Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

November 2016 Predicted Paper 2

Higher Tier

Time: 1 hour 45 minutes

Paper Reference **1MA0/2H**

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **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.

Information

- The total mark for this paper is 100
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

Advice

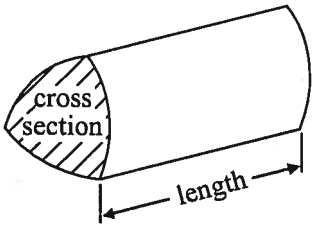
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

GCSE Mathematics 1MA0

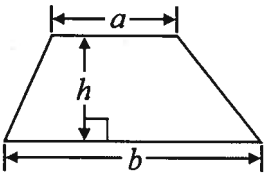
Formulae: Higher Tier

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 × length

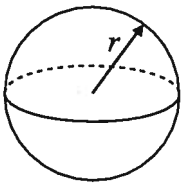


Area of trapezium $= \frac{1}{2}(a+b)h$



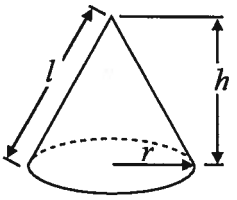
Volume of sphere $= \frac{4}{3}\pi r^3$

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

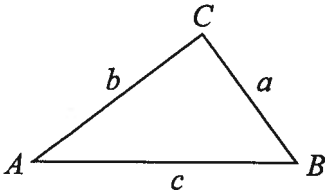


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$



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

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 The list below shows the weight, in grams, of 15 baskets of strawberries.

193	200	207	211	198
189	218	195	206	189
223	190	207	205	212

Show this information in an ordered stem and leaf diagram.
You must include a key.

18	9, 9
19	0, 3, 5, 8
20	0, 5, 6, 7, 7
21	1, 2, 8
22	3

Key: 18/9 = 189g

(Total for Question 1 is 3 marks)

2 (a) Dan is doing a survey to find out how much time students spend playing sport.
He is going to ask the first 10 boys on the register for his PE class.

This may **not** produce a good sample for Dan's survey.

Give **two** reasons why.

Reason 1

10 people is too small a sample

Reason 2

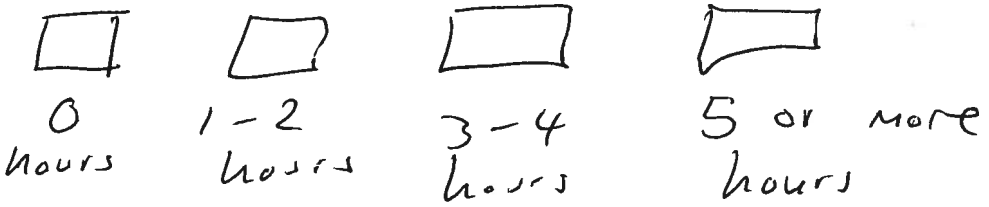
They are all boys. He should include girls too.

Also [They are all in PE] or [All the same age]

(2)

(b) Design a suitable question for Dan to use on a questionnaire to find out how much time students spend playing sport.

