

# Full Practice Exam — Set 1

Mathematics · Class 10 · Full Syllabus Practice Exam

|                    |                 |                   |                        |
|--------------------|-----------------|-------------------|------------------------|
| TIME<br>60 minutes | QUESTIONS<br>50 | TOTAL MARKS<br>60 | MAX. SCORE<br>___ / 60 |
|--------------------|-----------------|-------------------|------------------------|

Name: \_\_\_\_\_ Class/Sec: \_\_\_\_\_ Date: \_\_\_\_\_

## INSTRUCTIONS

- There are **50 questions** in this paper. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–45 carry **1 mark** each. Questions 46–50 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Use of a calculator is **not** allowed.
- Take  $\pi = 22/7$  wherever it is needed. Rough work may be done in the space at the side of each page.

## Section 1 — Logical Reasoning

Q1–Q10 · 1 mark each

- What comes next in the series? 4, 9, 19, 39, \_\_\_\_  
 (A) 59 (B) 69  
 (C) 79 (D) 89
- What comes next in the series? AZ, BY, CX, \_\_\_\_  
 (A) DW (B) DV  
 (C) EW (D) DX
- If '+' means  $\times$ , ' $\times$ ' means  $-$ , ' $-$ ' means  $\div$  and ' $\div$ ' means  $+$ , then the value of  $16 + 4 \times 3 - 2 \div 8$  is \_\_\_\_\_.  
 (A) 70.5 (B) 64.5  
 (C) 72.5 (D) 78.5
- Find the **odd one out**: 25, 36, 49, 60  
 (A) 25 (B) 36  
 (C) 49 (D) 60
- Complete the analogy:  $3 : 27 :: 4 : \underline{\hspace{1cm}}$   
 (A) 16 (B) 36  
 (C) 64 (D) 81
- A boy walks 6 km east, then 8 km north. How far is he from his starting point?  
 (A) 2 km (B) 48 km  
 (C) 14 km (D) 10 km
- Pointing to a lady, Rahul said, "She is the daughter of my grandfather's only son." How is the lady related to Rahul?  
 (A) Sister (B) Mother  
 (C) Aunt (D) Cousin

8. In a row of 35 children, Priya is 14th from the left. How many children are to her right?
- (A) 20 (B) 21  
(C) 22 (D) 23
9. What is the angle between the hour hand and the minute hand of a clock at 4:20?
- (A)  $0^\circ$  (B)  $30^\circ$   
(C)  $20^\circ$  (D)  $10^\circ$
10. Squares are built in a row from matchsticks, as shown. How many matchsticks are needed for a row of 5 squares?



*Matchstick squares built in a row*

- (A) 13 (B) 16  
(C) 17 (D) 20

## Section 2 — Mathematical Reasoning

Q11–Q28 · 1 mark each

11. The HCF of 18 and 24 is \_\_\_\_\_.  
(A) 2 (B) 6  
(C) 12 (D) 72
12. The LCM of 4, 6 and 8 is \_\_\_\_\_.  
(A) 12 (B) 24  
(C) 48 (D) 192
13. The sum of the zeroes of  $3x^2 - 5x + 2$  is \_\_\_\_\_.  
(A)  $\frac{5}{3}$  (B)  $-\frac{5}{3}$   
(C)  $\frac{2}{3}$  (D) 5
14. The roots of  $x^2 - 7x + 12 = 0$  are \_\_\_\_\_.  
(A) 1 and 12 (B) -3 and -4  
(C) 2 and 6 (D) 3 and 4
15. The equation  $x^2 + 4x + 4 = 0$  has \_\_\_\_\_.  
(A) Two equal real roots (B) Two distinct real roots  
(C) No real roots (D) Three roots
16. The 5th term of the AP 7, 10, 13, ... is \_\_\_\_\_.  
(A) 16 (B) 19  
(C) 22 (D) 25
17. The sum of the first 10 terms of the AP 1, 3, 5, 7, ... is \_\_\_\_\_.  
(A) 55 (B) 81  
(C) 100 (D) 121

