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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

CLASS - 7

Question Paper Code : 1O109

KEY

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

SOLUTIONS

MATHEMATICS

01. (C) Required tempurate
= 40 °C + (–5 °C) × 10
= –10 °C

02. (D) Let the number to be divided be 'x'

$$\therefore \frac{\left(\frac{-11}{2}\right)}{x} = \frac{-33}{8}$$

$$\frac{-11}{2} = \frac{-33}{8}x \Rightarrow \frac{33x}{8} = \frac{11}{2}$$

$$x = \frac{11}{2} \times \frac{8}{33} \Rightarrow x = \frac{4}{3}$$

03. (A) $\frac{31.62 \div 9.3}{14.62 \div 4.3} = \frac{3.4}{3.4}$
= 1

04. (C) No. of kilograms of fruits sold during the four hours = 35 + 26 + 45 + 20 = 126 kgs

05. (D) $\frac{x-4}{3} - \frac{2x+1}{6} = \frac{5x+1}{2}$
multiply with 6 on both sides
$2(x - 4) - (2x + 1) = 3(5x + 1)$

$\cancel{2x}$ –8 $\cancel{-2x}$ –1 = 15x + 3
–12 = 15x

$$-4 = 5x \Rightarrow \frac{-4}{5} = x$$

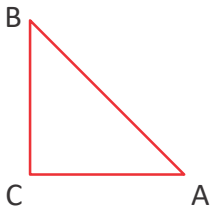
06. (C) $\frac{1}{u}+\frac{1}{v}=\frac{1}{f}$

$\Rightarrow \frac{1}{30}+\frac{1}{v}=\frac{1}{20}$

$\Rightarrow \frac{1}{v}=\frac{1}{20}-\frac{1}{30}=\frac{3-2}{60}=\frac{1}{60}$

$\Rightarrow v = 60$

07. (C) Vertex opposite to the Largest side while contains the Largest angle.



08. (B) $\Rightarrow a=\frac{1}{a}$

Number = its reciprocal

$\Rightarrow 1, -1$

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

09. (A) $\frac{-11}{28}=-0.392, \frac{-5}{7}=-0.71$

$\frac{-9}{14}=-0.642, \frac{-29}{42}=-0.69$

$\therefore \frac{-11}{28}$ is greatest

10. (B) An isosceles triangle has one line of symmetry.

11. (A) Salary of Rahul

Ram : Ajay

$7^2 : 17^2$

49 : 289

490 : 2890

$= \frac{490\times17}{7}$ = Rs. 1190

Therefore, salary of Ajay

$= \frac{1190\times17}{7}$ = Rs. 2890

12. (C) From the figure,

$150 - x + 70 - x + x = 180°$

$\Rightarrow x = 220° - 180° = 40°$

Since AE || BD, $y = x$ as they are alternate angles

In ΔBCD, $\angle BDC = x$ (Alternate angles)

$70 - x + x + z = 180°$

$\Rightarrow 70 + z = 180°$

$\Rightarrow z = 110°$

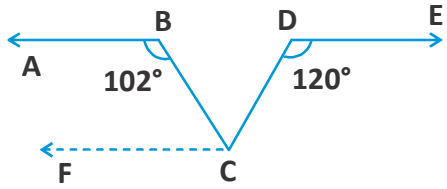
$\therefore$ The required sum $= x + y + z = 40° + 40° + 110° = 190°$

13. (A) Area of shaded part = Area of PQRS – area of ABCD

$= (100^2 - 90^2)$ sq m

= 10000 – 8100 = 1900 sq m

14. (D) Const:- Draw FC || AB



FC || AB $\Rightarrow \angle ABC + \angle FCB = 180°$ [$\because$ alternative angles]

$102° + \angle FCB = 180°$

$\angle FCB = 180° - 102° = 78°$

But DE || FC $\Rightarrow \angle FCD = \angle D$ [$\because$ alternative angles]

$78° + \angle BCD = 120°$

$\angle BCD = 120° - 78° = 42°$

$\angle BCD = 42°$

15. (A) Let the principal be Rs. x. Then amount

= Rs. $3x$, T = T years, $R = 16\frac{2}{3}\%$

$\therefore \quad 3x = x\left(1+\frac{50\,T}{300}\right)$

$\Rightarrow 3 = \left(1+\frac{T}{6}\right) \Rightarrow 3 = \frac{6+T}{6}$

$\Rightarrow T = 18 - 6 = 12$ years

16. (C) Let the number of fruits bought

= L.C.M. of 16 and 8 = 16

C.P. of 16 fruits = Rs. 24

S.P. of 16 fruits = Rs. $\left(\frac{18}{8}\times 16\right)$

= Rs. 36

$\therefore$ Profit% = $\left(\frac{12}{24}\times 100\right)$ % = 50%

17. (B) Let the required rational number be x.

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

$\Rightarrow x = \frac{26}{-8/39} = 26 \times \frac{39}{-8} = \frac{-507}{4}$

18. (C) $7(x + 2y) - 3y - 2(4y - 5x)$

$\Rightarrow 7x + 14y - 3y - 8y + 10x$

$= 17x + 3y$

19. (B) Given that the angles of the triangle are $(x + 10°)$, $(x + 40°)$ and $(2x - 30°)$

Sum of the angles of a triangle

= 180°

$\Rightarrow x + 10° + x + 40° + 2x - 30° = 180°$

$\Rightarrow 4x + 20° = 180°$

$\Rightarrow 4x + 180° - 20°$

$\Rightarrow 4x = 160° \Rightarrow x = \frac{160°}{4} = 40°$

20. (B) $-(3 - 4) - (5 - 6) - (7 - 8) .... - (99 - 100) = -(1 - 2) - (3 - 4) - (5 - 6) - (7 - 8) .... - (99 - 100) + (1 - 2)$

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

= 50 + 1 – 2

= 49

21. (B) Let C.P. of the article be Rs. x

$x\left(1 + \frac{6}{100}\right) - x\left(1 + \frac{4}{100}\right)$ = Rs. 3

$x\frac{(100 + 6)}{100} - x\frac{(100 + 4)}{100}$ = Rs. 3

$\frac{106x}{100} - \frac{104x}{100}$ = Rs. 3

$\frac{106x - 104x}{100}$ = Rs. 3

$\frac{2x}{\cancel{100}\,50}$ = Rs. 3

x = Rs. 3 × 50

x = Rs. 150

22. (A) Area of right angled triangle

= $\frac{1}{2}$ × product of perpendiculars

= $\frac{1}{2}$ × 100 cm × 8.6 cm

= 430 cm^2

23. (C) 248 × 124 – 346 × 248 – 248 × 778

= 248 (124 – 346 – 778)

= 248 (–1000)

= – 248000

24. (D) $\frac{3}{4}$ = 0.75 and $\frac{-5}{6}$ = –0.83

$\frac{2}{3}$ = 0.66 lies between 0.75 & –0.83

$\frac{-1}{5}$ = –0.2 lies between 0.75 & –0.83

$\frac{-7}{12}$ = –0.58 lies between 0.75 & –0.83

25. (A) Perimeter = 21 m = 2100 cm

Length = 5 m 60 cm

= 560 cm

Width $= \frac{P}{2} - l$

$= \left(\frac{2100}{2} - 560\right)$ cm

= (1050 – 560) cm

= 490 cm = 4 m 90 cm

PHYSICS

26. (A) Iron does not retain magnetism when current is switched off. So, it is the most suitable metal to use it as the core of an electromagnet. It can be used in an electric bell.

27. (B) Melting ice, at 0° C, is used to determine the lower fixed point and boiling water, at 100° C is used to determine the upper fixed point on the Celsius or centigrade scale.

28. (D) Both the wheels P and Q of the moving cycle and also its pedals undergo rotatory motion.

29. (B) P is made up of soft iron. Hence, it behaves as a temporary magnet. On opening the switch, P loses its magnetism and none of the iron nails remain attracted to it. Q is made up of steel core which acts as a permanent magnet. On opening the switch, core Q still retains the magnetism and all the 5 iron nails remain attracted to it.

