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0069181711

MATHEMATICS **0580/23**

Paper 2 (Extended) **October/November 2020**

1 hour 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Blank pages are indicated.

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[Turn over

1 Write down the cube number that is greater than 50 but less than 100.

..... [1]

2 Calculate.

$$\frac{4}{\sqrt{0.0025}}$$

..... [1]

3 In triangle ABC, $BC = 7.6\,\text{cm}$ and $AC = 6.2\,\text{cm}$.

Using a ruler and compasses only, construct triangle ABC.
Leave in your construction arcs.
The side AB has been drawn for you.

[2]

4 Simplify.

$a^2 \div a^6$

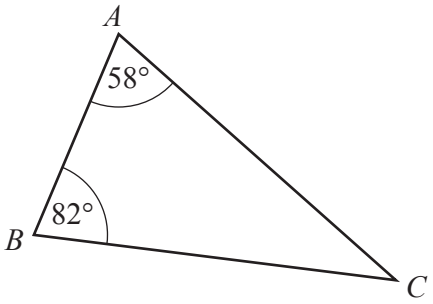
..... [1]

5 Thor changes 40 000 Icelandic Krona into dollars when the exchange rate is 1 krona = \$0.0099 .

Work out how many dollars he receives.

\$ ..... [1]

6



NOT TO SCALE

The diagram shows triangle *ABC*.
The triangle is reflected in the line *BC* to give a quadrilateral *ABDC*.

(a) Write down the mathematical name of the quadrilateral *ABDC*.

..... [1]

(b) Find angle *ACD*.

Angle *ACD* = ... [2]

7 Change 457 000 cm^2 into m^2.

.....m^2 [1]

8 The length, l cm, of a line is 18.3 cm, correct to the nearest millimetre.

Complete this statement about the value of l.

..... $\leqslant l <$ ..... [2]

9 **Without using a calculator**, work out $1\frac{1}{7} \times 2\frac{1}{10}$.
You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

10 Solve the simultaneous equations.
You must show all your working.

$$3x - 8y = 22$$
$$x + 4y = 4$$

$x =$ .....

$y =$ ..... [3]

11 A bag contains 7 red discs, 5 green discs and 2 pink discs.

(a) Helen takes one disc at random, records the colour and replaces it in the bag.
She does this 140 times.

Find how many times she expects to take a green disc.

..... [2]

(b) Helen adds 9 green discs and some pink discs to the discs already in the bag.
The probability of taking a green disc is now $\frac{2}{7}$.

Find the number of pink discs that Helen added to the bag.

..... [2]

12 A straight line, l, has equation $y = 5x + 12$.

(a) Write down the gradient of line l.

..... [1]

(b) Find the coordinates of the point where line l crosses the x-axis.

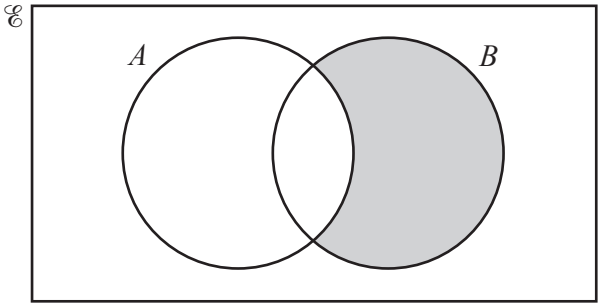
(..... , ...) [2]

(c) A line perpendicular to line l has gradient k.

Find the value of k.

$k =$ ..... [1]

13



Use set notation to describe the shaded region.

..... [1]

14 $N = 2^4 \times 3 \times 7^5$

$PN = K$, where P is an integer and K is a square number.

Find the smallest value of P.

$P =$ ..... [2]

15 $m = 2p + \sqrt{\frac{x}{y}}$

Make x the subject of this formula.

$x =$ ..... [3]

16 A paperweight has height 4 cm and volume 38.4 cm^3.
A mathematically similar paperweight has height 7 cm.

Calculate the volume of this paperweight.

..... cm^3 [3]

17 Adil and Brian are paid the same wage.
Adil is given a 7% pay decrease and his new wage is $427.80 .
Brian is given a 7% pay increase.

Work out Brian's new wage.

$ ..... [3]

18 **(a)** Simplify. $\left(4xy^2\right)^3$

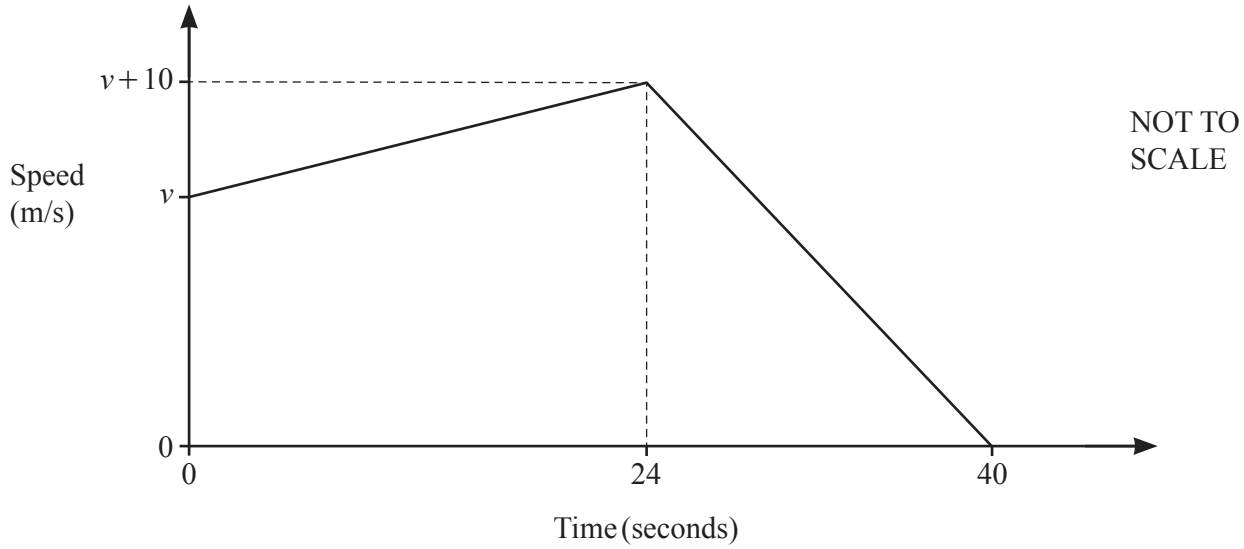
..... [2]

(b) $25 = 125^k$

Find the value of k.

$k =$ ..... [1]

19



The diagram shows the speed–time graph for the final 40 seconds of a car journey.
At the start of the 40 seconds the speed is v m/s.

(a) Find the acceleration of the car during the first 24 seconds.

..... m/s^2 [1]

(b) The total distance travelled during the 40 seconds is 1.24 **kilometres**.

Find the value of v.

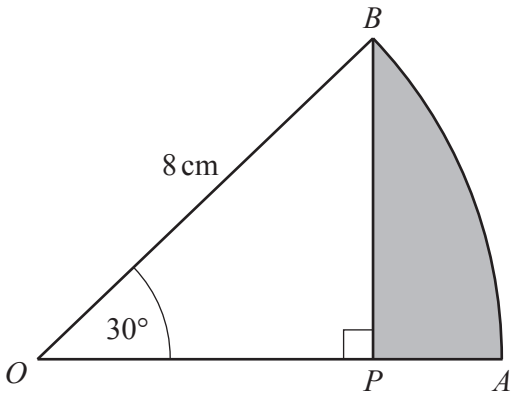
$v =$ ..... [4]

20 Factorise.

$3x + 8y - 6ax - 16ay$

..... [2]

21



NOT TO SCALE

OAB is the sector of a circle, centre *O*.
OB = 8 cm and angle *AOB* = 30°.
BP is perpendicular to *OA*.

(a) Calculate *AP*.

AP = ... cm [3]

(b) Work out the area of the shaded region *APB*.

..... cm^2 [3]

22 The table shows information about the times, t seconds, taken by each of 100 students to solve a puzzle.

Time (t seconds)	$0 < t \leqslant 10$	$10 < t \leqslant 15$	$15 < t \leqslant 20$	$20 < t \leqslant 40$	$40 < t \leqslant 75$
Frequency	9	18	22	30	21

(a) Calculate an estimate of the mean time.

..... s [4]

(b) Emmanuel draws a histogram to show this information.
The table shows the heights, in cm, of some of the bars for this histogram.

Complete the table.

Time (t seconds)	$0 < t \leqslant 10$	$10 < t \leqslant 15$	$15 < t \leqslant 20$	$20 < t \leqslant 40$	$40 < t \leqslant 75$
Height of bar (cm)	3.6	14.4	17.6		

[3]

23 y is inversely proportional to the square root of x.
When $y = 7$, $x = 2.25$.

Write y in terms of x.

$y =$ ..... [2]

24 Simplify.

$$\frac{x^2 - 25}{x^2 - 17x + 60}$$

..... [4]

Question 25 is printed on the next page.

25 Solve $3\tan x = -4$ for $0° \leqslant x \leqslant 360°$.

$x =$ ..... or $x =$ ..... [3]