Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Mathematics A

Paper 2 (Calculator)

Sar.

Higher Tier

Friday 14 June 2013 – Morning
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

ND030325126

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.

Turn over

P43600A

6/5/5/

P 4 3 6 0 0 A 0 1 2 8

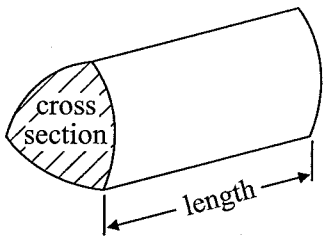
PEARSON

GCSE Mathematics 1MA0

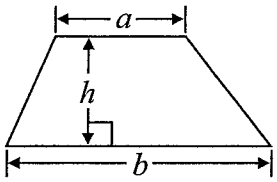
Formulae: Higher Tier

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

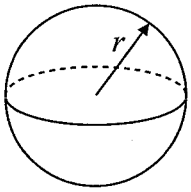


Area of trapezium $= \frac{1}{2}(a + b)h$



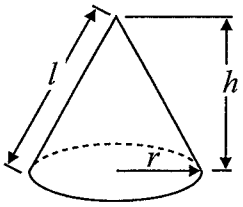
Volume of sphere $= \frac{4}{3}\pi r^3$

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

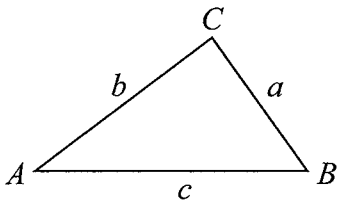


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



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

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Here is a cuboid.

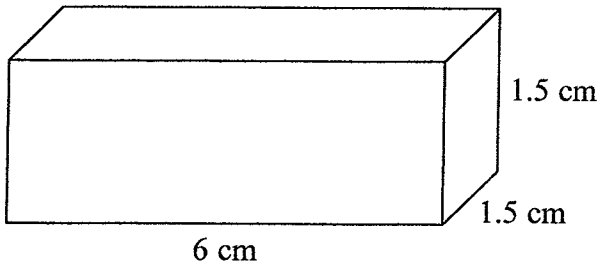


Diagram **NOT** accurately drawn

The cuboid is 6 cm by 1.5 cm by 1.5 cm.

Work out the total surface area of the cuboid.

$(6 \times 1.5) \times 2 = 18$

$(1.5 \times 1.5) \times 2 = 4.5$

$(6 \times 1.5) \times 2 = 18$

Total = $40.5\ cm^2$

..... cm^2

(Total for Question 1 is 3 marks)

*2 Here is a list of ingredients for making 18 mince pies.

Ingredients for 18 mince pies
225 g of butter
350 g of flour
100 g of sugar
280 g of mincemeat
1 egg

Elaine wants to make 45 mince pies.

Elaine has

1 kg of butter
1 kg of flour
500 g of sugar
600 g of mincemeat
6 eggs

Does Elaine have enough of each ingredient to make 45 mince pies?
You must show clearly how you got your answer.

for 45 she needs (÷ 18 x 45)

