Cambridge Assessment International Education



# Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

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**MATHEMATICS** **0580/42**

Paper 4 Calculator (Extended) **May/June 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 $\pi$, 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

**1** A quadrilateral has these properties

- the diagonals are the only lines of symmetry
- it has rotational symmetry of order 2.

Write down the mathematical name of this quadrilateral.

.....rhombus..... [1]

**2**

The diagram shows the net of a solid.

Write down the mathematical name of this solid.

triangular prism..... [1]

**3** Mass of box $A$ : Mass of box $B$ = 4 : 7

The mass of box $B$ is 2.4 kg more than the mass of box $A$.

Calculate the mass of box $A$ and the mass of box $B$.

$\frac{m_A}{m_B} = \frac{4}{7} \Rightarrow \frac{m_B}{7} = \frac{m_A}{4} = \frac{m_B - m_A}{7-4} = \frac{2.4}{3} = 0.8$

$m_B = 0.8 \times 7 = 5.6$

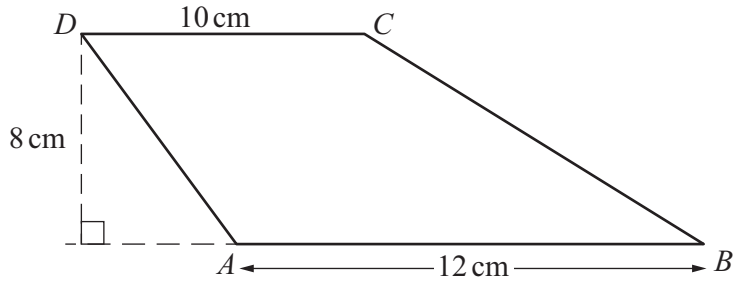
$m_A = 0.8 \times 4 = 3.2$

box $A$ .....3.2..... kg

box $B$ .....5.6..... kg

[3]

**4**




NOT TO SCALE

*ABCD* is a trapezium.

Work out the area of the trapezium.

$\frac{(10+12)\,8}{2} = 88$

..... 88 ..... $cm^2$ [2]

**5** Scott changes \$300 into pounds (£).
The exchange rate is £1 = \$1.20 .

Calculate the amount Scott receives.

$\frac{300}{1.2} = 250$

..... 250 ..... pounds [1]

**6** A solid wooden cone has base radius 4 cm and height 12 cm.
The density of the wood is 0.74 $g/cm^3$.

Calculate the mass of the cone.
[Density = Mass ÷ Volume]

$V_{cone} = \frac{1}{3}\pi 4^2 \times 12 = 64\pi$

$0.74 = \frac{mass}{64\pi}$

$mass = 0.74 \times 64\pi \approx 149$

..... 149 ..... g [3]

**7** $y = mx + c$

Rearrange the formula to make $m$ the subject.

$y - c = mx$

$m = \frac{y - c}{x}$

$m =$ $\frac{y-c}{x}$ [2]

**8** Calculate.

$$\frac{2.1^2 - 1.9}{0.5}$$

5.02 [1]

**9** Solve the simultaneous equations.
You must show all your working.

$$2w - 3y = 11$$
$$3w + y = 11$$

$2w - 3y = 11$

$+ \quad 9w + 3y = 33$

$11w = 44$

$w = 4$

$\Rightarrow 2 \times 4 - 3y = 11$

$\Rightarrow 3y = 8 - 11 = -3$

$y = -1$

$w =$ 4

$y =$ −1 [3]

**10** A group of 12 adults and 9 children travel on a bus.

The cost of an adult ticket is $\$n$.
The cost of a child ticket is $\$(n-10)$.

The total cost of the tickets is \$277.50 .

Find the cost of one adult ticket.

$12n + 9(n-10) = 277.50$

$12n + 9n - 90 = 277.50$

$21n = 367.5$

$n = 17.5$

$ ..... 17.5 ..... [3]

**11** In a sale, the original price ($s$) of a shirt is reduced by 15%.
The sale price of the shirt is \$23.63 .

Find the original price of the shirt.

