UNICUS OLYMPIADS

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Sample Paper

Class 9
Unicus Mathematics Olympiad (UMO)

Time: 60 minutes

Pattern and Marking Scheme			
Section	**Total Questions**	**Marks per Question**	**Total Marks**
Classic Section	40	1	40
Scholar Section	10	2	20
Grand Total	50		60

Classic Section (Each Question is 1 Mark)

1. The sum of two consecutive natural numbers is 45. Which of the following represents the above statement?

   a. $(x + 1) + (x + 2) = 45$

   b. $(x) + (x + 1) = 45$

   c. $(x - 1) + x = 45$

   d. All of these

2. Look at the following expression and choose the correct option:
   $(a - b/2 + 2c)^2 = a^2 + b^2/4 + 4c^2$ _____ .

   a. $- 2ab - 2bc + 4ac$

   b. $- ab - bc + 2ac$

   c. $- ab - 2bc + 2ac$

   d. $- ab - 2bc + 4ac$

3. A leak in the bottom of a tank can empty the full tank in 6 hours. An inlet pipe fills water at the rate of 4 litres per minute. When the tank is full, the inlet is opened and due to the leak, the tank is empty in 8 hours. The capacity of the tank is:

   a. 5260 L

   b. 5760 L

   c. 5846 L

   d. 6970 L

4. If CE is parallel to DB in the given figure, then the value of x will be:

   a. 45º

   b. 75º

   c. 30º

   d. 85º
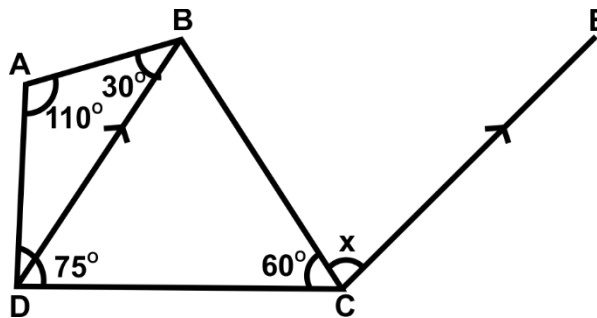
5. The cost of turfing a triangular field at the rate of $45 per 100 m² is $900. If double the base of the triangle is 5 times the height, then the height is:

   a. 50 m

   b. 45 m

   c. 60 m

   d. 40 m

6. In the ground, soldiers are arranged in rows and columns. The number of soldiers in each column is twice the number of soldiers in each row. If the total number of soldiers is 16200, then find the number of soldiers in each row:

a. 45   b. 90
c. 180   d. 360

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7. Successive discounts of $12\frac{1}{2}$ % and $7\frac{1}{2}$ % are given on the marked price of a cupboard. If the customer pays $2590, then what is the marked price?

a. $3108   b. $3148
c. $3200   d. $3600

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8. Given, AB||ED, AG||CB and AF ⊥ AB. ∠FAG = 38º, ∠CDE = 45º. Find the value of x:

a. 263º   b. 277º
c. 289º   d. 308º

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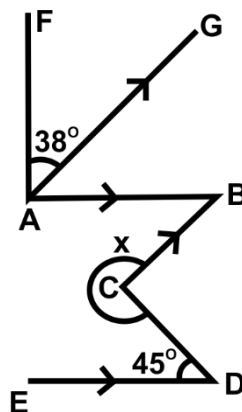
9. If 3/7 + x + (-8/21) + 5/22 = -125/462, then the value of x will be:

a. 6/11   b. -5/11
c. -6/11   d. 5/11

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10. To construct a kite which of the following is necessary?

a. Two adjacent unequal sides and included diagonal
b. Two adjacent equal sides and included diagonal
c. Opposite sides length
d. None of these

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11. If the sum of cubes of digits of a number is equal to the number itself, the number is called' Armstrong Number'. Which of the following is the Armstrong Number?

a. 367   b. 470
c. 153   d. 234

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12. The real factors of $x^2 + 4$ are:

a. $(x^2 + 2) (x^2 - 2)$
b. $(x + 2) (x - 2)$
c. $(x + 2) (x^2 - 2)$
d. Does not exist

13. Which of the following is true?

a. The median of the data 10, 9, 13, 12, 5, 6, is 9.5
b. Range of data 13, 12, 14, 13, 15, 16, 18, 39, 41, 23, 27, is 27
c. The mean of the data 7, 8, 9, 11, 15, is 12
d. The mode of data is the highest value in data