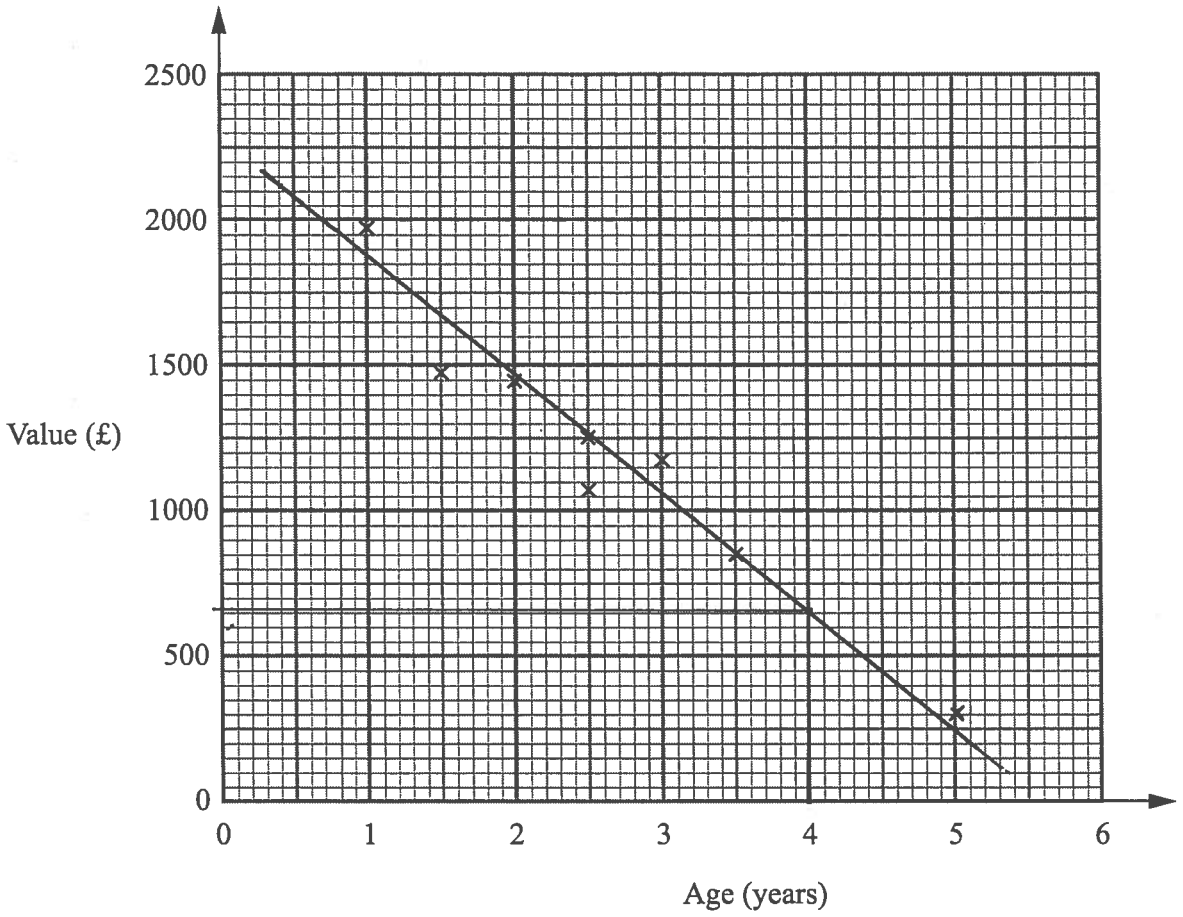
How much time do you spend playing sport a week?



(2)

(Total for Question 2 is 4 marks)

3 The scatter graph shows information about the ages and values of seven Varley motor scooters.



Another Varley motor scooter is 5 years old.
It has a value of £300

(a) Show this information on the scatter graph.

(1)

(b) Describe the relationship between the age and the value of Varley motor scooters.

As the age increases the value decreases (Negative Correlation)

(1)

A Varley motor scooter is 4 years old.

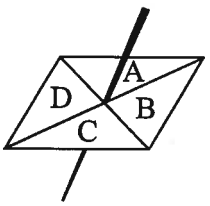
(c) Estimate its value.

£ 650

(2)

(Total for Question 3 is 4 marks)

4 Here is a four-sided spinner.
The sides of the spinner are labelled A, B, C and D.



The table shows the probability that the spinner will land on A or on B or on D.

Letter	A	B	C	D
Probability	0.12	0.39	0.31	0.18

Amber spins the spinner once.

(a) Work out the probability that the spinner will land on C.

0.31

(2)

Lucy is going to spin the spinner 50 times.

