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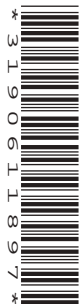
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MATHEMATICS

0580/22

Paper 2 (Extended)

February/March 2021

1 hour 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

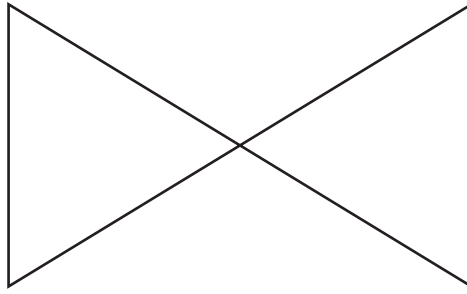
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction 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.

1



(a) Complete this statement.

The diagram has rotational symmetry of order [1]

(b) On the diagram, draw all the lines of symmetry. [2]

2 Sahil and Anika share \$78 in the ratio 5 : 8.

Calculate the amount each receives.

Sahil \$

Anika \$ [2]

3 The number of passengers on a bus is recorded each day for 14 days.

15 18 22 17 35 38 24
19 19 24 25 31 36 29

(a) Complete the stem-and-leaf diagram.

1	
2	
3	

Key: 1 | 5 represents 15 passengers

[2]

(b) Find the median.

..... [1]

- 4 By writing each number correct to 1 significant figure, find an estimate for the value of

$$\frac{2.8 \times 82.6}{27.8 - 13.9} .$$

..... [2]

- 5 The number of bowls of hot soup sold decreases when the temperature rises.

What type of correlation does this statement describe?

..... [1]

- 6 Joseph spends $\frac{5}{24}$ of one week's earnings to buy a jacket.
The cost of the jacket is \$56.50 .

Calculate the amount Joseph earns in a week.

\$ [2]

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

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

..... [3]

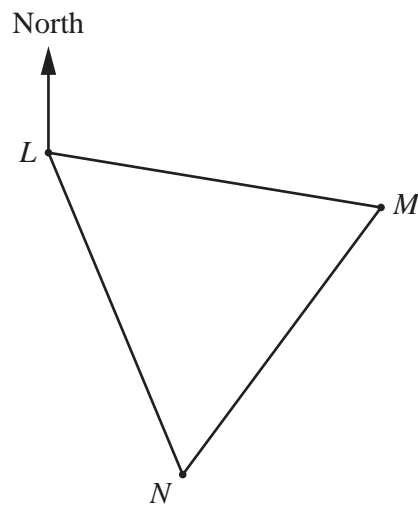
8 Write $0.\dot{3}7$ as a fraction.

..... [1]

9 Calculate $4.8 \times 10^6 + 3.7 \times 10^7$.
Give your answer in standard form.

..... [1]

10



NOT TO
SCALE

On a map, the positions of the towns L , M and N form an equilateral triangle.
The bearing of M from L is 103° .

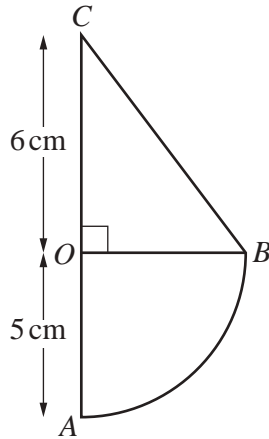
Work out the bearing of L from N .

..... [2]

11 Find the highest common factor (HCF) of 36 and 84.

..... [2]

12



NOT TO SCALE

The diagram shows a shape made from a quarter-circle, OAB , and a right-angled triangle OBC . The radius of the circle is 5 cm and $OC = 6$ cm.

Calculate the area of the shape.

..... cm^2 [3]

13 The population of one variety of butterfly is decreasing exponentially at a rate of 34% per year. At the end of 2014, the population was 125.9 million.

Calculate the population at the end of 2019.

..... million [2]

14 (a) These are the first four terms of a sequence.

29 22 15 8

Write down the next two terms.

..... , [2]

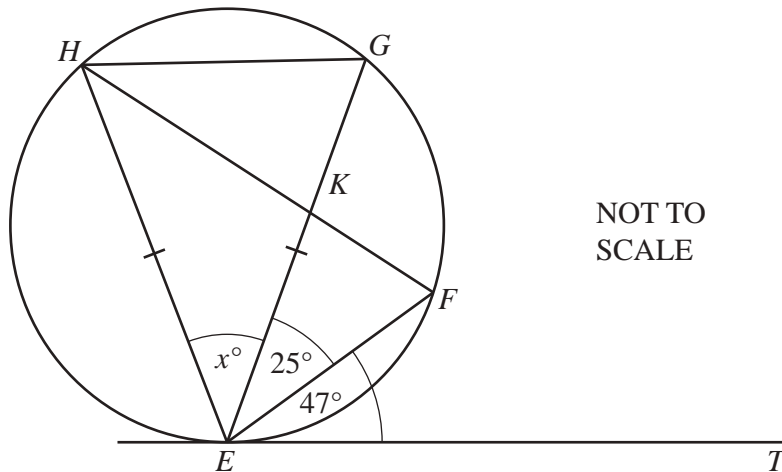
(b) These are the first five terms of another sequence.