14. A tabletop, in the shape of a parallelogram, was polished, which cost $20 per 10 cm2. If the base of the parallelogram is 45 cm and the total cost is $2250, find the altitude of the parallelogram:

a. 15 cm
b. 25 cm
c. 20 cm
d. 24 cm

15. Find the value of $a^2 + b^2 + c^2 - 2ab - 2ac + 2bc$ when a = 17, b = 15 and c = 13:

a. 111
b. 121
c. 225
d. 361

16. If $x + y + z = 0$, then the value of $(x^2 + xy + y^2)$ is equal to:

a. $(y^2 + yz - z^2)$
b. $(y^2 - yz + z^2)$
c. $z^2 - zx + x^2$
d. $z^2 + zx + x^2$

17. Buses to city A arrive at the bus stop every 7 minutes while buses going to city B arrive at the bus stop every 5 minutes. If buses to both cities arrive at the bus stop together at 7:30 a.m., when will they arrive at the bus stop together?

a. 7:55 a.m.
b. 8:05 a.m.
c. 8:15 a.m.
d. 9:05 a.m.

18. A contractor undertook a contract to complete a part of a stadium in 9 months with a work force of 560 men. Later on it was required to complete the job in 7 months. Extra men employed by him is:

a. 160
b. 150
c. 100
d. 120

19. The product of two expressions is $x^3 + x^2 - 44x - 84$. If the H.C.F of these two expressions is x + 6, then their L.C.M will be:

a. $(x + 2)(x + 7)$
b. $(x + 2)(x - 7)$
c. $(x - 2)(x + 7)$
d. $(x - 2)(x - 7)$

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20. My grandfather was 8 times older than me 16 years ago. He would be 3 times my age 8 years from now. Eight years ago, what was the ratio of my age to that of my grandfather?

a. 1 : 2
b. 1 : 5
c. 13 : 18
d. 11 : 53

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21. If $2/x + 3/y = 2$ and $6/x + 18/y = 9$, then the values of x and y respectively are:

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

---

22. How much should a sum of $16000 approximately amount to in 2 years at 10% p.a. compound interest compounded half yearly?

a. $17423
b. $18973
c. $19448
d. $19880

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23. If 5 spiders can catch 5 flies in 5 minutes, how many flies can 100 spiders catch in 100 minutes?

a. 100
b. 500
c. 1000
d. 2000

---

24. A number, when divided by 361, gives a remainder 47. If the same number is divided by 19, then the remainder obtained is:

a. 8
b. 1
c. 3
d. 9

---

25. The largest number of 5 digits, which is a perfect square, is:

a. 99999
b. 99764
c. 99976
d. 99856

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26. The product of Ron's age 5 years ago with his age 7 years later is 28. Ron's present age:

a. 4 years
b. 6 years
c. 7 years
d. 8 years

---

27. Rationalise the denominator of $(\sqrt{7} + \sqrt{5})/(\sqrt{7} - \sqrt{5})$:

a. 1

c. 2

b. $6 + \sqrt{35}$

d. $6 - \sqrt{35}$

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28. The reflex angle between the hands of a clock at 10:25 is:

a. 180°

c. 195°

b. $(192 \frac{1}{2})^\circ$

d. $(197 \frac{1}{2})^\circ$

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29. The quantity of sugar used in the month of April is approximately what percent of the total quantity of food items used in the same month?

Quantity of Various Food Items used by a Restaurant During the First Half of a Year (In kg)

Food Items	Jan	Feb	March	April	May	June
Rice	250	230	210	260	240	220
Wheat	320	340	280	290	300	360
Sugar	240	210	200	210	160	150
Pulses	360	300	320	245	235	250
Vegetables	380	390	385	375	355	370
Misc.	460	485	440	460	475	480

a. 21%

c. 11%

b. 18%

d. 25%

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30. What is the difference in Direct Recruits and Promotee Assistants?

OUT OF THESE

	Direct	Promotee
1. Steno	30%	70%
2. Assistant	40%	60%
3. Supervisor	50%	50%
4. Clerk I	90%	10%
5. Clerk II	30%	70%
6. Officer I	90%	10%
7. Officer II	70%	30%

Total Number of Employees = 7000

Officer II 11%
Officer I 8%
Steno 10%
Assistant 15%
Clerk II 20%
Supervisor 15%
Clerk I 19%
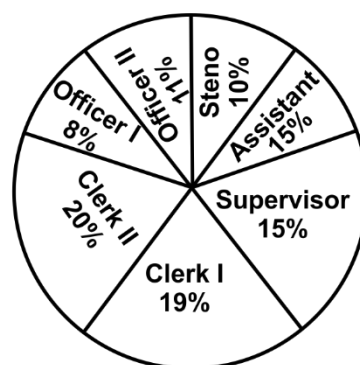
a. 210

c. 180

b. 280

d. 110

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31. Find the compound interest on $31250 at 16% per annum compounded quarterly for 9 months:

a. $4000

c. $3500

b. $3902

d. $4200

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32. A water tank is 30 m long, 20 m wide and 12 m deep. It is made up of an iron sheet which is 3 m wide. The tank is open at the top. If the cost of the iron sheet is $10 per metre, then the total cost of the iron sheet required to build the tank is:

a. $6000

b. $8000

c. $9000

d. $10000

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33. A watch that gains uniformly is 2 minutes slow at noon on Monday and is 4 minutes 48 seconds fast at 2 p.m. on the following Monday. When was it correct?

a. 2 p.m. on Tuesday

b. 2 p.m. on Wednesday

c. 3 p.m. on Thursday

d. 1 p.m. on Friday

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34. A container has 60 L of milk. 20 L are drawn out of the container every day and replaced by 20 L of water. What will be the quantity of milk left in the container at the end of the third day?

a. 15 L

b. 12 L

c. 17.77 L

d. 18 L

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35. A 110 m long train is running at a speed of 60 km/h. How many seconds does it take to cross another train of length 170 m, which is standing on a parallel track?

a. 15.6

b. 16.8

c. 17.2

d. 18

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36. The L.C.M. and H.C.F. of two numbers are 44 and 264 respectively. If the first number is divided by 2, the quotient is 44. What is the second number?

a. 44

b. 88

c. 132

d. 176

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37. Three friends J, K and L jog around a circular stadium and complete one round in 12, 18 and 20 seconds respectively. In how many minutes will all three meet again at the starting point?

a. 18

b. 9

c. 3

d. 21

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38. Alice gave 30% of his money to Olive. Olive gave 2/3 of what he received to his mother. Olive's mother gave 5/8 of the money she received from Olive to the grocer. She is left with $600 now. How much money did Alice have initially?

a. $24000

b. $8000

c. $18000

d. $4000

---

39. If the numerator of a fraction be increased by 12% and its denominator is decreased by 2%, then the value of the fraction becomes 6/7. Find the original fraction:

a. 6/7

b. 3/5

c. 3/5

d. 7/8

40. 18 buckets of water fill a tank when the capacity of each bucket is 9 L. How many buckets will be needed to fill the same tank, if the capacity of the bucket is 13.5 L?

a. 12

b. 13.5

c. 24

d. Can not be determined because the capacity of the tank is not given

Scholar Section (Each Question is 2 Marks)

41. Which of the following is not true about square?

a. It is a parallelogram with all angles as a right angle.

b. Diagonals of the square are not equal.

c. Sides of the square are equal.

d. Opposite sides of the square are parallel.

42. A student was asked to find the sum of all the prime numbers between 10 and 40. He found the sum as 180. Which of the following statements is true?

a. He missed one prime number between 10 and 20

b. He missed one prime number between 20 and 30

c. He added one extra prime number between 10 and 20

d. None of these

43. A and B are two alloys of gold and copper prepared by mixing metals in the ratio 7: 2 and 7: 11 respectively. If equal quantities of the alloys are melted to form a third alloy C, the ratio of gold and copper in C will be:

a. 5: 7

b. 5: 9

c. 7: 5

d. 9: 5

44. The height of a room is 40% of its semi-perimeter. It costs $260 to paper the walls of the room with paper 50 cm wide at $2 per m allowing an area of 15 m2 for doors and windows. The height of the room is:

a. 2.6 m

b. 3.9 m

c. 4 m

d. 4.2 m

45. A rhombus OABC is drawn inside a circle whose centre is at O in such a way that the vertices A, B and C of the rhombus are on the circle. If the area of the rhombus, is $32\sqrt{3}$ m², then the radius of the circle is:

a. 64 m

b. 8 m

c. 32 m

d. 46 m

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46. Three persons, A, B and C invested $3000, $5000 and $7000 to start a business. At the end of the year, the profit is $100000, out of which 25% goes for charity. By how much is B's share greater than A's share?

a. $20000

b. $10000

c. $5000

d. $2500

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47. The parallel sides of a field in the shape of a trapezium are 20 m and 41 m and the remaining two sides are 10 m and 17 m. Find the cost of levelling the field at the rate of $30 per square m.

a. $6400

b. $7320

c. $7500

d. $7000

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48. A student took five papers in an examination, where the full marks were the same for each paper. His marks in these papers were in the proportion of 6: 7: 8: 9: 10. In all papers together, the candidate obtained 60% of the total marks. then the number of papers in which he got more than 50% marks is:

a. 2

b. 3

c. 4

d. 5

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49. The radius of a wire is decreased to one-third. If volume remains the same, length will increase by:

a. 1.5 times

b. 3 times

c. 6 times

d. 9 times

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50. If a = 25, b = 15, c = - 10, then find the value of the following:

$[(a)^3 + (b)^3 + (c)^3 - 3abc]/[(a - b)^2 + (b - c)^2 + (c - a)^2]$

a. 30

b. -1

c. -30

d. 15

Answer Key

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