sent only girls.  
Each of the 5 schools sent the same number of students.  
Work out the total number of students sent to the conference by these 5 schools.

.....  
(Total for Question is 4 marks)

## Recipes

### Things to remember:

- Calculate the scale factor.
- Multiply each ingredient by the scale factor.
- Check your answer using estimating and common sense to check that it seems sensible.

### Questions:

1. This is a list of ingredients for making a pear & almond crumble for 4 people.

Ingredients for 4  
people.  
80 g plain flour  
60 g ground almonds  
90 g soft brown sugar  
60 g butter  
4 ripe pears

Work out the amount of each ingredient needed to make a pear & almond crumble for 10 people.

..... g plain flour

..... g ground almonds

..... g soft brown sugar

..... g butter

..... ripe pears  
(Total 3 marks)

2. Here are the ingredients needed to make 500 ml of custard.

**Custard**  
**makes 500 ml**  
400 ml of milk  
3 large egg yolks  
50 g sugar  
2 teaspoons of  
cornflour

- (a) Work out the amount of sugar needed to make 2000 ml of custard.

.....g  
(2)

- (b) Work out the amount of milk needed to make 750 ml of custard.

.....ml  
(2)  
(Total 4 marks)



3. Here is a recipe for making 10 chocolate chip cookies.

**Chocolate Chip Cookies**  
Makes 10 cookies.  
100 g of flour  
60 g of sugar  
50 g of margarine  
40 g of chocolate chips  
2 eggs

Work out the amounts needed to make 15 chocolate chip cookies.

..... g of flour

..... g of sugar

..... g of margarine

..... g of chocolate chips

..... eggs  
**(Total 3 marks)**

4. Here is a list of ingredients for making a peach dessert for 6 people.

Peach dessert for 6 people.

150 g    jelly  
10       sponge fingers  
500 ml   custard  
200 g    peaches

Bob is going to make a peach dessert for 15 people.  
Work out the amount of each ingredient he needs.

.....g jelly

.....sponge fingers

.....ml/ custard

.....g peaches  
**(Total for Question is 3 marks)**

5. Here are the ingredients needed to make leek and potato soup for 4 people.

|                             |
|-----------------------------|
| <b>Leek and potato soup</b> |
| <b>Serves 4</b>             |
| 4 leeks                     |
| 350 g potatoes              |
| 600 ml vegetable stock      |
| 300 ml milk                 |

Jenny wants to make soup for 6 people.  
Work out the amount of each ingredient she needs.

..... leeks  
..... g potatoes  
..... ml vegetable stock  
..... ml milk

**(Total for question = 3 marks)**

6. Jane made some almond biscuits which she sold at a fête.  
She had:  
5 kg of flour  
3 kg of butter  
2.5 kg of icing sugar  
320 g of almonds  
Here is the list of ingredients for making 24 almond biscuits.

|   |
|---|
| <b>Ingredients for 24 almond biscuits</b> |
| 150 g flour                               |
| 100 g butter                              |
| 75 g icing sugar                          |
| 10 g almonds                              |

Jane made as many almond biscuits as she could, using the ingredients she had.  
Work out how many almond biscuits she made.

**(Total for question = 3 marks)**

## Percentages of Amounts, Increasing and Decreasing

### Things to remember:

- "Per cent" means "out of 100".
- Increase means the value will go up, decrease means the value will go down.

### Questions:

1. David is going to buy a cooker.  
The cooker has a price of £320  
David pays a deposit of 15% of the price of the cooker.  
How much money does David pay as a deposit?

£ .....  
(Total for Question is 2 marks)

2. Work out 65% of 300

.....  
(Total for question = 2 marks)

- \*3. Barak is going to buy 550 nails from one of these companies.

| Nail Company          | Hammer Company                       |
|-----------------------|--------------------------------------|
| 50 nails              | 25 nails                             |
| £4.15 plus VAT at 20% | £2.95                                |
|                       | Special offer<br>Buy 100 get 25 free |

He wants to buy the nails at the cheaper cost.

Where should he buy the nails, from the Nail Company or the Hammer Company?

(Total for question = 5 marks)

4. Greg sells car insurance and home insurance.  
The table shows the cost of these insurances.

|                  |               |                |
|------------------|---------------|----------------|
| <b>Insurance</b> | car insurance | home insurance |
| <b>Cost</b>      | £200          | £350           |

Each month Greg earns  
£530 basic pay  
5% of the cost of all the car insurance he sells  
and 10% of the cost of all the home insurance he sells  
In May Greg sold  
6 car insurances  
and 4 home insurances  
Work out the total amount of money Greg earned in May.

