UNICUS OLYMPIADS

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Sample Paper

Class 7

Unicus Global Mathematics Olympiad (UGMO)

Time: 60 minutes

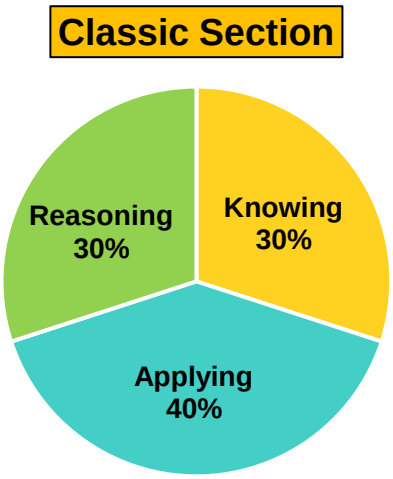
Pattern and Marking Scheme			
Section	**Total Questions**	**Marks per Question**	**Total Marks**
Classic Section	30	1	30
Scholar Section	15	2	30
Grand Total	**45**		60

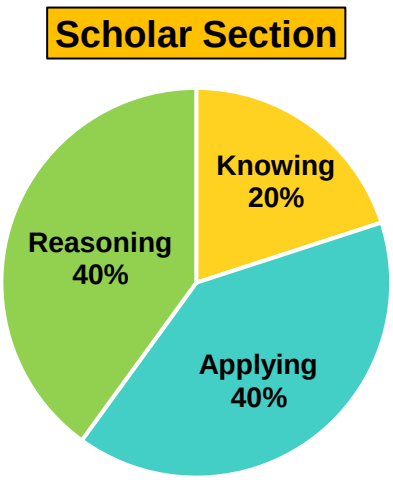
Unicus Global Mathematics Olympiad (UGMO)

The **Unicus Global Olympiad** is organised around two dimensions:

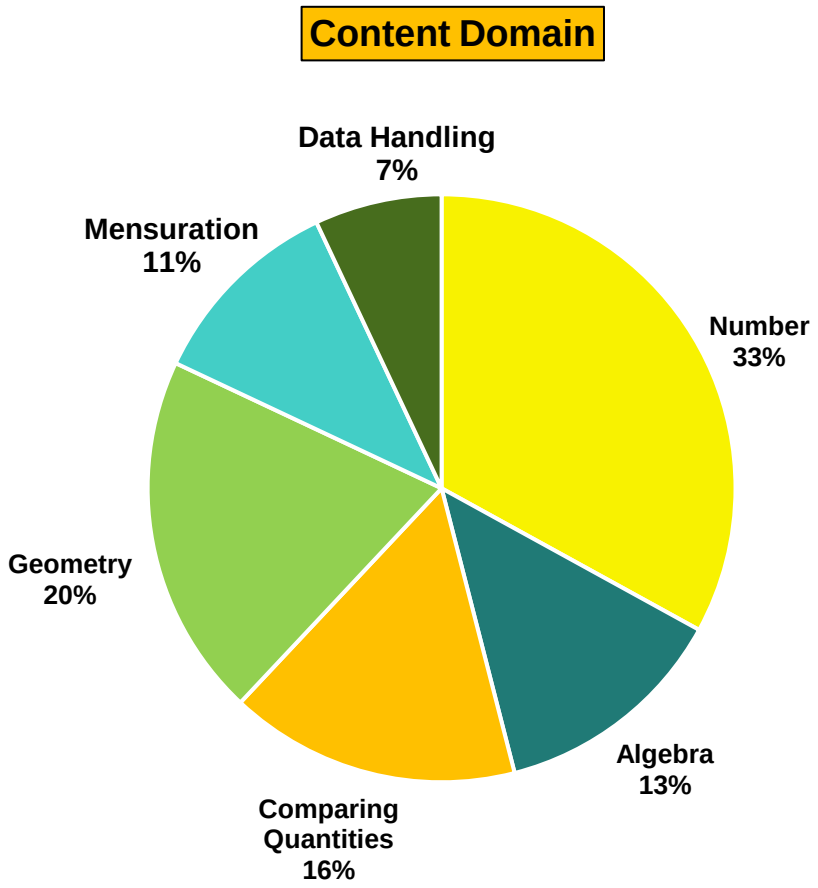
1. Content dimension, specifying the subject matter domains to be assessed
2. Cognitive dimension, specifying the thinking processes to be assessed

Target percentages of the question paper devoted to cognitive domains





Target percentages of the question paper devoted to content domains



For more details, visit https://www.unicusolympiads.com/.