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

50 × 0.12

6

(2)

(Total for Question 4 is 4 marks)

5 (a) Simplify $3y + 2x - 4 + 5x + 7$

$7x + 3y + 3$

(1)

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

$2x(x - 2)$

(2)

(c) Expand and simplify $11 - 3(x+2)$

$11 - 3x - 6$

$5 - 3x$

(2)

(d) Expand and simplify $(x-6)(3x+7)$

$3x^2 + 7x - 18x - 42$

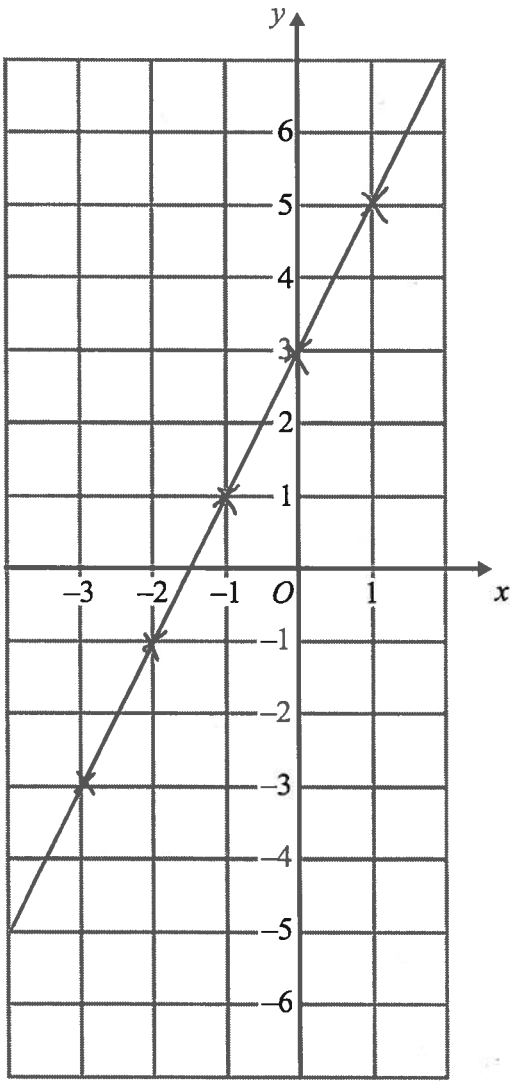
$3x^2 - 11x - 42$

(2)

(Total for Question 5 is 7 marks)

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

x	-3	-2	-1	0	1
y	-3	-1	1	3	5



(Total for Question 6 is 3 marks)

7 Use your calculator to work out $\frac{\sqrt{40.96}}{7.1 - 2.48}$

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

1.385281385

(Total for Question 7 is 2 marks)

*8 he diagram shows a flower bed in the shape of a circle.

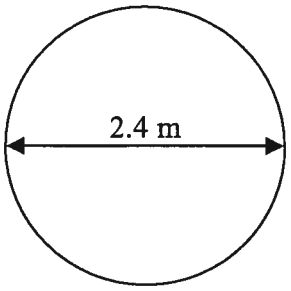


Diagram **NOT** accurately drawn

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.

circumference = $\pi \times d$
= $\pi \times 2.4$
= 7.539822369 m

Sue needs 4 rolls

(Total for Question 8 is 4 marks)

*9 Ketchup is sold in three different sizes of bottle.

Small bottle Medium bottle Large bottle

A small bottle contains 342 g of ketchup and costs 88p
A medium bottle contains 570 g of ketchup and costs £1.95
A large bottle contains 1500 g of ketchup and costs £3.99

Which bottle is the best value for money?
You must show your working.

$\frac{88}{342}$ $\frac{195}{570}$ $\frac{399}{1500}$

0.257 p/g 0.342p/g 0.266 p/g

the small bottle is the best value for money.

(Total for Question 9 is 4 marks)

10 The first five terms of an arithmetic sequence are

4n 4 8 12 16 20

2 6 10 14 18

(a) Write down an expression, in terms of n, for the nth term of this sequence.

$4n - 2$

(2)

An expression for the nth term of a different sequence is $20 - 5n$

(b) Work out the 10th term of this sequence.

