



CREST Mathematics Olympiad (CMO)

Previous Year Paper

Class 10 (Set - A)

Time Allowed: 1 hour

Maximum Marks: 60

- Additional **10 minutes** will be allotted to fill up information on the OMR Sheet, before the start of the exam.
- Fill in all the mandatory fields clearly on the OMR Sheet.
- There are a total of **50 questions** in this booklet comprising **2 sections** namely
- The **Practical Mathematics & Achievers' Section** consists of **40 questions (1 mark each) & 10 questions (2 marks each)** respectively.
- There is no negative marking. The use of a calculator is not permitted.
- There is **only ONE correct option** to a given question.
- Use **HB Pencil / Ballpoint pen (Blue / Black) only** for marking the correct choice of answers on the OMR Sheet.
- Rough work is to be done in the space provided in the test booklet. Extra plain sheet may be provided by the school for the rough work.
- The OMR Sheet is to be handed over to the invigilator at the end of the exam.
- No candidate is allowed to carry any textual material, printed or written, bits of paper, any electronic device, digital watches, etc. inside the examination hall.
- The use of unfair means may result in the cancellation of the exam. Any such instances must be reported at **+91-98182-94134** or **info@crestolympiads.com**

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

FILL IN THE DETAILS

Candidate Name: _____

Class: _____ Section: _____

CREST ID: _____

Practical Mathematics (Each Question is 1 Mark)

- If m is prime, n is a composite number and $m + n = 240$. Also their L.C.M. is 4199. Find the value of m and n :
 - 13 and 227
 - 17 and 223
 - 19 and 221
 - 23 and 217
- Find the remainder when $1 + x + x^2 + x^3 + \dots + x^{2006}$ is divided by $x - 1$:
 - 2005
 - 2006
 - 2007
 - 2008
- If the second and seventh terms of an arithmetic progression are 2 and 22 respectively, then find the sum of the first 35 terms:
 - 2310
 - 3210
 - 2130
 - 2320
- Find the distance of the perpendicular drawn from the centre of a circle to the chord if the diameter of the circle is 30 cm and its chord is 24 cm:
 - 6 cm
 - 7 cm
 - 9 cm
 - 10 cm
- If θ lies in the first quadrant and $5 \tan \theta = 4$, then find the value of the following:
$$\frac{5 \sin \theta - 3 \cos \theta}{\sin \theta + 2 \cos \theta}$$
 - $\frac{5}{14}$
 - $\frac{3}{14}$
 - $\frac{1}{14}$
 - 0
- If $\sin \theta + \sin^2 \theta = 1$, what is the value of $\cos^2 \theta + \cos^4 \theta$?
 - 0
 - $\sqrt{2}$
 - 1
 - 2
- Which of the following statements are true?
 - If the graph of a polynomial intersects the x -axis at three points, then it contains three zeroes.
 - If the discriminant of a quadratic polynomial, $D > 0$, then the polynomial has two real and equal roots.
 - By division algorithm of polynomials, $p(x) = g(x) + q(x) \times r(x)$
 - only i
 - i and ii
 - ii and iii
 - i and iii
- What is the coefficient of x^5 in the expansion of $(1 + x^2)^5 (1 + x)^4$?
 - 120
 - 30
 - 60
 - 45
- If α, β are the roots of the equation $x^2 + 4x + 3 = 0$, then find the equation whose roots are $2\alpha + \beta$ and $\alpha + 2\beta$:
 - $x^2 - 12x - 33 = 0$
 - $x^2 - 12x + 35 = 0$
 - $x^2 + 12x - 33 = 0$
 - $x^2 + 12x + 35 = 0$
- Three circles of radius a, b, c touch each other externally. The area of the triangle formed by joining their centres is:
 - $\sqrt{[(a + b + c)abc]}$
 - $(a + b + c) \sqrt{[(ab + bc + ca)]}$
 - $ab + bc + ca$
 - $a + b + c$
- The value of the polynomial $x^8 - x^5 + x^2 - x + 1$ is:
 - Positive for all the real numbers
 - Negative for all the real numbers
 - Zero
 - Depends on value of x

12. At present age of a father and his son are in the ratio 7: 3, and they will be in the ratio 2: 1 after 10 years. Then the present age of the father (in years) is:
- a. 42 b. 56
c. 70 d. 77
13. To divide a line segment AB in the ratio 3: 4, we draw a ray AX, so that $\angle BAX$ is an acute angle and then mark the points on ray AX at equal distances such that the minimum number of these points is:
- a. 3 b. 4
c. 7 d. 10
14. The volume of the largest sphere that can be cut from the cylindrical log of wood of a base radius of 1 m and height of 4 m, is:
- a. $16\pi/3 \text{ m}^3$ b. $8\pi/3 \text{ m}^3$
c. $4\pi/3 \text{ m}^3$ d. $10\pi/3 \text{ m}^3$
15. If $m = -19$, $n = 23$, find the value of $\sqrt{(25n^2 + 40mn + 16m^2)}$:
- a. 39 b. 0
c. 16 d. None of these
16. If $a = 1$, find the value of the following: $[15a^3 - (3a^3 - 1) - (4a^4 + a^3 - 3) + (a^3 - 1)]/0$
- a. 11 b. 1
c. 0 d. infinite
17. If A = the sum of the first 21 natural numbers, B = the sum of the squares of the first 9 natural numbers, C = the sum of the first 16 odd natural numbers, and D = the sum of the first 15 even natural numbers, then find the average of A, B, C, and D:
- a. 253 b. 243
c. 273 d. 264
18. All the letters of the word 'EAMCET' are arranged in possible ways. The number of such arrangements in which no two vowels are adjacent to each other is:
- a. 360 b. 144
c. 72 d. 54
19. There are 10 lamps in a hall. Each one of them can be switched on independently. The number of ways in which the hall can be illuminated is:
- a. 10^2 b. 1023
c. 2^{10} d. 1098
20. The area of quadrilateral ABCD whose vertices in order are A(1, 1), B(7, -3), C(12, 2) and D(7, 21) is:
- a. 66 sq units b. 132 sq units
c. 124 sq units d. 86.5 sq units
21. A point P (h, k) lies on the straight line $x + y + 1 = 0$ and is at a distance of 5 units from the origin. If k is negative, then h is equal to:
- a. -3 b. 3
c. -4 d. 4
22. The probability that a man can hit a target is $3/4$. He tries 5 times. The probability that he will hit the target at least three times is:
- a. $\frac{291}{364}$ b. $\frac{371}{464}$
c. $\frac{471}{502}$ d. $\frac{459}{512}$
23. A tower stands at the end of a straight road. The angles of elevation of the top of the tower from two points on the road 500m apart are 45° and 60° respectively. Find the height of the tower:

- a. $500\sqrt{3}/(\sqrt{3} - 1)$ m
- b. $5000\sqrt{3}$ m
- c. $500\sqrt{3}/(\sqrt{3} + 1)$ m
- d. $500\sqrt{3}$ m

24. An electric pole 20 m high stands upright on the ground with the help of steel wire to its top and affixed on the ground. If the steel wire makes 60° with the horizontal ground, find the length of the steel wire:

- a. $20\sqrt{3}$ m
- b. $40\sqrt{3}$ m
- c. $20/\sqrt{3}$ m
- d. $40/\sqrt{3}$ m

25. The length of the diagonal of a rhombus is 80% of the length of the other diagonal. The area of the rhombus is how many times the square of the side of the longer diagonal.

- a. $\frac{4}{5}$
- b. $\frac{2}{5}$
- c. $\frac{3}{4}$
- d. $\frac{1}{4}$

26. 64329 is divided by a certain number. While dividing, the numbers 175, 114 and 213 appear as three successive remainders. The divisor is:

- a. 184
- b. 224
- c. 234
- d. 112

27. It is given that $(2^{32} + 1)$ is exactly divisible by a certain number. Which of the following is also definitely divisible by the same number?

- a. $(2^{16} + 1)$
- b. $(2^{16} - 1)$
- c. 7×2^{33}
- d. $2^{96} + 1$

28. Each boy contributed rupees equal to the number of girls and each girl contributed rupees equal to the number of boys in a class of 60 students. If the total contribution thus collected is \$1600, how many boys are there in the class?

- a. 40 or 20
- b. 30 or 30
- c. 15 or 45
- d. 25 or 35

29. If $a = (\sqrt{3} - \sqrt{2})/(\sqrt{3} + \sqrt{2})$, then the value of $(a + 1/a)$ is equal to:

- a. 4
- b. 6
- c. 9
- d. 10

30. The perimeter of two similar triangles ABC and PQR are 36 cm and 24 cm respectively. If $PQ = 10$ cm, then find AB:

- a. 10
- b. 20
- c. 25
- d. 15

31. Lucy applied for and was hired for a job. She was offered a position with a starting monthly salary of \$8000 and a \$500 annual salary increase. She successfully completed ten years at the firm. What is her current salary after ten years of service?

- a. \$10000
- b. \$10500
- c. \$11500
- d. \$12500

32. Angelina celebrated the project's successful completion with a party. She ordered apple pies for everyone who came to the party. The apple pies are arranged in some fashion on a large tray. There are 23 apple pies in the first row of a tray, 21 in the second, 19 in the third, and so on. In the last row, there are five apple pies. What is the total number of rows in the tray?

- a. 8
- b. 9
- c. 10
- d. 11

33. The point which divides the line segment joining the points $(7, -6)$ and $(3, 4)$ in ratio 1 : 2 internally lies in which of the quadrant?

- a. I Quadrant
- b. II Quadrant
- c. III Quadrant
- d. IV Quadrant

34. Milo and Leh were playing near a beach; Milo was standing at point A(2, -2) and Leh was standing at point B. (-1, x). If the distance between the points A(2, -2) and B(-1, x) is equal to 5, then the value of x is:

- a. 2 b. -2
c. 1 d. -1

35. Alekson, a 6-feet-tall man, discovers that the angle of elevation of a 24-feet-tall pillar and its angle of depression at its base are complementary angles. Alekson is located at the following distance from the pillar:

- a. $4\sqrt{2}$ feet b. $6\sqrt{3}$ feet
c. $9\sqrt{2}$ feet d. $11\sqrt{3}$ feet

36. To draw a pair of tangents to a circle which are inclined to each other at an angle of 60° , it is required to draw tangents at end points of those two radii of the circle, the angle between them should be:

- a. 140° b. 135°
c. 120° d. 100°

37. The length of a tangent from a point A at distance 5 cm from the centre of

circle is 4 cm. The radius of the circle is:

- a. 5 cm b. 4 cm
c. 3 cm d. 2 cm

38. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80° , then $\angle POA$ is equal to:

- a. 40° b. 50°
c. 60° d. 70°

39. If in a frequency distribution, the mean and median are 21 and 22 respectively, then its mode is approximately:

- a. 23.0 b. 24.0
c. 25.4 d. 26.3

40. Nike and his cousins spent their spring vacation driving through 11 states. Gasoline prices vary from state to state. Find the median gasoline price. 42, 54, 12, 89, 56, 75, 29, 13, 20, 11, 34

- a. 20 b. 29
c. 54 d. 34

Achievers' Section (Each Question is 2 Marks)

41. If D(3, -1), E(2, 6) and F(-5, 7) are the midpoints of the sides of $\triangle ABC$, then what is the area of the $\triangle DEF$?:

- a. 96 sq units b. 24 sq units
c. 48 sq units d. 50 sq units

42. The value of $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + \dots + \sin^2 85^\circ + \sin^2 90^\circ$ is:

- a. 7 b. 8
c. 9.5 d. 10

43. If $x^2 = y + z$, $y^2 = z + x$, $z^2 = x + y$, then the value of $1/(x + 1) + 1/(y + 1) + 1/(z + 1)$ is:

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

44. A bag contains four blue shirts, five red shirts and six yellow shirts. Three shirts are drawn randomly. What is the probability that exactly one of them is blue?

- a. $\frac{36}{91}$ b. $\frac{40}{91}$

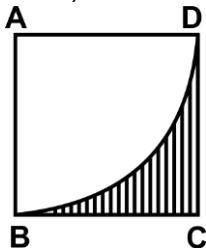
c. $\frac{44}{91}$

d. $\frac{48}{91}$

45. Two trains can run at the speed of 54 km/hr and 36 km/hr respectively on parallel tracks. When they are running in opposite directions, they pass each other in 10 seconds. When they are running in the same direction, a person sitting in the faster train observes that he passes the other train in 30 seconds. Find the lengths of the train:

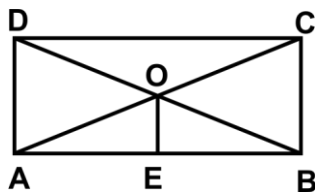
- a. 100 m, 150 m b. 120 m, 140 m
c. 115 m, 125 m d. 125 m, 140 m

46. In the given figure, ABCD is a square of diagonal $14\sqrt{2}$ cm. With A as a centre and AB as radius, the arc BD is drawn. Find the area of the shaded region (in cm^2):



- a. 42 b. 39
c. 45 d. 37

47. In the given rectangle ABCD, the sum of the lengths of two diagonals is equal to 52 cm and E is a point in AB, such OE is perpendicular to AB. Find the lengths of the sides of the rectangle, if $OE = 5$ cm.



- a. 24 cm, 10 cm b. 12 cm, 10 cm
c. 24 cm, 5 cm d. 12 cm, 15 cm

48. Alice and his friends have formed a circle. If the coordinates of one end of a circle's diameter are (2,3) and the coordinates of its centre are (-2,5), then the coordinates of the other end of the diameter are:

- a. (2, 3) b. (5, 3)
c. (-6, 7) d. (-6, 5)

49. Mike's house is near a bridge, and he used to spend quality time there with his books. The bridge, which is in the shape of a straight path across a river, forms a 60° angle with the width of the river. If the bridge is 100 metres long, then the river width is:

- a. 20 m b. 30 m
c. 40 m d. 50 m

50. Assertion:

If mean and median of an asymmetrical distribution are 58 and 61 respectively, then Mode = 67.

Reason:

For an asymmetrical distribution,
Mode = 3 Median - 2 Mean

- a. Assertion and Reason are correct and Reason is correct explanation for Assertion
b. Assertion and Reason are correct but Reason is not correct explanation for Assertion
c. Assertion is true, Reason is false
d. Assertion is false, Reason is true

Answer Key

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