



# UNIFIED COUNCIL

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## NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

CLASS - 7

Question Paper Code : UN460

### KEY

1. B	2. A	3. D	4. B	5. A	6. A	7. C	8. B	9. D	10. C
11. B	12. B	13. B	14. B	15. C	16. B	17. C	18. A	19. D	20. D
21. B	22. D	23. A	24. D	25. B	26. D	27. C	28. C	29. A	30. D
31. D	32. D	33. A	34. B	35. D	36. A	37. B	38. D	39. D	40. D
41. A	42. D	43. A	44. B	45. A	46. D	47. D	48. C	49. A	50. B
51. B	52. C	53. B	54. D	55. D	56. C	57. A	58. A	59. C	60. A

### SOLUTIONS

#### MATHEMATICS

1. (B) Circumcentre and orthocentre may lie out side the triangle based on the angles

2. (A) In  $\Delta PQV$  given  $PQ + QV + VP = 13$  cm

$$4 \text{ cm} + QV + 4 \text{ cm} = 13 \text{ cm}$$

$$QV = 13 \text{ cm} - 8 \text{ cm} = 5 \text{ cm}$$

■ Perimeter =  $PV - VU + UT + TS + SR + RQ + QP$

$$= 4 \text{ cm} + 5 \text{ cm} + 5 \text{ cm} + 5 \text{ cm} + 5 \text{ cm} + 5 \text{ cm} + 4 \text{ cm}$$

$$= 33 \text{ cm}$$

3. (D) All the three statements are true about a parallelogram

4. (B) Given area of circle =  $\frac{1}{\pi^3} \text{cm}^3$

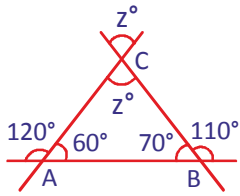
$$\pi r^2 = \frac{1}{\pi^3} \text{cm}^3$$

$$r^2 = \frac{1}{\pi^3} \times \frac{1}{\pi} = \frac{1}{\pi^4} \text{cm}^2 = \left( \frac{1}{\pi^2} \text{cm} \right)^2$$

$$\therefore r = \frac{1}{\pi^2} \text{cm}$$

5. (A)  $\angle CAB = 180^\circ - 120^\circ = 60^\circ$

$\angle ABC = 180^\circ - 110^\circ = 70^\circ$



In  $\triangle ABC$ ,  $\angle CAB + \angle ABC + \angle z = 180^\circ$

$60^\circ + 70^\circ + \angle z = 180^\circ$

$\angle z = 180^\circ - 130^\circ = 50^\circ$

6. (A) If negative integer is multiplied by itself odd number of times give negative sign

7. (C)  $\frac{0.034 - 0.34}{0.0034 \div 0.34} = \frac{-0.306}{0.01} = -30.6$

8. (B) Middle most value in the ascending order are  $2x$  &  $2x + 4$

$\therefore \frac{2x + 2x + 4}{2} = 63$

$2x + 2 = 63$

$2x = 63 - 2$

$2x = 61$

$x = 30.5$

9. (D) Given number =  $10(x + 3) + x \times 1$

$= 10x + 30 + x$

$= 11x + 30$

10. (C) The perpendicular distance between two parallel lines remains same

11. (B) Two equilateral triangles are same length are congruent

12. (B) Let the number be 'x'

Given  $x - 12 = \frac{60}{100}x$

$x - 12 = \frac{3x}{5}$

$5(x - 12) = 3x$

$5x - 60 = 3x$

$5x - 3x = 60$

$2x = 60$

Required number (x) = 30

13. (B) Let 'x' years later the ages ratio of father and son = 7 : 3

Given  $30 + x : 6 + x = 7 : 3$

$7(6 + x) = 3(30 + x)$

$42 + 7x = 90 + 3x$

$7x - 3x = 90 - 42$

$4x = 48$

$x = \frac{48}{4} = 12$

After 12 years father and son's age will be 7 : 3

14. (B)  $x = 4\frac{2}{6} = 4\frac{1}{3}$  &  $y = 5\frac{4}{6} = 5\frac{2}{3}$

$x - y = 4\frac{1}{3} - 5\frac{2}{3} = \frac{13}{3} - \frac{17}{3} = \frac{13 - 17}{3} = -\frac{4}{3} = -1\frac{1}{3}$

