

Unit 6 & 7 – Missing Measures & Probability
Practice Test - Version B

PART 1: MULTIPLE CHOICE (EACH QUESTION IS WORTH 4 MARKS)

- 1 The ratio of the volumes of two similar solids is 216. What is the ratio of their areas?

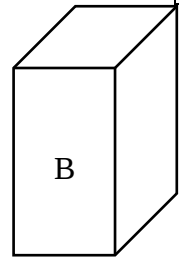
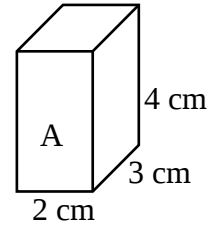
4 | 0

- A) 6
 B) 36
 C) 72
 D) 108

- 2 Both prisms A and B shown below are similar. If prism B has a total area equal to 117 cm^2 , what is its volume?

4 | 0

- A) 36 cm^3
 B) 54 cm^3
 C) 60 cm^3
 D) 81 cm^3



- 3 Two similar cones have a radius equal to 18 cm and 15 cm respectively. If the lateral area of the large cone is 180 cm^2 , what is the lateral area of the small cone?

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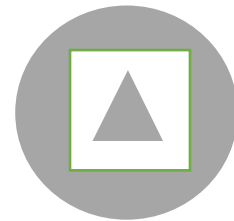
- A) 216 cm^2
 B) 259 cm^2
 C) 125 cm^2
 D) 150 cm^2

- 4 A game of chance involves throwing a dart at a circular target on which a triangle and a square are drawn. If the dart lands in a shaded area, the player will win a prize.

4 | 0

Which expression below must be used to calculate the probability of winning a prize in this game?

- A) $\frac{\text{Area of the circle} - \text{Area of the square} + \text{Area of the triangle}}{\text{Area of the circle}}$
 B) $\frac{\text{Area of the circle} - \text{Area of the triangle} + \text{Area of the square}}{\text{Area of the circle}}$
 C) $\frac{\text{Area of the circle} + \text{Area of the triangle}}{\text{Area of the circle}}$
 D) $1 - \frac{\text{Area of the square}}{\text{Area of the circle}}$



- 5 A cube has a total surface area of 541.5 cm^2 . What is the volume of the cube?

4 | 0

- A) $857,375 \text{ cm}^3$
 B) $90,25 \text{ cm}^3$
 C) $28,5 \text{ cm}^3$
 D) $\approx 58,34 \text{ cm}^3$

- 6 A cone and a cylinder have the same volume. The height and the radius of the cylinder measure respectively 8 cm and 3 cm.

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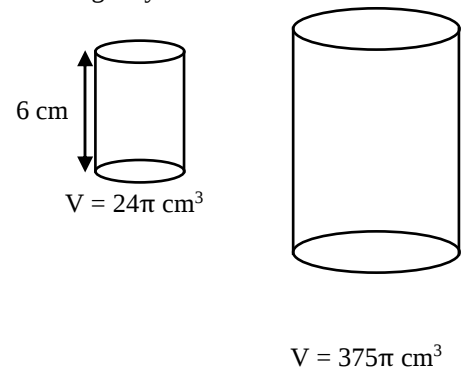
What is the height of the cone if its radius measures 2 cm?

- A) 18 cm
 B) 20 cm
 C) 27 cm
 D) 54 cm

PART 2: SHORT ANSWERS (EACH QUESTION IS WORTH 4 MARKS)

- 7 Two cylinders are similar. The smaller cylinder has a volume equal to $24\pi \text{ cm}^3$ and the larger cylinder has a volume equal to $375\pi \text{ cm}^3$.
If the height of the smaller cylinder is equal to 6 cm, determine the lateral area of the larger cylinder.

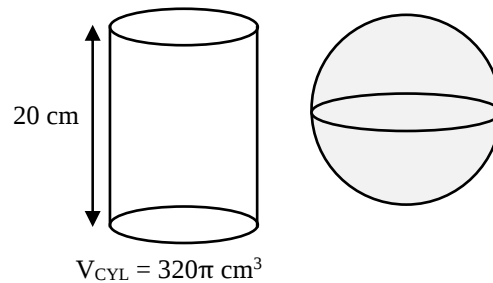
4 | 0



The lateral area of the larger cylinder is equal to _____ cm^2 .

- 8 The cylinder and the sphere, shown below, have the same radius. Determine, rounded to the nearest unit, the volume of the sphere if the volume of the cylinder is $320\pi \text{ cm}^3$ and its height is 20 cm.

4 | 0

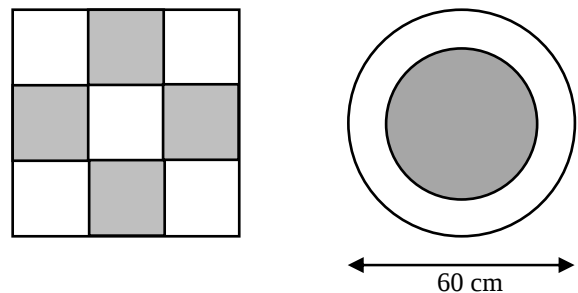


The volume of the sphere is _____ cm^3 .

- 9 A game of darts includes a square target and a circular target. The square target is divided into 9 congruent squares, of which 4 are shaded. The circular target, with a diameter of 60 cm, is composed of two concentric disks. The inside disk is shaded.

