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5271476699

MATHEMATICS **0580/41**

Paper 4 Calculator (Extended) **October/November 2025**

2 hours

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 scientific 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 100.
- The number of marks for each question or part question is shown in brackets [ ].

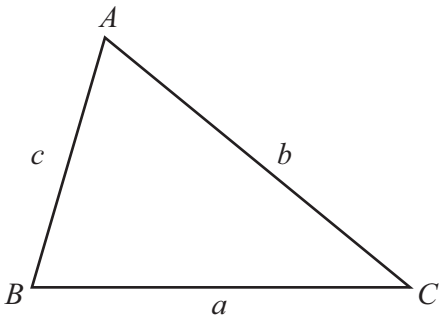
This document has **20** pages. Any blank pages are indicated.

[Turn over

List of formulas

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle of radius r.	$A = \pi r^2$
Circumference, C, of circle of radius r.	$C = 2\pi r$
Curved surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Curved surface area, A, of cone of radius r, sloping edge l.	$A = \pi rl$
Surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of pyramid, base area A, height h.	$V = \frac{1}{3}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{3}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$
For the equation $ax^2 + bx + c = 0$, where $a \neq 0$,	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

For the triangle shown,



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \frac{1}{2}ab\sin C$$

1 A quadrilateral has

- rotational symmetry of order 2
- two diagonals that are the only lines of symmetry.

Write down the geometrical name of this quadrilateral.

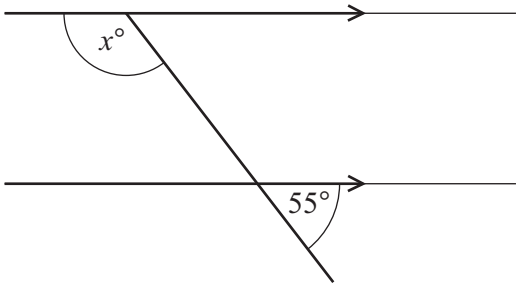
..... [1]

2 Solve.

$11 - 2x = 4$

$x =$ ..... [2]

3



NOT TO SCALE

The diagram shows two parallel lines and a straight line.

Find the value of x.

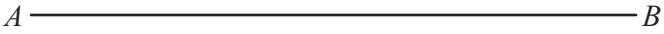
$x =$ ..... [2]

4 A train journey starts at 22 16.
The journey takes 5 hours 52 minutes.

Find the time the train journey finishes.

..... [1]

5



(a) In triangle ABC, $AB = 8$ cm, $AC = 7$ cm and $BC = 5$ cm.

Using a ruler and compasses only, construct triangle ABC.
The side AB has been drawn for you. [2]

(b) Measure angle ACB.

..... [1]

(c) Triangle ABC is a scale drawing of a field.

(i) The scale is 1 : 10 000.

Find the actual distance from A to B.
Give your answer in kilometres.

..... km [1]

(ii) B is due east of A.
Find the bearing of A from B.

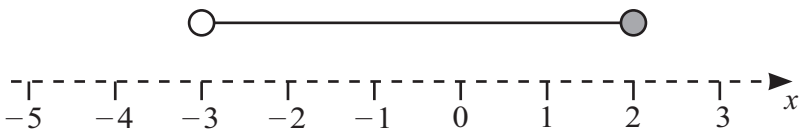
..... [1]

6 Expand.

$g(3-2g)$

..... [1]

7 **(a)**



Write down the inequality represented in the diagram.

..... [2]

(b) Write down the integer values of x that satisfy the inequality $-4 < 2x \leqslant 8$.

..... [2]

8 Calculate.

$$(3.5^2 - 2.2^3)^{\frac{1}{4}}$$

..... [1]

9 An athlete runs at a speed of 9.5 m/s.

Convert this speed into km/h.

..... km/h [2]

10 A is the point (2, 1).

$\overrightarrow{AB} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$

Find the coordinates of B.

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

11 In a sale, the prices of coats are reduced by 15%.

(a) The original price of a coat is \$60.

Calculate the sale price of the coat.