$s - 15\%\, s = 23.63$

$0.85\, s = 23.63$

$s = 27.8$

$ ..... 27.8 ..... [2]

**12** The length of a rectangle is 16 cm, correct to the nearest centimetre.
The width of the rectangle is 14 cm, correct to the nearest centimetre.

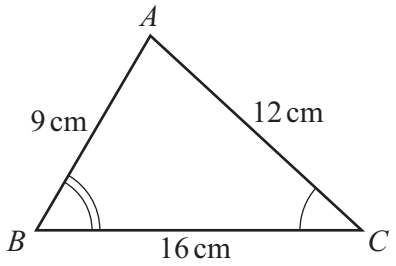
Calculate the lower bound of the perimeter of the rectangle.

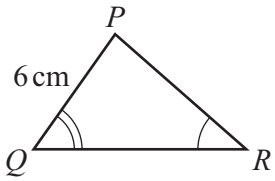
perimeter (min) $= 2($ length (min) $+$ width (min) $)$

$= 2\left(16 - \frac{1}{2} + 14 - \frac{1}{2}\right)$

..... 58 ..... cm [2]

**13**




NOT TO SCALE

Triangle $ABC$ and triangle $PQR$ are mathematically similar.

**(a)** Calculate the length of $PR$.

$\frac{AB}{PQ} = \frac{AC}{PR} \Rightarrow PR = \frac{6 \times 12}{9} = 8$

$PR =$ ..... 8 ..... cm [2]

**(b)** Triangle $ABC$ and triangle $PQR$ are the cross-sections of two prisms.
These prisms are mathematically similar.
The volume of the smaller prism is $1120\,cm^3$.

Calculate the volume of the larger prism.

$\frac{V_{small}}{V_{large}} = \left(\frac{\text{side small}}{\text{side large}}\right)^3 = \left(\frac{6}{9}\right)^3 = \frac{8}{27}$

$V_{large} = 1120 : \frac{8}{27}$

..... 3780 ..... $cm^3$ [2]

**14** Factorise.

$5x - 10 - ax + 2a$

$5(x-2) - a(x-2)$

$(5-a)(x-2)$

$(5-a)(x-2)$ [2]

**15** The interior angle of a regular polygon is 172°.

Find the number of sides of this polygon.

$\frac{(n-2)\,180}{n} = 172$

$180n - 360 = 172n$

$8n = 360$

$n = 45$

.....45..... [2]

**16** On any day, the probability that the weather will be sunny is 0.7 .

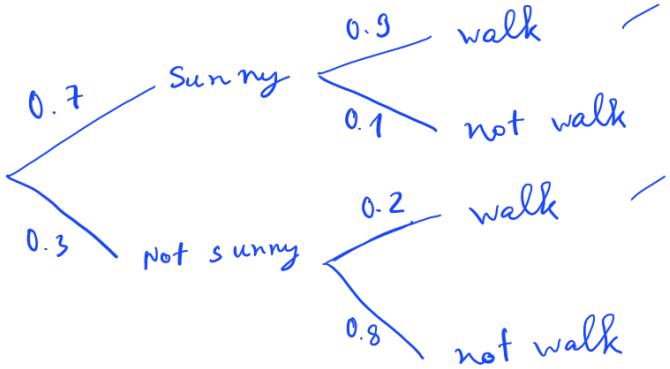
**(a)** Find the probability that on any day the weather will not be sunny.

$1 - 0.7 = 0.3$

.....0.3..... [1]

**(b)** When the weather is sunny, the probability that Rohit goes for a walk is 0.9 .
When the weather is not sunny, the probability that Rohit goes for a walk is 0.2 .

Find the probability that on any day Rohit goes for a walk.




$0.7 \times 0.9 + 0.3 \times 0.2 = 0.69$

.....0.69..... [3]

**17** **(a)** Alex invests $400 at a rate of 2.3% per year simple interest.

Find the total amount Alex has at the end of 5 years.

$\text{interest} = 400 \times \frac{2.3}{100} \times 5 = 46$

$\text{Total} = 400 + 46 = 446$

$ .....446..... [3]

**(b)** Virat has \$100 to spend.

In February he spends \$$x$ .
In March he spends 10% more than he spends in February.
In April he spends 10% more than he spends in March.

At the end of April, Virat has \$33.80 remaining.

Find the value of $x$.

Virat spends $x$ in Feb

He spends $x + 10\%\, x = 1.1x$ in March

He spends $1.1x + 10\%\, 1.1x = 1.21x$ in April

$$100 - x - 1.1x - 1.21x = 33.8$$

$$3.31x = 66.2$$

$$x = 20$$

$x =$ .....20..... [3]

**(c)** Bobbie invests \$500 in an account that pays compound interest each year.
At the end of 17 years, the value of Bobbie's investment is \$700.13 .

Find the value of Bobbie's investment at the end of 20 years.

$$700.13 = 500\left(1 + \frac{r}{100}\right)^{17}$$

$$1 + \frac{r}{100} = \sqrt[17]{\frac{700.13}{500}} = 1.02$$

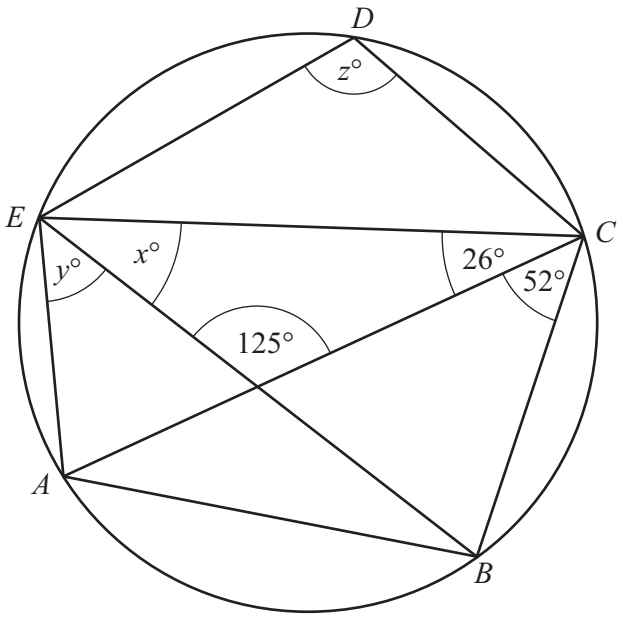
$$\frac{r}{100} = 0.02 \Rightarrow r = 2$$

Value after 20 years $= 500\left(1 + \frac{2}{100}\right)^{20}$

$\approx 743$

\$ ....743..... [4]

18




NOT TO SCALE

$A$, $B$, $C$, $D$ and $E$ lie on a circle.

Find the values of $x$, $y$ and $z$.

$x = 180° - 125° - 26° = 29°$

$y = \overset{\frown}{ACB} = 52°$

$z = \overset{\frown}{ECA} + \overset{\frown}{ACB} + \overset{\frown}{CEB}$

$z = 26° + 52° + 29°$

$z = 107°$

$x =$ 29°

$y =$ 52°

$z =$ 107°

[4]

**19** $f(x) = x + 1$ $g(x) = 5 - 2x$ $h(x) = 2^x$

**(a)** Find $f(-3)$.

$-3 + 1 = -2$

..... $-2$ ..... [1]

**(b)** The domain of $g(x)$ is $\{-3, 0, 2\}$.

Find the range of $g(x)$.

$g(-3) = 5 - 2(-3) = 11$

$g(0) = 5 - 2 \times 0 = 5$

$g(2) = 5 - 2 \times 2 = 1$

{ ..... 1, 5, 11 ..... } [2]

**(c)** Find $x$ when $h(x) = \frac{1}{32}$.

$2^x = \frac{1}{32} = \frac{1}{2^5} = 2^{-5}$

$x =$ ..... $-5$ ..... [1]

**(d)** Find $x$ when $h^{-1}(x) = 3$.

$y = 2^x$

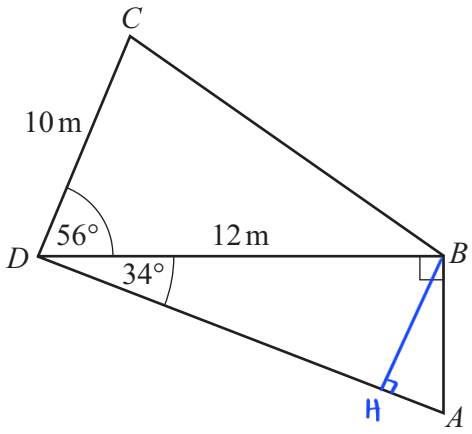
$\sqrt[x]{y} = 2$

swap : $\sqrt[y]{x} = 2$

$\sqrt[3]{x} = 2$

$x =$ ..... $8$ ..... [2]

20




NOT TO SCALE

The diagram shows a quadrilateral $ABCD$.
$CD = 10$ m and $DB = 12$ m.
Angle $DBA = 90°$, angle $CDB = 56°$ and angle $ADB = 34°$.

**(a)** Calculate the length of $AB$.

$\tan 34° = \frac{AB}{BD}$

$AB = 12 \tan 34° \approx 8.0941$

$AB =$ ..... 8.09 ..... m [2]

**(b)** Calculate the area of the quadrilateral $ABCD$.

$A_{ABCD} = A_{\Delta ABD} + A_{\Delta BCD}$

$= \frac{1}{2} AB \times BD + \frac{1}{2} BD \times CD \sin 56°$

$= \frac{1}{2} \times 8.0941 \times 12 + \frac{1}{2} \times 12 \times 10 \sin 56°$

$\approx 98.3$

..... 98.3 ..... $m^2$ [3]

**(c)** Calculate the perimeter of the quadrilateral $ABCD$.

$BC^2 = 10^2 + 12^2 - 2 \times 10 \times 12 \cos 56°$

$\Rightarrow BC \approx 10.478$

$AD^2 = 12^2 + 8.0941^2$

$\Rightarrow AD = 14.475$

$\text{perimeter}_{ABCD} = 10 + 10.478 + 8.0941 + 14.475$

$= 43.0471$

43.0 ..... m [5]

**(d)** Calculate the shortest distance from $B$ to the line $AD$.

$\sin 34° = \frac{BH}{BD} = \frac{BH}{12}$

$\Rightarrow BH = 12 \sin 34° \approx 6.7103$

6.71 ..... m [3]

**21** Simplify.

**(a)** $3t^5 \times 5t^3$

$15t^8$ ..... [2]

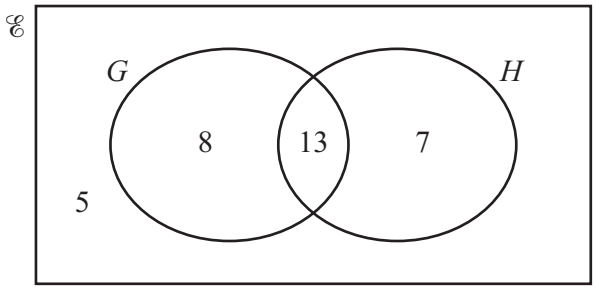
**(b)** $\left(64u^{36}\right)^{\frac{5}{6}}$

$(64)^{\frac{5}{6}} (u^{36})^{\frac{5}{6}}$

$32u^{30}$

$32u^{30}$ ..... [2]

22




$\mathscr{E}$ = {number of students in a class}
$G$ = {number of students who study geography}
$H$ = {number of students who study history}

The Venn diagram shows information about the 33 students in a class.

**(a)** One of the students in the class is picked at random.

Find the probability that this student

**(i)** does not study geography and does not study history

$\frac{5}{33}$ [1]

**(ii)** studies geography and studies history.

$\frac{13}{33}$ [1]

**(b)** Two of the students who study history are picked at random.

Find the probability that one student also studies geography and one student does not study geography.

$\left(\frac{13}{20} \times \frac{7}{19}\right) \times 2$

$\frac{91}{190}$ [3]

**23** Simplify.

$$\frac{h^2+4h}{h^2-16}$$

$$\frac{h(h+4)}{(h-4)(h+4)}$$

$$\frac{h}{h-4}$$ [3]

**24** Ahmed walks 2 km at a speed of $x$ km/h.
He then walks a further 3 km at a speed of $(x+1)$ km/h.

The total time he takes to walk the 5 km is $1\frac{1}{4}$ hours.

**(a)** Show that $5x^2-15x-8=0$.

$$\frac{2}{x}+\frac{3}{x+1}=1\frac{1}{4}$$

$$\frac{2(x+1)+3x}{x(x+1)}=\frac{5}{4}$$

$$4(5x+2)=5(x^2+x)$$

$$20x+8=5x^2+5x$$

$$5x^2-15x-8=0$$

[5]

**(b)** Find the value of $x$.
Show all your working and give your answer correct to 2 decimal places.

$$x=\frac{-(-15)\pm\sqrt{(-15)^2-4\times5(-8)}}{2\times5}$$

$$x\simeq 3.46 \quad \text{or} \quad x=-0.46$$

$$x\geqslant 0 \quad \text{so} \quad x=3.46$$

$x =$ 3.46 [3]

**25** $P$ is the point $(8, 0)$ and $Q$ is the point $(20, 6)$.

Find the equation of the perpendicular bisector of $PQ$. $\ell$
Give your answer in the form $y = mx + c$.

Mid point of PQ: $\left(\frac{8+20}{2}, \frac{0+6}{2}\right) = (14, 3)$

$m_{PQ} = \frac{6-0}{20-8} = \frac{6}{12} = 0.5$

$m_\ell = -1 : 0.5 = -2$

Equation of $\ell$: $y - 3 = -2(x - 14)$

$y - 3 = -2x + 28$

$y = -2x + 31$

$y =$ $-2x + 31$ [5]

**26** $y = ax^{11} + 3x^b$

$\frac{dy}{dx} = 44x^{10} + 18x^c$

Find the values of $a$, $b$ and $c$.

$\frac{dy}{dx} = 11ax^{10} + 3bx^{b-1}$

$= 44x^{10} + 18x^c$

$\Rightarrow \begin{cases} 11a = 44 \\ 3b = 18 \\ b - 1 = c \end{cases}$

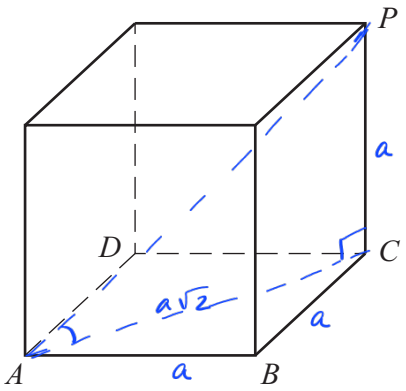
$a =$ 4

$b =$ 6

$c =$ 5

[2]

27




NOT TO SCALE

The diagram shows a cube.

Calculate the angle between the diagonal $AP$ and the base $ABCD$.

$AC = a\sqrt{2}$

$\tan \hat{PAC} = \frac{PC}{AC} = \frac{a}{a\sqrt{2}} = \frac{1}{\sqrt{2}}$

$\hat{PAC} = 35.3°$

..... 35.3° ..... [4]