15. (C) Given  $a < b \Rightarrow \frac{a}{ab} < \frac{b}{ab}$

$\Rightarrow \frac{1}{b} < \frac{1}{a}$

$\Rightarrow -\frac{1}{a} < -\frac{1}{b}$

16. (B) ON is radius  $\Rightarrow$  LM is diameter which is twice the radius

17. (C)  $b^5 \times -b^2 = -b^5 \times b^2 = -b^{5+2} = -b^7$

18. (A) A scalene triangle has no line of symmetry

19. (D)

$\left(\frac{3}{5}x^2y - \frac{7}{3}xy^2\right)\left(\frac{3}{7}xy^2 + \frac{5}{3}x^2y\right) = \frac{3}{5}x^2y\left(\frac{3}{7}xy^2 + \frac{5}{3}x^2y\right) - \frac{7}{3}xy^2\left(\frac{3}{7}xy^2 + \frac{5}{3}x^2y\right)$

$= \frac{3}{5} \times \frac{3}{7}x^3y^3 + \frac{3}{5} \times \frac{5}{3}x^4y^2 - \frac{7}{3} \times \frac{3}{7}x^2y^4 - \frac{7}{3} \times \frac{5}{3}x^3y^3$

$= \frac{9}{35}x^3y^3 + x^4y^2 - x^2y^4 - \frac{35}{9}x^3y^3$

$= \frac{9}{35}x^3y^3 - \frac{35}{9}x^3y^3 + x^4y^2 - x^2y^4$

$\frac{81x^3y^3 - 1225x^3y^3}{315} + x^4y^2 - x^2y^4$

$$\frac{1144x^3y^3}{315} + x^4y^2 - x^2y^4$$

$$= x^4y^2 - \frac{1144x^3y^3}{315} - x^2y^4$$

20. (D) Let the required number be 'x'

$$\text{Given } \frac{(-12)^{-1}}{x} = \left(\frac{3}{2}\right)^{-3}$$

$$\Rightarrow \frac{1}{-12x} = \left(\frac{2}{3}\right)^3$$

$$-\frac{1}{12x} = \frac{8}{27}$$

$$-\frac{1}{12} \times \frac{27}{8} = x$$

$$-\frac{9}{32} = x$$

21. (B) Required value =  $1000^2 + 345^2 + 655^2 - 2 \times 1000 \times 345 + 2 \times 345 \times 655 - 2 \times 1000 \times 655$

$$= 1000000 + 119025 + 429025 - 690000 + 451950 - 1310000$$

$$= 0$$

22. (D) Let principal be ₹ x

$$\text{Given } A = ₹ 2x$$

$$\blacksquare I = A - P = ₹ 2x - ₹ x = ₹ x$$

$$\text{But } I = \frac{PRT}{100}$$

$$₹ x = \frac{₹ x \times \cancel{12.5}^1 \times 5}{\cancel{100}_8}$$

$$\frac{₹ x \times 8}{₹ x} = T$$

$$\Rightarrow T = 8 \text{ years}$$

23. (A)  $(1^3 + 2^3 + 3^3 + \dots + 73)^{-3/2} = (1 + 8 + 27 + 64 + 125 + 216 + 343)^{-3/2}$