£ .....  
(Total for Question is 5 marks)

5. Mr Watkins needs to buy some oil for his central heating.  
Mr Watkins can put up to 1500 litres of oil in his oil tank.  
There are already 850 litres of oil in the tank.  
Mr Watkins is going to fill the tank with oil.  
The price of oil is 67.2p per litre.  
Mr Watkins gets 5% off the price of the oil.  
How much does Mr Watkins pay for the oil he needs to buy?

£ .....  
(Total for Question is 5 marks)

- \*6. Jim's pay is £180 each week.  
Jim asks his boss for an increase of £20 a week.  
Jim's boss offers him a 10% increase.  
Is the offer from Jim's boss more than Jim asked for?  
You must show your working.

(Total for Question is 3 marks)

- \*7. Gordon owns a shop.  
Here are the prices of three items in Gordon's shop and in a Supermarket.

| Gordon's Shop       |       | Supermarket         |       |
|---------------------|-------|---------------------|-------|
| 400 g loaf of bread | £1.22 | 400 g loaf of bread | £1.15 |
| 1 litre of milk     | £0.96 | 1 litre of milk     | £0.86 |
| 40 tea bags         | £2.42 | 40 tea bags         | £2.28 |

Gordon reduces his prices by 5%.  
Will the total cost of these three items be cheaper in Gordon's shop than in the Supermarket?

(Total for Question is 3 marks)

8. Mr Brown and his 2 children are going to London by train.  
An adult ticket costs £24  
A child ticket costs £12  
Mr Brown has a Family Railcard.

**Family Railcard gives**

$\frac{1}{3}$  off adult tickets

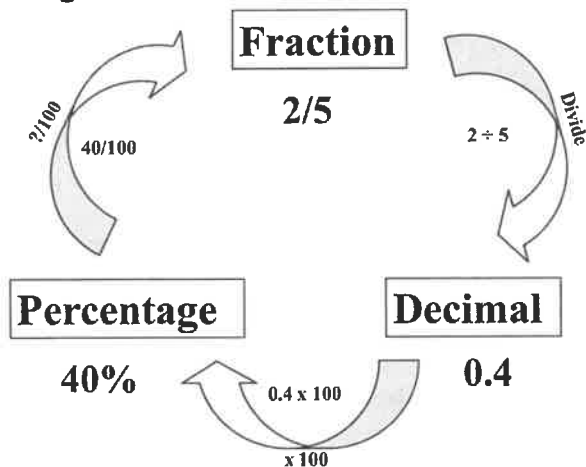
60% off child tickets

Work out the total cost of the tickets when Mr Brown uses his Family Railcard.

£.....  
(Total for Question is 4 marks)

## Fractions, Decimals and Percentages

Things to remember:



**Questions:**

1. (a) Write 0.1 as a fraction.

.....  
(1)

- (b) Write  $\frac{1}{4}$  as a decimal.

.....  
(1)

**(Total for Question is 2 marks)**

2. (a) Write  $\frac{3}{4}$  as a decimal.

.....  
(1)

- (b) Write 0.3 as a fraction.

.....  
(1)

**(Total for Question is 2 marks)**

3. (a) Write  $\frac{1}{4}$  as a decimal.

.....  
(1)

- (b) Write 0.15 as a fraction.

.....  
(1)

- (c) Write 17 out of 40 as a fraction.

.....  
(1)

**(Total for question = 3 marks)**

4. (a) Write  $\frac{7}{10}$  as a decimal.

.....

- (b) Write 0.45 as a percentage.

.....

- (c) Write 30% as a fraction.  
Give your fraction in its simplest form.

.....

(2)  
(Total for Question is 4 marks)

5. (a) Write 0.7 as a fraction.

.....

- (b) Write 0.3 as a percentage.

.....

- (c) Write  $\frac{8}{12}$  in its simplest form.

.....

(1)  
(Total for Question is 3 marks)

6. Write these numbers in order of size. Start with the smallest number.

75%       $\frac{7}{8}$       0.25       $\frac{1}{2}$        $\frac{2}{3}$

.....  
(Total for question = 2 marks)

7. Write these numbers in order of size. Start with the smallest number.

0.6       $\frac{2}{3}$       65%      0.606

.....  
(Total for question = 2 marks)



8. Celina and Zoe both sing in a band.  
One evening the band plays for 80 minutes.  
Celina sings for 65% of the 80 minutes.

$$\frac{5}{8}$$

Zoe sings for  $\frac{5}{8}$  of the 80 minutes.  
Celina sings for more minutes than Zoe sings.  
Work out for how many more minutes.  
You must show all your working.

..... minutes  
(Total for question = 4 marks)