868

868TUTORS

TUTORS

Preparation for

High School Mathematics

Measurement III
Solutions

Math

$-$ $\times$
$+$ $\div$
$=$

Instructions and Tips:

- ✓ **You have 75 minutes to complete this worksheet**
- ✓ **This worksheet consists of 12 questions**
- ✓ **Write answers in the spaces provided**
- ✓ **All working must be clearly shown**
- ✓ **Diagrams are not drawn to scale**

Student Name: _____

Student ID: _____

Date: _ _ / _ _ / _ _ _ _

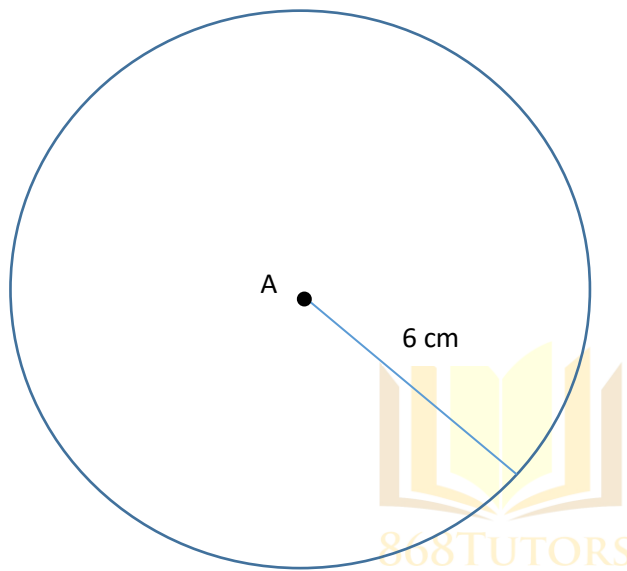**Total Score:**

Highest Score:

Tutor's Comments:

Access more free worksheets at www.868tutors.com

Question 1

Consider the circle below with centre A and a radius of 6 cm:

Use π = 3.14

(Diagram not drawn to scale)

A

6 cm

(a) Calculate the area of the circle.

$A = \pi r^2$

$A = 3.14 \times (6\ cm)^2$

$A = 3.14 \times 36\ cm^2$

Area of the circle = **113.04 cm²**

(2 marks)

(b) Calculate the circumference of the circle.

$C = 2\pi r$

$C = 2 \times 3.14 \times 6\ cm$

Circumference of the circle = **37.68 cm**

(2 marks)

Question 2

Use π = 3.14

(a) Calculate the area of a circle of diameter 5 m.

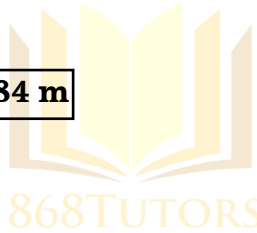$A = \pi r^2$ diameter = 5m   radius = 2.5 m

$A = 3.14 \times (2.5)^2$

$A = 3.14 \times 6.25$

Area of the circle = **19.625 m²**

(2 marks)

(b) Calculate the circumference of a circle of diameter 6 m.

C = 2 πr diameter = 6 m   radius = 3 m

C = 2 × 3.14 × 3 m

Circumference of the circle = **18.84 m**

(2 marks)

(c) A circle has an area of 49 m² . Calculate the diameter of the circle.

$A = \pi r^2$ making r the subject of the formula

$r^2 = \dfrac{A}{\pi}$

$r = \left(\dfrac{A}{\pi}\right)^{0.5}$

$r = \left(\dfrac{49}{3.14}\right)^{0.5}$ $r = 3.950328536\, m$

d = 2r

diameter = 7.90 m (to 2 decimal places)

(2 marks)

Question 3

Consider the rectangle below:

(Diagram not drawn to scale)

5 cm

9 cm

(a) Calculate the perimeter of the rectangle.

Perimeter = $2 \times l + 2 \times w$

Perimeter = 2×9 cm $+ 2 \times 5$ cm

Perimeter = 18 cm + 10 cm

Perimeter = 28 cm

(1 mark)

(b) Calculate the area of the rectangle.

Area = length × width

Area = 9 cm × 5 cm

Area = 45 cm²

(1 mark)

(c) A square has an area of 144m². Determine the length of the side of the square.