4 | 0

What is the radius of the shaded disk if the probability of reaching the shaded region is the same for both targets?

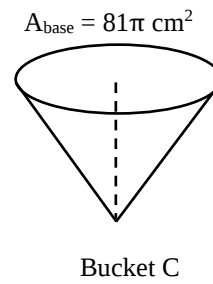
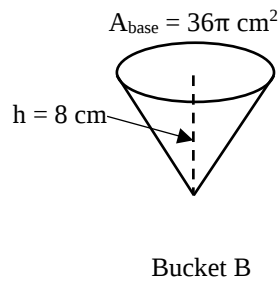
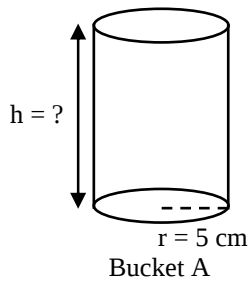


The radius of the shaded disk is equal to _____ cm.

PART 3: EXTENDED ANSWERS (EACH QUESTION IS WORTH 10 MARKS)

10	9	8	7	6	5	4	3	2	1	0
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- 10 Alex has 3 buckets to play on the sand at the beach; one in the form of a cylinder and the other two in the form of similar cones as shown below (figures are not to scale).



Alex fills the cylindrical bucket (A) at full capacity with sand. With this sand, he is able to fill the 2 conical buckets (B and C) to full capacity and exactly.

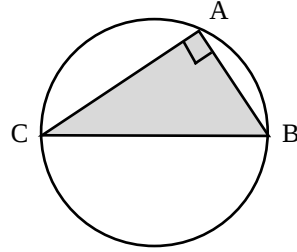
If the radius of the cylindrical bucket (A) is 5 cm, what is the height of this bucket?

Show all your work.

The height of the cylindrical bucket (A) is _____ cm.

10	9	8	7	6	5	4	3	2	1	0
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- 11 A right triangle ABC is inscribed in a circular target, as show below. Side BC, measuring 20 cm, is a diameter of the target and side AB measures 12 cm.



The game of darts involves throwing a dart at the target. A player wins this game if the dart hits the shaded region bounded by triangle ABC.

What is the probability of winning?

Show all your work.

The probability of winning is _____%

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- 1 B 2 D 3 C 4 A 5 A 6 D

- 7 The lateral area of the larger cylinder is equal to $150\pi \text{ cm}^2$.
- 8 The volume of the sphere is $\approx 268 \text{ cm}^3$ (≈ 268.0826).
- 9 The radius of the shaded disk is equal to 20 cm.
- 10 Similarity ratio between the conical buckets:

$$k^2 = \frac{\text{Area of base cone C}}{\text{Area of base cone B}} = \frac{81\pi}{36\pi} = 2.25$$

$$k = \sqrt{2.25} = 1.5$$

Dimensions of bucket C are 1.5 times larger than those of bucket B.

Volume of bucket B:

$$V_{\text{cone B}} = \frac{A_{\text{base}} \cdot h}{3}$$

$$V_{\text{cone B}} = \frac{36\pi(8)}{3}$$

$$V_{\text{cone B}} = 96\pi \text{ cm}^3$$

Volume of bucket C:

$$V_{\text{cone C}} = V_{\text{cone B}} \cdot k^3$$

$$V_{\text{cone C}} = V_{\text{cone B}} \cdot k^3$$

$$V_{\text{cone C}} = 96\pi \cdot 1.5^3$$

$$V_{\text{cone C}} = 324\pi$$

Volume of bucket A:

$$V_{\text{cylinder A}} = V_{\text{cone B}} + V_{\text{cone C}}$$

$$V_{\text{cylinder A}} = 96\pi + 324\pi$$

$$V_{\text{cylinder A}} = 420\pi$$

Height of bucket A:

$$V_{\text{cylinder A}} = \pi r^2 h$$

$$420\pi = \pi(5^2)(h)$$

$$\frac{420\pi}{25\pi} \approx \frac{\pi(25)(h)}{25\pi}$$

$$16.8 \text{ cm} = h$$

Answer: The height of the cylindrical bucket (A) is 16.8 cm.

- 11 **Probability of winning at the game of darts:**

Measure of side AC (a leg, using the Pythagorean Theorem):

$$a = \sqrt{c^2 - b^2}$$

$$m\overline{AC} = \sqrt{m\overline{BC}^2 - m\overline{AB}^2} = \sqrt{20^2 - 12^2} = \sqrt{400 - 144} = \sqrt{256} = 16 \text{ cm}$$

Area of triangle ABC:

$$\text{Area}_{\text{triangle ABC}} = \frac{bxh}{2} = \frac{m\overline{AB} \times m\overline{AC}}{2} = \frac{12 \times 16}{2} = 96 \text{ cm}^2$$

Area of the target (disk):

$$r = \frac{d}{2} = \frac{20}{2} = 10 \text{ cm}$$

$$\text{Area}_{\text{disk}} = \pi r^2 = \pi 10^2 = 100\pi \text{ cm}^2$$

Probability of winning the game of darts:

$$P_{\text{Darts}} = \frac{\text{Area of triangle ABC}}{\text{Area of disk}} = \frac{96}{100\pi} \approx 0.3056 \approx 31\%$$

Answer: the probability of winning is 31%