Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

MATHEMATICS **0580/04**

Paper 4 Calculator (Extended) **For examination from 2025**

SPECIMEN PAPER B **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 **18** pages. Any blank pages are indicated.

1 Find the reciprocal of 0.35 .

$\frac{20}{7}$ .... [1]

2 Calculate.

$$\frac{4^2 - 1.9}{3.2 - 2.6}$$

23.5 .... [1]

3 Navin and Esther share some money in the ratio Navin : Esther = 5 : 7.

(a) Find Navin's share as a percentage of the total money.

$\frac{5}{5+7} \times 100\%$

41.7 .... % [1]

(b) Find Esther's share as a percentage of Navin's share.

$\frac{7}{5} \times 100\%$

140 .... % [1]

(c) Navin's share is $160.

Work out Esther's share.

$160 \times 140\%$

$ 224 .... [2]

4 **(a)** Simplify.

(i) $5x^2 - 7x + 6x - x^2$

$4x^2 - x$ .... [2]

(ii) $\frac{4x}{3y} \div \frac{2a}{9y}$

$\frac{4x}{3y} \times \frac{9y}{2a} = \frac{36xy}{6ay}$

$\frac{6x}{a}$ .... [2]

(b) Solve.

$5(3 - 2x) = 17$

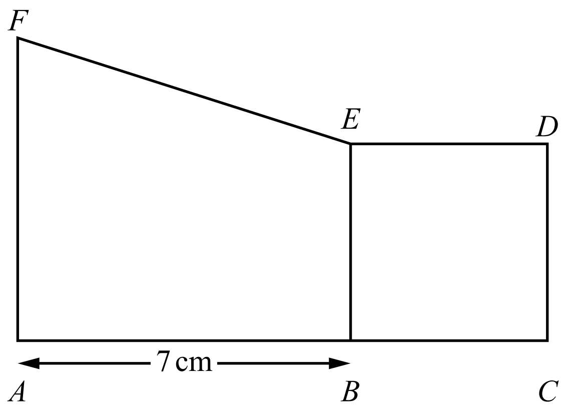
$15 - 10x = 17$

$10x = 15 - 17 = -2$

$x = \frac{-2}{10}$

$x =$ $\frac{-2}{10}$ .... [3]

5



NOT TO SCALE

The diagram shows a trapezium *ABEF* joined to a square *BCDE*.
ABC is a straight line and $AB = 7$ cm.
$AF : BE = 3 : 2$.
The area of the square is $32\,\text{cm}^2$.

Calculate the area of the trapezium *ABEF*.

$BE^2 = 32$

$BE = \sqrt{32}$

$\frac{AF}{BE} = \frac{3}{2}$

$\Rightarrow AF = \frac{3}{2}\sqrt{32}$

$A_{ABEF} = \frac{1}{2}\left(\frac{3}{2}\sqrt{32} + \sqrt{32}\right) \times 7$

$= 35\sqrt{2}$

.......49.5....... cm^2 [4]

6 Write 0.0473 in standard form.

4.73×10^{-2} .... [1]

7 **(a)** Talia invests \$1500 in a savings account for 4 years.

The account pays simple interest at a rate of $2\frac{1}{6}$% per year.

Calculate the total interest she receives at the end of 4 years.

$1500 \times 2\frac{1}{6} : 100 \times 4$

\$ ....130.......... [2]

(b) Kylian invests \$1500 in a different savings account.
The account pays compound interest at a rate of r% per year.

At the end of 5 years, the value of the investment is \$1825.

Calculate the value of r.

$1825 = 1500\left(1 + \frac{r}{100}\right)^5$

$1 + \frac{r}{100} = \sqrt[5]{\frac{1825}{1500}}$

$\frac{r}{100} = 0.0400$

$r =$ ....4.00.......... [3]

8 **(a)** On a map, the distance between two cities is 7.3 cm.

