

Dear Santa...



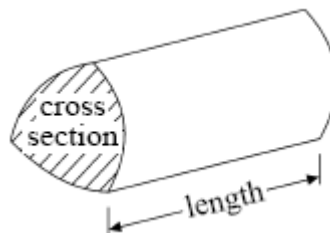
Love from _____

GCSE Mathematics (Linear) 1380

Formulae: Higher Tier

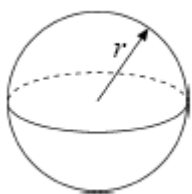
**You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.**

Volume of prism = area of cross section \times length



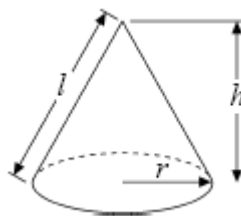
Volume of sphere $\frac{4}{3} \pi r^3$

Surface area of sphere $= 4\pi r^2$

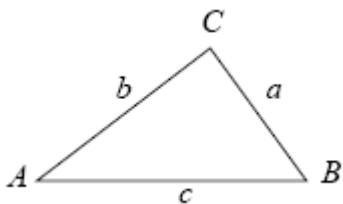


Volume of cone $\frac{1}{3} \pi r^2 h$

Curved surface area of cone $= \pi r l$



In any triangle ABC



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle $= \frac{1}{2} ab \sin C$

June 2009

NON CALCULATOR

1. The two-way table gives some information about how 100 children travelled to school one day.

	Walk	Car	Other	Total
Boy	15		14	54
Girl		8	16	
Total	37		30	100

- (a) Complete the two-way table.

(3)

One of the children is picked at random.

- (b) Write down the probability that this child walked to school that day.

.....
(1)
(Total 4 marks)

2. (a) Simplify $4x + 3y - 2x + 5y$

.....
(2)

Compasses cost c pence each.
Rulers cost r pence each.

- (b) Write down an expression for the total cost, in pence, of 2 compasses and 4 rulers.

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

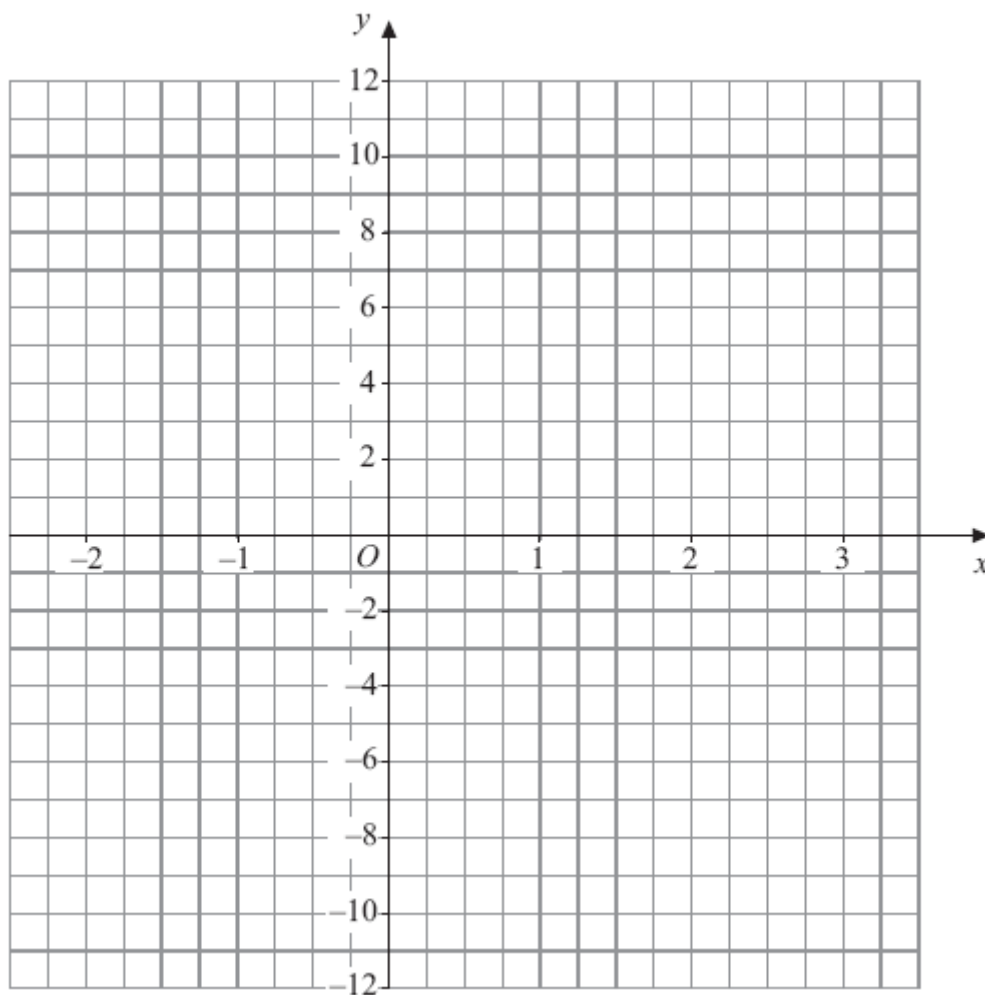


3. (a) Complete the table of values for $y = 4x - 3$

x	-2	-1	0	1	2	3
y	-11		-3			9

(2)

- (b) On the grid, draw the graph of $y = 4x - 3$, for values of x from -2 to 3



(2)

(Total 4 marks)

4. $P = 4k - 10$

$P = 50$

(a) Work out the value of k .

.....
(2)

$y = 4n - 3d$

$n = 2$

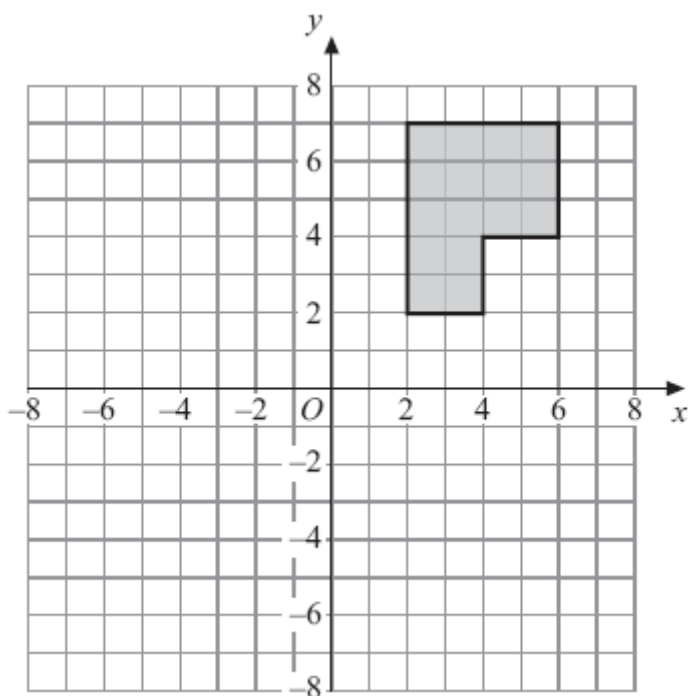
$d = 5$

(b) Work out the value of y .

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

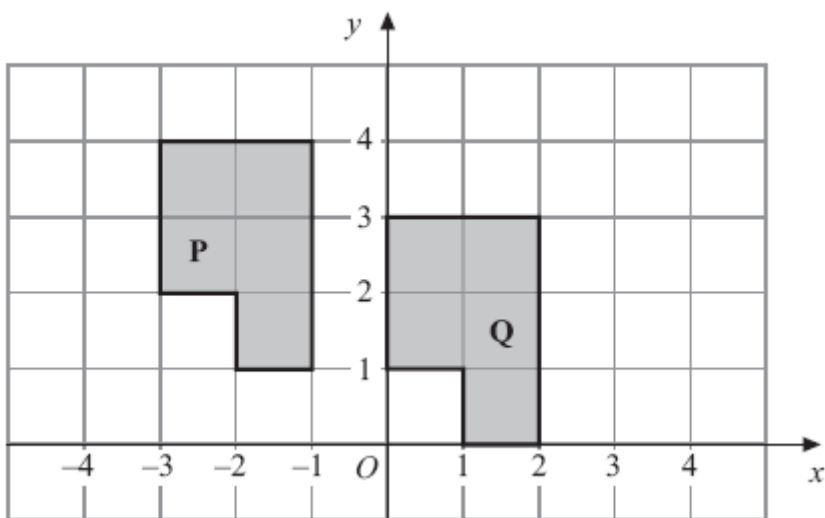


5.



(a) Rotate the shaded shape 90° clockwise about the point O .

