



UNIFIED COUNCIL

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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)

CLASS - 7

Question Paper Code : UN449

KEY

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

SOLUTIONS

MATHEMATICS

1. (D) $-27(16 - 14) = -27 \times 2 = -54$
 $-54 + 54 = 0$

2. (B) $AB = \frac{AC}{2} = 8 \text{ cm}$

$\therefore AE = AB = 8 \text{ cm}$

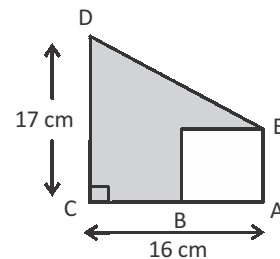
Area of shaded region = Area of trapezium ACDE – Area of square ABFE

$$= \frac{1}{2} \times 16(17 + 8) \text{ cm}^2 - (8 \text{ cm})^2$$

$$= 8 \times 25 \text{ cm}^2 - 64 \text{ cm}^2$$

$$= (200 - 64) \text{ cm}^2$$

$$= 136 \text{ cm}^2$$



3. (C) Area of original squarer = x^2

Area of new rectangle

$$= \left[x \times \frac{140}{100} \right] \left[x \times \frac{130}{100} \right]$$

$$= \frac{182 x^2}{100}$$

$$\text{Increased area} = \frac{182x^2}{100} - x^2 = \frac{82x^2}{100}$$

Percentage of increased area

$$= \frac{\left(\frac{82x^2}{100}\right)}{x^2} \times 100 = 82\%$$

4. (A) $I = \frac{\text{PTR}}{100} = \frac{\text{₹ } 4,500 \times \frac{73}{365} \times 10}{100} = \text{₹ } 90$

5. (C) $\frac{x+3}{7} - \left(\frac{2x-5}{3}\right) - \left(\frac{2x-1}{14}\right) = 0$
 $\frac{6(x+3) - 14(2x-5) - 3(2x-1)}{42} = 0$

$$6x + 18 - 28x + 70 - 6x + 3 = 0$$

$$91 = 28x$$

$$x = \frac{91}{28} = \frac{13}{4} = 3\frac{1}{4}$$

6. (B) $P - Q + R = (3x - 4y - 8z)$
 $- (-10y + 7x + 11z) + (19z - 6y + 4x)$
 $= 3x - 4y - 8z + 10y - 7x - 11z + 19z - 6y + 4x = 0$

7. (C) Pure lead = 60% of 50 kg = 30 kg
 let 'x' kg of lead to be mixed to 50 kg of mixture to get 75% of lead
 $30 + x = 75\% \text{ of } (50 + x)$

$$30 + x = \frac{3}{4} (50 + x)$$

$$4(30+x) = 150 + 3x$$

$$4x - 3x = 150 - 120 = 30$$

8. (A) Let CP = x, SP = y

$$\Rightarrow \text{Profit} = y - x$$

$$\text{Given } 2y - x = 3(y - x)$$

$$2y - x = 3y - 3x$$

$$2x = y$$

$$\therefore \text{Profit} = y - x = 2x - x = x$$

$$\text{Profit percentage} = \frac{x}{x} \times 100 = 100$$

9. (C) $x + y = a = b$

[∵ alternative angles are equal]

10. (B) Centroid is the point of concurrence of medians

11. (C) $\frac{1792.8 \text{ kg}}{4.98 \text{ kg}} = 360$

12. (A) The ratio of ₹ 1,50 paise and 25 paise = 2 : 3 : 4

$$= 2x : 3x : 4x$$

∴ Total amount

$$= 2x \times \text{₹ } 1 + 3x \times \text{₹ } \frac{1}{2} + 4x \times \text{₹ } \frac{1}{4} = 180$$

$$\Rightarrow 2x + \frac{3x}{2} + x = 180$$

$$3x + \frac{3x}{2} = 180$$

$$\frac{9x}{2} = 180$$

$$x = 180 \times \frac{2}{9} = 40$$

Number of 50 paise coins = $3x = 3 \times 40 = 120$

13. (A) In ΔPQT , $PQ = PT \Rightarrow \angle T = \angle Q = 62^\circ$

$$\therefore \angle Q + \angle QPT + \angle T = 180^\circ$$

$$62^\circ + \angle QPT + 62^\circ = 180^\circ$$

$$\angle QPT = 56^\circ$$

$$\therefore x + 34^\circ + x = 56^\circ$$

$$2x = 22^\circ$$

$$x = 11^\circ$$

14. (B) LHS = $1 - 2 + 3 - 4 + 5 - 6 + \dots + 99 - 100 + 101$

$$= -1 - 1 - 1 \dots - 1 + 101$$

$$= -50 + 101$$

$$= 51$$

15. (C) $\frac{51}{4} \times 26 = \frac{663}{2} = 331\frac{1}{2}$ litres

16. (B) In a quadrilateral ABCD,

$$\angle A + \angle B + \angle C + \angle D = 360^\circ \rightarrow (1)$$

$$\text{In } \Delta BOC, \frac{\angle B}{2} + \frac{\angle C}{2} + \angle BOC = 180^\circ$$

