UNIFIED COUNCIL

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Test • Assess • Achieve

NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

CLASS - 7
Question Paper Code : UN465

KEY

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

SOLUTIONS

MATHEMATICS

1: (B) $- (3 - 4) - (5 - 6) - (7 - 8) \ldots - (99 - 100) = - (1 - 2) - (3 - 4) - (5 - 6) - (7 - 8) \ldots - (99 - 100) + (1 - 2)$

$$\underbrace{-1+2}_{1} \underbrace{-3+4}_{1} \underbrace{-5+6}_{1} \underbrace{-7+8}_{1} \ldots \underbrace{-99+100}_{1} + 1 - 2$$

$= 50 + 1 - 2$

$= 49$

2: (C) Let the number be 'x'

Given $12x + 50 = 290$

$12x = 290 - 50$

$12x = 240$

$x = \dfrac{240}{12} = 20$

3: (D) Given

$X\dfrac{5}{4} = Y \Rightarrow \dfrac{X}{Y} = \dfrac{4}{5} \times \dfrac{20}{20} = \dfrac{80}{100} = 80\%$

4: (B) Commutative property is true for addition & multiplication

5: (D) Let the number of balls be 'x'

Given $\dfrac{3x}{4} + \dfrac{x}{6} + 4 = x$

$\therefore 4 = x - \dfrac{3x}{4} - \dfrac{x}{6}$

$$= \frac{12x - 9x - 2x}{12}$$

$\therefore x = 4 \times 12 = 48$

$\therefore$ No. of red balls $= \frac{3x}{4} = \frac{3}{4} \times 48 = 36$

6: (B) Angle of science

$$= \frac{\text{Science marks}}{\text{Total marks}} \times 360°$$

$$= \frac{35}{\cancel{180}_1} \times \cancel{360}°^{2}$$

$= 70°$

7: (B) $\Rightarrow a = \frac{1}{a}$

Number = its reciprocal

$\Rightarrow 1, -1$

$1 + \frac{1}{1} = 2$

$-1 + \frac{1}{-1} = -2$

8: (A) $P + Q = a^2 - a + 1 + a^2 - a - 1 = 2a^2 - 2a$

$= 2a(a - 1)$

$= 2a(a - 1)$

$= 2(-2)(-2-1)$

$= -4 \times -3$

$= 12$

9: (C) Given $30° + 40° + r = 180°$

$\therefore r = 180° - 70° = 110°$

$40° + t + 80° = 180°$

$t = 180° - 120° = 60°$

$\therefore r - t = 110° - 60° = 50°$

10: (A) $\angle D = \angle E$ [$\because$ Corresponding angles]

$\therefore \angle D = x = 47°$

In $\triangle ACD$, $y + x + 108° = 180°$

$y + 47° + 108° = 180°$

$y = 180° - 155° = 25°$

11: (A) A. A. A. similartiy does n't exist.

$\therefore$ One triangle is enlarged copy of other.

12: (C) CP of 400 oranges

$$= ₹ \frac{250}{100} \times 400 = ₹ 1000$$

Profit = ₹ 600

SP of 400 oranges = ₹ 1000 + ₹ 600 = ₹ 1600

$\therefore$ SP of each orange = $\frac{₹1600}{400} = ₹ 4$

SP of dozen orange = ₹ 4 × 12 = ₹ 48

13: (B) Given 'x' is positive integer as $-x$ is negative integer.

LCM of 2, 3, 5 & 6 = 30

$\therefore \dfrac{-x}{3} = \dfrac{-x}{3} \times \dfrac{10}{10} = \dfrac{-10x}{30}$

$\dfrac{-x}{2} = \dfrac{-x}{2} \times \dfrac{15}{15} = \dfrac{-15x}{30}$

$\dfrac{-x}{5} = \dfrac{-x}{5} \times \dfrac{6}{6} = \dfrac{-6x}{30}$

$\dfrac{-x}{6} = \dfrac{-x}{6} \times \dfrac{5}{5} = \dfrac{-5x}{30}$

$\therefore \dfrac{-15x}{30} < \dfrac{-10x}{30} < \dfrac{-5x}{30} < \dfrac{6x}{30}$

$\therefore \dfrac{-15x}{30}$ is the least ie $\dfrac{-x}{2}$ is the least.

14: (C) Let the rational number to be multiplied be x

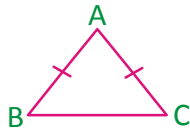$$\frac{-39}{8} \times x = 26$$

$$x = \cancel{26}^{2} \times \frac{-8}{\cancel{36}_3} = \frac{-16}{3}$$

15: (A) If three angles are given with out side we can't construct a triangle.

