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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.

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 .

$$V = \frac{1}{3}\pi r^2 h$$

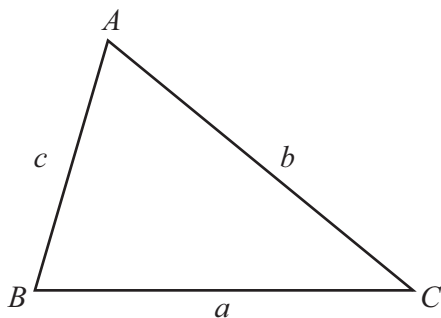
Volume, V , of sphere of radius r .

$$V = \frac{4}{3}\pi r^3$$

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.

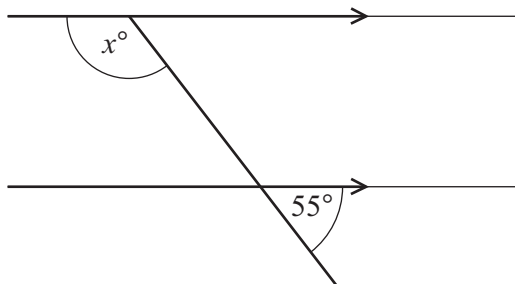
..... [1]

- 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]





A ————— B

- (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]

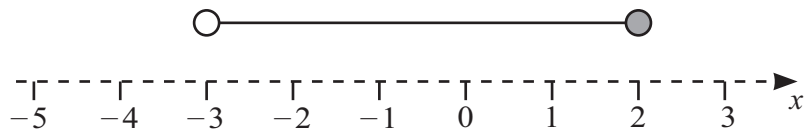
- 6 Expand.

$$g(3 - 2g)$$

..... [1]



7 (a)



Write down the inequality represented in the diagram.

..... [2]

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

..... [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]

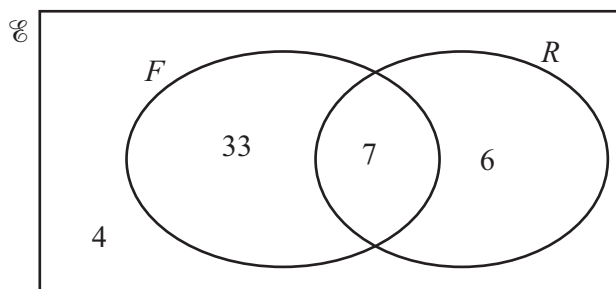
- (b) The sale price of a different coat is \$58.14 .

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.



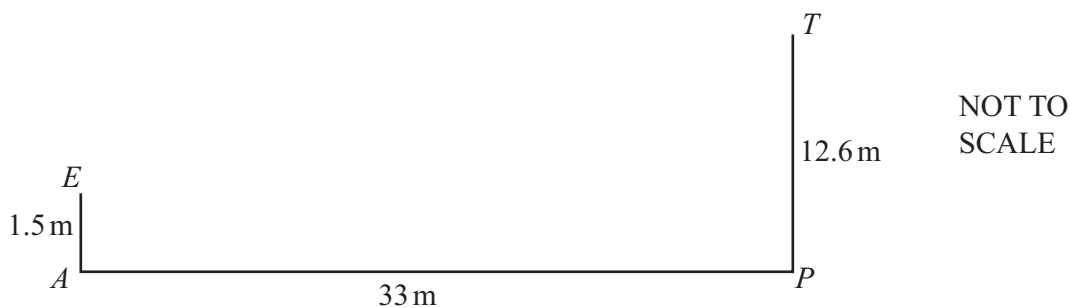
- (a) Find the number of students who do not like rugby.

..... [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 g/cm^3 .

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

..... kg [2]

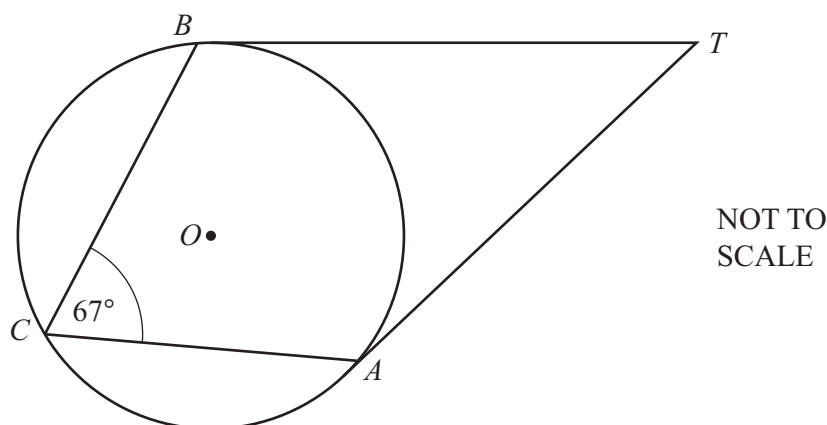


- (d) The sphere is melted down and made into a solid cylinder with radius 3.1 cm.

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

..... cm² [4]

15



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)	$5 < h \leq 10$	$10 < h \leq 12$	$12 < h \leq 20$
Frequency	3	24	23

Calculate an estimate of the mean height.

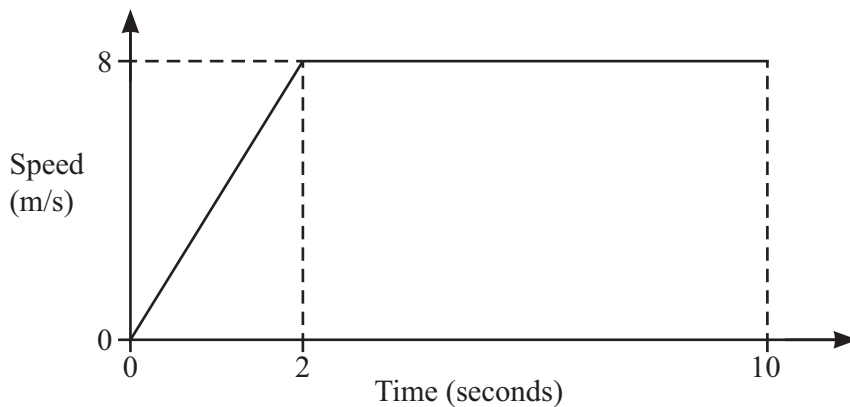
..... cm [4]

- 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
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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 n th term.

..... [2]

- 21 In triangle STU , $ST = 8$ cm, $SU = 9$ cm and angle $TSU = 50^\circ$.

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 .

$$r = \dots\dots\dots [3]$$

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

When $x = 8, y = 3$.

Find y in terms of x .

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



- 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.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [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.

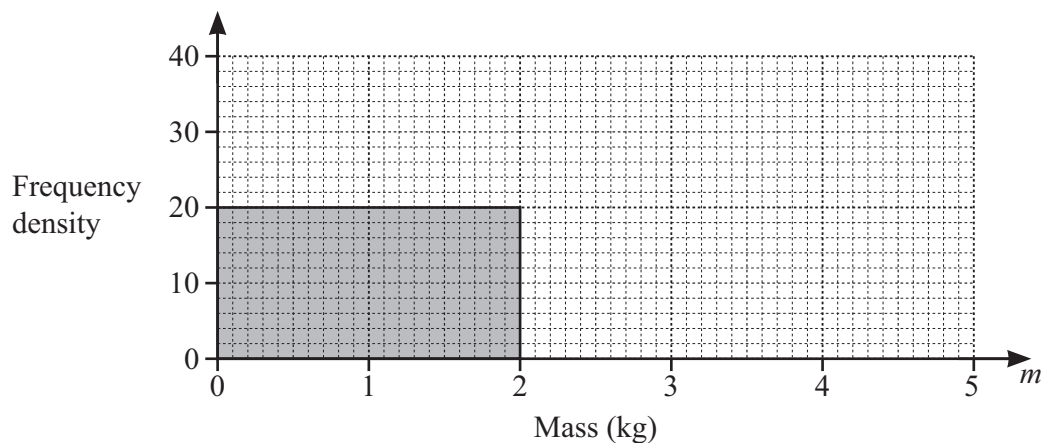
..... h min [3]



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

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

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.

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

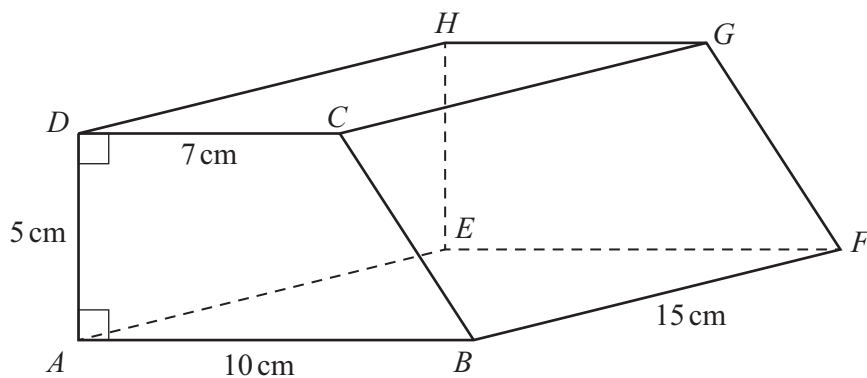
$$y = 2x - 7$$

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

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

[4]





NOT TO
SCALE

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

Angle $DAB = 90^\circ$ and angle $ADC = 90^\circ$.
 $AB = 10$ 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

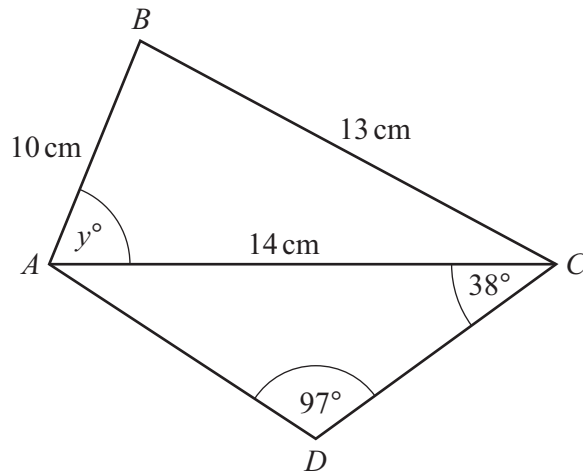
(a) $f(x) = 1$

$$x = \dots\dots\dots [1]$$

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

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





NOT TO
SCALE

(a) Calculate the value of y .

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

(b) Calculate BD .

$BD = \dots\dots\dots\text{ cm}$ [5]



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