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MATHEMATICS

0580/23

Paper 2 (Extended)

October/November 2023

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 Tara goes on a journey by train.
 The train leaves at 0648.
 The journey takes 12 hours and 35 minutes.

Find the time when Tara arrives.

..... [1]

2

61	63	64	66	68	69
----	----	----	----	----	----

From this list, write down

(a) a cube number

..... [1]

(b) a prime number.

..... [1]

3 The stem-and-leaf diagram shows the heights, in centimetres, of some plants.

10	4	8
11	1	3
12	2	3
13	2	6

Key: 10|4 represents 10.4 cm

(a) Find the median height.

..... cm [1]

(b) Work out the mean height.

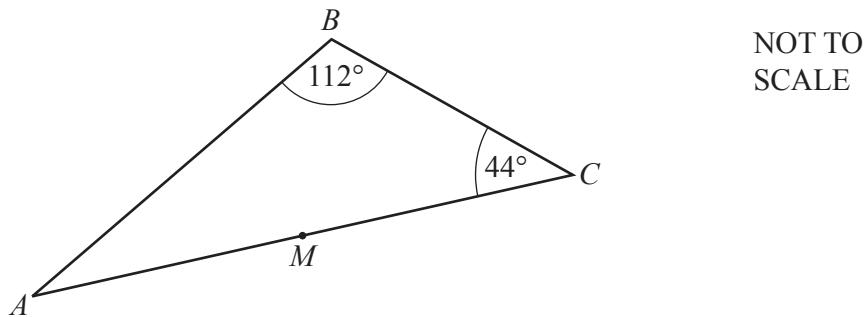
..... cm [2]

4 Shubhu invests \$750 in a savings account for 5 years.
The account pays simple interest at a rate of 1.8% per year.

Calculate the total interest she earns during the 5 years.

\$ [2]

5



The diagram shows triangle ABC .
 M is the midpoint of AC .

Triangle ABC is rotated 180° about centre M .
The image and the original triangle together form a quadrilateral $ABCD$.

(a) Write down the mathematical name of the quadrilateral $ABCD$.

..... [1]

(b) Find angle BAD .

Angle BAD = [2]

6 Rama asks a group of students how they travel to school.
The table shows the probability of how a student, chosen at random, travels to school.

	Bus	Walk	Car	Other
Probability	0.4	0.32	0.17	

(a) Complete the table.

[2]

(b) There are 1800 students at the school.

Find the expected number of students that walk to school.

..... [1]

7 **Without using a calculator**, work out $1\frac{5}{6} \div \frac{11}{15}$.

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

..... [3]

8 Find the highest common factor (HCF) of 48 and 80.

..... [2]

9
$$P = \frac{2wy^2}{3}$$

Find the positive value of y when $P = 108$ and $w = 8$.

$y =$ [3]

10 $\vec{AB} = \begin{pmatrix} 7 \\ -3 \end{pmatrix}$

(a) Find $3\vec{AB}$.

$$\begin{pmatrix} & \end{pmatrix}$$
 [1]

(b) Find $|\vec{AB}|$.

$|\vec{AB}| =$ [2]

11 A bronze sphere has radius 3.6 cm.
The density of bronze is 8.05 g/cm^3 .

Find the mass of the sphere.

Give your answer **in kilograms**, correct to the nearest gram.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

[Density = mass \div volume.]

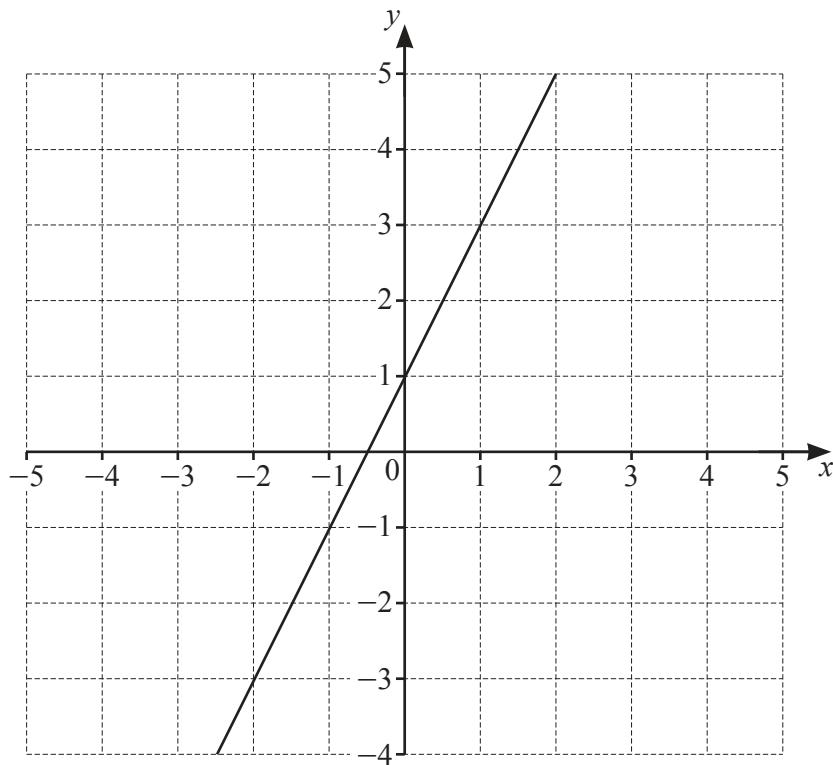
..... kg [4]

12 Oliver sent 22% more messages in June than in May.
He sent 305 messages in June.

Find how many more messages he sent in June than in May.

..... [3]

13 The graph of $y = 2x + 1$ is drawn on the grid.



By shading the **unwanted** regions of the grid, find and label the region R which satisfies these inequalities.

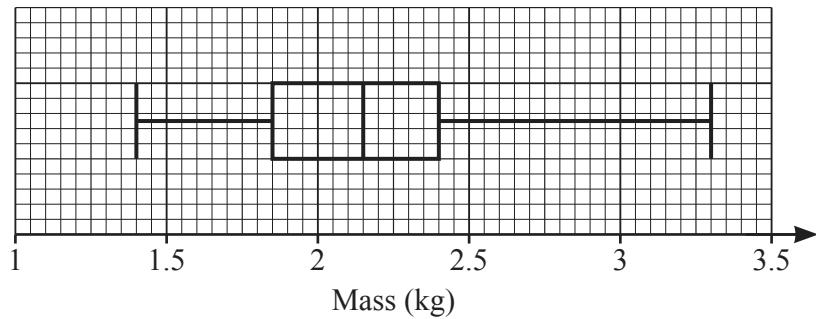
$$y \geq 2x + 1$$

$$y \geq 1$$

$$4x + 3y < 12$$

[4]

14 The box-and-whisker plot shows information about the mass, in kg, of some parcels.



(a) Find the mass of the heaviest parcel.

..... kg [1]

(b) Find the interquartile range.

..... kg [1]

15 $T = \sqrt{3d - e}$

Rearrange the formula to make d the subject.

$$d = \dots \quad [3]$$

16 A cylinder with height 12.5 cm has a curved surface area of $105\pi \text{ cm}^2$.

Calculate the volume of the cylinder.

$$\dots \text{ cm}^3 \quad [4]$$

17 (a) Simplify.

$$(64y^{27})^{\frac{2}{3}}$$

$$\dots \quad [2]$$

(b) Simplify.

$$\frac{x-5}{x^2-25}$$

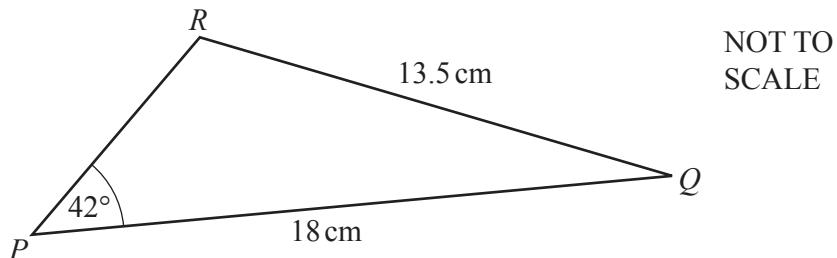
$$\dots \quad [2]$$

18 F is proportional to the product of m and a .

Calculate the percentage change in F when m is increased by 40% and a is decreased by 15%.

..... % [3]

19



Calculate the obtuse angle PRQ .

Angle PRQ = [4]

20 $(x+a)(x+2)(2x+3)$ is equivalent to $2x^3 + bx^2 + cx - 18$.

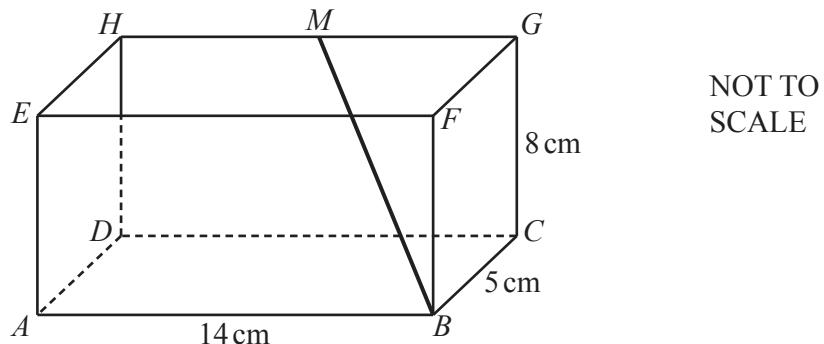
Find the value of each of a , b and c .

$$a = \dots$$

$$b = \dots$$

$$c = \dots \quad [3]$$

21



The diagram shows a cuboid $ABCDEFGH$.

$AB = 14$ cm, $BC = 5$ cm and $CG = 8$ cm.

M is the midpoint of HG .

(a) Calculate BM .

..... cm [3]

(b) Calculate the angle that BM makes with the base $ABCD$.

..... [3]

Question 22 is printed on the next page.

22 Find the coordinates of the point where the line $4x + y = 9$ intersects the curve $y + x^2 = 5$.
You must show all your working.

(..... ,) [5]

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