UNIFIED COUNCIL

An ISO 9001:2008 Certified Organisation

nstse

Test • Assess • Achieve

NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

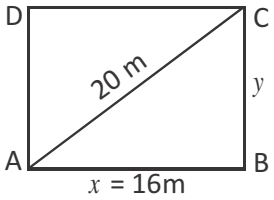
Paper Code: UN426 (UPDATED)

Solutions for Class : 6

Mathematics

1. **(C)** $0.625 = \frac{625}{1000} = \frac{25}{40} = \frac{5}{8}$

2. **(C)** Let the length and the breadth of the field be x and y respectively in metres.



$AC = \sqrt{x^2 + y^2} \Rightarrow \sqrt{16^2 + y^2} = 20$

$\Rightarrow y = 12$ m

3. **(D)** 1056 + (–798) + (–38) + 56

$= (1056 + 56) + (-836)$

$= 1112 - 836 = 276$

4. **(C)** Let numerator = x

$\therefore$ denominator = 3x + 1

As per data given, $\frac{x+1}{3x+1-2} = 0.5$

$\Rightarrow \frac{x+1}{3x-1} = \frac{\cancel{5}^{1}}{\cancel{10}_{2}} = \frac{1}{2}$

$\Rightarrow$ 2(x + 1) = 1(3x – 1)

$\Rightarrow$ 2x + 2 = 3x – 1

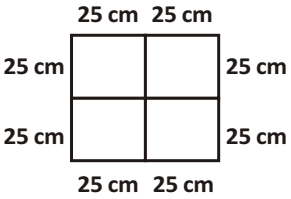
$\Rightarrow$ 3x – 2x = 2 + 1

$\Rightarrow$ x = 3

$\therefore$ Fraction is $\frac{3}{3(3)+1} = \frac{3}{10}$

5. **(D)** Closure and commutative properties do not hold good for division of whole numbers

6. **(D)**



The four square mats are arranged as shown in the figure. So, the area covered = 50 cm × 50 cm = 2500 sq. cm

7. **(C)** Number of equal divisors = 12

Number of shaded regions = 4

fraction = $\frac{4}{12} = \frac{1}{3}$

8. **(D)** Salary of A: salary of B = 8 : 3 = 40 : 15

Salary of B : salary of C = 5 : 12 = 15:36

$\therefore$ The ratio of salaries of A, B and C = 40 : 15 : 36

9. **(C)** A triangle has no diagonal.

10. **(C)** The triangle formed from the given measurements is a scalene triangle.

11. **(A)** Let the number of pencils bought by Shilpa be 'p'. Then the number of pencils Devi bought = 4p

$\therefore$ Total pencils bought = p + 4p = 5p

The number of pencils remaining in the shop = 30.

$\therefore$ Required answer = 5p + 30.

12. **(A)** The numerals that can be repeated in a Roman system are I, X and C.

13. **(B)** total number of sweets the four children have = 30.

Since each  represents 2 sweets, the number of symbols in the pictograph

$= \frac{30}{2} = 15$

13 symbols are already present in the pictograph.

Therefore, Anu has (15 – 13) × 2 sweets

= 2 × 2 = 4 sweets

14. **(C)** LCM of 40, 240 and 480 = 480

HCF of 40, 240 and 480 = 40

difference of LCM and HCF = 480 – 40

= 440 which is twice of 220.

15. **(D)** Since the diagonals of a square are equal and bisect at right angles.

$\therefore$ The triangle AOB is an isosceles right angled triangle.

16. **(C)** No. of 8-digit numbers = smallest 9 - digit no. – smallest 8-digit no.

= 10,00,00,000 – 1,00,00,000

= 9,00,00,000

17. **(A)** If p, q are unequal, the value of p – q is positive when p > q but p – q is negative when p < q.

Hence p = q $\Rightarrow$ p – q = 0 ε W.

Hence whole numbers are closed under substraction if and only if p = q.

18. **(A)** Let the initial length and the breadth of the rectangle be x and y respectively.

