



SCIENCE APTITUDE TEST

CLASS
9

ANSWER KEY WITH SOLUTIONS

DATE : 05.01.25

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PART - I : MENTAL ABILITY

1.

Sol: (a)

8, 11, 15, 22, 33, 51, ?, 127, 203.

 $t_1, t_2, t_3, t_4, t_5, t_6, t_7, t_8, t_9.$ $t_2 - t_1 = 3, t_3 - t_2 = 4, t_4 - t_3 = 7, t_5 - t_4 = 11,$ $t_6 - t_5 = 18, t_7 - t_6 = ?, t_7 = 51 + 11 + 18 = 80$

2.

Sol: (b)

RAT = $9 + 26 + 7 = 42$ CAT = $24 + 26 + 7 = 57$ LATE = $15 + 26 + 7 + 22 = 70$

3.

Sol: (b)

V A R S T E

1 2 3 4 5 6

STARVE is the word

Starve Meaning : to suffer.

4.

Sol: (d)

Brother

5.

Sol: (a)

2100 is not divisible by 400

6.

Sol: (d)

2006 → Ordinary year 1 odd day

1 Jan 2006 → Sunday

1 Jan 2007 → Monday

1 Jan 2008 → Tuesday

1 Jan 2009 → Thursday

1 Jan 2010 → Friday

7.

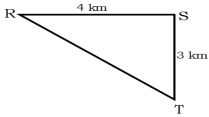
Sol: (d)

$$\left| 30H - \frac{11}{2}M \right| = 100 \quad \therefore \left| 30(2) - \frac{11}{2}M \right| = 100 \quad \therefore \left| 60 - \frac{11}{2}M \right| = 100 \quad \therefore \frac{11}{2}M - 60 = 100$$

$$\therefore \frac{11}{2}M = 160 \quad \therefore M = \frac{320}{11} = 29 \frac{1}{11} \quad \text{Time : } 2 : 29 \frac{1}{11}$$

8.

Sol: (b)



$$RT = 5 \text{ km}$$

By pythagoras them.

9.

Sol: (c)

$$(9 \times 0.7) + (9 \times 0.4) + (0.7)(0.4) = 50.9$$

$$(12 \times 0.6) + (12 \times 0.5) + (0.6)(0.5) = 67.5$$

$$(1.1 \times 2.3) + (1.1 \times 0.7) + (2.3)(0.7) = 24.55$$

10.

Sol: (c)

By observation

11.

Sol: (c)

By observation

12.

Sol: (a)

To obtain equal pieces, cuts must be made parallel to 3 planes.

Let us assume a, b and c cut made along three planes such that there will be

$$(a + 1)(b + 1)(c + 1) = m \text{ pieces \& } a + b + c = 7$$

From several combination (2, 2, 3) will give us max. value.

13.

Sol: (d)

$$\text{LCM}(2, 4, 5) = 20$$

Least no. of identical cuboids

$$= \frac{20 \times 20 \times 20}{2 \times 4 \times 5} = 10 \times 5 \times 4 = 200$$

14.

Sol: (b)

By observation.

15.

Sol: (a)

$$\frac{(36 - 4) \div 8 - 4}{4 \times 8 - 2 \times 16 + 1} \text{ (BODMAS)}$$

$$= \frac{32 \div 8 - 4}{32 - 32 + 1} = \frac{4 - 4}{0 + 1} = \frac{0}{1} = 0$$

PART - I : MATHEMATICS

1.

Sol: (b)

$$1 - 10 + 36 - 49 + 24 = 61 - 59 = 2$$

2.

Sol: (a)

$$\frac{(3.7)^2 + (2.3)^2 + 2(3.7)(2.3)}{(4.6)^2 - (3.4)^2} = \frac{((3.7) + (2.3))^2}{(4.6 - 3.4)(4.6 + 3.4)} = \frac{6^2}{1.2 \times 8} = \frac{6 \times 6 \times 10}{12 \times 8} = \frac{15}{4} = 3\frac{3}{4}$$

3.

