

KH J-2023

Exam for
Young Scientists..!



SCIENCE APTITUDE TEST

CLASS 7

ANSWER KEY WITH SOLUTION

DATE : 08.10.23

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Vasna - Bhayli Branch : Akshar Pavilion,
3rd Floor, Tower A, Vasna Bhayli Road, Gotri
Opp. Bhyali TP - 1 Vadodara - 390021

Manjalpur Branch : SF-1 TO 12, Kabir Plaza,
Beside Kabir Complex, Above IDBI Bank, Manjalpur,
Vadodara - 390010 .

Anand Branch : 2nd Floor, HR Stone Building,
Beside Croma Showroom, A.V. Road, Nr. Town Hall,
Anand.

www.iitashram.com | Email :- iitashram.2011@gmail.com

ALKAPURI

9081062221 / 9033063029

VASNA-BHAYLI

6358891896 / 9081062221

MANJALPUR

9033063027 / 9033063028

ANAND

9227777098 / 8460009041

PART - I : MENTAL ABILITY

1.

Sol. (b) Position from guard's cabin = $25 - 13 + 1 = 13$ th

2.

Sol. (d) 6 times

3.

Sol. (d) Note the direction of arrow which changes alternately. The dots are also changing alternately. Hence, we are looking for a figure in which the arrow points down and the dots are positioned as problem figure second.

4.

Sol. (d) By observation.

5.

Sol. (b) By observation.

6.

Sol. (d) Clearly, figure (d) will complete the pattern when placed in the blank space of figure (X) as shown below.

7.

Sol. (c) 26

$$\begin{array}{cccccc} 1, & 10, & 17, & 22, & 25, & \\ +9 & +7 & +5 & +3 & +1 & \end{array}$$

8.

Sol. (c) AH, DL, GP, JT, **MX**

A, D, G, J, M

H, L, P, T, X

9.

Sol. (c) $3 \times 3 + 6 \times 5 = 39$

$$7 \times 5 + 4 \times 4 = 51$$

$$5 \times 5 + 3 \times 4 = 37$$

10. (d)

Sol. IN, ACTIVE

11.

Sol. (c) C A S T L E

5 6 4 1 3 2

12.

Sol. (d) Soap is used for washing cloth and soap is called ink.

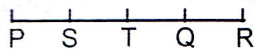
13.

Sol. (b) By counting

14.

Sol. (c) Organ

15..

Sol. (d) On the basis of information, we have the arrangement of the persons in a line as under-**PART - II : MATHEMATICS**

1.

Sol. (a) $p = q + 1$
 $= q - p - 4$
 $= q - (q + 1) - 4$
 $= - 5$

2.

Sol. (d) $\frac{3}{8} \div \left(\frac{15-4}{24}\right) = \frac{3}{8} \div \frac{11}{24} = \frac{3}{8} \times \frac{24}{11} = \frac{9}{11}$

3.

Sol. (d) $11.1 \times 1.1 \times 0.11 = 1.3431$

4.

Sol. (b) Cost of $4\frac{1}{2}$ cloth is = $98\frac{3}{4}$
 \therefore cost of 1 m cloth = $98\frac{3}{4} \div 4\frac{1}{2} = \frac{395}{18}$

5.

Sol. (d) 694728
 (using divisibility rule of 8)

6.

Sol. (c) Because 117, 171 divisible by 9 and 169 is divisible by 13

7.

Sol. (b) $= 43 \times 78 = 40 \times 80 = 3200$

8.

Sol. (a) $9 \times (-16) + (-12) \times (-16)$
 $(-16) \times [9 + (-12)]$
 $(-16) \times (-3) = 48$

9.

Sol. (b) $\frac{5}{12} = \frac{5 \times 7}{12 \times 7} = \frac{35}{84}$

10.

Sol. (b) $\frac{37}{1000} m = 0.037$

11.

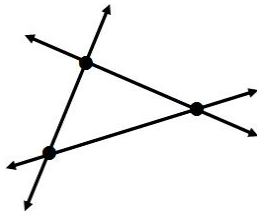
Sol. (a) Largest angle = $\frac{5}{10} \times 180 = 90^\circ$

12.

Sol. (b) $8.5 + 8.5 + 7 = 24 \text{ cm}$

13.

Sol. (d)



Maximum = 3 points

14.

Sol. (b) 3 : 1

[S_1, S_2 are sides are P_1, P_2 are perimeter of square]

$$\frac{S_1^2}{S_2^2} = \frac{9}{1} \Rightarrow \frac{S_1}{S_2} = \frac{3}{1} \Rightarrow \frac{4S_1}{4S_2} = \frac{3}{1} \quad \text{So, } \frac{P_1}{P_2} = \frac{3}{1}$$

15.

