

Cambridge IGCSE™

CANDIDATE NAME



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MATHEMATICS

0580/41

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 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 **16** pages.



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1 Solve.



$4c - 9 = 13$

$4c = 13 + 9 = 22$

$c = \frac{22}{4} = 5.5$

$c = \dots\dots\dots 5.5 \dots\dots\dots$ [2]

2 Work out.



$\frac{16.71 + 46.13}{\sqrt{8.6^2 - 3.5^2}}$

Give your answer correct to 2 significant figures.

$\dots\dots\dots 8.0 \dots\dots\dots$ [2]

3 In the USA, one gallon of fuel costs \$4.83 .
In the UK, one litre of fuel costs £1.62 .



The exchange rate is £1 = \$1.215 .
1 gallon = 3.785 litres

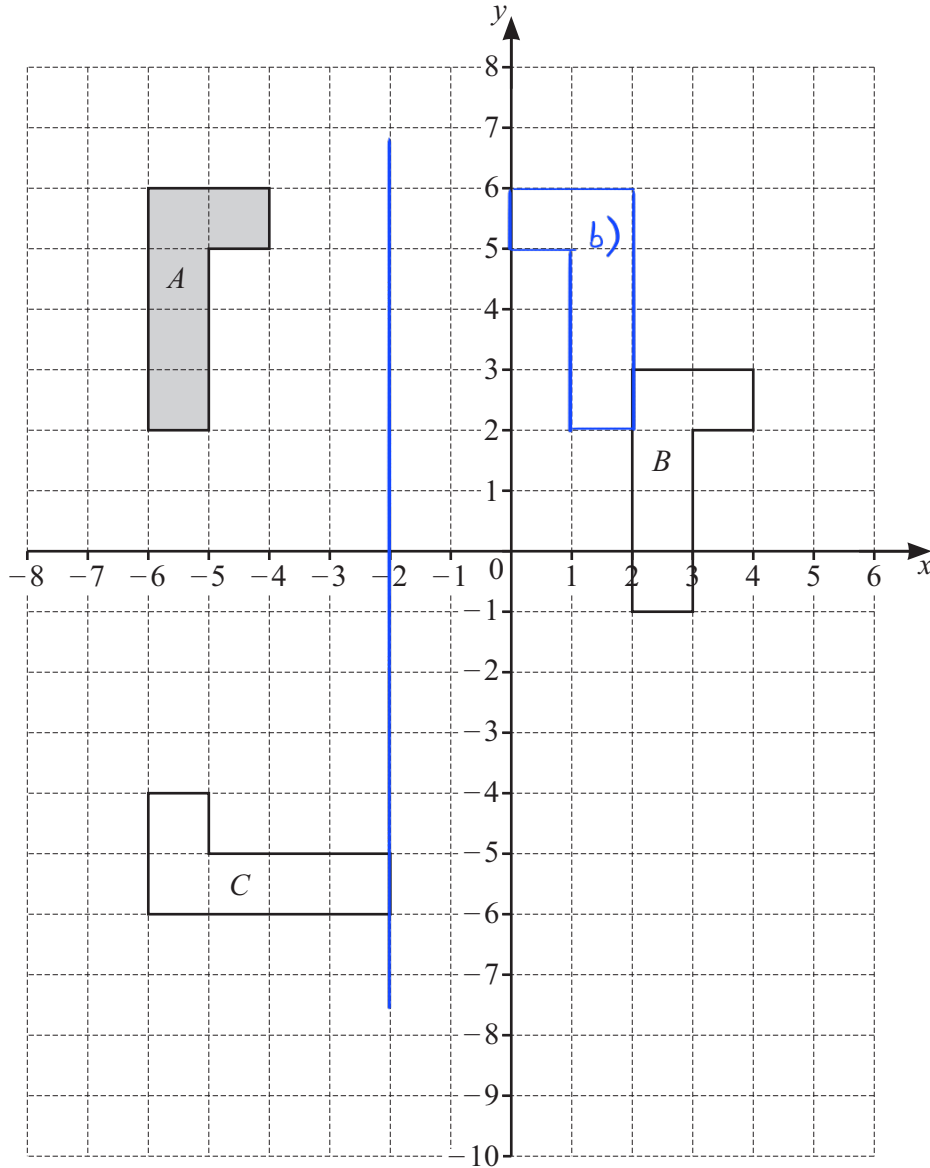
In which country does 1 litre of fuel cost more and by how much?
Give your answer in dollars.