16: (B) $\dfrac{2\pi r}{\pi} = 2r \Rightarrow$ Divide circumference by π to get diameter

17: (C)   BC < AB + AC

∴   BC = 11 cm [∵ BC is maximum and integer]

∴   Maximum perimeter of a triangle = 6cm + 6cm + 11cm = 23 cm

18: (B)   Perimeter = $[(9y − 9x + 6) + (2x − y − 1) + (3x − 2)]$cm

= $(9y − 9x + 6 + 2x − y − 1 + 3x − 2)$ cm

= $[(−9x + 2x + 3x) + (9y − y) + (6 − 1 − 2)]$ cm

= $(−4x + 8y + 3)$ cm

19: (B) $2^{3^{64}} = 2^{3^{2×32}} = 2^{(3^2)^{32}} = 2^{9^{32}}$

20: (C)   Given $x + y = 5.7, y + z = 7.9$ & $x + z = 6.8$

∴ $x + y + y + z + z + x = 5.7 + 7.9 + 6.8$

$2x + 2y + 2z = 20.4$

∴ $2(x + y + z) = 20.4$

$x + y + z = \dfrac{\cancel{20.4}^{10.2}}{\cancel{2}1}$

21: (B) $(x^2 − 3x + 7)(2x + 3) = x^2 (2x + 3) − 3x (2x + 3) + 7(2x + 3)$

= $2x^3 + 3x^2 − 6x^2 − 9x + 14x + 21$

= $2x^3 − 3x^2 + 5x + 21$

22: (C) $\left(x − \dfrac{1}{x}\right)\left(x + \dfrac{1}{x}\right)\left(x^2 + \dfrac{1}{x^2}\right)\left(x^4 + \dfrac{1}{x^4}\right)$

$= \left(x^2 − \dfrac{1}{x^2}\right)\left(x^2 + \dfrac{1}{x^2}\right)\left(x^4 + \dfrac{1}{x^4}\right)$

$= \left[\left(x^2\right)^2 − \left(\dfrac{1}{x^2}\right)^2\right]\left(x^4 + \dfrac{1}{x^4}\right)$

$= \left(x^4\right)^2 − \left(\dfrac{1}{x^4}\right)^2$

$= x^8 = \dfrac{1}{x^8}$

23: (B)   Let the number to be multiplied be x

∴ $\left(\dfrac{7}{3}\right)^{-2} x = \left(\dfrac{5}{3}\right)^{-3}$

$\Rightarrow \left(\dfrac{3}{7}\right)^{2} x = \left(\dfrac{3}{5}\right)^{3}$

$\dfrac{9}{49} x = \dfrac{27}{125}$

$x = \dfrac{\cancel{27}^{3}}{125} × \dfrac{49}{\cancel{9}_1}$

$= \dfrac{147}{125}$

24: (A)   Given $\dfrac{5y − 3}{19y + 2} = 5$

$\Rightarrow$ $5y − 3 = 5(19y + 2)$

$5y − 3 = 95y + 10$

$5y − 95y = 10 + 3$

$− 90y = 13$

$y = \dfrac{−13}{90}$

25: (A)   Given l ||m $\Rightarrow 4x + 25° + 5x + 20° = 180°$
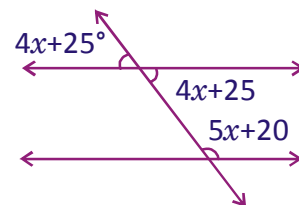
$9x + 45° = 180°$

$9x = 180° - 45°$

$9x = 135°$

$x = \dfrac{135°}{9} = 15°$

PHYSICS

26: **(D)** All the given characteristics of nichrome enables it to be used as a heating element.

27: **(C)** Distance travelled by a plane

= Speed × Time

Speed = 600 km/h

Time taken = 15:45 − 13:00

= 2:45 h or 2 h 45 min = $2\frac{3}{4}$ h

Distance = $600 \times 2\frac{3}{4}$ = 1650 km

28: **(D)** Cold air is denser and sinks to the ground.

Option (A) : Warm air is less dense and rises.

Option (B) : Warm air is less dense than cold air.

Option (C) : Cold air is denser. It does not rise upwards.

29: **(A)** Only bells 1, 5 and 6 ring when the switch is closed. This shows that electric current can flow through object X. Thus, object X is an electrical conductor. As bells 2, 3 and 4 did not ring when the switch is closed, it shows that object Y is not an electrical conductor. Object Z may be an electrical conductor or insulator.

30: **(A)** The time period of oscillation of pendulums P and Q does not depend on the mass of the bob but depends on the length of the string or pendulum.

31: **(C)** Gases (air) expand the most, followed by liquids (water) and lastly solids (copper).

32: **(C)** An electric cooker, an electric toaster and a soldering iron are electrical appliances that need a heating element. An electric fan does not need a heating element.

33: **(D)** Statements (A) and (B) are correct

(A) Every oscillatory motion is periodic in nature, i.e., every to and fro motion takes place in equal intervals of time is correct.

(B) The motion of a pendulum bob is periodic and oscillatory in nature is correct.