$A = s^2$ s = $(A)^{0.5}$ s = $(144)^{0.5}$ **s = 12 m**
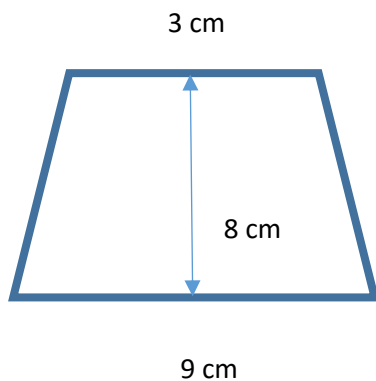
(1 mark)

Question 4

Calculate the area of each trapezium shown:

(Diagrams not drawn to scale)

(a)

5 cm

5 cm

7 cm
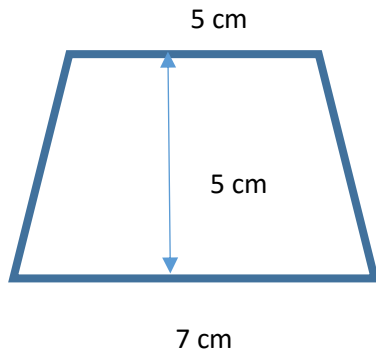
Area of a trapezium = $\frac{1}{2}$ (a + b) × h

Area of trapezium = $\frac{1}{2}$ (5cm + 7cm) × 5cm

Area of trapezium = $\frac{1}{2}$ (12cm) × 5cm

Area of trapezium = 30 cm²

(2 marks)

(b)

3 cm

8 cm

9 cm

Area of a trapezium = $\frac{1}{2}$ (a + b) × h

Area of trapezium = $\frac{1}{2}$ (3 + 9) × 8

Area of trapezium = $\frac{1}{2}$ (3 + 9) × 8

Area of trapezium = $\frac{1}{2}$ (12) × 8

Area of trapezium = 6 × 8

Area of trapezium = 48 cm²

(2 marks)

(c)
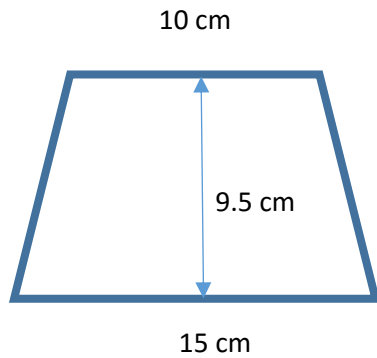
10 cm

9.5 cm

15 cm

Area of a trapezium = $\frac{1}{2}$ (a + b) × h

Area of trapezium = $\frac{1}{2}$ (10cm + 15cm) × 9.5 cm

Area of trapezium = $\frac{1}{2}$ (25cm) × 9.5 cm

Area of trapezium = 12.5cm × 9.5 cm

Area of trapezium = 12.5cm × 9.5 cm

Area of trapezium = 118.75 cm²

(2 marks)

(d)

5.5 m

11.4 cm

6.4 m
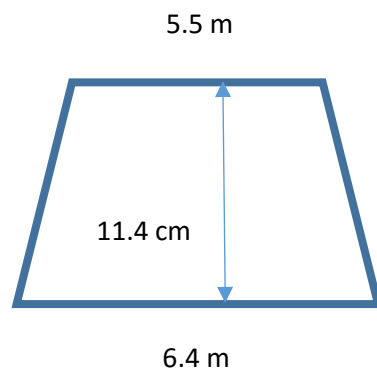
Area of a trapezium = $\frac{1}{2}$ (a + b) × h

Area of trapezium = $\frac{1}{2}$ (5.5 + 6.4) × 11.4

Area of trapezium = $\frac{1}{2}$ (11.9) × 11.4

Area of trapezium = 5.95 × 11.4

Area of trapezium = 67.83 m²

(2 marks)

Question 5

Calculate the area of the triangle with the given dimensions.

(Diagram not drawn to scale)
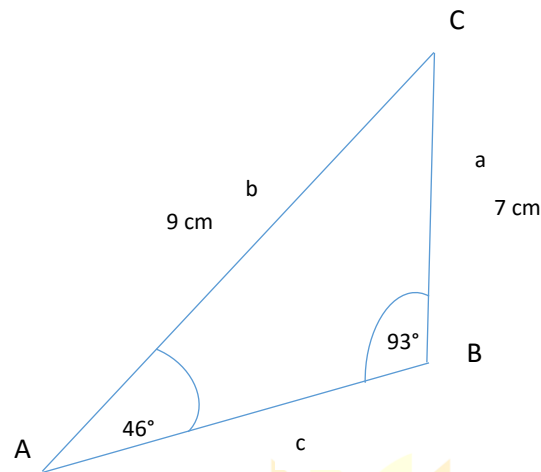
Area of a triangle = $\frac{1}{2}$ ab sin C

C = $180° - (46° + 93°)$ (Internal angles in a triangle sum to $180°$)

C = $41°$

Area of triangle = $\frac{1}{2}$ (7 cm) × (9 cm) sin (41°)

Area of triangle = $\frac{63}{2}$ sin (41°) = 31.5 sin (41°)
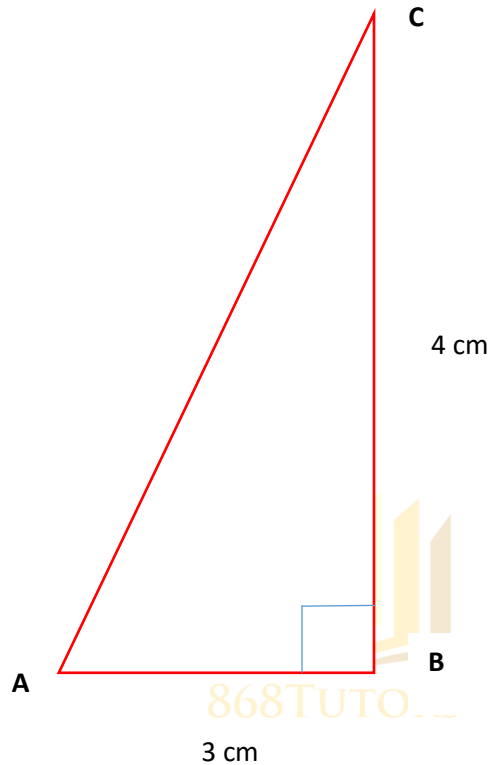
Area of triangle = 20.67 cm² (to 2 decimal places)

(2 marks)

**Question 6**

Calculate the area of the triangle with the given dimensions.

(Diagram not drawn to scale)

C

4 cm

A   B

3 cm

Area of a triangle = $\frac{1}{2}$ (b × h)

Area of triangle = $\frac{1}{2}$ (3cm × 4cm)

Area of triangle = 6 cm²
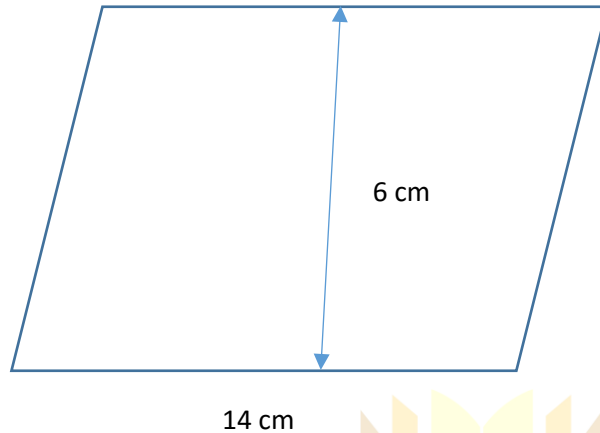
(2 marks)

**Question 7**

Calculate the area of the parallelograms with the given dimensions:

(Diagrams not drawn to scale)
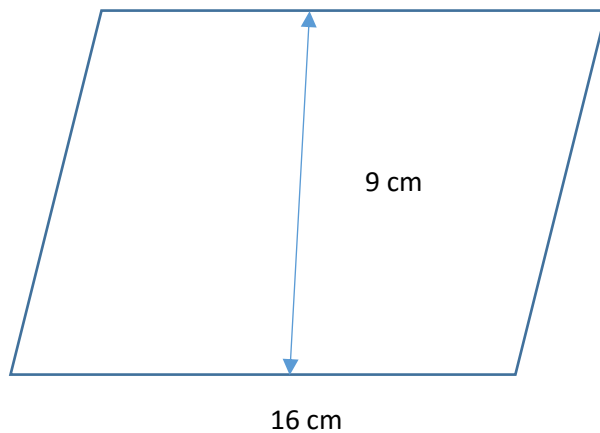
(a)

6 cm

14 cm

Area of parallelogram = b × h = 14 cm × 6 cm

Area of parrallelogram = 84 cm²

(2 marks)

(b)

9 cm

16 cm

Area of parallelogram = b × h = 16 cm× 9 cm

Area of parallelogram = 144 cm²
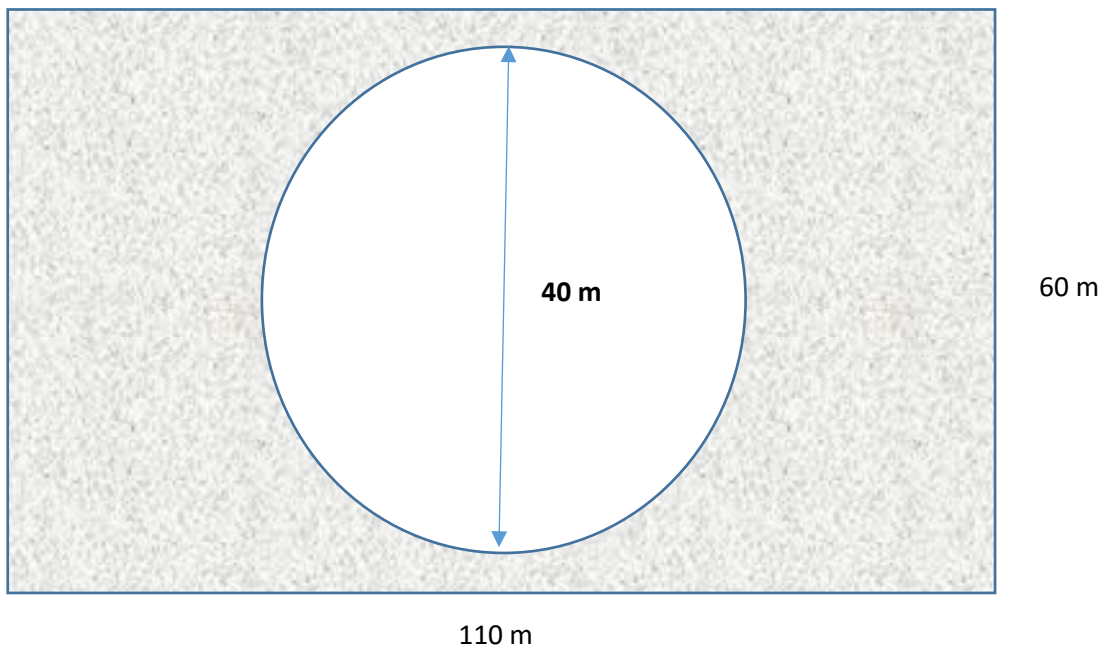
(2 marks)

Question 8

Consider a circle inside of a rectangle. The circle has a diameter of 40 m.

Use π = 3.14

(Diagram not drawn to scale)

40 m

60 m

110 m

Calculate the area of the shaded region.

Area of the shaded region = Area of the rectangle − Area of the circle

Area of the rectangle = b × h = 110 m × 60 m = 6600 m²

Area of the circle = πr^2 radius = 20 m

Area of the circle = 3.14 × $(20)^2$ = 3.14 × 400 = 1256 m²

Area of the shaded region = 6600 m² − 1256 m²

Area of the shaded region = 5344 m²
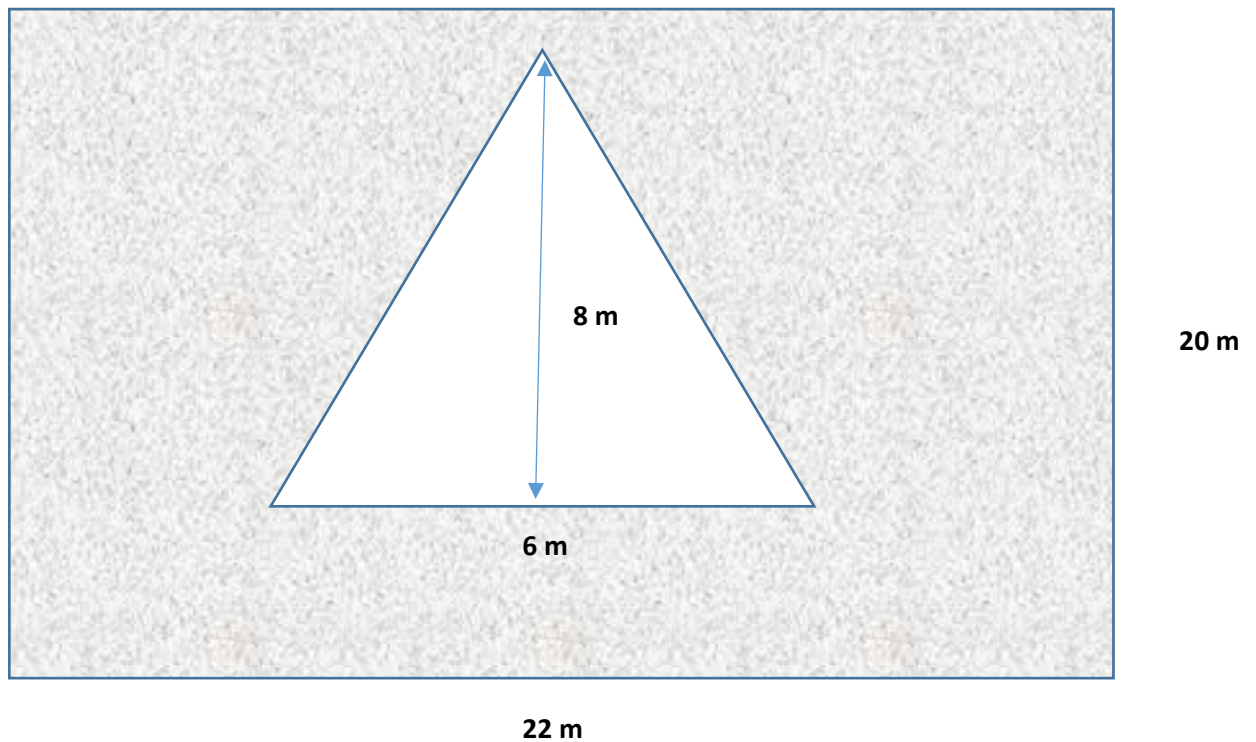
(5 marks)

Question 9

Consider a triangle inside of a rectangle.

The triangle has a base of 6 m and a height of 8 m.

(Diagram not drawn to scale)

8 m

20 m

6 m

22 m

Calculate the area of the shaded region.

Area of the shaded region = Area of the rectangle − Area of the triangle

Area of the rectangle = b × h = 22 m × 20 m = 440 m²

Area of the triangle = $\frac{1}{2}$ (b × h) = $\frac{1}{2}$ (6 × 8) = 24 m²
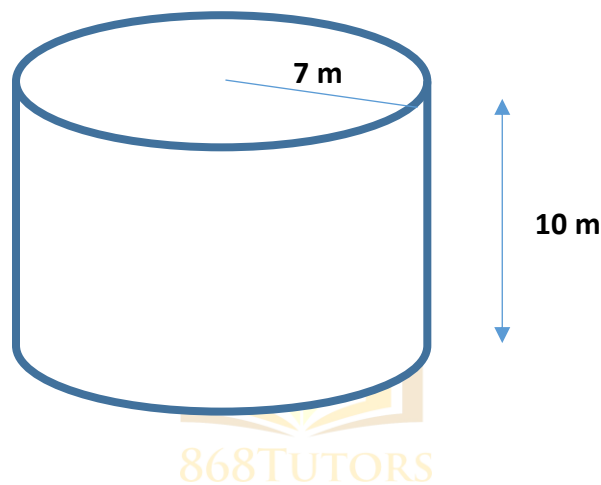
Area of the shaded region = 440 m² - 24 m² = 416 m²

(5 marks)

Question 10

Consider the cylindrically shaped tank below. The radius of the circle that forms part of the tank is 7 m. The height of the tank is 10 m.

Use π = 3.14

(Diagram not drawn to scale)

7 m

10 m

868TUTORS

(a)Calculate the volume of the tank.

