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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.

- 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 , $BC = 7.6$ cm and $AC = 6.2$ 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.

$$a^2 \div a^6$$

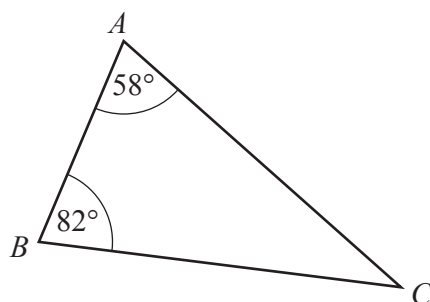
..... [1]

- 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 $457\,000\text{ cm}^2$ 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 .

$$\dots\dots\dots \leq l < \dots\dots\dots [2]$$

- 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.

$$\dots\dots\dots [3]$$

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

$$\begin{aligned} 3x - 8y &= 22 \\ x + 4y &= 4 \end{aligned}$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots [3]$$

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.

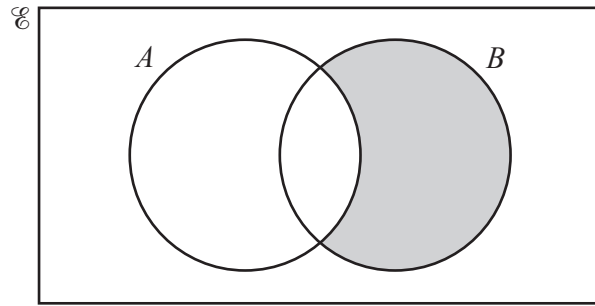
(..... ,) [2]

- (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. $(4xy^2)^3$

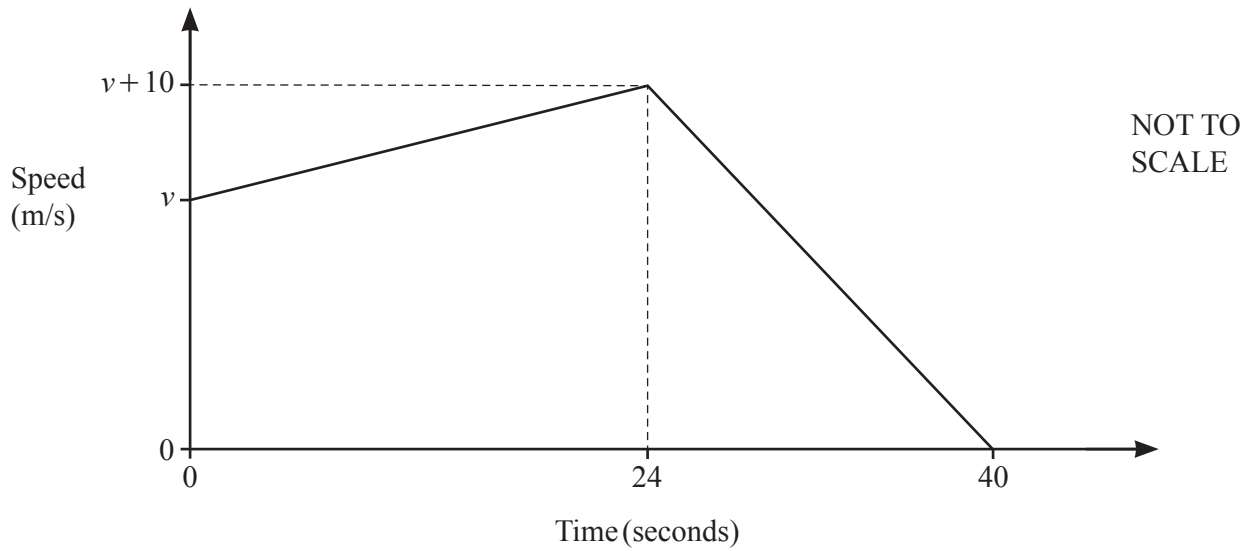
..... [2]

(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 .

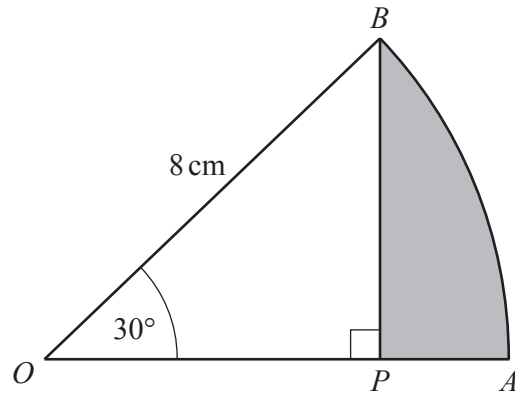
$v =$ [4]

20 Factorise.

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

..... [2]

21

NOT TO
SCALE

OAB is the sector of a circle, centre O .
 $OB = 8\text{ cm}$ and angle $AOB = 30^\circ$.
 BP is perpendicular to OA .

(a) Calculate AP .

$AP = \dots\dots\dots\text{ cm}$ [3]

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

$\dots\dots\dots\text{ cm}^2$ [3]

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

Time (t seconds)	$0 < t \leq 10$	$10 < t \leq 15$	$15 < t \leq 20$	$20 < t \leq 40$	$40 < t \leq 75$
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)	$0 < t \leq 10$	$10 < t \leq 15$	$15 < t \leq 20$	$20 < t \leq 40$	$40 < t \leq 75$
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 .

$$y = \dots\dots\dots [2]$$

- 24 Simplify.

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

$$\dots\dots\dots [4]$$

Question 25 is printed on the next page.

25 Solve $3 \tan x = -4$ for $0^\circ \leq x \leq 360^\circ$.

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

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