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NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION - UN401 (UPDATED)

Solutions for Class: 6

Mathematics

1. (A) No. of angles smaller than $90^\circ = (3 \times 4) + 4$
 $= 12 + 4$
 $= 16$

No. of right angles = 8

\Rightarrow Their difference = $16 - 8 = 8$

2. (A) Consider four positive even consecutive numbers to be 2, 4, 6 and 8. Their sum is x (Given).

$$\therefore x = 20$$

Now the sum of 2nd and 3rd numbers is $4 + 6$

$$= 10 = \frac{20}{2} = \frac{x}{2}$$


\therefore The sum of second and third integers is

$$\frac{x}{2}$$

3. (B) Total cost of 'x' pencils = ₹ $4x$
 Total cost of 'y' sharpeners = ₹ $3y$
 \therefore Amount to be paid = ₹ $(4x + 3y)$
4. (C) $\triangle ABC$ is right angled at B.
 $\therefore \angle ACB < 90^\circ$, Also, $\angle C$ in the square CDEF = 90° .
 $\angle ACB + \angle DCF < 180^\circ$
 Therefore $a + b = 360^\circ - (\angle ACB + \angle DCF)$
 $\Rightarrow a + b > 180^\circ$
 Hence, **$a + b > \angle ACB + \angle DCF$**

5. (D) Figure A represents $\frac{1}{4}$ shaded part and $\frac{3}{4}$ unshaded part.
 No. of parts in figure B = 20.
So, $\frac{1}{4} \times 20 = 5$ parts should be shaded in figure B.

6. (B) If $ab = 0$ then $a = 0$, or $b = 0$ or $a = b = 0$.
 7. (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 $(15 - 13) \times 2$ sweets = $2 \times 2 = 4$ sweets

8. (C) Length of a rectangular play ground = 250 m
 Its breadth = 120 m
 Perimeter of a rectangle = $2(l + b)$
 Length of wire needed for the fence
 $= 2(250 + 120)$ m
 $= 2(370)$ m
 $= 740$ m

\therefore The length of the wire needed to fence the play ground is 740 m.

9. (D) The only prime number between 90 and 100 is 97.
 \therefore The required sum is **97**.
10. (C) The vertical distance of the mine from the peak = $(6300 + 39060)$ m = **45360 m**.
11. (B) A line intersecting two or more lines at different points is called a transversal. **In the given figure line f is the transversal.**
12. (B) Let the number be 100.
 25% increase in 100 is 125.

$$20\% \text{ decrease in } 125 \text{ is } \left(\frac{100 - 20}{100} \right) \times 125$$

$$= \frac{80}{100} \times 125 = 100 \text{ which is the resultant number.}$$

The resultant number (100) is 100% of the original number (100).

13. (C) Redraw the figure such that $PQ > RS$.



Checking the given inequalities:-

I) $PQ > QR$ may or may not be correct.

II) $PR > QS$ is clearly true, as $PQ > RS \Rightarrow PQ + QR > QR + RS \Rightarrow PR > QS$.

III) $PR > RS$ is true as $PQ > RS$ and $PR = PQ + QR$.

Hence both II and III are correct.

14. (B) Ratio of areas of P & Q is 4 : 9.

Area of P = 144 sq cm

Area of Q = x sq cm (Suppose)

$\therefore 4 : 9 :: 144 : x$

$\Rightarrow x = 324$ sq cm

\Rightarrow Side of Q = 18 cm [Since $324 = 18 \times 18$.]

\therefore Perimeter of Q = 18×4 cm = **72 cm**

15. (C) Area of square = $s \times s = 3 \times 3$ cm² = 9 sq cm

Area of 25 squares = 25×9 cm² = **225 sq cm**

16. (B) Area of square P is 16 sq. units.

\Rightarrow Side = 4 units

\therefore Perimeter = 16 units

Perimeter of P is $\frac{2}{3}$ the perimeter of Q.

\Rightarrow Perimeter of Q = $\frac{3}{2} \times 16$ units
= 24 units

Perimeter of Q is $\frac{2}{3}$ the perimeter of R

\Rightarrow Perimeter of R = $\frac{3}{2} \times 24$ units
= 36 units

\Rightarrow Side of R = 9 units

\therefore Area of R = **81 sq. units**

17. (C) If the radius is increased by 3 times then diameter increases by 3 times.

r	d
r	$2r$
$3r$	$2 \times 3r = 6r$ $= 3(2r)$

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

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

The number of pencils remaining in the shop = 30.