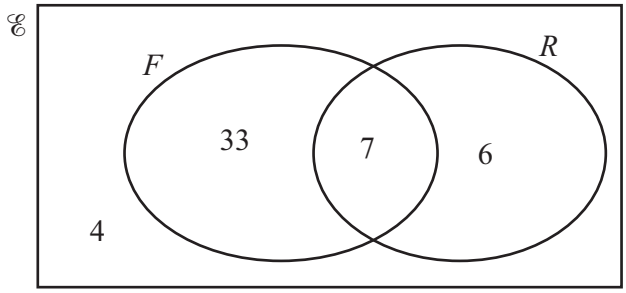
\$ ..... [2]

(b) The sale price of a different coat is \$58.14 .

Calculate the original price of this coat .

\$ ..... [2]

12 Some students are asked if they like football (F) or rugby (R).
The Venn diagram shows the results.



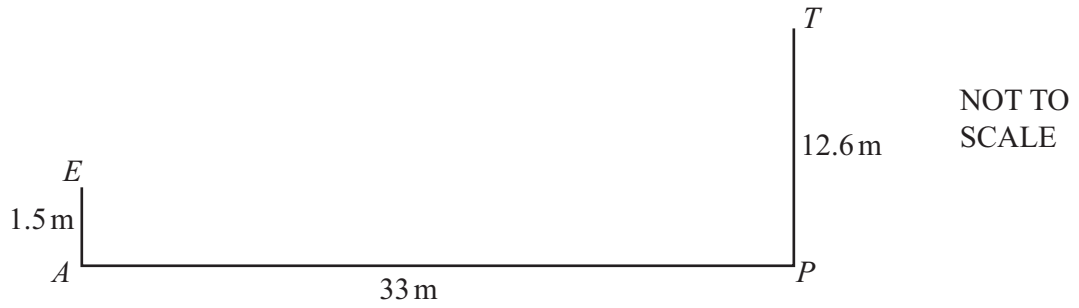
(a) Find the number of students who do not like rugby.

..... [1]

(b) Use set notation to describe the region containing students who like rugby but not football.

..... [1]

13



The diagram shows two vertical poles, AE and PT, standing on horizontal ground, AP.

Calculate the angle of elevation of the point T from the point E.

..... [3]

14 A cube contains a solid metal sphere.
The sphere touches all the faces of the cube.
The side length of the cube is 8 cm.

(a) Show that the volume of the sphere is $\frac{256}{3}\pi\,\text{cm}^3$.

[1]

(b) Calculate the percentage of the cube that is **not** occupied by the sphere.

..... % [3]

(c) The density of the metal of the sphere is $7.86\,\text{g/cm}^3$.

Calculate the mass of the sphere.
Give your answer in kilograms.
[Density = mass ÷ volume]

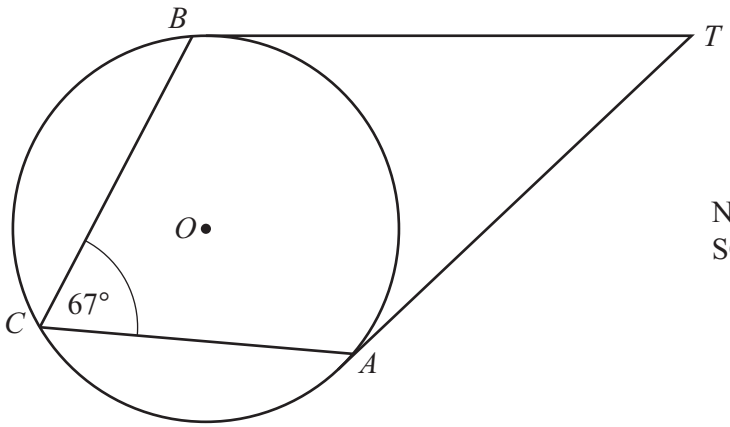
..... kg [2]

(d) The sphere is melted down and made into a solid cylinder with radius 3.1 cm.

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

..... cm^2 [4]

15



NOT TO SCALE

A, *B* and *C* lie on a circle, centre *O*.
TA and *TB* are tangents to the circle at *A* and *B*.

Calculate angle *ATB*.

Angle *ATB* = ... [3]

16 The table shows some information about the heights of 50 plants.

Height (h cm)	$5 < h \leqslant 10$	$10 < h \leqslant 12$	$12 < h \leqslant 20$
Frequency	3	24	23

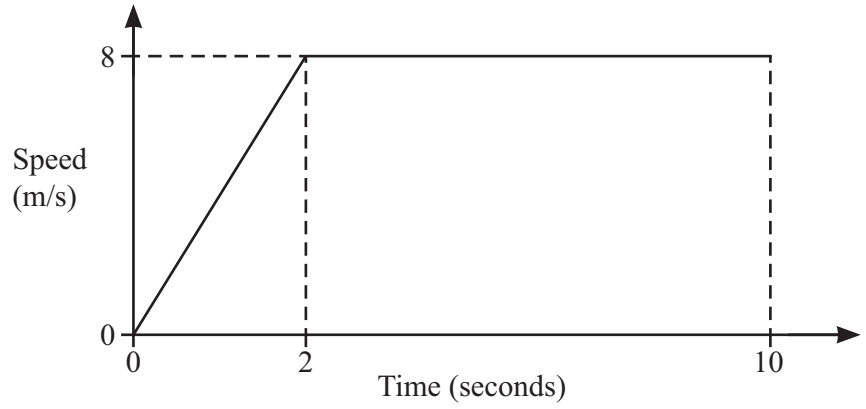
Calculate an estimate of the mean height.

..... cm [4]

17 Find the equation of the straight line that passes through the points (2, 0) and (0, 4).
Give your answer in the form $y = mx + c$.

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

18



NOT TO SCALE

The diagram shows part of the speed–time graph for an athlete in a race.

(a) Calculate the distance the athlete runs in the first 10 seconds.

..... m [2]

(b) The length of the race is 100 m.
After 10 seconds, the athlete continues to run at a speed of 8 m/s until the end of the race.

Calculate the **total** time the athlete takes to complete the 100 m race.

..... s [2]

19 The mass of a radioactive substance decays exponentially at a rate of 10% per day.
The initial mass of the substance is 20 g.

Find the number of whole days it takes for the mass of the substance to first be less than 1 g.

..... days [3]

20 These are the first five terms of a sequence.

48 24 12 6 3

(a) Find the next term.

..... [1]

(b) Find the nth term.

..... [2]

21 In triangle STU, $ST = 8$ cm, $SU = 9$ cm and angle $TSU = 50°$.

Calculate the area of triangle STU.

..... cm^2 [2]

22 Alex invests \$200 at a rate of r% per year compound interest.
At the end of 25 years the value of this investment is \$301.10 .

Find the value of r.

$r =$ ..... [3]

23 $y \propto \dfrac{1}{\sqrt{x+1}}$

When $x = 8$, $y = 3$.

Find y in terms of x.

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

24 Martha walks a distance of 10 km at a speed of x km/h.
She then runs a distance of 5 km at a speed of $(x+4)$ km/h.
The total time taken for the whole journey is 3.5 hours.

(a) Write down an expression in terms of x for the time Martha is walking.

..... h [1]

(b) Show that $7x^2 - 2x - 80 = 0$.

[4]

(c) Solve $7x^2 - 2x - 80 = 0$, giving your answers correct to 2 decimal places.
You must show all your working.

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

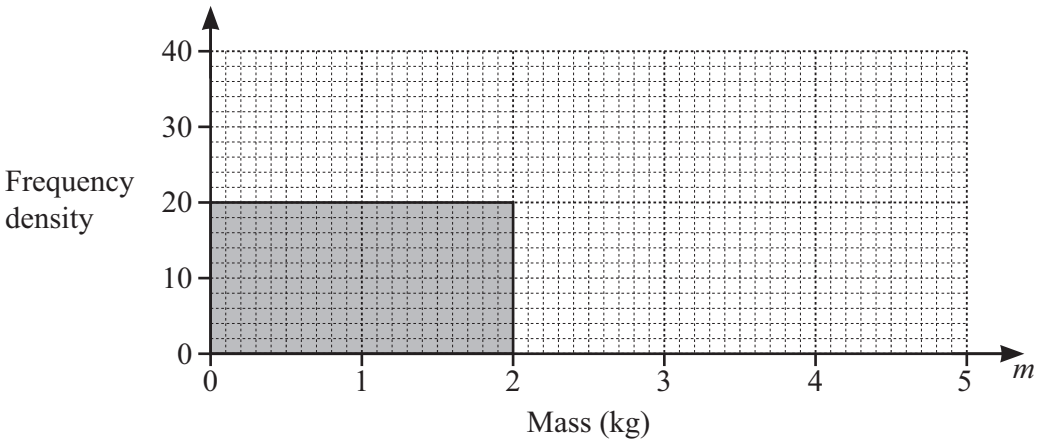
(d) Calculate the difference between the time Martha is walking and the time she is running.
Give your answer in hours and minutes correct to the nearest minute.

..... h ..... min [3]

25 Kai sorts parcels into two types, light and heavy.

Type of parcel	Mass (m kg)
Light	$0 < m \leqslant 2$
Heavy	$2 < m \leqslant 5$

The histogram shows some information about the number of parcels Kai sorts in one day.



(a) Find the number of light parcels.

..... [1]

(b) There are 102 heavy parcels.

Complete the histogram. [2]

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

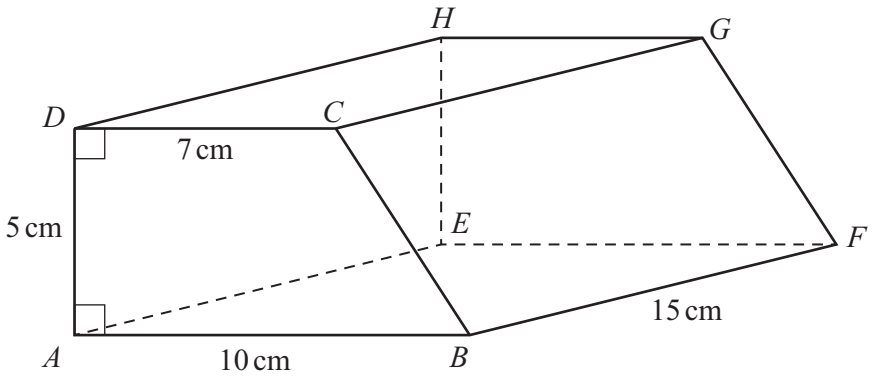
$y = 2x^2 - 3x - 7$
$y = 2x - 7$

$x =$ ..... , $y =$ .....

$x =$ ..... , $y =$ .....

[4]

27



NOT TO SCALE

The diagram shows a prism of length 15 cm.
The cross-section of the prism is a trapezium.

Angle $DAB = 90°$ and angle $ADC = 90°$.
$AB = 10$ cm, $AD = 5$ cm and $DC = 7$ cm.

Calculate the angle the diagonal AG makes with the base $ABFE$.

..... [4]

28 $f(x) = 7^{x-4}$

Find the value of x when

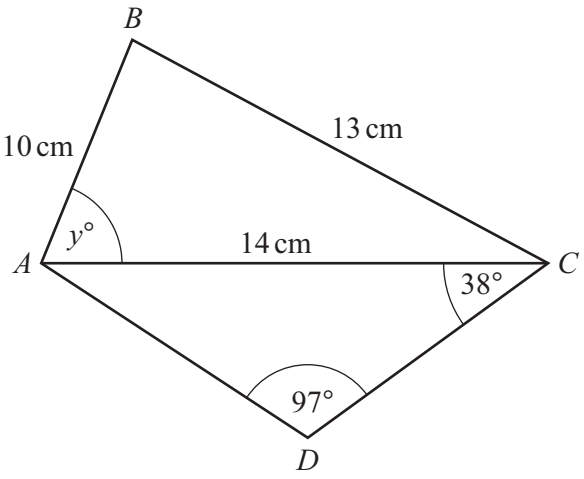
(a) $f(x) = 1$

$x =$ ..... [1]

(b) $f^{-1}(x) = 1$.

$x =$ ..... [2]

29



NOT TO SCALE

(a) Calculate the value of y.

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

(b) Calculate BD.

$BD =$ ..... cm [5]

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