



UNICUS OLYMPIADS

Sample Paper

Class 10

Unicus Non-Routine Mathematics Olympiad



Section	Total Questions	Marks per Questions	Total Questions
Classic Section	10	3	30
Scholar Section	10	6	60
Grand Total	20		90

Classic Section (Each Question is 3 Marks)

1. Three children stand on a coordinate axis. Alex stands at the origin, Bob stands on $(-2,3)$ and Cherry stands on $(6, -9)$. If they join their hands, they form a/an _____.

- a. scalene triangle
b. right-angled triangle
c. equilateral triangle
d. straight line
-

2. Harry and Leo together have some marbles with them which are more than 40 but less than 50. Harry said to Leo, "If you give me a certain number of marbles, I will have eight times as many as you have. Instead if I give you the same number of marbles, I will have twice as many as you have". How many more marbles did Harry have compared to Leo initially?

- a. 15
b. 25
c. 35
d. 30
-

3. Sarah drew a polygon such that the angles of the polygon when arranged in ascending order have a difference of 10° from the previous angle. How many sides does the polygon have, if the smallest angle is 100° ?

- a. 8
b. 9
c. Either 8 or 9
d. 10
-

4. Alexander planned a formation of troops to attack the Philander's army at night. He asked his troops to form a triangle such that the angles of a triangle are in A.P. with a common difference of 30° . What would be the value of $\cos A \cdot \cos B \cdot \cos C$?

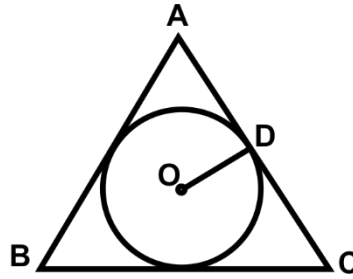
- a. 0
b. $\frac{3}{5}$
c. $\frac{3}{4}$
d. $\frac{1}{2}$
-

5. Bob wants Archie to find if points $(7, 2)$ lie on the line L. He wants to give the least amount of information. Among statements I and II which information, he must provide Tom, for him to solve the question.

- i. L passes through $(5, 6)$
ii. The slope of the line L is $\frac{3}{5}$
- a. Only I
b. Either I or II
c. Both I and II
d. Both I and II are not sufficient
-

Unicus Non-Routine Mathematics Olympiad (UNRMO)

6. Let O be the centre of the inscribed circle of triangle ABC and D be the point on AC with OD perpendicular to AC . If $AB = 10$ cm, $AC = 9$ cm, $BC = 11$ cm, find the value of CD .



- a. 4 cm
b. 4.5 cm
c. 5 cm
d. 5.5 cm
-

7. Paul wants to make a container like a tumbler, the bottom and top should have a radius of 5 cm and 15 cm. If the height of the container has to be 24 cm, find the area of the metal sheet required. (Take $\pi = 3.14$)

- a. 1711.30 cm^2
b. 1812.30 cm^2
c. 1171.30 cm^2
d. 1279.30 cm^2
-

8. Anglia drew a circle of radius 5 cm. She drew two lines from center to the circumference such that they made an angle of 144° at the centre. What is the length of the arc between the lines?

- a. 2π cm
b. 4π cm
c. 5π cm
d. 6π cm
-

9. Curran brothers were solving UNRMO sample papers, and both were stuck while solving a quadratic equation. Sam got the constant term wrong and got the root as 5 and 9. Tom got the coefficient of x wrong and got 12 and 4 as roots. What was the correct equation to be solved?

- a. $x^2 + 48x + 14 = 0$
b. $x^2 + 45x - 14 = 0$
c. $x^2 - 14x + 48 = 0$
d. $x^2 - 16x + 45 = 0$
-

10. Ben and Travis have same two-digit number. Both add the digits of the number. Ben multiplies the number by its sum but Tom multiplies the number written in reverse by its sum. Ben gets 405 and Tom gets 486. Find the value of P , if P is 18 less than the square of the number Ben and Travis had.

- a. 2007
b. 2025
c. 6543
d. 6561
-

Scholar Section (Each Question is 6 Marks)

11. There are a few integers n such that $n^2 + n + 1$ divides $n^{2013} + 61$. Find the sum of the squares of these integers.

- a. 61
b. 62
c. 36
d. 25

12. Trent drew a quadrilateral inside a circle such that all its 4 vertices lie on the circle with $AB = AC$. The line FG is tangent to the circle at point C , and is parallel to BD . If $AB = 6$ cm and $BC = 4$ cm, find the value of $3AE$.

- a. 9 cm
b. 12 cm
c. 13 cm
d. 10 cm

13. There are 3 vases A, B and C. A contains 4 red roses and 3 black roses. Vase B contains 5 red roses and 4 black roses. Vase C contains 4 red roses and 4 black roses. One rose is drawn from each of these vases. What is the probability that the 3 roses drawn consist of 2 red roses and a black rose?

- a. $17/42$
b. $25/42$
c. $19/42$
d. $23/42$

14. Schofield went out on an international tour. In every country, he spent \$2 more than 50% of what he had when he landed in that country. At the end of travelling 3 countries, he had \$150 left with him. What amount did he have initially?

- a. 1128
b. 1028
c. 1084
d. 1228

15. Mrs. Jonas called Lucas to show him a special A.P. series in which if we multiply the 4th term and its next term, we get 456 as a result. If we divide the 9th term by the 4th term, we get the quotient as 11 and leave 10 as the remainder. What is the first term of her series?

- a. - 52
b. - 42
c. - 56
d. - 66

16. From a steamer moving toward a lighthouse at a constant velocity, the angle of elevation of the top of the lighthouse is observed to be 30° . 10 minutes from that instant, the angle of elevation changes to 60° . If the steamer reaches the lighthouse at noon, then find the time at which the first observation was made.

- a. 11:30 AM
b. 11:45 AM
c. 11:15 AM
d. 10:45 AM

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17. Find the value of $(\cos^4 75^\circ + \sin^4 75^\circ + 3 \sin^2 75^\circ \cos^2 75^\circ) / (\cos^6 75^\circ + \sin^6 75^\circ + 4 \sin^2 75^\circ \cos^2 75^\circ)$.
- a. $\sqrt{2}/4$ b. $3/4$
c. $1/2$ d. 1
-
18. Tom gave two similar triangles to Rachel. M is the mid-point of base BC of triangle ABC and N is the mid-point of base QR of triangle PQR. Given that the area of ABC is 100 sq. cm and the other triangle is 144 sq. cm. If AM = 4cm, find the value of PN.
- a. 4.8 cm b. 12 cm
c. 4 cm d. 5.6 cm
-
19. A security officer wants a job at a leading hotel chain of X or Y. There is a chance of 70 % of getting selected at X and a chance of 50% of getting rejected at Y. The probability of at least one of his applications getting rejected is 0.60. What is the probability that he will be selected in one of the hotels?
- a. 0.2 b. 0.4
c. d. 0.7
-
20. Marnus had a ball that had a unique property to bounce $7/8^{\text{th}}$ of the height it had fallen from. If he drops the ball from a height of 420 m, how much distance will the ball cover before it becomes still?
- a. 12.8 km b. 6.3 km
c. 256 km d. 32 km
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Answer Key

1.	d	2.	b	3.	c	4.	a	5.	c	6.	c	7.	a
8.	b	9.	c	10.	a	11.	b	12.	d	13.	a	14.	d
15.	d	16.	b	17.	d	18.	a	19.	c	20.	b		