$\therefore$ Initial area = xy

Now, new length = $x + x \times \frac{50}{100} = \frac{3x}{2}$

And new breadth = $y - y \times \frac{25}{100} = \frac{3y}{4}$

$\therefore$ New area = $\frac{3x}{2} \times \frac{3y}{4} = \frac{9xy}{8}$

Clearly, new area is more than the initial area.

$\therefore$ Increment in percent in area

$$= \frac{\frac{9xy}{8} - xy}{xy} \times 100\% = 12.5\%$$

19. **(A)** Number of balloons decorated to each table = 10 + 15 = 25

Total tables = 70

$\therefore$ total number of balloons needed

$\Rightarrow$ x = 70 (10 + 15)

20. **(D)** All the given statements are false

21. **(C)** Boundary of the plot (perimeter)

= 2(l + b) units

= 2(30 + 15) m

= 90 m

Distance between two vertical stones = 10 m

No. of stones required to cover the boundary = 90 $\div$ 10 = 9

22. **(A)** Let the initial length and width are l and b respectively.

Final length = $l \times \frac{160}{100}$

Final width = b' (say)

Initial area = final area

$$l \times b = l \times \frac{160}{100} = b' \Rightarrow b' \frac{100}{160} b = \frac{5}{8} b$$

Percentage decriment in width

$$= \frac{b - b'}{b'} \times 100 = \frac{b - \frac{5}{8}b}{b} \times 100\%$$

= 37.5%

23. **(A)** – 4, – 3, – 2 and – 1 are the integers between – 5 and 0. There are no positive integers.

24. **(D)** If the length of the diagonals are not equal, then the quadrilateral can be a rhombus but not a square.

25. **(B)** 27 × x = 9 × 9

$$x = \frac{9 \times 9}{27}$$

x = 3

Physics

26. **(A)** When S1 and S2 are closed, electric current can flow through the circuit to light up two red bulbs and two green bulbs. When S1 and S3 are closed, three red bulbs and one green bulb will light up. When S2 and S3 are closed, only two red bulbs and one green bulb will light up. When all the three switches are closed, all the bulbs will light up.

27. **(D)** All the given examples in common are in circular motion.

28. **(D)** As the Sun appears to move across the sky, the shadows cast by an object will point in different directions at different times of the day.

    Early in the morning, the Sun is low in the eastern horizon, so a long shadow pointing to the west is cast. At noon, the Sun is directly overhead, so a short shadow is cast. In the late afternoon, the Sun is low in the western horizon, so a long shadow pointing to the east is cast.

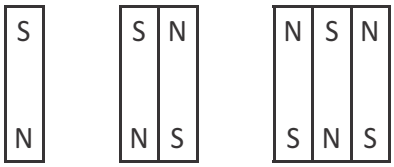
29. **(D)** Only steel nails and nickel pins are magnetic materials and therefore they can be separated by magnetic attraction.

30. **(C)** A student travelled 10 km in first hour, 15 km in second hour and 20 km in third hour respectively. The total distance travelled by him is 10 + 15 + 20 = 45 km.

31. **(A)** Bulbs in circuit P glow the brightest as the batteries are connected in series and the bulbs receive the most amount of electric current. Bulbs in circuit R glow the dimmest as the batteries are connected in parallel and the bulbs receive the least amount of electric current. Bulbs in circuit Q receive half of the electric current than the bulbs in circuit P receives while bulbs in circuit R receive only one-quarter of the electric current than the bulbs in circuit P receives.

32. **(B)** The Moon is a non-luminous object as it does not emit light of its own.

33. **(D)** Like poles of magnets repel. Unlike poles of magnets attract.



34. **(C)** Both the metal tip and metal casing of the bulb must be connected to the wires for electric current to flow through to light up the bulbs. Bulbs in set ups P,R and S light up as they are properly connected. Only one bulb in set-up Q will light up. The other bulb in set up Q has no contact with the two terminals of the battery.

35. **(B)** 1 km = 1000 m and 39 km = 39000 m

    Other conversions are incorrect.