$$\angle B + \angle C + 2\angle BOC = 360^\circ \rightarrow (2)$$

from (1) & (2)

$$\angle A + \angle B + \angle C + \angle D = \angle B + \angle C + 2\angle BOC$$

$$\therefore \angle A + \angle D = 2\angle BOC$$

17. (C) $4(x^2 + 10x + 25) - (4x^2 + 4x + 1)$
 $= 3x - 15 + 180$
 $4x^2 + 40x + 100 - 4x^2 - 4x - 1 = 3x + 165$
 $36x + 99 = 3x + 165$
 $33x = 66$
 $x = 2$

18. (A) Let fourth proportion be 'x'
 $\therefore \frac{13}{3}, \frac{39}{4}, \frac{17}{2}$, x are in proportion
 $\frac{13x}{3} = \frac{39}{4} \times \frac{17}{2}$
 $x = \frac{39}{4} \times \frac{17}{2} \times \frac{3}{13} = \frac{153}{8}$

19. (A) Given $\frac{3x}{4} + x + \frac{x}{2} = 180^\circ$
 $\frac{3x + 4x + 2x}{4} = 180^\circ$
 $9x = 180^\circ \times 4$
 $x = 80^\circ$

20. Deleted

21. (C) CP of rakesh = ₹ 11,250
loss = 4%
SP of rakesh = ₹ 11,250 $\times \frac{96}{100}$
= ₹ 10,800

22. (B) In $\triangle ABF$ $33^\circ + x = 115^\circ$
 $x = 115^\circ - 33^\circ = 82^\circ$
In $\triangle BCE$ $x = y + 36^\circ$
 $82^\circ = y + 36^\circ$
 $y = 46^\circ$

23. (A) $(2P - 3q)(4p^2 + 6pq + 9q^2) + (2p + 3q)(4p^2 - 6pq + 9q^2)$
 $= 8p^3 + 12p^2q + 18pq^2$
 $- 12p^2q - 18pq^2 - 27q^3 + 8p^3 - 12p^2q +$

$$18pq^2 + 12p^2q - 18pq^2 + 27q^3 = 16p^3$$

(OR) use $(a^3 - b^3) + (a^3 + b^3) = 2a^3$.

24. (C) Let the number of girls be x & boys be y
Given $y - x = 12\% (x+y)$

$$y - x = \frac{12}{100} (x+y)$$

$$y - x = \frac{3}{25} (x+y)$$

$$25y - 25x = 3x + 3y$$

$$22y = 28x$$

$$\frac{y}{x} = \frac{28}{22} = \frac{14}{11}$$

25. (B) Given $a : b = 5 : 7 = 5x : 7x$

$$a = 5x \text{ \& } b = 7x$$

$$\therefore 3a + 5b : 5a - 2b$$

$$= 15x + 35x : 25x - 14x$$

$$= 50x : 11x$$

$$= 50 : 11$$

PHYSICS

26. (B) An electric bell has an electromagnet in it.

27. (D) An outer polished and shiny surface of an electric kettle is a poor emitter to reduce energy loss through radiation.

28. (C) Speed of car in first hour = 30 km h⁻¹
In 30 minutes, it travels 30/2 = 15 km

$$\text{Speed of car next } 1\frac{1}{2} \text{ hour} = 45 \text{ km h}^{-1}$$

$$\text{Remaining time} = 1\frac{1}{2} \text{ h} = \frac{3}{2} \text{ h}$$

$$\text{Distance travelled in the remaining } 3/2 \text{ hours} = 45 \times \frac{3}{2} = 67.5 \text{ km}$$

$$\therefore \text{Total distance travelled by the car in 2 hrs} = 15 + 67.5 \Rightarrow 82.5 \text{ km}$$

29. (B) Streaks of bright light are produced naturally in the sky during lightning and emit light.

30. (B) Melting point and boiling point on Celsius scale of given substances is more by 1° C. So, the change in temperature is correct as the margin of error is cancelled out.
31. (C) When the distance time graph of a car is a straight line parallel to the time axis or X axis, then it is not moving or at rest.
32. (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.
33. (D) A black outer surface is a good absorber of thermal radiations. An inner white and shiny surface is a poor emitter of thermal radiations.
34. (A) In uniform motion, a body travels equal distances in equal intervals of time. The body has covered 2 m in every minute from 1 to 4 minutes.
35. (D) Old and frayed wiring, over loaded sockets and damaged plugs when used have the potential to overheat and cause electric fires in the home.