$20 - 5(10)$

$20 - 50$

-30

(2)

(Total for Question 10 is 4 marks)

11 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?

Bread rolls 40, 80, 120

Sausages 24, 48, 72, 96, 120

3 packs of bread rolls

5 packs of sausages

(ii) How many hot dogs can she make?

120 hot dogs

(Total for Question 11 is 5 marks)

12

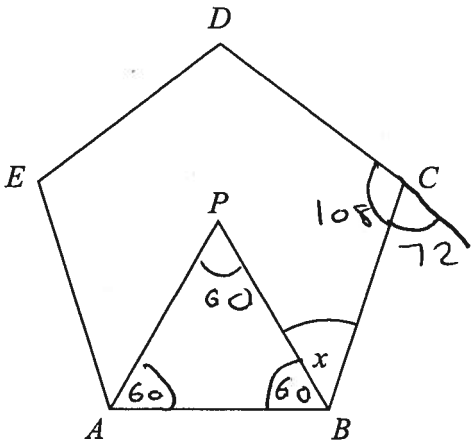


Diagram **NOT** accurately drawn

$\frac{360}{5} = 72$

$180 - 72 = 108$

ABCDE is a regular pentagon.
ABP is an equilateral triangle.

Work out the size of angle *x*.

$108 - 60 = 48$

48 °

(Total for Question 12 is 4 marks)

13 The table gives information about the speeds of 75 cars on a road.

Speed (s km/h)	Frequency	Midpoint	M.p x F
$30 \leqslant s < 40$	7	35	245
$40 \leqslant s < 50$	22	45	990
$50 \leqslant s < 60$	34	55	1870
$60 \leqslant s < 70$	12	65	780

Work out an estimate for the mean speed.

$$\frac{3885}{75} = 51.8$$

51.8 km/h

(Total for Question 13 is 4 marks)

14.The table shows information about the lengths, in seconds, of 40 TV adverts.

Time (T seconds)	Frequency
$10 < T \leqslant 20$	4
$20 < T \leqslant 30$	7
$30 < T \leqslant 40$	13
$40 < T \leqslant 50$	12
$50 < T \leqslant 60$	4

15 The equation

$$x^3 - 2x = 30$$

has a solution between 3 and 4

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	$(x)^3 - 2(x)$	comment
3.5	35.875	too high
3.4	32.504	too high
3.3	29.337	too low
3.35	30.895375	too high