(C) Every periodic motion is not oscillatory in nature. eg., rotation of earth around the sun is periodic in nature, but it is not an oscillatory motion is not correct.

34: **(A)** Glass is a poor conductior of heat. When the boiling water is poured into the glass beaker, the heat is conducted away slowly. The glass gets heated up. Due to the thickness of the glass, expansion caused by the heat is uneven. The inside surface of glass expands more quickly then the outside surface. This causes the glass to crack. In contrast, copper is a good conductior of heat. When the boiling water is poured into a copper beaker, the heat is quickly conducted away. The copper beaker does not crack.

35: **(D)** All the given precautions are to be taken while repairing a faulty power socket.

CHEMISTRY

36: **(A)** When the air in the bag is heated up, it rises up causing an imbalance in the arrangement.

37: **(A)** Potassium hydroxide and nitric acid react to form potassium nitrate and water.

38: **(B)** Statements (A), (C) and (D) are true. Eruption of volcanoes is not a desirable change.

39: **(C)** Sulphuric acid has two hydrogens - H_2SO_4

40: **(C)** Only combustion is a chemical and irreversible change as new products are formed.

Contraction and Expansion occur due to cooling and heating of substances.

Condensation is change of state from gas to liquid of a substance.

41: **(B)** Litmus is extracted from a plant called 'Lichen'.

42: (D) Drying of wet clothes and switching on an electric stove are both physical changes.

Drying of cement on a brick wall is a chemical change as the cement reacts with carbon dioxide in the air to form a new hard material.

43: (B) Sulphuric acid (H_2SO_4) is called as king of chemicals.

44: (B) Neutralisation is a chemical change as it is a reaction between an acid and a base.

45: (D) Pressure is highest in a bottle or any container which is closed.

BIOLOGY

46. (B) The leaf exposed to sunlight was able to make food. Starch would be present and hence, the iodine would turn dark blue in leaf Y.

The leaf that was covered was unable to make food. Starch would not be present and iodine would remain brown in leaf X.

47. (D) The change in the fur of an arctic hare from summer to winter. It makes them less visible to predators.

48. (B) The most direct factors that are necessary for photosynthesis to proceed are carbon dioxide, water, light and chlorophyll.

49. (D) Seeds only need water, air and warmth to germinate.

They do not need sunlight because they do not have leaves to make their own food.

They get their food from the seed leaves.

50. (D) The breakdown of proteins (i) occurs in the stomach due to the action of pepsin. It is a form of chemical digestion (ii). The churning action of the stomach helps to break the food bollus into liquid chyme. This is a form of physical digestion (iii). The hydrochloric acid produced helps to kill any micro-organisms that may have been ingested (iv). It also provides a suitable pH for the action of pepsin and rennin.

51. (A) Fabrics are made by weaving and knitting.

52. (C) Ginger is a modified stem.

53. (B) 1 is a red blood cell because it does not have a nucleus and its central portion is a lighter colour due to its biconcave shape. 2 has a lobed-shaped nucleus and is therefore a white blood cell (phagocyte). 3 is much smaller than 1 and 2; and does not have a nucleus; thus, it is a platelet.

54. (B) Grass planted on hill slopes can slow down the flow of rain water.

The roots of grass bind the soil together and thus prevent the soil from being washed down by rain water or blown away by wind. Hence, the grass growing on hill slopes prevents soil erosion.

55. (A) Germinating seeds respire they take in oxygen and give out carbon dioxide. Potassium hydroxide solution is typically added to respiration set-ups to absorb carbon dioxide and form salts.

CRITICAL THINKING

56: (B) Each image contain two parts.

Inner and outer parts

The third image is combination of first two images

Common lines of first two images of inner part we get third image inner part.

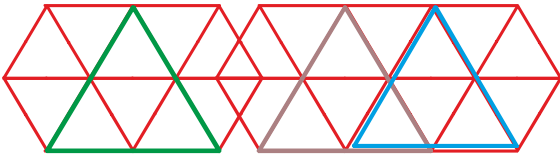Overlap first and second outer parts we get third outer part.

57: (C)

58: (B)

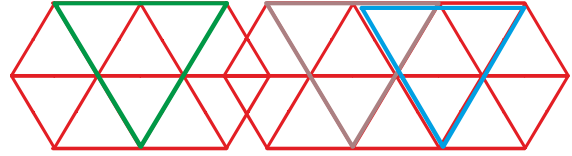|	Friday	Saturday	
A → 24 cookies →	6	18	(3 times more)
B → 25 cookies →	5	20	(4 times more)
C → 24 cookies →	4	20	(5 times more)
D → 27 cookies →	9	18	(2 times more)
E → 28 cookies →	4	24	(6 times more)

59: (B)   32

Number of visible triangles, including the small triangle = 26

Number of bigger triangles as seen in the next two images = 3+3 = 6

Total number of triangles = 26+6 = 32

60: (B)   "News" is the essential part of the word Newspaper.

THE END