562.5g butter. ✓

875g flour. ✓

250g sugar. ✓

700g mincemeat. ×

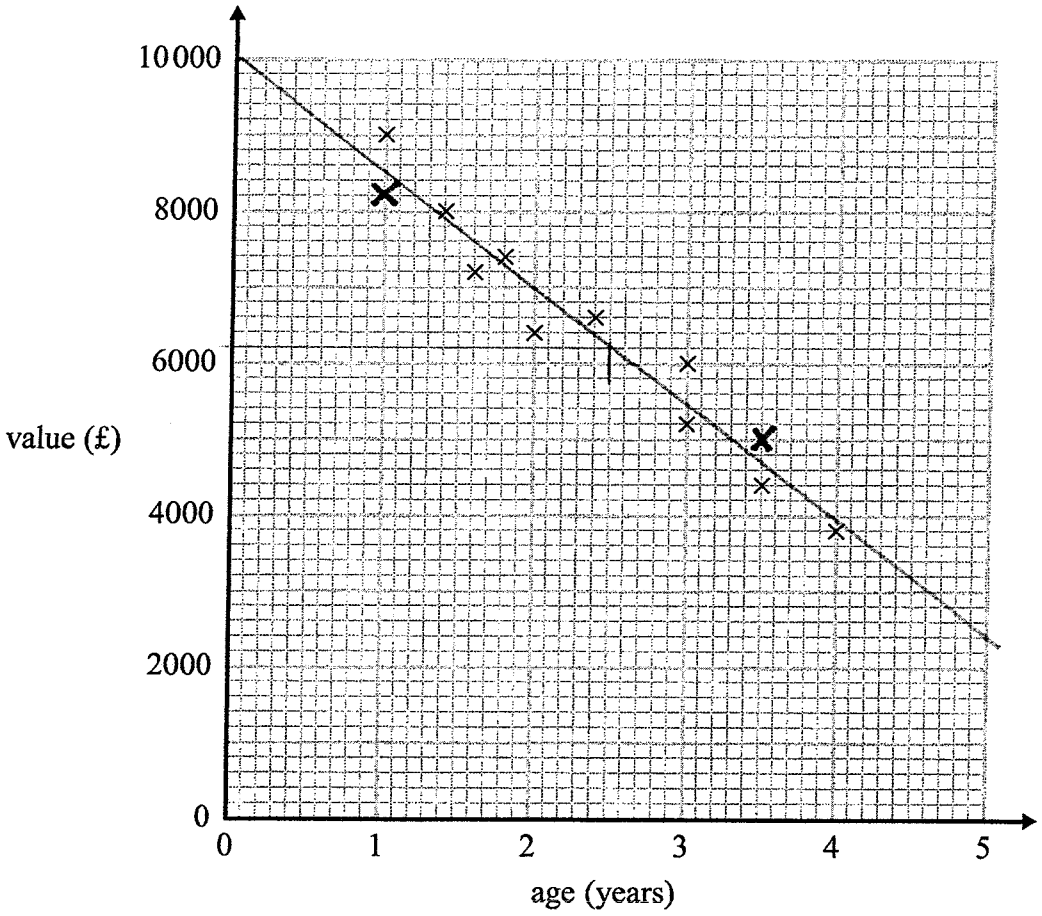
2.5 (ie 3) eggs. ✓

She does not have enough mincemeat. 100g short.

(Total for Question 2 is 4 marks)

3 The scatter graph shows some information about 10 cars, of the same type and make.

The graph shows the age (years) and the value (£) of each car.



The table shows the age and the value of two other cars of the same type and make.

age (years)	1	3.5
value (£)	8200	5000

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

(1)

(b) Describe the relationship between the age and the value of the cars.

Negative correlation.

(1)

A car of the same type and make is $2\frac{1}{2}$ years old.

(c) Estimate the value of the car.

5200 - 6600

≈ £6200

(2)

(Total for Question 3 is 4 marks)

4 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.

P(Win) = 0.63

0.63 × 200 = 126 times.

.....

(Total for Question 4 is 3 marks)

5 Mason is doing a survey to find out how many magazines people buy.

He uses this question on his questionnaire.

How many magazines do you buy?

☐ 0 to 4 ☐ 4 to 8 ☐ 8 to 12

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

1 over-lapping response boxes.

2 No over 12 answer.

No time frame

(2)

(b) Write a better question for Mason to use on his questionnaire to find out how many magazines people buy.

How many magazines do you buy per Month on average?

☐ 0 ☐ 9 – 12

☐ 1 – 4 ☐ over 12

☐ 5 – 8

(2)

Mason asks his friends at school to do his questionnaire.
This may **not** be a good sample to use.

(c) Give **one** reason why.

Friends likely to have similar interests ∴ biased

(1)

(Total for Question 5 is 5 marks)

6 Tame Valley is a company that makes yoghurt.

A machine fills trays of 20 pots with yoghurt.
In one hour, the machine fills a total of 15000 pots.

Work out how many seconds the machine takes to fill each tray of 20 pots.

$\frac{15000}{20} = 750$ trays $= 1$ hour

$= 3600$ secs.

$\therefore$ 1 tray $= \frac{3600}{750} = 4.8$ secs.

..... seconds

(Total for Question 6 is 4 marks)

7 Colin, Dave and Emma share some money.

Colin gets $\frac{3}{10}$ of the money.

Emma and Dave share the rest of the money in the ratio 3 : 2

What is Dave's share of the money?

