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UDAAN

A QUEST FOR SCIENCE ASPIRANTS

SCIENCE APTITUDE TEST

CLASS - 9

SOLUTIONS

EXAM DATE : 21.12.25

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PART - I : MENTAL ABILITY

1.

Sol. (b) 13

The series is: 2, 3, 5, 7, 11, ?, 17

These are prime numbers. The missing prime number between 11 and 17 is 13.

2.

Sol. (d) None of these

Given: A = +, B = -, C = ÷, D = ×

18 A 12 C 6 D 2 B 5 = 18 + 12 ÷ 6 × 2 - 5 = 18 + 2 × 2 - 5 = 18 + 4 - 5 = 22 - 5 = 17

3.

Sol. (b) QLPNMF

13479 → AQFJL and 5268 → DMPN

1 → A, 3 → Q, 4 → F, 7 → J, 9 → L 5 → D, 2 → M, 6 → P, 8 → N

So: 3 → Q, 9 → L, 6 → P, 8 → N, 2 → M, 4 → F

396824 → QLPNMF...

4.

Sol. (d) 14

First Row: 32, 35, 39

- Difference: 35 - 32 = 3
- Difference: 39 - 35 = 4

Second Row: 42, 46, 51

- Difference: 46 - 42 = 4
- Difference: 51 - 46 = 5

Third Row: 3, 8, ?

- Difference: 8 - 3 = 5
- Next difference = 6
- Missing number = 8 + 6 = 14

5.

Sol. (b) 15 km

Let us draw Anil's path step by step:

Step 1: Anil goes 10 km South (downwards)

Step 2: He turns right (now facing West - left side) and goes 5 km

Step 3: He turns right again (now facing North - upwards) and goes 10 km

- Now he is at the same height as his home, but to the left side

Step 4: He turns left (facing West again - left side) and goes 10 km

- Now he is even more to the left of his home D rawing the path:

Final position: Anil is 15 km to the left of his home (5 km + 10 km = 15 km)

He is at the same level as his home (because he went 10 km down, then 10 km up) Straight distance = 15 km

6.

Sol. (c) 56 : 26

Pattern: Second number = (First number - 2) divided by 2

(a) 32 : 15 = (32-2)/2 = 15

(b) 86 : 42 = (86-2)/2 = 42

(c) 56 : 26 = (56-2)/2 = 27

(not 26) (d) 74 : 36 = (74-2)/2 = 36 ?

7.

Sol. (b) 10

Counting all straight lines in the triangle figure:

- Horizontal lines = 4
- Left slanting lines = 3
- Right slanting lines = 3

Total = 4 + 3 + 3 = 10

8.

Sol. (a) 4

From the dice views:

- View (i): 3 is adjacent to 5 and 6
- View (ii): 3 is adjacent to 6 and 1
- View (iii): 3 is adjacent to 2 and 1

Numbers adjacent to 3: 1, 2, 5, 6 Number NOT adjacent to 3: 4

Therefore, 3 is opposite to 4.

Verification: Opposite faces add to

$7 \rightarrow 3 + 4 = 7$

9.

Sol. (c) Court

Sailor works on Ship, Lawyer works in Court.

10.

Sol. (d) 5 & 6

Graduates (triangle) AND social organizations (circle) = regions 5 and 6.

11.

Sol. (d) 6

Graduates in social organizations ONLY (not in professional) = region 6.

12.

Sol. (a) 5 and 7

Graduates (triangle) AND professional organizations (square) = regions 5, 7.

13.

Sol. (b) YWRK

CEJQ $\rightarrow$ XVQJ (reverse alphabets)

C $\rightarrow$ X, E $\rightarrow$ V, J $\rightarrow$ Q, Q $\rightarrow$ J

BDIP $\rightarrow$ YWRK

14.

Sol. (a) 8 kms

15.

Sol. (c) 4

PART - II : MATHEMATICS

1.

Sol. (c) $24\sqrt{5}$ cm

Sides: a=35, b=54, c=61

Semi-perimeter: $s = \frac{35+54+61}{2} = 75$ cm

Area by Heron's formula:

$A = \sqrt{[s(s-a)(s-b)(s-c)]}$

$= \sqrt{[75\times40\times21\times14]}$

$= \sqrt{[75\times11760]} = \sqrt{882000} = 420\sqrt{5}$ cm²

Longest altitude corresponds to shortest side

$h = \frac{2A}{\text{base}} = 2\times420\sqrt{\frac{5}{36}} = 24\sqrt{5}$ cm

2.