Sol. (b) 36

$$\frac{a+b+c}{3} = 6 \Rightarrow a+b+c = 180 \quad \Rightarrow \quad a = \frac{1}{4} \times (b+c) \Rightarrow 4a = b+c$$

$$\therefore a + 4a = 180 \Rightarrow 5a = 180 \Rightarrow a = 36$$

16.

Sol. (d)

$$(x) + (x + 1) + (x + 2) + (x + 3) = 70$$

$$4x + 6 = 70$$

$$4x = 70 - 4$$

$$4x = 64$$

$$x = \frac{64}{4} = 16$$

$$x = 16$$

17.

Sol. (c)

RHS property

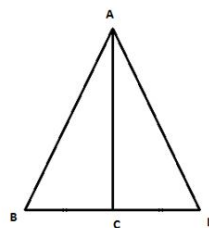
In the given triangle,

$$AB = AD \text{ (Given)}$$

AC is the common side

$$\angle ACB = \angle ACD = 90^\circ$$

Hence, by RHS congruence rule, the two triangles are congruent.



18.

Sol. (a) $\angle ADB = \angle CDB$, $\angle ABD = \angle CBD$; $BD = BD$
corresponding parts of congruent triangles are equal

19.

Sol. (c) at least two acute angles

20.

Sol. (a) P and R only

21.

Sol. (c) 80°

$50^\circ + \angle QPR = 130^\circ$ Alternate angles

$\therefore \angle QPR = 80^\circ$

22.

Sol. (a) If two straight lines intersect, the measures of the vertically opposite angles are equal.

23.

Sol. (c) point T

24.

Sol. (b)

To find the ratio of two numbers, we have to consider their fraction. Here, the numbers are 96 m and 72 m, then we have:

$$\frac{96 \text{ m}}{72 \text{ m}} = \frac{96}{72} = \frac{4}{3} = 4 : 3$$

Hence, the ratio of 96m and 72m is 4:3.

25.

Sol. (b) $60 \times \frac{2}{5} = \text{Rs.} 24 \quad \Rightarrow \quad 60 \times \frac{3}{5} = \text{Rs.} 36$

Difference = $36 - 24 = \text{Rs.} 12$

26.

Sol. (c) The ratio is a method in which we compare the two similar quantities by dividing them and check how much one value contains or is contained within the other.

27.

Sol. (b)

Let number of boys be x and number of girls be y .

Then, it is given that, $\frac{x}{y} = \frac{7}{4}$

$$\Rightarrow 4x = 7y \quad \dots\dots\dots (1)$$

$$x - y = 21$$

$$\Rightarrow x = 21 + y \quad \dots\dots\dots (2)$$

Substituting (2) in (1), we get,

$$4(21 + y) = 7y$$

$$\Rightarrow 7y - 4y = 84 \quad \Rightarrow y = \frac{84}{3} = 28 \quad \text{Hence, } x = 21 + y = 49 \quad \text{Therefore, } x + y = 49 + 28 = 77$$

28.

Sol. (a) x, y

29.

Sol. (d) 1

30.

Sol. (d) perimeter of pentagon: $5 \times \text{side} = 5 \times 5 = 25 \text{ cm}$

PART - III : PHYSICS & CHEMISTRY

1.

Sol. (b) The slope of a distance-time graph represents the speed of an object. From the graph, it is clear that slope of vehicle A is greater than that of vehicle B and hence vehicle A is moving faster than vehicle B.

2.

Sol. (b) Angle of reflection - The angle between reflected ray and the normal at the point of incidence to a reflecting surface is known as angle of reflection.
Angle of incidence = $90^\circ - 35^\circ = 55^\circ$. By law of reflection, angle of incidence is equal to angle of reflection. Hence $i = r = 55^\circ$

3.

Sol. (d) Characteristics of a Shadow:

- * The size of images depends upon the position of source of light and screen from the object.
- * It can be smaller, equal or bigger than the object.

4.

Sol. (c) Magnet can either pull or push another magnet, depending on which way the poles of magnets point.

5.

Sol. (b) Heat is a form of energy. It is not a force

6.

Sol. (d) Effects of electric current:

When current flows in a circuit it exhibits various effects. The main effects are given below:

- * Production of the magnetic field due to a current flowing through a coil.
- * When current flows through a conducting solution, chemical reactions take place in the solution. This effect is called the chemical effect of electric current.
- * When an electric current is passed through a conductor, the conductor becomes hot after some time and produces heat. This is called the heating effect of current.