C $\frac{3}{10}$ E+D $\frac{7}{10}$

3 : 2

$\frac{7}{10} \div 5 \rightarrow \frac{7}{10} \times \frac{1}{5} = \frac{7}{50}$ = 1 part.

Dave's share is $2 \times \frac{7}{50} = \frac{14}{50}$

$= \frac{7}{25}$

(Total for Question 7 is 4 marks)

8 The diagram shows the plan of a playground.

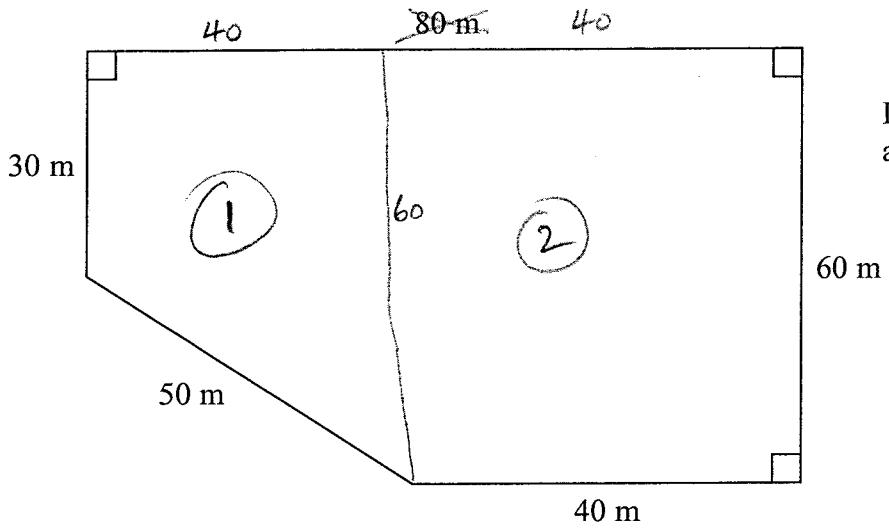


Diagram **NOT** accurately drawn

Bill is going to cover the playground with tarmac.
It costs £2.56 to cover each square metre with tarmac.

Work out the total cost of the tarmac Bill needs.

$\frac{40(60+30)}{2} = 1800\,m^2$ A. of (1)

$60 \times 40 = 2400\,m^2$ = A. of (2)

Total = $4200\,m^2$

∴ cost = 2.56×4200

£ 10752

(Total for Question 8 is 4 marks)

9

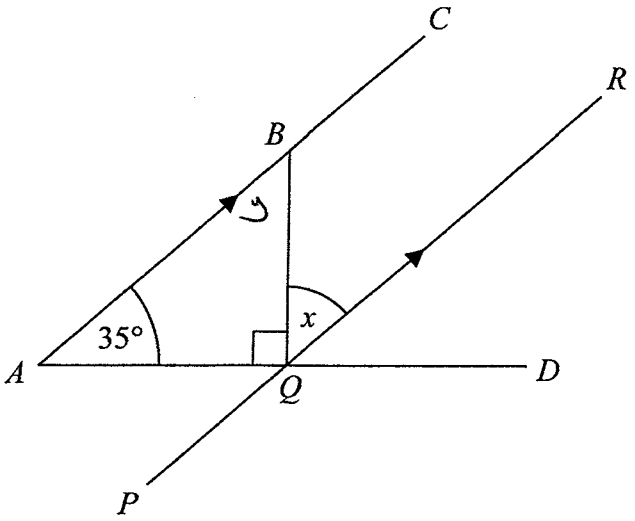


Diagram **NOT** accurately drawn

ABC, *PQR* and *AQD* are straight lines.
ABC is parallel to *PQR*.

Angle *BAQ* = 35°
Angle *BQA* = 90°

Work out the size of the angle marked *x*.
Give reasons for each stage of your working.

$y = 180 - 90 - 35 = 55^\circ$ ($\Delta = 180^\circ$)

$x = 55^\circ$ (alternate to 'y')

$x =$ 55 °

(Total for Question 9 is 4 marks)

10 The equation

$$x^3 + 2x = 110$$

has a solution between 4 and 5

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		
4	= 72	Too L
5	= 135	Too H
4.7	= 113.223	H.
4.6	= 106.536	L

Test

4.65	= 109.844625	L

$x =$ 4.7 to 1d p.

(Total for Question 10 is 4 marks)

11 *XYZ* is a right-angled triangle.

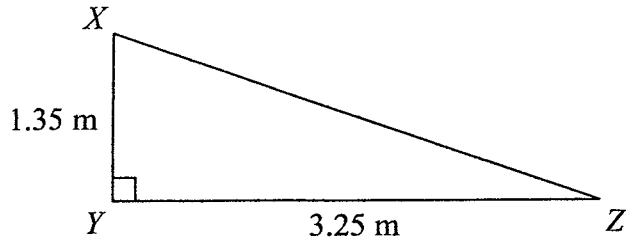


Diagram **NOT** accurately drawn

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

$XZ = \sqrt{(1.35)^2 + (3.25)^2}$

3.52 ..... m

(Total for Question 11 is 3 marks)

12 (a) Solve $3(x - 2) = x + 7$

$3x - 6 = x + 7$

$2x = 13$

$x =$ 6·5
(3)

(b) Solve $\frac{2 - y}{5} = 1$

$2 - y = 5$

$2 - 5 = y$

$y =$ −3
(2)

(Total for Question 12 is 5 marks)

13

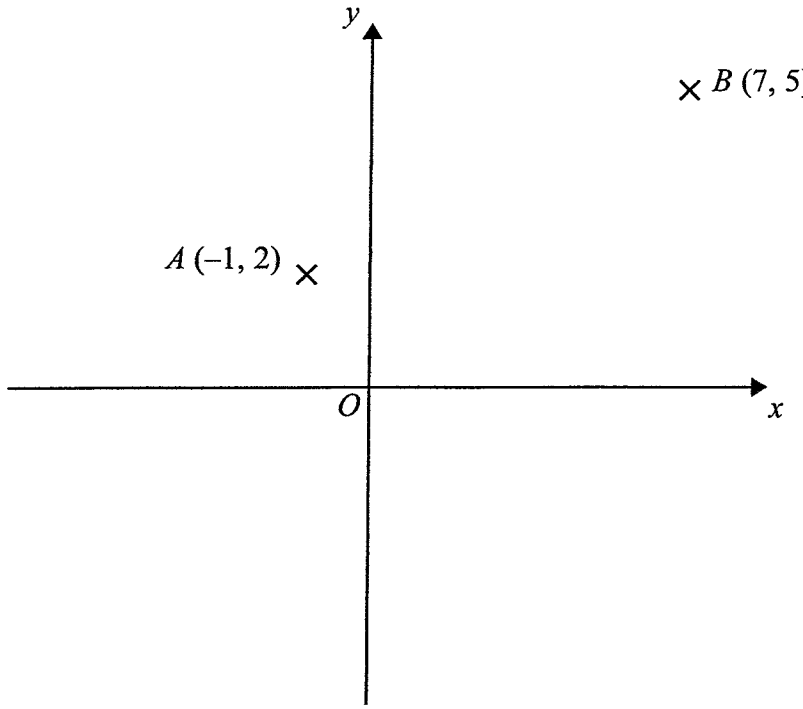


Diagram **NOT** accurately drawn

A is the point $(-1, 2)$
B is the point $(7, 5)$

(a) Find the coordinates of the midpoint of AB.

$\frac{-1+7}{2}$ $\frac{2+5}{2}$

(3 , 3.5)

(2)

P is the point $(-4, 4)$
Q is the point $(1, -5)$

(b) Find the gradient of PQ.

$-\frac{9}{5} = -1\frac{4}{5} = -1.8$

(2)

(Total for Question 13 is 4 marks)

***14** Viv wants to invest £2000 for 2 years in the same bank.

The International Bank	**The Friendly Bank**
Compound Interest	Compound Interest
4% for the first year 1% for each extra year	5% for the first year 0.5% for each extra year

At the end of 2 years, Viv wants to have as much money as possible.

Which bank should she invest her £2000 in?

Inter

$2000 \times 1.04 = £2080$

$2080 \times 1.01 = £2100.80$

Friendly

$2000 \times 1.05 = £2100$

$2100 \times 1.005 = £2110.50$

∴ Friendly bank better investment!

(Total for Question 14 is 4 marks)

15 (a) Complete the table of values for $y = x^2 - 2x$

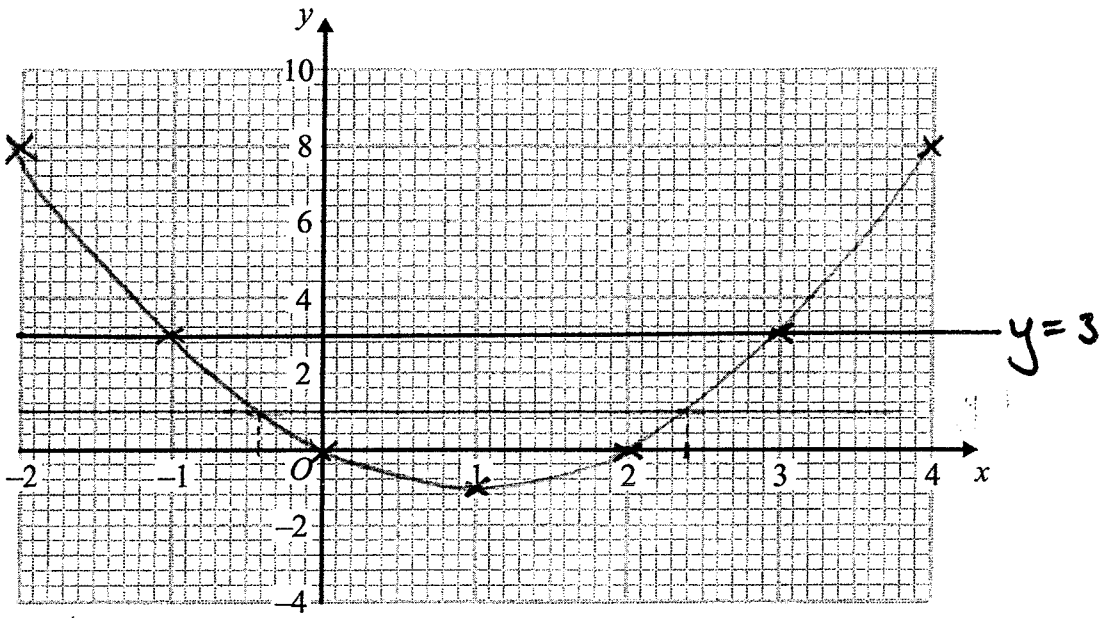
x	–2	–1	0	1	2	3	4
y	8	3	0	–1	0	3	8

4 + 4

1 – 2

(2)

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



(2)

(c) Solve $x^2 - 2x - 2 = 1$

$x = -1$ and 3

(2)

(Total for Question 15 is 6 marks)

***16**

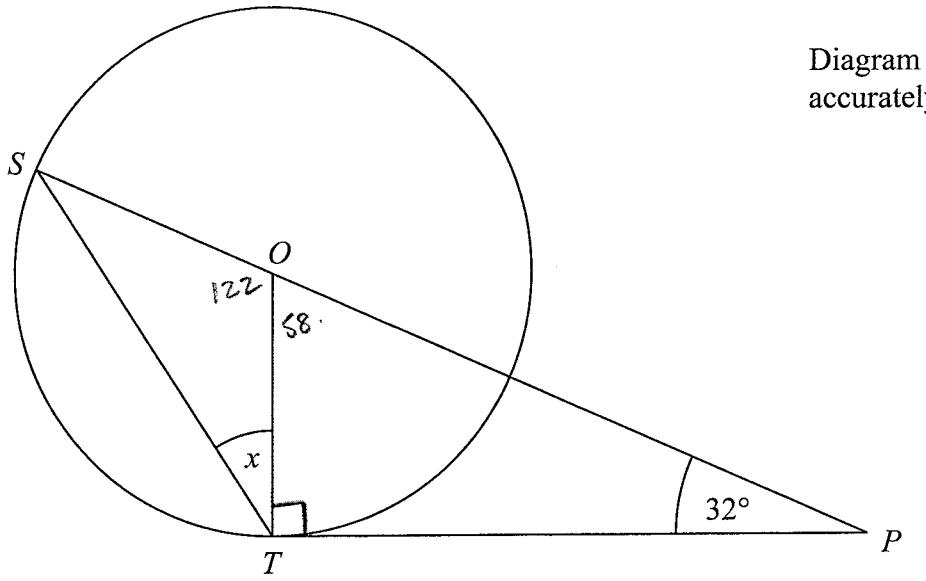


Diagram **NOT** accurately drawn

S and *T* are points on the circumference of a circle, centre *O*.
PT is a tangent to the circle.
SOP is a straight line.

Angle *OPT* = 32°

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

OTP = 90° (radius to tang. = 90°)

TOP = 58° (Δ = 180°)

SOT = 180 − 58 = 122° (St. line = 180)

$x = \frac{180 - 122}{2} = 29°$ (Base ∠'s in isosceles Δ are the same)

°

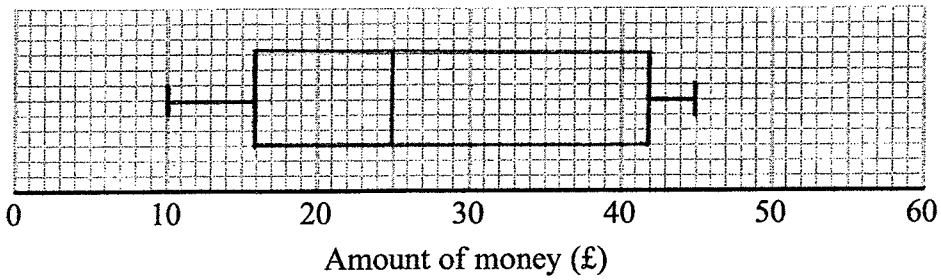
(Total for Question 16 is 5 marks)

17 Some girls did a sponsored swim to raise money for charity.

The table shows information about the amounts of money (£) the girls raised.

Least amount of money (£)	10
Greatest amount of money (£)	45
Median	25
Lower quartile	16
Upper quartile	42

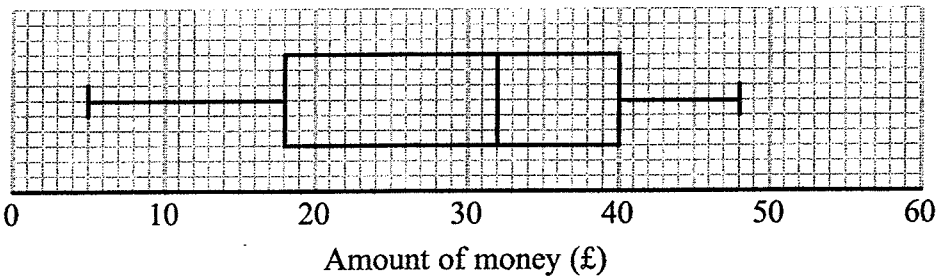
(a) On the grid, draw a box plot for the information in the table.



(2)

Some boys also did the sponsored swim.

The box plot shows information about the amounts of money (£) the boys raised.



(b) Compare the amounts of money the girls raised with the amounts of money the boys raised.

Median (G) = 25 (B) = 32

Range (G) 45 − 10 = 35 (B) 48 − 5 = 43 ∴ much greater.

IQR (G) 42 − 16 = 26 (B) 40 − 18 = 22 closer.

(2)

(Total for Question 17 is 4 marks)

18 Make p the subject of the formula $y = 3p^2 - 4$

$y + 4 = 3p^2$

$\sqrt{\frac{y+4}{3}} = p$

.....

(Total for Question 18 is 3 marks)

19 (a) Factorise $6 + 9x$

$3(2 + 3x)$

.....

(1)

(b) Factorise $y^2 - 16$

$(y + 4)(y - 4)$

.....

(1)

(c) Factorise $2p^2 - p - 10$

$(2p - 5)(p + 2)$

.....