\therefore No. of pencils in the shop before the girls bought pencils is **$5p + 30$** .

19. (B) $A = -2014$; $B = 2014$

$A + B = |-2014 + 2014| = 0$

$A + B = -2014 + 2014 = 0$

$\therefore |A + B| = A + B$ is true.

20. (A) Consider four consecutive multiples of 8 – 16, 24, 32 and 40.

Then $a = 16$, $b = 24$, $c = 32$ and $d = 40$.

$\therefore (a - c)(d - b) = (16 - 32)(40 - 24)$

= $(-16)(16)$

= **(-256)**

21. (A) Total length of rope = $36\frac{1}{3}$ m = $\frac{109}{3}$

Sum of lengths of three parts

= $\left(12\frac{2}{5} + 13\frac{1}{2} + 5\frac{4}{15}\right)$ m

= $\left(\frac{62}{5} + \frac{27}{2} + \frac{79}{15}\right)$ m

= $\left(\frac{372 + 405 + 158}{30}\right)$ m

= $\frac{935}{30}$ m

Length of rope left out = $\left(\frac{109}{3} - \frac{935}{30}\right)$ m

= $\left(\frac{1090 - 935}{30}\right)$ m

= $\frac{155}{30}$ m

= $\frac{31}{6}$ m = $5\frac{1}{6}$ m

22. (D) A perfect number has the sum of all its factors equal to twice itself.

$2 \times 6 = 1 + 2 + 3 + 6$ and $2 \times 28 = 1 + 2 + 4 + 7 + 14 + 28$. **So, 6 and 28 are perfect numbers.**

23. (D) The sum of any two sides of a triangle must be greater than the third side. So, the length of the third side + 5 must be greater than 7.

\Rightarrow The third side must be greater than 2.

The smallest integer greater than 2 is 3

\Rightarrow The third side of the triangle is 3 cm.

The smallest possible perimeter of the triangle = $(3 + 5 + 7)$ cm = **15 cm**

24. (C) According to the given graph, the amount spent on Thursday is ₹ 70.

Rina bought 2 packets of sweets on Thursday.

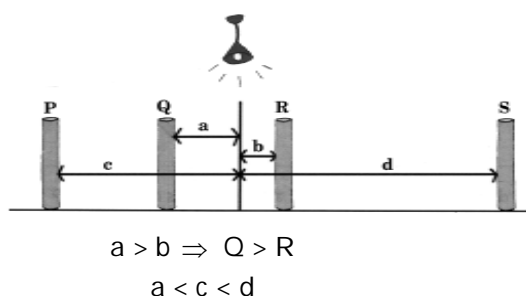
∴ The cost of each sweet packet

$$= \frac{₹ 70}{2} = ₹ 35$$

25. (A) Least prime number : Least composite number
= 2 : 4
= 1 : 2

Physics

26. (A) Chemical energy is stored in an accumulator.
27. (B) The type of motion that does not occur at regular intervals of time is known as non-periodic motion. Examples of this motion are the eruption of a volcano, earthquake, landslide, storm, etc.
28. (C) Length of the shadow of an object depends on its distance from the source of light



∴ Length of the shadow at P lies between the lengths of shadows at Q and S. Clearly, $12 < 16 < 21$

∴ Length of the shadow at P = 16 cm

29. (C) When a bar magnet is cut into four equal parts and joined again using quick fix, then each cut part of the magnet forms both the poles. The unlike poles of the four parts attract each other and behave as one ordinary bar magnet as shown below.



30. (D) A bundle of rays originating from the flash of a camera are incident on an object. But none of the incident rays get reflected on the mirror to obtain a clear image of the object. Hence, the photograph of the image formed will not show anything except white colour.
31. (A) A measuring tape has standard markings of length. Hence, it is used to find the length between the bowler and the wickets.
32. (C) The metals used to make button cells are nickel and cadmium.
33. (B) Symbols of units are usually written in small letter, in singular form and followed by a full stop only when they are at the end of a sentence, if necessary.