3.3

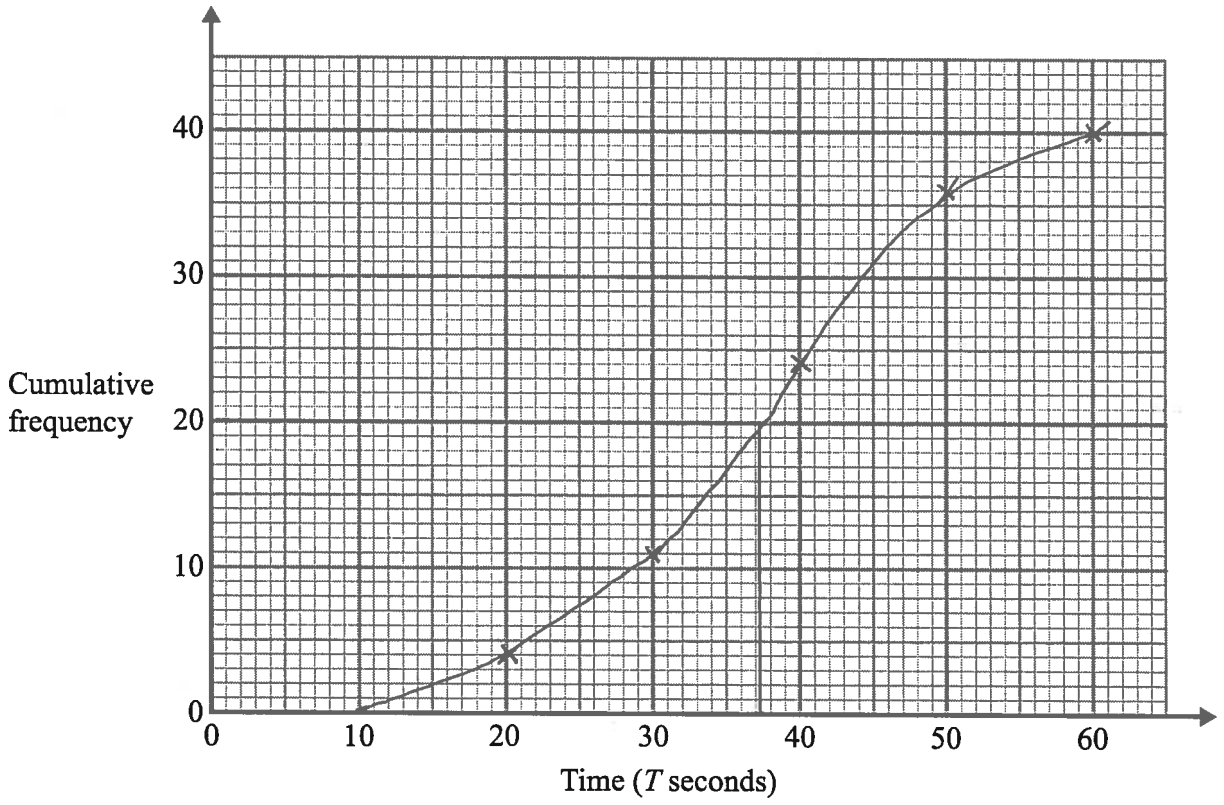
(Total for Question 15 is 4 marks)

(a) Complete the cumulative frequency table for this information.

Time (T seconds)	Cumulative frequency
$10 < T \leqslant 20$	4
$10 < T \leqslant 30$	11
$10 < T \leqslant 40$	24
$10 < T \leqslant 50$	36
$10 < T \leqslant 60$	40

(1)

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



(2)

(c) Use your graph to find an estimate for the median length of these TV adverts.

37 seconds

(1)

(Total for Question 14 is 4 marks)

16 Kristen buys a laptop.

She gets a discount of 20% off the normal price.
Kristen pays £480 for the laptop.

Work out the discount.
Give your answer in pounds.

(20% off of 100%.)

÷100 (480 = 80%.
6 = 1%.) ÷100
x20 (£120 = 20%.) x 20

£ 120

(Total for Question 16 is 3 marks)

17 (a) Find the value of 5^0

1

(1)

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

3

(1)

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

$\frac{1}{8}$

(1)

(Total for Question 17 is 3 marks)

18.

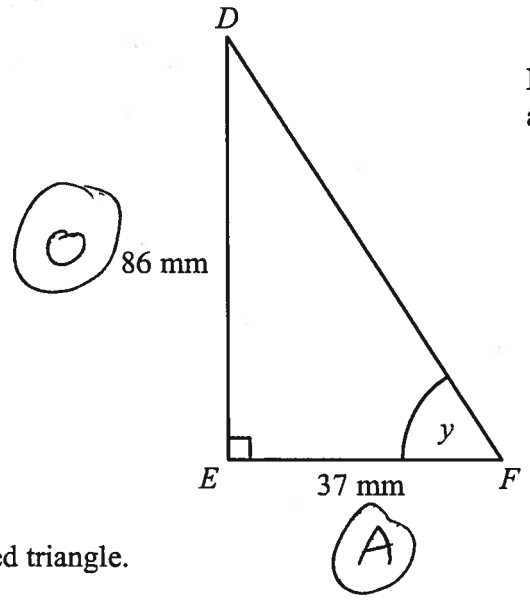


Diagram **NOT** accurately drawn

DEF is a right-angled triangle.
DE = 86 mm
EF = 37 mm

Calculate the size of the angle marked *y*.
Give your answer correct to 1 decimal place.