(2)

(Total for Question 19 is 4 marks)

***20** The diagram shows a ladder leaning against a vertical wall.

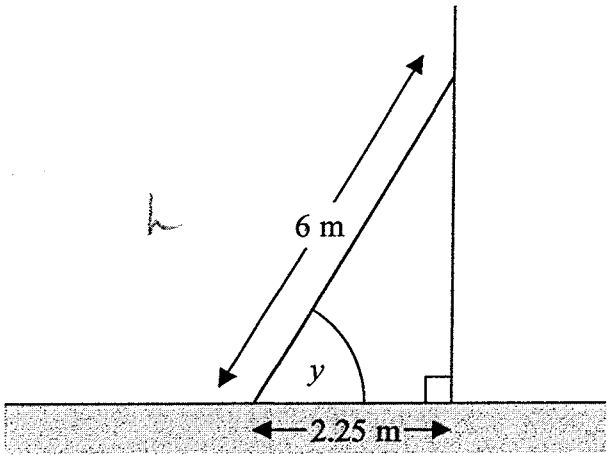


Diagram **NOT** accurately drawn

The ladder stands on horizontal ground.

The length of the ladder is 6 m.
The bottom of the ladder is 2.25 m from the bottom of the wall.

A ladder is safe to use when the angle marked y is about 75°.

Is the ladder safe to use?
You must show all your working.

$\cos y = \frac{a}{h}$

$\cos y = \frac{2.25}{6}$

$\therefore y = 68.0°$ to 1.d.p

Is NOT close to 75° $\therefore$ not safe.

(Total for Question 20 is 3 marks)

21 In Holborn School there are

460 students in Key Stage 3
320 students in Key Stage 4
165 students in Key Stage 5

Total = 945.

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.

$KS3 = \frac{460}{945} \times 100 = 49$

$KS4 = \frac{320}{945} \times 100 = 34$

$KS5 = \frac{165}{945} \times 100 = 17$

KS3 = 49.

(Total for Question 21 is 2 marks)

22 h is inversely proportional to the square of r.

When $r = 5$, $h = 3.4$

Find the value of h when $r = 8$

$h \propto \frac{1}{r^2}$

$h = \frac{k}{r^2}$

$3.4 = \frac{k}{25}$

$85 = k$

$h = \frac{85}{64}$

$h = 1.328125$

$h =$ 1.33 to 3sf.

(Total for Question 22 is 3 marks)

23 Dan does an experiment to find the value of π.
He measures the circumference and the diameter of a circle.

He measures the circumference, C, as 170 mm to the nearest millimetre.
He measures the diameter, d, as 54 mm to the nearest millimetre.

Dan uses $\pi = \frac{C}{d}$ to find the value of π.

Calculate the upper bound and the lower bound for Dan's value of π.

$C = 170$ → 170.5, 169.5

$d = 54$ → 54.5, 53.5

upper bound = ...

lower bound = ...

(Total for Question 23 is 4 marks)

Upper

$\pi = \frac{170.5}{53.5}$

$= 3.186915888$

Lower

$\pi = \frac{169.5}{54.5}$

$= 3.110091743$

24 *ABC* is a triangle.

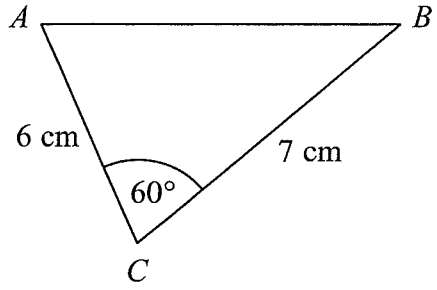


Diagram **NOT** accurately drawn

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

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

$\frac{1}{2} \times 6 \times 7 \times \sin 60$

18.2 ..... cm^2

(2)

(b) Work out the length of the side *AB*.
Give your answer correct to 3 significant figures.

$(AB)^2 = 6^2 + 7^2 - 2 \times 6 \times 7 \times \cos 60.$

$AB = 6.56\,cm.$

..... cm

(3)

(Total for Question 24 is 5 marks)

25 Solve the simultaneous equations $x^2 + y^2 = 9$ (1)
$x + y = 2$ (2)

Give your answers correct to 2 decimal places.

from (2)

$y = 2 - x$

sub into (1)

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

$x^2 + 4 - 4x + x^2 = 9$

$2x^2 - 4x - 5 = 0$

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

$$\frac{4 \pm \sqrt{16 + 40}}{4}$$

$$\frac{4 \pm \sqrt{56}}{4}$$

$x =$ 2.87 $y =$ −0.87

or $x =$ −0.87 $y =$ 2.87

(Total for Question 25 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS