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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION (UPDATED)
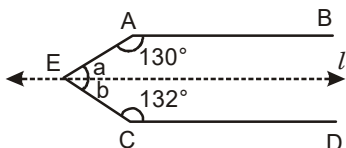
CLASS - 7
Question Paper Code : UN489

KEY

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

SOLUTIONS

MATHEMATICS

01. (D) Through E, draw a line l parallel to AB $\Rightarrow l \parallel$ CD.

∴ $130° + a = 180° \Rightarrow a = 50°$ .....(1)

and $132° + b = 180° \Rightarrow b = 48°$ .....(2)

From (1) and (2),

$x = a + b = 50° + 48° = 98°$

02. (A)
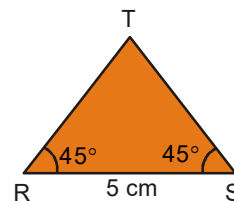
Clearly, from the figure two angles and the included side are given. So, A.S.A. criterion can be used to construct DRST

03. (D) $\dfrac{3^n + 3^{n+1}}{3^{n+1} - 3^n} = \dfrac{3^n + 3^n \times 3}{3^n \times 3 - 3^n}$

$= \dfrac{3^n(1+3)}{3^n(3-1)} = \dfrac{2}{1} = 2$

04. (D) Let Sheila's money be ₹ x

$\therefore$ Rita's money = ₹ $(300 - x)$

Given ₹ $5(x - 56)$ = ₹$(300 - x + 56)$

$5x - 280 = 356 - x$

$5x + x = 356 + 280$

$6x = 636$

$x = ₹106$

05. (A) $\dfrac{3}{4}x - \dfrac{2}{5}ax - y + \dfrac{1}{3}ax - \dfrac{1}{8}x$

$= \left(\dfrac{3}{4} - \dfrac{1}{8}\right)x + \left(\dfrac{1}{3} - \dfrac{2}{5}\right)ax - y$

$= \left(\dfrac{6-1}{8}\right)x + \left(\dfrac{5-6}{15}\right)ax - y$

$= \dfrac{5}{8}x - \dfrac{1}{15}ax - y$

When a = 3, $x = (-2)$ and $y = (-6)$, the value of the expression is

$\dfrac{5}{8}(-2) - \dfrac{1}{15}(3)(-2) - (-6)$

$= \left(\dfrac{-5}{4}\right) + \dfrac{2}{5} + 6$

$= \dfrac{-25 + 8 + 120}{20} = \dfrac{128 - 25}{20}$

$= \dfrac{103}{20} = 5\dfrac{3}{20}$

06. (B) Let 'k' to be subtracted from $\left(\dfrac{x}{y}\right)$ to get $\dfrac{y}{x}$

$\therefore \dfrac{x}{y} - k = \dfrac{y}{x}$

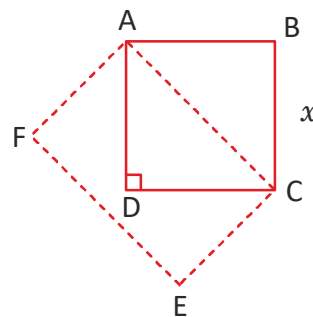$\Rightarrow \dfrac{x}{y} - \dfrac{y}{x} = k$

$\Rightarrow \dfrac{x^2 - y^2}{xy} = k$

07. (C) Given present ages ratio of

A & B = 9 : 11 = $9x : 11x$

Given $9x - 10 : 11x - 10 = 7 : 9$

Product extreemes = Product means

$\therefore 81x - 90 = 77x - 70$

$81x - 77x = 90 - 70 = 20$

$4x = 20$

$x = \dfrac{20}{4} = 5$

$\therefore$ Sum of their present ages

$= 9x + 11x = 20x = 20 \times 5 = 100$ years

08. (D) Let the side of square x be a cm

$\therefore$ Area of square ABCD (p) = a²

In $\triangle$ADC, $\angle$D = 90° $\Rightarrow$

$AC^2 = AD^2 + DC^2 = a^2 + a^2$

$AC^2 = 2a^2$

$\therefore$ Area of square ACEF (q) = $AC^2 = 2a^2$

$\therefore \dfrac{p}{q} = \dfrac{a^2}{2a^2} = \dfrac{1}{2}$

09. (C)

Let a = $2^3 \times 3^2 \times 5^2 \times 7$

= ②× 2 × 2 × 3 × 3 ×⑤×⑤×⑦

b = $2 \times 5^2 \times 7^3$ = ②×⑤×⑤×⑦× 7 × 7

$\therefore$ HCF = common factors of both a & b

= 2 × 5 × 5 × 7 = $2 \times 5^2 \times 7$

10. (B) Length of longest pencil

$= \sqrt{l^2 + b^2 + h^2} = \sqrt{12^2 + 4^2 + 3^2}$

$= \sqrt{12^2 + 5^2} = 13\,cm$

11. (C) Let the two numbers be x & y

Given $x + y = \dfrac{1}{x} + \dfrac{1}{y} = \dfrac{x+y}{xy}$

$\therefore xy = \dfrac{(x+y)}{(x+y)} = 1$
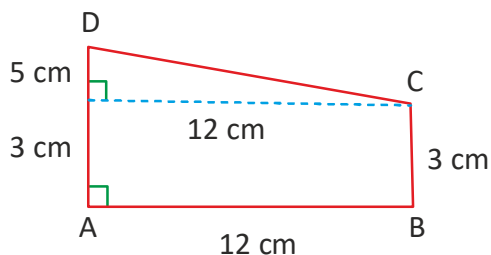
12. (C) $a° = 1 \Rightarrow \dfrac{a}{b} = 0$

$\therefore a = 0 \times b$

$a = 0$

13. (C) $-8x - 5[2x - 3\{-4x + 9\}]$

$= -8x - 5[2x + 12x - 27]$

$= -8x - 5[14x - 27]$

$= -8x - 70x + 135$

$= -78x + 135$

14. (B)

D
5 cm
C
3 cm   12 cm
3 cm
A   12 cm   B

Const : Draw CE // AB

$\therefore$ ABCE is a rectangle

$\therefore$ CE = AB = 12 cm

$\therefore$ AE = BC = 3 cm

$\therefore$ DE = AD − AE = 5 cm

In $\triangle$CDE, $\angle$E = 90°

$\therefore CD^2 = DE^2 + CE^2 = 12^2 + 15^2 =$

CD = $\sqrt{169}$ cm = 13 cm

15. (C) Perimeter = 100 cm = 2 (l + b)

length = 35 cm

$\therefore$ breadth $= \dfrac{100}{2} - 35 = 15$ cm

16. (C) 98765 × 123 + 98765 × 678 + 98765 × 987 + 98765 × 212

= 98765 (123 + 678 + 987 + 212)

= 98765 × 2000

= 19,75,30,000

17. (B) Let the pricipla be 'x'

Given Amount = ₹1,28,800

But $P\left(1 + \dfrac{tr}{100}\right) = A$

$\Rightarrow P\left(1 + \dfrac{2\dfrac{8}{12} \times 15}{100}\right) = ₹\,1,28,800$

$\Rightarrow P\left(1 + \dfrac{\dfrac{8}{3} \times 15}{100}\right) = ₹\,1,28,800$

$P\left(\dfrac{20+8}{20}\right) = ₹\,1,28,800$

$P = ₹\,1,28,800 \times \dfrac{20}{28}$

= ₹ 92,000

18. (C) If a number is divisible by 3 & 4, then it is divisible by its LCM also.

$\therefore$ Option (C) sum of the digits is 78 which is divisible 3.

Last two digits is 20 is divisible by 4.

$\therefore$ Option (C) is divisible by 12.

19. (C) Area of the given figure

= 9 × 1 cm² + 8 × $\dfrac{1}{2}$ × 1 cm²

= (9 + 4) cm² = 13 cm²

20. (A) In $\triangle$ABC, given AB = BC

$\Rightarrow \angle$C = $\angle$A = 35°

But $\angle$ABD = $\angle$A + $\angle$C = 35° + 35° = 70°

21. (C)
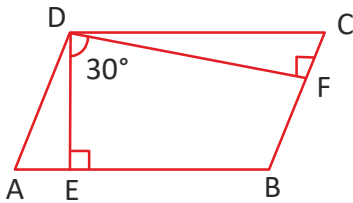
DEBF is a quadrilateral

$\therefore \angle E + \angle EDF + \angle B + \angle F = 360°$

$90° + 30° + \angle B + 90° = 360°$

$\angle B = 360° - 210° = 150°$

But $\angle B + \angle A = 180° \Rightarrow \angle A = 30°$

But $\angle A + \angle ADC = 180°$

$\Rightarrow \angle ADC = 180° - 30° = 150°$

22. (C) Let the CP of each article be ₹ 45 and SP be ₹ 50

$\therefore$ CP of 50 articles = SP of 45 articles

Profit = SP − CP = ₹ 50 − ₹ 45 = ₹ 5

$\therefore$ Profit percentage $= \dfrac{\text{Profit}}{\text{CP}} \times 100$

$= \dfrac{₹\,5}{₹\,45} \times 100 = 11\dfrac{1}{9}\%$

23. (B) The first 10 composite numbers are 4, 6, 8, 9, 10, 12, 14, 15, 16, 18

$\text{Mean} = \dfrac{4+6+8+9+10+12+14+15+16+18}{10}$

$= \dfrac{112}{10} = 11.2$

24. (A) A non isosceles right angled triangle is a scalene triangle

$\therefore$ Number of lines of symmetries = zero

25. (A) $\triangle OBA \cong \triangle OAC$ [$\because$ SAS congruency]

$\Rightarrow \angle OBA = \angle OAC$

Corresponding angles of congruent figures are equal.

PHYSICS

26. (A) Miniature circuit Breakers are switches which are used in the place of fuses. They shut off automatically when the electric current exceeds the safe limit. They can be turned on once again when the circuit is complete.

27. (C) Time = 6 am − 5:20 am = 40 min

Speed = 2 km/min

Distance = Speed × Time

= 2 × 40 = 80 km

Odometer reading = 234562 km + 80 km = 234642 km

28. (D) The glass with the least milk will cool down the fastest. Hence, it will be the one with the lowest temperature, while the glass with the most milk will have the highest temperature. So, the correct order of milk in four glasses with increasing temperature is 4, 2, 1, 3.

29. (C) Statements (I) and (IV) are not true. Set-up X has two batteries and more number of turns of coil. Set-up Y has one battery and few turns of coil. Hence, steel nail in set-up X has attracted more iron pins than in set-up Y.

30. (D) W to O is equal to $\dfrac{1}{4}$th of the oscillation.

Hence, time period = 4 times (W to Y + Y to O) = $4(t_1 + t_2)$.

31. (D) Among the three objects Y has more temperature of 60 °C than objects X 50 °C and Z 40 °C. So, the temperature will flow from object Y to object X and from object Y to object Z as shown below.

X Y Z
50° 60° 40° (C)
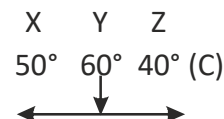
32. (A) X represents the devices which work only based on the principle of heating effect of electric current and Y represents the devices which work on the principle of magnetic effect of electric current. Soldering iron, electric geyser, electric kettle, electric iron, electric bulb, room heaters and electric fuse etc., work based on the heating effect of electric current. Electric bell, crane, loudspeaker, telephone ear piece work based on the magnetic effect of electric current.

33. (A) I. speed; II. position; III. uniform; IV. m/s; V. rotatory

34. (B) As the wax on Rod Y melted first, it is a better conductor of heat compared to Rods X and Z. Rod Y must be made up of metal. Heat travels through metal faster than wood and plastic. The wax on Rod X melted last so it is made up of wood as wood is a poorer conductor of heat compared to metal and plastic.

35. (C) The correct matching is

P - (iii), Q - (iv), R - (i), S - (ii)

Filament of electric bulb - Tungsten

Electric source - Battery

Conductor - Tap water

Insulator - Ebonite

CHEMISTRY

36. (B) In cold polar regions hot rising winds are rare.

37. (C) Statement I is true but statement II is false. Dilute acid contains acid in very less amount and water in large quantity.

38. (C) The correct matching is

M-1, N-4, O-2, P-3

Heating a metal for expanding or expansion is a physical change.

Placing a stone in sunlight is neither a physical nor a chemical change.

Burning of kerosene in stove. Liquid kerosene changing to kerosene vapours on burning. It is a physical change as there is only a change of state from liquid to gaseous state.

Burning of kerosene in stove produces carbon dioxide gas and water vapour along with heat and light. It is a chemical change.

Curdling of milk is a chemical change.

39. (B) Antacid pair which is used to neutralise the acidity in stomach are magnesium hydroxide $Mg(OH)_2$ and aluminium hydroxide $Al(OH)_2$ respectively.

40. (B) Statements I and III are correct. Iron and rust are chemically different and zinc coated iron pipes do not rust easily.

41. (C) Soda water - Acidic, Lime water - Basic, Washing soda - Basic, Toothpaste - Basic, Milk of magnesia - Basic, Shampoo - Basic, Sugar solution - Neutral, Sodium sulphate solution - Neutral.

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

$CuSO_4 + Fe \rightarrow FeSO_4 + Cu$

43. (A) H^+ ions produced by an acid neutralise the OH^- ions produced by a base to form both a neutral salt and water.

44. (C) Burning of paper is not a physical change (1), it is a chemical change as it produces a new substance ash.

45. (C) In test tube Z, the heat in boiling water increases the temperature of air inside the balloon, the air in it expands and thus inflates the balloon Z.

BIOLOGY

46. (C) a – iv; b – i; c – ii; d – iii

Cactus - Autotrophic; Cuscuta - parasitic; Lichens - Symbiotic; Mushroom - Saprophytic

47. (B) Pollen grains, that contain the male gametes, are produced in the anther of a plant.

48. (C) Stigma, style and ovary are associated with female reproductive parts of a flower.

49. (A) The order of flow of urine in human excretory system is : Kidney → Ureter → Bladder → Urethra. The blood containing wastes like urea enters the kidney. These wastes are then transported as urine from the kidney into the ureters. From the ureters, urine passes into the urinary bladder, and ultimately is passed out of the body through urinary opening present at the end of urethra.

50. (A) In unicellular organisms exchange of gases takes place by diffusion through cell membrane.

51. (B) Large ears help in dissipating body heat and thus keep the desert animals cool in hot climate.

52. (B) Pitcher plant can be found in nutrient poor wet lands. In order to obtain enough nutrients for healthy growth, the plants may have adaptations to trap animals.
The pitcher plants have modified leaves to create pitfall traps.
The plants will then secrete digestive juice to digest the insects and absorb the nutrients.

53. (C) The function of the cilia is to produce sweeping movements to remove excess mucus.

54. (C) Fats are absorbed by the lacteals. The lymph in the lacteals has a milky appearance due to its high fat content and is called chyle.

55. (B) During exhalation, the ribs moves down and inward and the diaphragm move up and returns to dome shaped.

CRITICAL THINKING

56. (D)

57. (C) On the basis of the given information and data we can prepare the following table

Floor	Person	Wife
Top	Ram	Anita
Fourth	Pavan	Esha
Third	Srikanth	Bharathi
Second	Uday	Divya
First	Quamra	Fatima
Ground	Tanishq	Chandu

58. (C) Miss Sakshi like to have her room clean as irrespective of who messes it up, she is more inclined to keep her room clean.
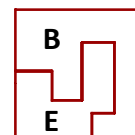
59. (D)

60. (B) Every time the shape turn 45 ° left side.