$$\tan(y) = \frac{O}{A}$$

$$\tan(y) = \frac{86}{37}$$

$$y = \tan^{-1}\left(\frac{86}{37}\right)$$

$$= 66.7^\circ \text{ (1dp)}$$

66.7 °

(Total for Question 18 is 3 marks)

19

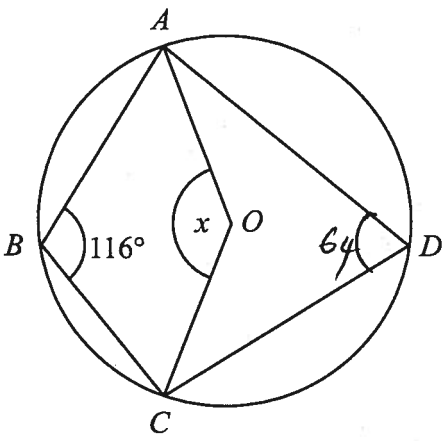


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on the circumference of a circle with centre *O*.
Angle *ABC* = 116°

Find the size of the angle marked *x*.
Give reasons for your answer.

$A\hat{D}C = 64°$ opposite angles in a cyclic quadrilateral sum to 180°

$x = 128°$ the angle at the centre is double the angle at the circumference

(Total for Question 1 9 is 4 marks)

$a = 5 \quad b = 6 \quad c = -2$

20 Solve $5x^2 + 6x - 2 = 0$

Give your solutions correct to 2 decimal places.

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

$$= \frac{-(6) \pm \sqrt{(6)^2 - 4(5)(-2)}}{2(5)}$$

$$= 0.27 \text{ or } -1.47$$

.....

(Total for Question 20 is 3 marks)

21 The table gives information about the number of students at a school.

Year 9	Year 10	Year 11	Total
244	315	181	740

Priya is going to survey 60 of the students in the school.
She is going to use a sample stratified by year group.

(a) Work out the number of year 9, year 10 and year 11 students Priya should have in her sample.
You must show all your working.

Yr 9: $\frac{244}{740} \times 60 = 19.783783783$

Yr 10: $\frac{315}{740} \times 60 = 25.540540541$

Yr 11: $\frac{181}{740} \times 60 = 14.675675676$

Year 9 20

Year 10 25 or 26

Year 11 15

(3)

Priya is going to use a random sample to select the students.

(b) (i) Explain what is meant by a random sample.

everyone has an equal chance of getting picked

(ii) Describe how Priya could take a random sample.

picking names out of a hat (or random number generator)

(2)

(Total for Question 21 is 5 marks)

22 Simplify fully $\dfrac{x^2-2x-15}{x^2-4x-21}$

$$\frac{(x-5)(x+3)}{(x-7)(x+3)}$$

$$\frac{x-5}{x-7}$$

(Total for Question 22 is 3 marks)