36. **(A)** **P** and **Q** are permanent magnets as pole 2 of **P** repels pole 3 of **Q**. **R** is not a magnet as pole 6 is attracted by both the poles 1 and 2 of magnet **P**. **R** is just an object made of a magnetic material.

37. **(B)** Iron, copper and aluminium being metals are good conductors of heat and electricity.

38. **(D)** The strongest magnet is the one with the short string, the most number of attracted pins and is the farthest away from the tray of pins.

39. **(A)** Student 'S's house is nearest to the school.

40. **(D)** A transparent object does not cast a shadow. Shadows are cast only if the objects block light. The formation of shadows is not dependent on the object's weight or space.

41. **(D)** A solar cell can generate electric current when kept in sunlight but not when kept in the dark.

42. **(B)** An opaque object blocks light completely. It will cast a dark shadow. A translucent object blocks light partially. It will cast a lighter shadow. A transparent object does not block light but allows light to pass through it completely. It will not cast a shadow. A shadow has no mass and does not occupy space. All shadows are dark or light irrespective of the colour of the light, the colour of the object or the colour of the surface on which the shadow is formed.

43. **(A)** PQ is a bar magnet, while metal bar RS is a magnetic material and not a magnet. RS will be attracted to both the sides of PQ and vice-versa. Magnetic materials do not have poles, hence, option (B), (C) and (D) are not correct.

44. **(D)** Light rays travel in straight lines and many light rays together are called a beam of light.

45. **(D)** To increase the speed of a fan in a circuit, the amount of electric current in the circuit must also be increased. Batteries of higher electrical energy can be connected to the circuit. More batteries can also be connected in series to the circuit. Changing the position of the fan in the circuit does not increase the amount of electric current flowing in the circuit.

46. **(A)** As 1 decimetre is equal to 0.1 metre, it is smaller than a metre.

1 kilometre = 1000 metres

1 hectometre = 100 metres

1 decametre = 10 metres

1 decimetre = 0.1 metre

1 centimetre = 0.01 metre

1 millimetre = 0.001 metre

47. **(D)** Both chalk and sand are insoluble in water and can be separated by filtration. Sugar is water soluble and therefore cannot be separated by filtration.

48. **(C,D)** If S-pole of a bar magnet is stroked on an iron nail from left to right, the right side of an iron nail will become the N-pole. Hence, it will be attracted to S-pole of the compass. If S-pole of a bar magnet is stroked on an iron nail from right to left, the right side of an iron nail will become the S-pole. Hence, it will be attracted to N-pole of the compass.

49. **(D)** A ruler is used to measure the length of small objects.

50. **(A)** The filament of an electric bulb is usually made up of a thin wire with many coils.

Chemistry

51. **(D)** Oxygen, air and steam are gases. The other groups contain a mixture of solids, liquids and gases.

52. **(D)** Carbon is not a plastic. It is a non-metallic element.

53. **(D)** Dissolve the mixture of sand and sulphur in carbon disulphide solution in a beaker. Sulphur dissolves in carbon disulphide and heavier sand settles at the bottom of the beaker. Pour sand particles in water to remove traces of CS_2 and filter to get sand crystals.

54. **(D)** When a substance in burnt, the original substances (reactants) change to form an entirely new substance or substances called products.

55. **(D)** The glass in set-up II has less water because the fan will speed up the process of evaporation.

56. **(A)** Glass, plastic and metals do not absorb water.

57. **(D)** All the given examples use filtration techniques.

58. **(B)** Air occupies the space inside the 'empty' beaker. As the funnel prevents the air in the beaker from escaping, oil cannot flow into the beaker.

He can lift up the funnel slightly so that air can escape through the gaps between the funnel and the beaker. This will enable oil to flow into the beaker easily.

59. **(D)** Statements (A), (B) and (C) explain the process of condensation.

60. **(A)** Metals are extracted from the earth and are not made by man.

61. **(C)** Solid 'P' being lighter and an impurity can be separated by winnowing to obtain a pure, heavier solid 'Q'.

62. **(C)** Rubber is obtained from the sap of rubber trees.

Silk is obtained from animals such as silkworm.