Classic Section (Each Question is 1 Mark)

Cognitive Domain: Applying	Content Domain: Number

1. Simplify:

$$21 + [\{(-48 \div -4) - (-5)\} + \overline{400 \div 10}]$$

a. 78
b. 54
c. 85
d. 90

Cognitive Domain: Applying	Content Domain: Number

2. Divide the sum of (-238), (-456), (214) by the product of (-4) and 10.

a. 10
b. -12
c. 12
d. -10

Cognitive Domain: Knowing	Content Domain: Number

3. Simplify:
(7/12 ÷ 14/6) x (1/16 ÷ 3/8)

a. 3/2
b. 1/24
c. 1/6
d. 1/4

Cognitive Domain: Knowing	Content Domain: Number

4. The distance between two towns is 3½ miles. If you travel 5/8 of this distance, how many miles have you travelled?

a. $2\frac{3}{16}$
b. $2\frac{1}{2}$
c. $2\frac{1}{5}$
d. $2\frac{5}{16}$

Cognitive Domain: Applying	Content Domain: Number

5. If a/b = 3/4 then, find the value of (a + 3)/(b + 4).

a. 3/4
b. 6/18
c. 1/2
d. 9/13

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Cognitive Domain: Reasoning	Content Domain: Number

6. The fluid contained in a bucket can fill four large bottles or seven small bottles. A full large bottle is used to fill an empty, small bottle. What fraction of the fluid is left over in the large bottle when the small one is full?

a. 4/7
b. 2/7
c. 3/7
d. 5/7

Cognitive Domain: Reasoning	Content Domain: Algebra

7. Find the value of pq if $p^3 - q^3 = 68$ and $p - q = -4$.

a. 11
b. -11
c. -12
d. 12

Cognitive Domain: Reasoning	Content Domain: Algebra

8. Samantha is baking cakes and uses x cups of flour for each cake. She also uses 2 cups of sugar for each batch of frosting, which covers 3 cakes. If she makes 6 cakes, how many cups of sugar and flour in total does she use?

a. 3x + 6
b. 3x + 2
c. 9x + 6
d. 6x + 4

Cognitive Domain: Applying	Content Domain: Algebra

9. Solve for x:
$(x + 6)(x - 6) - (x - 5)^2 = 40 - 17(x - 2)$

a. -5
b. 5
c. 10
d. 15

Cognitive Domain: Reasoning	Content Domain: Algebra

10. If 40 is subtracted from two-thirds of a number, the result is equal to the sum of 50 and one-fourth of that number. What is the number?

a. 36
b. 72
c. 216
d. 144

Cognitive Domain: Applying	Content Domain: Number

11. Peter earns $7200 per month. He gave 3/5 of his salary to his son, 5/8 of the remaining to his daughter and the rest to his wife. Find the share of his wife.

a. $2880
b. $1800
c. $1080
d. $4320

Cognitive Domain: Reasoning	Content Domain: Number

12. Imagine you are part of a mathematical treasure hunt where you have to solve various problems to move to the next clue. One of the challenges presents you with a series of fractions, each representing a portion of a key needed to unlock the next part of the puzzle. The fractions are given as follows: If N = 1/2 + 1/6 + 1/12 + 1/30 + ... + 1/156, Your task is to find the value of N to determine how much of the key you have gathered.