Sol: (d)

$$\frac{3x^3 + 9x^2 + 27x}{3x} = \frac{3x}{3x}(x^2 + 3x + 9) = x^2 + 3x + 9$$

4.

Sol: (a)

$$(5x + 2)(5x) - x \cdot 2x - 3x \cdot x = 25x^2 + 10x - 2x^2 - 3x^2 = 20x^2 + 10x$$

5.

Sol: (a)

By observation, 2005 yr.

6.

Sol: (b)

$$d(AB) = \sqrt{(-5 - 7)^2 + (0 - 0)^2} = \sqrt{(-12)^2} = \sqrt{144} = 12 \text{ units}$$

7.

Sol: (b)

$$\begin{aligned} & x^2 + 5\sqrt{3}x + 12 \\ = & x^2 + 4\sqrt{3}x + \sqrt{3}x + 12 = x(x + 4\sqrt{3}) + \sqrt{3}(x + 4\sqrt{3}) = (x + 4\sqrt{3})(x + \sqrt{3}) \end{aligned}$$

8.

Sol: (d)

$$\begin{aligned} & x^3 + \frac{1}{x^3} + 2 \\ = & x^3 + \frac{1}{x^3} - 1 + 3 = x^3 + \frac{1}{x^3} + (-1)^3 - 3(-1)(x)\left(\frac{1}{x}\right) = \left(x + \frac{1}{x} - 1\right)\left(x^2 + \frac{1}{x^2} + 1 - 1 + x + \frac{1}{x}\right) \\ = & \left(x + \frac{1}{x} - 1\right)\left(x^2 + \frac{1}{x^2} + x + \frac{1}{x}\right) \end{aligned}$$

9.

Sol: (a)

$$\left(x + \frac{1}{x}\right)^3 = (\sqrt{3})^3 \Rightarrow x^3 + \frac{1}{x^3} + 3 \cdot x \cdot \frac{1}{x} \left(x + \frac{1}{x}\right) = 3\sqrt{3} \Rightarrow x^3 + \frac{1}{x^3} + 3\sqrt{3} = 3\sqrt{3}$$

$$\Rightarrow x^3 + \frac{1}{x^3} = 0$$

10.

Sol: (c)

Remaider

$$= 2\left(\frac{-1}{2}\right)^3 + 5\left(\frac{-1}{2}\right)^2 - 4\left(\frac{-1}{2}\right) - 6 \Rightarrow = 2\left(\frac{-1}{8}\right) + \frac{5}{4} + 2 - 6 \Rightarrow = \frac{-1}{4} + \frac{5}{4} - 4 = 1 - 4 = -3$$

11.

Sol: (a)

$$\begin{aligned} & (x^2 + 5)^2 - (3x)^2 \\ &= x^4 + 10x^2 + 25 - 9x^2 \\ &= x^4 + x^2 + 25 \end{aligned}$$

12.

Sol: (a)

$$\frac{1}{2} \times 1\% = \frac{1}{2} \times \frac{1}{100} = \frac{0.5}{100} = 0.005$$

13.

Sol: (c)

$$\frac{40}{100} \times 1640 + x = \frac{35}{100} \times 980 + \frac{150}{100} \times 850$$

$$\begin{aligned} \therefore 4 \times 164 + x &= \frac{35 \times 98}{10} + 15 \times 85 & \therefore 656 + x &= 7 \times 49 + 1275 & \therefore x &= 1275 + 343 - 656 \\ &= 1618 - 656 = 962 \end{aligned}$$

14.

Sol: (a)

$$\frac{SP}{1200} = \frac{88}{100}$$

$$\therefore S.P. = 12 \times 88 = 1056$$

15.

Sol: (d)

$$\text{Difference} = \frac{PR^2}{100^2} = P\left(\frac{R}{100}\right)^2$$

$$\therefore 144 = P\left(\frac{15}{100}\right)^2 \Rightarrow P = \frac{100}{15} \cdot \frac{100}{15} \cdot 144 \Rightarrow = \frac{20}{3} \cdot \frac{20}{3} \cdot 144 = 20 \cdot 20 \cdot 16 = 6400$$

16.