63. **(B)** Growth of a new plant from a seed involves several changes. As it takes few days/months, it is a slow change.

64. **(B)** Water has no definite shape but has a definite volume.
Air has no definite shape but has a definite volume. It will take up all the remaining space in the bottle.
As water has taken up ($\frac{1}{4}$ × 1000 cm^3 =) 250 cm^3 of the space in the bottle, the volume of the remaining space will be (1000 cm^3 – 250 cm^3 =) 750 cm^3. The 200 cm^3 of air pumped in will spread out to occupy the remaining space in the bottle. [NOTE: 1 cm^3 = 1 ml]

65. **(D)** Rubber is used to make tyres, edge of handle bar and brake pads in a bicycle. Metal is used to make complete frame work of a bicycle. Plastic is used to make seat cover and insulating wire to a dynamo in the bicycle.

66. **(D)** 'P' is in solid state as it has gone through the freezing process. 'Q' is in liquid state as P has melted and changed to liquid. 'R' is in gaseous state as Q has evaporated and converted to gaseous water vapour.

67. **(D)** By preventing rusting of iron objects, they will last longer and are safe for use.

68. **(C)** Light from the sun is absorbed by the green plants to carry out photosynthesis. This process occurs in the presence of chlorophyll by using carbon dioxide from air and water from the ground.

69. **(C)** Salt is a solid. It dissolves in liquid water to form a salt solution. It is a mixture of solid-in-liquid.

70. **(D)** The water cycle does not only occur in the day or the night. It occurs continuously regardless of time. The water cycle is important to all the living things as living things cannot survive without water.

Biology

71. **(D)** Plants loose water through leaves by transpiration. Hence, shedding of leaves, needle shaped and waxy leaves help to prevent transpiration and save water in plants that tend to loose a lot of water in hot weather.

72. **(B)** Rabbit is called prey. An animal that is hunted and killed by another for food.

73. **(D)** Ginger has modified stem to store food.

74. **(D)** Moist skin, lungs and webbed toes help frog to live both on land and water.

75. **(A)** Insects have jointed appendages. They are arthropods. Artho means joints and Poda means legs.

76. **(C)** Camel stores fat in its hump. It can be broken down when it needs energy.

77. **(C)** Part 'X' in the given plant is a modified root. Food is made by the leaves of the plants and is transported to all parts of the plant.

78. **(C)** Skeleton protects our delicate parts. It gives shape. Without it, we are like an empty sack. It gives us support like the pillars of a building.

79. **(A)** The flow chart shown in the question is the sequential representation of silk production.

80. **(D)** Biodegradable waste is converted to organic manure by the action of decomposers in compost pits.

81. **(C)** Cartilage is a flexible connective tissue which is less rigid than bones but stiffer than muscle. They can be found at the ear, the nose and joints between bones.

82. **(B)** White of an egg is rich in proteins. Proteins turn to violet when copper sulphate and caustic soda are added to it.

83. **(C)** The spinal cord is protected by the backbone which is labelled R in the figure.

84. **(D)** Deficiency of vitamin C is called Scurvy. The symptoms of this disease are swollen and bleeding gums.

85. **(D)** Snake and mouse have skeletal system.

86. **(D)** The longitudinal and transverse section of ovary, i.e., lowermost swollen part of pistil shows ovule. It is a structure that gives rise to and contains the female reproductive cells.

87. **(B)** I is fixed joint, II is Hinge joint, III is Ball and socket joint. Knee can be placed in group II.

88. **(C)** Mahatma Gandhi's movement for charkha was aimed at building a new economic and social order based on self-sufficient, non-exploitative village communities of the past.

89. **(B)** The given figure shows the process of photosynthesis. Arrow labelled Q represents oxygen.

90. **(C)** The correct sequence in the formation of an organism is Cell → Tissue → Organ → System → Organism.

91. **(B)** 92. **(C)** 93. **(C)**

94. **(C)** 95. **(D)** 96. **(B)**

97. **(D)** 98. **(C)** 99. **(D)**

100. **(B)**