34. (D) From 9 hours, the length of the shadow decreases till noon. At 12 noon, the sun is right above the object, so the shadow is diminished. The length of the shadow increases from noon to 17 hours.

35. (C) Generally, non-metals are bad conductors of heat and electricity but graphite, a form of carbon is a good conductor of electricity. It allows the flow of current through it.

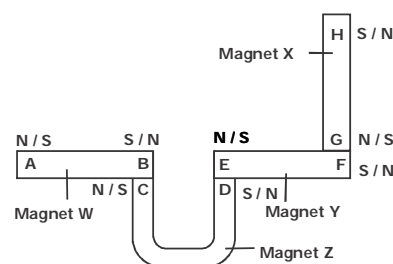
36. (D) The wheels of a bicycle rotate about their axis which results in the forward, linear motion of a bicycle on a straight road. A combination of rotatory and linear motion called the resultant motion is exhibited by the bicycle.

37. (A) The figure shown in box 'Y' represents the rectilinear propagation of light as light rays travel in a straight line..

38. (A) A cricket ball delivered by the bowler exhibits both linear and spin motion.

39. (D) In magnets, the force of attraction is maximum at the poles.

40. (C) Poles A and C repel. Poles E and H attract as per the given figure.



41. (D) Alphabets C, K, Z, D, J, N, G, P and R undergo lateral inversion as shown.



Alphabets A, H, V undergo lateral inversion when viewed through a plane mirror but appear to be the same as shown.



42. (D) An eel produces small amount of electric current in its body to scare its enemies by giving shocks.

43. (A) Rani can see full image including her feet in a mirror due to reflection of light. Light rays from her feet incident on the mirror get reflected which enables to see her feet in the mirror.

44. (B) From the given figures, option (B) shows the correct arrangement of batteries in a torch light.

Three batteries are arranged in series inside the torch light. The positive terminal is in contact with the bulb of torch light and its negative terminal is in contact with the positive terminal of the second battery. The

negative terminal of the second battery is in contact with the positive terminal of the third battery.

45. (C) The correct length of 1 foot = 304.8 mm, as
 $1 \text{ foot} = 12 \text{ inches} = 12 \times 2.54 \text{ cm} = 30.48 \text{ cm} = 304.8 \text{ mm}$
46. (C) Option (C) shows the correct grouping of objects based on the medium through which light rays travel.
- (i) Air is a transparent substance through which light rays travel totally.
 - (ii) Ground glass is a translucent substance through which light rays travel partially.
 - (iii) Brick is an opaque object. So, light rays cannot travel through them totally.
47. (C) The part labelled P is the shiny surface around the bulb in the torch light which acts as a reflector. Due to the black painting on it, the intensity of light from the bulb decreases when the torch light is switched on.
48. (A) When the switch is closed in the given set up, four bulbs are lighted up. Glass rod placed in the middle of the circuit being transparent allows light to pass through it. Hence, no shadow is formed.
49. (B) Alnico, an alloy made up of aluminium, nickel and cobalt is used to make permanent magnets.
50. (A) Among the given figures, a swing in motion shows oscillatory motion.
- Chemistry
51. (B) The conversion of a solid directly into a gas is called sublimation e.g. ammonium chloride, iodine, etc.
52. (D) Porcelain is not a combustible material. Wood, paper and husk are examples of combustible materials.
53. (D)
- (i) A piece of cloth dipped in kerosene burns vigorously.
 - (ii) When an electric bulb is switched on, it glows instantaneously.
 - (iii) When a few drops of sodium chloride solution are added to a solution of silver nitrate, a white precipitate of silver chloride is formed immediately.
 - (iv) The fermentation of grape juice, resulting in wine, is an example of a slow change.
54. (B) When excess sugar is added to a glass of water at room temperature, water dissolves required amount of sugar and forms a saturated sugar solution. Remaining sugar crystals form a sediment and settle down at the bottom of the glass.
55. (C) The correct sequence is
 Milk – Contaminated water
 Mustard seeds – Argemone seeds
 Black pepper – Papaya seeds
 i – q, ii – r, iii – p.
56. (C) Examples of periodic change are
- (i) Rotation of the moon on its axis.
 - (ii) Halley's comet appears once in 76 years.
 - (iii) Revolution of the earth around the sun takes $365\frac{1}{4}$ days.
- Thunder and lightning do not take place at regular intervals of time.
57. (B) In 30 days, water consumption is 6000 litres.
- In 1 day, water consumption is $\frac{6000}{30}$ litres
 $= 200 \text{ l}$
 Average consumption for 4 members per day
 $= 200 \text{ l}$
 \therefore Average consumption for 1 member per day
 $= \frac{200}{4} \text{ l} = 50 \text{ l}$
58. (A) Various types of flours are separated by using a sieve. A sieve separates flour and bran due to the difference in the size of their particles.
59. (C) Rubber is preferred over metals for making soles of shoes because it is more flexible than metals and can be easily cut into required shapes. Metals are expensive, they break on wear and tear and cause injuries. Also, there is a chance of slipping, if soles are made of metals.
60. (D) Solid wax on heating changes to liquid. On cooling it changes to solid again. Melting of wax is a reversible change.
61. (A) Metals are strong, hard and shiny. They are good conductors of heat and electricity. They can be made into sheets and wires. They produce sound when struck with other bodies.
62. (C) We can observe the visible change of shape of the moon everyday from the new moon day to the full moon day.
63. (D) The processes which add water vapour to the atmospheric air are evaporation and transpiration.
64. (A) Oil in the liquid form vapourises slowly at the wick in the earthen lamp which continues to keep the lamp burning once it is lighted.
65. (B) Statements (A), (C) and (D) are false of crystallisation.
66. (A) As air is a bad conductor of electricity overhead cables need not be insulated.