4 7 12 19 28

Find the n th term.

..... [2]

15



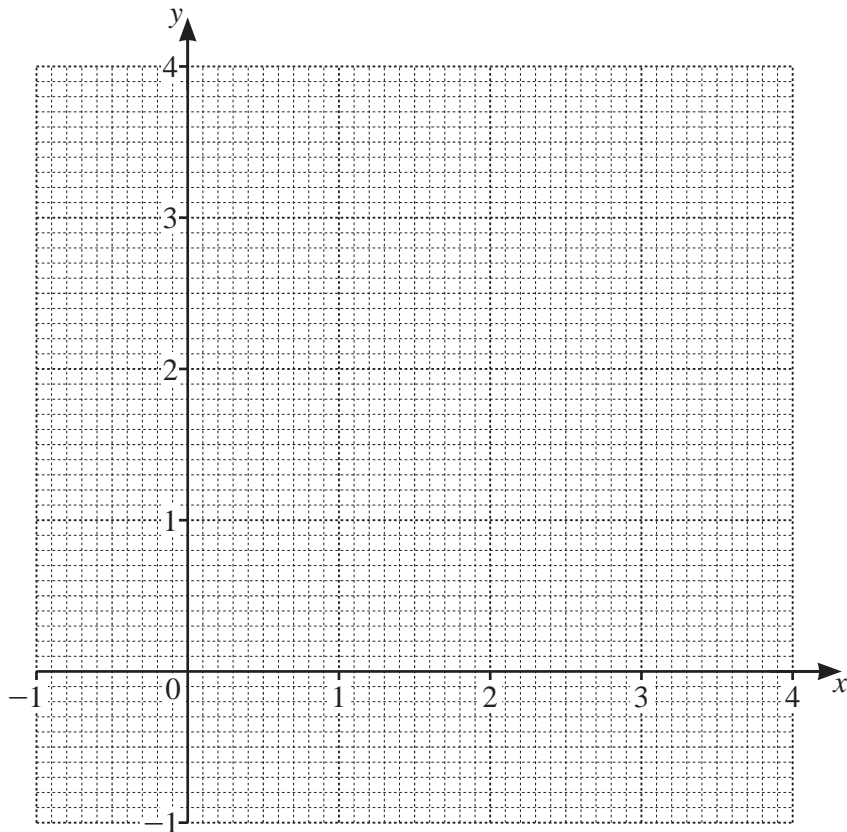
NOT TO SCALE

Points E, F, G and H lie on the circle and $EG = EH$.
 HF and EG intersect at K .
 ET is a tangent to the circle at E .
 Angle $FET = 47^\circ$ and angle $FEG = 25^\circ$.

Find the value of x .

$x =$ [2]

16



The region R satisfies these three inequalities.

$$y > 1 \quad y < 2x + 2 \quad x + y \leq 3$$

By drawing three suitable lines, and shading unwanted regions, find and label the region R . [5]

- 17 Some students were asked how many books they each had in their school bags. The table shows some of this information.

Number of books	5	6	7	8	9	10
Frequency	4	5	x	11	7	5

The mean number of books is 7.6 .

Calculate the value of x .

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

18 Simplify $(343x^9)^{\frac{2}{3}}$.

..... [2]

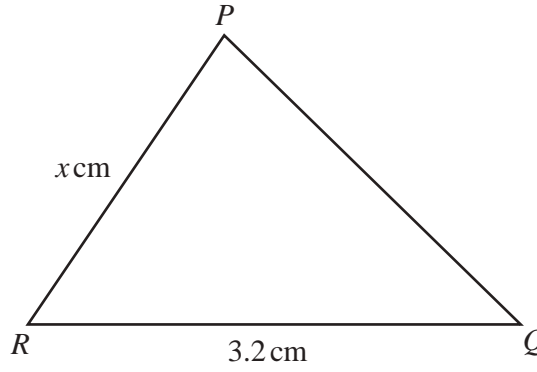
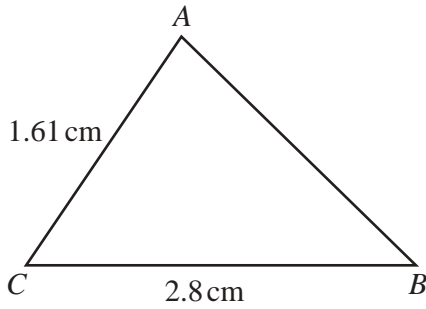
19 Solve the simultaneous equations.
You must show all your working.

$$\begin{aligned}x - y &= 7 \\ x^2 + y &= 149\end{aligned}$$

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

$x = \dots\dots\dots y = \dots\dots\dots$ [5]

20 (a)



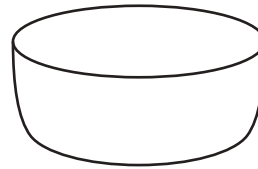
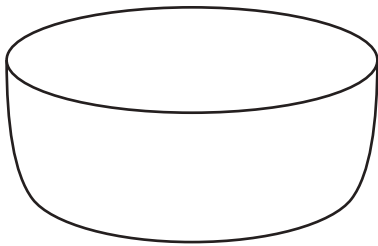
NOT TO SCALE

Triangle ABC is mathematically similar to triangle PQR .

Find the value of x .

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

(b)



NOT TO SCALE

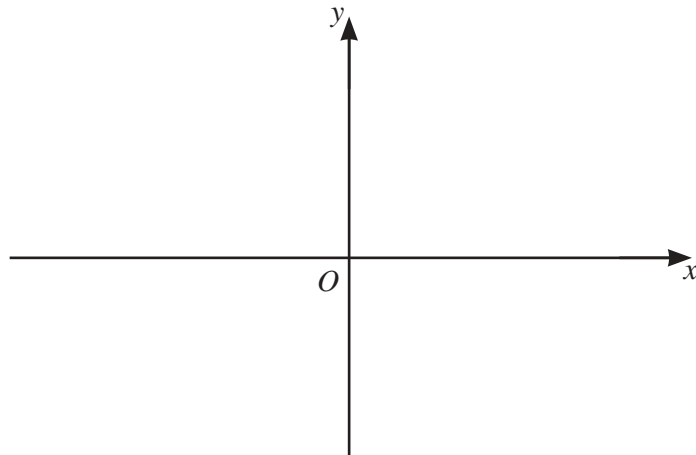
The diagram shows two mathematically similar bowls.
 The larger bowl has capacity 7.8 litres and height 11.5 cm.
 The smaller bowl has capacity 4 litres.

Calculate the height of the smaller bowl.

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

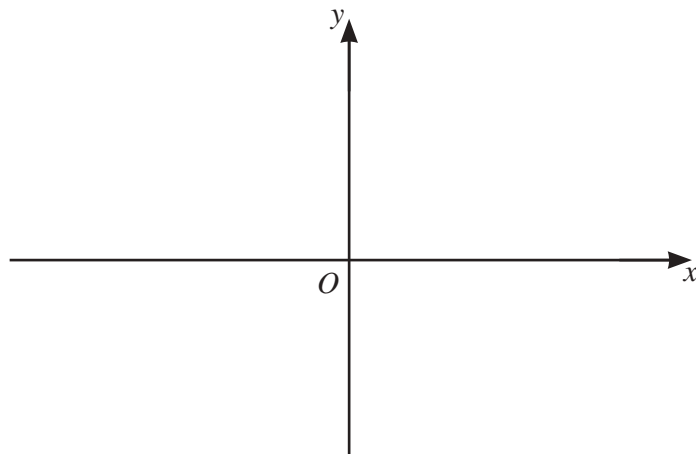
21 On the axes, sketch the graph of each of these functions.

(a) $y = \frac{1}{x}$



[2]

(b) $y = 4^x$



[2]

22 (a) A bag of rice has a mass of 25 kg, correct to the nearest kilogram.

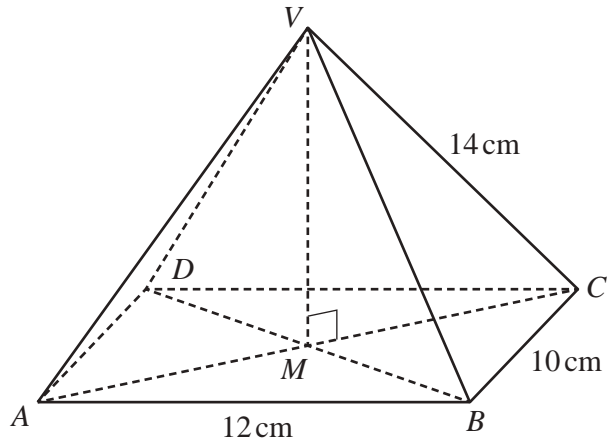
Calculate the lower bound of the total mass of 10 of these bags.

..... kg [1]

(b) Virat has 200 metres of wire, correct to the nearest metre.
He cuts the wire into n pieces of length 3 metres, correct to the nearest 20 centimetres.

Calculate the largest possible value of n .

$n =$ [3]



NOT TO SCALE

The diagram shows a pyramid $VABCD$ with a rectangular base. V is vertically above M , the intersection of the diagonals AC and BD . $AB = 12\text{ cm}$, $BC = 10\text{ cm}$ and $VC = 14\text{ cm}$.

Calculate the angle that VC makes with the base $ABCD$.

..... [4]

Question 24 is printed on the next page.

24 A curve has equation $y = x^3 - 2x^2 + 5$.

Find the coordinates of its two stationary points.

(.....,) and (.....,) [5]

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