Sol. (d) 96^0

In cyclic quadrilateral, opposite angles sum to 180°.

$\angle A + \angle C = 180°$,(2x+4) + (4y-4)

= 180 2x + 4y = 180 ... (i)

$\angle B + \angle D = 180°$, (x+10) + (5y+5)

= 180 x + 5y = 165 ... (ii)

From (ii): x = 165-5y Substitute in

(i) : 2(165-5y) + 4y = 180 330 - 10y + 4y = 180

-6y = -150 y = 25

$\angle C$ = 4y-4 = 4(25)-4 = 96°

3.

Sol. (a) 100^0

AB is diameter, CD || BA $\Delta BAC = 20°$

Since AB is diameter,

$\angle ACB = 90°$, $\angle ABC$= 180° - 90° - 20° = 70°

Since CD||AB, $\angle ACD = \angle BAC = 20°$

(alternate angles) $\angle COD = 2\times\angle CAD$

$= 2\times20° = 40°$

4.

Sol. (a) 8.5 cm

In trapezium, line joining midpoints of non-parallel sides:

$$PQ = \frac{AB + CD}{2} = \frac{10+7}{2} = 8.5 \text{ cm}$$

5.

Sol. (b) 18^0

Given: y = 5x and z = 4x

Angles in triangle: x + y + z = 180°,

x + 5x + 4x = 180° ,10x = 180°, x = 18°

6.

Sol. (b) 50^0

Linear pair: a + b = 180°,

Given: a - 2b = 30°

From first: a = 180° - b, Substitute:

(180°-b) - 2b = 30° ,180° - 3b = 30°,

3b = 150°, b = 50°

7.

Sol. (d) 4

Given: (2,0) is solution of

2x + 3y = k ,2(2) + 3(0) = k, k = 4

8.

Sol. (b) 95^0F

C = (5F-160)/9, 35 = (5F-160)/9,

315 = 5F - 160 ,5F = 475, F = 95°F

9.

Sol. (d) Rs 248

First km: Rs 20, Remaining 19 km: 19×12 = Rs 228,Total: 20 + 228 = Rs 248

10.

Sol. (d) $(x^2 + xy + y^2)(x^2 - xy + y^2)$

$x4 + x^2y^2 + y4$

Add and subtract x^2y^2

$x4 + 2x^2y^2 + y4 - x^2y^2 = (x^2 + y^2)^2 - (xy)^2$

$= (x^2 + y^2 + xy)(x^2 + y^2 - xy)$

$= (x^2 + xy + y^2)(x^2-xy+y^2)$

11.

Sol. (b) $8y^3$

$(x+y)^3 - (x-y)^3 - 6y(x^2-y^2)$

$= x^3+3x^2y+3xy^2+y^3 - (x^3-3x^2y+3xy^2-y^3) - 6x^2y+6y^3$

$= x^3+3x^2y+3xy^2+y^3 - x^3+3x^2y-3xy^2+y^3 - 6x^2y+6y^3$

$= 6x^2y - 6x^2y + 8y^3 = 8y^3$

12.

Sol. (c) 0

$x/y + y/x = -1$

$\Rightarrow (x^2+y^2)/xy = -1$

$\Rightarrow x^2+y^2 = -xy$

$\Rightarrow$ Now, $x^3-y^3 = (x-y)(x^2+xy+y^2) = (x-y)(xy-xy)$

$= (x-y)0 = 0$

$x^3-y^3 = 0.$

13.

Sol. (a) 108

$x^3 + y^3 + z^3 - 3xyz$

$= (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$

$x^2 + y^2 + z^2 = (x + y + z)^2 - 2(xy + yz + zx)$

$= 81 - 46 = 35$

$x^3 + y^3 + z^3 - 3xyz = 9(35 - 23) = 9 \times 12 = 108$

14.

Sol. (b) $(x + 1)(x - 2)(x^2 - x + 1)(x^2 + 2x + 4)$

$x6 - 7x^3 - 8$ Let $y = x^3$ $y^2 - 7y - 8$

$= (y - 8)(y + 1) = (x^3 - 8)(x^3 + 1)$

$= (x - 2)(x^2 + 2x + 4)(x + 1)(x^2 - x + 1)$

15.