$$= (784)^{-3/2}$$

$$= 28^{2 \times -\frac{3}{2}}$$

$$= 28^{-3}$$

$$= \frac{1}{(28^3)} = \frac{1}{21952}$$

24. (D) Given  $8x + 13x + 45^\circ + 17x + 40^\circ = 180^\circ$

$$38x + 85^\circ = 180^\circ$$

$$38x = 180^\circ - 85^\circ$$

$$38x = 95^\circ$$

$$x = \frac{95^\circ}{38} = \frac{5^\circ}{2} = 2.5^\circ$$

$$\blacksquare 8x = 8 \times 2.5^\circ = 20^\circ$$

$$13x + 45^\circ = 13 \times 2.5^\circ + 45^\circ = 32.5^\circ + 45^\circ = 77.5^\circ$$

$$17x + 40^\circ = 17 \times 2.5^\circ + 40^\circ = 42.5^\circ + 40^\circ = 82.5^\circ$$

$$\blacksquare \text{Required sum} = 82.5^\circ + 20^\circ = 102.5^\circ$$

25. (B) It is in indirect proportion

$$\blacksquare 15 \times 42 = 30 \times y_2$$

$$y_2 = \frac{\cancel{15}^3 \times \cancel{42}^7}{\cancel{30}_5 \cancel{1}} = 21 \text{ men}$$

$$\text{More men required} = 21 \text{ men} - 15 \text{ men} = 6 \text{ men}$$

### PHYSICS

26: (D) An electromagnet is made by winding insulated wire around an iron nail. It behaves like a magnet as long as the current passes through it. It is a temporary magnet.

27: (C) Speed =  $\frac{\text{Distance}}{\text{Time}}$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{30 \text{ km}}{60 \text{ km/h}} = \frac{1}{2} \text{ h}$$

$$= \frac{1}{2} \times 60 = 30 \text{ minutes}$$

28: (C) Mercury is used in thermometers because it expands uniformly (a uniform amount for each unit of temperature change).

Option (A) : Mercury is a poisonous (not harmless) liquid.

Option (B) : The colour and attractiveness of a liquid are not properties that determine the use of the mercury in thermometers.

Option (D) : The property of being good at reflecting light is not a property that determines the use of the mercury in thermometers.

29: (A) The symbol for a series combination of



30: (D) The time period of a simple pendulum is dependent on the length of the pendulum and is independent of the mass of the bob and its shape.

31: (D) An air conditioner and an electric kettle make use of convection currents to cool the room and to boil the water respectively. An electric food mixer just mixes things.

32: (D) A cell converts chemical energy to electrical energy thereby producing a continuous flow of current across the ends of a conductor connected to the terminals of the cell.

33: (A) The object is at rest in distance time graph if it is a straight line parallel to the time axis.

34: (B) A hot air balloon rises up because the hot air in the balloon is less dense than the cool air surrounding it.

35: (D) An electric fuse is a safety device made up of a short metal wire of an alloy of tin and lead or tinned copper. It has a low melting point and if the flow of current exceeds the melting point, the fuse wire melts and breaks the circuit. It is connected in series.

## CHEMISTRY

36: (A) Upon heating, the molecules in the gases move away from each other due to increase in more space and thus become lighter.

37: (B) Lactic acid is present in curd.

38: (D) All the given examples are chemical changes.

39: (D) Acids turn blue litmus paper to red while bases turn red litmus paper to blue. Water is neutral and does not change the colour of litmus paper.

40: (D) Reaction with moisture to get rusted is a chemical property of iron.

41: (A) Pure water does not change the colour of blue litmus as it is neutral.

Option (B) : Vinegar turns phenolphthalein colourless and not pink.

Option (C) : Water will change to green colour with universal indicator.

Option (D) : Lemon juice turns methyl orange red and not yellow.

42: (D) (i) In the process of condensation, a gaseous substance changes to liquid at low temperature with release of heat. It is a physical change.

(ii) & (iii) Burning of wood produces heat and light.

Bursting of crackers produces sound along with heat and light. Both are chemical changes.

(iv) Ice melts by absorbing heat. It is a physical change.

43: (A)  $H^+$  ions from an acid are neutralised by  $OH^-$  ions from the base to form neutral salt and water.