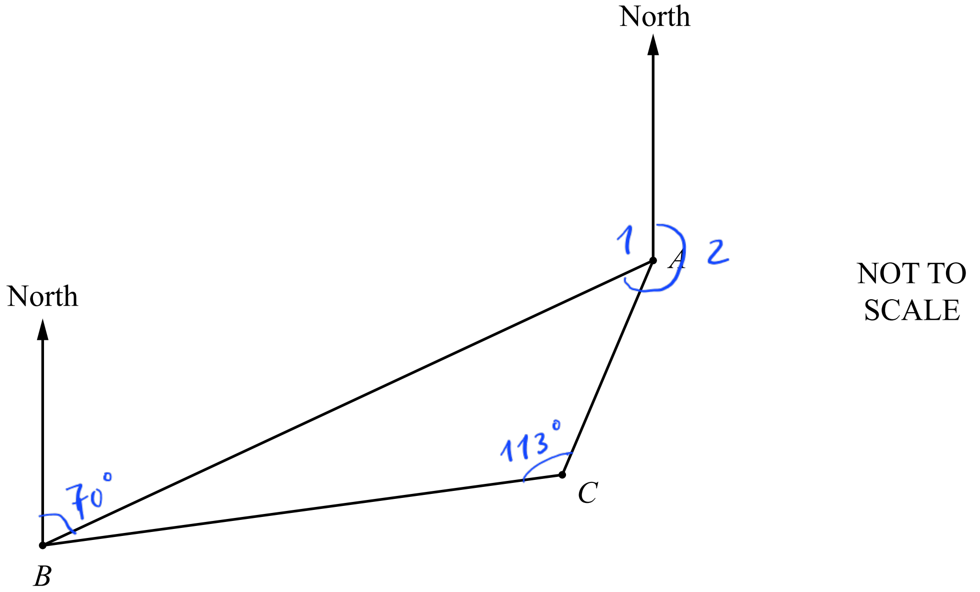
The actual distance between the two cities is 365 km.
The scale of this map is 1 : n. 365 00000

Find the value of n.

$$\frac{7.3}{365\,000\,00} = \frac{1}{5\,000\,000}$$

n = ...5 000 000...................... [2]

(b) The diagram shows the positions of towns A, B and C.
The towns are joined by straight roads.



(i) The bearing of A from B is 070°.

Find the bearing of B from A.

$\hat{A}_1 = 180° - 70° = 110°$

$A_2 = 360° - 110° = 250°$

.....................250°..................... [2]

(ii) The bearing of C from A is 195° and angle BCA = 113°.

Find the bearing of C from B.

$\widehat{BAC} = 250° - 195° = 55°$

$\widehat{ABC} = 180° - 113° - 55° = 12°$

$\text{Bearing}_{C \text{ from } B} = 70° + 12° = 82°$

.....................082°..................... [3]

9 P is the point (4, 10) and Q is the point (–8, 5).

Find the coordinates of the midpoint of PQ.

$$\left(\frac{4+(-8)}{2} , \frac{10+5}{2} \right)$$

(......-2...... , ...7.5......) [2]

10 The test scores of 13 pupils are recorded.

~~21~~ ~~23~~ 23 ~~24~~ ~~26~~ ~~27~~ 34 37 38 40 42 43 48

(a) Find the median.

......................34...................... [1]

(b) Find the interquartile range.

$Q_1 = \frac{23+24}{2} = 23.5$

$Q_3 = \frac{40+42}{2} = 41$

$Q_3 - Q_1 = 41 - 23.5$

......................17.5...................... [2]

11 Line L has equation $y = 6x - 1$.

(a) Find the equation of the line parallel to line L that passes through the point (0, 3).

line t

$m_t = m_L = 6$

$\Rightarrow$ Equation of line t: $y - 3 = 6(x - 0)$

$y - 3 = 6x$...................... [2]

(b) Write down the gradient of a line perpendicular to line L.

$-1 : 6$

......................$-\frac{1}{6}$...................... [1]

12 Find the integer values of x that satisfy the inequality.

$$-1 \leqslant 4 - 2x < 8$$

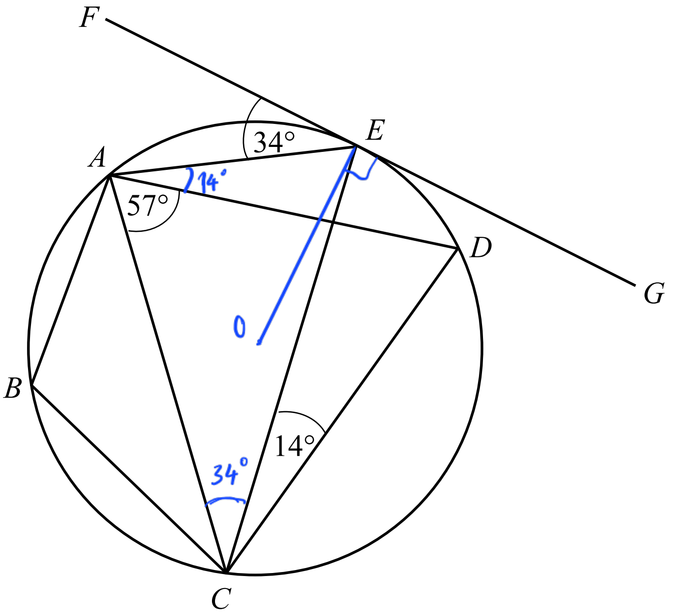
$-1 \leq 4 - 2x$ and $4 - 2x < 8$

$-5 \leq -2x$ and $-2x < 4$

$2.5 \geq x$ and $x > -2$

-1, 0, 1, 2 .... [3]

13



NOT TO SCALE

A, B, C, D and E are points on a circle.
FG is a tangent to the circle at E.

Find

(a) angle EAC

$\widehat{EAD} = \widehat{ECD} = 14°$

$\widehat{EAC} = 14° + 57°$

Angle EAC = ...71°...... [2]

(b) angle ADC

$\widehat{ACE} = \widehat{AEF} = 34°$

$\widehat{ACD} = 34° + 14° = 48°$

$\widehat{ADC} = 180° - 57° - 48°$

Angle ADC = ...75°...... [2]

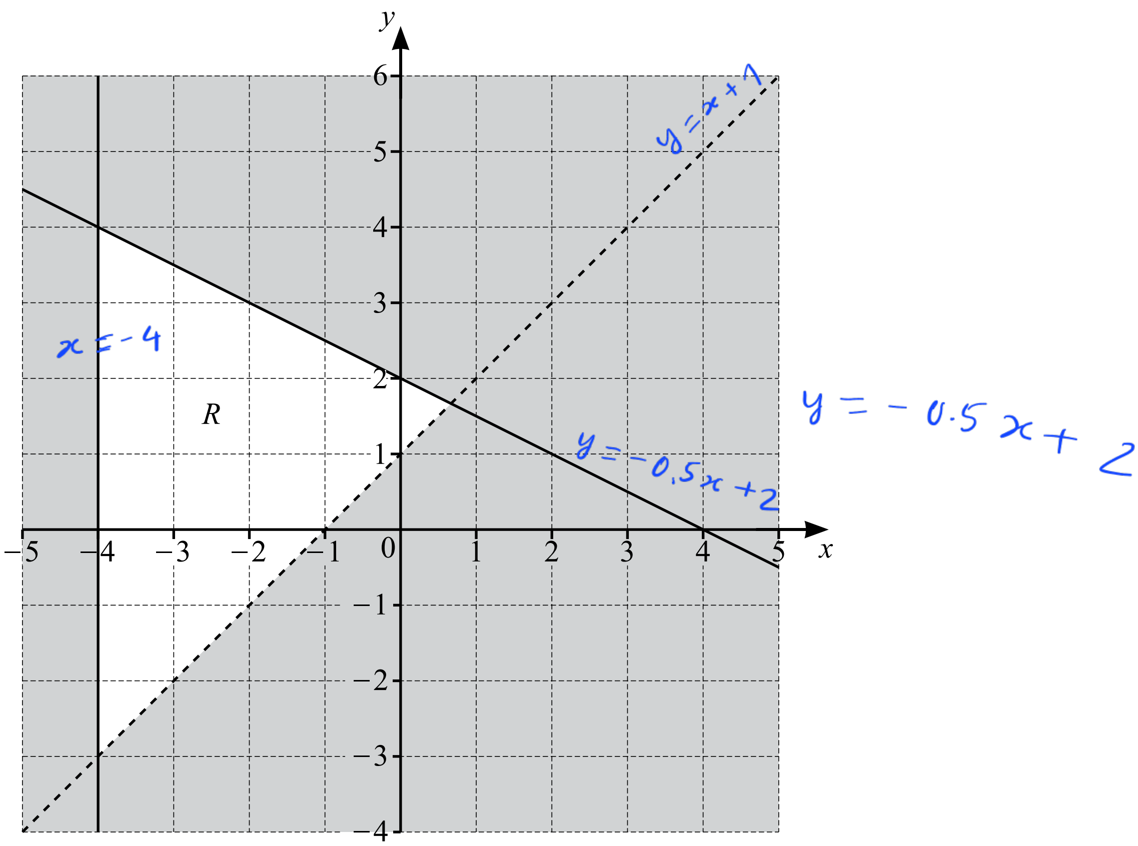
(c) angle ABC.

$\widehat{AEC} = \widehat{ADC} = 75°$

$\widehat{ABC} = 180° - 75° = 95°$

Angle ABC = ...105°...... [1]

14



Find the three inequalities that define the unshaded region, R.

$x \geqslant -4$

$y \leqslant -0.5x + 2$

$y > x + 1$

[4]

15 $f(x) = 2x^2 - 3x$ $g(x) = 7 + 2x$

(a) Find

(i) $g(-8)$

$7 + 2(-8)$

-9 [1]

(ii) $gf(5)$

$f(5) = 2 \times 5^2 - 3 \times 5 = 35$

$g(10) = 7 + 2 \times 35$

77 [2]

(iii) $g^{-1}(x)$.

$\times 2 \rightarrow + 7$

$\div 2 \leftarrow - 7$

$g^{-1}(x) = \frac{x-7}{2}$ [2]

(b) Find $f(x - 6)$.
Give your answer in the form $ax^2 + bx + c$.

$2(x-6)^2 - 3(x-6)$

$2(x^2 - 12x + 36) - 3x + 18$

$2x^2 - 24x + 72 - 3x + 18$

$2x^2 - 27x + 90$

$2x^2 - 27x + 90$ [4]

(c) Use the quadratic formula to solve $f(x) - 6 = 0$.
Show all your working and give your answers correct to 2 decimal places.

$2x^2 - 3x - 6 = 0$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4 \times 2(-6)}}{2 \times 2}$$

$$x = \frac{3 \pm \sqrt{57}}{4}$$

$x = -1.14$ or $x = 2.64$ [3]

16 Tina records the mass of each of 120 apples.
The results are shown in the table.

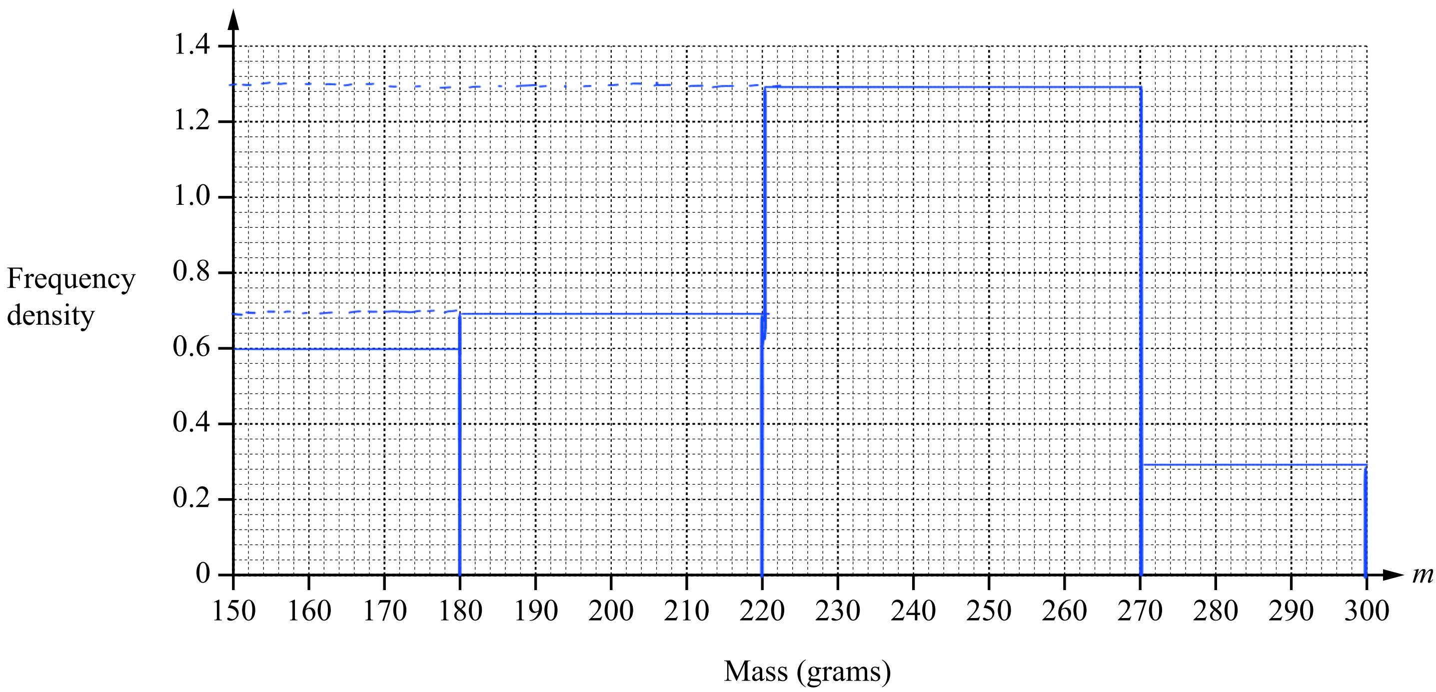
Mid value	165	200	245	285
Mass (m grams)	$150 < m \leqslant 180$	$180 < m \leqslant 220$	$220 < m \leqslant 270$	$270 < m \leqslant 300$
Frequency	18	28	65	9