23

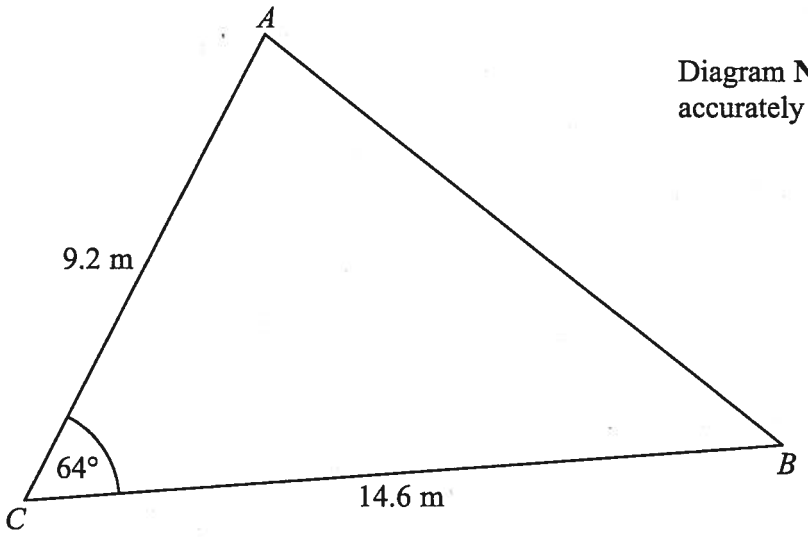


Diagram **NOT** accurately drawn

$AC = 9.2$ m
$BC = 14.6$ m
Angle $ACB = 64°$

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

$$\text{Area} = \frac{1}{2} a\, b \sin C$$
$$= \frac{1}{2}(9.2)(14.6)\sin(64)$$
$$= 60.363008\,15$$

60.4 m²

(2)

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

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$a^2 = (9.2)^2 + (14.6)^2 - 2(9.2)(14.6)\cos(64)$$
$$a^2 = 180.035\,9751$$
$$a = 13.417\,74851$$

13.4 m

(3)

(Total for Question 23 is 5 marks)

24

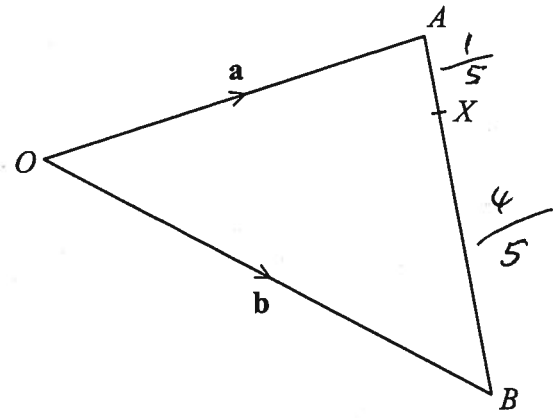


Diagram **NOT** accurately drawn

OAB is a triangle.

$\overrightarrow{OA} = \mathbf{a}$

$\overrightarrow{OB} = \mathbf{b}$

(a) Write down the vector $\overrightarrow{AB}$ in terms of **a** and **b**.

$-a+b$

(1)

X is the point on AB such that $AX : XB = 1 : 4$

(b) Express the vector $\overrightarrow{OX}$ in terms of **a** and **b**.

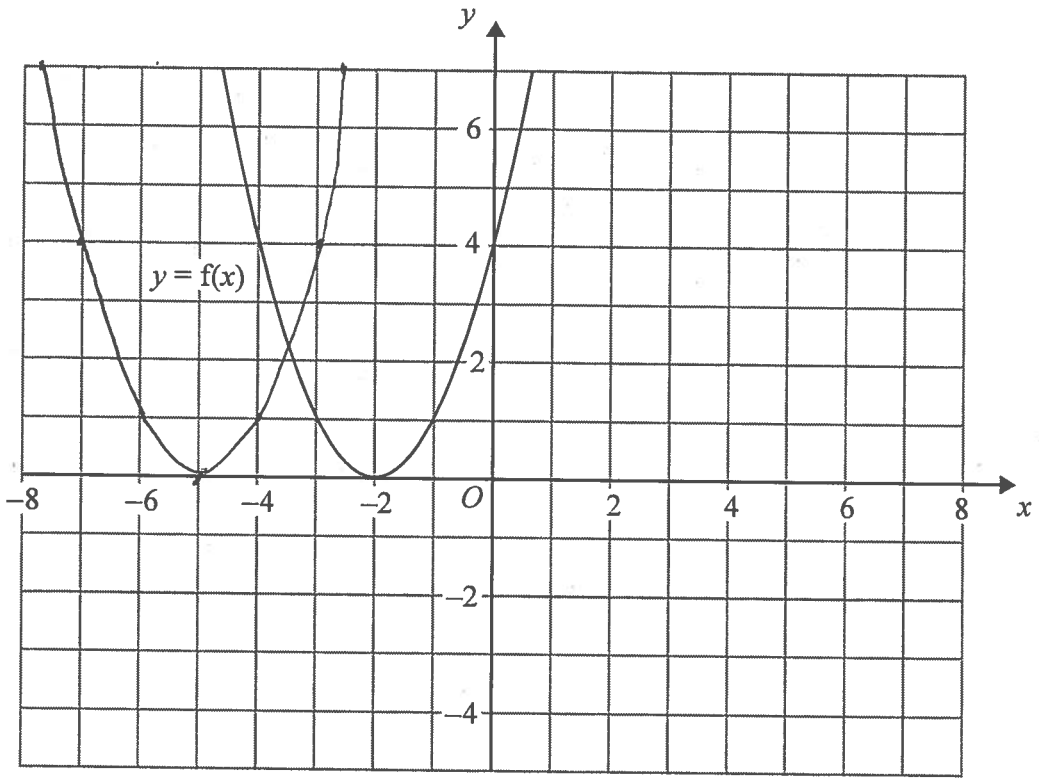
$$\overrightarrow{OX} = \overrightarrow{OA} + \frac{1}{5}(\overrightarrow{AB})$$
$$= a + \frac{1}{5}(-a+b)$$
$$= a - \frac{1}{5}a + \frac{1}{5}b$$
$$= \frac{4}{5}a + \frac{1}{5}b$$

