

Write your name here			
Surname		Other names	
Pearson Edexcel		Centre Number	Candidate Number
Level 1/Level 2 GCSE (9-1)			
Mathematics Paper 3 (Calculator) Foundation Tier			
Tuesday 12 June 2018 – Morning		Paper Reference	
Time: 1 hour 30 minutes		1MA1/3F	
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.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise 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.



Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

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 ➡

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 Write $\frac{9}{10}$ as a decimal.

$$\frac{9}{10} = 9 \div 10 = 0.9$$

FRACTION DECIMAL
÷ divide

0.9

(Total for Question 1 is 1 mark)

- 2 Write 0.3 as a percentage.

DECIMAL PERCENTAGE
x100

$$0.3 \times 100 = 30\%$$

30 %

(Total for Question 2 is 1 mark)

- 3 Write the number 2538 correct to the nearest hundred.

2538
└─┬─┘ tens
hundreds column

3 < 5 so we round down
to the nearest 100 = 2500

2500

(Total for Question 3 is 1 mark)

- 4 Here are the first 4 terms of a sequence.

$$2 \xrightarrow{+7} 9 \xrightarrow{+7} 16 \xrightarrow{+7} 23$$

- (a) (i) Write down the next term in the sequence.

Common difference of +7

$$23 + 7 = 30$$

30

(1)

- (ii) Explain how you got your answer.

Increases by 7

(1)

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

Dino method

Difference = 7

0th term = $2 - 7 = -5$

term number

$$= 7n - 5$$

when $n=10$

$$= (7 \times 10) - 5 = 70 - 5$$

65

(1)

(Total for Question 4 is 3 marks)

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5 Here are four digits.

7 3 4 9

(a) Use three of these digits to write down the largest possible 3-digit number.

We need the largest digit in the hundreds column
 $900 > 700 > 400 > 300$
 hundreds tens units
 $974 > 973$
 $970 > 940 > 930$
 = Second largest (as we can't use the 9 twice)

974
 (1)

(b) Here are four different digits.

8 2 1 6

Put one of these digits in each box to give the smallest possible answer to the sum.
 You must use each digit only once.

leftover digits in units
 Smallest digits in tens columns
 $18 + 26 = 28 + 16$
 (1)

(Total for Question 5 is 2 marks)

6 Write down all the factors of 30

Factor Pairs:

1 × 30

2 × 15

3 × 10

5 × 6 ← Stop here

[6 × 5] we have already counted 5 and 6,
 so now we have found all factor
 pairs

1, 2, 3, 5, 6, 10, 15, 30

(Total for Question 6 is 2 marks)



$$N = 6$$

- 7 David has twice as many cousins as Becky.
Becky has twice as many cousins as Nishat.
Nishat has 6 cousins.

How many cousins does David have?

Work backwards through the information.

$$B = 2 \times N$$

$$B = 2 \times 6$$

$$B = 12$$

$$D = 2 \times B$$

$$D = 2 \times 12$$

$$D = 24$$

24

(Total for Question 7 is 2 marks)

- 8 (a) Find the value of $\sqrt{1.44 \times 3.61}$

$$\sqrt{(1.44 \times 3.61)} = \sqrt{5.1984}$$

2.28

(1)

- (b) Find the value of $(3.54 - 0.96)^2 - 4.096$

Order of operations:

First * Brackets

* Indices

Division

Multiplication

Addition

Last * Subtraction

$$B \quad (3.54 - 0.96) = 2.58$$

$$I \quad 2.58^2 = 6.6564$$

$$S \quad 6.6564 - 4.096 = 2.5604$$

2.5604

(2)

(Total for Question 8 is 3 marks)

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- 9 This is part of a bus timetable between Bury and Manchester.

	Bus 1	Bus 2	...			
Bury	08 25	08 55	09 15	09 30	09 45	10 05
Whitefield	08 34	09 04	09 24	09 39	09 54	10 14
Heaton Park	08 46	09 16	09 36	09 51	10 06	10 27
Cheetham	08 56	09 26	09 46	10 01	10 16	10 37
Manchester	09 05	09 35	09 55	10 10	10 25	10 48

- (a) How many minutes should the 08 25 bus take to go from Bury to Manchester?

$$08:25 \rightarrow 09:05 = 40 \text{ minutes}$$

40 minutes
(1)

Daniel goes from Whitefield to Manchester by bus.

Daniel takes 17 minutes to get from his house to the bus stop in Whitefield.

He takes 15 minutes to get from the bus stop in Manchester to work.

Daniel has to get to work by 10 am.

He leaves his house at 8.45 am.

- (b) Does Daniel get to work by 10 am?
You must show all your working.

