2024-25

ENGLISH MEDIUM
RRB-ALP
Assistant Loco Pilot/Technician
Solved Papers

Youth Competition Times

RRB
1st & 2nd STAGE
(COMPULSORY PAPERS)

ALP
ASSISTANT LOCO PILOT/TECHNICIAN

63 SETS **SOLVED PAPERS**

TRADE
Fitter, Physics & Math, Mechanic Diesel, Heat Engine, Electronic Mechanics, Technician (Electrician), Mechanic, Refrigeration & Air Conditioning Mechanic, Electronics Instrumentation Mechanics, Mechanic Motor Vehicles

STAGE : I SOLVED PAPERS
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 31-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 01-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 31-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 30-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 30-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 30-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 29-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 29-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 29-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 21-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 21-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 21-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 20-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 20-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 20-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 17-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 17-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 17-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 14-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 14-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 14-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 13-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 13-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 13-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 10-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 10-08-2018, Shift
- RRB Loco Pilot/Technician Exam, 2018 Ex.Dt.: 10-08-2018, Shift

STAGE : II SOLVED PAPERS
- RRB Loco Pilot/Technician Exam, Ex.Dt : 21-01-2019, Shift
- RRB Loco Pilot/Technician Exam, Ex.Dt : 22-01-2019, Shift
- RRB Loco Pilot/Technician Exam, Ex.Dt : 21-01-2019, Shift
- RRB Loco Pilot/Technician Exam, Ex.Dt : 22-01-2019, Shift
- RRB Loco Pilot/Technician Exam, Ex.Dt : 22-01-2019, Shift
- RRB Loco Pilot/Technician Exam, Ex.Dt : 22-01-2019, Shift
- RRB Loco Pilot/Technician Exam, Ex.Dt : 23-01-2019, Shift
- RRB Loco Pilot/Technician Exam, Ex.Dt : 23-01-2019, Shift
- RRB Loco Pilot/Technician Exam, Ex.Dt : 23-01-2019, Shift

TCS PATTERN

Detailed explanation and certified by the Board ANSWER-KEY

Railway Recruitment Board
RRB ALP
Assistant Loco Pilot/ Technician Stage-Ist &IInd
SOLVEDPAPERS
(ALL TRADE & SHIFT)

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ALP/Technician Online Exam Syllabus

First Stage (CBT)

Duration : 60 Min.   **No. of Questions : 75**

(A) Mathematics

Number system, BODMAS, Decimals, Fractions, LCM, HCF, Ratio and Proportion, Percentages, Mensuration, Time and Work; Time and Distance, Simple and Compound Interest, Profit and Loss, Algebra, Geometry and Trigonometry, Elementary Statistics, Square Root, Age Calculations, Calendar & Clock, Pipes & Cistern etc.

(B) General Intelligence and Reasoning

Analogies, Alphabetical and Number Series, Coding and Decoding, Mathematical operations, Relationships, Syllogism, Jumbling, Venn Diagram, Data Interpretation and Sufficiency, Conclusions and Decision Making, Similarities and Differences, Analytical reasoning, Classification, Directions, Statement– Arguments and Assumptions etc.

(C) General Science

The syllabus under this shall cover Physics, Chemistry and Life Sciences of 10th standard level.

(D) General awareness on current affairs :

In Science & Technology, Sports, Culture, Personalities, Economics, Politics and other subjects of importance.

Second Stage (CBT)

Short listing of Candidates for the Second Stage CBT exam shall be based on the normalized marks obtained by them in the First Stage CBT Exam.

Total number of candidates to be shortlisted for second stage shall be 15 times the community wise total vacancy of ALP and Technician Posts notified against the RRB as per their merit in First Stage CBT. However, Railways reserve the right to increase/decrease this limit in total or for any specific trade (s) as required to ensure availability of acequate candidates for all the notified posts.

Total Duration : 2 hours and 30 minutes (for Part A and Part B together)

The Second Stage CBT shall have two parts viz Part A and Part B as detailed below.

PART A

Duration: 90 Min.   **No. of Questions: 100**

Minimum percentage of marks for eligibuility in various categories: UR-40%, OBC-30%, SC-30%, ST-25%. These percentages of marks for eligibility may be relaxed by 2% for PWD candidates in case of shortage of PWD candidates against vacancies reserved for them.

The marks scored in Part A alone shall be used for short listing of candidates for further stages of recruitment process subject to the condition that the candidate is securing qualifying mark in Part B.

(A) Mathematics

Number system, BODMAS, Decimals, Fractions, LCM, HCF, Ratio and Proportion, Percentages, Mensuration, Time and Work; Time and Distance, Simple and Compound Interest, Profit and Loss, Algebra, Geometry and Trigonometry, Elementary Statistics, Square Root, Age Calculations, Calendar & Clock, Pipes & Cistern etc.

(B) General Intelligence and Reasoning

Analogies, Alphabetical and Number Series, Coding and Decoding, Mathematical operations, Relationships, Syllogism, Jumbling, Venn Diagram, Data Interpretation and Sufficiency, Conclusions and Decision Making, Similarities and Differences, Analytical reasoning, Classification, Directions, Statement– Arguments and Assumptions etc.

(C) Basic Science and Engineering

The broad topics that are covered under this shall be Engineering Drawing (Projections, Views, Drawing Instruments, Lines, Geometric figures, Symbolic Representation), Units, Measurements, Mass Weight and Density, Work Power and Energy, Speed and Velocity, Heat and Temperature, Basic Electricity, Levers and Simple Machines, Occupational Safety and Health, Environment Education, IT Literacy etc.

General awareness on current affairs in Science & Technology, Sports, Culture, Personalities, Economics, Politics and any other subjects of importance.