7.

Sol. (b) We know that energy (heat) is given to the water, to convert it into vapour (called vaporisation). It means vapour has more energy than water. In the formation of rain, the reverse process takes place (called condensation), therefore vapour releases the heat to convert itself into water.

8.

Sol. (a) Tungsten is used in electric bulb because it has high melting point. Thus tungsten filament does not melt even when a large amount of heat is produced due to passage of current through the filament (via heating effect of current).

9.

Sol. (c) Celsius and Fahrenheit are two scales used to measure temperature. The temperature in the centigrade scale will be expressed in degrees Celsius. The temperature in the Fahrenheit scale will be expressed in degrees Fahrenheit. Relation between $^{\circ}\text{C}$ and $^{\circ}\text{F}$ is given by $\frac{\text{C}}{100} = \frac{\text{F} - 32}{180}$. As both the thermometers show the same reading, the temperature is 40°C which is equal to 40°F .

10.

Sol. (c) m/s^2 is the SI unit of Acceleration. Acceleration is the rate of change of velocity with time. Velocity is the rate of change of displacement with time. Time is measured in seconds (s), displacement in metres (m). The units of velocity are metre per second: $\text{m/s} = \text{ms}^{-1}$. The unit of acceleration is metre per second per second: $\left(\frac{\text{m/s}}{\text{s}}\right) = \text{ms}^{-2}$.

11.

Sol. (b) Mixing sugar and water (Explanation: Mixing sugar and water is a physical change as no new substance is formed.)

12.

Sol. (c) Methane (Explanation: Methane is produced during the decomposition of organic matter in sewage.)

13.

Sol. (c) Sodium bicarbonate (Explanation: Baking soda's chemical name is sodium bicarbonate.)

14.

Sol. (b) A chemical change (Explanation: Changing colour due to a chemical reaction indicates a chemical change.)

15.

Sol. (a) HCl (Explanation: The chemical formula of hydrochloric acid is HCl.)

16.

Sol. (c) Citric acid (Explanation: Lemon juice contains citric acid.)

17.

Sol. (a) Sodium chloride and water (Explanation: The reaction between hydrochloric acid and sodium hydroxide produces sodium chloride and water.)

18.

Sol. (d) Water softening (Explanation: The process of removing calcium and magnesium ions from hard water is called water softening.)

19.

Sol. (b) Carbon dioxide (Explanation: Carbon dioxide turns lime water milky due to the formation of calcium carbonate.)

20.

Sol. (b) Distillation (Explanation: Distillation is the process of separating components based on their boiling points.)

PART - IV : BIOLOGY

1.
Sol. (c)
 1. The plant which catches insects and feeds on them is the pitcher plant.
 2. The numerous carnivorous plants in the pitcher plant family have modified stems named pitfall traps.
 3. Insectivorous plants trap nutrient-rich insects because they grow in shallow soil which is nutrient-deficient.
2.
Sol. (b) Light, temperature, and carbon dioxide are all considered external influences, however, chlorophyll is considered an internal component because it is found within the plant's own body. As a result, chlorophyll is the internal element that has an impact on the photosynthetic process.
3.
Sol. (a) The liver is the largest gland in the human body. It is also the largest (internal) organ in our body and can weigh up to 1.5 kg for a human adult.
4.
Sol. (c) Water is the primary component of food absorbed in the large intestine. The primary function of the large intestine is to reabsorb water and electrolytes from the remaining indigestible material and form feces, which are then eliminated from the body via the rectum and anus.
5.
Sol. (d) The tip of the tongue is most sensitive to sweet and salty substances, the side to sour, while the back is most sensitive to bitter taste.
6.
Sol. (b) When the breakdown of glucose occurs with the use of oxygen it is called aerobic respiration. Food can also be broken down, without using oxygen called anaerobic respiration.
7.
Sol. (a) Cellular respiration is the process by which cells break down molecules for energy. The cells use oxygen to break down food in the form of glucose to produce water and release carbon dioxide. In this reaction, energy is produced in the form of ATP which is used by the cell for its various activities.
8.
Sol. (b) Platelets are tiny blood cells that help your body form clots to stop bleeding. If one of your blood vessels gets damaged, it sends out signals to the platelets. The platelets then rush to the site of damage and form a plug (clot) to fix the damage.
9.
Sol. (a) A stethoscope is an instrument used to amplify the sound of the heartbeat. It is used to hear the heartbeats in the chest by placing its chest piece in the appropriate place.
10.
Sol. (a) The vegetative propagation in sweet potatoes takes place by the roots which produce shoots or producing buds.