OCR
Oxford Cambridge and RSA

H

GCSE (9–1) Mathematics

J560/05 Paper 5 (Higher Tier)

Thursday 7 June 2018 – Morning

Time allowed: 1 hour 30 minutes

You may use:
- geometrical instruments
- tracing paper

Do not use:
- a calculator

First name										
Last name										
Centre number						Candidate number				

INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Read each question carefully before you start to write your answer.
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. If additional space is required, use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the barcodes.

INFORMATION
- The total mark for this paper is **100**.
- The marks for each question are shown in brackets **[ ]**.
- This document consists of **20** pages.

No calculator can be used for this paper

Answer **all** the questions.

1 **(a)** Calculate.

$$\frac{3}{5}+\frac{5}{8}$$

Give your answer as a mixed number in its simplest form.

(a) ..... **[3]**

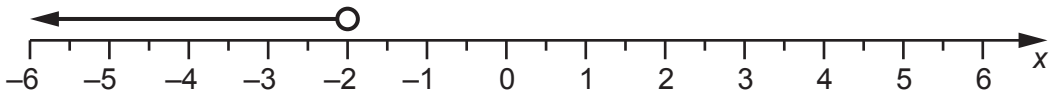
(b) Work out.

$$5\times10^{4}-1.6\times10^{3}$$

Give your answer in standard form.

(b) ..... **[3]**

2 Gemma's solution to the inequality $3x + 1 > -5$ is shown on the number line.



Is Gemma's solution correct?
Explain your reasoning.

..... **[3]**

3 Work out.

(a) $\begin{pmatrix} -3 \\ 2 \end{pmatrix} + \begin{pmatrix} 5 \\ 7 \end{pmatrix}$

(a) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[1]**

(b) $\begin{pmatrix} 3 \\ 4 \end{pmatrix} - 2\begin{pmatrix} 1 \\ -3 \end{pmatrix}$

(b) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[2]**

4 Here is the nutritional information for a 110 g serving of cereal.

Carbohydrates	99.4 g
Proteins	9.5 g
Fats	1.1 g

Emily says that more than 90% of this serving is carbohydrates.

Is she correct?
Explain your reasoning.

.....

..... **[3]**

5 The table shows the relative frequencies of the results for a football team after a number of games.

Result of game	won	lost	drew
Relative frequency	0.2	0.45	

(a) Complete the table. **[2]**

(b) The team lost 10 more games than they won.

How many games did the team play altogether?

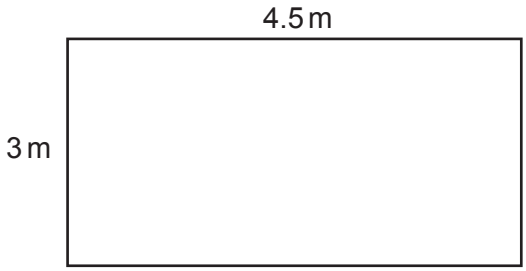
(b) ..... **[3]**

6 Jack sent 15% more text messages in March than in February.
Jack sent 460 text messages in March.

How many more texts did Jack send in March than in February?

..... **[4]**

7 Here is the floor plan of a rectangular room.



Not to scale

Tim buys carpet tiles for this room.

Each tile is a square measuring 50 cm by 50 cm.
The tiles are only sold in packs of ten.
Each pack costs £20.
Tim pays for fitting at a rate of £7.50 per square metre, with any fraction of a square metre rounded up.

Work out the **total** cost of the tiles and fitting.

£ ..... **[6]**

8 Hannah wants to display all the possible outcomes when rolling two fair 6-sided dice.

(a) Give a reason why a tree diagram is not the best method to use.

..... **[1]**

(b) **(i)** Draw a sample space to display all the possible outcomes. **[2]**

(ii) Show that the probability of the scores on the two dice adding to 11 is $\frac{1}{18}$.

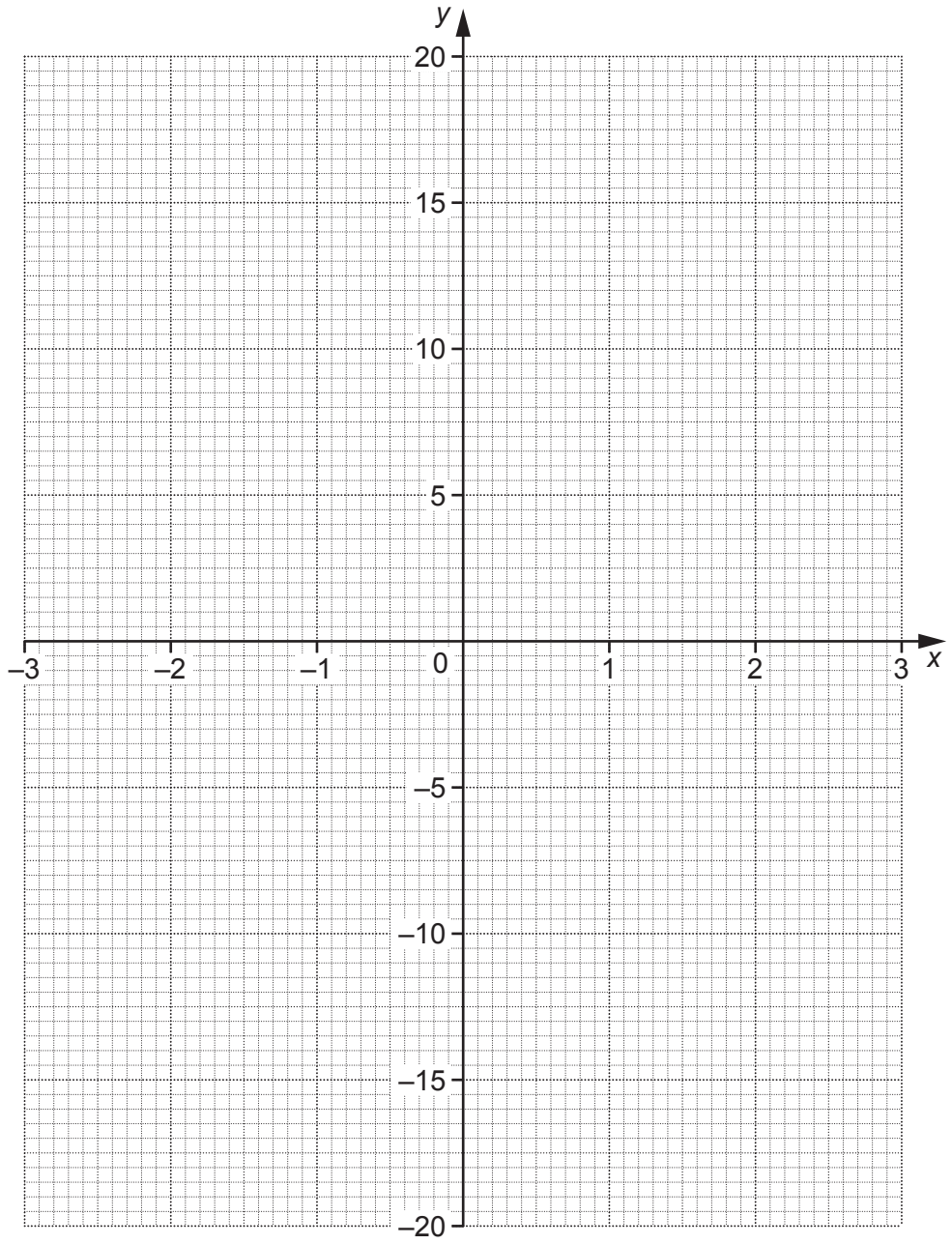
..... **[2]**

9 **(a)** Complete the table for $y = x^3 - 3x$.

x	-3	-2	-1	0	1	2	3
y	-18	-2		0	-2	2	18

[1]

(b) Draw the graph of $y = x^3 - 3x$ for $-3 \leqslant x \leqslant 3$.

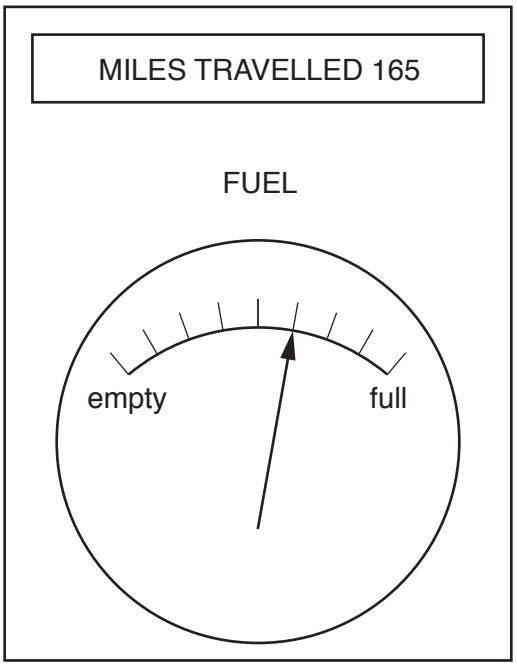


[3]

(c) Use your graph to solve $x^3 - 3x = 10$.

(c) $x =$ ..... **[1]**

10 Ifsaw noticed this information on her car's dashboard at the end of her journey.
She started her journey with a full tank of fuel and her miles travelled set to zero.



(a) Work out how far Ifsaw's car can travel on a full tank of fuel.

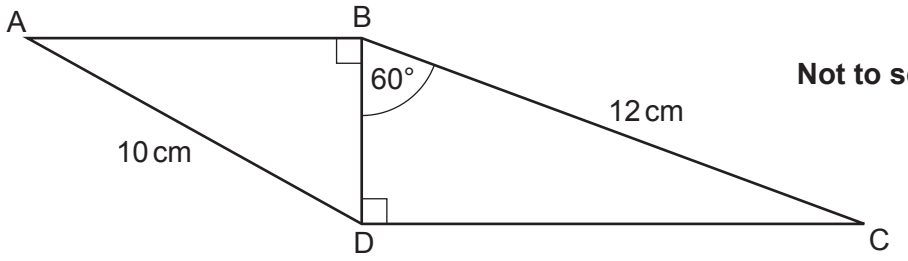
(a) ..... miles **[3]**

(b) What assumption have you made when answering part **(a)**?

.....

..... **[1]**

11 The diagram shows two right-angled triangles ABD and BCD, sharing a common side BD.
AD = 10 cm, BC = 12 cm and angle DBC = 60°.



Not to scale

Work out the length of AB.

..... cm **[6]**

12 Carol says that $64^{-\frac{1}{2}} = \frac{1}{32}$.

Explain her error and give the correct value of $64^{-\frac{1}{2}}$ in the form $\frac{p}{q}$.

.....

.....

.....

..... **[3]**

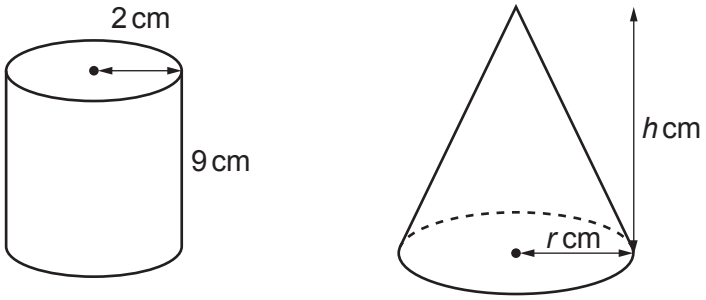
13 **(a)** Write $\frac{5}{12}$ as a recurring decimal.

(a) ..... **[2]**

(b) Convert $0.\dot{7}\dot{6}$ to a fraction.

(b) ..... **[2]**

14 The diagram shows a cylinder and a cone.



The cylinder has radius 2 cm and height 9 cm.
The cone has radius r cm and height h cm.

The ratio $r : h$ is 1 : 4.
The volume of the cone is **equal to** the volume of the cylinder.

Work out the value of ***r***.

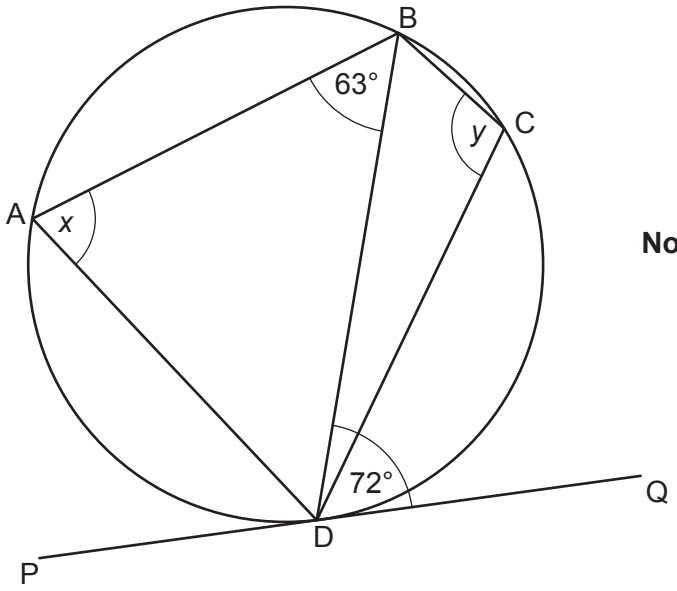
[The volume V of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

..... **[5]**

15 n is a positive integer.

Prove that $13n + 3 + (3n - 5)(2n + 3)$ is a multiple of 6. **[4]**

16 A, B, C and D are points on the circumference of a circle.



Not to scale

PQ is a tangent to the circle at D.
Angle BDQ = 72° and angle ABD = 63°.

(a) Work out angle *x*.
Give a reason for your answer.

Angle *x* = ...° because .....

..... **[2]**

(b) Work out angle *y*.
Give a reason for your answer.

Angle *y* = ...° because .....

..... **[2]**

17 $(x+a)(x+3)(2x+1) = bx^3 + cx^2 + dx - 12$

Find the value of a, b, c and d.

$a =$ .....

$b =$ .....

$c =$ .....

$d =$ ..... **[4]**

18 **(a)** A straight line passes through the point (0, 6) and is perpendicular to $y = 4x - 5$.

Find the equation of this line, giving your answer in the form $y = mx + c$.

(a) ..... **[3]**

(b) Work out the coordinates of the intersection of the graphs of $y = 4x - 5$ and $y = x^2 - 17$.

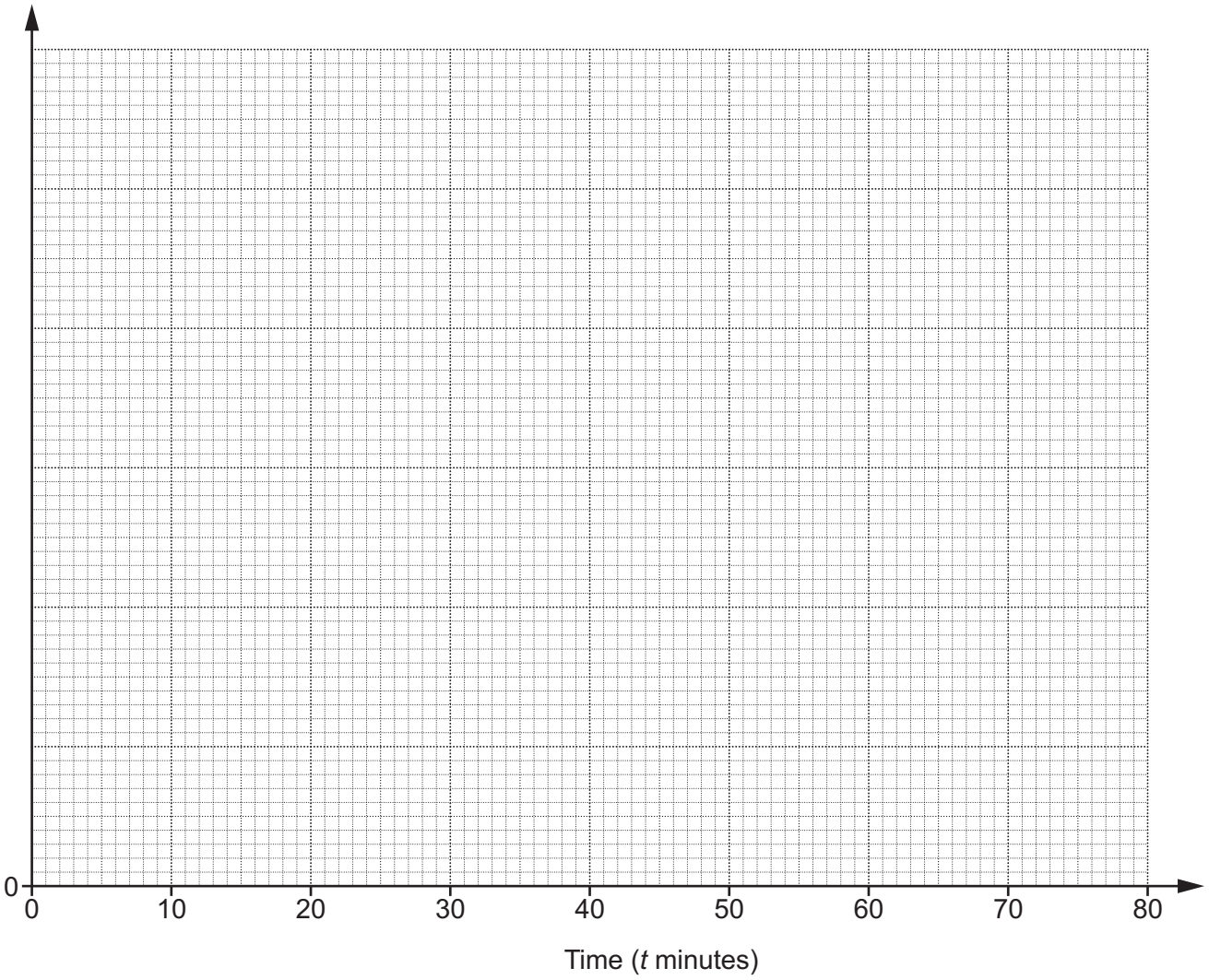
(b) (..... , ...)

(..... , ...) **[6]**

19 Ceri records the time taken, t minutes, to travel to school for a sample of 168 students at her Academy.

Time taken (t minutes)	Frequency
$0 < t \leqslant 10$	54
$10 < t \leqslant 20$	50
$20 < t \leqslant 40$	44
$40 < t \leqslant 80$	20

(a) Draw a histogram to represent this information.



[4]

(b) Ceri says

The longest time that any of these students took to travel to school was 80 minutes.

Is she correct?
Give a reason for your answer.

.....

..... **[1]**

(c) Ceri also claims that 25% of all of the students at this Academy took more than 30 minutes to travel to school.

(i) Show how Ceri might have worked out her claim. **[2]**

(ii) State one assumption that Ceri has made in making her claim.

.....

..... **[1]**

20 In the following equation, n is an integer greater than 1.

$$(\sqrt{2})^n = k\sqrt{2}$$

(a) (i) Find k when $n = 7$.

(a)(i) $k =$ ..... **[2]**

(ii) Find n when $k = 64$.

(ii) $n =$ ..... **[2]**

(b) Show that $\dfrac{14}{3-\sqrt{2}}$ can be written in the form $a + b\sqrt{2}$. **[5]**

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).