Sol: (a)

Population after 3yrs

$$= 25000 \left(\frac{104}{100}\right) \left(\frac{105}{100}\right) \left(\frac{108}{100}\right) = 29484$$

17.

Sol: (c)

Let $x = \text{C.P}$ & $\text{Profit}\% = y$

$$\therefore \frac{340}{x} = \frac{100 + y}{100} \Rightarrow \frac{34000}{x} = 100 + y$$

$$\therefore \frac{350}{x} = \frac{105 + y}{100} \Rightarrow \frac{35000}{x} = 105 + y$$

$$5 = \frac{1000}{x} \Rightarrow x = 200$$

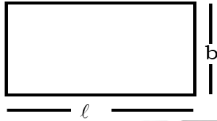
18.

Sol: (d)

$$\text{Cost} = 5.5 \times 3.75 \times 800 = 16500$$

19.

Sol: (a)



$$2b + 2\frac{l}{2} = 34 \Rightarrow 2b + l = 34$$

$$\Rightarrow 2\frac{b}{2} + 2l = 38 \Rightarrow b + 2l = 38$$

$$\Rightarrow l = 14 \text{ \& } b = 10$$

$$\therefore l.b = 140 \text{ cm}^2$$

20.

Sol: (b)

$$\text{Distance} = \frac{15}{2} \times 7 = \frac{105}{2} \text{ m}$$

time = 9 sec.

$$\text{Speed} = \frac{\text{Distance}}{\text{time}} = \frac{105}{2 \times 9} \text{ m/s} = \frac{105}{2 \times 9} \times \frac{18}{5} = 21 \frac{\text{km}}{\text{hr}}$$

21.

Sol: (d)

$$\text{Radius} = \frac{\text{side}}{\sqrt{3}} = \frac{12}{\sqrt{3}} = 4\sqrt{3}$$

22.

Sol: (b)

$$\frac{r}{h} = \frac{2}{3} \Rightarrow h = \frac{3r}{2} \Rightarrow h = \frac{3 \times 14}{2} = 21 \text{ cm}$$

$$\pi r^2 h = 12936 \text{ cm}^3 \Rightarrow \frac{22}{7} \times r^2 \cdot \left(\frac{3r}{2}\right) = 12936 \Rightarrow r^3 = \frac{12936 \times 14}{22 \times 3} = 2744 \therefore r = 14 \text{ cm}$$

$$\text{TSA (Cylinder)} = 2\pi r(r + h) = 2 \times \frac{22}{7} \times 14 \times (35) = 3080 \text{ cm}^2$$

23.

Sol: (b)

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

$$6x^2 + 2x + 9x + 3 = 6x^2 - 3x - 2x + 1$$

$$11x + 3 = 1 - 5x$$

$$16x = -2$$

$$x = -\frac{1}{8}$$

24.

Sol: (b)

$$x^2 + 10x + 21 = 2x^2 - 4x - 30$$

$$\therefore x^2 - 14x - 51 = 0$$

$$\therefore (x - 17)(x + 3) = 0$$

$$\therefore x = 17 \text{ or } -3$$

25.

Sol: (b)

$$4a + 5b + 9c = 36 \dots\dots\dots \text{Given}$$

$$8a + 10b + 18c = 72 \dots\dots \text{(i) multiplying by (2)}$$

$$7a + 9b + 17c = 66 \dots\dots \text{(ii)}$$

$$a + b + c = 6 \dots\dots \text{Equation(i)-(ii)}$$

26.

Sol: (c)

$$\frac{3^{(2n+2)} \cdot 3^n - 3^{3n}}{3^{3m} \cdot 2^3} = \frac{1}{3^3}$$

$$\frac{3^{3n} \cdot 9 - 3^{3n}}{3^{3m} \cdot 2^3} = 3^{-3}$$

$$3^{3n-3m} = 3^{-3}$$

$$\therefore 3n - 3m = -3$$

$$\therefore m - n = 1$$

27.

Sol: (d)

$$\frac{2^n}{2} + 2^n \cdot 2 = 320$$

$$\therefore 2^n \left(\frac{5}{2} \right) = 320$$

$$\therefore 2^n = 128 = 2^7$$

$$\therefore n = 7$$

28.