Bury	08 25	08 55	09 15	09 30	09 45	10 05
Whitefield	08 34	09 04	09 24	09 39	09 54	10 14
Heaton Park	08 46	09 16	09 36	09 51	10 06	10 27
Cheetham	08 56	09 26	09 46	10 01	10 16	10 37
Manchester	09 05	09 35	09 55	10 10	10 25	10 48

When does he get to Whitefield?

$$08:45 + 17 \text{ minutes} = 09:02 \quad (1)$$

$\uparrow$ leaves home $\uparrow$ house $\rightarrow$ bus stop

As he reaches the stop at 09:02, the earliest bus he can catch is at 09:04.
This arrives at Manchester at 09:35 (1)

$$09:35 + 15 \text{ minutes} = 09:50$$

$\uparrow$ arrives at Manchester $\uparrow$ Manchester $\rightarrow$ work

Which is before 10 am, so yes he does get to work before 10 am. (1)

(3)

(Total for Question 9 is 4 marks)

10 Bronwin works in a restaurant.

The table gives her rates of pay.

Day	Rate of pay
Monday to Friday	£8.40 per hour
Weekend	£11.20 per hour

Bronwin worked for a total of 20 hours last week.

She worked 8 of these 20 hours at the weekend.

Show that Bronwin was paid less than £200 last week.

$$\text{Weekend : } 8 \times £11.20 = £89.60 \quad (1)$$

$$\text{Mon} \rightarrow \text{Fri : } 20 - 8 = 12 \text{ hours worked in the week}$$

$$12 \times £8.40 = £100.80 \quad (1)$$

$$\text{Total : } £89.60 + £100.80 = £190.40 \quad (1)$$

$$£190.40 < £200$$

(Total for Question 10 is 3 marks)

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- 11 Last year the cost of a season ticket for a football club was £560
This year the cost of a season ticket for the club has been increased to £600

Write down the increase in the cost of a season ticket as a fraction of last year's cost.

$$\frac{\text{Increase}}{\text{Original amount}} = \frac{600 - 560}{560} = \frac{40}{560} \text{ increase } \textcircled{1}$$

$$\frac{40}{560} \textcircled{1}$$

(Total for Question 11 is 2 marks)



12 The diagram shows a scale drawing of a tennis court.

(11.5 → 11.7) 11.5 ① measured with a ruler

(5.6 → 6.0)
5.8 cm



The scale of the drawing is 1 : 200 1 cm on paper = 200 cm in real life

Work out the perimeter of the real tennis court.
Give your answer in metres.

Finding actual dimensions:

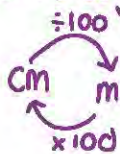
$$\text{width: } 5.8 \times 200 = 1160 \text{ cm } ①$$

$$\text{length: } 11.5 \times 200 = 2300 \text{ cm}$$

Perimeter of real rectangle:

$$(2 \times \text{width}) + (2 \times \text{height}) = (2 \times 1160) + (2 \times 2300) \\ = 6920 \text{ cm } ①$$

Converting into metres:



$$6920 \div 100 = 69.2 \text{ m } ①$$

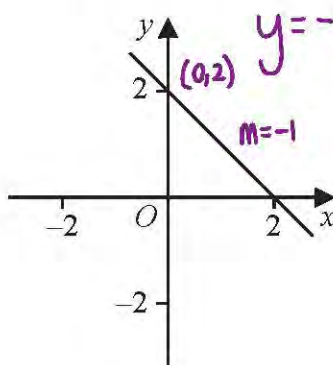
Answer range:
67.6 → 70.8

69.2 ① metres

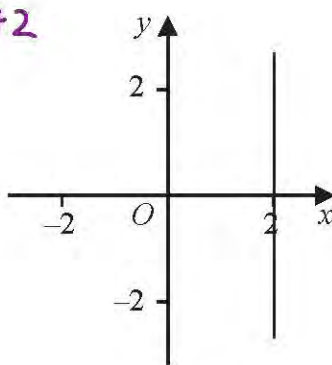
(Total for Question 12 is 5 marks)



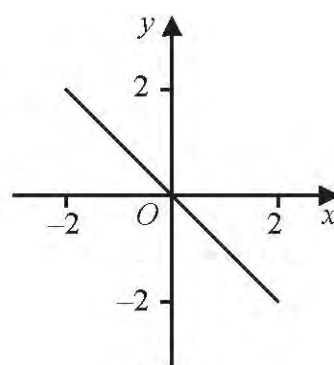
13 Here are six straight line graphs.



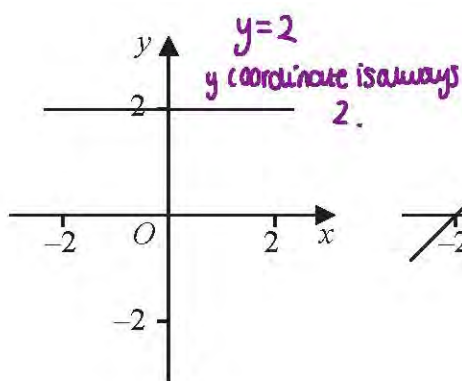
Graph A



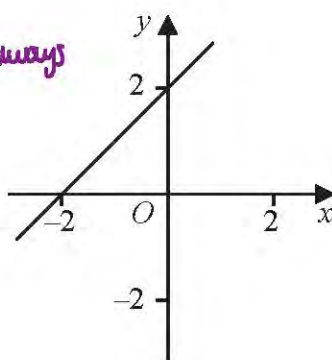
Graph B



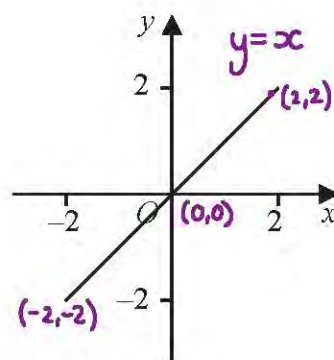
Graph C



Graph D



Graph E



Graph F

Match each equation in the table to the correct graph.
Write the letter of the graph in the table.

Equation	Graph
$y = 2$	D
$y = x$	F
$x + y = 2$	A

For every x value, the y coordinate is 2 $(x, 2)$

Rearrange into a more recognisable form:

$$x + y = 2$$

$$y = 2 - x$$

$$y = -x + 2 \leftarrow y \text{ intercept } (0, 2)$$

$\uparrow$ gradient of -1

$\leftarrow$ x and y values are always equal.
e.g. $(0, 0)$ $(1, 1)$ $(-2, -2)$

(Total for Question 13 is 2 marks)



14 Here are the marks 20 students got in a French test.

~~76~~ ~~82~~ ~~84~~ 69 80 64 70 81 75 91
87 67 80 70 94 76 81 69 71 77

(a) Show this information in a stem and leaf diagram.

Unordered diagram:
Stem → TENS leaf → UNITS

6	9479
7	6050617
8	2401701
9	14

$$6 | 4 = 64 \quad (1)$$

6	4799
7	0015667
8	0011247
9	14

(3)

One of these students is going to be chosen at random.

The pass mark in the French test is 71

Omar writes,

The probability that this student failed the French test is $\frac{1}{4}$

Omar is wrong.

(b) Explain why.

6 Students failed (1)

(had a score less than 71)

$$\frac{6}{20} \neq \frac{1}{4} \quad (1)$$

(2)

(Total for Question 14 is 5 marks)

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ORDER OF OPERATIONS

Brackets

Indices

Division

★ Multiplication

Addition

★ Subtraction

15 Jenny is asked to find the value of $12 - 2 \times 4$

Here is her working.

$$12 - 2 \times 4 = 10 \times 4 = 40$$

Jenny's answer is wrong.

(a) Explain what Jenny has done wrong.

$$12 - (2 \times 4) = 12 - 8 = 4$$

She should have multiplied first

(1)

Rehan is asked to find the range of the numbers 3 1 8 7 5

Here is his working.

$$\text{Range} = 5 - 3 = 2$$

Range = greatest - smallest
in list

This is wrong.

(b) Explain why.

The range is the difference between the greatest and least values in the set.

(1)

(Total for Question 15 is 2 marks)



16 Alan, Bispah and Chan share a sum of money.

Alan gets $\frac{1}{8}$ of the money.

Bispah gets $\frac{1}{2}$ of the money.

Chan gets the rest of the money.

Alan gets £2.50

(a) Work out how much money Bispah gets.

Alan gets $\frac{1}{8}$ of the total. Alan gets £2.50

$$\begin{aligned} \frac{1}{8}t &= £2.50 & t = \text{total money} \\ \times 8 & & \\ t &= 2.50 \times 8 & \text{①} \\ t &= £20 \end{aligned}$$

Bispah gets $\frac{1}{2}$ of the total (t)

$$\begin{aligned} B &= \frac{1}{2}t = \frac{1}{2} \times 20 \\ &= £10 \end{aligned}$$

£ 10 ①
(2)

(b) Find the ratio

amount of money Alan gets : amount of money Chan gets

Give your answer in the form $a:b$ where a and b are whole numbers.

$A = £2.50$ $t = £20$

$B = £10$

Chan's Share:

$C = 20 - 10 - 2.50 = 7.50$ ①

Alan : Chan

$$\begin{aligned} &£2.50 : £7.50 & \text{①} \\ \div 2.50 & \left(\begin{array}{c} 1 : 3 \end{array} \right) \div 2.50 & \leftarrow \text{we need a ratio with whole numbers} \end{aligned}$$

1 : 3 ①
(3)

(Total for Question 16 is 5 marks)

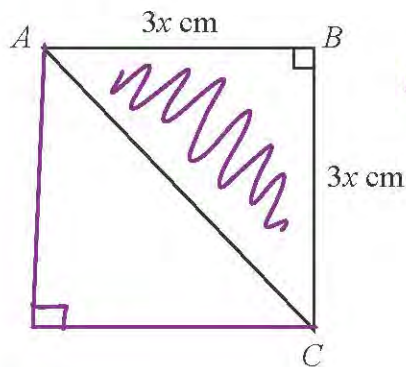
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- 17 ABC is an isosceles right-angled triangle.



$$\begin{aligned}\Delta \text{ area} &= \frac{1}{2} \square \text{ area} \\ &= \frac{1}{2} \times AB \times BC \\ &= \frac{1}{2} \times 3x \times 3x\end{aligned}$$

The area of the triangle is 162 cm^2

Work out the value of x .

Area of Δ - setting up an equation in x

$$3x \times 3x \times \frac{1}{2} = 162 \quad (1)$$

$$\frac{9}{2} x^2 = 162$$

$$x^2 = \frac{162 \times 2}{9} \quad (1)$$

$$x = \sqrt{36}$$

$$x = 6$$

x must be positive
as you can't have a negative length

$$x = 6 \quad (1)$$

(Total for Question 17 is 3 marks)

- 18 Work out the value of

$$\frac{2.645 \times 10^9}{1.15 \times 10^3}$$

Give your answer in standard form.

Laws of Indices:

$$\frac{2.645}{1.15} \times \frac{10^9}{10^3}$$

$$\frac{a^n}{a^m} = a^{n-m}$$

$$\uparrow$$

2.3

$$\uparrow$$

 $\times 10^6$

(already in standard form)

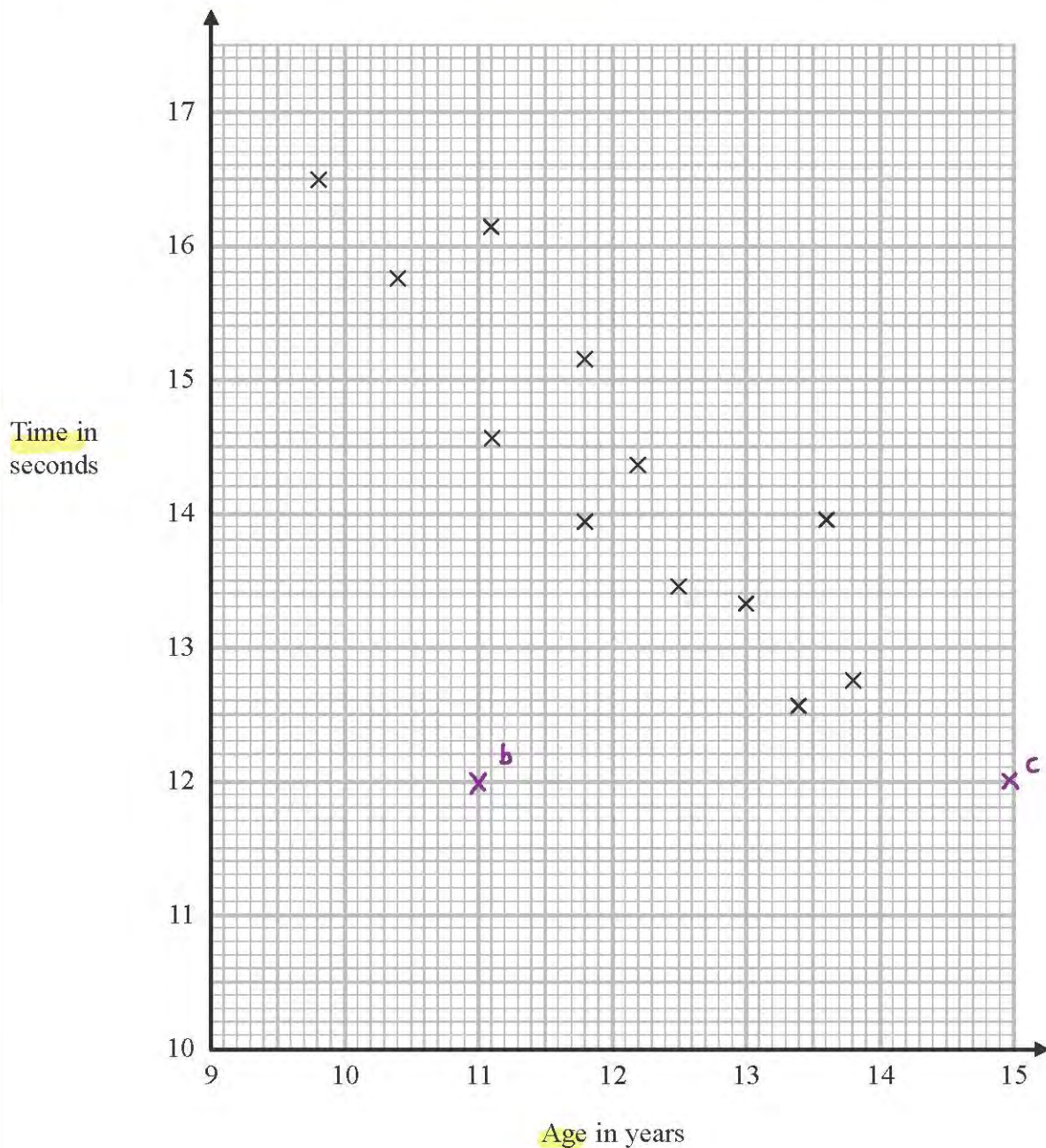
$$2.3 \times 10^6$$

(Total for Question 18 is 2 marks)



19 The scatter diagram shows information about 12 girls.

It shows the age of each girl and the best time she takes to run 100 metres.



(a) Write down the type of correlation.

The general trend = as age increases,
time decreases

negative

(1)

The line of best fit has a negative gradient.



Kristina is 11 years old.

Her best time to run 100 metres is 12 seconds.

The point representing this information would be an outlier on the scatter diagram.

doesn't fit trend - far from other points / line of best fit

(b) Explain why.

It is not in line with the trend of the other points

(1)

Debbie is 15 years old.

Debbie says,

"The scatter diagram shows I should take less than 12 seconds to run 100 metres."

Extrapolation → extending graph beyond plotted points is unreliable as we can't be sure that the trend will continue

(c) Comment on what Debbie says.

The point would be outside of the range of the scatter diagram

(1)

(Total for Question 19 is 3 marks)

20 Expand and simplify

$$5(p+3) - 2(1-2p)$$

$$((5 \times p) + (5 \times 3)) + (-2 \times 1) + (-2 \times -2p)$$

$$= (5p + 15) + (-2 + 4p) \quad \textcircled{1} \text{ Expanding 1 bracket}$$

$$= (5p + 4p) + (15 - 2)$$

$$= 9p + 13 \quad \leftarrow (13 \text{ is prime})$$

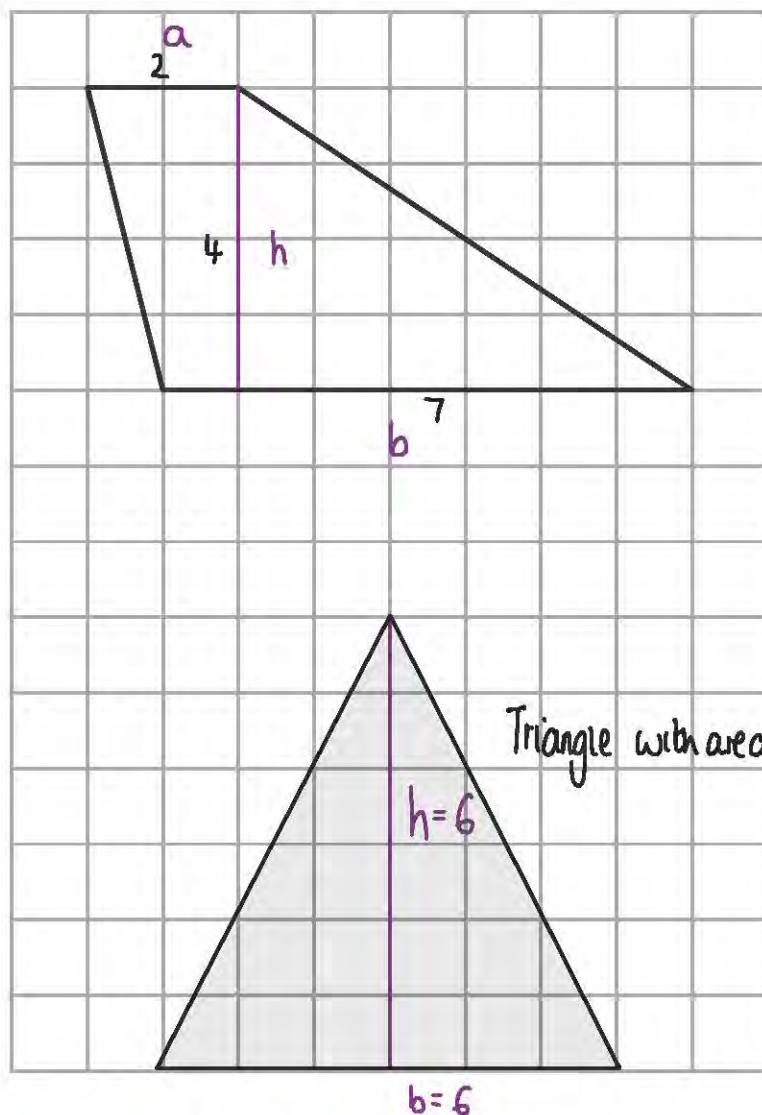
9 and 13 have no common factors,
so this can't be simplified further.

$$9p + 13 \quad \textcircled{1}$$

(Total for Question 20 is 2 marks)



21 Here is a trapezium drawn on a centimetre grid.



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On the grid, draw a triangle equal in area to this trapezium.

$$\begin{aligned}
 \text{Area of Trapezium} &= \frac{1}{2} (a+b) \times h \quad \leftarrow \begin{array}{l} \text{sum of parallel sides} \\ \text{height between them} \end{array} \\
 &= \frac{1}{2} (2+7) \times 4 \\
 &= 18 \text{ cm}^2 \quad \text{①}
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of Triangle} &= 18 = \frac{1}{2} bh \\
 bh &= 36
 \end{aligned}$$

The base and height must multiply to get 36
= a factor pair of 36

9 and 4
or 6 and 6

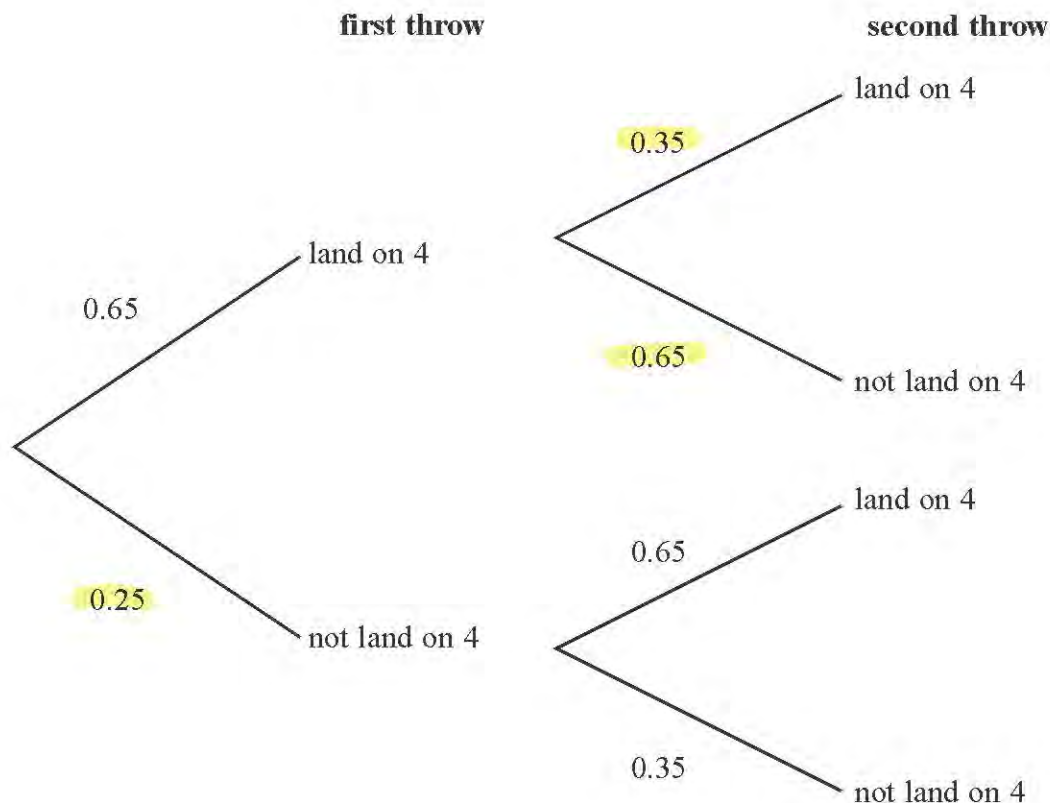
If $b=6$ and $h=6$

(Total for Question 21 is 2 marks)



- 22 When a biased 6-sided dice is thrown once, the probability that it will land on 4 is 0.65. The biased dice is thrown twice.

Amir draws this probability tree diagram.
The diagram is **not** correct.



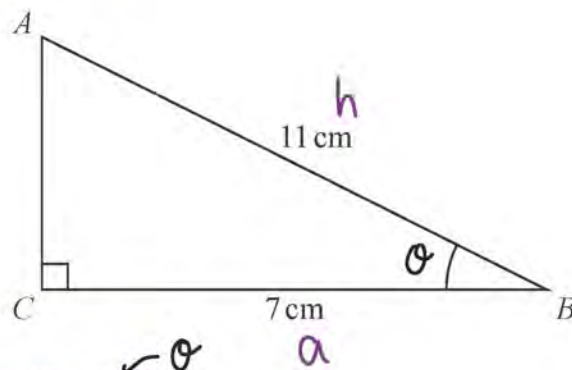
Write down **two** things that are wrong with the probability tree diagram.

- 1 Probabilities should sum to 1
0.25 should be 0.35 ①
- 2 For the second throw, the probability it lands on a 4 should still be 0.65 (the top 0.35 and 0.65 should be swapped) ①

(Total for Question 22 is 2 marks)



23 ABC is a right-angled triangle.



- (a) Work out the size of angle ABC .
Give your answer correct to 1 decimal place.

SOH (CAH) TOA

We need to use cos as we have the length of the adjacent and hypotenuse

$$\cos \theta = \frac{a}{h} = \frac{7}{11}$$

$$\theta = \cos^{-1}\left(\frac{7}{11}\right)$$

$$\theta = 50.4788^\circ$$

$$\theta = 50.5^\circ \text{ to 1 dp}$$

50.5

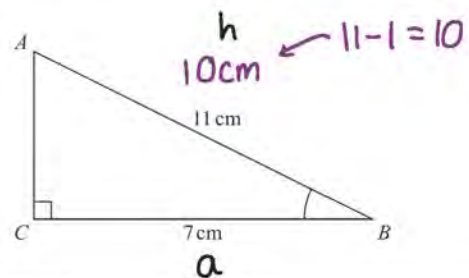
(2)

The length of the side AB is reduced by 1 cm.

The length of the side BC is still 7 cm.

Angle ACB is still 90°

- (b) Will the value of $\cos ABC$ increase or decrease?
You must give a reason for your answer.



$$\cos ABC = \frac{a}{h} = \frac{7}{10}$$

$\frac{7}{10}$ is greater than $\frac{7}{11}$, so $\cos ABC$ has increased

(1)

(Total for Question 23 is 3 marks)

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- 24 There are some counters in a bag.

The counters are red or white or blue or yellow.

Bob is going to take at random a counter from the bag.

The table shows each of the probabilities that the counter will be blue or will be yellow.

Colour	red	white	blue	yellow
Probability	$2x$	x	0.45	0.25

There are 18 blue counters in the bag.

The probability that the counter Bob takes will be red is twice the probability that the counter will be white.

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

Probabilities sum to 1 :

$$2x + x + 0.45 + 0.25 = 1$$

$$3x = 0.3 \quad (1)$$

$$x = 0.1$$

$$2x = P(\text{Red}) = 0.2 \quad (1)$$

$P(\text{Blue}) = 0.45$ ← total counters

$$0.45t = 18 \quad \leftarrow \text{number of blue counters}$$

$$t = \frac{18}{0.45} = 40 \text{ counters} \quad (1)$$

Number of red counters :

$$40 \times 0.2 = 8$$

$$8 \quad (1)$$

A marble is going to be taken at random from a box of marbles.

The probability that the marble will be silver is 0.5

$\frac{1}{2}t$ must be a whole number

There must be an even number of marbles in the box.

- (b) Explain why.

0.5 multiplied by an odd number will never be a whole number and we can not have half a marble. For half of a number to be an integer, the number must be even. (1)

(Total for Question 24 is 5 marks)



25 Solve $\frac{5-x}{2} = 2x-7$ (find x)

We need to isolate the x terms

$\times 2 \left(\frac{5-x}{2} = 2x-7 \right) \times 2$ Do the same to both sides of the equals sign

$$\downarrow 5-x = 2(2x-7)$$

$+x \left(5-x = 4x-14 \right) +x$

$$\downarrow 5 = 5x-14$$

$+14 \left(19 = 5x \right) +14$

$$\downarrow 19 = 5x$$

$\div 5 \left(\frac{19}{5} = x \right) \div 5$

$$\downarrow \frac{19}{5} = x$$

$$x = \frac{19}{5}$$

(Total for Question 25 is 3 marks)

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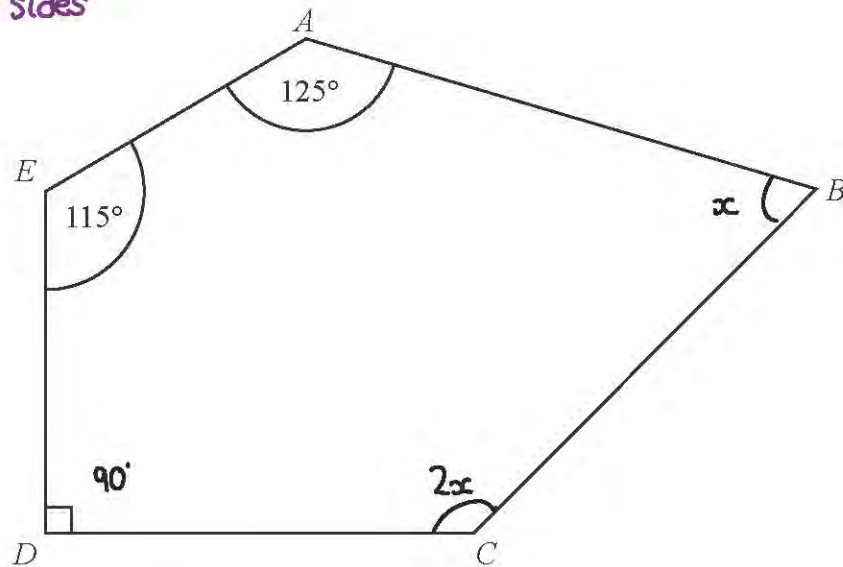
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26 $ABCDE$ is a pentagon.

5 sides



Angle $BCD = 2 \times$ angle ABC

Work out the size of angle BCD .

You must show all your working.

$$\text{Let } \angle ABC = x \quad \therefore \angle BCD = 2x$$

Sum of interior angles of a pentagon:

$$\begin{aligned} (n-2) \times 180 &= (5-2) \times 180 \quad \textcircled{1} \\ &= 180 \times 3 \\ &= 540^\circ \quad \textcircled{1} \end{aligned}$$

Setting up an equation in x :

$$\begin{aligned} x + 2x + 90 + 115 + 125 &= 540 \quad \textcircled{1} \\ 3x &= 210 \quad \textcircled{1} \\ x &= 70^\circ \end{aligned}$$

$$\angle BCD = 2x = 2 \times 70 = 140^\circ$$

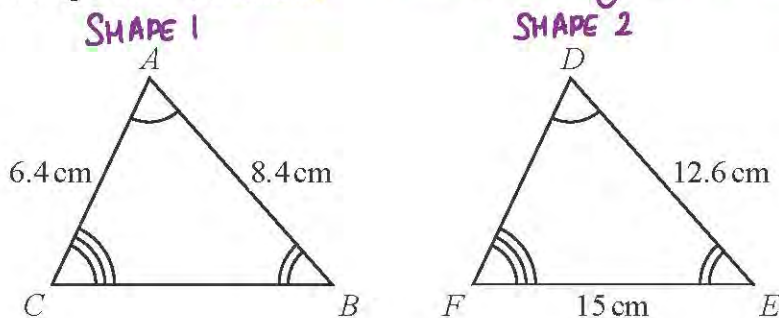
140 ^① °

(Total for Question 26 is 5 marks)



27 Triangle ABC and triangle DEF are similar.

Same angles but side lengths are scaled up by the same factor



(a) Work out the length of DF .

$$AC \times x = DF$$

$$AB \times x = DE$$

$$x = \frac{DE}{AB} = \frac{12.6}{8.4} = 1.5$$

$$DF = 1.5 \times AC$$

$$= 1.5 \times 6.4 = 9.6$$

9.6 cm
(2)

(b) Work out the length of CB .

$$CB \times x = FE$$

$$CB = \frac{FE}{x} = \frac{15}{1.5} = 10$$

10 cm
(2)

(Total for Question 27 is 4 marks)

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28 Make g the subject of the formula

$$T = \sqrt{\frac{g+6}{2}}$$

← having g in a $\sqrt{\quad}$ will make it difficult to isolate, so we need to eliminate the square root by Squaring both sides of the expression
 $(\sqrt{a})^2 = a$

$$\begin{array}{lcl} T^2 & = & \frac{g+6}{2} \quad (1) \\ \times 2 \downarrow & & \downarrow \times 2 \\ 2T^2 & = & g+6 \quad (1) \\ -6 \downarrow & & \downarrow -6 \\ 2T^2 - 6 & = & g \end{array}$$

$$g = 2T^2 - 6 \quad (1)$$

(Total for Question 28 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS



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