

Write your name here

Surname

Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9-1)

Centre Number

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Candidate Number

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Mathematics

Paper 3 (Calculator)

Foundation Tier

Tuesday 12 June 2018 – Morning
Time: 1 hour 30 minutes

Paper Reference

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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6/7/7/7/8/8/7/1/

.CG Maths.
Worked Solutions



Pearson

Please note that these worked solutions have neither been provided nor approved by Pearson Education and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue should be written in the exam.

Anything written in green in a rectangle doesn't have to be written in the exam.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

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.

Typing it into the calculator and formatting it as a decimal

0.9

(Total for Question 1 is 1 mark)

2 Write 0.3 as a percentage.

To convert a decimal to a percentage, multiply it by 100

30 %

(Total for Question 2 is 1 mark)

3 Write the number 2538 correct to the nearest hundred.

5 is in the hundreds place. The 3 in the next place causes it to round down so it stays as a 5. All the digits after the 5 are ignored and become 0

2500

(Total for Question 3 is 1 mark)

4 Here are the first 4 terms of a sequence.

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

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

30

(1)

(ii) Explain how you got your answer.

Add 7

(1)

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

37, 44, 51, 58 ← Keep adding 7 until the 10th term is found

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.

The largest digits should be used first

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.

1 8 + 2 6

The smallest digits should be used for the tens

(1)

(Total for Question 5 is 2 marks)

6 Write down all the factors of 30

Writing the factors in pairs starting with the smallest and largest. $1 \times 30 = 30$, so both 1 and 30 are factors

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

(Total for Question 6 is 2 marks)

- 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?

6×2 ← This works out that Becky has 12 cousins

12×2 ← This works out that David has 24 cousins

24

(Total for Question 7 is 2 marks)

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

Type it into the calculator exactly as it is above

2.28

(1)

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

Type it into the calculator exactly as it is above

2.5604

(2)

(Total for Question 8 is 3 marks)

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

| | | | | | | |
|-------------------|-------|-------|-------|-------|-------|-------|
| 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?

$09^{\circ}05^{\circ} - 08^{\circ}25^{\circ}$ ← Subtracting the 08 25 from the 09 05 time it arrives in Manchester gives $0^{\circ}40'0''$, which can be read as 40 minutes. Entering the times into the calculator as sexagesimals

.....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.

$8^{\circ}45^{\circ} + 0^{\circ}17^{\circ} = 9^{\circ}2'0''$ ← Adding the 17 minutes to 8.45 am works out that Daniel arrives at the bus stop in Whitefield at 9.02 am

$09^{\circ}35^{\circ} + 0^{\circ}15^{\circ} = 9^{\circ}50'0''$ ← He can get the 09 04 from Whitefield which arrives in Manchester at 09 35. Adding the 15 minutes to the 09 35 works out that Daniel arrives at work at 9.50 am

Yes ← 9.50 am is before 10 am

(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.

$$20 - 8 \leftarrow \begin{array}{l} \text{Subtracting the 8 hours worked on the weekend from the 20} \\ \text{hours works out that 12 hours were worked Monday to Friday} \end{array}$$
$$8.40 \times 12 = 100.80 \leftarrow \begin{array}{l} \text{Multiplying the £8.40 by the 12 hours worked Monday to} \\ \text{Friday works out that £100.80 was paid for Monday to Friday} \end{array}$$
$$11.20 \times 8 = 89.60 \leftarrow \begin{array}{l} \text{Multiplying the £11.20 by the 8 hours worked at the} \\ \text{weekend works out that £89.60 was paid for the weekend} \end{array}$$
$$100.80 + 89.60 = 190.40 \leftarrow \begin{array}{l} \text{Adding the £100.80 for Monday to Friday and the £89.60 for the} \\ \text{weekend works out that £190.40 was paid, which is less than £200} \end{array}$$

(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.