Sol: (b)

x^{y^z}	X	Y	Z	x. y. z
2^{8^1}	2	8	1	16
256^{1^1}	256	1	1	256
16^{2^1}	16	2	1	32

etc....

$$\therefore \text{Max. of (x.y.z)} = 256$$

29.

Sol: (a)

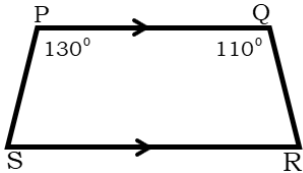
$$15376$$

$$= 4 \times 4 \times 31 \times 31$$

$$\therefore \sqrt{15376} = 4 \times 31 = 124$$

30.

Sol: (a)



$$\angle Q + \angle R = 180^\circ$$

$$\angle R = 180^\circ - \angle Q = 180^\circ - 110^\circ = 70^\circ$$

31.

Sol: (c)

Each exterior angle = 180° - each interior angle

$$\therefore \frac{360}{n} = 180 - 135 = 45$$

$$\therefore n = \frac{360}{45} = 8$$

32.

Sol: (a)

$$\angle BDC = 45^\circ \text{ \& \; } \angle DCM = 60^\circ$$

$$\therefore x = \angle BDC + \angle DCM = 45^\circ + 60^\circ = 105^\circ$$

33.

Sol: (c)

$$\frac{1}{a} + \frac{1}{b} = \frac{2 - \sqrt{3}}{1} + \frac{2 + \sqrt{3}}{1} = 4$$

34.

Sol: (a)

$$\sqrt[6]{7} = \sqrt[12]{49} = a$$

$$\sqrt[4]{3} = \sqrt[12]{27} = b$$

$$\sqrt[12]{48} = \sqrt[12]{48} = c$$

$$b < c < a$$

35.

Sol: (b)

 $\triangle BAP \cong \triangle CAP$ SSS congruency

$$\therefore \angle BAP = \angle CAP$$

$$\therefore \angle BAP = \frac{1}{2} \angle BAC$$

36.

Sol: (a)

$$\angle a = 3x \text{ \& \ } \angle b = 2x$$

$$\therefore 3x + 2x = 90^\circ \text{ as } \angle Q = 90^\circ$$

$$\therefore 5x = 90^\circ$$

$$\therefore x = 18^\circ$$

$$\therefore \angle a = 54^\circ \text{ \& \ } \angle b = 36^\circ$$

Now, $\angle a + \angle p + \angle b + \angle c = 180^\circ$ cointerior angle.

$$\therefore 54 + \angle p + 100^\circ = 180^\circ$$

$$\begin{aligned} \therefore \angle p &= 180^\circ - 100^\circ - 54^\circ \\ &= 80^\circ - 54^\circ = 26^\circ \end{aligned}$$

37.

Sol: (b)

By definition

38.

Sol: (a)

$$\angle BAC = 90^\circ$$

$$\therefore \angle ABC + 65^\circ = 90^\circ$$

$$\therefore \angle ABC = 90^\circ - 65^\circ = 25^\circ$$

39.

Sol: (a)

$$\begin{aligned} \angle ADC &= \angle DAP + \angle APD \\ &= 30^\circ + 45^\circ = 75^\circ \end{aligned}$$

$$\angle ABC = \angle ADC = 75^\circ \text{ Angles in the same segment}$$

$$\therefore \angle CBP = 180^\circ - \angle ABC = 180^\circ - 75^\circ = 105^\circ$$