(2)



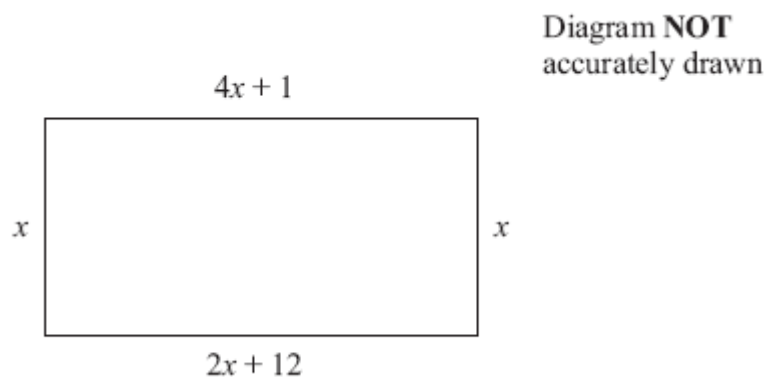
(b) Describe fully the single transformation that will map shape **P** onto shape **Q**.

.....

(2)

(Total 4 marks)

6.



The diagram shows a rectangle.
All the measurements are in centimetres.

- (a) Explain why $4x + 1 = 2x + 12$

.....
(1)

- (b) Solve $4x + 1 = 2x + 12$

$x =$
(2)

- (c) Use your answer to part (b) to work out the perimeter of the rectangle.

..... cm
(2)
(Total 5 marks)

7. Use the information that

$$322 \times 48 = 15\,456$$

to find the value of

(a) 3.22×4.8

.....
(1)

(b) 0.322×0.48

.....
(1)

(c) $15\,456 \div 4.8$

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

8. $2x^2 = 2$

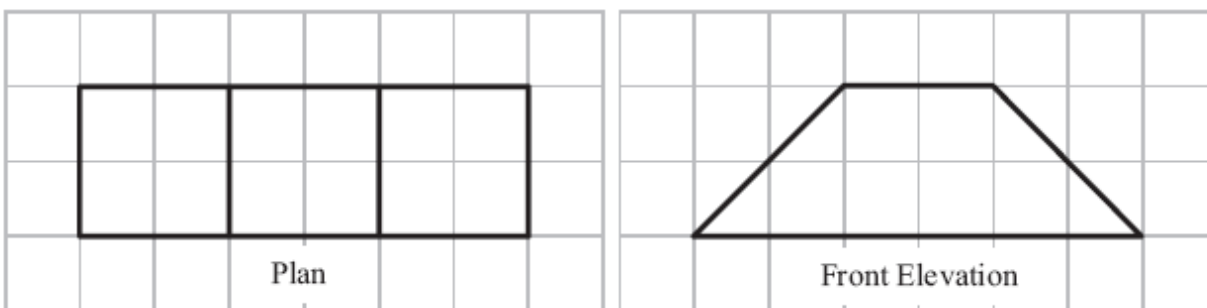
- (a) Find a value of x .

.....
(2)

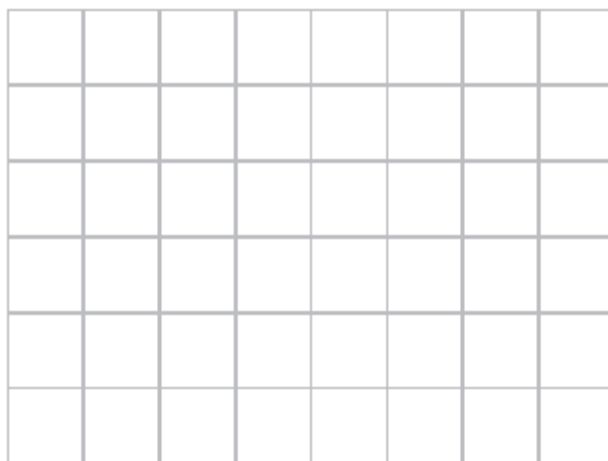
- (b) Express 72 as a product of its prime factors.

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

9. Here are the plan and front elevation of a solid shape.



- (a) On the grid below, draw the side elevation of the solid shape.



(2)

- (b) In the space below, draw a sketch of the solid shape.

(2)

(Total 4 marks)

10. There are 40 litres of water in a barrel.

The water flows out of the barrel at a rate of 125 millilitres per second.

1 litre = 1000 millilitres.

Work out the time it takes for the barrel to empty completely.

..... seconds
(Total 3 marks)



11. The length of a line is 63 centimetres, correct to the nearest centimetre.

(a) Write down the **least** possible length of the line.

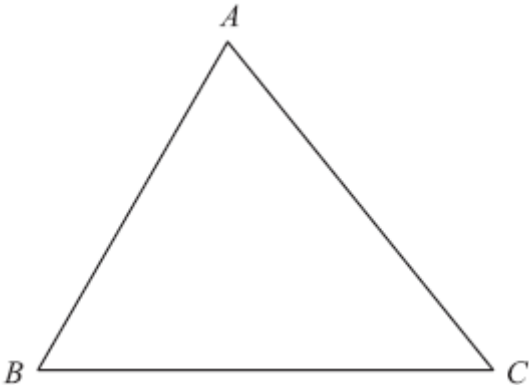
..... centimetres
(1)

(b) Write down the **greatest** possible length of the line.

..... centimetres
(1)

(Total 2 marks)

12.



ABC is a triangle.

Shade the region inside the triangle which is **both**

less than 4 centimetres from the point B
and closer to the line AC than the line AB .

(Total 4 marks)



13. Fred is going to take a survey of the magazines read by students.

He wants to design a questionnaire.

- (a) Design a suitable question that he could use to find out what types of magazine students read.

(2)

Fred put the question below on his questionnaire.

‘How many magazines have you read?’

☐

A few

☐

A lot

- (b) Design a better question.
You should include some response boxes.

(2)

(Total 4 marks)

- 14.** Work out an estimate for the value of

$$\frac{6.8 \times 191}{0.051}$$

.....
(Total 3 marks)

- 15.** (a) Write 64 000 in standard form.

.....
(1)

- (b) Write 156×10^{-7} in standard form.

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

- 16.** (a) Factorise fully $4x^2 - 6xy$

.....
(2)

- (b) Factorise $x^2 + 5x - 6$

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

17.

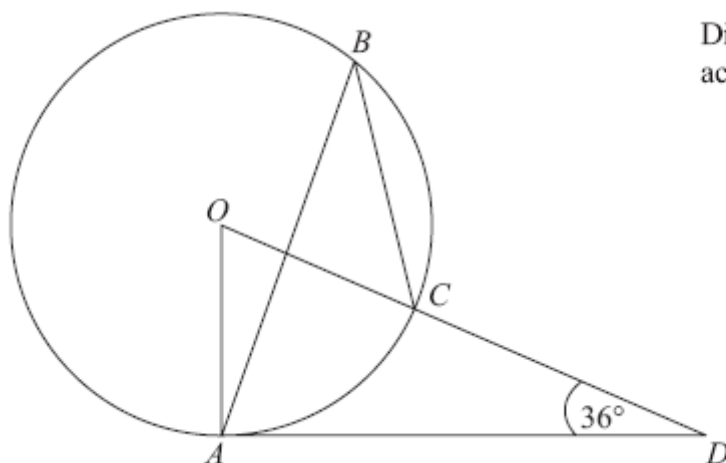


Diagram **NOT**
accurately drawn

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 .

.....^o
(2)

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

.....^o

(ii) Give a reason for your answer.

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

JUNE 2009 CALCULATOR

1. Tania went to Italy.
She changed £325 into euros (€).

The exchange rate was £1 = €1.68

- (a) Change £325 into euros (€).

€
(2)

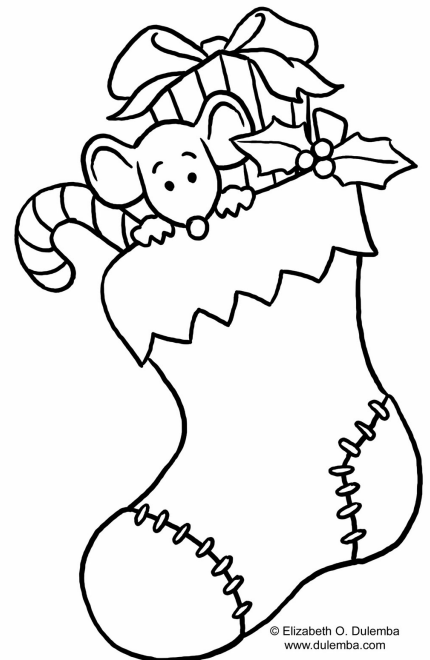
When she came home she changed €117 into pounds.

