

# Practice Set 5

A Whole Content Based Test for Class 10th Mathematics Olympiad

1. Which of the following statements is correct?
- $x^4 + 1$  when divided by  $x + 1$  leaves remainder 2
  - $x^4 + 1$  when divided by  $x + 1$  leaves remainder 1
  - $x^4 + 1$  when divided by  $x - 1$  leaves remainder  $-1$
  - $x^4 + 1$  when divided by  $x - 1$  leaves remainder  $-2$

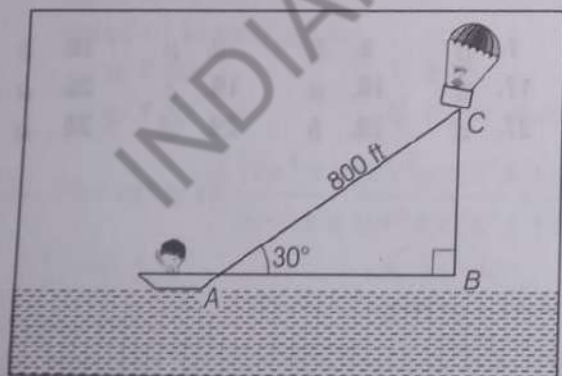
2. The cost of 3 books and 5 notebooks is ₹ 250 and the cost of 4 books and 4 notebooks is ₹ 280. If cost of book is represented by  $x$  and cost of notebook is represented by  $y$ , then which of the following represent the correct equation?

- $3x + 5y = 280, 4x + 4y = 250$
- $3x + 5y = 250, 4x + 4y = 280$
- $4x + 3y = 250, 3x + 4y = 280$
- None of the above

3. A dishonest dealer professes to sell his goods at cost price but uses 750 g for a kg weight. His gain per cent is

- 25%
- 30%
- 40%
- None of these

4. A motorboat is pulling a parasailer. The line to the parasailer is 800 ft long. The angle between the line and the water is about  $30^\circ$ . How high is the parasailer?



- 300 ft
- 350 ft
- $300\sqrt{3}$  ft
- 400 ft

5. If both  $11^2$  and  $3^3$  are factors of the number  $a \times 4^3 \times 6^2 \times 13^{11}$ , then what is the smallest possible value of  $a$ ?

- 121
- 1331
- 363
- 3993

6. A box contains only pens and pencils. There are three times as many pens as pencils. If one writing tool is to be selected at random from the box, what is the probability that the tool is a pen?

- $1/3$
- $1/4$
- $3/4$
- $4/3$

7. If  $P = \frac{x^2 + 4x + 4}{x^2 - 5x + 6}$ ,  $Q = \frac{x^4 - 8x}{x^2 - 3x - 10}$

$$\text{and } R = \frac{(2x^2 + 4x + 8)(2x + 4)}{x^2 - 8x + 15}$$

Then,  $(P \times Q) \div R$  is equal to

- $x^2$
- $2/x$
- $x/4$
- $x^2 + 1$

8. Global Tea Estate began production in 1999, it produced 8000 cartons of tea, it is projected that production will increase by 50 cartons each year. Also, the production cost for first year was ₹ 70 per carton which reduced by ₹ 2 each successive year and the selling price of each carton increases by 10% of the production cost of year 1999.

Find the total production from start when it has just increased production by 30% over the initial figure.

- 450000
- 480000
- 480500
- 450800

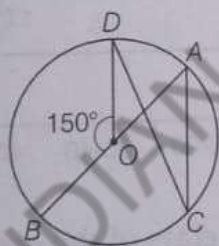
9. The hypotenuse of a right angled triangle is  $(l + 1)$  cm, while the length of one of its sides is  $m$  cm. The length of the other side, if  $l^2 + 2l = m^2 + n^2 + 2n$ , where  $n$  is a natural number, is
- a  $(n + 2)$  cm      b  $(n - 2)$  cm  
 c  $(n + 1)$  cm      d Can't be determined

10. A piggy bank contains ₹ 65 in denomination of two rupees and one rupee coins. If the total number of coins is 50. Then, what is the probability of drawing a one rupee coin from the piggy bank?
- a  $\frac{4}{10}$       b  $\frac{3}{10}$   
 c  $\frac{7}{10}$       d  $\frac{7}{15}$

11. Ages of A and B are in the ratio of 2 : 3 respectively. 6 yr hence, the ratio of their ages will become 8 : 11 respectively. What is B's present age?
- a 18 yr      b 24 yr  
 c 27 yr      d 28 yr

12. The mean of five numbers is 42. If one of the numbers is excluded the mean gets reduced by 1. The excluded number is
- a 42      b 44  
 c 46      d 36

13. In the given figure,  $AOB$  is a diameter of a circle with centre  $O$ . If  $\angle BOD = 150^\circ$ , find  $\angle ACD$ .



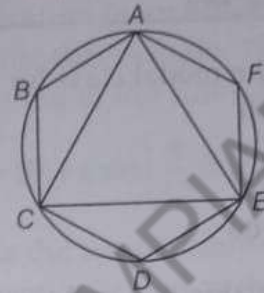
- a  $15^\circ$       b  $60^\circ$   
 c  $30^\circ$       d  $90^\circ$

14. If the area of the triangle with vertices  $(0, -2)$ ,  $(1, y)$  and  $(2, 0)$  is 4 sq units, then the value of  $y$  is
- a -5      b 1  
 c 0      d None of these

15. The sum of three numbers in AP is 21 and the product of their extremes is 48. Then, the numbers are
- a 6, 7 and 8      b 8, 7 and 6  
 c Both (a) and (b)      d None of these

16. If  $x = \operatorname{cosec} \theta + \cot \theta$  and  $y = \operatorname{cosec} \theta - \cot \theta$ , then eliminating  $\theta$  from both, we get the value of  $xy$  is
- a 0  
 b 1  
 c None of the above  
 d Can't be determined

17. In the below figure, if a regular hexagon  $ABCDEF$  is inscribed in a circle. Then, which of the following statements is/are true?

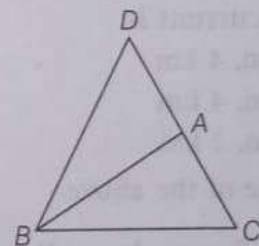


- a  $\triangle ACE$  is an equilateral triangle  
 b  $\triangle AFE$  is an isosceles triangle  
 c Both (a) and (b)  
 d None of the above

18. There are 15 books on a book shelf. Out of these, seven books are on Mathematics, five books are on English and the remaining books are on History. If Ramesh picks a book at random, then what is the probability that the book picked up is either on English or on History?

- a  $\frac{1}{5}$       b  $\frac{5}{7}$       c  $\frac{2}{5}$       d  $\frac{8}{15}$

19. In  $\triangle ABC$ , if  $\angle A = 2\angle B$ , then value of  $BC^2$  is



- a  $AC(AC + AB)$   
 b  $AB(AC + AB)$   
 c  $AC + AB$   
 d  $2(AC + AB)$

20. If the coordinates of the end point of the diameter of a circle with centre  $(-1, 2)$  are  $(5, 9)$ , then what are the coordinates of the other end point of the diameter?
- a  $(-7, -5)$       b  $(-5, -7)$   
 c  $(7, -5)$       d  $(-7, 5)$

21.

Interval	Frequency
0-20	5
20-40	7
40-60	13
60-80	7
80-100	8
100-120	9
120-140	6

What is the modal class for the above data?

- a 20-40
- b 40-60
- c 60-80
- d 80-100

22. For what value of  $a$  will the pair of linear equations  $3x + 4y = 9$  and  $ax + 3y = 7$  be inconsistent?

- a  $a = \frac{7}{3}$
- b  $a = \frac{4}{3}$
- c  $a \neq \frac{7}{3}$
- d  $a \neq \frac{4}{3}$

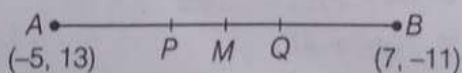
23.  $2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta) + 1$  is equal to

- a 1
- b 2
- c 0
- d 4

24. A person can row 4 km upstream and 12 km downstream in 4 h. If he can row 6 km upstream and 6 km downstream in 4 h. Then, the speed of person in still water and speed of current is

- a 4 km, 4 km
- b 2 km, 4 km
- c 4 km, 2 km
- d None of the above

25. The given figure shows line segment  $AB$ .  $P$  and  $Q$  are points on  $AB$  such that  $AP : PQ : QB = 3 : 4 : 5$ . What are the coordinates of mid-point of line segment  $PQ$ ?



- a  $(-2, 7)$
- b  $(2, -1)$
- c  $(0, 3)$
- d  $(0, -3)$

26. If the point  $(x, y)$  lies on the line joining the points  $(5, 3)$  and  $(-3, -2)$ , then the relation between  $x$  and  $y$  is given by the algebraic relation

- a  $5x - 8y + 1 = 0$
- b  $8x - 5y + 1 = 0$
- c  $5x - 8y - 1 = 0$
- d  $8x - 5y - 1 = 0$

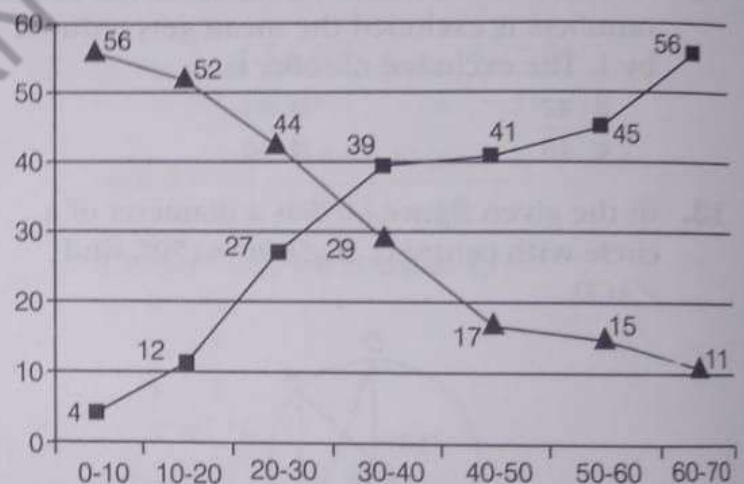
27. The sum of all two-digit numbers divisible by 9 is

- a 625
- b 562
- c 585
- d 475

28. The value of  $\operatorname{cosec}^2 \theta - \left( \frac{2\cos^4 \theta - \cos^2 \theta}{\sin^2 \theta - 2\sin^4 \theta} \right)$

- a 0
- b 1
- c -2
- d -1

**Directions** (Q. Nos. 29-30) Given below are the ogives for some data. On the basis of it, answer the following questions.



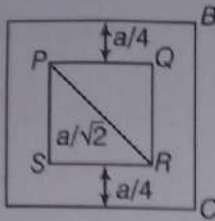
29. The modal class of the given data is

- a 10-20
- b 60-70
- c 20-30
- d 30-40

30. The correct frequency table for the given data is

- a  $f$  4 8 12 15 2 4 11
- b  $f$  4 8 15 12 4 2 11
- c  $f$  4 8 15 12 2 4 11
- d None of the above

31.



Given two squares  $ABCD$  and  $PQRS$  such that  $PQRS$  is inscribed in  $ABCD$ . Then, the area of the above figure  $ABCD$  is

- a  $\frac{a^2}{4}$       b  $a^2$       c  $2a^2$       d  $\frac{a^2}{2}$

32. Let  $x, y$  and  $z$  be distinct integers, where  $x, y$  are odd and positive, and  $z$  is even and positive. Then, which of the following cannot be true?

- a  $(x-z)^2 y$  is odd      b  $(x-y)^2 z$  is even  
 c  $(x-z)^2 y$  is even      d  $(x+y)^2 z$  is odd

33. Choose the correctly marked option. The distance between the centre of two circles when

- a concentric - 0  
 b touch internally -  $|r_1 - r_2|$   
 c touch externally -  $|r_1 + r_2|$   
 d All of the above

34. Each number in the first 200 natural numbers is written on a separate but identical card such that no number is repeated. If one card is picked at random, then what is the probability that the card drawn is a multiple of 2, 4 and 5?

- a  $\frac{1}{100}$       b  $\frac{1}{50}$   
 c  $\frac{1}{20}$       d  $\frac{1}{5}$

35. The temperature in an office is controlled by an electronic thermostat. The temperatures vary according to the sinusoidal function:

$$y = 19 + 6 \sin \left[ \frac{\pi}{12} (x - 11) \right]$$

where,  $y$  is the temperature ( $^{\circ}\text{C}$ ) and  $x$  is the time in hours past mid-night.

What is the temperature in the office at 13 O'clock, when employees come to work?

- a 16  
 b 22  
 c 24  
 d 26

## Answers

- |       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. a  | 2. b  | 3. d  | 4. d  | 5. c  | 6. c  | 7. c  | 8. d  | 9. c  | 10. c |
| 11. c | 12. c | 13. a | 14. a | 15. c | 16. b | 17. c | 18. d | 19. a | 20. a |
| 21. b | 22. c | 23. c | 24. c | 25. c | 26. c | 27. c | 28. b | 29. c | 30. c |
| 31. b | 32. c | 33. d | 34. c | 35. b |       |       |       |       |       |