67. (C) When copper sulphate crystals are added to water, they dissolve to form a blue coloured solution.
68. (B) When Calcium oxide (quick lime) is dissolved in water, it forms Calcium hydroxide (slaked lime) and gives out a large amount of heat. It is an example of exothermic reaction.
69. (C) Grains are separated from husk by winnowing. Iron filings get attracted to a magnet leaving behind sand. Ammonium chloride on heating changes directly to gas. Common salt does not undergo sublimation.
70. (B) By using aluminium, we can make an alloy called Alnico which is used for making permanent magnets. So, it can be placed under group X.
71. (C) Sweet potato is a root part of the plant.
72. (C) Hinge joint is similar to a hinge on a door. It helps unidirectional movement. Examples are joint at elbow, knee, fingers and toes.
73. (A) A root anchors the plant to the ground. It absorbs water and mineral salts from the soil.
74. (C) Thick fur and a thick layer of fat underneath the skin protect the bear from cold. Thick fur on bear makes it hard to spot it in white snow and webbed toes help them to swim.
75. (A) Chloroplast traps sunlight to make food for the plant. Stomata help in exchange of gases and allow excess water to evaporate from the leaves.
76. (C) A dolphin and a whale are mammals. They are aquatic animals, that breathe through their lungs and give birth to young ones and suckle them.
77. (C) When you have a broken leg, the tibia is fractured.
78. (D) A bat is a mammal. It has hair on its body. The characteristic feature of a bird is the presence of feathers.
79. (C) The given description refers to the skeletal system.
80. (C) Ant, man, crow and rat are omnivores.
81. (B) P → Grass is a plant that is able to make its own food.
Q → Mould is a non green plant that feeds on decaying organic matter.
R → Frog is a heterotroph that feeds on plants and on other animals.

Biology

82. (C) Broccoli is the flower part of a plant.
83. (D) Gram is a pulse.
84. (C) Meat is a good source of protein
85. (C) Deficiency of vitamin A leads to night blindness (Poor night vision).
86. (C) Roughage for humans refers to dietary fibre. It is found in vegetables and fruits and is needed in the human body to eliminate wastes as it helps in the production of mucus.
87. (A) Each anther has four pollen sacs, two in each of the lobes on the anther. Each pollen sac is filled with powdery pollens or pollen grains.
88. (B) Q is a plant. Plant is an autotroph.
89. (B) A rib cage is formed by 12 pairs of curved ribs.
90. (A) All the bones in cranium are fixed. It is made of eight large flat bones, joined together by fixed joints known as sutures.