USA : 1 gallon : \$4.83
3.785 l : \$4.83
1 l : \$1.276

UK : 1 l : £1.62
1 l : \$(1.62 × 1.215)
1 l : \$1.9683
1.9683 - 1.276 = 0.6923

$\dots\dots\dots$ UK $\dots\dots\dots$ by \$ $\dots\dots\dots 0.69 \dots\dots\dots$ [3]





(a) Describe fully the **single** transformation that maps

(i) shape *A* onto shape *B*

..... Translation by vector $\begin{pmatrix} 8 \\ -3 \end{pmatrix}$ [2]

(ii) shape *A* onto shape *C*.

..... Rotation 90° anticlockwise centre $(0, 0)$ [3]

(b) On the grid, draw the image of shape *A* after a reflection in the line $x = -2$.

[2]





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5 (a) These are the first 5 terms of a sequence.



1 8 27 64 125

Find the 10th term of this sequence.

n^3

..... 10^3 [1]

(b) These are the first 5 terms of a different sequence.

5 8 13 20 29
+3 +5 +7 +9

Find the n th term of this sequence.

$an^2 + bn + c$

$$\begin{cases} a + b + c = 5 \\ 4a + 2b + c = 8 \\ 9a + 3b + c = 13 \end{cases} \Rightarrow \begin{cases} a = 1 \\ b = 0 \\ c = 4 \end{cases}$$

..... $n^2 + 4$ [2]

(c) The sum of the first n terms of another sequence is $\frac{n}{2}(5n - 1)$.

(i) Use $n = 2$ to find the sum of the first two terms in this sequence.

$S_2 = \frac{2}{2} (5 \times 2 - 1) = 9$

..... 9 [1]

(ii) Find the 3rd term of this sequence.

$$\begin{aligned} u_3 &= S_3 - S_2 \\ &= \frac{3}{2} (5 \times 3 - 1) - 9 = \end{aligned}$$

..... 12 [2]

6 Expand.

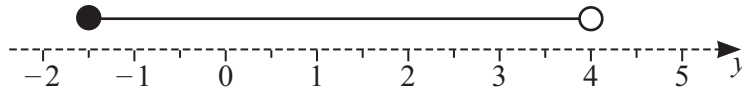


$5x^2(3x - 2)$

..... $15x^3 - 10x^2$ [2]



7
R



Write down the inequality in y shown by the number line.

..... $-1.5 \leq y < 4$ [2]

8
R

Hadi buys a dishwasher.
He can either pay a single payment of \$980 or he can pay using a monthly plan.
The monthly plan is 20% of \$980 **plus** 12 payments of \$75.25 .

(a) Hadi uses the monthly plan.

Calculate the total amount Hadi pays.

$980 \times 20 \% + 12 \times 75.25$

\$ 1099 [2]

(b) Find the percentage increase in the cost using the monthly plan compared to a single payment.

$\frac{1099 - 980}{980} \times 100 \% = 12.1 \%$

..... 12.1 % [2]

9
R

In a sale, the original price of a sewing machine is reduced by \$38.
This is an 8% reduction in the original price.

Work out the original price of the sewing machine.

$38 = 8\% \times \text{original price}$
 $\Rightarrow \text{original price} = 38 : 8\% = 475$

\$ 475 [2]





10 (a) Write down **all** the factors of 18.



1, 2, 3, 6, 9, 18 [2]

(b) Factorise.

$$3y - xy + 15 - 5x$$

$$y(3 - x) + 5(3 - x)$$
$$(y + 5)(3 - x)$$

(y + 5)(3 - x) [2]

(c) $3y - xy + 15 - 5x = 18$

where x and y are positive integers.

Using your answers to **part (a)** and **part (b)**, find one possible value of x and the corresponding value of y .

$$(y + 5)(3 - x) = 18$$

$$y + 5 = 18 \quad \text{and} \quad 3 - x = 1$$

$$y = 13 \quad \text{and} \quad x = 2$$

$x = 2$, $y = 13$ [2]

11 A warehouse has a floor area of 800 m^2 .



The plan of the warehouse is drawn to a scale of $1 : 50$.

Calculate the floor area on the plan.

Give your answer in square centimetres.

$$\frac{\text{Area plan}}{\text{Area real}} = \left(\frac{1}{50}\right)^2$$

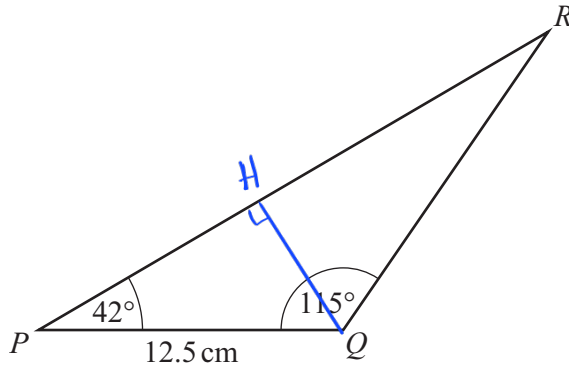
$$\Rightarrow \text{Area plan} = \left(\frac{1}{50}\right)^2 \times 800 = 0.32 \text{ m}^2$$

..... 3.2 0.0 cm^2 [3]



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The diagram shows triangle PQR .

Calculate the shortest distance from Q to PR .

$$\sin 42^\circ = \frac{QH}{PQ}$$

$$QH = 12.5 \sin 42^\circ \\ \approx 8.36$$

..... 8.36 cm [3]

13 Make x the subject of this formula.



$$A = w^2 + 5x^2$$

$$A - w^2 = 5x^2$$

$$\frac{A - w^2}{5} = x^2$$

$$x = \pm \sqrt{\frac{A - w^2}{5}}$$

$x = \pm \sqrt{\frac{A - w^2}{5}}$ [3]



- 14 The table shows some values for $y = 5x^2 - x^3 - 4$.

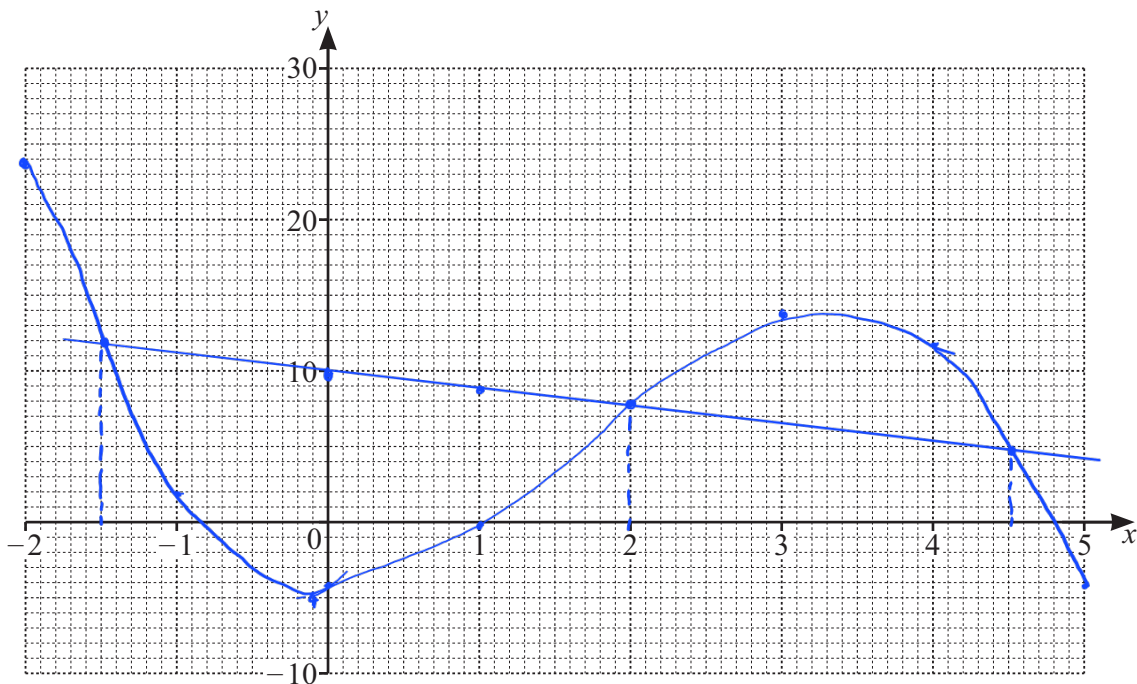
7

x	-2	-1	0	1	2	3	4	5
y	24	2	-4	0	8	14	12	-4

- (a) Complete the table.

[3]

- (b) On the grid, draw the graph of $y = 5x^2 - x^3 - 4$ for $-2 \leq x \leq 5$.



[4]

- (c) By drawing a suitable straight line on the grid, solve the equation $x^3 - 5x^2 - x + 14 = 0$.

$$\begin{aligned}
 -x^3 + 5x^2 + x - 14 &= 0 \\
 -x^3 + 5x^2 - 4 + x - 10 &= 0 \\
 -x^3 + 5x^2 - 4 &= 10 - x
 \end{aligned}$$

$$x = \dots -1.5 \dots \text{ or } x = \dots 2 \dots \text{ or } x = \dots 4.5 \dots \quad [4]$$





15 The height of each of 140 basketball players is recorded.

The table shows the results.

Height (h cm)	$160 < h \leq 180$	$180 < h \leq 185$	$185 < h \leq 190$	$190 < h \leq 200$	$200 < h \leq 210$
Frequency	7	12	31	70	20
Mid value	170	182.5	187.5	195	205

(a) Calculate an estimate of the mean height.

$$\frac{170 \times 7 + 182.5 \times 12 + 187.5 \times 31 + 195 \times 70 + 205 \times 20}{140}$$

..... 192 cm [4]

(b) Two of the players are chosen at random.

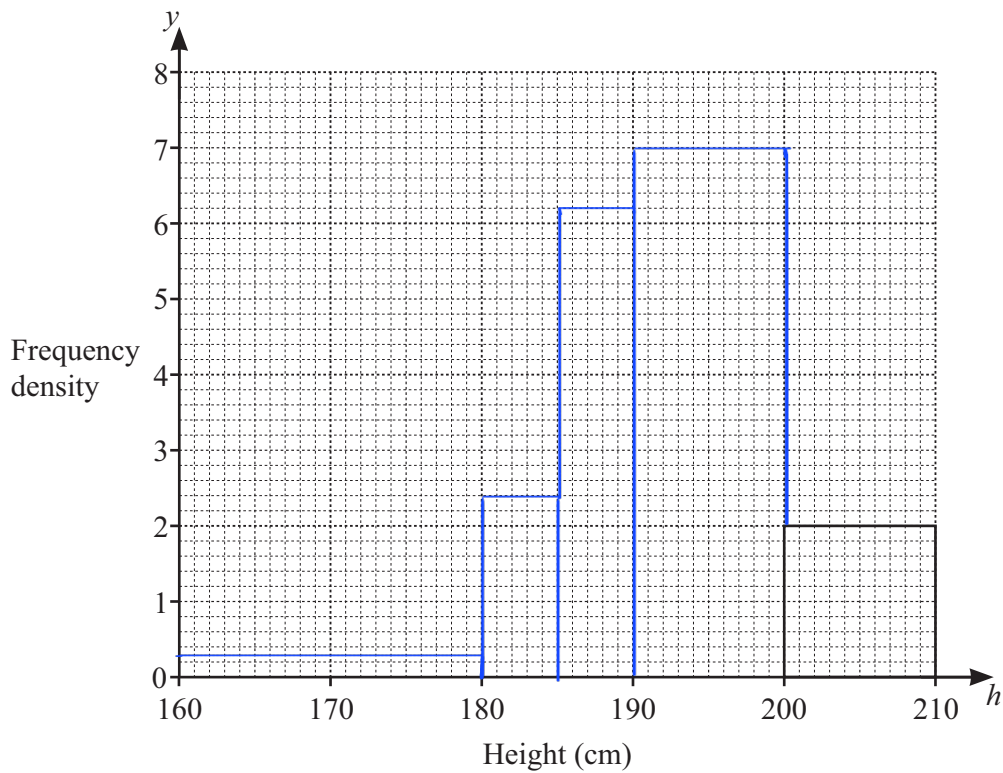
Find the probability that both players have a height greater than 190 cm and no more than 200 cm.

$$\frac{70}{140} \times \frac{69}{139} = \frac{69}{278}$$

..... $\frac{69}{278}$ [2]



(c) Complete the histogram to show the information in the frequency table.



[3]

- 16 Mateo invests \$1250 at a rate of $r\%$ per year compound interest.
 At the end of 6 years the total value of his investment is \$1484.

R

Calculate the value of r .

$$1484 = 1250 \left(1 + \frac{r}{100}\right)^6$$

$$\frac{1484}{1250} = \left(1 + \frac{r}{100}\right)^6$$

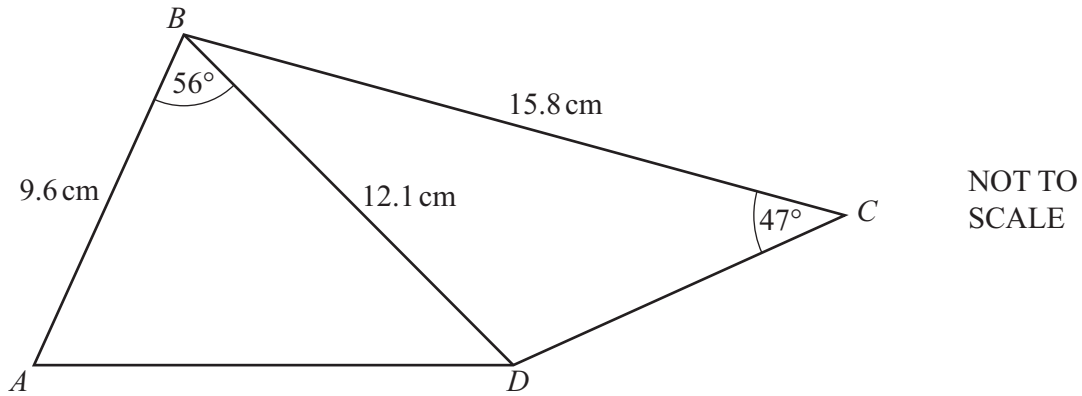
$$1 + \frac{r}{100} = \sqrt[6]{\frac{1484}{1250}} \approx 1.02901$$

$$\frac{r}{100} \approx 0.02901$$

$$r = \underline{2.9} \dots \dots \dots [3]$$



17



The diagram shows a quadrilateral $ABCD$.

(a) Calculate AD .

$$\begin{aligned} AD^2 &= AB^2 + BD^2 - 2AB \times BD \times \cos 56^\circ \\ &= 9.6^2 + 12.1^2 - 2 \times 9.6 \times 12.1 \times \cos 56^\circ \\ \Rightarrow AD &\approx 10.4 \end{aligned}$$

$$AD = \underline{10.4} \dots \dots \dots \text{cm} \quad [3]$$

(b) Calculate the obtuse angle BDC .

$$\frac{15.8}{\sin \widehat{BDC}} = \frac{12.1}{\sin 47^\circ}$$

$$\sin \widehat{BDC} = 0.955$$

$$\widehat{BDC} = 72.746^\circ$$

$$\text{OR } \widehat{BDC} = 180^\circ - 72.746^\circ = 107.254^\circ$$

$$\text{Angle } BDC = \underline{107.2^\circ} \dots \dots \dots [4]$$

(c) Calculate the area of the quadrilateral.

$$\widehat{DBC} = 180^\circ - 107.254^\circ - 47^\circ = 25.746^\circ$$

$$A_{\triangle ABD} + A_{\triangle BDC}$$

$$= \frac{1}{2} \times 9.6 \times 12.1 \sin 56^\circ + \frac{1}{2} \times 12.1 \times 15.8 \sin 25.746^\circ$$

$$\approx 89.673^\circ$$

$$\underline{89.7} \dots \dots \dots \text{cm}^2 \quad [3]$$



- 18 $2x^2 + 12x - 2$ can be written in the form $a(x+b)^2 - c$.

7

Find the values of a , b and c .

$$2(x^2 + 6x) - 2$$

$$2(x^2 + 2 \cdot x \cdot 3 + 3^2 - 3^2) - 2$$

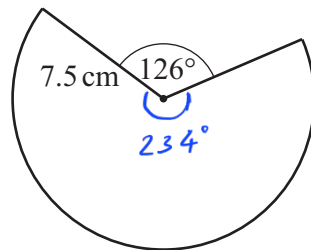
$$2(x + 3)^2 - 2 \times 3^2 - 2$$

$$2(x + 3)^2 - 20$$

$$a = \dots 2 \dots, b = \dots 3 \dots, c = \dots 20 \dots [3]$$

19

7



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The diagram shows a major sector of a circle with radius 7.5 cm.

Calculate the perimeter of the major sector.

$$234^\circ = \frac{234\pi}{180} = \frac{13\pi}{10} \text{ rad}$$

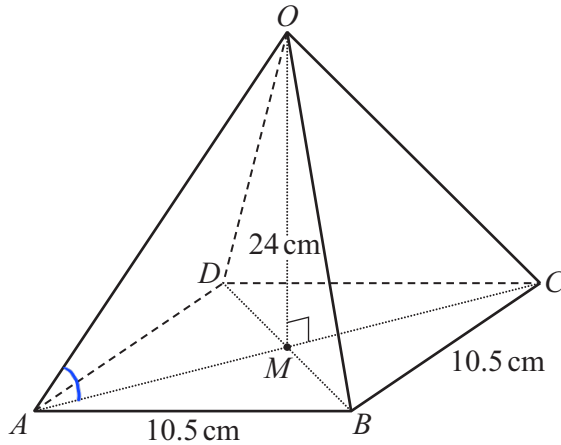
$$\text{major arc length} = 7.5 \times \frac{13\pi}{10} = 9.75\pi$$

perimeter of the major sector:

$$9.75\pi + 7.5 \times 2 \approx 45.6$$

$$\dots 45.6 \dots \text{ cm } [4]$$





NOT TO
SCALE

The diagram shows a pyramid $OABCD$.
The pyramid has a square base, $ABCD$, with sides 10.5 cm.
The vertex O is vertically above the centre of the base, M .
The height of the pyramid is 24 cm.

(a) Calculate the angle that OA makes with the base.

$$AC = 10.5\sqrt{2}$$

$$AM = \frac{10.5\sqrt{2}}{2} = 5.25\sqrt{2}$$

$$\tan \widehat{OAM} = \frac{24}{5.25\sqrt{2}}$$

$$\widehat{OAM} \approx 72.8^\circ$$

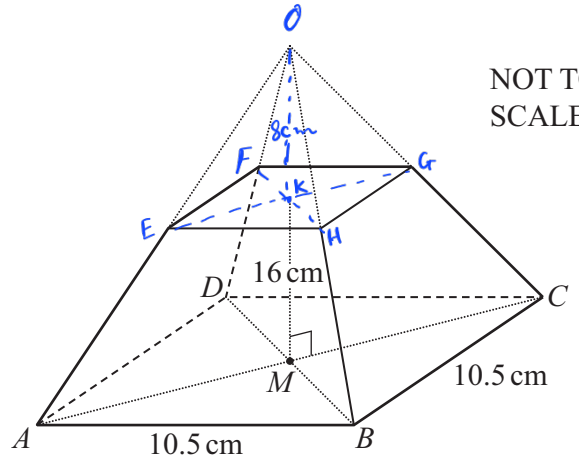
..... 72.8° [4]



(b)

The diagram shows a frustum of the pyramid $OABCD$.
The height of the frustum is 16 cm.

Calculate the volume of the frustum.



NOT TO SCALE

$$\triangle OEK \sim \triangle OAM$$

$$\frac{EK}{AM} = \frac{OK}{OM} = \frac{24-16}{24} = \frac{1}{3}$$

$$\Rightarrow \frac{EG}{AC} = \frac{1}{3} \Rightarrow \frac{EH}{AB} = \frac{1}{3}$$

$$\Rightarrow EH = \frac{1}{3} \times 10.5 = 3.5$$

$$V_{\text{small pyramid}} = \frac{1}{3} \times 3.5^2 \times 8 = \frac{98}{3}$$

$$V_{\text{large pyramid}} = \frac{1}{3} \times 10.5^2 \times 24 = 882$$

$$V_{\text{frustum}} = 882 - \frac{98}{3} \approx 849$$

..... 849 cm³ [5]

21

$$\frac{16^{5m}}{4} = 64^{2n}$$

\mathcal{R}

Find m in terms of n .

$$\frac{(4^2)^{5m}}{4} = (4^3)^{2n}$$

$$4^{10m} = 4^{6n} \times 4$$

$$10m = 6n + 1$$

$$m = \frac{6n+1}{10} \dots\dots\dots [3]$$

22

V is 50, correct to the nearest 10.

R is 13, correct to the nearest integer.

$$I = \frac{V}{R}$$

\mathcal{R}

Calculate the upper bound of I .

$$I_{\text{max}} = \frac{V_{\text{max}}}{R_{\text{min}}} = \frac{50 + \frac{10}{2}}{13 - \frac{1}{2}} = \frac{55}{12.5} = 4.4$$

..... 4.4 [3]



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