Sol. (b) 189

Step 1: First, let us find the value of $x + 1/x$

We know the formula: $(x + 1/x)^2$

$= x^2 + 1/x^2 + 2$

Let $x + 1/x = a$

Then: $a^2 = 34 + 2$ $a^2 = 36$ $a = 6$

Therefore: $x + 1/x = 6$

Step 2: Now we will find $x^3 + 1/x^3$

Using the formula: $(x + 1/x)^3$

$= x^3 + 1/x^3 + 3(x + 1/x)$

Substituting $x + 1/x = 6$:

$6^3 = x^3 + 1/x^3 + 3 \times 6$

$216 = x^3 + 1/x^3 + 18$

$x^3 + 1/x^3 = 216 - 18$

$x^3 + 1/x^3 = 198$

Step 3: Find the final answer

$x^3 + 1/x^3 - 9 = 198 - 9 = 189$

16.

Sol. (d) 3

$a + b + c = 0$ means $a^2 + b^2 + c^2$

$= -2(ab + bc + ca)$

$$\frac{a^2}{bc}+\frac{b^2}{ca}+\frac{c^2}{ab}=\frac{a^3+b^3+c^3}{abc}$$

Since $a + b + c = 0$: $a^3 + b^3 + c^3 = 3abc$

Therefore: $\frac{3abc}{abc} = 3$

17.

Sol. (b) 6 cm

Intersecting chords theorem:

$\Rightarrow$ $AP \times PB = CP \times PD$

$\Rightarrow$ $3 \times 4 = 2 \times PD$

$\Rightarrow$ $PD = 6$ cm

18.

Sol. (a) 100

$$\frac{83^3 + 17^3}{83^2-83\times17+17^2}$$

Using $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$$= \frac{(83 + 17)(83^2 - 83 \times 17 + 17^2)}{(83^2 - 83 \times 17 + 17^2)}$$

$= 83+17 = 100$

19.

Sol: (b) 98

$$x = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} = \frac{\left(\sqrt{3}+\sqrt{2}\right)^2}{3 - 2} = 3+2\sqrt{6}+2=5+2\sqrt{6}$$

$$y = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}+\sqrt{2}} = \frac{\left(\sqrt{3}+\sqrt{2}\right)^2}{3 - 2} = 3-2\sqrt{6}+2=5-2\sqrt{6}$$

$x + y = 10$ $xy = (5 + 2\sqrt{6})(5 - 2\sqrt{6}) = 25-24 = 1$

$x^2 + y^2 = (x + y)^2 - 2xy = 100 - 2 = 98$

20.

Sol. (d) 98

$$a = 5 + 2\sqrt{6},\ b = \frac{1}{a} = \frac{1}{5+2\sqrt{6}} = \frac{5-2\sqrt{6}}{25-24} = 5-2\sqrt{6}$$

$a+b = 10$, $ab = 1$

$a^2 + b^2 = (a+b)^2 - 2ab = 100-2 = 98$

21.

Sol. (b) 2

$3(5x-7) - 2(9x-11)$

$= 4(8x-13) - 17$ $15x - 21 - 18x + 22$

$= 32x - 52 - 17$ $-3x + 1$

$= 32x - 69$ $70 = 35x$, $x = 2$

22.

Sol. (c) 8.5 cm

Diagonals: $d_1 = 8$ cm, $d_2 = 15$ cm

$$\text{Side} = \left[\left(\frac{d_1}{2}\right)^2 + \left(\frac{d_2}{2}\right)^2\right] = \sqrt{[4^2 + 7.5^2]}$$

$$= \sqrt{[16 + 56.25]} = \sqrt{72.25} = 8.5 \text{ cm}$$

23.

Sol. (b) 15

Step 1: Find the square roots

$\sqrt{0.2304} = 0.48$

(because $0.48 \times 0.48 = 0.2304$)

$\sqrt{0.1764} = 0.42$

(because $0.42 \times 0.42 = 0.1764$)

Step 2: Substitute the values

Numerator $= \sqrt{0.2304} + \sqrt{0.1764}$

$= 0.48 + 0.42 = 0.90$

Denominator $= \sqrt{0.2304} - \sqrt{0.1764}$

$= 0.48 - 0.42 = 0.06$

Step 3: Divide

Answer = $\frac{0.90}{0.06} = \frac{90}{6}$

(multiplying both by 100 to remove decimals) = 15

24.