(a) Calculate an estimate of the mean mass of the apples.

$$\frac{165 \times 18 + 200 \times 28 + 245 \times 65 + 285 \times 9}{120}$$

.......225.5....................... g [4]

(b) Draw a histogram to show the information in the table.



[3]

Class width	30	40	50	30
Freq. density	0.6	0.7	1.3	0.3

(c) **(i)** One of the 120 apples is picked at random.

Find the probability that this apple has a mass of 180 g or less.

$\frac{18}{120}$

$\frac{18}{120}$ .... [1]

(ii) Two apples are picked at random from those with a mass greater than 180 g.

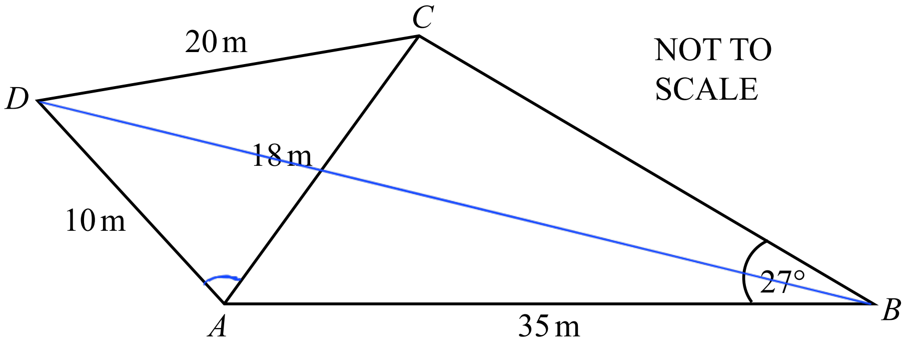
Find the probability that one of these apples has a mass greater than 270 g, and the other apple has a mass of 220 g or less.

There are 102 apples with a mass greater than 180 g

$\left(\frac{9}{102} \times \frac{28}{101}\right) \times 2$

$\frac{24}{1717}$ .... [3]

17



The diagram shows the positions A, B, C and D on a football pitch.

(a) Show that angle $CAD = 86.2°$, correct to 1 decimal place.

$$CD^2 = AD^2 + AC^2 - 2 \cdot AD \cdot AC \cos \widehat{CAD}$$

$$20^2 = 10^2 + 18^2 - 2 \times 10 \times 18 \cos \widehat{CAD}$$

$$\cos \widehat{CAD} = \frac{1}{15}$$

$$\widehat{CAD} \approx 86.2°$$

[4]

(b) Calculate the **obtuse** angle ACB.

$$\frac{35}{\sin \widehat{ACB}} = \frac{18}{\sin 27°}$$

$$\sin \widehat{ACB} = \frac{35 \sin 27°}{18}$$

$$\widehat{ACB}_{acute} \approx 61.977°$$

$$\widehat{ACB}_{obtuse} \approx 118.0°$$

..........118.0°.......... [4]

(c) A player runs directly from *B* to *D* in a time of 5.3 seconds.

Calculate the average speed of the player.

$\widehat{CAB} = 180° - 118.0° - 27° = 35°$

$\widehat{DAB} = 35° + 86.2° = 121.2°$

$BD^2 = AB^2 + AD^2 - 2\,AB.AD\cos\widehat{DAB}$

$BD^2 = 35^2 + 10^2 - 2 \times 35 \times 10\cos 121.2°$

$BD^2 = 1687.619$

$BD \approx 41.081$

$\text{speed} = \dfrac{41.081}{5.3} \approx 7.75$

..........7.75.......... m/s [5]

18 f is inversely proportional to the cube of g.
When $f = 0.5$, $g = 3$.

(a) Find f in terms of g.

$$f = \frac{k}{g^3}$$

$$0.5 = \frac{k}{3^3} \quad \Rightarrow k = 0.5 \times 27 = 13.5$$

$f =$ ...... $\frac{13.5}{g^3}$ ...... [2]

(b) g is increased by 100%.

Find the percentage change in f.

$g_{new} = g_{old} + 100\% \, g_{old} = 2 g_{old}$

g increases 2 times

$\Rightarrow g^3$ increases $2^3 = 8$ times

$\Rightarrow f$ decreases 8 times

$$\frac{f - \frac{1}{8}f}{f} \times 100\% = 87.5\%$$

...... 87.5 ...... % [3]

19 The area of a triangle is $12\,m^2$, correct to the nearest square metre.
The base of the triangle is 5.7 m, correct to the nearest 0.1 m.

Calculate the smallest possible height of the triangle.

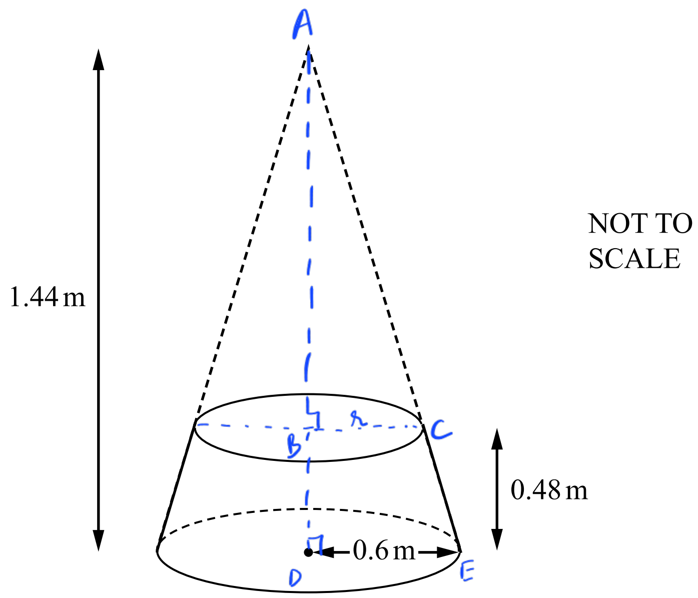
Area $= \frac{1}{2}$ base $\times$ height

$$\text{height (min)} = \frac{2 \text{ area (min)}}{\text{base (max)}}$$

$$= \frac{2 \times (12 - \frac{1}{2})}{5.7 + \frac{0.1}{2}} = 4$$

...... 4 ...... m [3]

20



The diagram shows the frustum of a cone.
The frustum has base radius 0.6 m and vertical height 0.48 m.
The vertical height of the original cone is 1.44 m.

Calculate the total surface area of the frustum.

$\Delta ABC \sim \Delta ADE$

$\frac{AB}{AD} = \frac{BC}{DE}$

$\frac{1.44 - 0.48}{1.44} = \frac{BC}{0.6} \Rightarrow BC = 0.4$

slant height of smaller cone : $\sqrt{0.96^2 + 0.4^2} = 1.04$

slant height of larger cone : $\sqrt{1.44^2 + 0.6^2} = 1.56$

curved surface area of the frustum :

$\pi \times 0.6 \times 1.56 - \pi \times 0.4 \times 1.04 = 0.52\pi$

Total surface area of frustum :

$\pi \times 0.4^2 + \pi \times 0.6^2 + 0.52\pi = 1.04\pi$

.......3.27....... m^2 [6]