$$600 - 560$$

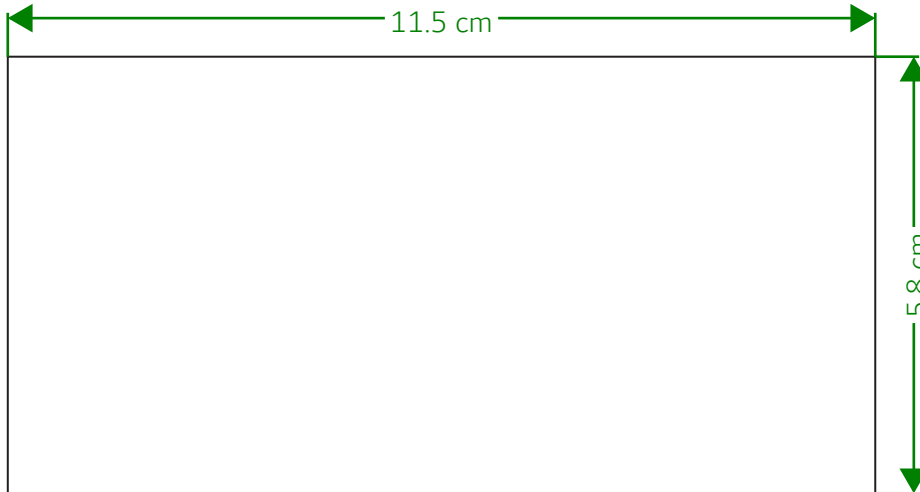
Subtracting the original cost from the new cost works out the difference and so works out that the increase in the cost is £40

Expressing the increase in cost as a fraction of last year's cost

$$\frac{40}{560}$$

(Total for Question 11 is 2 marks)

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



The scale of the drawing is 1 : 200

Work out the perimeter of the real tennis court.

Give your answer in metres.

$$11.5 + 11.5 + 5.8 + 5.8$$

Perimeter is all the outside sides added together. There are two 11.5 cm and two 5.8 cm lengths. So the perimeter is 34.6 cm on the drawing

$$34.6 \times 200$$

From the scale, the lengths of the real tennis court are 200 times greater than the lengths on the drawing. So multiplying the perimeter on the drawing by 200 works out that the real perimeter is 6920 cm

$$6920 \div 100$$

1 m = 100 cm. So dividing the 6920 cm by 100 converts it to 69.2 m

..... 69.2 metres

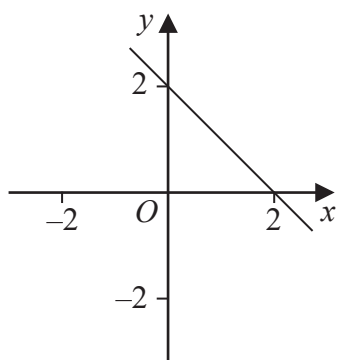
(Total for Question 12 is 5 marks)

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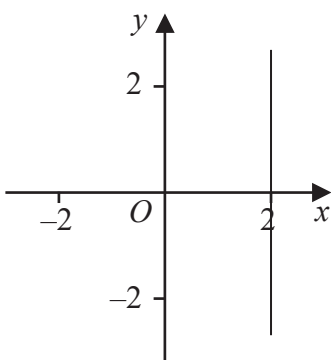
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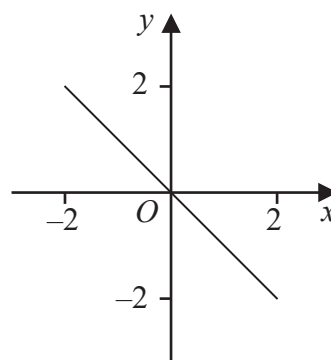
13 Here are six straight line graphs.



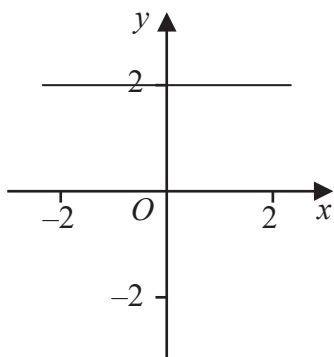
Graph A



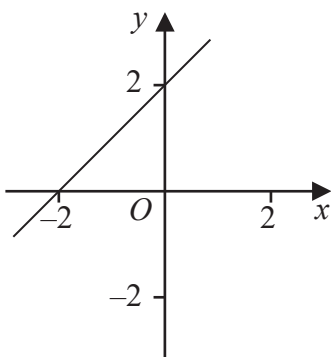
Graph B



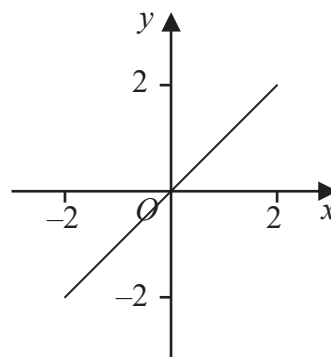
Graph C



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 <input type="checkbox"/> |
| $y = x$ | F <input type="checkbox"/> |
| $x + y = 2$ | A <input type="checkbox"/> |

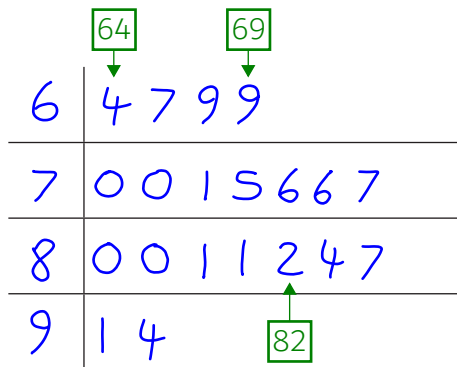
(Total for Question 13 is 2 marks)

A : All the points on D have y-coordinates of 2.
 B: All the x-coordinates are the same as y-coordinate at all points on F.
 C: Adding the x-coordinates to the y-coordinates gives 2 for all points on A

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.



key:
6 | 4 = 64

(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.

$6/20$ of the students failed. This is not equivalent to $1/4$

6 out of the 20 students scored less than 71

(2)

(Total for Question 14 is 5 marks)

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.

Should have done 2×4 first

The order of operations (BIDMAS) should be followed

(1)

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

Here is his working.

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

This is wrong.

(b) Explain why.

Should have done $8 - 1 = 7$

Range = largest - smallest. The largest is 8 and the smallest is 1

(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.

2.50×8 ← Multiplying the £2.50 Alan gets by 8 undoes the $\frac{1}{8}$ and finds that the total amount of money is £20

$20 \div 2$ ← Dividing the total amount of money by 2 works out that $\frac{1}{2}$ of the money is £10, which is what Bispah gets

£ 10
(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.

$20 - 2.50 - 10$ ← Subtracting the £2.50 Alan gets and the £10 Bispah gets from the total £20 works out that Chan gets £7.50

$2.50 : 7.50$ ← Expressing the ratio of the amount Alan gets to the amount Chan gets

Putting the fraction $2.50/7.50$ into the calculator simplifies it to $\frac{1}{3}$. So the ratio will simplify to $1:3$ as ratios simplify in a similar way to fractions

..... 1 : 3
(3)

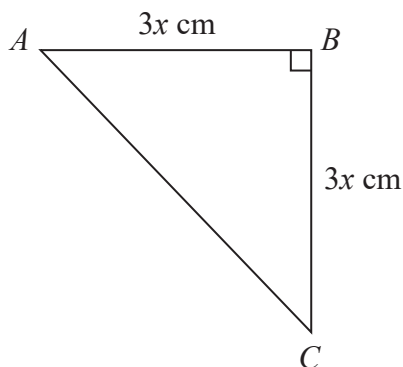
(Total for Question 16 is 5 marks)

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17 ABC is an isosceles right-angled triangle.



The area of the triangle is 162 cm^2

Work out the value of x .

$\frac{1}{2} \times 3x \times 3x$ ← Expressing the area of the triangle in terms of x . Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

$\frac{9x^2}{2} = 162$ ← Simplifying the expression and setting it equal to the value of the area

$9x^2 = 324$ ← Multiplying both sides by 2 eliminates the 2 as the denominator on the left

$x^2 = 36$ ← Dividing both sides by 9 eliminates the 9 on the left

Square rooting both sides eliminates the 2 as a power on the left

$x = \dots\dots\dots 6$

(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.

23000000 ← Typing it into the calculator gives 23000000

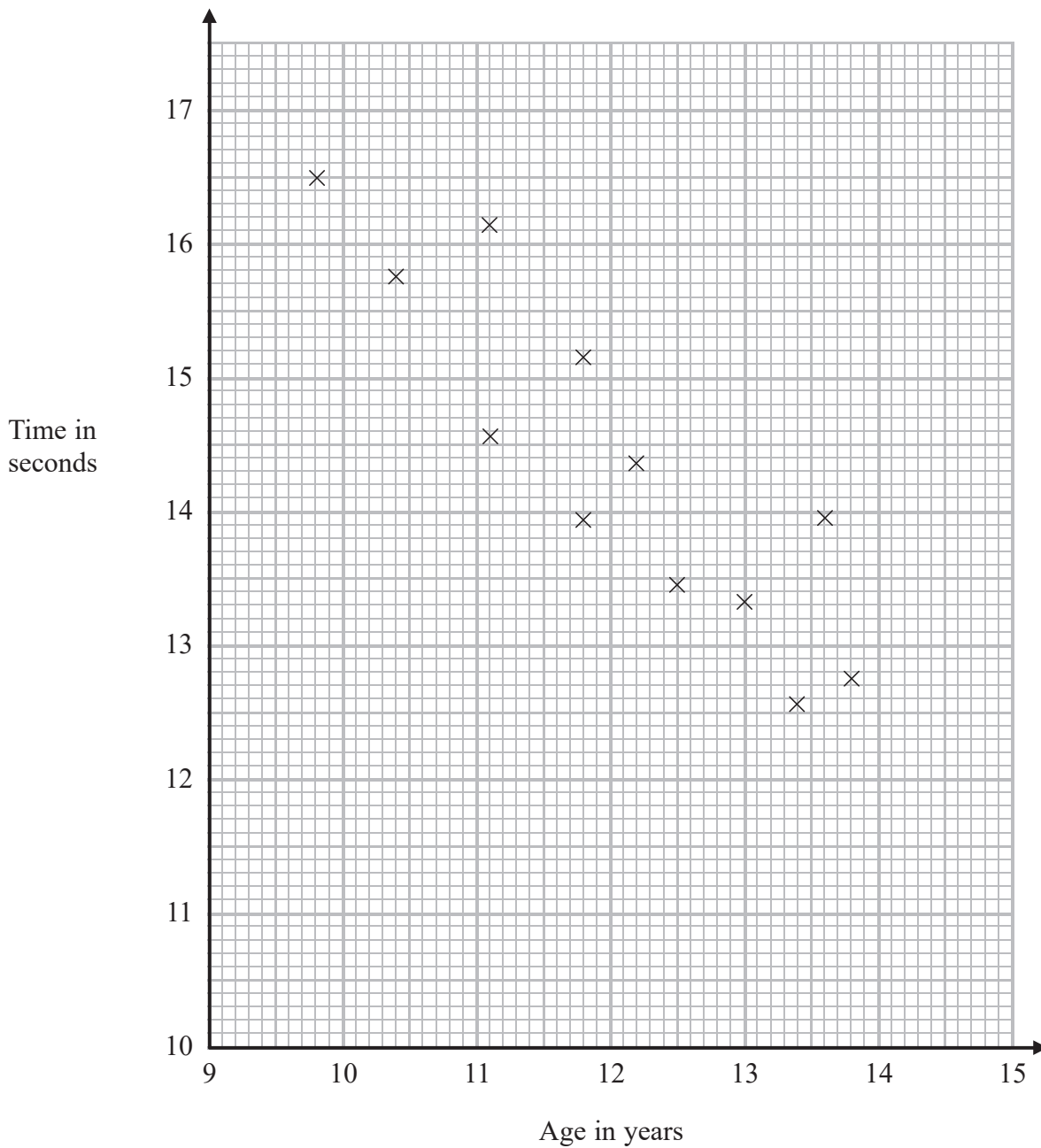
23000000 needs to be divided by ten 6 times to get 2.3, which is at least 1 and less than 10. So 2.3 needs to be multiplied by 10^6

2.3×10^6

(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.

Negative

As the age in years increases, the time in seconds generally decreases

(1)

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.

(b) Explain why.

It is far away from 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.”

(c) Comment on what Debbie says.

It does not show this as 15 years old is outside the range of the data given

The downward trend might not continue

(1)

(Total for Question 19 is 3 marks)

20 Expand and simplify $5(p + 3) - 2(1 - 2p)$

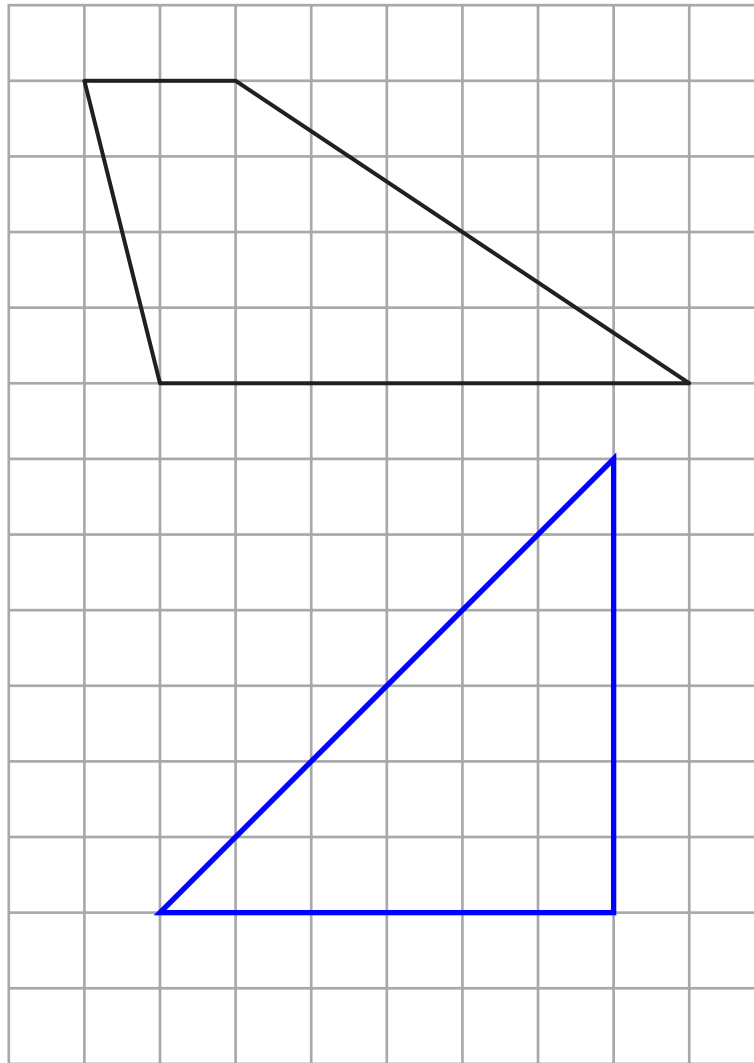
$$5p + 15 - 2 + 4p \leftarrow \text{Expanding the brackets}$$

Simplifying by collecting like terms

$$9p + 13$$

(Total for Question 20 is 2 marks)

21 Here is a trapezium drawn on a centimetre grid.



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

$$\frac{1}{2}(2+7) \times 4 = 18$$

Area of trapezium = $\frac{1}{2} \times (a + b) \times h$, where a and b are the parallel sides and h is the distance between a and b . So the area of the trapezium is 18 cm^2

$$\frac{1}{2}bh = 18$$

Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$. The area must also be 18 cm^2

$$bh = 36$$

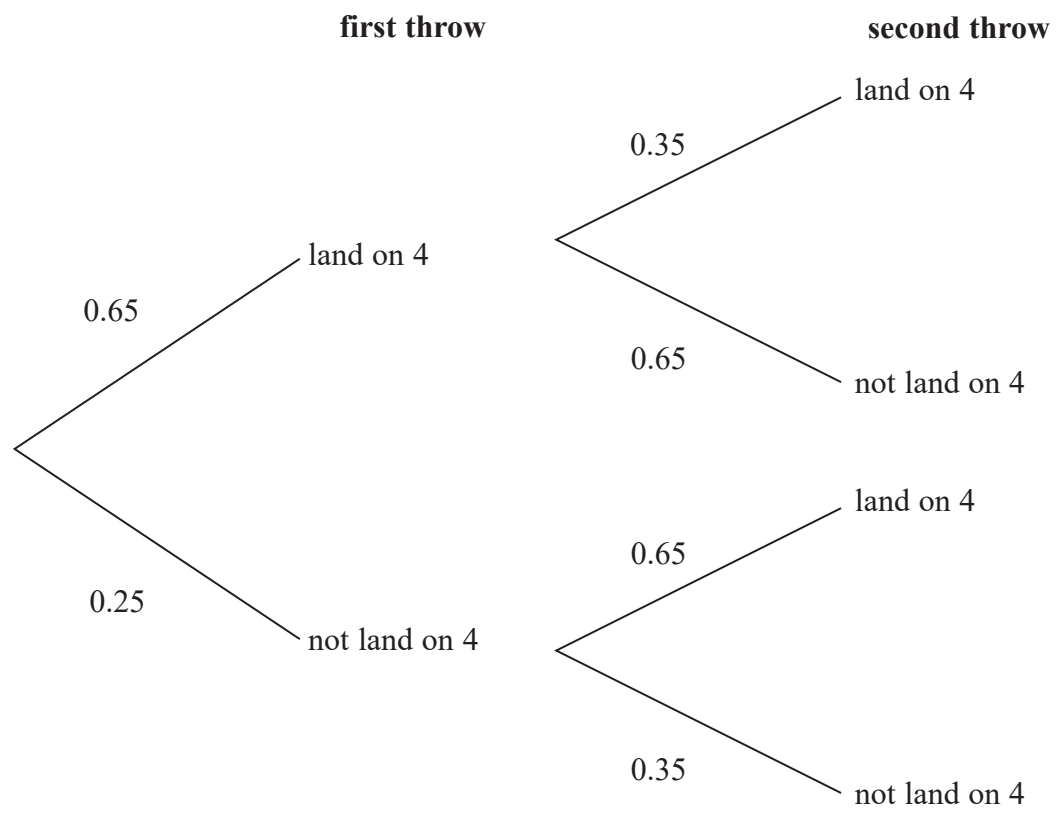
Multiplying both sides by 2 eliminates the $\frac{1}{2}$ on the left

$6 \times 6 = 36$ so a triangle with base of 6 cm and height of 6 cm could be drawn

(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.



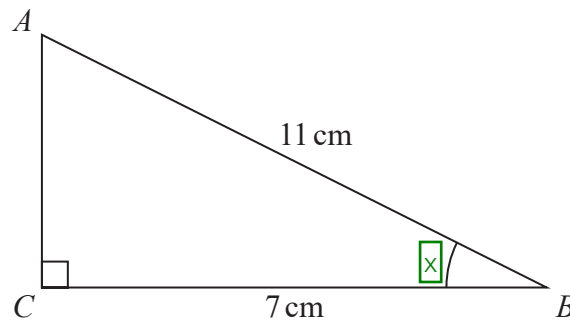
Write down **two** things that are wrong with the probability tree diagram.

1 0.25 should be 0.35 ← As it is certain to either land on a 4 or not to land on a 4, both probabilities must add to 1. $0.65 + 0.25 = 0.9$, not 1

2 0.35 and 0.65 are the wrong way round ← The probability that it will land on 4 is 0.65, not 0.35

(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.

S O H C A H T A

Using right-angled trigonometry. Ticking H as the 11 cm is the hypotenuse and ticking A as the 7 cm is the adjacent. There are two ticks on the CAH formula triangle so this one can be used

$$\cos x = \frac{7}{11}$$

Covering C in the CAH formula triangle finds that \cos of the angle = adjacent/hypotenuse

Doing the inverse cos of both sides gets x on its own. 50.47... is rounded to 1 decimal place

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.

Increases as $7/10$ is greater than $7/11$

$$\cos ABC = \text{adjacent/hypotenuse}$$

(1)

(Total for Question 23 is 3 marks)

- 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 | | | 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.

$$18 \div 0.45 = 40$$

Multiplying the total number of counters by the probability of blue would give the number of blue counters. So dividing the 18 blue counters by the probability of blue works out that there are 40 counters in total

$$1 - 0.45 - 0.25$$

Subtracting the probabilities of blue and yellow from 1 finds that the probability of red or white is 0.3

$$0.3 \div 3$$

The ratio of red to white is 2 : 1 and $2 + 1 = 3$ parts in total in the ratio which represents the red and white counters. So dividing the probability of red or white by 3 works out that 1 part of the ratio is worth 0.1

$$0.1 \times 2$$

Multiplying the value of 1 part of the ratio by the 2 parts which represent red works out that the probability of red is 0.2

$$40 \times 0.2$$

Multiplying the total number of counters by the probability of red works out that there are 8 red counters

8

(4)

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

0.5 is $\frac{1}{2}$

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

- (b) Explain why.

If there was an odd number, halving would give a fraction of a marble

If the probability is $\frac{1}{2}$ then $\frac{1}{2}$ of the marbles must be silver. There must be a whole number of silver marbles

(1)

(Total for Question 24 is 5 marks)

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

$5-x = 4x-14$ ← Multiplying both sides by 2 eliminates the 2 as a denominator on the left

$5 = 5x-14$ ← Adding x to both sides gets all the x on the same side

$19 = 5x$ ← Adding 14 to both sides eliminates the -14 on the right and gets the x term on its own

Dividing both sides by 5 gets x on its own

$x = \dots\dots\dots 3.8$

(Total for Question 25 is 3 marks)

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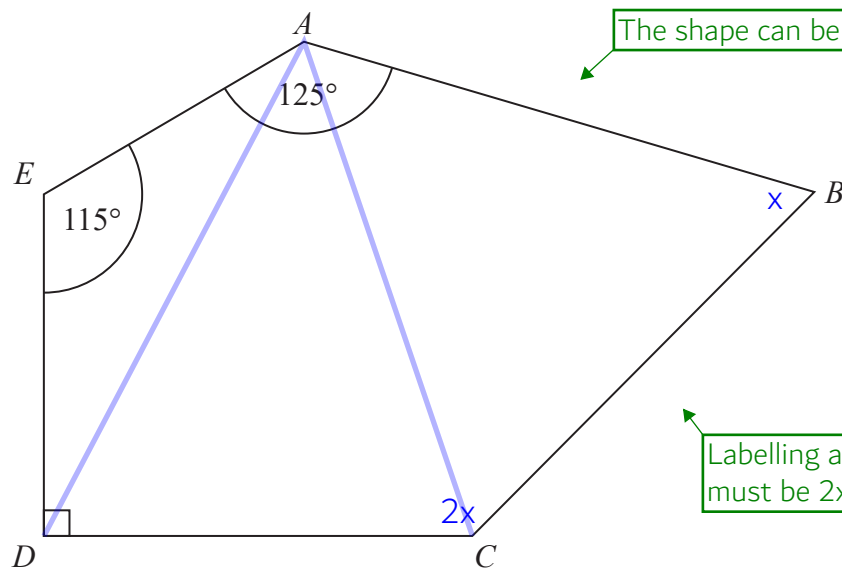
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26 $ABCDE$ is a pentagon.



The shape can be split into 3 triangles

Labelling angle ABC as x . Angle BCD must be $2x$ as it is $2 \times$ angle ABC

Angle $BCD = 2 \times$ angle ABC

Work out the size of angle BCD .
You must show all your working.

$3 \times 180 = 540$

There are 180° in a triangle. Multiplying 180° by the 3 triangles in the pentagon works out that there are 540° in total in a pentagon

$90 + 115 + 125 + x + 2x$

Adding all the angles in the pentagon expresses the total of the angles in terms of x

$3x + 330 = 540$

Simplifying by collecting like terms. This expression of the total of the angles in the pentagon must be equal to 540°

$3x = 210$

Subtracting 330 from both sides gets the x term on its own

$x = 70$

Dividing both sides by 3 gets x on its own. So angle ABC is 70°

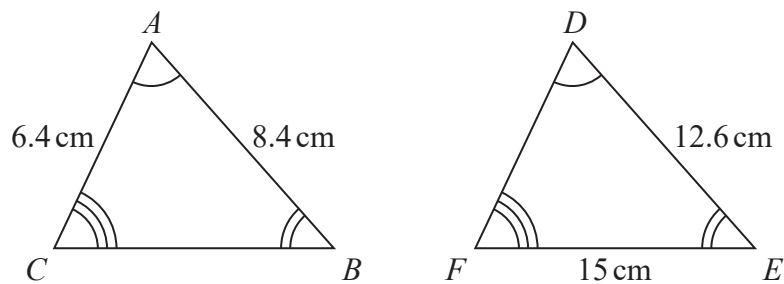
2×70

Angle $BCD = 2 \times$ angle ABC

.....140°

(Total for Question 26 is 5 marks)

27 Triangle ABC and triangle DEF are similar. Triangle DEF is a larger version of triangle ABC



(a) Work out the length of DF .

$12.6 \div 8.4 = 1.5$ Dividing the 12.6 cm by the 8.4 cm works out that the scale factor is 1.5

6.4×1.5 Multiplying the 6.4 cm by the scale factor works out that DF is 9.6 cm

..... 9.6 cm
(2)

(b) Work out the length of CB .

$15 \div 1.5$ Dividing the 15 cm by the scale factor works out that CB is 10 cm

..... 10 cm
(2)

(Total for Question 27 is 4 marks)

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28 Make g the subject of the formula $T = \sqrt{\frac{g+6}{2}}$

$T^2 = \frac{g+6}{2}$ ← Squaring both sides eliminates the square root on the right

$2T^2 = g+6$ ← Multiplying both sides by 2 eliminates the denominator of 2 on the right

Subtracting 6 from both sides gets g on its own

$g = 2T^2 - 6$

(Total for Question 28 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS