Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						1	3	8	0	/	4	H	Signature	

Paper Reference(s)

1380/4H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Linear) – 1380

Paper 4 (Calculator)

Higher Tier

Friday 12 November 2010 – Morning

Time: 1 hour 45 minutes

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 28 questions in this question paper. The total mark for this paper is 100.
There are 28 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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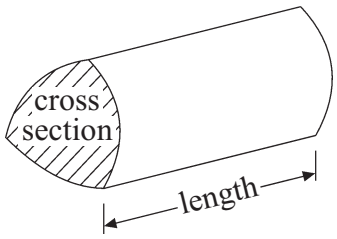
GCSE Mathematics (Linear) 1380

Formulae: Higher Tier

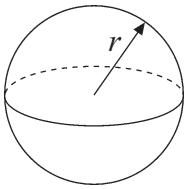
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



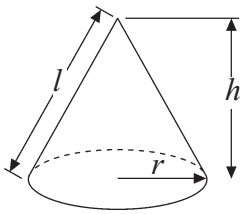
Volume of sphere $= \frac{4}{3}\pi r^3$

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

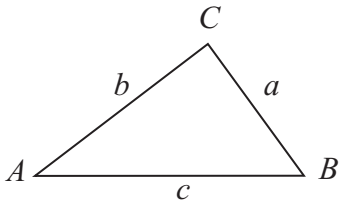


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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 $= \frac{1}{2}ab\sin C$

The Quadratic Equation

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

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

Leave blank

Answer ALL TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1.

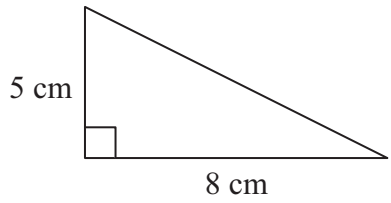


Diagram **NOT** accurately drawn

Work out the area of this right-angled triangle.

Area of triangle $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 5 \times 8$

$= 20 cm^2$

20 ..... cm^2

(Total 2 marks)

Q1

2. A spinner can land on red or blue or pink.
The table shows the probabilities that the spinner will land on red or on blue.

Colour	red	blue	pink
Probability	0.58	0.30	0.12

Work out the probability that the spinner will land on pink.

$0.58 + 0.30 = 0.88$

$1.00 - 0.88 = 0.12$

0.12 .....

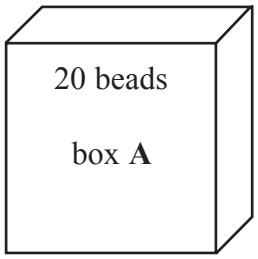
(Total 2 marks)

Q2

Leave blank

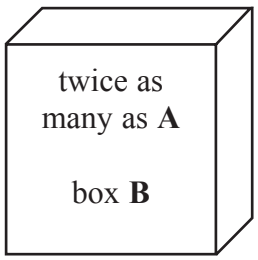
3. There are 20 beads in box **A**.

20



In box **B** there are twice as many beads as in box **A**.

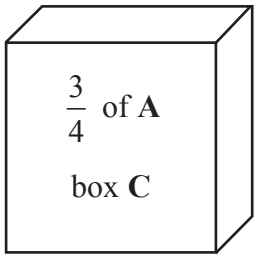
$2 \times 20 = 40$



In box **C** there are $\frac{3}{4}$ of the number of beads as in box **A**.

$20 \div 4 = 5$

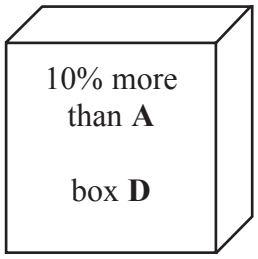
$5 \times 3 = 15$



In box **D** there are 10% **more** beads than in box **A**.

10% of 20 = 2

$20 + 2 = 22$



Work out the **total** number of beads in the four boxes.

$$\begin{array}{r} 20 \\ 40 \\ 15 \\ +\ 22 \\ \hline 97 \end{array}$$

97 ..... beads

(Total 4 marks)

Q3

Leave blank

4. Here is a list of ingredients to make melon sorbet for **6** people.

Melon Sorbet
for 6 people

800 g	melon
4	egg whites
$\frac{1}{2}$	lime
100 g	caster sugar

Terry makes melon sorbet for 18 people.

(a) Work out how much caster sugar he uses.

18 people is 6 ...

100g × 3 = 300g

300 g

(2)

Hedley makes melon sorbet.
He uses 2 limes.

(b) Work out how many people he makes melon sorbet for.

2 limes is 4 x as many as $\frac{1}{2}$ a lime

so Hedley makes sorbet for 6×4 = 24 people

24

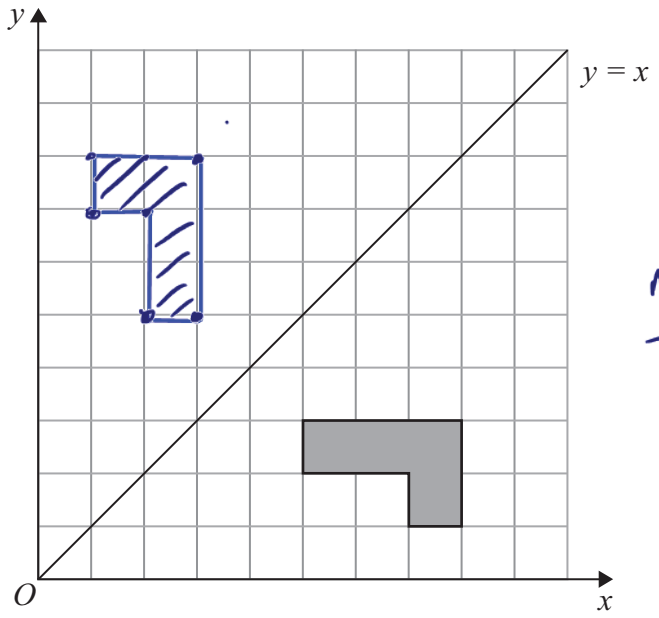
(2)

Q4

(Total 4 marks)

Leave blank

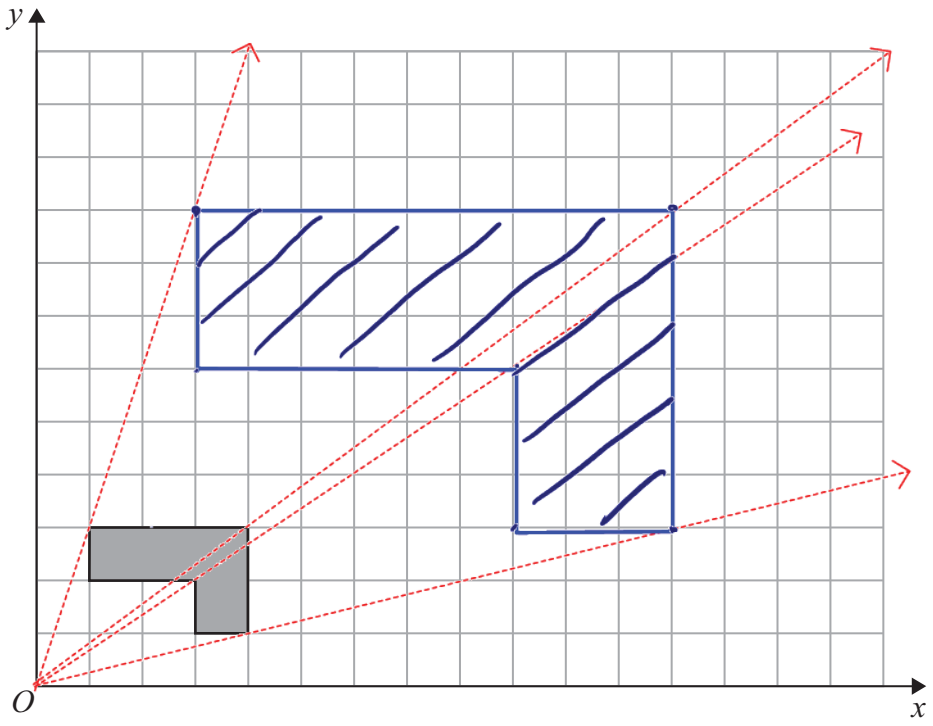
5.



MARK IN THE CORNERS

(a) Reflect the shaded shape in the line $y = x$.

(2)



(b) On the grid, enlarge the shaded shape by a scale factor of 3, centre O.

(3) **Q5**

(Total 5 marks)

Leave blank

6. (a) Simplify $7x + 2y - x + 3y$

$7x - x + 2y + 3y$

$= 6x + 5y$

$6x + 5y$

(2)

(b) Solve $2x + 3 = 10$

$(-3)\quad 2x = 7$

$(\div 2)\quad x = 3.5$

$x =$ 3.5

(2)

(c) Simplify

(i) $c^5 \times c^6$ $= c^{5+6} = c^{11}$

c^{11}

(ii) $e^{12} \div e^4$ $= e^{12-4} = e^8$

e^8

(2)

Q6

(Total 6 marks)

7. Noah got 8 out of 20 in a test.

Write 8 out of 20 as a percentage.

$\frac{8}{20} \xrightarrow{\times 5} \frac{40}{100} = 40\%$

or $\frac{8}{20} = 0.4$ $0.4 \times 100 = 40\%$

40 %

Q7

(Total 2 marks)

Leave blank

8. The table shows some information about the ages, in years, of 60 people.

Age (in years)	Frequency
0 to 9	6
10 to 19	13
20 to 29	12
30 to 39	9
40 to 49	7
50 to 59	3
60 to 69	10

modal class → 10 to 19

13 ← most frequent

cf: 6, 19, 31, 40, 47, 50, 60

(a) Write down the modal class.

10 to 19

(1)

Luke says

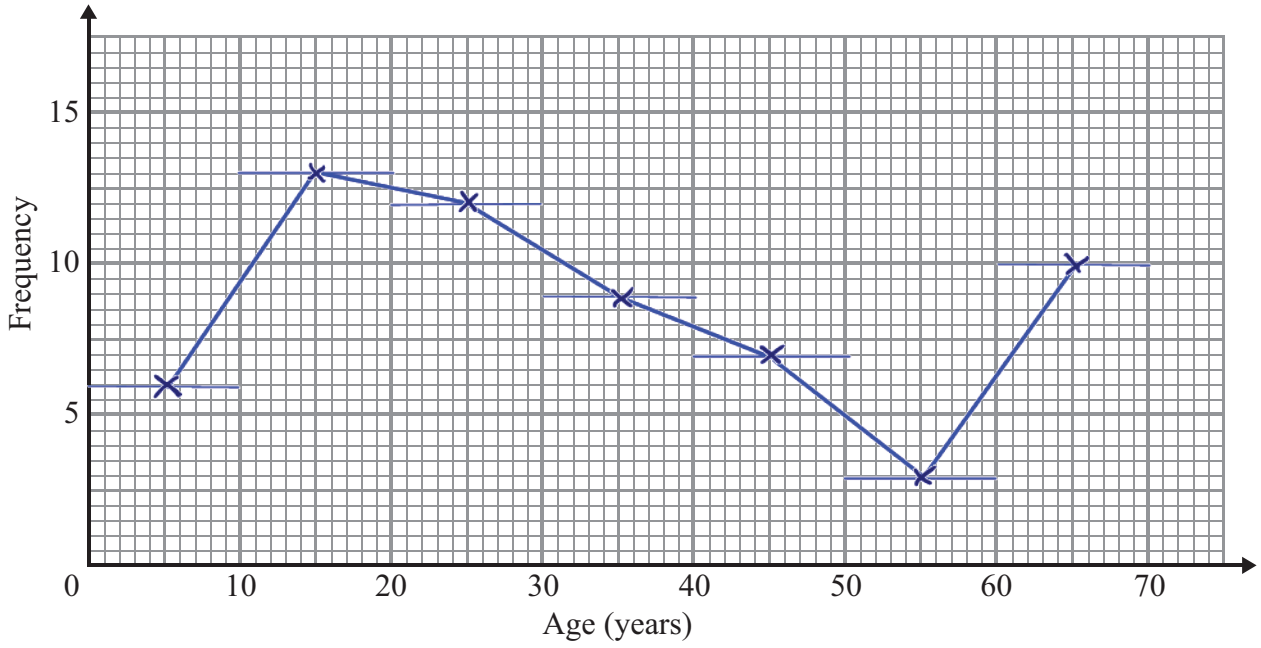
'The median lies in the class 30 to 39'

Luke is wrong.

(b) Explain why.

The middle observations from 60 are the 30th and 31st. Using cumulative frequency we can see the 30th and 31st observations lie in the class 20 to 29.

(1)



(c) On the grid, draw a frequency polygon for the information in the table.

(2)

(Total 4 marks)

Q8

Leave blank

9. Use your calculator to work out

$$\frac{13.7 + 5.86}{2.54 \times 3.17}$$

Write down all the figures on your calculator display.
You must give your answer as a decimal.

2.429270474

Q9

(Total 2 marks)

10. $-3 < k \leqslant 2$
k is an integer.

(a) Write down all the possible values of k.

$-2, -1, 0, 1, 2$

(2)

(b) Solve the inequality $\frac{2x}{3} < 10$

$(\times 3)$ $2x < 30$

$(\div 2)$ $x < 15$

$x < 15$

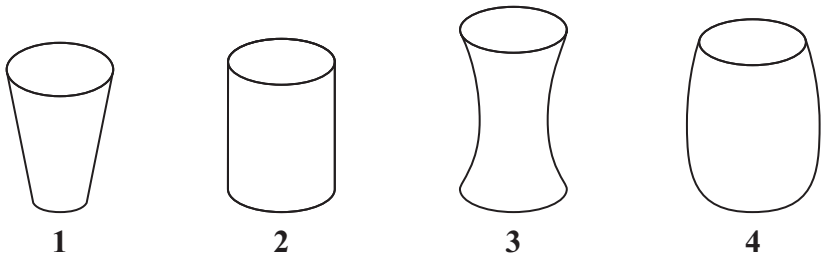
(2)

Q10

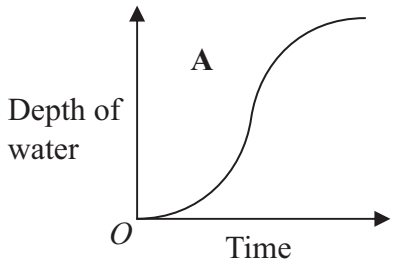
(Total 4 marks)

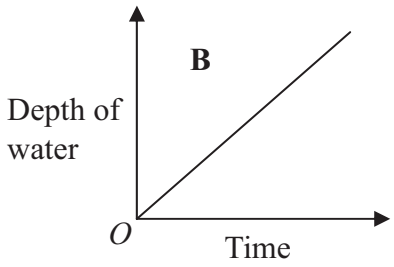
Leave blank

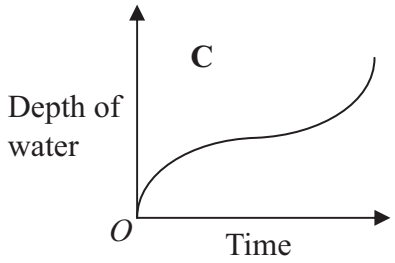
11. Here are four containers.
Water is poured into each container at a constant rate.

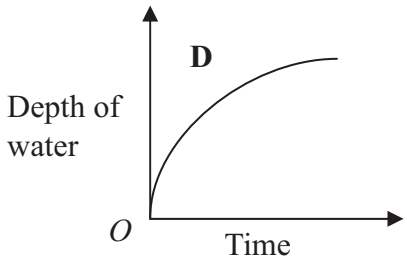


Here are four graphs.
The graphs show how the depth of the water in each container changes with time.









Match each graph with the correct container.

A and 3

B and 2

C and 4

D and 1

Q11

(Total 2 marks)

Leave blank

12. A shop sells small boxes and large boxes for storing CDs.

A small box stores x CDs.
A large box stores y CDs.

Ethan buys 7 small boxes.
He also buys 5 large boxes.

Ethan can store a total of T CDs in these boxes.

Write down a formula for T in terms of x and y.

$T = 7x + 5y$

$T = 7x + 5y$ .....

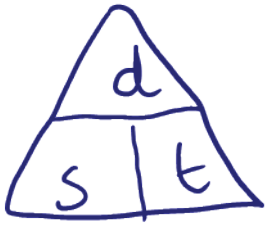
Q12

(Total 3 marks)

13. A family went on holiday to Miami.
They travelled from London by plane.

The distance from London to Miami is 7120 km.
The plane journey took 8 hours.

Calculate the average speed of the plane.



$S = \frac{d}{t}$

$S = \frac{7120}{8} = 890 \text{ Km/h}$

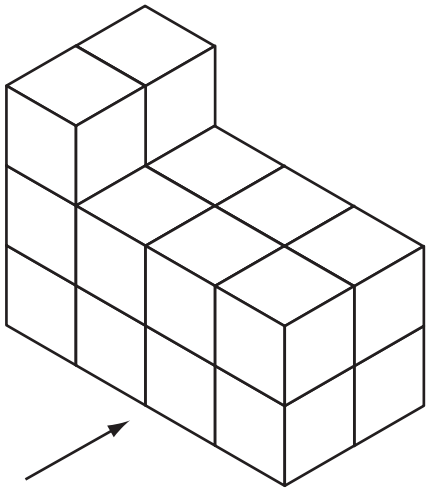
890 .....km/h

Q13

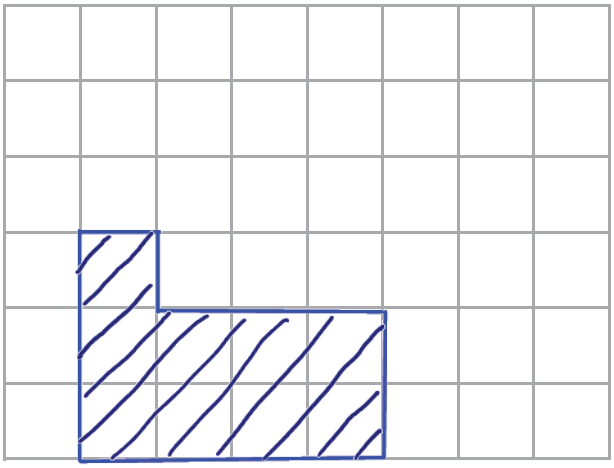
(Total 2 marks)

Leave blank

14. The diagram shows a solid prism made from centimetre cubes.

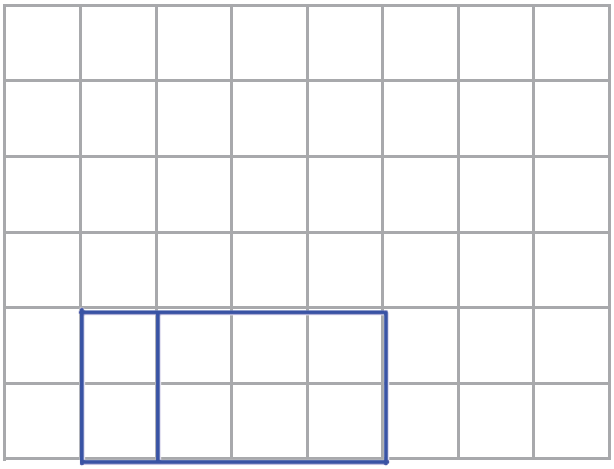


(a) On the centimetre square grid, draw the front elevation of the solid prism from the direction shown by the arrow.



(2)

(b) On the centimetre square grid below, draw the plan of the solid prism.



(2) **Q14**

(Total 4 marks)

Leave blank

15. 200 students in Year 11 took a mathematics test.
Kamini wants to find out whether students in Year 11 like mathematics.

For her sample she asks the 20 students who got the highest marks in the test.

This is **not** a good sample to use.

(a) Write down **one** reason why.

The sample would not be representative of all students who study mathematics.

(1)

She uses this question on her questionnaire.

What do you think of mathematics?

☐ Excellent ☐ Very good ☐ Good

(b) Write down **one** thing that is wrong with this question.

The ratings are subjective.

There is no option to indicate that students don't like mathematics.

(1)

Kamini also wants to find out how many hours students spend on their mathematics homework.

(c) Design a suitable question that Kamini could use on her questionnaire.
You must include some response boxes.

How many hours per week do you spend on mathematics homework?

☐ less than 1 hour ☐ 1-2 hours per week ☐ 3-4 hours per week ☐ 5 or more hours per week

(2)

Q15

(Total 4 marks)

Leave blank

16. G and H are vertices of a cuboid.

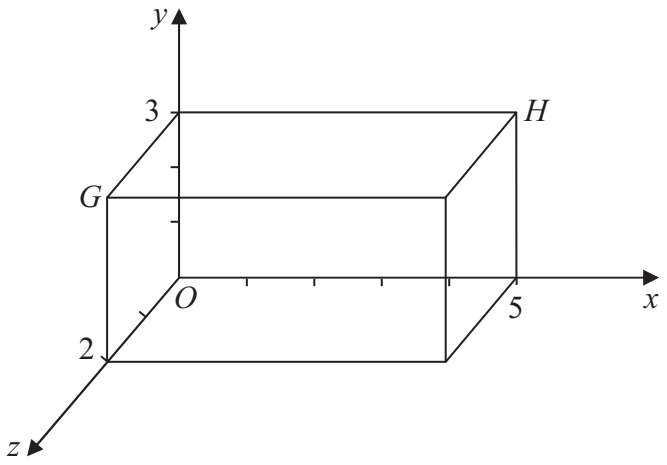


Diagram **NOT** accurately drawn

(a) Write down the coordinates of point G.

(0 , 3 , 2)

(1)

(b) Write down the coordinates of point H.

(5 , 3 , 0)

(1)

Q16

(Total 2 marks)

17. (a) Write 82 500 000 in standard form.

8.25×10^7

(1)

(b) Work out $(5.2 \times 10^{-7}) \times (2.8 \times 10^{-9})$

Give your answer in standard form.

$5.2 \times 2.8 \times 10^{-7} \times 10^{-9}$

$= 1.456 \times 10^{-15}$

get this result from your calculator

1.456×10^{-15}

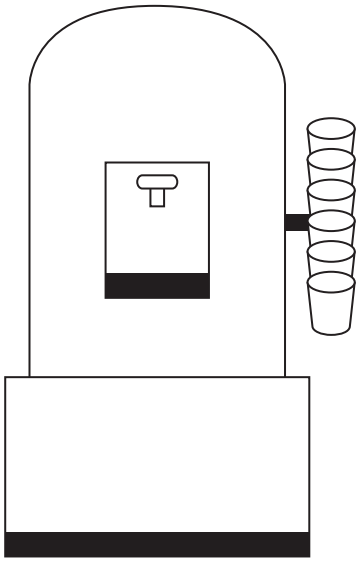
(2)

Q17

(Total 3 marks)

Leave blank

18.



A water container has 19.5 litres of water in it.
A cup holds 210 m*l* of water.

At most 92 cups can be filled completely from the water container.
Explain why.
You must show all your working.

19.5 litres = 19.5 × 1000 = 19 500 ml

19500 ÷ 210 = 92.857142

= 92 whole cups

Q18

(Total 3 marks)

Leave blank

19. There are 100 teachers at Maria's school.
Maria found out the age of each teacher.

The table gives information about her results.

Age (A years)	Frequency
$20 < A \leqslant 30$	26
$30 < A \leqslant 40$	35
$40 < A \leqslant 50$	21
$50 < A \leqslant 60$	12
$60 < A \leqslant 70$	6

(a) Complete the cumulative frequency table.

Age (A years)	Cumulative Frequency
$20 < A \leqslant 30$	26
$20 < A \leqslant 40$	61
$20 < A \leqslant 50$	82
$20 < A \leqslant 60$	94
$20 < A \leqslant 70$	100

(1)

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

(2)

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

37 ..... years

(1)

(d) Use your graph to find an estimate for the number of these teachers who are **older** than 56 years old.

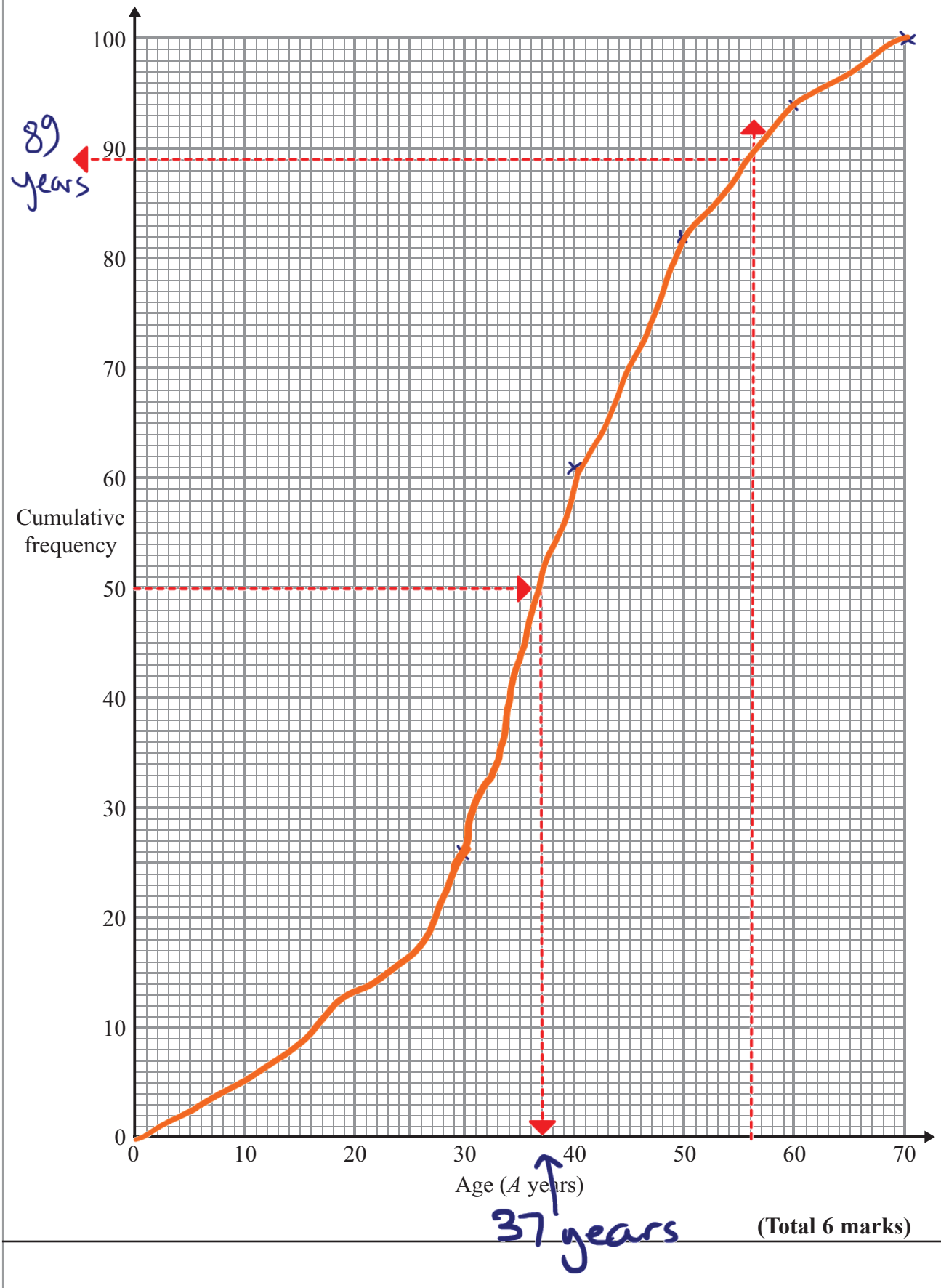
100
- 89

11

11 .....

(2)

Leave blank



Q19

(Total 6 marks)

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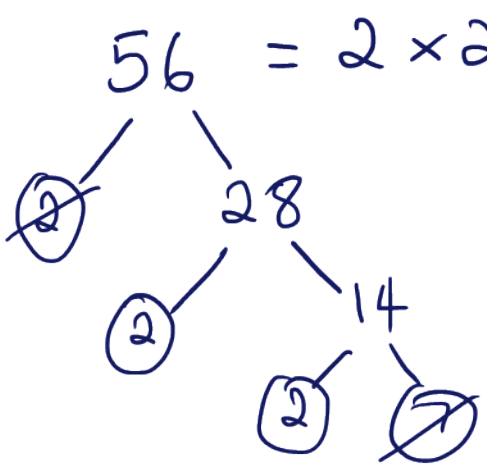
20. (a) Write 56 as a product of its prime factors.

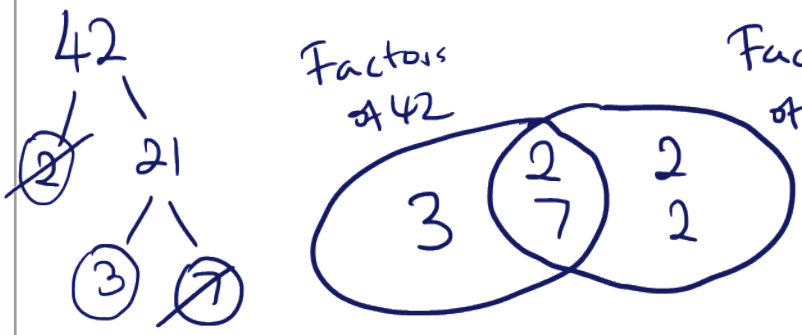


56 = $2^3 \times 7$

(2)

(b) Find the Highest Common Factor (HCF) of 56 and 42

HCF = 2 × 7
HCF = 14



HCF(56,42) = 14

(2)

(Total 4 marks)

Q20

21.

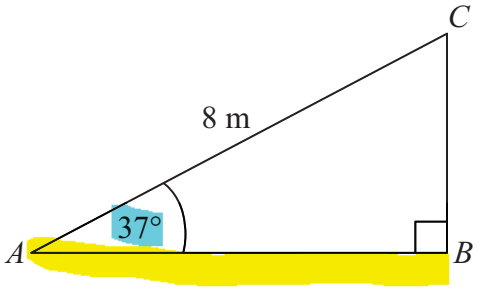


Diagram **NOT** accurately drawn

SOH CAH TOA

ABC is a right-angled triangle.
AC = 8 m.
Angle *CAB* = 37°.

adjacent = cos × hyp.

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

length of AB = cos 37° × 8 m
= 6.389084 08
= 6.39 m

6.39 ..... m

(Total 3 marks)

Q21

Leave blank

22. (a) Complete the table of values for $y = x^3 - 7$

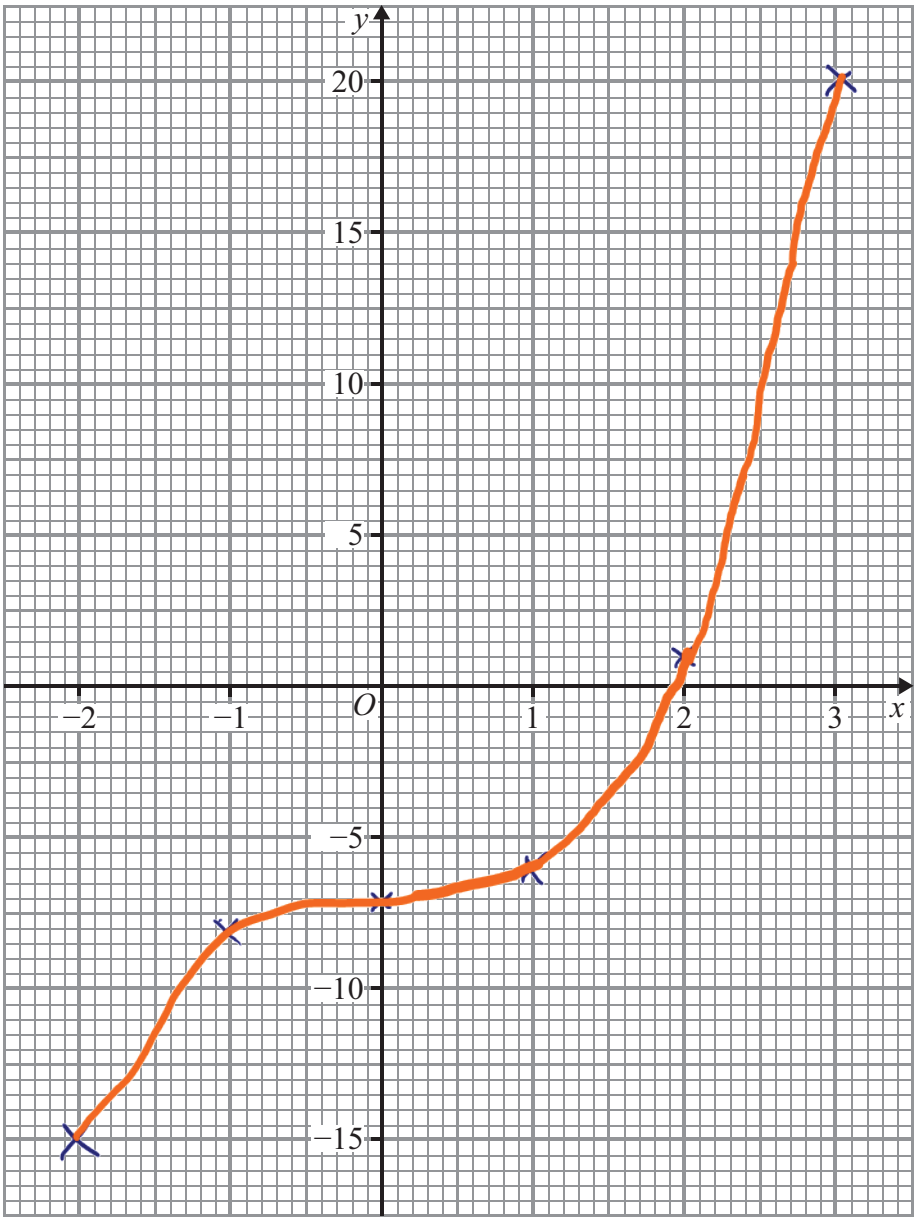
x	–2	–1	0	1	2	3
y	−15	–8	−7	−6	1	20

x^3 −8 −1 0 1 8 27

x^3-7 −15 −8 −7 −6 1 20

(2)

(b) On the grid, draw the graph of $y = x^3 - 7$ for values of x from –2 to 3



(2)

Q22

(Total 4 marks)

Leave blank

23.

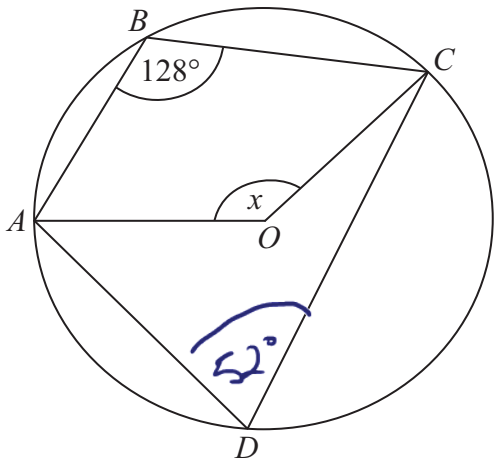


Diagram **NOT** accurately drawn

The diagram shows a circle, centre O.
A, B, C and D are points on the circumference of the circle.

Angle $ABC = 128°$.

Work out the size of the angle marked x.

opposite angles in cyclic quadrilateral add to 180°

180
−128
52°

angles at centre are twice the angle at the circumference

$x° = 52° \times 2$

104 °

Q23

(Total 2 marks)

Leave blank

24.

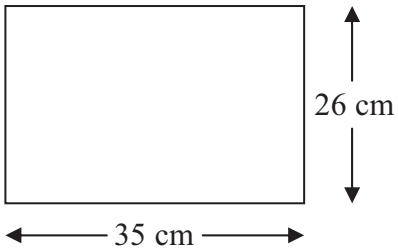


Diagram **NOT** accurately drawn

The length of the rectangle is 35 cm correct to the nearest cm.
The width of the rectangle is 26 cm correct to the nearest cm.

Calculate the upper bound for the area of the rectangle.
Write down all the figures on your calculator display.

	accuracy	tolerance	UB
length 35	1	0.5	35.5
width 26	1	0.5	26.5

UB of area = 35.5 × 26.5
= 940.75 cm²

940.75 ..... cm²

Q24

(Total 3 marks)

Leave blank

25. (a) Expand and simplify $(2x + 4y)(4x - 5y)$

F $8x^2$
O $-10xy$
I $+16xy$
L $-20y^2$
S $8x^2 - 10xy + 16xy - 20y^2 = 8x^2 + 6xy - 20y^2$

(2)

(b) Simplify fully $\dfrac{(x+10)^5}{(x+10)^4} = \dfrac{(x+10)(x+10)(x+10)(x+10)(x+10)}{(x+10)(x+10)(x+10)(x+10)}$

$x + 10$

(1)

(c) Simplify fully $\dfrac{x^2 - 25}{x^2 + 7x + 10}$

$\dfrac{(x+5)(x-5)}{(x+5)(x+2)}$

$\dfrac{x-5}{x+2}$

(3)

For all values of x, $x^2 + 6x - 2 = (x + p)^2 + q$ completing the square

(d) Find the value of p and the value of q.

$(x+3)^2 = x^2 + 6x + 9$

$(x+3)^2 - 9 - 2$

$= (x+3)^2 - 11$

$p = 3$ $q = -11$

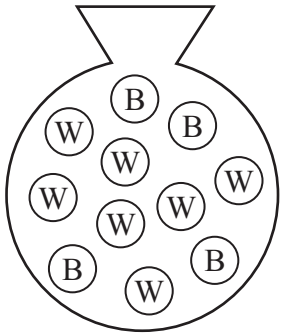
(2)

Q25

(Total 8 marks)

Leave blank

26. There are 11 buttons in a bag.

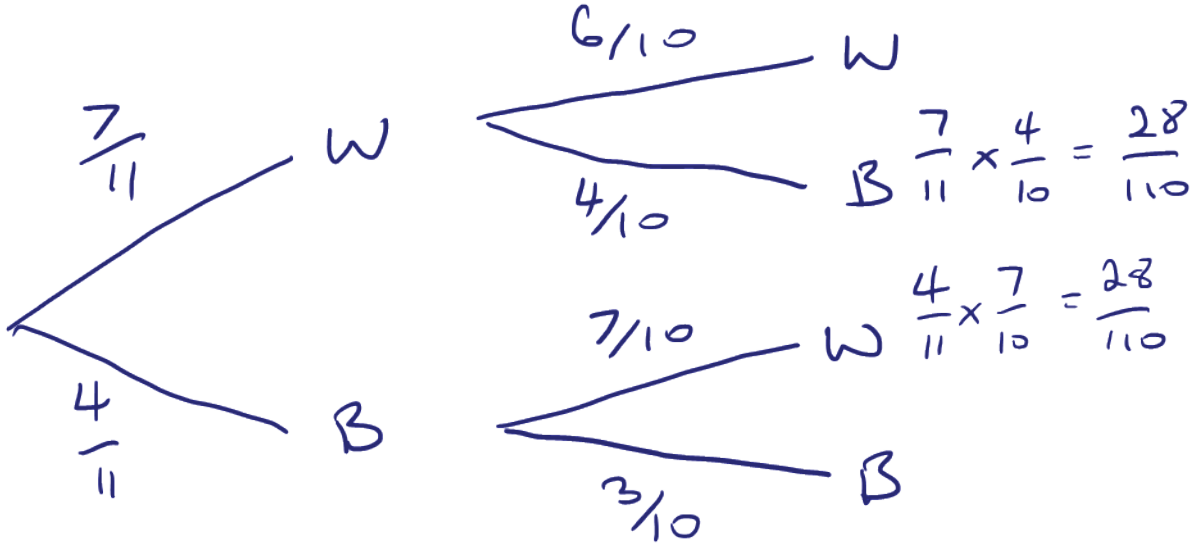


7 buttons are white.
4 buttons are black.

Harley takes a button at random from the bag, and keeps it.

She now takes another button at random from the bag.

Work out the probability that Harley takes a button of each colour.