Sol. (a) 3.3 m

Ladder = 5.5 m, Height = 4.4 m

Distance $=\sqrt{5.5^2 - 4.4^2}$

= $\sqrt{30.25 - 19.36} = \sqrt{10.89} = 3.3$ m

25.

Sol. (a) 0

Any number raised to power 0 equals 1.
Therefore x = 0

26.

Sol. (a) 1

$= x^{\left(\frac{q}{r}-\frac{q}{p}\right)} \times x^{\left(\frac{r}{p}-\frac{r}{q}\right)} \times x^{\left(\frac{p}{q}-\frac{p}{r}\right)}$

$= x^{\left[\left(\frac{q}{r}-\frac{q}{p}\right)+\left(\frac{r}{p}-\frac{r}{q}\right)+\left(\frac{p}{q}-\frac{p}{r}\right)\right]}$

Simplifying the exponent:

$= \frac{q}{r}-\frac{q}{p} + \frac{r}{p}-\frac{r}{q} + \frac{p}{q}-\frac{p}{r} = 0$

$x^\circ = 1$

27.

Sol: (c) $\frac{17}{8}, \frac{11}{8}$

$3(x+y) = 81 = 34$, so $x+y = 4$

$81(x-y) = 3 = 3^1$, so $3(4(x-y)) = 3^1$,

$4(x-y) = 1$, $\quad x-y = \frac{1}{4}$

$x+y = 4$; $\quad x-y = \frac{1}{4}$

$2x = 4.25 = \frac{17}{4}$, $x = \frac{17}{8}$

$2y = 3.75 = \frac{15}{4}$, $y = \frac{15}{8}$

28.

Sol. (b) $(2x-5y)^2$

$4(x+y)^2 - 28y(x+y) + 49y^2$

Let u = x+y:

$4u^2 - 28yu + 49y^2$

$= (2u - 7y)^2$

$= (2(x+y) - 7y)^2$

$= (2x + 2y - 7y)^2$

$= (2x - 5y)^2$

29.

Sol. (c) 200,000

Present value = Rs 1,60,000
(after 20% depreciation)

Last year value × 0.8 = 1,60,000

Last year value

$= \frac{1,60,000}{0.8}$ = Rs 2,00,000

30.

Sol. (b) 4.431 gram

Pure gold = 58.3% of 7.6 grams

= 0.583 × 7.6 = 4.4308 ≈ 4.431 grams

PART - III : PHYSICS & CHEMISTRY

1.

Sol. (b) $\frac{2v_1v_2}{v_1+v_2}$

Let total distance be 2x. Time for 1st half t1 = x/v_1. Time for 2nd half $t_2 = x/v_2$.

$$\text{Avg Speed} = \frac{\text{Total Dist}}{\text{Total Time}} = \frac{2x}{(x/v_1 + x/v_2)}$$

$$= \frac{2}{\frac{v_1+v_2}{v_1v_2}} = \frac{2v_1v_2}{v_1+v_2}$$

2.

Sol. (c) 8,000 Pa

Pressure is maximum when Area is minimum.

Dimensions in meters: 0.1, 0.2, 0.4.

Smallest Area A = 0.1 × 0.2 = 0.02 m^2.

Force F = mg = 16 × 10 = 160 N.

Max Pressure P = F/A = 160/0.02 = 8000 Pa.

3.

Sol. (a) 5

Formula: $n = \frac{360}{\theta} - 1$

(if $\frac{360}{\theta}$ is an even integer).

Here, $= \frac{360}{60} = 6$ (even).

Number of images n = 6 - 1 = 5.

4.

Sol. (a) 4.4 m/s

Conservation of Momentum:

$m_1u_1 + m_2u_2 = (m_1 + m_2)v$.

(0.01 kg × 400) + 0 = (0.01 + 0.9)v.

4 = 0.91v

$\Rightarrow u \approx 4.39$ m/s, which is approx 4.4 m/s.

5.

Sol. (c) 125%

KE $K' = \frac{p^2}{2m}$. If momentum p increases by 50%, new momentum p' = 1.5p.

New KE $K' \propto (1.5p)^2 = 2.25p^2$

Change is 2.25 - 1 = 1.25, which corresponds to a 125% increase.

6.

Sol. (a) $\frac{2}{9}g_e$

$g \propto \frac{M}{R^2}$. $g' \propto \frac{2M}{(3R)^2} = \frac{2M}{9R^2}$.

Therefore, $g' = \frac{2}{9}g_e$

7.

Sol. (b) 833.3 W

Output Power $P_{out} = \frac{mgh}{t} = \frac{2000\times10\times10}{5\times60}$

$= \frac{200000}{300} = \frac{2000}{3} = W \approx 666.6W.$

Efficiency $\eta = \frac{P_{out}}{P_{in}}.0.08 = \frac{666.6}{P_{in}}$

$\Rightarrow P_{in} = \frac{666.6}{P_{in}} \approx 833.3W$

8.

Sol. (d)

When we through a body with velocity its velocity is u at t=0 and at top most point it becomes zero & again velocity increase in opposite direction.

9.

Sol. (c) Distance

A light year is the distance light travels in one vacuum year. It is a unit of astronomical distance.

10.

Sol. (b) Longitudinal and mechanical

Sound waves require a medium for propagation (mechanical) and the particle displacement is parallel to the direction of wave propagation (longitudinal).

11.

Sol. (c) Sugar water is a homogeneous mixture (solution), while lemon pulp mixture is suspension

Sugar completely dissolved so it became a solution where you can't see particles. Lemon pulp pieces are visible and settle down, that's why it's a suspension.

12.

Sol. (b) Iron rod and silver wire

Iron and silver are metals, so they conduct electricity well. Coal and sulphur are non-metals, they don't conduct electricity properly.

13.

Sol. (b) Complete combustion is occurring at the bottom with sufficient oxygen

Blue flame means the candle is burning completely with enough oxygen. That's why the bottom part of flame looks blue when air reaches it properly.

14.

Sol. (b) No, clothes drying is evaporation (occurs at any temperature from surface only), while boiling is vaporization (occurs at a specific temperature throughout the liquid)

Evaporation happens slowly from the surface at any temperature, like clothes drying. Boiling happens at fixed temperature with bubbles throughout the liquid.

15.

Sol. (a) Zinc - vigorous reaction; Lead - slow reaction; Silver - no reaction

Zinc is more reactive so it reacts fast with acid making lots of bubbles. Silver doesn't react with dilute acids at all because it's less reactive than hydrogen.

16.

Sol. (b) A - Element; B - Compound; C - Mixture

Mercury is an element (can't be broken down), copper oxide is a compound (can be split by electricity into copper and oxygen), milk is a mixture (has fat, water, proteins mixed together).

17.

Sol. (d)

First solution: $15/(15+60) \times 100 = 20\%$. Second solution: $25/(25+100) \times 100 = 20\%$. Both have same concentration even though amounts look different.

18.

Sol. (d) All three students correctly explained their observations

All three are right - gases have particles far apart that move freely, liquids have particles that can move and flow, solids have tightly packed particles that just vibrate.

19.

Sol. (a)

The student is right that distilled water is purest in the lab sense.

20.

Sol. (b) Sugar solution - homogeneous mixture; Carbon dioxide - compound; Sodium - element

Sugar solution is homogeneous mixture (uniform throughout), CO_2 is compound (carbon and oxygen chemically bonded), and sodium is element (only one type of atom).

PART - IV : BIOLOGY

1.

Sol. (a)

A and R are true, and R is the correct explanation

Adolescents grow rapidly; hence proteins and iron are needed for muscle and blood formation. The reason correctly explains the assertion.

2.

Sol. (c) 1, 3, 4 only

Statements 1, 3 and 4 are true. Hydra reproduces asexually by budding, so statement 2 is false.

3.

Sol. (b) Stomata are present mainly on roots.

Stomata are present on leaves, not roots. Other statements are correct.

4.

Sol. (a) A-4, B-2, C-3, D-1

Rhizobium fixes nitrogen, algae do photosynthesis, viruses cause disease, Lactobacillus forms curd.

5.

Sol. (b) It produces energy in the form of ATP

Mitochondria generate ATP (energy currency) by cellular respiration.

6.

Sol. (b) It allows roots to breathe and improves water penetration

Loosening and turning the soil (ploughing): allows air to reach roots improves water absorption helps roots grow deeper promotes growth of earthworms and microbes. Hence it is essential for healthy crop growth.

7.

Sol. (c) Muscular

Muscles contract and relax to cause movement.

8.

Sol. (d) Uterus

The uterus provides protection and nutrients to the developing fetus.

9.

Sol. (c) Tiger

Tiger numbers have reduced due to hunting and habitat loss.

10.

Sol. (c) Protozoan

Malaria is caused by Plasmodium (a protozoan) spread by female Anopheles mosquito.