CHEMISTRY

36. (D) Corrosion is a chemical change and it is irreversible.
37. (B) When a concentrated acid is dissolved in water, dilute acid is formed and heat is given out (exothermic reaction). For this reason, it is dangerous to add water to acid. To dilute an acid, always add acid to water slowly with constant stirring.
38. (D) Following are the precautions to be taken during a storm:
- (i) Do not take shelter under a tree.
 - (ii) Do not lie down on the floor or ground.
 - (iii) Close all the doors and windows in the house.

39. (C) Stage III is a combustion reaction and a lot of heat is evolved. Stage IV is condensation of steam causing release of heat.
40. (B) An acid always contains the element hydrogen.
Option (A) : Acids are often colourless liquids.
Option (C) : Acids have a pH value below 7. The pH value of 7 is for neutral substance.
Option (D) : Most of the acids contain the element oxygen but not all. An example is hydrochloric acid *HCl* that does not contain oxygen.
41. (D) Salinity is harmful to the plants. During cyclones, the sea waves rise high and flood the land making the soil saline and unfertile.
42. (C) Magnetisation makes the molecules in an iron bar regroup themselves in an orderly alignment. It does not involve any increase in mass.
43. (D) **Nitric acid** is a strong acid. Citric, acetic and tartaric are weak acids.
44. (C) When we add sugar to water, it becomes sweet. It is a physical change because the original substance sugar can be recovered by physical methods.
45. (C) When an acid and an alkali are mixed together, only a soluble salt and water are formed, with no gas evolved. They will always form a soluble salt. Hence, no precipitate is formed. The salt formed is colourless. A neutralisation reaction is actually exothermic and produces a rise in temperature. Hence, the reaction mixture becomes hot.

BIOLOGY

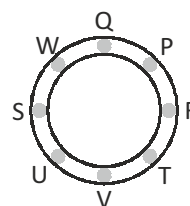
46. (C) The male and female parts of the plant are found on separate flowers
[The flowers of maize plants are unisexual, not bisexual].
Only female flowers or bisexual flowers will develop into fruit after pollination and fertilization.

- Male flowers will not develop into fruit.
47. (D) When we are exercising our muscles need more energy. To produce more energy in a process called respiration, more food and oxygen are needed. Thus, our heart pumps blood faster so that blood rich in oxygen and food can be circulated faster to the muscles. At the same time, carbon dioxide and waste produced at our muscles have to be carried away more quickly by the blood to the excretory organs.
48. (D) When we breathe out, our ribcage moves in and downwards and our diaphragm moves upwards. Thus there is less space in our chest and air is forced out of our lungs
49. (B) Plants need chlorophyll, carbon dioxide, water and light to carry out photosynthesis. Sugar and oxygen are produced during photosynthesis.
50. (B) Transfer of pollen grains to the stigma is called pollination.
51. (D) Promote public transport and car-pooling will reduce the number of vehicles travelling on the roads, and this reduce the emissions of gases that cause air pollution. Air pollutants have caused global warming acid rain and thinner ozone layer.
Using cleaner fuels or green vehicles will reduce air pollutants. Growing more trees helps to purify air.
Using natural predators (biological control) to control pests instead of spraying pesticides (chemical control) will reduce air, land and water pollution.
52. (A) Large scale destruction of forest leads to soil erosion, decrease in air humidity, increase in the risk of flooding and increase in carbon dioxide content of the air
53. (C) Excretion is the removal of harmful waste products of metabolic reactions and toxic materials from the body of an organism. Carbon dioxide is a metabolic waste product of aerobic respiration in all living tissues which is removed from the lungs during expiration.

54. (A) Physical digestion occurs during chewing action when the teeth cuts and grinds food into smaller pieces and mixes them with saliva. This process is known as mastication. Chemical digestion occurs when salivary amylase present in the saliva acts on starch in the food and breaks them down into maltose.
55. (D) Deamination of excess amino acids in the liver produces urea which is excreted by the kidney.

CRITICAL THINKING

56. (A, D)



57. (C) When A and C are of the same colour,
3 ways to colour A and C,
2 ways to colour B,
2 ways to colour D.
 $3 \times 2 \times 2 = 12$

When A and C are of different colours,
3 ways to colour A,
2 ways to colour B,
1 way to colour C,
1 way to colour D.
 $3 \times 2 \times 1 \times 1 = 6$
 $12 + 6 = 18$

There are 18 ways to colour the four circles if no two circles connected by a line can have the same colour.

58. (B) Mar - 3; April - 2; May - 3; June - 2;
July - 3; Aug - 3; Sept - 2; Oct - 3.
Total 21 odd days.
 $21 / 7 = 0$.
So November has start with the same day.
59. (C)
60. (C) $P / U > P / U > R > Q / T > Q / T > S$