a. 12/13
b. 11/13
c. 1/11
d. 1/13

Cognitive Domain: Applying	Content Domain: Number

13. Simplify:

$$\left[\frac{125}{27} \times \left(\frac{9}{25}\right)^3\right] \div \left(\frac{3}{5}\right)^2$$

a. 3/5
b. 9/25
c. 5/3
d. 5/4

Cognitive Domain: Reasoning	Content Domain: Number

14. If $a = x^{1/3} + x^{-1/3}$, find the value of $a^3 - 3a$.

a. 0
b. $x^{-1/3} + x^{1/3}$
c. $x + x^{-1}$
d. 1

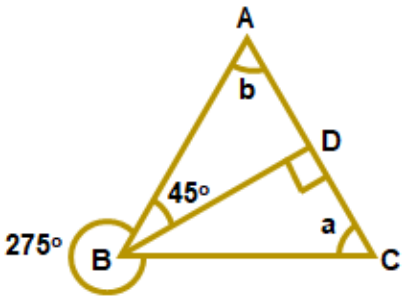
Cognitive Domain: Reasoning	Content Domain: Number

15. There are three places A, B and C in a straight line. If the distance between place A and B is 2.7×10^6 m and the distance between B and C is 5.2×10^5 m, then find the distance between place A and C is a standard form.

a. 322×10^6 km
b. 3.22×10^4 m
c. 3.22×10^6 m
d. 3.22×10^6 km

Cognitive Domain: Knowing	Content Domain: Geometry

16. In the given figure, by how much a is bigger than b?



a. 5°
b. 50°
c. 10°
d. 45°

Cognitive Domain: Knowing	Content Domain: Geometry

17. In a triangle ABC, if ∠A = ∠B + ∠C, then find ∠A.

a. 60°
b. 90°
c. 45°
d. 120°

Cognitive Domain: Knowing	Content Domain: Mensuration

18. The adjacent sides of a parallelogram are 8 m and 5 m. The distance between the longer sides is 6 m. What is the distance between the shorter sides?

a. 9.6 m
b. 8.5 m
c. 9.4 m
d. 6.4 m

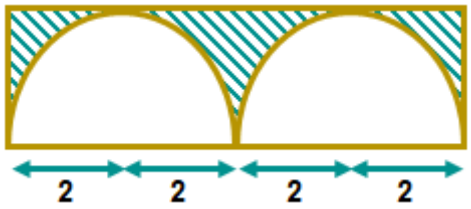
Cognitive Domain: Applying	Content Domain: Mensuration

19. If the perimeter of a right-angled isosceles triangle is $(\sqrt{2} + 1)$ units, then what is the length of the hypotenuse?

a. $\sqrt{2}$ units
b. 1 unit
c. 2 units
d. $\sqrt{2} + 1$ units

Cognitive Domain: Reasoning	Content Domain: Mensuration

20. The figure is formed by two identical semicircles in a rectangle. Find the area of shaded parts. (Take π = 3.14)



a. 3.44 cm^2
b. 32 cm^2
c. 50.4 cm^2
d. 12.56 cm^2

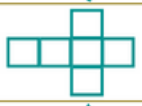
Cognitive Domain: Reasoning	Content Domain: Mensuration

21. A cuboidal water tank contains 96 litres of water. Its depth is 1/3 of its length and its breadth is 1/2 of its depth. What is the length of the tank?

a. 180 cm
b. 120 cm
c. 140 cm
d. 60 cm

Cognitive Domain: Knowing	Content Domain: Geometry

22. Match the following:

	Column I		Column II
i		a	
ii		b	
iii		c	
iii		d	

a. (i) - (a), (ii) - (b), (iii) - (c), (iv) - (d)
b. (i) - (d), (ii) - (a), (iii) - (b), (iv) - (c)
c. (i) - (c), (ii) - (b), (iii) - (a), (iv) - (d)
d. (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)

Cognitive Domain: Applying	Content Domain: Geometry

23. How many faces does the solid have?

a. 7
b. 6
c. 8
d. 9

Cognitive Domain: Applying	Content Domain: Geometry

24. A cone is standing on its base, what would be its top view?

a. square
b. triangle
c. circle
d. rectangle

Cognitive Domain: Knowing	Content Domain: Geometry

25. Which of the following shapes in the options has both line and rotational symmetry?

a. A scalene triangle
b. An arrow pointing right
c. An equilateral triangle
d. A parallelogram

Cognitive Domain: Knowing	Content Domain: Geometry

26. Which of the following shapes does not have rotational symmetry?

a. An equilateral triangle
b. A rectangle
c. A square
d. A scalene triangle

Cognitive Domain: Applying	Content Domain: Geometry

27. A figure is rotated counter-clockwise about a point. If the figure appears unchanged after a rotation of 120°, what is the order of the rotational symmetry?

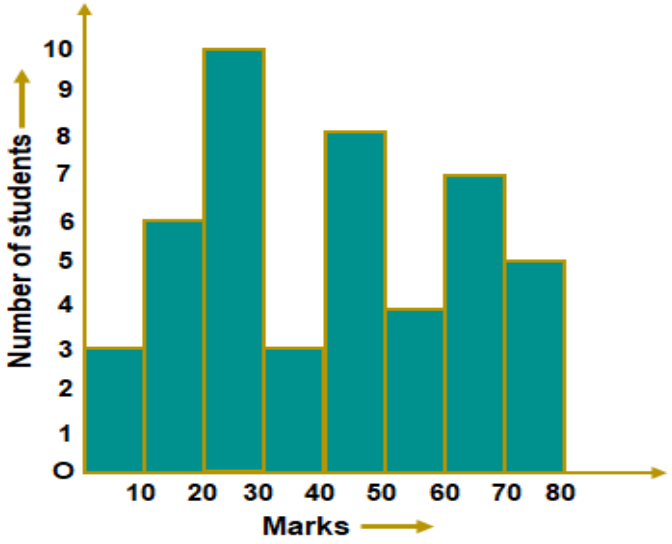
a. 2
b. 3
c. 0
d. 4

Cognitive Domain: Applying	Content Domain: Data Handling

28. A card is drawn at random from a well-shuffled deck of playing cards. Find the probability that the card drawn is neither a jack nor a king.

a. 4/13
b. 11/13
c. 1/13
d. 2/13

Directions (29-30): Read the graph carefully and answer the following questions.
The following histogram depicts the marks obtained by 45 students of a class.



Cognitive Domain: Applying	Content Domain: Data Handling

29. If passing marks are 30, what is the percentage of failures to the total number of students?

a. 40%
b. 42.3%
c. 43.5%
d. 41.3%

Cognitive Domain: Knowing	Content Domain: Data Handling

30. How many students obtained 30 or more marks but less than 40?

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

Scholar Section (Each Question is 2 Marks)

Cognitive Domain: Knowing	Content Domain: Number

31. Olivia makes a profit of $9 for every large basket she sells and loses $4 on every small basket. She cannot make only large baskets as buyers require that she supplies baskets of both sizes. If she gets an order to supply 3600 large baskets and 11,200 small baskets, what is the profit or loss she will be making from this order?

a. Loss of $12,400
b. Profit of $12,400
c. Loss of $6200
d. Profit of $6200

Cognitive Domain: Reasoning	Content Domain: Number

32. A number sequence starts with two integers, 5 and 6. Each subsequent number is calculated as the sum of all previous numbers plus the term that we are finding. What is the 6^{th} number in this sequence?
(Hint: Here, first term is 5, second term is 6 and then for the third term add previous numbers and add 3 to it)

a. 59
b. 119
c. 29
d. 239

Cognitive Domain: Applying	Content Domain: Algebra

33. Find the product.
$(a^2 + b^2)(a^4 + b^4)(a + b)(a - b)$

a. $(a^6 + b^6)$
b. $(a^8 - b^8)$
c. $(a^{16} + b^{16})$
d. $(a^{16} - b^{16})$

Cognitive Domain: Reasoning	Content Domain: Algebra

34. An alloy of silver and gold weighs 90 g in the air and 84 g in liquid. Assuming that silver loses one-tenth of its weight in the liquid and that gold loses one-nineteenth of its weight. Find the weight of each metal in the alloy.

a. 25 g, 65 g
b. 26.68 g, 63.32 g
c. 26.67 g, 63.33 g
d. 45 g, 45 g

Cognitive Domain: Knowing	Content Domain: Number

35. How many pieces of ribbon each measuring $4\frac{1}{5}$ m long can be cut from a roll 168 metres long?

a. 50
b. 40
c. 75
d. 80

Cognitive Domain: Knowing	Content Domain: Number

36. Find the product of these 9 fractions.
(1 - 1/2)(1 - 1/3)(1 - 1/4)…….(1 - 1/10)

a. 9/10
b. 11/10
c. 1/2
d. 1/10

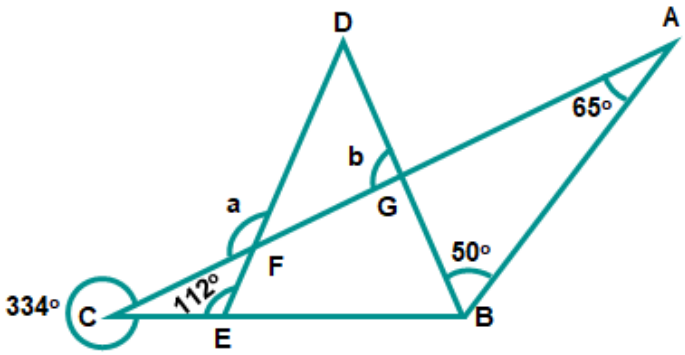
Cognitive Domain: Knowing	Content Domain: Comparing Quantities

37. The Cost price of 21 articles is equal to selling price of 18 articles. Find the gain or loss per cent.

a. 100/6%
b. 166/3%
c. 100/7%
d. 72/7%

Cognitive Domain: Applying	Content Domain: Geometry

38. The given figure shows two overlapping triangles. Find the value of a - b.



a. 73°
b. 138°
c. 65°
d. 48°

Cognitive Domain: Reasoning	Content Domain: Mensuration

39. The height of a rectangular prism is reduced by 50%, and the breadth is increased by 100%, while the length remains unchanged. By what percentage does the volume change?

a. Volume is halved
b. Volume is doubled
c. No change
d. Volume is decreased by 75%

Directions (40-42): Read the passage carefully and answer the given question.

Jack, on his deathbed, keeps half his property for his wife and divides the rest equally among his three sons Ben, Charlie and Dave. Some years later Ben dies leaving half his property to his widow and half to his brothers Charlie and Dave together, shared equally. When Charlie makes his will he keeps half his property for his widow and the rest he bequeaths to his younger brother Dave. When Dave dies some years later, he keeps half his property for his widow and the remaining for his mother. The mother now has $1,575,000

Cognitive Domain: Applying	Content Domain: Comparing Quantities

40. What was the worth of the property?

a. $2,400,000
b. $1,400,000
c. $31,500,000
d. $4,800,000

Cognitive Domain: Reasoning	Content Domain: Comparing Quantities

41. What was Charlie's original share?

a. $1,000,000
b. $500,000
c. $800,000
d. $750,000

Cognitive Domain: Reasoning	Content Domain: Comparing Quantities

42. What was the ratio of the property owned by the widows of the three sons in the end?

a. 7 : 10 : 16
b. 8 : 12 : 15
c. 8 : 10 : 15
d. 9 : 10 : 15

Directions (43-45): Read the passage carefully and answer the given question.

A survey of the magazine reading habits of people living in five cities P, Q, R, S and T is summarised in a table given below. Column I in the table gives the percentage of magazine readers in each city who read only one magazine a week. Column II gives the total number of magazine readers who read two or more magazines a week.

City	I	II
P	75	6000
Q	80	3500
R	60	3000
S	55	2700
T	25	4200

Cognitive Domain: Applying	Content Domain: Comparing Quantities

43. Find the city with the lowest number of magazine readers.

a. P
b. S
c. R
d. T

Cognitive Domain: Reasoning	Content Domain: Comparing Quantities

44. How many magazine readers in City Q read only one magazine a week?

a. 14000
b. 18000
c. 3300
d. 1400

Cognitive Domain: Reasoning	Content Domain: Comparing Quantities

45. Find the total number of all the magazine readers in the five cities who read only one magazine a week.

a. 40000
b. 41200
c. 31200
d. 50000

Answer Key

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