P(one of each colour) = P(W, B) + P(B, W)

$= \frac{28}{110} + \frac{28}{110} = \frac{56}{110}$

$= \frac{28}{55} = 0.509$

0.51 (2dp)

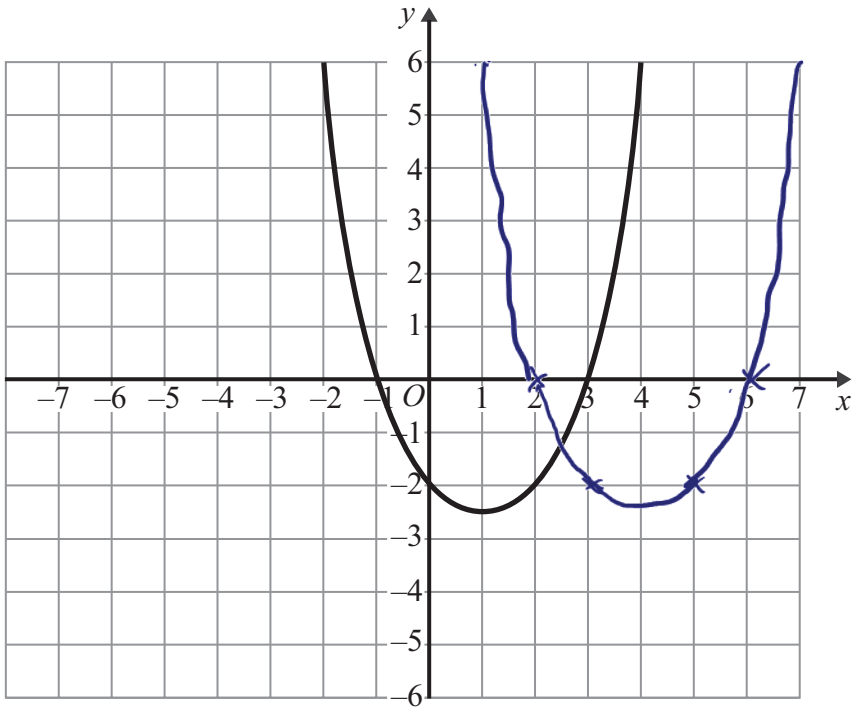
Q26

(Total 3 marks)

Leave blank

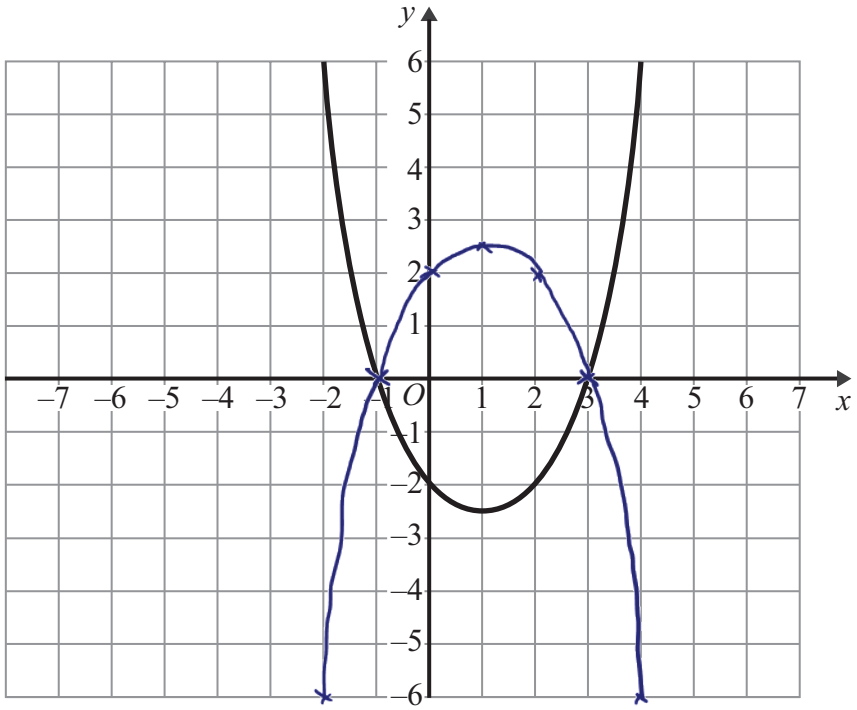
27. The graph of $y = f(x)$ is shown on the grids.

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



(2)

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



(2) **Q27**

(Total 4 marks)

Leave blank

28.

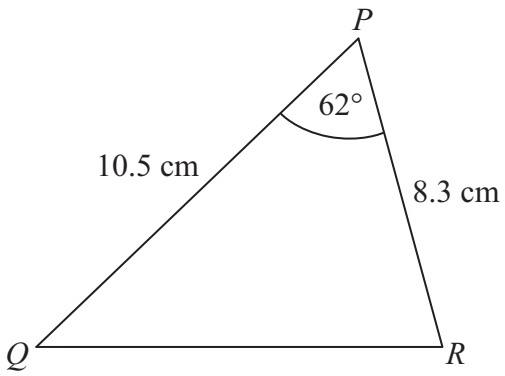


Diagram **NOT** accurately drawn

In triangle PQR,

$PQ = 10.5$ cm,
$PR = 8.3$ cm.
angle $QPR = 62°$.

(a) Calculate the area of triangle PQR.
Give your answer correct to 3 significant figures.

from formula sheet

Area of triangle $= \frac{1}{2} \times a \times b \times \sin C$

$= \frac{1}{2} \times 10.5 \times 8.3 \times \sin 62°$

$= 38.47444136 =$ 38.5

.....cm^2
(2)

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

formula sheet

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

$= 10.5^2 + 8.3^2 - (2 \times 10.5 \times 8.3 \times \cos 62°)$

$= 97.31110661$

$a = \sqrt{97.31110661}$

$= 9.864639203$

$= 9.86$ (3sf)

9.86

.....cm
(3)

Q28

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

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