PART B

Duration: 60 Min.   **No. of Questions: 75**

Qualifying Marks: 35% (This is applicable to all candidates and no relaxation is permissible)
This part is qualifying in nature and shall have questions from the trade syllabus prescribed by Director General of Employment & Training (DGET). Candidates with ITI/Trade Apprenticeship qualification will be required to appear in the section having questions from the relevant trade. Candidates holding Degree, Diploma and HSC (10+2) having eligibility for the posts of ALP have to select relevant trade from the list of trades listed against their engineering discipline/HSC (10+2). The trade syllabus can be obtained from the **DGET website.** The relevant trades for various engineering discipline/HSC (10+2) for appearing in the qualifying test is as below:

Sl. No.	Engineering Discipline (Diploma/Degree)	Relevant trade for PART B Qualifying Test to be selected from
1.	Electrical Engineering and combination of various streams of Electrical Engineering	Electrician/Instrument Mechanic/Wiremen/Winder (Armature)/Refrigeration and Air Conditioning Mechanic
2.	Electronics Engineering and combination of various streams of Electronics Engineering	Electronics Mechanic/Mechanic Radio &TV
3.	Mechanical Engineering and combination of various Engineering	Fitter/Mechanic Motor Vehicle/Tractor Mechanic/ Mechanic Diesel/Turner/Machinist/Refrigeration and Air Conditioning Mechanic/Heat Engine/ Millwright Maintenance Mechanic
4.	Automobile Engineering and combination of various streams of Automobile Engineering	Mechanic Motor Vehicle /Tractor Mechanic/ Machanic Diesel/Heat Engine/Refrigeration and Air Conditioning Mechanic
5.	HSC (10+2) with Physics and Maths	Electrician/Electronics Mechanic/Wireman

Railway Recruitment Boards
RRB ALP & Technicians Exam-2018
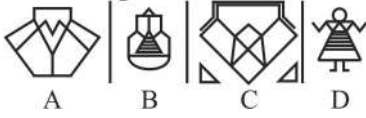
Date : 31/08/2018]   [Time : 10:00–11:00 AM

1. **The given Problem Figure is embedded in one of the given Answer Figures. Which is that Answer Figure?**

Problem Figure

Answer Figures

(a) A   (b) D
(c) B   (d) C

Ans : (b) It is clear from the answer figure that the question figure is embedded in figure D of the answer figure.

Hence, option (b) is correct.

2. **Among the following which is a rational number?**

(a) $\sqrt[3]{32}$ (b) $\sqrt[5]{32}$

(c) $\sqrt[4]{32}$ (d) $\sqrt[6]{32}$

Ans : (b) $\sqrt[3]{32} = \sqrt[3]{2\times2\times2\times2\times2} = 2\sqrt[3]{4}$

$\sqrt[5]{32} = \sqrt[5]{2\times2\times2\times2\times2} = 2$

$\sqrt[4]{32} = \sqrt[4]{2\times2\times2\times2\times2} = 2\sqrt[4]{2}$

$\sqrt[6]{32} = \sqrt[6]{2\times2\times2\times2\times2} = \dfrac{2}{\sqrt[6]{2}}$

Hence, it is clear from options that $\sqrt[5]{32} = 2$ is a rational number. So option (b) is correct.

3. **The Dhola-Sadiya Bridge, dedicated to the nation by Prime Minister Narendra Modi, is built across which river?**

(a) Ganges River   (b) Yamuna River
(c) Lohit River   (d) Narmada River

Ans : (c) The Dhola-Sadiya Bridge, dedicated to the nation by Prime Minister Narendra Modi, is built across Lohit River. It is the longest bridge in India built on Lohit River in Assam. Lohit river is the tributary of Brahmaputra River.

4. **The centre of the reflecting surface of a spherical mirror is a point called the _____.**

(a) Pole   (b) aperture
(c) radius   (d) focus

Ans : (a)
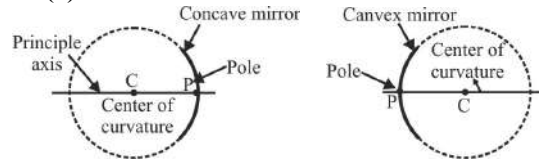
The mid point of reflecting surface of a spherical mirror is called pole.

5. **Consider the given statements to be true and decide which of the suggested courses of action logically follow(s) on the basis of the information given in the statements.**

Statements: The pollution and air quality in Delhi is beyond the acceptable level. This is due to industrial and automobile exhaustion.

Course of action:
1. Automobiles should be divided into groups to be run only on odd and even days, respectively.
2. The government should stop the registration of new factories and vehicles.

(a) Only 1 follows
(b) Only 2 follows
(c) Both 1 and 2 follows
(d) Neither 1 nor 2 follows

Ans : (a) The pollution and air quality in Delhi is beyond the acceptable level. This is due to pollution caused by industries and vehicles. Urgent action is needed to stop air pollution. According to the given actions, the vehicles should be divided into odd and even respectively, due to which the pollution caused by the vehicles will be less.