The new exchange rate was £1 = €1.50

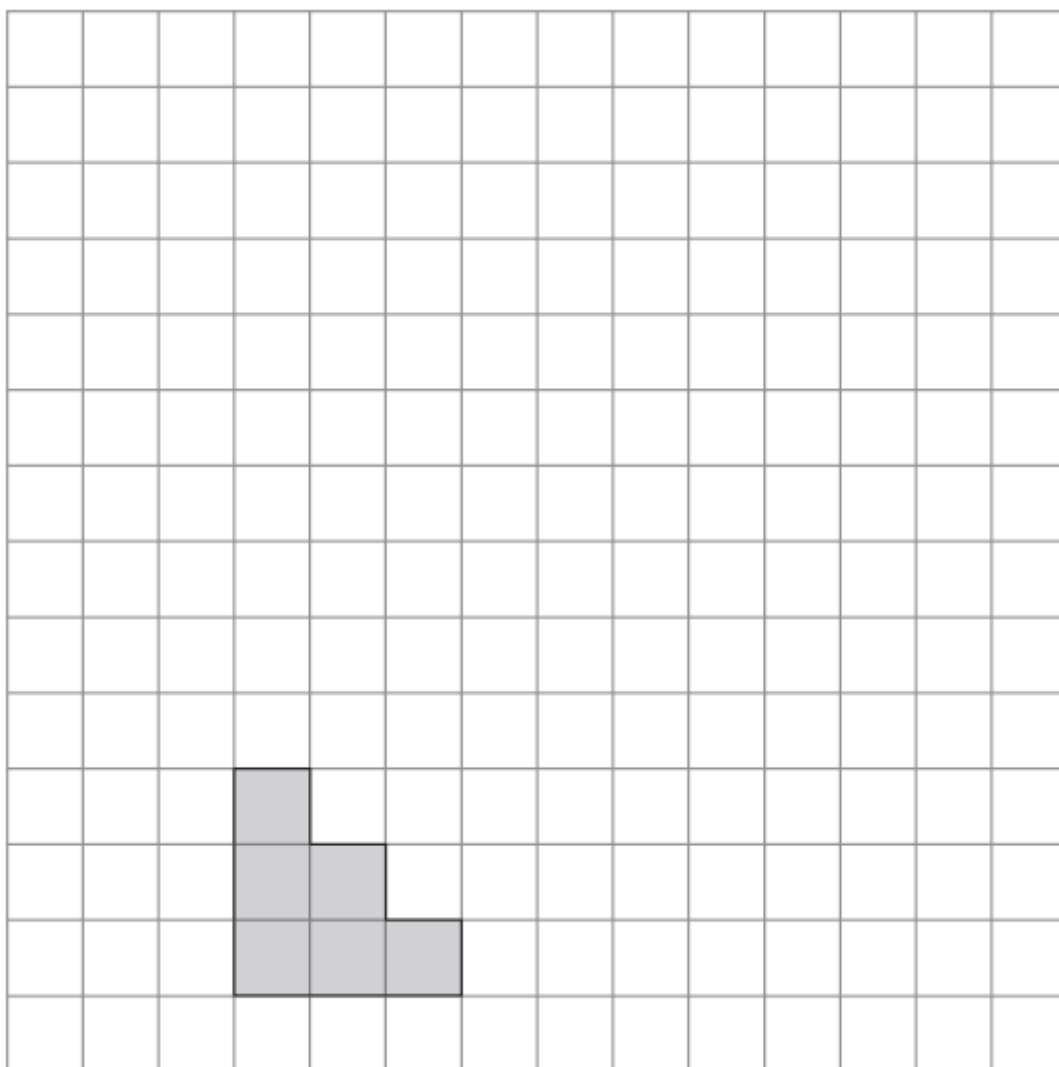
- (b) Change €117 into pounds.

£
(2)

(Total 4 marks)

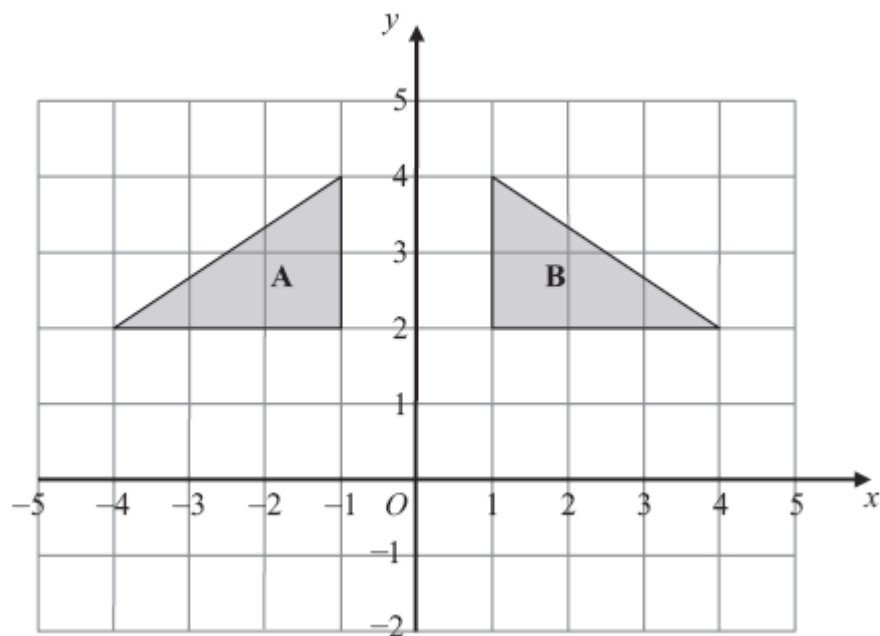


2.



(a) On the grid, draw an enlargement, scale factor 2, of the shaded shape.

(2)



- (b) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

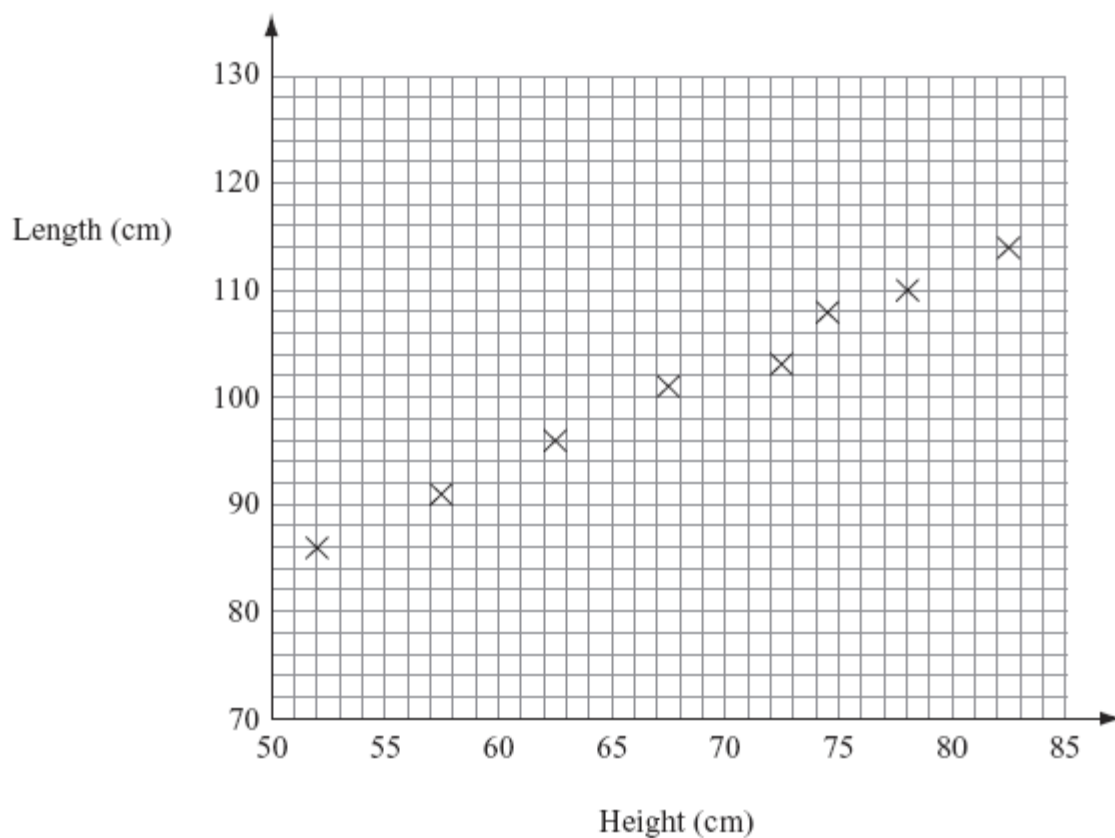
.....
(2)

(Total 4 marks)

3. The n th term of a number sequence is $n^2 + 1$
Write down the first three terms of the sequence.

.....
(Total 2 marks)

4. The scatter graph shows information about eight sheep.
It shows the height and the length of each sheep.



The table gives the height and the length of two more sheep.

Height (cm)	65	80
Length (cm)	100	110

- (a) On the scatter graph, plot the information from the table.

(1)

- (b) Describe the relationship between the height and the length of these sheep.

.....
(1)

The height of a sheep is 76 cm.

- (c) Estimate the length of this sheep.

.....cm
(2)

(Total 4 marks)

5. Julie buys 19 identical calculators.
The total cost is £143.64

Work out the total cost of 31 of these calculators.

£

(Total 3 marks)

6. $F = 1.8C + 32$

- (a) Work out the value of F when $C = -8$

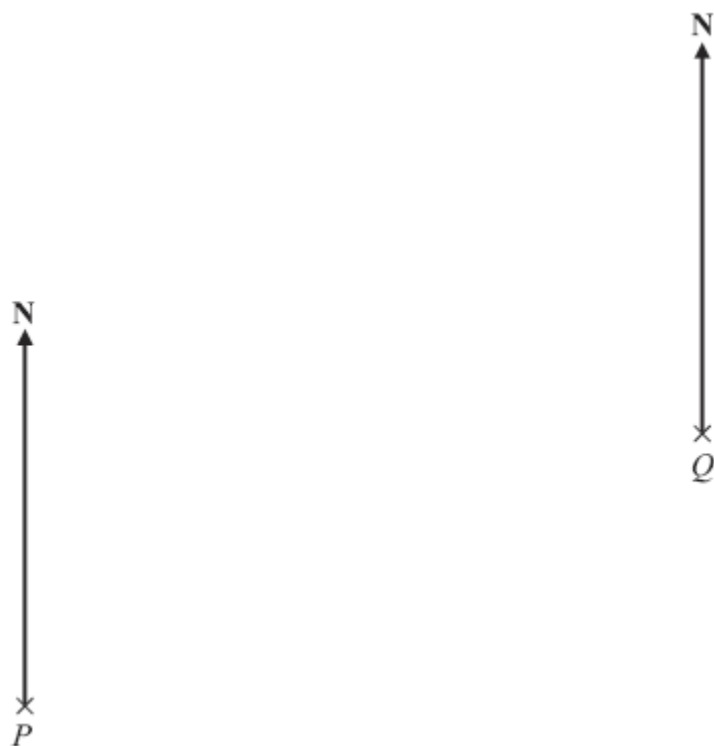
.....
(2)

- (b) Work out the value of C when $F = 68$

.....
(2)

(Total 4 marks)

7. The diagram shows the position of two boats, P and Q .



The bearing of a boat R from boat P is 060°

The bearing of boat R from boat Q is 310°

In the space above, draw an accurate diagram to show the position of boat R .
Mark the position of boat R with a cross (\times). Label it R .

(Total 3 marks)

8. There are some sweets in a bag.

18 of the sweets are toffees.

12 of the sweets are mints.

- (a) Write down the ratio of the number of toffees to the number of mints.
Give your ratio in its simplest form.

..... :
(2)

There are some oranges and apples in a box.

The total number of oranges and apples is 54

The ratio of the number of oranges to the number of apples is 1 : 5

- (b) Work out the number of apples in the box.

.....
(2)

(Total 4 marks)

9. The equation

$$x^3 + 20x = 71$$

has a solution between 2 and 3

Use a trial and improvement method to find this solution.

Give your answer correct to one decimal place.

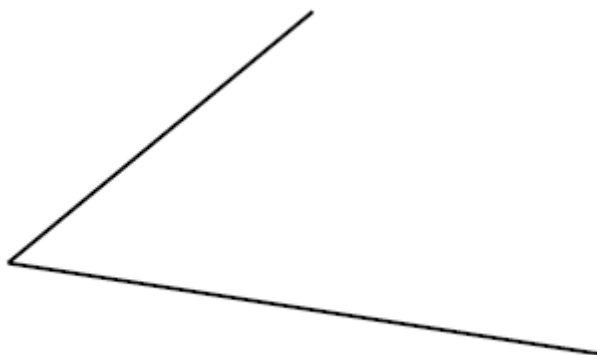
You must show **ALL** your working.

$x = \dots\dots\dots$

(Total 4 marks)



10. Use ruler and compasses to **construct** the bisector of this angle.
You must show all your construction lines.



(Total 2 marks)

11. Tarish says,
‘The sum of two prime numbers is always an even number’.

He is **wrong**.
Explain why.

.....

.....

(Total 2 marks)

12. Sethina recorded the times, in minutes, taken to repair 80 car tyres. Information about these times is shown in the table.

Time(t minutes)	Frequency		
$0 < t \leq 6$	15		
$6 < t \leq 2$	25		
$12 < t \leq 18$	20		
$18 < t \leq 24$	12		
$24 < t \leq 30$	8		

Calculate an estimate for the mean time taken to repair each car tyre.

..... minutes

(Total 4 marks)



13. Here is a tile in the shape of a semicircle.

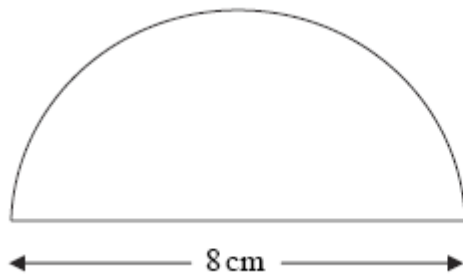


Diagram **NOT**
accurately drawn

The diameter of the semicircle is 8 cm.

Work out the perimeter of the tile.

Give your answer correct to 2 decimal places.

..... cm
(Total 3 marks)

14. (a) Simplify $a \times a \times a$

.....
(1)

(b) Expand $5(3x - 2)$

.....
(1)

(c) Expand $3y(y + 4)$

.....
(2)

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

.....
(2)

(e) Expand and simplify $(x + 4)(x - 3)$

.....
(2)

(Total 8 marks)



NOVEMBER 2009 CALCULATOR

Leave
blank

1. Ali asked 200 students which sport they like best.
They could choose swimming or tennis or athletics.

The two-way table shows some information about their answers.

	Swimming	Tennis	Athletics	Total
Female			19	
Male	36	42		
Total	79		54	200

Complete the two-way table.

Q1

(Total 3 marks)

2. (a) Use your calculator to work out the value of $\frac{8.7 \times 12.3}{9.5 - 5.73}$
Write down all the digits from your calculator.
Give your answer as a decimal.

.....
(2)

- (b) Write your answer to part (a) correct to 1 significant figure.

.....
(1)

(Total 3 marks)

Q2



3. (a) $p = 2$
 $q = -4$

Work out the value of $3p + 5q$

.....
(2)

(b) Factorise $3m - 6$

.....
(1)

(Total 3 marks)

Q3

4. Frank did a survey on the areas of pictures in a magazine.

The magazine had 60 pages.

Frank worked out the area of each of the pictures in the first 2 pages.

This may not be a good method to do the survey.
Explain why.

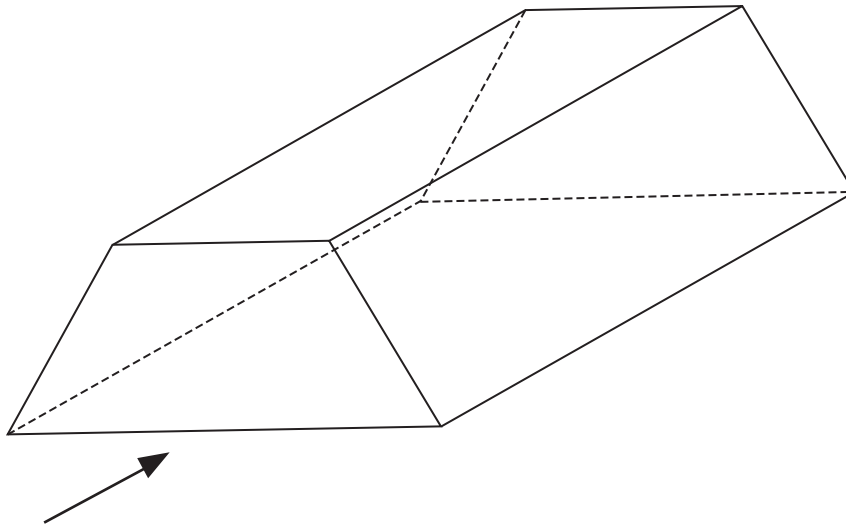
.....
.....

(Total 1 mark)

Q4



5.



The diagram shows a prism.

- (a) On the diagram, draw in **one** plane of symmetry for the prism. (2)
- (b) In the space below, sketch the front elevation from the direction marked with an arrow.

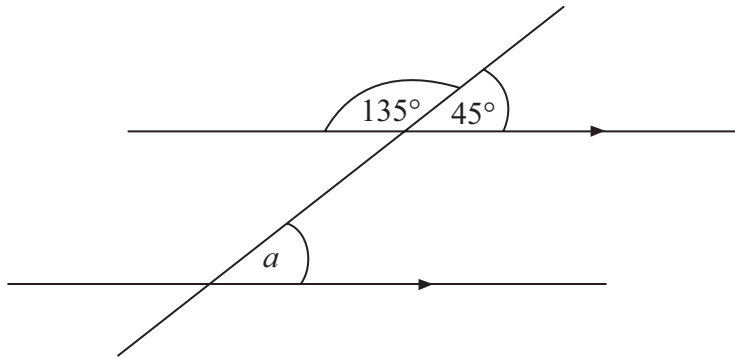
(2) Q5

(Total 4 marks)



6.

Diagram **NOT**
accurately drawn



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

..... °

- (ii) Give a reason for your answer.

.....

Q6

(Total 2 marks)

7. A circle has a radius of 5 cm.

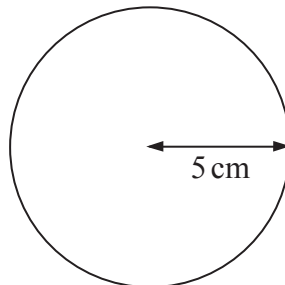


Diagram **NOT**
accurately drawn

Work out the area of the circle.
Give your answer correct to 3 significant figures.

..... cm^2

Q7

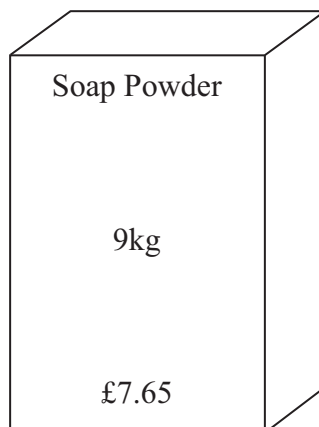
(Total 2 marks)



8. Soap powder is sold in two sizes of box.



Small box



Large box

A small box contains 2 kg of soap powder and costs £1.72

A large box contains 9 kg of soap powder and costs £7.65

Which size of box gives the better value for money?

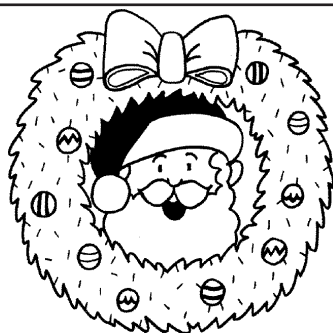
.....

Explain your answer.

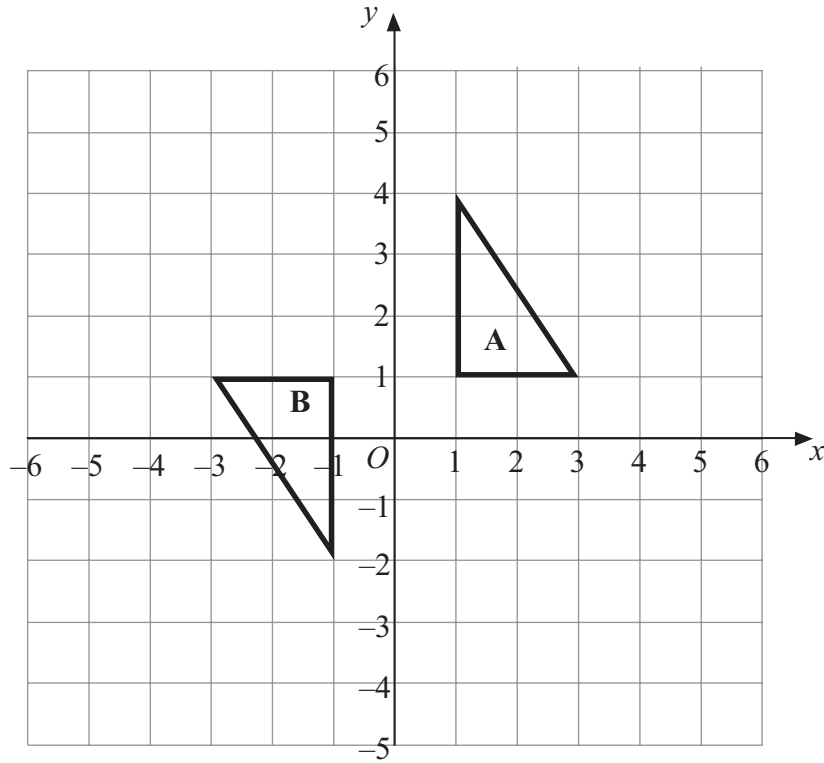
You must show all your working.

Q8

(Total 3 marks)



9.



Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....
.....

Q9

(Total 3 marks)

10. A computer costs £360 plus $17\frac{1}{2}\%$ VAT.

Calculate the total cost of the computer.



£360

plus

$17\frac{1}{2}\%$ VAT

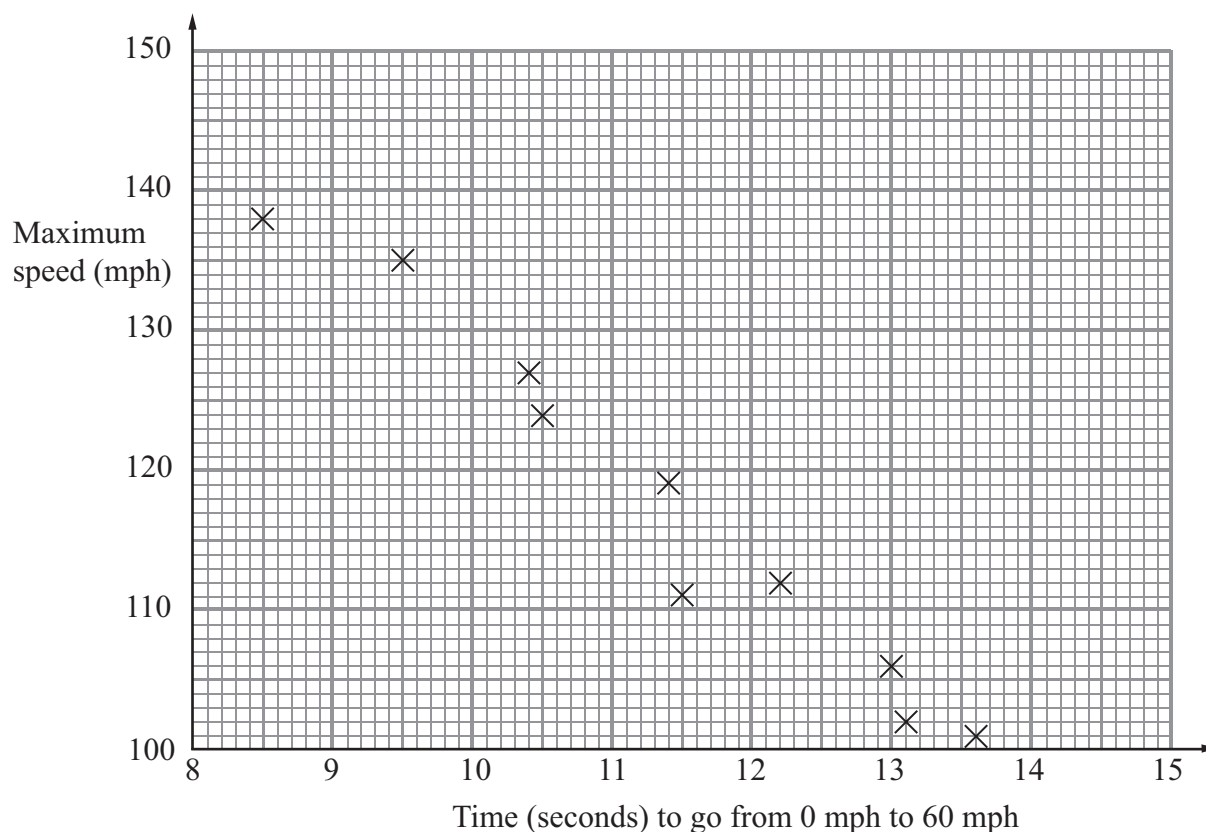
£

Q10

(Total 3 marks)



11. The scatter graph shows some information about 10 cars.
It shows the time, in seconds, it takes each car to go from 0 mph to 60 mph.
For each car, it also shows the maximum speed, in mph.



- (a) What type of correlation does this scatter graph show?

.....
(1)

The time a car takes to go from 0 mph to 60 mph is 11 seconds.

- (b) Estimate the maximum speed for this car.

..... mph
(2)

(Total 3 marks)

Q11



12.

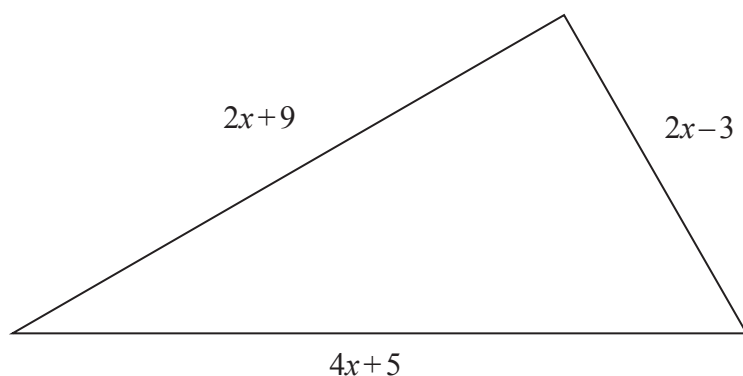


Diagram **NOT**
accurately drawn

In the diagram, all measurements are in centimetres.

The lengths of the sides of the triangle are

$2x+9$
 $2x-3$
 $4x+5$

- (a) Find an expression, in terms of x , for the perimeter of the triangle.
Give your expression in its simplest form.

.....
(2)

The perimeter of the triangle is 39 cm.

- (b) Find the value of x .

$x =$
(2)

(Total 4 marks)

Q12



- 13.** A piece of wood is 180 cm long.
Tom cuts it into three pieces in the ratio 2 : 3 : 4

Work out the length of the longest piece.

..... cm

(Total 3 marks)

Q13

- 14.** The equation

$$x^3 + 2x = 60$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.

Give your answer correct to 1 decimal place.

You must show all your working.

$x =$

(Total 4 marks)

Q14



15. (a) Simplify $m^3 \times m^4$

.....
(1)

(b) Simplify $p^7 \div p^3$

.....
(1)

(c) Simplify $4x^2y^3 \times 3xy^2$

.....
(2)

Q15

(Total 4 marks)

16.

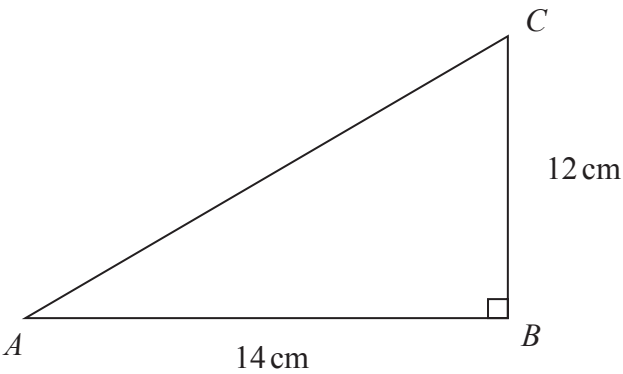


Diagram **NOT**
accurately drawn

ABC is a right-angled triangle.
 $AB = 14 \text{ cm}$.
 $BC = 12 \text{ cm}$.

Calculate the length of AC .
Give your answer correct to 3 significant figures.

..... cm

Q16

(Total 3 marks)

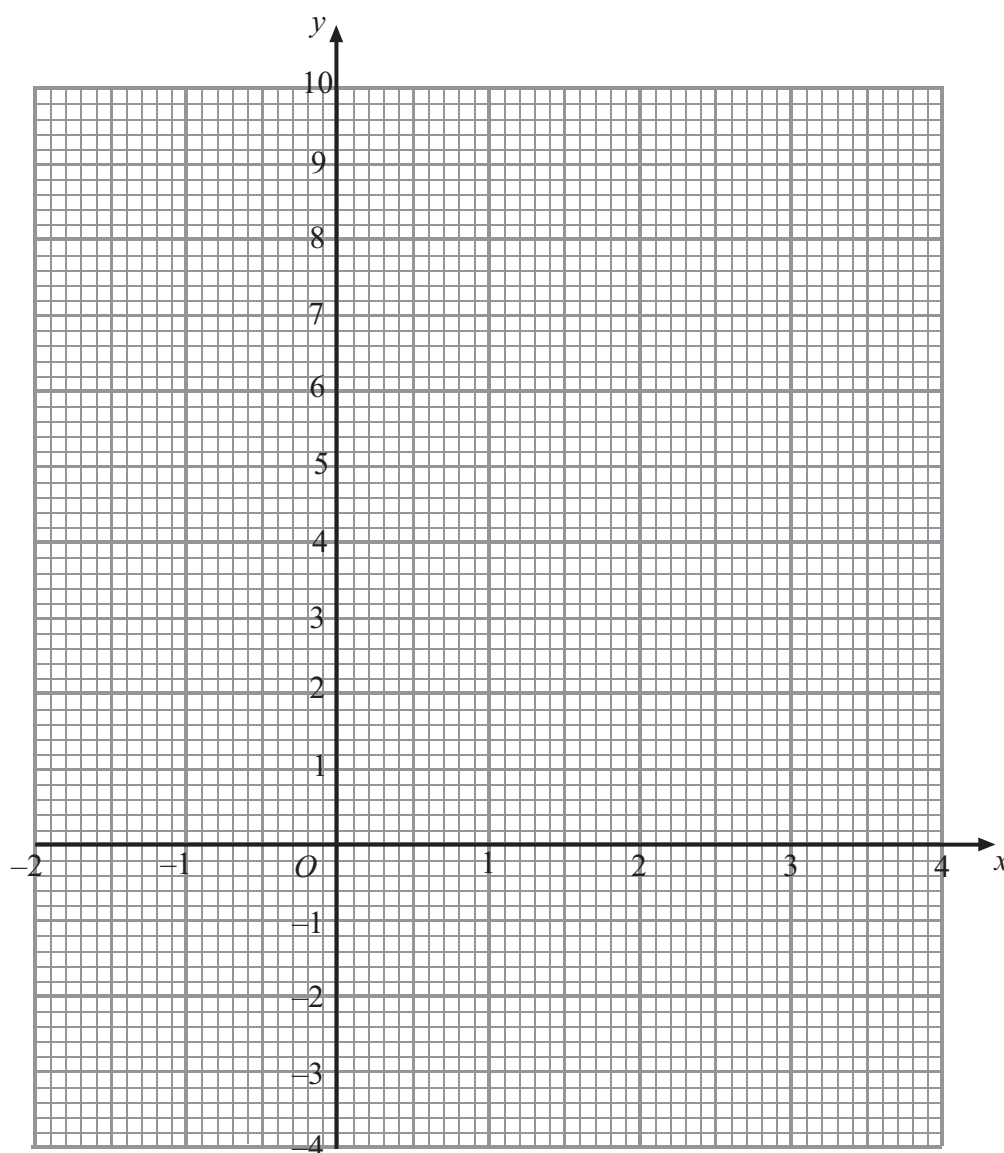


17. (a) Complete the table of values for $y = x^2 - 3x - 1$

x	-2	-1	0	1	2	3	4
y		3	-1	-3		-1	

(2)

(b) On the grid, draw the graph of $y = x^2 - 3x - 1$ for values of x from -2 to 4



(2)

Q17

(Total 4 marks)



18. The table shows some information about the heights (h cm) of 100 students.

Height (h cm)	Frequency		
$120 \leq h < 130$	8		
$130 \leq h < 140$	16		
$140 \leq h < 150$	25		
$150 \leq h < 160$	30		
$160 \leq h < 170$	21		

(a) Find the class interval in which the median lies.

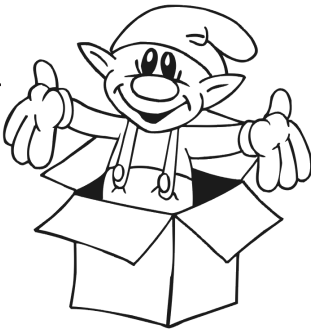
.....
(1)

(b) Work out an estimate for the mean height of the students.

..... cm
(4)

(Total 5 marks)

018



November 2009

NON CALCULATOR

1. Using the information that

$$74 \times 234 = 17\,316$$

write down the value of

(a) 740×234

.....
(1)

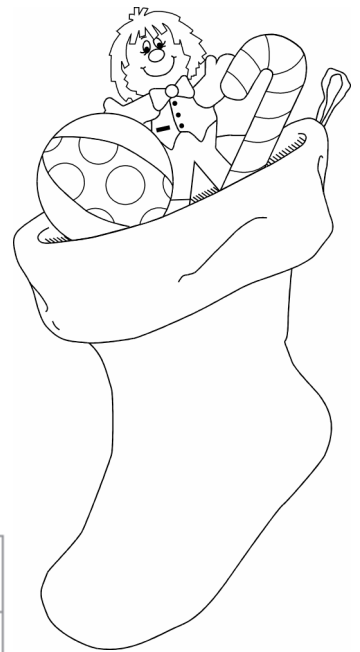
(b) 74×2.34

.....
(1)

(Total 2 marks)

2. Work out an estimate for the value of $\frac{31 \times 4.92}{0.21}$

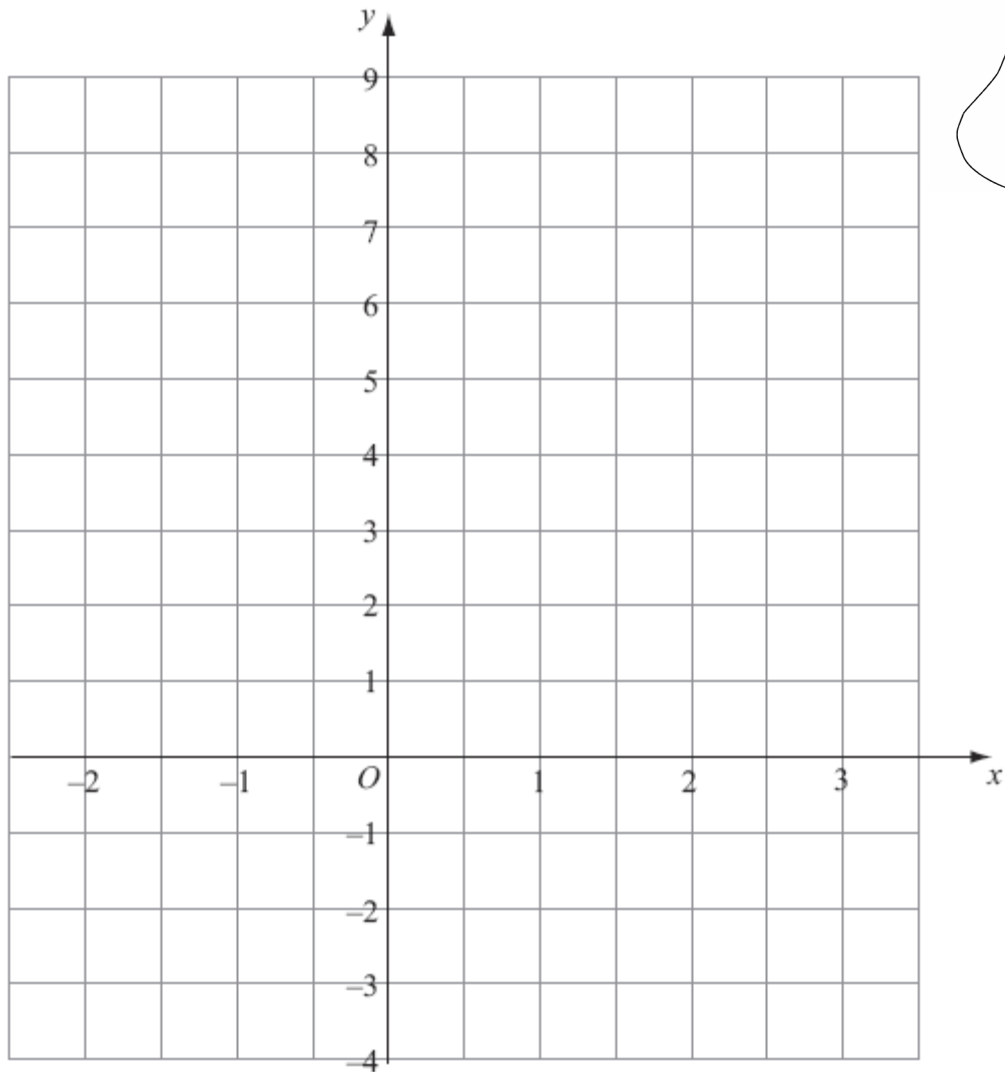
.....
(Total 3 marks)



3. (a) Complete the table of values for $y = 2x + 2$

x	-2	-1	0	1	2	3
y		0	2			

- (b) On the grid, draw the graph of $y = 2x + 2$



(2)

- (c) Use your graph to find

(i) the value of y when $x = -1.5$

$y = \dots\dots\dots$

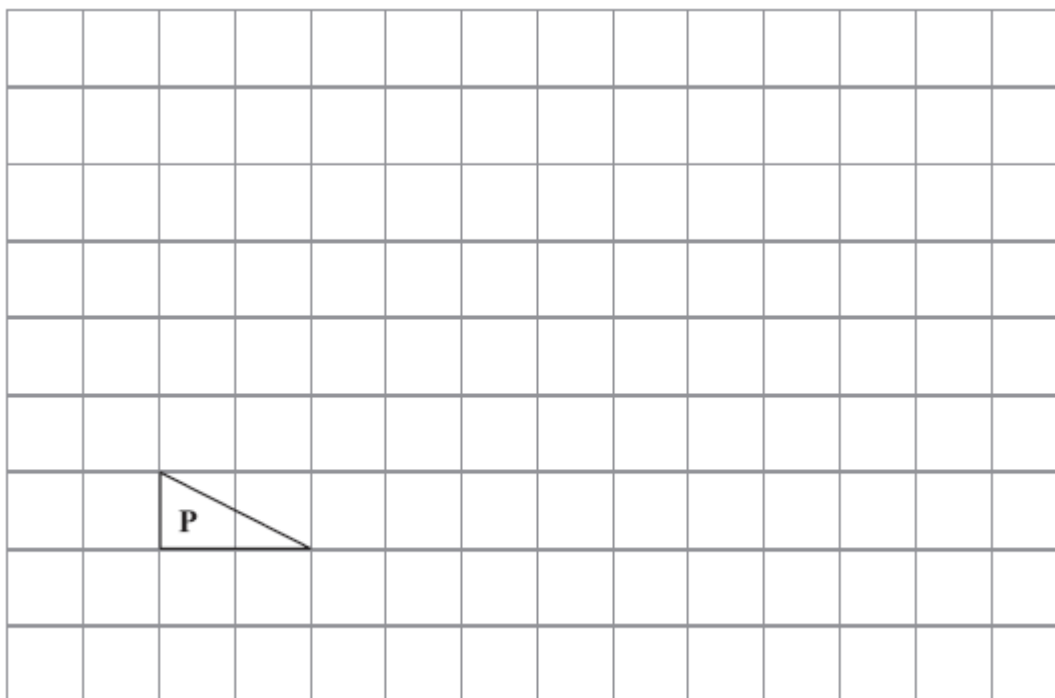
(ii) the value of x when $y = 7$

$x = \dots\dots\dots$

(2)

(Total 6 marks)

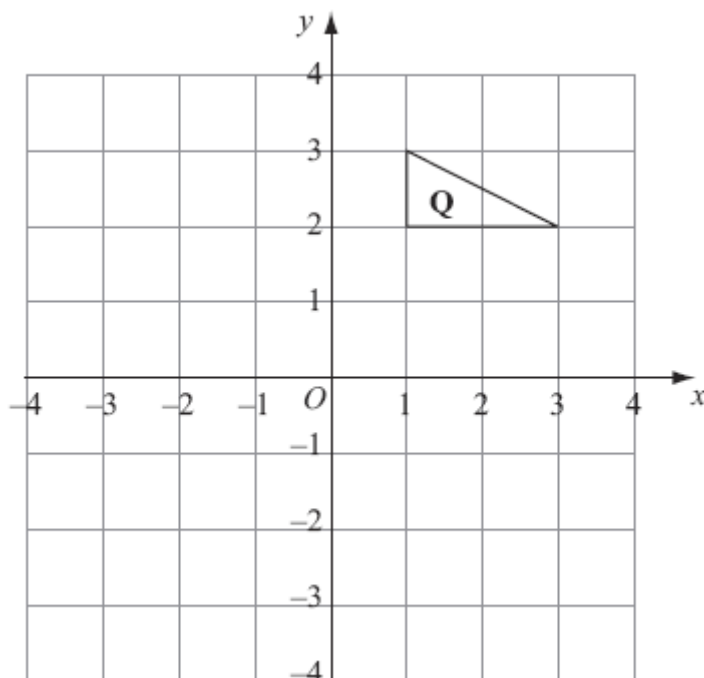
4.



Triangle **P** has been drawn on a grid.

- (a) On the grid, draw an enlargement of the triangle **P** with scale factor 3

(2)



Triangle **Q** has been drawn on a grid.

- (b) On the grid, rotate triangle **Q** 90° clockwise, centre O .

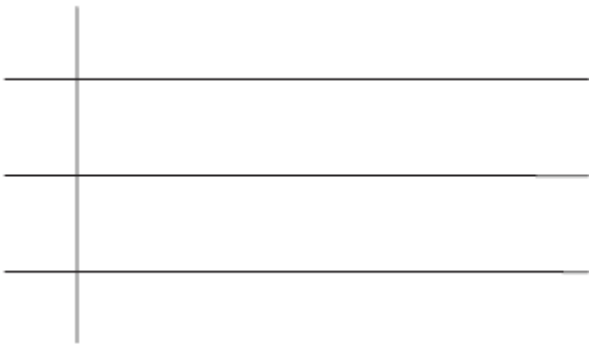
(3)

(Total 5 marks)

5. Here are the weights in grams, to the nearest gram, of 15 eggs.

33	46	41	54	51
38	60	44	55	51
62	55	52	37	63

- (a) Complete the ordered stem and leaf diagram to show this information.
You must include a key.



Key

(3)

Meg is going to pick at random one of the eggs.

- (b) Work out the probability that this egg will have a weight of more than 45 grams.