OX

(3)

(Total for Question 24 is 4 marks)

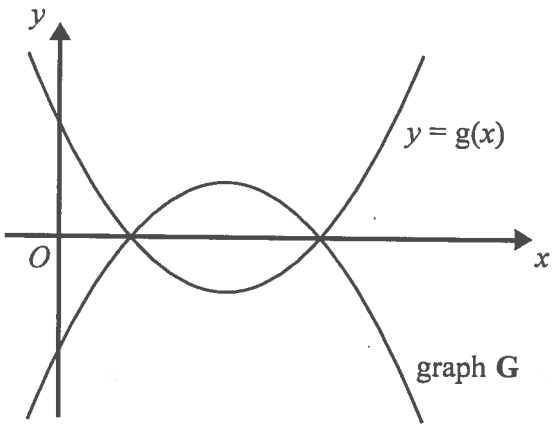
25 The graph of $y = f(x)$ is shown on the grid.



(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**.

$y = -g(x)$

(1)

(Total for Question 25 is 3 marks)

26 Sasha drops a ball from a height of d metres onto the ground.

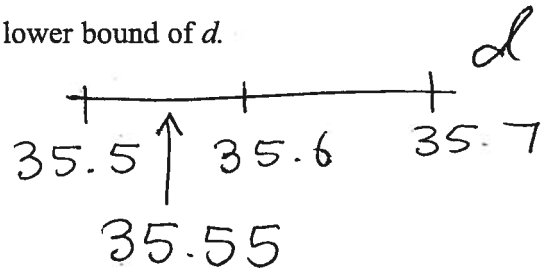
The time, t seconds, that the ball takes to reach the ground is given by

$$t = \sqrt{\frac{2d}{g}}$$

where g m/s^2 is the acceleration due to gravity.

$d = 35.6$ correct to 3 significant figures.
$g = 9.8$ correct to 2 significant figures.

(a) Write down the lower bound of d.

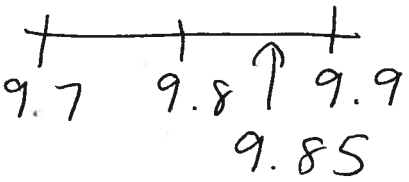


35.55

(1)

(b) Calculate the lower bound of t.
You must show all your working.

$$\text{lower}_t = \sqrt{\frac{2(\text{lower } d)}{(\text{upper } g)}}$$



$$= \sqrt{\frac{2(35.55)}{9.85}}$$

$$= 2.686684595$$

2.7 (2sf) ~~2dp~~

(3)

(Total for Question 26 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS