

Answer **all** the questions.

1 5 is a factor of 20.

(a) Write down another factor of 20.

Any of 1, 2, 4, 10, 20 ✓  
no extras

(a) ..... [1]

(b) Write down a multiple of 20.

20 etc ✓

(b) ..... [1]

2 (a) Complete the first seven square numbers.

1    4    9    16    25    36    49

[1] ✓

(b) Write the missing term in each sequence.

(i) 18    16    14    12    10    8

[1] ✓

(ii) 8    14    20    26    32    38

[1] ✓

3 Alex has a number game.  
He must put down tiles to make two calculations with the same answer.

Here is what Alex put down.



Is he correct?  
Show how you decide.

incorrect because  $2 - 3 \times 2 = -4$  ✓  
 $3 - 5 = -2$

..... [2]

4 A teacher asks nine of his pupils how many pets they have at home.

Here are the results.

1    1    1    2    3    4    5    7    111

(a) Work out the range of the nine results.

111 - 1

110 ✓

(a) ..... [1]

(b) The median of the nine results is 3.  
The mean is 15.

(i) Write down the mode.

1 ✓

(b)(i) ..... [1]

(ii) The teacher wants to use a sensible average to summarise the results.

Which average should he use and why?  
Median because it ignores extreme values ✓

..... [1]

Turn over

OCR-F  
Nov'20  
P3

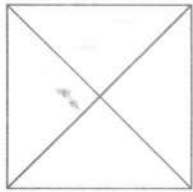
- 5 (a) The curved surface of a solid is made from this flat shape.



Write down the mathematical name of the solid.

(a) cylinder [1]

- (b) This is the plan view of a different solid.



Write down the mathematical name of the solid.

(b) (square based) pyramid [1]

or octahedron

- 6 (a) Work out 70% of 50.

$\frac{70}{100} \times 50$



35 [2]

(a) [2]

- (b) Beth multiplies a number by 3 and divides the answer by 10.

By what fraction has the number been reduced?

$\times \frac{3}{10}$

$\frac{7}{10}$  ✓✓

(b) [2]

- (c) Find a fraction which is bigger than  $\frac{3}{7}$  and smaller than  $\frac{4}{7}$ .

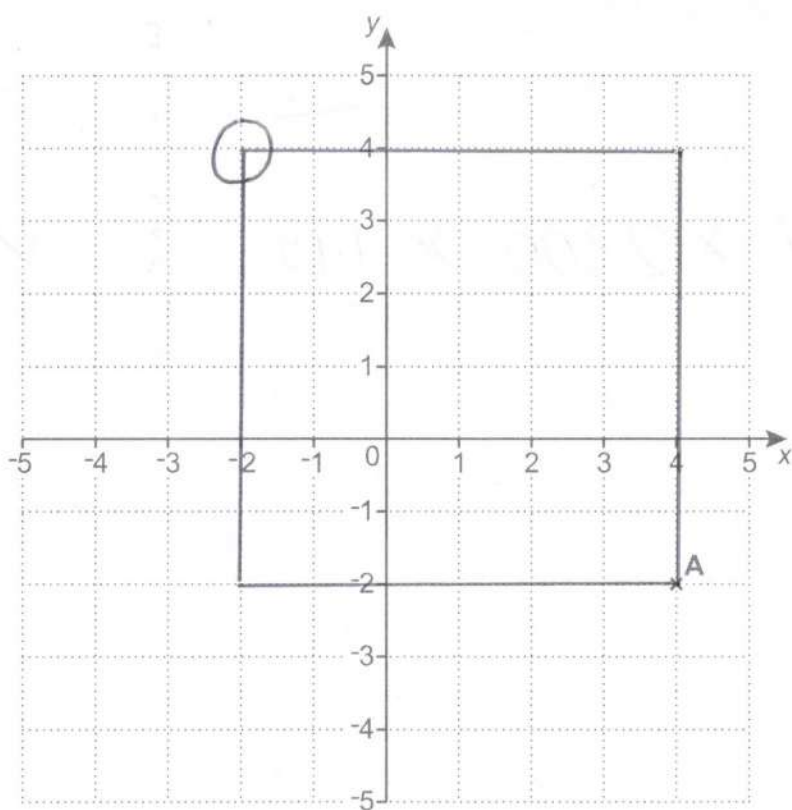
$\frac{6}{14}$        $\frac{8}{14}$



$\frac{7}{14} / \frac{1}{2}$  etc ✓

(c) [2]

- 7 Point A is plotted at (4, -2) on this one-centimetre square grid.



Point A is a corner of a square with area  $36 \text{ cm}^2$ .

$$= 6 \times 6$$

The other corners of the square have integer coordinates and lie on the grid.

Find the coordinates for the corner of the square that is diagonally opposite point A.  
You may use the grid above to help you.

(-2, 4) ✓

- 8 (a) Jo walks every day.  
This week she walked an average of 2300 steps a day.  
Next week she plans to increase this by 15%.

Work out how many steps she plans to walk **in total** next week?

$$7 \times 2300 \times 1.15$$

✓✓✓

18 515 ✓

(a) ..... [4]

- (b) Jo buys a pair of walking boots for £63 in a sale.  
She saves  $\frac{1}{10}$  of the original price of the boots.

Work out how much money Jo saves.

$$\begin{array}{l} \div 9 \quad \frac{9}{10} = \pounds 63 \\ \quad \quad \frac{1}{10} = \pounds 7 \end{array}$$

✓✓

7 ✓

(b) £ ..... [3]

- 9 Mia has knitted 3 left-hand gloves: 1 blue, 1 green, and 1 red.  
She has knitted 2 right-hand gloves: 1 green and 1 red.

She chooses a left-hand glove and a right-hand glove at random to make a pair of gloves.

Mia says

I have a probability of  $\frac{2}{3}$  of choosing a pair of gloves of the same colour as there is a red pair and a green pair and there are three colours.

Is she correct?

Show how you decide.

L	Right
B	G
G	G
R	G
B	R
G	R
R	R

✓✓ OE

Mia is Incorrect because the correct probability is

$$\frac{2}{6} = \frac{1}{3}$$

[3]

- 10 Sundip is going on holiday.  
She wants to change £400 into euros(€).

Bank A will change her £400 into €452.

Bank B changed £250 into €280 for Sundip's friend.  
It will use the same rate to change Sundip's £400 into euros.

At which bank will Sundip receive the most euros and by how many?  
Show your working.

$$\begin{array}{c} A \\ \pounds 400 \rightarrow \text{€}452 \end{array}$$

$$\begin{array}{c} B \\ 280 \div 250 \\ \times = 1.12 \end{array}$$

$$\begin{array}{c} \text{so} \\ 400 \times 1.12 \\ = \text{€}448 \end{array}$$

$$\begin{array}{c} 452 - 448 \\ = 4 \end{array}$$

At Bank A Sundip will receive € 4 more [5]

11  $5(2x+1) + c(x+d) = 12x-1$

Work out the value of  $c$  and the value of  $d$ .

$$\checkmark 10x + 5 + cx + cd = 12x - 1 \quad \checkmark$$

$$\boxed{x} \quad 10 + c = 12$$

$$c = 2$$

$$\boxed{\text{con}} \quad 5 + 2d = -1 \quad \checkmark$$

$$2d = -6$$

$$d = -3$$

$$c = \dots 2 \quad \checkmark$$

$$d = \dots -3 \quad \checkmark$$

[5]

12 (a) Complete the power of 2 for each statement by writing the missing value in the box.

(i)  $2^3 \times 2^3 = 2^{\boxed{6}}$

✓ [1]

(ii)  $\frac{1}{32} = 2^{\boxed{-5}}$

$32 = 2^5$

✓ [1]

(b)  $2 \times 2^y = 1$ .

Find the value of  $y$ .

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

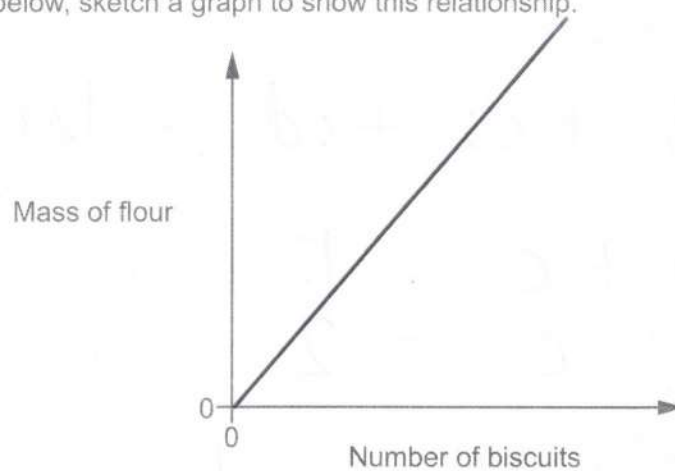
$\frac{1}{2} = 2^{-1} \quad \checkmark$

(b)  $y = \dots -1 \quad \checkmark$

[2]

- 13 (a) The mass of flour used in a recipe doubles as the number of biscuits made doubles.

On the axes below, sketch a graph to show this relationship.



✓ Line  
✓ (0,0)

[2]

- (b) Here are some of the ingredients for a recipe to make 10 biscuits.

To make 10 biscuits:

120g butter

100g sugar

Jane followed the recipe and used 432g of butter.  
All of the sugar used came from a new 2 kg bag.

- (i) Find the number of biscuits she made.

$$432 \div 120 = 3.6 \quad \checkmark$$

$$3.6 \times 10 \quad \checkmark$$

36 ✓

(b)(i) ..... [3]

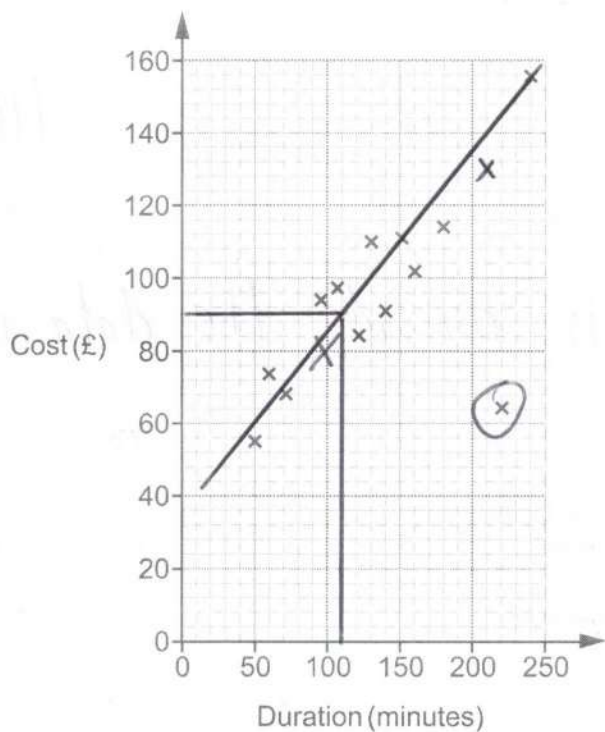
- (ii) Find the mass of the sugar, in grams, that Jane has left in the bag.

$$2000 - (3.6 \times 100) \quad \checkmark \checkmark$$

1640 ✓

(ii) ..... g [3]

- 14 A travel agent records the duration and cost of the 15 flights he sold on one day. The data for the first 13 flights are plotted on the scatter diagram.



- (a) The data for the final two flights is:

100

<b>Duration</b>	210 minutes	1 hour 40 minutes
<b>Cost</b>	£130	£80

Plot these flights on the scatter diagram.

[2]

- (b) The cost of one of the 15 flights had been discounted in a sale.

Circle the most likely flight on the scatter diagram.

[1]

(c) (i) Draw a line of best fit on the scatter diagram. ✓

[1]

(ii) Use your line of best fit to estimate the duration of a flight costing £90.

(c)(ii) ..... 110 <sup>ft</sup> ✓ minutes [1]

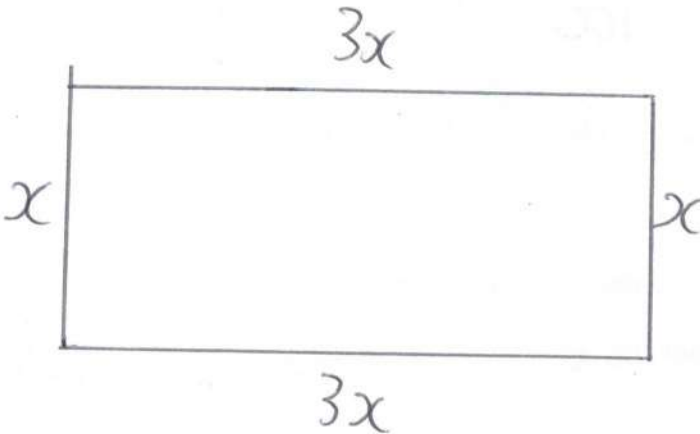
(d) Explain why the travel agent should not use his records to estimate the cost of a 7 hour flight.

7hrs is outside the data we have ✓ OE

[1]

15 A rectangle is three times as long as it is wide.  
It has a perimeter of 44 cm.

Find the length of the rectangle.



$$8x = 44 \quad \checkmark$$

$$x = 5.5 \quad \checkmark$$

$$\checkmark$$

$$3 \times 5.5$$

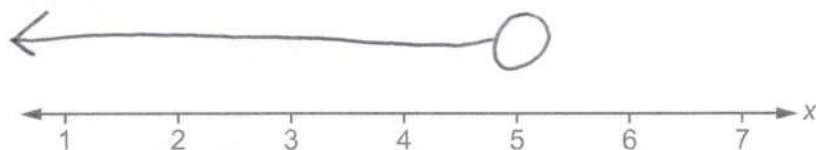
$$16.5 \quad \checkmark$$

..... cm [4]

- 16 Solve  $3x + 4 < 19$ .  
Show your solution on the number line.

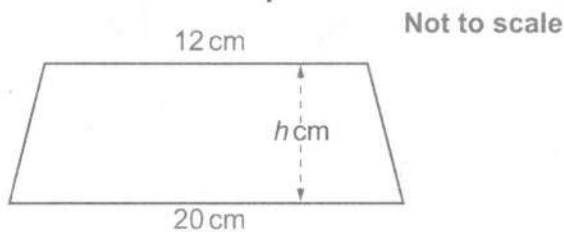
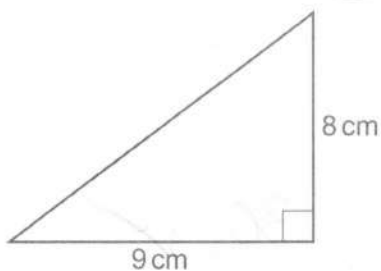
$$3x < 15 \quad \checkmark$$

$$x < 5 \quad \checkmark$$



[4]

- 17 The area of the triangle is equal to the area of the trapezium.



Calculate the height,  $h$  cm, of the trapezium.

$$\triangle = \frac{1}{2} \times 9 \times 8 = 36 \quad \checkmark \checkmark$$

$$\square = \frac{1}{2} (20 + 12) \times h = 36 \quad \checkmark$$

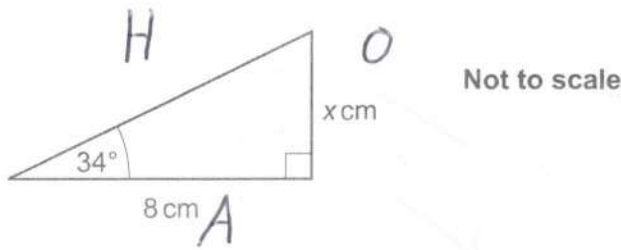
$$= 16h = 36 \quad \checkmark$$

$$h = 36 \div 16$$

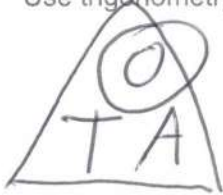
$$2.25 \quad \checkmark$$

$h = \dots\dots\dots$  cm [5]

18 Here is a right-angled triangle.



Use trigonometry to work out the value of  $x$ .

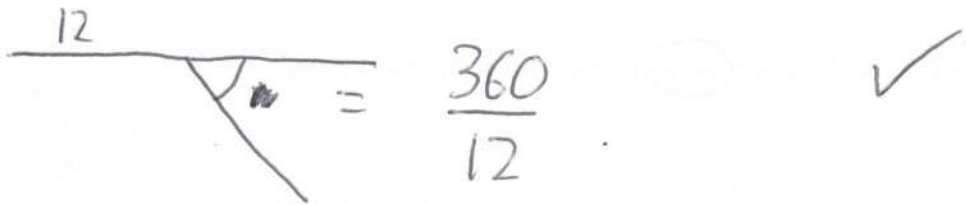


$$x = 8 \times \tan 34 = 5.396\dots$$

$x = 5.4$  ✓

$x = \dots\dots\dots [3]$

19 (a) Work out the size of the exterior angle of a regular 12-sided polygon.



$30$  ✓

(a)  $\dots\dots\dots^\circ [2]$

(b) Use your answer to part (a) to write down the size of the interior angle of a regular 12-sided polygon.

$$180 - 30$$

$150$  ✓ st

(b)  $\dots\dots\dots^\circ [1]$

- 20 A truck is used to transport some wood panels.  
 Each wood panel is a cuboid measuring 2.4 m by 1.2 m by 1.8 cm.  
 The density of each wood panel is  $750 \text{ kg/m}^3$ .

The truck can carry 15 tonnes of these wood panels.

Calculate the maximum number of wood panels that the truck can carry.  
 Show how you decide.

$$2.4 \times 1.2 \times \underline{1.8} \div 100 = 0.05184 \text{ m}^3 \quad \checkmark$$

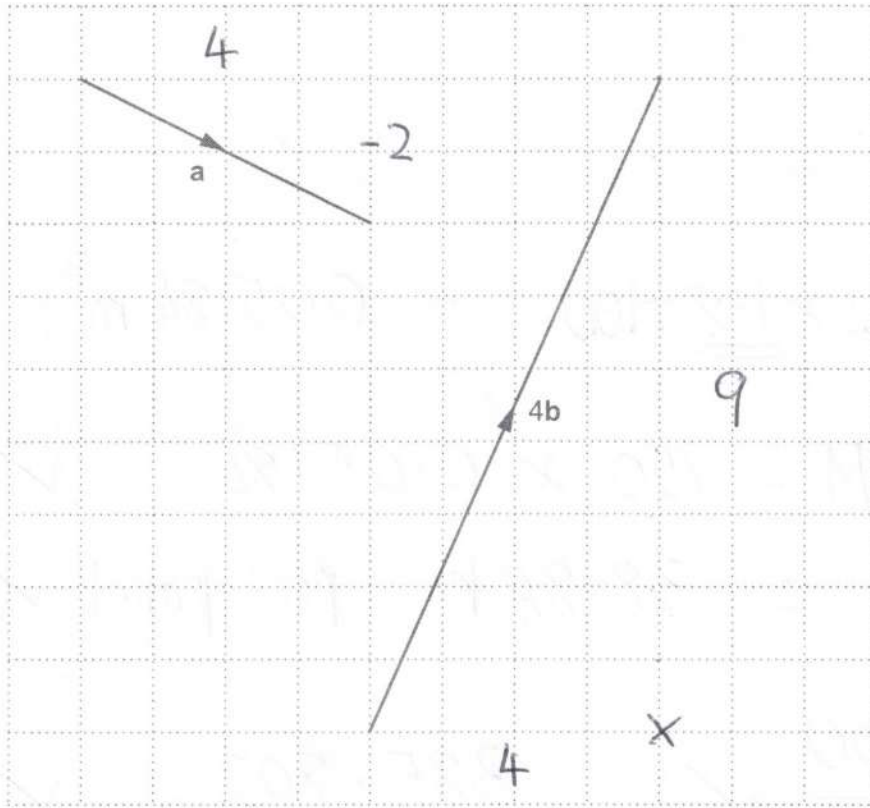
$$\begin{aligned} \text{D V} \quad \textcircled{\text{M}} \quad M &= 750 \times 0.05184 \quad \checkmark \\ &= 38.88 \text{ kg per panel} \quad \checkmark \end{aligned}$$

$$\frac{15 \times 1000}{38.88} \quad \checkmark = 385.802... \quad \checkmark$$

385  $\checkmark$

..... [6]

21 Vectors  $\mathbf{a}$  and  $4\mathbf{b}$  are drawn on the grid.



(a) Write vector  $\mathbf{a}$  as a column vector.

(a)  $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$  ✓ ✓ [2]

(b) Find vector  $\mathbf{b}$  as a column vector.

$$4\mathbf{b} = \begin{bmatrix} 4 \\ 9 \end{bmatrix}$$

$$\left( \frac{1}{4} \right)$$

(b)

$$\begin{pmatrix} 1 \\ 2.25 \end{pmatrix}$$

✓ ✓ [2]

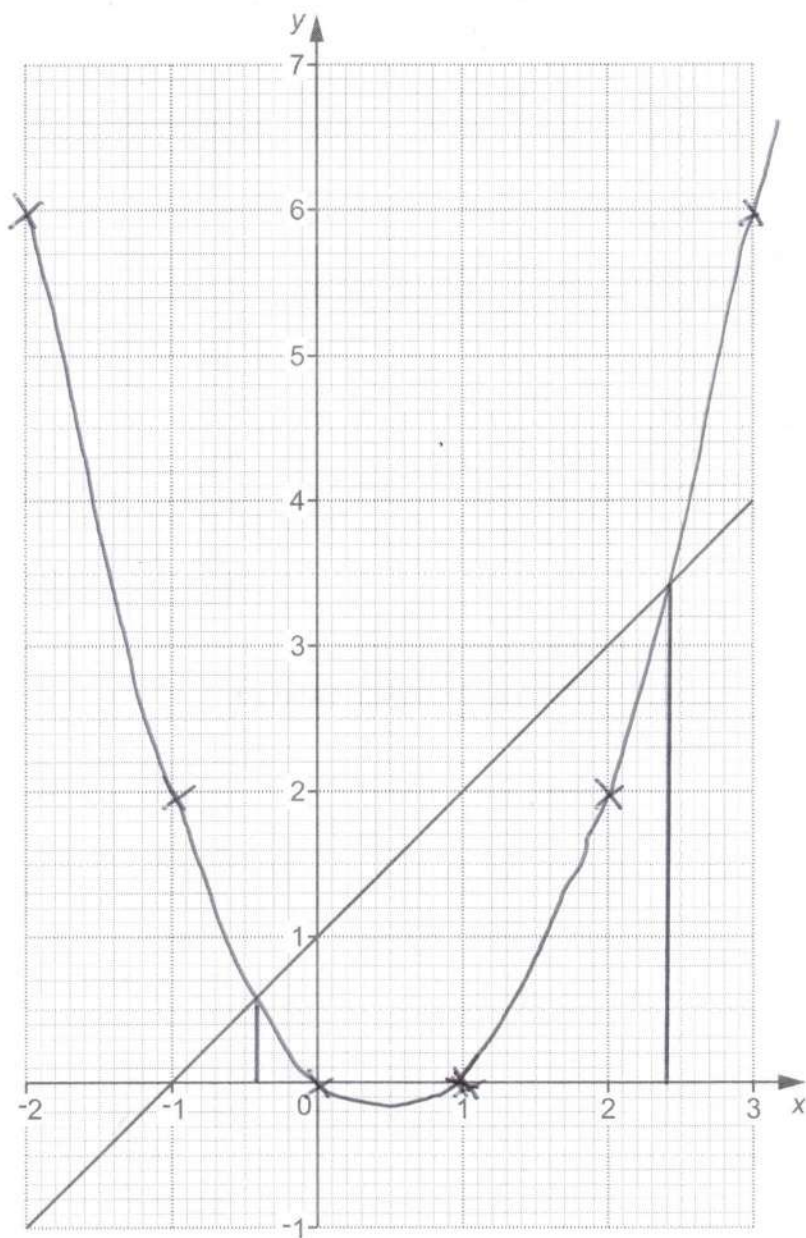
22 (a) Complete this table for  $y = x^2 - x$ .

x	-2	-1	0	1	2	3
y	6	2	0	0	2	6

[2]

(b) The graph of  $y = x + 1$  is shown on the grid.

On the same grid, use part (a) to draw the graph of  $y = x^2 - x$  for values of  $x$  from -2 to 3.



✓✓ All points

✓ curve

[3]

(c) Write down the  $x$ -coordinates of the points where  $y = x^2 - x$  and  $y = x + 1$  cross.

(c)  $x = -0.4$  and  $x = 2.4$  [2]

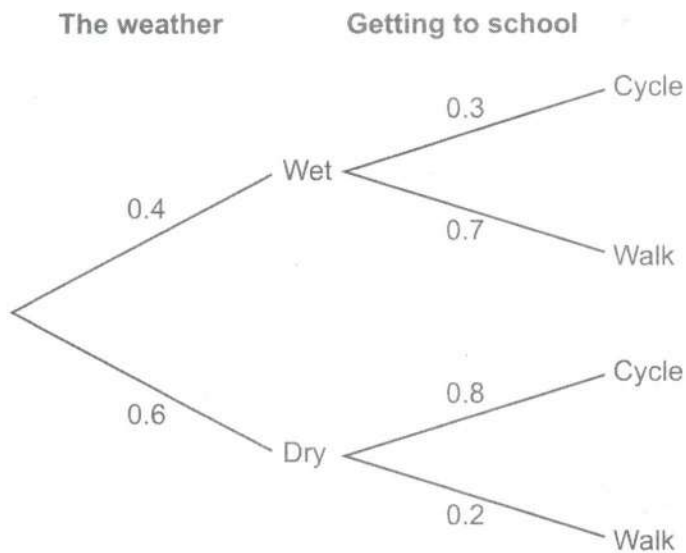
[ms  $\pm 0.05$ ]

Turn over for Question 23

23 The probability that Adam cycles to school or walks to school depends on the weather.

- On any day, the probability that the weather is wet is 0.4.
- When the weather is wet the probability that he cycles to school is 0.3.
- When the weather is dry the probability that he cycles to school is 0.8.

The information is shown on this tree diagram.



$0.6 \times 0.2 \checkmark$

Work out the probability that

(a) it is dry and Adam walks to school,

(a)  $0.12 \checkmark$  ..... [2]

(b) Adam cycles to school.

$(0.4 \times 0.3) + (0.6 \times 0.8)$   
 $0.12 + 0.48 = 0.6 \checkmark$   
 $\checkmark$  (b) ..... [3]

END OF QUESTION PAPER

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