44: (B) Carbon dioxide dissolves in water to form carbonic acid and this causes the decrease in the pH value of water.

45: (A) The gases in cylinders are liquefied and stored at very high pressure, so that they can be transported easily.

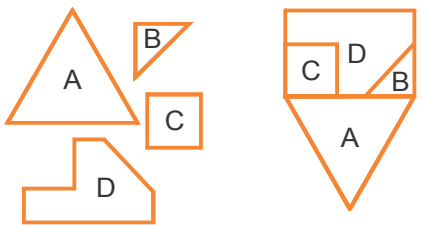
## BIOLOGY

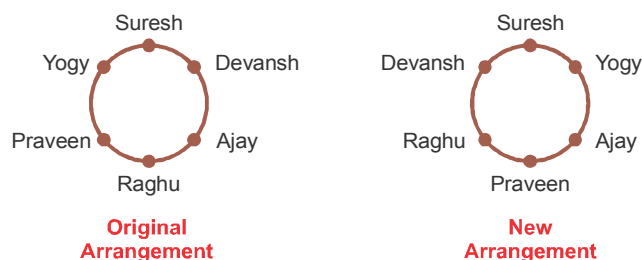
46. (D) Plants need carbon dioxide to make food. Carbon dioxide was available to leaf P. Starch was present in leaf P indicating that it had carried out photosynthesis. Carbon dioxide was not available to leaf Q. Starch was not present in leaf Q indicating that it had not carried out photosynthesis.
47. (D) A camel has adaptations to help it to survive in the desert. A desert has very little water, is very hot in the day but cold at night. A camel has broad feet equipped with fatty pads and elastic tissues to enable it to walk without sinking into the sand. As water is scarce, a camel can survive without drinking water for days, and can drink a lot of water at one time when water is available. Besides, it produces very little sweat and urine to reduce water loss.
48. (C) The stones in the stomach help to grind food into smaller pieces, much like how human teeth grind food. This grinding action increases the surface area to volume ratio of the food so that enzymes can work on the food more efficiently.
49. (A) When the blood capillaries at that area were broken. It causes a bruise. These red blood cells leak out from the blood vessels that collect under the skin cause bruise.
50. (B) P is a series of blood vessels that branches out along the side of the heart and supplies the heart muscles with oxygen and glucose. These are the coronary arteries.
51. (B) Saliva contains amylase which breaks down the starch in bread to maltose, a disaccharide which tastes sweet.
52. (C) Leather is not a fibre. It is the skin of animals which is treated with chemicals.
53. (B) Anemometer is used to know wind velocity.
54. (D) Not all organisms are able to utilise sunlight directly to synthesise sugars (1). Only photosynthetic organisms, e.g., plants, are able to do that.

55. (D) Food that enters the human digestive system (P) will be broken down into simpler soluble substances called digested food. The digested food will enter the human circulatory system (Q) and circulate to all parts of the body.

## CRITICAL THINKING

- 56: (C) By observing the shadows it is clear that the light source is located somewhere at the top right to the three objects. So, the length of the shadow casted by the three objects varies and need not be of same length. Shadows shown in A, B and D are all of same length.
- 57: (A) Ball, car and rowboat are placed anywhere. So, 3 objects are arranged in  $3 \times 2 = 6$  ways. After car, ship and airplane are placed. In that 6 ways ship and airplane are arranged in 2 ways.
- $6 \times 2 = 12$  ways

- 58: (A) 
- 59: (C) According to the question, the arrangements are as follow



- Clearly, Suresh is sitting to the left of Devansh.
- 60: (A) From statement 1 we can say that since prices have doubled, the family should make their consumption half to keep their expenditure the same. Therefore we can answer only based on statement 1. From statement 2, we cannot say that Rs 30 per kg is how much percentage change over the old price. Hence we cannot answer based on statement 2. Hence option 1 is correct.