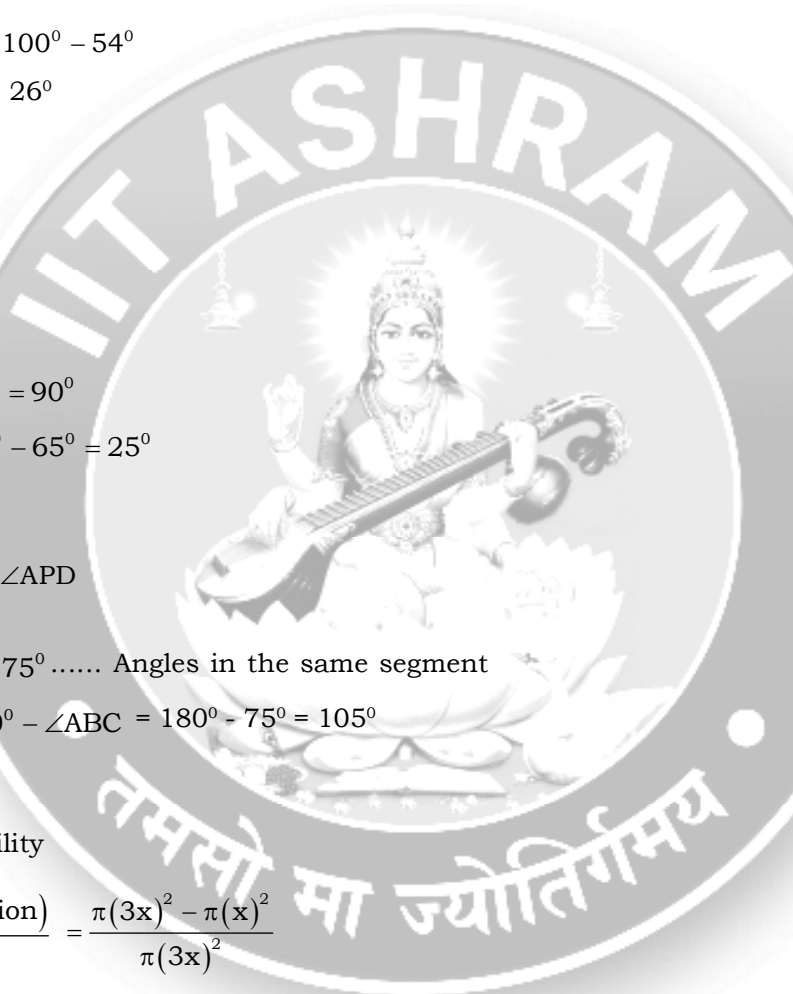
40.

Sol: (b)

Required probability

$$= \frac{\text{Ar}(\text{shaded region})}{\text{Ar}(\text{circle})} = \frac{\pi(3x)^2 - \pi(x)^2}{\pi(3x)^2}$$

$$= \frac{9x^2 - x^2}{9x^2} = \frac{8}{9}$$



PART - III : PHYSICS & CHEMISTRY

1.

Sol: (d) Newton.

Newton is a unit of force, not distance.

2.

Sol: (b)

Total distance = 100 km + 50 km = 150 km

Total time = 2 hours + 1 hour = 3 hours

Average speed = Total distance / Total time = 150 / 3 = 50 km/h

3.

Sol: (b)

The slope of the displacement-time graph for uniform motion is velocity.

4.

Sol: (b)

Using the equation of motion: $h = ut + \frac{1}{2}gt^2$ $h = \frac{1}{2}gt^2$ ($\because u = 0$) $t = (2h/g)^{1/2}$ $t = 2 \text{ Sec}$

5.

Sol: (c)

Relative speed = 15 + 25 = 40 m/s

Total distance = 100 + 100 = 200 m

Time = Distance / Speed = 200 / 40 = 5 s

6.

Sol: (b)

Impulse = Change in momentum.

7.

Sol: (b)

A body is in equilibrium when the resultant force acting on it is zero.

8.

Sol: (c)

When the bus moves with constant velocity, the ball continues to have the same horizontal velocity as the bus. It falls back into the person's hand.

9.

Sol: (b) 10 N.

$$F = ma = m \frac{(V - u)}{t} = \frac{5(0 - 8)}{4} = -10 \text{ N s}$$

10.

Sol: (a)

The SI unit of work is Joule.

11.

Sol: (a)

Momentum = Mass \times Velocity

For the same momentum, the lighter object will have a higher velocity.

12.

Sol: (d)

The speed of sound depends on temperature, density, and elasticity of the medium.

13.

Sol: (a)

The SI unit of pressure is Pascal.