6. $4+\dfrac{1}{6}\times[\{-12\times(24-13-3)\}\div(20-4)]=?$

(a) 4   (b) 6
(c) 5   (d) 3

Ans : (d) $4+\dfrac{1}{6}\times\left[\{-12\times(24-13-3)\}\div(20-4)\right]$

$=4+\dfrac{1}{6}\times\left[\{-12\times8\}\div16\right]$

$=4+\dfrac{1}{6}\times(-6)=4-1$

$=3$

7. **An element A forms an oxide with formula A_3O_4. What is the valency of element A?**

(a) 4   (b) 3
(c) 1   (d) 2

Ans : (a) In chemical formula A_3O_4,

      Element A has valency = 4

      Element O has valency = 3

8. The sum of the lengths of the edges of a cube is equal to four times the perimeter of a square. If a quarter of the numerical value of the volume of the cube is equal to the numerical value of the area of the square, then the length of one side of the square is:

  (a) 27 units   (b) 10.5 units

  (c) $\dfrac{9}{4}$ units   (d) $\dfrac{27}{16}$ units

Ans : (d) Let the length of the edge of a cube = y unit and length of side of square = x unit
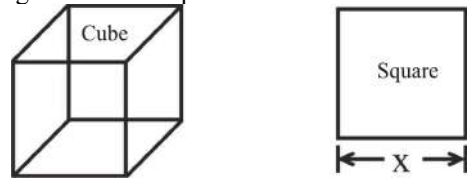
Now first condition-

Sum of length of the edges of a cube = 4 (perimeter of square)

$$12y = 4(4x) \qquad \left[\begin{array}{l} \because \ \text{Edges of cube} = 12 \\ \text{Perimeter of square} = 4x \end{array} \right]$$

$$12y = 16x$$

$$3y = 4x$$

$$\boxed{y = \dfrac{4}{3}x} \qquad \text{............. (1)}$$

Second condition-

$$\dfrac{\text{Numerical value of volume of the cube}}{4} = \text{Area of square}$$

$$\dfrac{y^3}{4} = x^2$$

$$y^3 = 4x^2 \qquad \text{............... (2)}$$

On putting the value of y from equation (1) in equation (2),

$$\left(\dfrac{4}{3}x\right)^3 = 4x^2$$

$$\dfrac{64}{27}x^3 = 4x^2$$

$$\dfrac{16}{27}x = 1$$

$$\boxed{x = \dfrac{27}{16}}$$

Hence, side of square $= \dfrac{27}{16}$ units.

9. Select the option that represents the number of triangles in the given figure.

  (a) 12   (b) 10

  (c) 14   (d) 15

Ans : (c)

Number of triangles made up of one digit = 10

Number of triangles made up of two digit = (2,3), (4,5), (6,7), (8,9) = 4

Hence, number of total triangles = 14

10.

Student / Subject	P	C	B	M
W	70	90	50	85
X	55	80	95	60
Y	60	20	90	40
Z	90	80	40	65

The given table represents the marks obtained by four students W, X, Y and Z in four subjects P, C, B and M, with the maximum marks in each subject being 100.

The average marks of the four students in M is:

  (a) 62   (b) 62.25

  (c) 62.75   (d) 62.5

Ans : (d) Average marks of the four students in M

$$= \dfrac{85 + 60 + 40 + 65}{4}$$

$$= \dfrac{250}{4} = 62.5$$

11. Which actor plays the role of social activist Arunachalam Muruganantham in the biopic movie 'Pad Man'?

  (a) Mohanlal   (b) Nana Patekar

  (c) Akshay Kumar   (d) Irrfan Khan

Ans : (c) Akshay Kumar played the role of social activist Arunachalam Muruganantham in the biopic movie Pad Man. He developed the machine for manufacturing low cost sanitary pads.

12. Solve the following:

  196 – 19.6 – 1.96 – 0.196 = ?

  (a) 173.254   (b) 173.234

  (c) 174.234   (d) 174.244

Ans : (d) 196−19.6−1.96−0.196

    = 196–21.756

    = 174.244

13. Select the figure that does NOT belong in the following group.

  A B C D
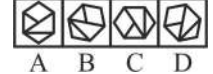
  (a) A   (b) C

  (c) B   (d) D

Ans : (d) Figure D is not related to all the other figures in the given group of figures, because in figure D the left part of this figure should have been towards the right part and right part should have been towards the left part.

14. **Primary growth in plants occurs by:**
A. Vertical meristem
B. Lateral meristem
C. Intercalary meristem
D. Apical meristem
(a) A, B, C and D   (b) C and D
(c) B, C and D   (d) A, B and D

Ans : (b) Primary growth in plants occurs by intercalary meristem or basal and apical meristem. Intercalary meristem occurs at the base of nodes or leaf. The main function is to provide longitudinal inter growth of that part of the plant where they are present. Apical meristem is the region at the tip of the plant body. It helps in the increase in the height of the plant.

15. **What is the percentage of methane in biogas?**
(a) 60%   (b) 90%
(c) 75%   (d) 80%

Ans : (c) Methane is the main constituent of biogas.
(i) Methane $(CH_4) \rightarrow$ 50−75%
(ii) Carbon dioxide $(CO_2) \rightarrow$ 25−50%
(iii) Nitrogen $(N_2) \rightarrow$ 0−10%
(iv) Hydrogen $(H_2) \rightarrow$ 0−1%
(v) Hydrogen sulphide $(H_2S) \rightarrow$ 0.1−0.5%

16. **Match the following with the correct response:**
(1) W   (A) Nm/s
(2) kW   (B) 3.6×10^6 J
(3) 1 kW·h   (C) 1000 W
(4) 1 HP   (D) 746 W
(a) 1-A, 2-C, 3-B, 4-D   (b) 1-A, 2-C, 3-D, 4-B
(c) 1-D, 2-B, 3-C, 4-A   (d) 1-A, 2-B, 3-C, 4-D

Ans : (a) 1. W   −   A. Nm/s
2. kW   −   C. 1000 W
3. 1 kWh   −   B. 3.6×10^6 J
4. 1 Hp   −   D. 746 W