18. The distance between the points (2, 3) and (5, 7) is \_\_\_\_\_.  
 (A) 3 units (B) 4 units  
 (C) 5 units (D) 7 units
19. The mid-point of the segment joining (-2, 4) and (6, 8) is \_\_\_\_\_.  
 (A) (-4, 6) (B) (4, 12)  
 (C) (2, 2) (D) (2, 6)
20. The areas of two similar triangles are in the ratio 4 : 9. The ratio of their corresponding sides is \_\_\_\_\_.  
 (A) 2 : 3 (B) 4 : 9  
 (C) 16 : 81 (D) 3 : 2
21. A tangent is drawn from a point P to a circle of radius 8 cm with centre O. If OP = 17 cm, the length of the tangent is \_\_\_\_\_.  
 (A) 9 cm (B) 12 cm  
 (C) 15 cm (D) 25 cm
22. The value of  $\sin 60^\circ$  is \_\_\_\_\_.  
 (A)  $\frac{1}{2}$  (B)  $\sqrt{3}$   
 (C)  $\frac{1}{\sqrt{2}}$  (D)  $\frac{\sqrt{3}}{2}$
23. The value of  $\cos 45^\circ$  is \_\_\_\_\_.  
 (A)  $\frac{1}{\sqrt{2}}$  (B)  $\frac{1}{2}$   
 (C)  $\frac{\sqrt{3}}{2}$  (D) 1
24. The value of  $\tan^2 45^\circ + \sin^2 30^\circ$  is \_\_\_\_\_.  
 (A) 1 (B)  $\frac{3}{2}$   
 (C)  $\frac{5}{4}$  (D) 2
25. The area of a circle whose diameter is 14 cm is \_\_\_\_\_.  
 (A)  $44 \text{ cm}^2$  (B)  $196 \text{ cm}^2$   
 (C)  $616 \text{ cm}^2$  (D)  $154 \text{ cm}^2$
26. The volume of a cone of base radius 7 cm and height 6 cm is \_\_\_\_\_.  
 (A)  $308 \text{ cm}^3$  (B)  $154 \text{ cm}^3$   
 (C)  $462 \text{ cm}^3$  (D)  $924 \text{ cm}^3$
27. The empirical relationship between the mean, the median and the mode is \_\_\_\_\_.  
 (A) Mode = Mean + Median (B) 3 Mean = Mode + 2 Median  
 (C) 3 Median = Mode + 2 Mean (D) Median = Mean + Mode
28. A fair die is thrown once. The probability of getting a prime number is \_\_\_\_\_.  
 (A)  $\frac{1}{6}$  (B)  $\frac{1}{3}$   
 (C)  $\frac{2}{3}$  (D)  $\frac{1}{2}$

29. Two tankers contain 850 litres and 680 litres of petrol. The maximum capacity of a container that can measure the petrol of either tanker an exact number of times is \_\_\_\_\_.  
 (A) 170 litres (B) 85 litres  
 (C) 340 litres (D) 425 litres
30. The length of a rectangular plot is 3 m more than its width, and its area is  $54 \text{ m}^2$ . The width is \_\_\_\_\_.  
 (A) 5 m (B) 6 m  
 (C) 9 m (D) 18 m
31. The shadow of a vertical pole is exactly as long as the pole itself. The angle of elevation of the sun is \_\_\_\_\_.  
 (A)  $30^\circ$  (B)  $60^\circ$   
 (C)  $45^\circ$  (D)  $90^\circ$
32. A woman saves ₹1000 in the first year and increases her yearly saving by ₹300. Her saving in the 8th year is \_\_\_\_\_.  
 (A) ₹2800 (B) ₹3700  
 (C) ₹3400 (D) ₹3100
33. On a map, town A is at (1, 2) and town B at (7, 10), one unit standing for 1 km. The straight-line distance between the towns is \_\_\_\_\_.  
 (A) 10 km (B) 8 km  
 (C) 14 km (D) 16 km
34. A circular garden has radius 21 m. The cost of fencing it at ₹25 per metre is \_\_\_\_\_.  
 (A) ₹1650 (B) ₹3300  
 (C) ₹4125 (D) ₹5250
35. A cylindrical tank has radius 1.4 m and height 5 m. Its capacity, in litres, is \_\_\_\_\_.  
 (A) 3080 litres (B) 15 400 litres  
 (C) 30 800 litres (D) 308 litres
36. The table shows the marks scored by 50 students. The modal class is \_\_\_\_\_.  
 (A) 20–40 (B) 80–100  
 (C) 60–80 (D) 40–60

| Marks              | 0–20 | 20–40 | 40–60 | 60–80 | 80–100 |
|--------------------|------|-------|-------|-------|--------|
| Number of students | 6    | 11    | 18    | 10    | 5      |

Table 1.1 — Marks scored by 50 students

- (A) 20–40 (B) 80–100  
 (C) 60–80 (D) 40–60
37. A box holds 500 bulbs, of which 25 are defective. The probability that a bulb picked at random is **not** defective is \_\_\_\_\_.  
 (A)  $\frac{19}{20}$  (B)  $\frac{1}{20}$   
 (C)  $\frac{1}{25}$  (D)  $\frac{24}{25}$
38. The angle of elevation of the top of a tower from a point  $30\sqrt{3}$  m away from its foot is  $30^\circ$ . The height of the tower is \_\_\_\_\_.  
 (A)  $30\sqrt{3}$  m (B) 30 m  
 (C) 60 m (D) 90 m

39. A floor 8 m long and 6 m wide is to be covered with square tiles of side 40 cm. The number of tiles needed is \_\_\_\_\_.  
 (A) 200 (B) 300  
 (C) 320 (D) 480
40. A car covers 300 km at a uniform speed. Had its speed been 10 km/h more, the journey would have taken 1 hour less. The original speed is \_\_\_\_\_.  
 (A) 40 km/h (B) 60 km/h  
 (C) 50 km/h (D) 75 km/h
41. A girl 1.2 m tall stands 3 m from a lamp post and casts a shadow 2 m long. The height of the lamp post is \_\_\_\_\_.  
 (A) 2.4 m (B) 4.2 m  
 (C) 3.6 m (D) 3 m
42. The minute hand of a clock is 7 cm long. The area it sweeps in 20 minutes is \_\_\_\_\_.  
 (A)  $\frac{154}{3} \text{ cm}^2$  (B)  $154 \text{ cm}^2$   
 (C)  $\frac{77}{3} \text{ cm}^2$  (D)  $44 \text{ cm}^2$
43. A spherical ball has radius 10.5 cm. Its surface area is \_\_\_\_\_.  
 (A)  $346.5 \text{ cm}^2$  (B)  $1386 \text{ cm}^2$   
 (C)  $693 \text{ cm}^2$  (D)  $4851 \text{ cm}^2$
44. The mean of the first five multiples of 4 is \_\_\_\_\_.  
 (A) 10 (B) 12  
 (C) 14 (D) 20
45. A number is chosen at random from 1 to 25. The probability that it is a multiple of 5 is \_\_\_\_\_.  
 (A)  $\frac{1}{25}$  (B)  $\frac{1}{4}$   
 (C)  $\frac{1}{5}$  (D)  $\frac{5}{24}$

### Achievers Section

Q46–Q50 · 3 marks each

46. For two numbers a and b,  $\text{HCF}(a, b) = 9$  and  $\text{LCM}(a, b) = 90$ . If  $a = 18$ , then  $b =$  \_\_\_\_\_.  
 (A) 27 (B) 36  
 (C) 45 (D) 54
47. The value of  $(1 + \tan^2 A)(1 - \sin A)(1 + \sin A)$  is \_\_\_\_\_.  
 (A) 0 (B)  $\sec^2 A$   
 (C)  $\sin^2 A$  (D) 1
48. A quadrilateral ABCD is drawn so that all four of its sides touch a circle. If  $AB = 6 \text{ cm}$ ,  $BC = 7 \text{ cm}$  and  $CD = 4 \text{ cm}$ , then  $AD =$  \_\_\_\_\_.  
 (A) 3 cm (B) 4 cm  
 (C) 5 cm (D) 9 cm

49. A toy is made of a cone mounted on a hemisphere, both of radius 3.5 cm. If the total height of the toy is 15.5 cm, its volume is \_\_\_\_\_.

(A)  $154 \text{ cm}^3$

(B)  $243.83 \text{ cm}^3$

(C)  $89.83 \text{ cm}^3$

(D)  $308 \text{ cm}^3$

50. Consider the three statements below.

(i) The sum of the first  $n$  odd natural numbers is  $n^2$ .

(ii) Every quadratic equation has at least one real root.

(iii) The tangents drawn at the two ends of a diameter of a circle are parallel.

Which of them are **true**?

(A) (i) and (ii) only

(B) (i) and (iii) only

(C) (ii) and (iii) only

(D) All three

## Answer Key

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|    |   |    |   |    |   |    |   |    |   |
|----|---|----|---|----|---|----|---|----|---|
| 1  | C | 2  | A | 3  | A | 4  | D | 5  | C |
| 6  | D | 7  | A | 8  | B | 9  | D | 10 | B |
| 11 | B | 12 | B | 13 | A | 14 | D | 15 | A |
| 16 | B | 17 | C | 18 | C | 19 | D | 20 | A |
| 21 | C | 22 | D | 23 | A | 24 | C | 25 | D |
| 26 | A | 27 | C | 28 | D | 29 | A | 30 | B |
| 31 | C | 32 | D | 33 | A | 34 | B | 35 | C |
| 36 | D | 37 | A | 38 | B | 39 | B | 40 | C |
| 41 | D | 42 | A | 43 | B | 44 | B | 45 | C |
| 46 | C | 47 | D | 48 | A | 49 | B | 50 | B |

## Solutions

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**1. Answer: (C)** 79

Each term is double the previous one plus 1:  $4 \times 2 + 1 = 9$ ,  $9 \times 2 + 1 = 19$ ,  $19 \times 2 + 1 = 39$ . So the next term is  $39 \times 2 + 1 = 79$ .

**2. Answer: (A)** DW

The first letters run forwards from A: A, B, C, **D**. The second letters run backwards from Z: Z, Y, X, **W**. So the next pair is **DW**.

**3. Answer: (A)** 70.5

Replacing the symbols gives  $16 \times 4 - 3 \div 2 + 8$ . Applying the usual order of operations:  $64 - 1.5 + 8 = 70.5$ .

**4. Answer: (D)** 60

$25 = 5^2$ ,  $36 = 6^2$  and  $49 = 7^2$  are perfect squares, while **60** is not ( $7^2 = 49$  and  $8^2 = 64$ ).

**5. Answer: (C)** 64

$27 = 3^3$ , so the rule is  $n \rightarrow n^3$ . Hence 4 gives  $4^3 = 64$ .

**6. Answer: (D)** 10 km

The two legs are perpendicular, so the distance is  $\sqrt{6^2 + 8^2} = \sqrt{100} = 10$  km. The 14 km figure is the distance walked, not the displacement.

**7. Answer: (A)** Sister

Rahul's grandfather's only son is Rahul's father. The lady is his father's daughter, which makes her Rahul's **sister**.

**8. Answer: (B)** 21

The 14 children counted from the left include Priya herself, so  $35 - 14 = 21$  children stand to her right.

**9. Answer: (D)**  $10^\circ$

The minute hand at 20 minutes is at  $20 \times 6^\circ = 120^\circ$ . The hour hand has moved past 4 by a third of an hour, so it is at  $(4 \times 30^\circ) + (20 \times 0.5^\circ) = 130^\circ$ . The angle between them is  **$10^\circ$** .

**10. Answer: (B)** 16

Each extra square needs only 3 more sticks, since one side is shared. The counts 4, 7, 10, 13, 16 form an AP with  $d = 3$ , so a row of 5 squares needs **16** matchsticks (the  $n$ -th term is  $3n + 1$ ).

**11. Answer: (B)** 6

Since  $18 = 2 \times 3^2$  and  $24 = 2^3 \times 3$ , the common primes taken to their lowest powers give  $2 \times 3 = 6$ .

**12. Answer: (B)** 24

Taking the highest power of each prime:  $4 = 2^2$ ,  $6 = 2 \times 3$  and  $8 = 2^3$ , so the LCM is  $2^3 \times 3 = 24$ .

**13. Answer: (A)**  $\frac{5}{3}$

The sum of the zeroes is  $-\frac{b}{a} = \frac{5}{3}$ . (The zeroes are 1 and  $\frac{2}{3}$ , whose sum is indeed  $\frac{5}{3}$ .)

**14. Answer: (D)** 3 and 4

Splitting the middle term,  $x^2 - 7x + 12 = (x - 3)(x - 4)$ , so the roots are **3 and 4**.

**15. Answer: (A)** Two equal real roots

The discriminant is  $16 - 16 = 0$ , so the roots are real and equal. Indeed the equation is  $(x + 2)^2 = 0$ , with the repeated root  $-2$ , so it has **two equal real roots**.

**16. Answer: (B)** 19

Here  $a = 7$  and  $d = 3$ , so  $a_5 = 7 + 4(3) = 19$ .

**17. Answer: (C)** 100

With  $a = 1$  and  $d = 2$ ,  $S_{10} = \frac{10}{2} [2 + 9(2)] = 5 \times 20 = 100$ . The sum of the first  $n$  odd numbers is always  $n^2$ .

**18. Answer: (C)** 5 units

Distance =  $\sqrt{((5 - 2)^2 + (7 - 3)^2)} = \sqrt{(9 + 16)} = \sqrt{25} = \mathbf{5 \text{ units}}$ .

**19. Answer: (D)** (2, 6)

Averaging the coordinates:  $(\frac{-2+6}{2}, \frac{4+8}{2}) = \mathbf{(2, 6)}$ .

**20. Answer: (A)** 2 : 3

The area ratio is the square of the side ratio, so the sides are in the ratio  $\sqrt{4} : \sqrt{9} = \mathbf{2 : 3}$ .

**21. Answer: (C)** 15 cm

The tangent is perpendicular to the radius at the point of contact, so its length is  $\sqrt{(17^2 - 8^2)} = \sqrt{(289 - 64)} = \sqrt{225} = \mathbf{15 \text{ cm}}$ .

**22. Answer: (D)**  $\frac{\sqrt{3}}{2}$

From the 30–60–90 triangle, the side opposite 60° is  $\sqrt{3}$  and the hypotenuse 2, so  $\sin 60^\circ = \frac{\sqrt{3}}{2} \approx 0.87$ .

**23. Answer: (A)**  $\frac{1}{\sqrt{2}}$

In an isosceles right triangle with legs 1 and hypotenuse  $\sqrt{2}$ ,  $\cos 45^\circ = \frac{1}{\sqrt{2}} \approx 0.71$ .

**24. Answer: (C)**  $\frac{5}{4}$

$\tan 45^\circ = 1$  and  $\sin 30^\circ = \frac{1}{2}$ , so the expression is  $1^2 + (\frac{1}{2})^2 = 1 + \frac{1}{4} = \frac{5}{4}$ .

**25. Answer: (D)** 154 cm<sup>2</sup>

The radius is 7 cm, so the area is  $\frac{22}{7} \times 7 \times 7 = \mathbf{154 \text{ cm}^2}$ . Using the diameter in place of the radius is the usual error.

**26. Answer: (A)** 308 cm<sup>3</sup>

Volume =  $\frac{1}{3} \pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times 49 \times 6 = \frac{1}{3} \times 22 \times 7 \times 6 = \mathbf{308 \text{ cm}^3}$ .

**27. Answer: (C)** 3 Median = Mode + 2 Mean

For a moderately skewed distribution the three measures satisfy **3 Median = Mode + 2 Mean**, which lets any one of them be estimated from the other two.

**28. Answer: (D)**  $\frac{1}{2}$

The primes among 1 to 6 are 2, 3 and 5 — three of the six equally likely faces — so the probability is  $\frac{3}{6} = \frac{1}{2}$ . Note that 1 is not prime.

**29. Answer: (A)** 170 litres

The container's capacity must divide both amounts exactly and be as large as possible, so it is HCF(850, 680). Since  $850 = 2 \times 5^2 \times 17$  and  $680 = 2^3 \times 5 \times 17$ , the HCF is  $2 \times 5 \times 17 = \mathbf{170 \text{ litres}}$ .

**30. Answer: (B)** 6 m

Let the width be  $x$ , so  $x(x + 3) = 54$ , that is  $x^2 + 3x - 54 = 0$ , which factorises as  $(x - 6)(x + 9) = 0$ . A width cannot be negative, so  $x = \mathbf{6 \text{ m}}$  and the length is 9 m.

**31. Answer: (C)** 45°

If the height and the shadow are equal, then  $\tan \theta = \frac{\text{height}}{\text{shadow}} = 1$ , so  $\theta = \mathbf{45^\circ}$ .

**32. Answer: (D)** ₹3100

The savings form an AP with  $a = 1000$  and  $d = 300$ , so the 8th term is  $1000 + 7(300) = \mathbf{₹3100}$ .

**33. Answer: (A)** 10 km

Distance =  $\sqrt{((7 - 1)^2 + (10 - 2)^2)} = \sqrt{(36 + 64)} = \sqrt{100} = \mathbf{10 \text{ km}}$ .

**34. Answer: (B)** ₹3300

The fence runs along the circumference:  $2 \times \frac{22}{7} \times 21 = 132 \text{ m}$ . At ₹25 per metre the cost is  $132 \times 25 = \mathbf{₹3300}$ .

**35. Answer: (C)** 30 800 litres

Volume =  $\pi r^2 h = \frac{22}{7} \times 1.4 \times 1.4 \times 5 = 30.8 \text{ m}^3$ . Since  $1 \text{ m}^3 = 1000 \text{ litres}$ , the capacity is **30 800 litres**.

**36. Answer: (D)** 40–60

The modal class is the one with the greatest frequency. Here that is **40–60**, with 18 students. The frequencies do add to 50, as they must.

**37. Answer: (A)**  $\frac{19}{20}$

The defective probability is  $\frac{25}{500} = \frac{1}{20}$ , so the probability of a good bulb is  $1 - \frac{1}{20} = \mathbf{\frac{19}{20}}$ .

**38. Answer: (B)** 30 m

Here  $\tan 30^\circ = \frac{h}{30\sqrt{3}}$ , so  $h = 30\sqrt{3} \times \frac{1}{\sqrt{3}} = \mathbf{30 \text{ m}}$ .

**39. Answer: (B)** 300

The floor measures 800 cm by 600 cm, taking  $800 \div 40 = 20$  tiles one way and  $600 \div 40 = 15$  the other. So  $20 \times 15 = \mathbf{300}$  tiles are needed.

**40. Answer: (C)** 50 km/h

Let the speed be  $x$ . Then  $\frac{300}{x} - \frac{300}{x+10} = 1$ , which clears to  $x^2 + 10x - 3000 = 0$ , that is  $(x - 50)(x + 60) = 0$ . Speed cannot be negative, so  $x = \mathbf{50 \text{ km/h}}$ : the journey takes 6 hours against 5 hours at 60 km/h.

**41. Answer: (D)** 3 m

The girl and the lamp post give similar triangles, with the post's shadow reaching  $3 + 2 = 5 \text{ m}$  from its foot. So  $\frac{h}{5} = \frac{1.2}{2}$ , giving  $h = 5 \times 0.6 = \mathbf{3 \text{ m}}$ .

**42. Answer: (A)**  $\frac{154}{3} \text{ cm}^2$

In 20 minutes the hand turns through  $\frac{20}{60}$  of a full circle, that is  $120^\circ$ . The swept area is  $\frac{1}{3} \times \frac{22}{7} \times 7 \times 7 = \frac{154}{3} \text{ cm}^2 \approx 51.3 \text{ cm}^2$ .

**43. Answer: (B)** 1386 cm<sup>2</sup>

Surface area =  $4\pi r^2 = 4 \times \frac{22}{7} \times 10.5 \times 10.5$ . Since  $\frac{22}{7} \times 10.5 = 33$ , this is  $4 \times 33 \times 10.5 = \mathbf{1386 \text{ cm}^2}$ .

**44. Answer: (B)** 12

The multiples are 4, 8, 12, 16 and 20, adding to 60. The mean is  $60 \div 5 = \mathbf{12}$ .

**45. Answer: (C)**  $\frac{1}{5}$

The multiples of 5 up to 25 are 5, 10, 15, 20 and 25 — five numbers out of 25 — so the probability is  $\frac{5}{25} = \mathbf{\frac{1}{5}}$ .

**46. Answer: (C)** 45

Since  $\text{HCF} \times \text{LCM} = a \times b$ , we get  $9 \times 90 = 18 \times b$ , so  $b = \frac{810}{18} = \mathbf{45}$ . Checking,  $\text{HCF}(18, 45) = 9$  and  $\text{LCM}(18, 45) = 90$ .

**47. Answer: (D)** 1

The last two factors give  $1 - \sin^2 A = \cos^2 A$ , and  $1 + \tan^2 A = \sec^2 A = \frac{1}{\cos^2 A}$ . Multiplying,  $\frac{1}{\cos^2 A} \times \cos^2 A = 1$ , whatever the value of A.

**48. Answer: (A)** 3 cm

For a quadrilateral circumscribing a circle, the two pairs of opposite sides have equal sums, because the tangents drawn from each vertex are equal:  $AB + CD = BC + AD$ . So  $6 + 4 = 7 + AD$ , giving  $AD = 3$  cm.

**49. Answer: (B)** 243.83 cm<sup>3</sup>

The hemisphere accounts for 3.5 cm of the height, so the cone's height is  $15.5 - 3.5 = 12$  cm. Hemisphere:  $\frac{2}{3} \times \frac{22}{7} \times 3.5^3 = 89.83$  cm<sup>3</sup>. Cone:  $\frac{1}{3} \times \frac{22}{7} \times 12.25 \times 12 = 154$  cm<sup>3</sup>. The total is  $89.83 + 154 = 243.83$  cm<sup>3</sup>.

**50. Answer: (B)** (i) and (iii) only

Statement (i) is true:  $1 + 3 + 5 + \dots$  to  $n$  terms is  $\frac{n}{2} [2 + (n - 1)2] = n^2$ . Statement (ii) is false, since  $x^2 + 1 = 0$  has no real root. Statement (iii) is true, because both tangents are perpendicular to the same diameter. So **(i) and (iii)** hold.