14.

Sol: (b)

According to Archimedes' principle, the upward force is equal to the weight of the liquid displaced.

15.

Sol: (b)

The gravitational force between the two objects will remain F .

The gravitational force depends only on the masses, the distance between them, and the gravitational constant. It does not depend on the medium in which the objects are placed. Therefore, filling the space with a liquid of density d does not affect the gravitational force.

16.

Sol: (c) They can slide past one another.

Explanation: Liquid particles have less strong intermolecular forces than solids, allowing them to flow.

17.

Sol: (c) Particles collide with the walls.

Explanation: Gas particles are in constant motion and exert pressure due to collisions with the walls of the container.

18.

Sol: (b)

Evaporation causes cooling because it absorbs heat from the surroundings to convert liquid into vapor.

19.

Sol: (d) It is homogeneous.

Explanation: A solution is a homogeneous mixture where solute particles are evenly distributed in the solvent.

20.

Sol: (b)

Mixtures can be separated physically; compounds require chemical methods.

21.

Sol: (b) Carbon dioxide and water

Explanation: Complete combustion produces carbon dioxide and water as the only products.

22.

Sol: (b) It produces carbon monoxide and soot.

Incomplete combustion occurs due to insufficient oxygen and produces harmful byproducts like carbon monoxide and soot.

23.

Sol: (b) White phosphorus

White phosphorus has a low ignition temperature and can ignite spontaneously in air.

24.

Sol: (c) Potassium

25.
Sol: (b) Sodium
26.
Sol: (d) Zinc
27.
Sol: (c) Silver
28.
Sol: (a)
Aluminum atom loses 3 electrons, so Al^{3+} has 10 electrons and retains its 13 protons.
29.
Sol: (c)
Calcium (Ca^{2+}) combines with two chloride ions (Cl) to form CaCl_2 .
30.
Sol: (a)
The number of protons in Ca^{2+} remains 20 (same as the atomic number of calcium)



PART - IV : BIOLOGY

1.
Sol: (c) A is true, but R is false.
Xylem indeed transports water and minerals, but it is made up of tracheids, vessels, xylem parenchyma, and xylem fibers-not sieve tubes and companion cells (these are components of phloem).
2.
Sol: (a) Both statements are true.
Frogs exhibit external fertilization, where male and female gametes are released into water and fuse outside the body.
3.
Sol: (c) *Vibrio cholerae*
Prokaryotic cells lack a true nucleus and membrane-bound organelles, characteristics of bacteria. *Vibrio Cholerae* is an example of bacteria.
4.
Sol: (b) Transporting food
Phloem conducts food from leaves (where it is synthesized) to other parts of the plant.
5.
Sol: (b) Tendon
Tendons are strong, fibrous connective tissues that connect muscles to bones, aiding movement.
6.
Sol: (a) Squamous epithelium
Squamous epithelial cells are thin and flat, allowing efficient diffusion of substances.

7.

Sol: (b) Crop rotation

Crop rotation prevents soil exhaustion by alternating crops that require different nutrients.

8.

Sol: (b) Fixing atmospheric nitrogen

Rhizobium bacteria form a symbiotic relationship with leguminous plants, fixing nitrogen into a usable form for the plant.

9.

Sol: (b) Airtight containers

Airtight containers prevent moisture and pests, preserving grains effectively for long periods.

10.

Sol: (b) Yeast

Yeast ferments sugars to produce alcohol and carbon dioxide, a process widely used in industries.

11.

Sol: (b) Malaria

Malaria is caused by the protozoan Plasmodium, transmitted by the female Anopheles mosquito.

12.

Sol: (b) Protect endangered species

Wildlife sanctuaries provide a safe environment for animals, conserving biodiversity and preventing extinction.

13.

Sol: (a) 1973

Project Tiger was initiated in 1973 to conserve tigers and their habitats.

14.

Sol: (c) Cow

Viviparous animals give birth to live young, as opposed to laying eggs.

15.

Sol: (b) Exchange of nutrients and gases

The placenta is an organ that facilitates the exchange of nutrients, gases, and waste between the mother and fetus.