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MATHEMATICS**0580/23**

Paper 2 (Extended)

May/June 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.

2

1 32 33 34 35 36 37 38 39

From this list of numbers, write down

(a) a multiple of 8,

..... [1]

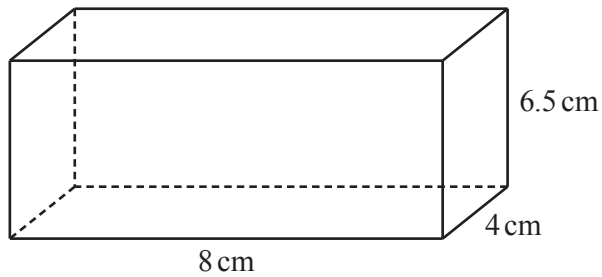
(b) a square number,

..... [1]

(c) a prime number.

..... [1]

2



NOT TO
SCALE

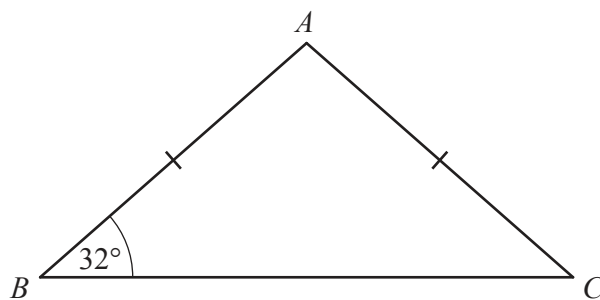
The diagram shows a cuboid.

Calculate the volume of the cuboid.

..... cm^3 [1]

3

3

NOT TO
SCALE

Triangle ABC is isosceles.
Angle $ABC = 32^\circ$ and $AB = AC$.

Find angle BAC .

Angle $BAC = \dots\dots\dots$ [2]

- 4 A train journey takes 5 hours 54 minutes.

(a) The journey starts at 09 15.

Find the time that the journey ends.

$\dots\dots\dots$ [1]

(b) The average speed of the train for this journey is 80 km/h.

Calculate the distance travelled.

$\dots\dots\dots$ km [2]

- 5 Sofia has a bag containing 8 blue beads and 7 red beads only.
She takes one bead out of the bag at random and replaces it.
She does this 90 times.

Find the number of times she expects to take a red bead.

$\dots\dots\dots$ [2]

4

6 Simplify.

(a) $p^2 \times p^4$

..... [1]

(b) $m^{15} \div m^5$

..... [1]

(c) $(k^3)^5$

..... [1]

7 **Without using a calculator**, work out $3\frac{1}{4} - 2\frac{2}{3}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [3]

8 The bearing of X from Y is 274° .

Calculate the bearing of Y from X .

..... [2]

5

- 9** Calculate the area of the sector of a circle with radius 65 mm and sector angle 42° .
Give your answer in square centimetres.

..... cm^2 [3]

- 10** A solid cylinder has radius 3 cm and height 4.5 cm.

Calculate the **total** surface area of the cylinder.

..... cm^2 [4]

- 11** y is directly proportional to the cube root of $(x+3)$.

When $x = 5$, $y = \frac{2}{3}$.

Find y when $x = 24$.

$y =$ [3]

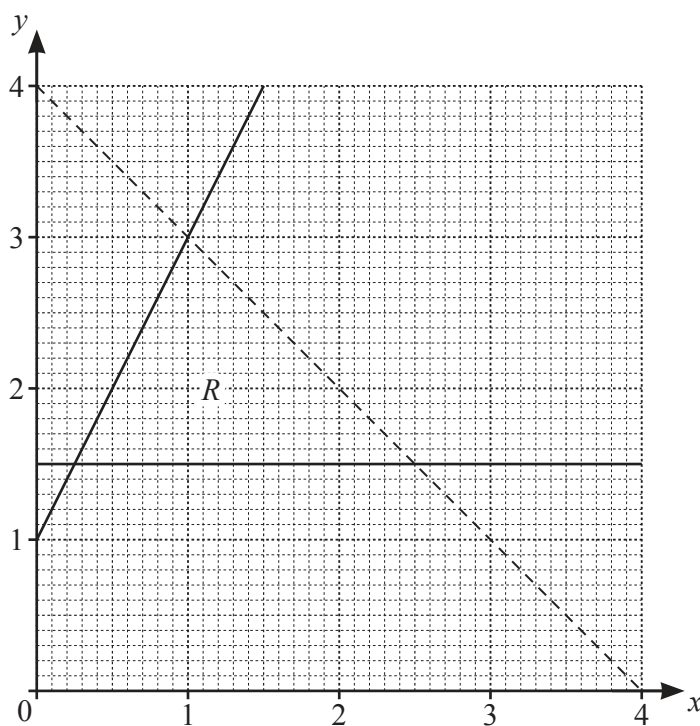
6

- 12 The total perimeter of a semicircle is 19.02 cm.

Calculate the radius of the semicircle.

..... cm [3]

13



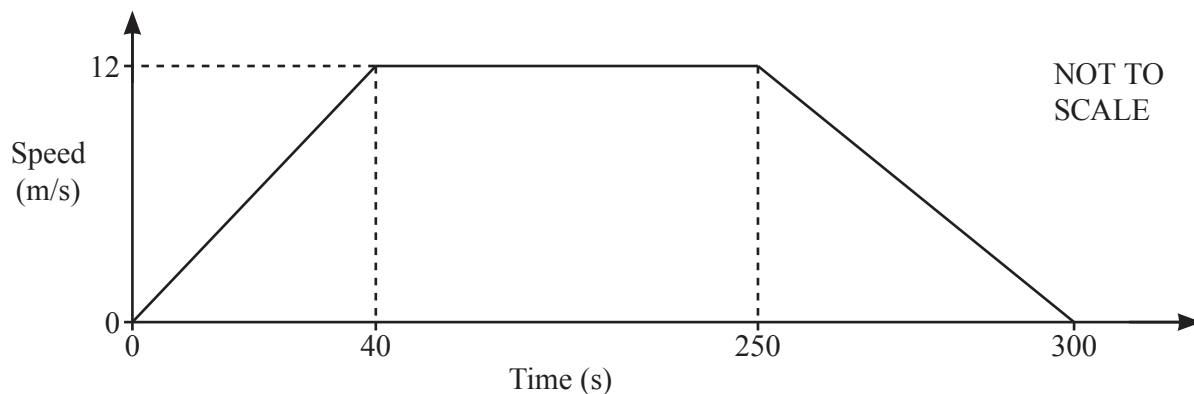
Write down the three inequalities that define the region R .

.....

.....

..... [4]

- 14** The diagram shows the speed–time graph of a train journey between two stations.



- (a)** Find the acceleration of the train during the first 40 seconds.

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

- (b)** Calculate the distance between the two stations.

..... m [3]

- 15** The table shows the amount of money, \$ x , given to a charity by each of 60 people.

Amount (\$ x)	$0 < x \leq 20$	$20 < x \leq 25$	$25 < x \leq 35$	$35 < x \leq 50$	$50 < x \leq 100$
Frequency	21	16	6	10	7

Calculate an estimate of the mean.

\$ [4]

8

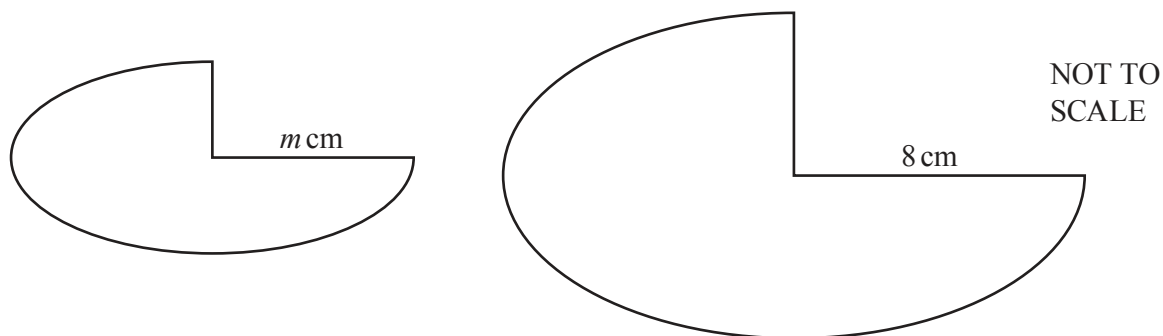
- 16** Paddy and Anna each invest \$2000 for 5 years.
Paddy earns simple interest at a rate of 1.25% per year.
Anna earns compound interest at a rate of $r\%$ per year.
At the end of 5 years, Paddy's investment is worth the same as Anna's investment.

Calculate the value of r .

$r = \dots\dots\dots$ [5]

9

17



The diagram shows two shapes that are mathematically similar.
The smaller shape has area 52.5 cm^2 and the larger shape has area 134.4 cm^2 .

Calculate the value of m .

$m = \dots\dots\dots$ [3]

18 (a) Write $x^2 - 18x - 27$ in the form $(x + k)^2 + h$.

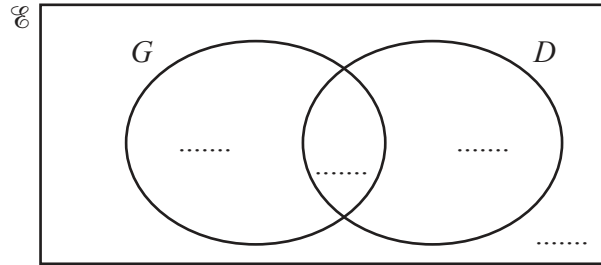
$\dots\dots\dots$ [2]

(b) Use your answer to **part (a)** to solve the equation $x^2 - 18x - 27 = 0$.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

19 (a) In a class of 40 students:

- 28 wear glasses (G)
- 13 have driving lessons (D)
- 4 do not wear glasses and do not have driving lessons.



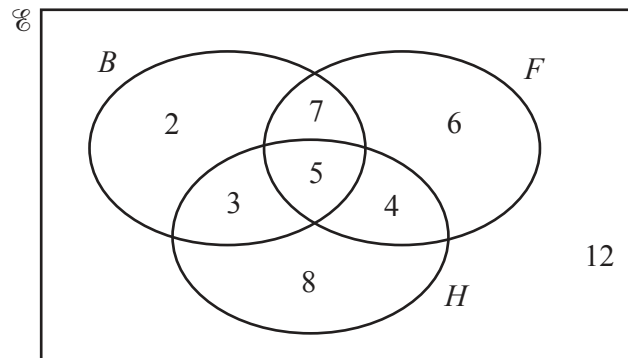
(i) Complete the Venn diagram.

[2]

(ii) Use set notation to describe the region that contains a total of 32 students.

..... [1]

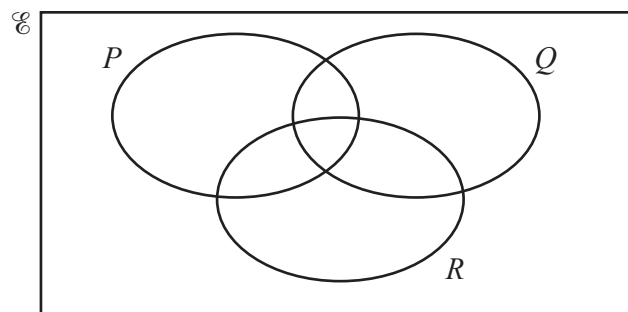
(b) This Venn diagram shows information about the number of students who play basketball (B), football (F) and hockey (H).



Find $n((B \cup F) \cap H')$.

..... [1]

(c)

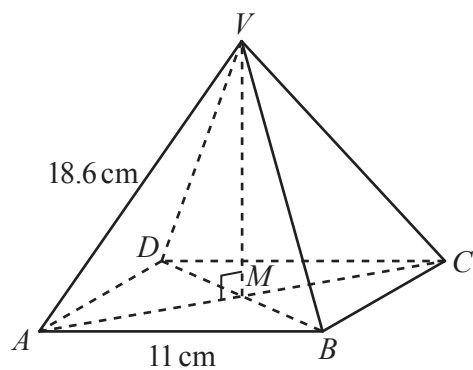


Shade the region $P \cup (Q \cap R)'$.

[1]

11

20

NOT TO
SCALE

The diagram shows a pyramid with a square base $ABCD$.

The diagonals AC and BD intersect at M .

The vertex V is vertically above M .

$AB = 11$ cm and $AV = 18.6$ cm.

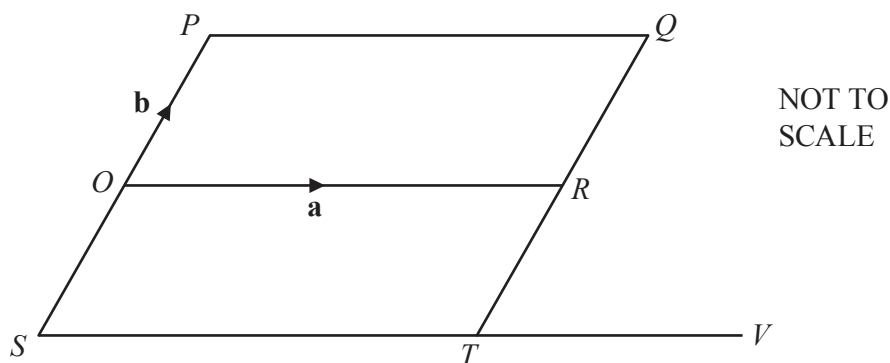
Calculate the angle that AV makes with the base.

..... [4]

Question 21 is printed on the next page.

12

21



O is the origin and $OPQR$ is a parallelogram.

SOP is a straight line with $SO = OP$.

TRQ is a straight line with $TR = RQ$.

STV is a straight line and $ST : TV = 2 : 1$.

$\vec{OR} = \mathbf{a}$ and $\vec{OP} = \mathbf{b}$.

(a) Find, in terms of $\mathbf{a}$ and $\mathbf{b}$, in its simplest form,

(i) the position vector of T ,

..... [2]

(ii) $\vec{RV}$.

$\vec{RV} =$ [1]

(b) Show that PT is parallel to RV .

[2]

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