Volume of a cylindrical tank = $\pi r^2 h$

Volume of the tank = (3.14) × (7)² × 10 m

Volume of the tank = (3.14) × 49 × 10 m

Volume of the tank = 1538.6 m³
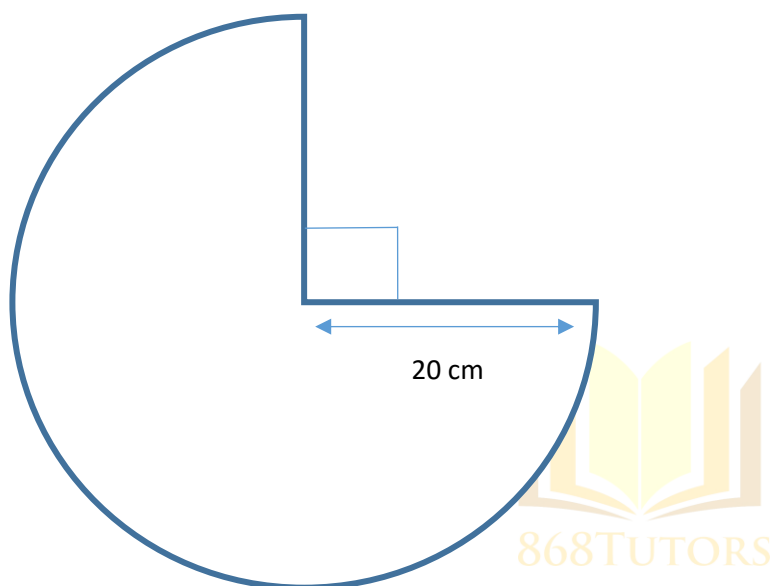
(5 marks)

Question 11

Consider the major circle sector with a sector angle of $270°$ and a radius of 20 cm.

Use π = 3.14

(Diagram not drawn to scale)

20 cm

(a) Calculate the area of the major sector.

Area of a circle = πr^2

Area of the major sector = $\frac{270°}{360°} \times \pi r^2$

Area of the major sector = $\frac{3}{4} \times \pi r^2$ = 0.75 × (3.14) × (20) ^{2}

Area of the major sector = 0.75 × (3.14) × 400 = $\boxed{942 \text{ cm}^2}$

(2 marks)

(b) Calculate the perimeter of the major sector.

Perimeter of the major sector = 20 cm + 20 cm + $\frac{3}{4}$ (2 πr)

Perimeter of the major sector = 40 cm + $\frac{3}{4}$ (2 × 3.14 × 20 cm) = $\boxed{134.2 \text{ cm}}$

(2 marks)

Question 12

Use π = 3.14

(a) Calculate the volume of a pyramid with a base of 20 m² and a height of 5 m.

Volume of a pyramid = Area of base × height

Volume of pyramid = 20 m² × 5 m

Volume of pyramid = 100 m³

(2 marks)

(b) Calculate the volume of a sphere that has a radius of 200 m.

$Volume\ of\ a\ sphere = \frac{4}{3}\pi r^3$ radius = 200m

Volume of sphere = $\frac{4}{3} \times 3.14 \times (200)^3$ = $\frac{4}{3} \times 3.14 \times 8{,}000{,}000$

Volume of sphere = 33,493,333.33 m³

(3 marks)

(c) Calculate the radius of a sphere that has a volume of 300 m³.

$Volume\ of\ a\ sphere = \frac{4}{3}\pi r^3$, making r the subject of the formula

$r = \left(\frac{0.75\ V}{\pi}\right)^{\frac{1}{3}}$ $r = \left(\frac{0.75\ \times\ 300}{\pi}\right)^{\frac{1}{3}}$

$r = \left(\frac{225}{3.14}\right)^{\frac{1}{3}}$

$r = 4.15\ \mathbf{m}$ **(to 2 decimal places)**

(3 marks)

(d) Calculate the surface area of a sphere that has a radius of 20 m.

A (Surface area of a sphere) = $4\pi r^2$ radius = 20m

A = 4 × 3.14 × $(20)^2$ = **5,024 m²**

(2 marks)

(e) A cone has a diameter of 30 cm and a vertical height of 64 cm. Calculate the volume of the cone.

V (Volume of a cone) = $\frac{\pi h r^2}{3}$ diameter = 30 cm, radius = 15 cm

$$V = \frac{3.14 \times 64cm \times (15)^2}{3}$$

$\boxed{\textbf{V= 15,072 cm}^3}$

(2 marks)

(f) A cone has a volume of 320 cm³. The cone has a height of 40 cm. Calculate the radius of the cone.

V (Volume of a cone) = $\frac{\pi h r^2}{3}$

Making r the subject of the formula

$3v = \pi h r^2$

$r = \left(\frac{3V}{\pi \times h}\right)^{\frac{1}{2}}$ $r = \left(\frac{3 \times 320}{3.14 \times 40}\right)^{\frac{1}{2}}$ $r = \left(\frac{960}{125.6}\right)^{\frac{1}{2}}$ $\boxed{\textbf{radius = 2.76 cm (to 2 decimal places)}}$

(2 marks)

END OF WORKSHEET