30. (A) Amount of heat absorbed by a body depends upon its material and color. Dark colored bodies are good absorbers and good emitters of heat radiations as compared to light colored bodies. Therefore, the water in black tin will be hotter than water in white tin.

31. (C) By adjusting the length of the pendulum, the motion of clock can be made to maintain correct time.

32. (D) The magnetic effect of an electromagnet can be increased by all the given factors.

33. (A) Unknown temperature $= \frac{50-20}{170-20} \times 100$

$= 20°C$

34. (C) Distance = Speed $\times$ Time

distance $= 3\ m\ s^{-1} \times 20 \times 60$

$= 3 \times 1200 = 3600\ m = \frac{3600}{1000} = 3.6\ km$

(1000 m = 1 km)

35. (B) Both the copper strip and silver coin are good conductors of electricity. Hence, only bells 2 and 3 will ring because the current is able to flow through the circuit. The wooden rod is not a conductor of electricity. Bell 1 will not ring at all because no current is able to pass through as it is an insulator.

CHEMISTRY

36. (B) NH_4OH Ammonium hydroxide does not have a metal in it as a base. Rest of the bases have metals in them.

37. (A) A piece of magnesium gives off bright flames when burnt is a chemical change.

A piece of iron glows red hot when heated strongly is a physical change.

38. (C) China rose is a flower and it is used as an indicator.

(ii) China rose is a natural indicator.

(iii) China rose indicator turns basic solution to green with a base. China rose indicator turns to dark pink colour in acidic solution.

39. (B) Blue colour solution is of $CuSO_4$ (blue vitriol) and green colour solution is of $FeSO_4$ (green vitriol). The correct chemical equation can be represented as

$CuSO_4 + Fe \rightarrow FeSO_4 + Cu$

40. (B) A blue litmus paper changed first to red when it was dipped in dilute HCl solution. When the same litmus paper was dipped into a base, the red litmus paper changed to blue.

41. (D) A solution of copper sulphate is prepared by adding more amount of copper sulphate (solute) to less amount of water solvent till the solubility stops. This solution so obtained is super saturated.

On evaporation of water, solid, blue, pure crystals are obtained.

It is a reversible process as we can prepare a pure copper sulphate solution and also obtain pure crystals by evaporating water.

42. (B) Acids are sour in taste. Acids as well as bases both are corrosive in nature. They show different colours on testing with an indicator.

43. (B) Rust is hydrated iron oxide formed by the reaction of iron with air and water.

44. (B) Lemon juice contains citric acid that turns blue litmus paper red.

45. (D) Painting the main gate made up of iron prevents it from rusting and also looks beautiful.

BIOLOGY

46. (C) A row of trees can help conserve soil as the trees act as a windbreak, reducing soil erosion caused by blowing wind.

47. (A) The pancreas produces pancreatic juice (that contains amylase and lipase) and hormones involved in the regulation of blood glucose concentrations (insulin and glucagon). Pepsin is produced in the stomach and requires an acidic pH to function.

48. (B) The walls of blood capillaries are one-cell thick to assist in the diffusion of substances.

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. (A) Blue black

51. (B) Pollen grains germinate on stigma by absorbing water and nutrients.

52. (B) Gas Y is oxygen. When a glowing splinter is introduced into a jar containing Gas Y glows brightly.

53. (A) Structured labelled as P is trachea.

54. (C) P - Bryophyllum

Q - Sweet potato

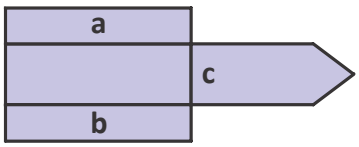
R - Ginger

55. (A) Pulmonary artery carries deoxygenated (CO_2 rich) blood that enters from the heart to lungs. The blood in pulmonary artery contains least amount of oxygen and highest amount of carbon dioxide.

Critical Thinking

56. (C) Rope Z require the most effort to pull the mast over.

57. (D)



58. (B) $(7 \times 5) - (5 \times 6) = 5$;

$(4 \times 9) - (4 \times 7)$;

$(2 \times 5) - (3 \times 3)$

59. (D) The bulb filaments are not made of silver and silver can be melted.

60. (C)