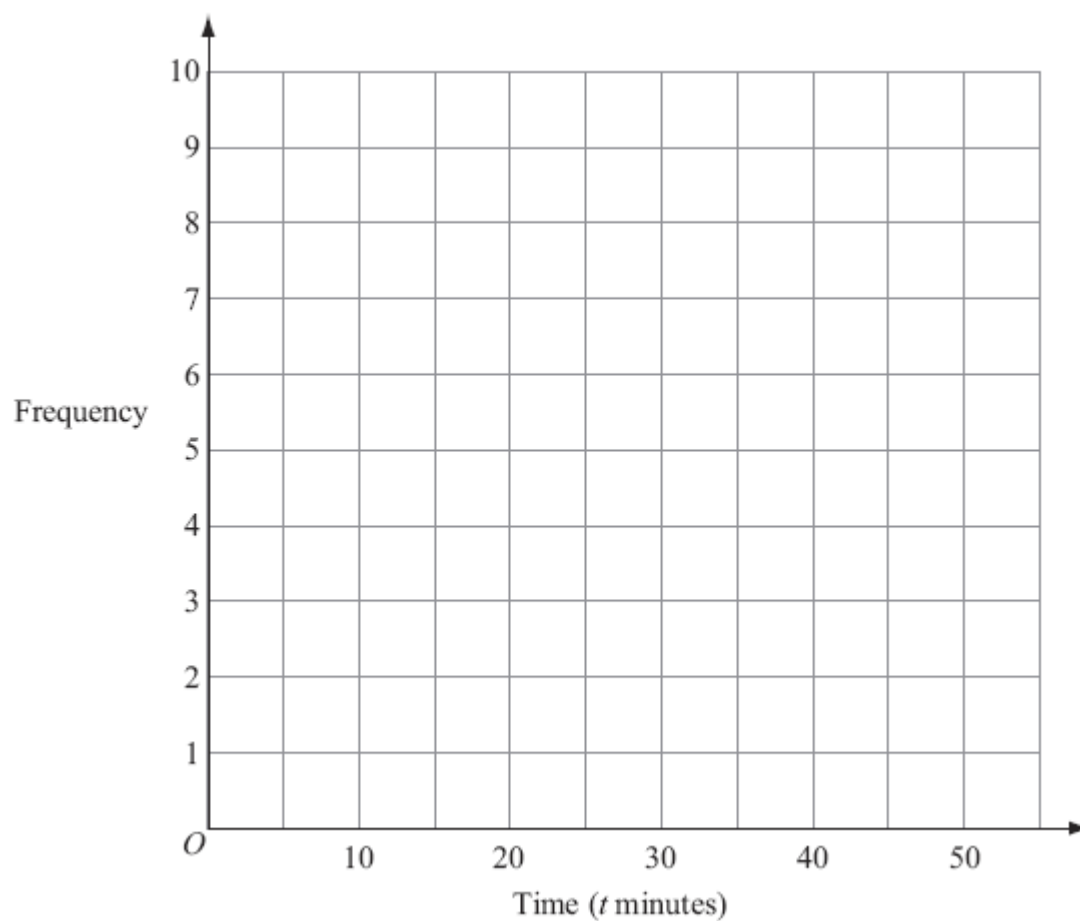
.....
(2)

(Total 5 marks)

6. 30 students took a test.
The table shows information about how long it took them to complete the test.

Time (t minutes)	Frequency
$0 < t \leq 10$	5
$10 < t \leq 20$	7
$20 < t \leq 30$	8
$30 < t \leq 40$	6
$40 < t \leq 50$	4

- (a) On the grid, draw a frequency polygon for this information.

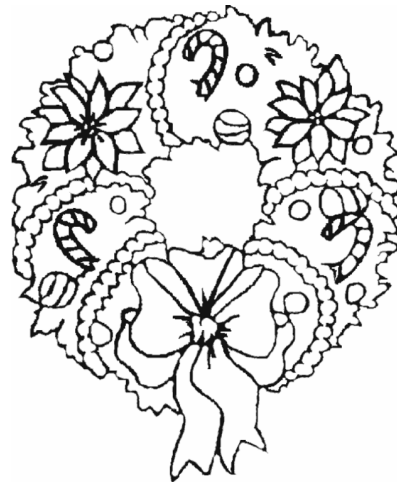


(2)

- (b) Write down the modal class interval.

(1)

(Total 3 marks)



7. (a) Work out $\frac{3}{8} + \frac{1}{4}$

Give your answer in its simplest form.

.....
(2)

(b) Work out $\frac{2}{3} \times \frac{4}{5}$

.....
(2)

(c) Work out 423×12

You **must** show **all** your working.

.....
(3)
(Total 7 marks)

8. Simon wants to find out how much people spend using their mobile phone.

He uses this question on a questionnaire.

How much do you spend using your mobile phone?		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
£1–£5	£5–£10	£10–£15

- (a) Write down **two** things that are wrong with this question.

1

.....

2

.....

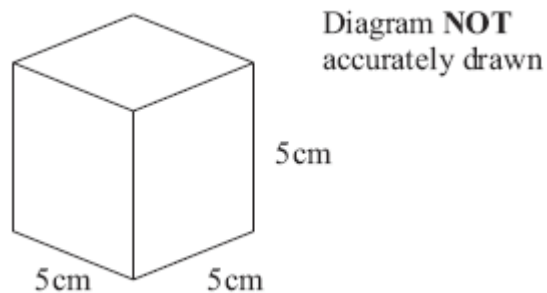
(2)

- (b) Design a better question for his questionnaire to find out how much people spend using their mobile phone.
You should include some response boxes.

(2)

(Total 4 marks)

9. (a) A solid cube has sides of length 5 cm.



Work out the total surface area of the cube.
State the units of your answer.

.....
(4)

The volume of the cube is 125 cm^3 .

- (b) Change 125 cm^3 into mm^3 .

..... mm^3
(2)

The weight of the cube is 87 grams, correct to the nearest gram.

- (c) (i) What is the minimum the weight could be?

..... grams

- (ii) What is the maximum the weight could be?

..... grams
(2)

(Total 8 marks)

10. (a) Simplify $3a + 4c - a + 3c$

.....
(2)

(b) Expand $y(2y - 3)$

.....
(1)

(c) Factorise $x^2 - 4x$

.....
(2)

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

.....
(2)

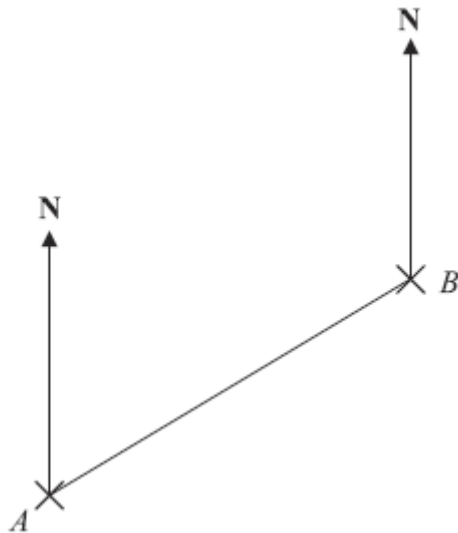
(e) Solve $3(x + 2) = 8$

$x =$
(2)

(Total 9 marks)



11. The diagram shows the positions of two telephone masts, A and B , on a map.



(a) Measure the bearing of B from A .

.....°
(1)

Another mast C is on a bearing of 160° from B .

On the map, C is 4 cm from B .

(b) Mark the position of C with a cross (\times) and label it C .

(2)

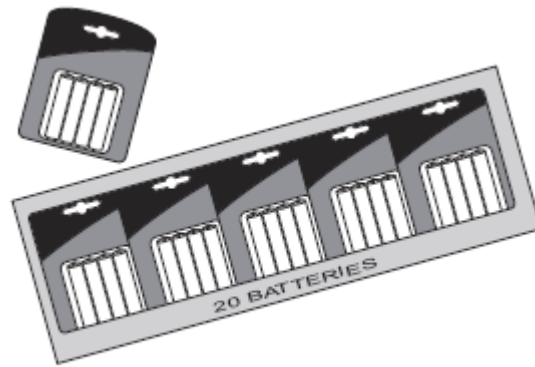
(Total 3 marks)

12. Batteries are sold in packets and boxes.

Each packet contains 4 batteries.
Each box contains 20 batteries.

Bill buys p packets of batteries
and b boxes of batteries.

Bill buys a total of N batteries.
Write down a formula for N in
terms of p and b .



.....
(Total 3 marks)

13. (a) Write in standard form 213 000

.....
(1)

- (b) Write in standard form 0.00123

.....
(1)

(Total 2 marks)

14. (a) Write down the value of 5^0

.....
(1)

- (b) Write down the value of 2^{-1}

.....
(1)

(Total 2 marks)

15. k is an integer such that $-1 \leq k < 3$

(a) List all the possible values of k .

.....
(2)

(b) Solve the inequality $6y \geq y + 10$

.....
(2)

(Total 4 marks)

16. Make q the subject of the formula $5(q + p) = 4 + 8p$
Give your answer in its simplest form.

$q =$
(Total 3 marks)