17. **A 145 m long train crosses a 655 m long bridge in 36 seconds. What is the speed of the train?**
(a) 60 km/h   (b) 70 km/h
(c) 80 km/h   (d) 75 km/h

Ans : (c) Let the speed of train be x m/sec.
According to the question,
$$\frac{145 + 655}{x} = 36$$
$$x = \frac{800}{36} \text{ m/sec}$$
$$= \frac{800}{36} \times \frac{18}{5}$$
$$x = 80 \text{ km/hr.}$$

18. **The latest issued bank notes in the denomination of Rs. 50 by RBI have what motif on their reverse side?**
(a) Mangalyaan
(b) Sanchi Stupa
(c) Red Fort
(d) Stone chariot of Hampi

Ans : (d)

Rupee Note	Motif
(i) 10 Rupees note	Sun temple of Konark
(ii) 20 Rupees note	Ellora Caves
(iii) 50 Rupees note	Hampi Temple
(iii) 100 Rupees note	Rani Ki Vav
(iv) 200 Rupees note	Sanchi Stupa
(v) 500 Rupees note	Red Fort
(vi) 2000 Rupees note	Mangalyan

19. **If a person bought an item for Rs. 96 and sold it at a profit of 12.5%, the selling price of the item was:**
(a) ₹105   (b) ₹110
(c) ₹112   (d) ₹108

Ans : (d) Selling price $= 96\left(1 + \frac{12.5}{100}\right)$
$$= 96 \times \frac{112.5}{100}$$
$$= 96 \times 1.125$$
$$= ₹108$$
Hence, the selling price of the item is 108.

20. **Consider the given statement to be true and decide which of the following courses of action logically follow(s) from the statement.**
Statements: The manufacturing companies in Tamil Nadu are facing acute power shortage.
Course of Action:
1. Government should take steps to solve the power crisis.
2. Government should shut down manufacturing companies to save power.
(a) Both 1 and 2 follow
(b) Neither 1 nor 2 follows
(c) Only 1 follows   (d) Only 2 follows

Ans : (c) Statement- The manufacturing companies in Tamil Nadu are facing acute power shortage.
Hence only I follows i.e. Government should take steps to solve the power crisis.

21. **The following table gives the details of the number of students in Class 10, section A and B, who had taken their midterm and final exams.**

Result	Section A 10 'A'	Section B 10 'B'
Total number of students who failed in both the exams	28	23
Number of students who failed in the midterm but passed in the final exam	14	12
Number of students who passed in the midterm but failed in the final exam	6	17
Number of students who passed in both the exams	64	55

Based on the given data, the percentage of Section A students who passed the annual exam is _____.

(a) 69.64 (b) 69.70

(c) 69.69 (d) 69.54

Ans : (a) Number of student who passed in final exam in section A

$$= 64+14=78$$

Total number of student in section A $= 14+28+6+64=112$

Percentage of passed student in final exam of 10'A'

$$= \frac{78}{112} \times 100$$

$$= 69.64$$

22. The denominator of a rational number exceeds its numerator by 10. If the numerator is increased by 4 and the denominator is reduced by 3, the number obtained is $\frac{5}{6}$. The original rational number is:

(a) $\frac{13}{23}$ (b) $\frac{9}{19}$

(c) $\frac{7}{17}$ (d) $\frac{11}{21}$

Ans : (d) Let the numerator of a rational number be x.

So denominator of a rational number exceeds its numerator by 10 = 10 + x

According to the question,

$$\frac{x+4}{x+10-3} = \frac{5}{6}$$

$$6x+24 = 5x+35$$

$$x = 11$$

Hence, Rational number $= \frac{x}{x+10} = \frac{11}{21}$

23. What is the value of acceleration due to gravity on the surface of the earth?

(a) 10.8 m/s^2 (b) 9.8 cm/s^2

(c) 9.6 cm/s^2 (d) 9.8 m/s^2

Ans : (d) Gravitational force on the surface of the earth

$$= \frac{GM_e}{R^2}$$

We know that $\quad G = 6.67 \times 10^{-11}$ Nm^2/kg^2

$$M_e = 5.9722 \times 10^{24} \text{ kg}$$

$$R = 6.4 \times 10^6 \text{ m}$$

$$g = \frac{6.67 \times 10^{-11} \times 5.97 \times 10^{24}}{(6.4 \times 10^6)^2}$$

$$= \frac{39.8199 \times 10^{13}}{40.96 \times 10^{12}}$$

$$= 0.972 \times 10$$

$$= 9.72 \text{ m/s}^2$$

$$= 9.8 \text{ m/s}^2$$

24. Using the sequence VWY9PONI5FSLUDTG61AJ, find the term missing from the following series.

YP, _____, 5S, LD

(a) PN (b) OI

(c) N5 (d) OT

Ans : (b)

Hence, OI is the missing term.

25. Which of these rivers primarily flows in South Africa?

(a) Niger River (b) Orange River

(c) Congo River (d) Nile River

Ans : (b)

River Name	Drainage Area
(i) Niger River −	West Africa
(ii) Orange River −	South Africa
(iii) Congo River −	Africa (Congo)
(iv) Nile River −	North East Africa

26. Select the INCORRECT set of Molecular Formula – IUPAC Name – Common Name from the following options.

(a) C_4H_9OH – Butanol – Butyl Alcohol

(b) C_2H_5OH – Ethanol – Ethyl Alcohol

(c) C_3H_7OH – Propanol – Propyl Alcohol

(d) C_2H_3OH – Methanol – Methyl Alcohol

Ans : (d) Common formula for Alcohol group- $C_nH_{2n+1}OH$

Where = 1, 2, 3, 4, etc.

(i) Taking n=1 $\rightarrow CH_3OH$ – Methanol/Methyl Alcohol

(ii) Taking n = 2 $\rightarrow C_2H_5OH$ − Ethanol/Ethyl Alcohol

(iii) Taking n=3$\rightarrow C_3H_7OH$ – Propanol/Propyl Alcohol

(iv) Taking n= 4 $\rightarrow C_4H_9OH$ – Butanol/Butyl Alcohol

27. What will be the 20th term in the given sequence?

−50, −47, −44, _____

(a) −10 (b) 10

(c) −7 (d) 7

Ans : (d) Given,

$$-50, \ -47, \ -44$$

Common difference (d) = $d_2 - d_1 = 47-(-50) = 3$

$\therefore \quad$ nth term = ?

$$\boxed{T_n = a + (n-1)d}$$ where, a = first term

d=common difference

n=20

$$T_{20} = -50 + (20-1)3$$

$$T_{20} = -50 + 19 \times 3$$

$$T_{20} = -50 + 57$$

$$T_{20} = 7$$

28. Select the missing number based on the given related pair of numbers.

158 : 384 : : 140 : _____

(a) 349 (b) 346

(c) 347 (d) 348

Ans : (d)

$$158 : 384 :: 140 : \boxed{348}$$
$$\times 2 + 68 \qquad \times 2 + 68$$

Hence 348 will be on the blank space.

29. The distance between two places can be covered in $3\frac{1}{2}$ hours at a speed of 62 km/hr. If the speed is increased by 8 km/hr, how much time would be saved?
(a) 24 minutes   (b) 20 minutes
(c) 30 minutes   (d) 15 minutes

Ans : (a) Distance = Speed × Time

$$= 62 \times \frac{7}{2}$$

$$= 31 \times 7 = 217 \text{ km.}$$

Time taken to increse the speed by 8 km/h

$$\frac{217}{(62+8)} = \frac{217}{70} = \frac{31}{10} = 3\frac{1}{10}$$

Remaining time $= 3\frac{1}{2} - 3\frac{1}{10}$

$$= \frac{7}{2} - \frac{31}{10} = \frac{35-31}{10} = \frac{4}{10} = \frac{2}{5} \text{ hours}$$

$$= \left(\frac{2}{5} \times 60\right) = 24 \text{ minutes}$$

30. Acids that contain Hydrogen and other non-metallic element(s), except Oxygen, are called:
(a) Strong acids   (b) Weak acids
(c) Hydracids   (d) Dilute acids

Ans : (c) Acids that contain hydrogen and other non-metallic elements, except oxygen are called Hydracids. Chromium, Manganese, Technetium, Rhenium and Boron are examples of Hydracids.

31. Which of the following diagrams represent the relationship between Male, Husband and Model.

(a)   (b)

(c)   (d)
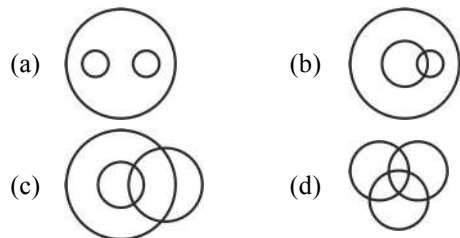
Ans : (c) Relationship between Male, Husband and model is as follows-
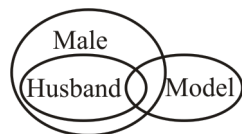
Note- 1. A man can be husband as well as model.
    2. The model can be either male or female.

32. In the given sequence, if every letter beginning from position 8 from the left is replace by its next letter in the English alphabet, and Z is replaced by A, then how many Vs will be there in the resulting sequence?
ZUDJKNCXVCSLLIEBSFJVATWQK
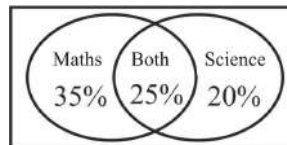(a) 0   (b) 3
(c) 2   (d) 1

Ans : (a)

Z U D J K N C X V C S L L I E B S F J V A T W Q K
↓ ↓
Y W D T M M J F C T G K W B U X R L

Hence, there is zero Vs in the resulting sequence.

33. In a class, 60% of children like Mathematics, 45% like Science and 25% like both Mathematics and Science. What is the percentage of children who like at least one subject?
(a) 45%   (b) 55%
(c) 70%   (d) 80%

Ans : (d)

Children who only like Math = (60–25)% = 35%
Children who only like Science = (45–25)% = 20%
So, number of children who like at least one subject
= only maths + only science + both
= 35%+20%+25% = 80%

34. Consider the given statements to be true and decide which of the courses of action logically follow(s) from the statements.
Statements: Due to heavy rain in Bangalore, the normal lives of the citizens are paralysed.
Course of Action:
1. Government should take measures to help people and avoid life and property destruction.
2. Government should provide free treatment in all the hospitals of Bangalore.
(a) Only 1 follows
(b) Neither 1 nor 2 follows
(c) Only 2 follows
(d) Both 1 and 2 follow

Ans : (a) It is clear from statement that heavy rains in Bangalore have caused inconvenience to the people. So the government should make arrangement to help them immediately so that people do not face any problem. Hence only 1 follows.

35. An object of 1.2 cm height is placed 30 cm before a concave mirror of focal length of 20 cm to get a real image at a distance of 60 cm from the mirror. What is the height of the image formed?
(a) –2.4 cm   (b) 1.2 cm
(c) –3.6 cm   (d) 2.4 cm

Ans : (a) Height of object (h) = 1.2 cm

Focal length of concave mirror (f) = –20 cm

height of image (h') = ?

Image distance (v) = –60 cm

$$\text{Magnifaction} = \frac{\text{height of image(h')}}{\text{height of object(h)}} = \frac{\text{image distance(v)}}{\text{object distance(u)}}$$

$$= \frac{h'}{1.2} = \frac{-60}{30}$$

h' = –2.4 cm

36. _____, **present in the centre of a flower, forms the female reproductive part.**

(a) Carpels   (b) Stamens

(c) Petals   (d) Sepals

Ans : (a) Carpels, present in the centre of a flower, forms the female reproductive part. Carpel is the ovule-bearing female reproductive organ of flowering plants and is required to ensure its protection, an efficient fertilization and the development of diversified types of fruits, thereby it is a vital element of most food crops.

37. **The maximum number of electrons that can be accommodated in a shell is indicated by the formula:**

(a) 2n   (b) $2n^{-2}$

(c) $2n^3$ (d) $2n^2$

Ans : (d) According to Bohr-Burry scheme the maxiumum number of electrons that can be accommodated in a shell is equal to $2n^2$ where 'n' is the quantum number of the shell. (i.e., the serial number of the shell from -the nucleus.).
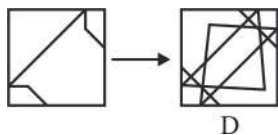
38.

A   B   C   D
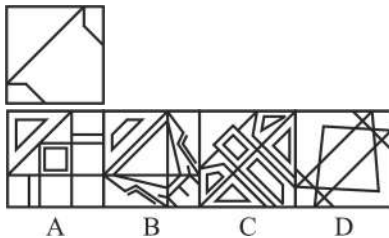
The above figure is embedded in any of these four figures. The correct figure containing the above figure is

(a) B   (b) C
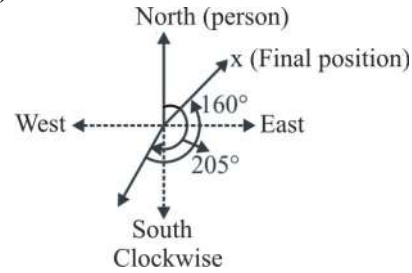
(c) A   (d) D

Ans : (d)

Hence it is clear that question figure is embedded in figure D.

39. **Facing North, X turns 205° clockwise and then 160° anticlockwise. Which direction is X facing now?**

(a) North-East   (b) South-East

(c) South-West   (d) North-West

Ans : (a)

Hence X is facing North-East direction.

40. **If ΔABC ≅ ΔXYZ and angle BAC = 55°, then angle ZXY = ?**

(a) 65°   (b) 135°

(c) 55°   (d) 67.5°

Ans : (c) Given, ∠BAC = 55°

$$\Delta ABC \cong \Delta XYZ$$

So by congruency rule-

∠A = ∠X
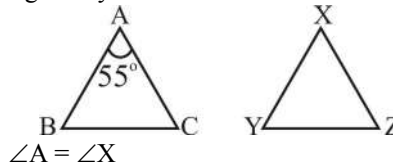
or   ∠BAC = ∠ZXY

55° = ∠ZXY

41. **If a rod of length $208\frac{4}{5}$ is cut into equal pieces of length $23\frac{1}{5}$ then the total number of rods obtained is:**

(a) 5   (b) 7

(c) 8   (d) 9

Ans : (d) Total length of rod $= 208\frac{4}{5} = \frac{1044}{5}$

The given rod is to be cut into equal pieces of length $23\frac{1}{5}$.

Hence the number of rods obtained

$$= \frac{\text{Length of total rods}}{\text{Length of a part}}$$

$$= \frac{\frac{1044}{5}}{23\frac{1}{5}}$$

$$= \frac{\frac{1044}{5}}{\frac{116}{5}}$$

$$= \frac{1044}{5} \times \frac{5}{116}$$

$$= \frac{1044}{116} = 9$$

42. Which of the following is NOT a constituent of biogas?
(a) Hydrogen Sulphide (b) Methane
(c) Carbon Monoxide (d) Carbon Dioxide

Ans : (c) Methane (CH_4) gas mainly found in Biogas. The composition of various gases prersent in Biogas is as follows-
(i) Methane $\rightarrow$ 50 – 75%
(ii) Carbondioxide $\rightarrow$ 25 – 50%
(iii) Nitrogen $\rightarrow$ 0 – 10%
(iv) Hydrogen $\rightarrow$ 0 – 3%
(v) Hydrogen sulphide$\rightarrow$ 1 – 0.5%

43. The value of $14 \div \{(5 \text{ of } 2 - 3)\} \times 4 (7 - 2)$ is:
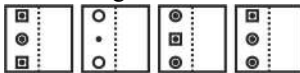
(a) $\dfrac{1}{10}$ (b) 40

(c) 44 (d) $\dfrac{14}{19}$

Ans : (b) $14 \div \left\{(5 \times 2 - 3)\right\} \times 4(7 - 2)$
$$= 14 \div \left\{(10 - 3)\right\} \times 4(7 - 2)$$
$$= 14 \div 7 \times 4 \times 5 = 2 \times 4 \times 5 = 40$$

44. Select the option that depicts the following transparent sheet (Problem Figure) when folded at the dotted line shown.
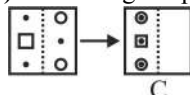Problem Figure

Answer Figures

(a) C (b) D
(c) A (d) B

Ans : (a) On folding the problem figure-

Hence option (a) is correct.

45. Which of the following elements was the last element in Newland's Law of Octaves?
(a) Bromine (b) Hydrogen
(c) Thorium (d) Rubidium

Ans : (c) Thorium was the last element in Newland's law of Octaves. Newland's law of octave is the first to classify elements in groups with a table with each group having elements with similar properties. According to Newlands law of octave, the properties of every 8th element will be the repetition of properties of the 1st element.

46. Which of the following is an anthropology museum that presents an integrated story of the evolution of man and culture with special reference to India?
(a) The Indira Gandhi Sangrahalaya (IGS)
(b) The Indira Gandhi Jantu Sangrahalaya (IGJS)
(c) The Indira Gandhi Rashtriya Manav Sangrahalaya (IGRMS)
(d) The Indira Gandhi Pustak Sangrahalaya (IGPS)

Ans : (c) The Indira Gandhi Rashtriya Manav Sangrahalaya (IGRMS) is an anthropology museum that presents an integrated story of the evolution of man and culture with special reference to India.

47. Name the character in Mahabharata who was blessed with the 'divine vision' to see the Mahabharata battle and explain it scene by scene to the blind king Dhritarashtra.
(a) Dussala (b) Balarama
(c) Sanjaya (d) Vidura

Ans : (c) Sanjay in Mahabharata who was blessed with the divine vision to see the Mahabharata battle and explain it scene by scene to blind king Dhritarashtra. Sanjay was diciple of Maharashi Vyas.

48. The forces between two bodies are always equal and opposite. This idea is stated in the form of Newton's.
(a) third law of motion
(b) second law of motion
(c) first and second law of motion
(d) first law of motion

Ans : (a) The forces between two bodies are always equal and opposite. This idea is stated in the Newton's third law of motion.

49. Select the option that correctly matches the contents of the first column with the contents of the second column.

A.	Elements combine in fixed ratios	I.	Dalton's atomic theory
B.	Atoms are indivisible	II.	The same number of molecules
C.	Sulphate and oxalate ions are anions, whereas magnesium and	III.	Law of constant proportions
D.	Gram atomic mass of an element and the gram molecular mass of a compound contain	IV.	Ammonium ions are cations

(a) A-III, B-I, C-IV, D-II
(b) A-I, B-III, C-IV, D-II
(c) A-III, B-IV, C-I, D-II
(d) A-III, B-II, C-IV, D-I

Ans : (a)

A.	Elements combine in fixed ratios	I.	Law of constant proportions
B.	Atoms are indivisible	II.	Dalton's atomic theory
C.	Sulphate and oxalate ions are anions, whereas magnesium and	III.	Ammonium ions are cations
D.	Gram atomic mass of an element and the gram molecular mass of a compound contain	IV.	The same number of molecules

50. Consider the given question and decide which of the following statements is sufficient to answer the question.

X took a loan from Y on compound interest. Find the rate per annum?

Statements:
1. After 3 years, X paid Rs. 500 as interest.
2. After 3 years, X paid Rs. 1,500 to clear his loan with Y.

(a) 2 alone is sufficient while 1 alone is not sufficient to answer the question
(b) Both 1 and 2 are sufficient to answer the question
(c) Either 1 or 2 is sufficient to answer the question
(d) 1 alone is sufficient while 2 alone is not sufficient to answer the question

Ans : (b) It is clear that both statement 1 and 2 are sufficient to answer the question.

51. Select the option that can replace the question mark (?) in the following equation.

$$\frac{(0.2)^3 - (0.1)^3}{(0.2 + 0.1)^2} = ?$$

(a) $\dfrac{7}{90}$ (b) $\dfrac{-7}{90}$

(c) $\dfrac{1}{18}$ (d) $\dfrac{3}{40}$

Ans : (a) $\because \left[\left(a^3 - b^3\right) = \left(a - b\right)\left(a^2 + b^2 + ab\right) \right]$

$$\frac{(0.2)^3 - (0.1)^3}{(0.2 + 0.1)^2} = \frac{(0.2 - 0.1)\left[(0.2)^2 + (0.1)^2 + (0.2)(0.1)\right]}{(0.2 + 0.1)^2}$$

$$= \frac{0.1\left[0.04 + 0.01 + 0.02\right]}{(0.2 + 0.1)^2}$$

$$= \frac{0.07 \times 0.1}{(0.3)^2} = \frac{0.007}{0.09} = \frac{7}{90}$$

52. By selling an item for Rs. 696 Unnati incurred a loss of 13%. By how much should she have raised the price to gain a profit of 10%?

(a) ₹84   (b) ₹104
(c) ₹184   (d) ₹160.08

Ans : (c) Price of an item when it is at a profit of 10%

$$= 696 \times \frac{100}{87} \times \frac{110}{100} = ₹880$$

Required increment in price of an item = 880 − 696
$$= ₹184$$

53. Which ex-cricketer has acted in the movies 'Team 5' and 'Aksar 2'?
(a) Zaheer Khan
(b) S. Sreesanth
(c) Salil Ankola
(d) Mohammad Azharuddin

Ans : (b) S. Sreesanth ex- Indian cricketer has acted in the movies Team 5 and Aksar 2.

54. Calculate the work done by the force of gravity when a satellite moves in an orbit of radius 40,000 km around the earth.
(a) 0 J   (b) 4,000 J
(c) 8,000 J   (d) 4,00,000 J

Ans : (a) When a planet moves on a circular path, then the net displacement is zero. So the work done by the planet will be 0 J.

55. Select the option that depicts the correct mirror image of the following figure.

(a)   (b)

(c)   (d)
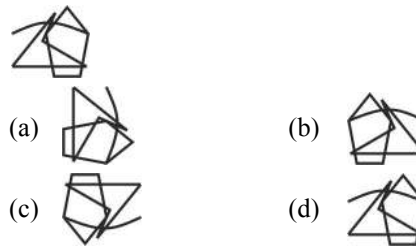
Ans : (b) The mirror image of the given image is in option (b).

56. Pinaki is 9 years younger than Bhaswati. Thirteen years hence Bhaswati will be 1.2 times as old as Pinaki. Find Pinaki's present age.
(a) 28 years   (b) 32 years
(c) 30 years   (d) 33 years

Ans : (b) Let the present age of Bhaswati = x years
According to the question,
Age of Pinaki = (x–9) years
After 13 years, age of Bhaswati = (x+13) years
Then after 13 years age of Pinaki = (x–9+13)
                         = (x+4) years

     (x+13) = 1.2 (x+4)
     = x+13 = 1.2x+4.8
     0.2x = 8.2
$$x = \frac{8.2}{0.2} = 41$$
Hence Pinaki's present age = (x–9) = (41–9) = 32 years

57. Sunil started his journey at 2 : 33 : 34 p.m. and reached the destination at 4 : 43 : 45 p.m. Anil started the journey 45 mins 27 secs after Sunil and reached the destination 37 mins 16 secs after him. How long did Anil take to complete his journey?
(a) 2 hours 1 min 12 secs
(b) 2 hours 2 secs
(c) 1 hours 59 mins
(d) 2 hours 2mins

Ans : (d) Time at which by Anil start the journey
     = 2 : 33 : 34 + 0 : 45 : 27
     = 3 : 19 : 01 pm.
Time taken by Anil to reach destination
                    =4:43:45+0:37:16
                    = 5 : 21 : 01 pm.
Time taken by Anil to complete the journey
                    = (5 : 21 : 01) – (3 : 19 : 01)
                    = 2 : 02 : 00
Hence Anil completed his journey in 2 hours and 2 minutes.

58. _____ **is the most ductile metal.**

    (a) Ph   (b) Au
    (c) Ag   (d) C

Ans : (b) Ductility of a metal is the property of a metal to convert the metal into thin wires. As we known that the most ductile metal till now is gold (Au) and the most malleable metal till now is gold (Au).

59. **Which part of the brain regulates breathing?**

    (a) Mid-brain   (b) Fore-brain
    (c) Medulla   (d) Cerebellum

Ans : (c) Medulla oblongata the bottom part of the brainstem helps regulate youth breathing heart rhythms, blood pressure and swallowing.

60. **Select the option that depicts the following transparent sheet (Problem Figure) when folded at the dotted line shown.**

    (a) C   (b) A
    (c) B   (d) D

Ans : (d) In the given problem figure, a transparent sheet folded along the dotted line is shown in figure D. Hence, option (d) is correct.

61. **Select the option that depicts the correct mirror image of the following figure if the mirror is held at the AB line.**

Ans : (b) The mirror image of the given image is in option (b).

62. **The value of 16 − [5 − 2 {14 of 2 − (8 ÷ 4 × 2 − 1 + 3)}] is:**
    (a) −9   (b) −14
    (c) −10   (d) −12

Ans : (*) $16 - [5 - 2 \{14 \text{ of } 2 - (8 \div 4 \times 2 - 1 + 3)\}]$

$= 16 - \left[5 - 2\{14 \text{of} 2 - (2 \times 2 - 1 + 3)\} \right]$

$= 16 - \left[5 - 2\{14 \times 2 - (4 - 1 + 3)\} \right]$

$= 16 - \left[5 - 2\{14 \times 2 - 6\} \right]$

$= 16 - \left[5 - 2\{28 - 6\} \right]$

$= 16 - [5 - 2 \times 22]$

$= 16 - [5 - 44]$

$= 16 - [-39]$

$= 16 + 39 = 55$

63. **Consider the given statement and decide which of the given assumptions is (are) implicit in the statement.**
  Statement: During an exam, an invigilator said, "if anyone tries to copy, I will cancel their exam".
  Assumptions:
  1. Some students copy during exams.
  2. Students will not copy during exams.
    (a) Only assumption 2 is implicit
    (b) Both assumptions 1 and 2 are implicit
    (c) Only assumption 1 is implicit
    (d) Either assumption 1 or 2 is implicit

Ans : (b) During various types of examination, many students try to copy each other while giving the exam in the examination class. Since here during the exam, it is being said by the invigilator that if any student tries to cheat, I will cancel his exam. Hearing the above statement of the invigilator the student will get seared and will not try to cheat during the exam. Hence both assumption 1 and 2 are implicit in the statement.

64. **35% of an alloy was silver. If in the quantity of alloy there was 119 g of silver, what was the quantity of the other elements in the alloy?**
    (a) 273 g   (b) 221 g
    (c) 340 g   (d) 204 g

Ans : (b) Let an alloy be x gram.
Given, Quantity of silver in alloy = 119 gm

Quantity of silver $= x \times \dfrac{35}{100} = \dfrac{35x}{100} = \dfrac{7x}{20}$ gm

Now, $\dfrac{7x}{20} = 119$ gm

$x = \dfrac{119 \times 20}{7} = 17 \times 20 = 340$ gm

So, alloy = 340 gm
Quantity of other element in the aloy
= Quantity of an alloy – Quantity of silver
= 340–119
= 221 gm

65. **Name the former world silver medallist representing Manipur who claimed gold in the 48 kg category at the 2018 National Women's Boxing Championships in Rohtak.**
(a) Mithali Raj   (b) Shobha Pandit
(c) Sarjubala Devi   (d) Sravanthi Naidu

Ans : (c) Former world silver Medallist Sarajubala Devi representing Manipur who claim the gold in the 48 kg category in the National Womens Boxing championships in Rohtak.

66. **Given below are the ages (in years) of a group of children. What is the median age?**
**7, 9, 8, 6, 5, 3, 9, 2**
(a) 6.5   (b) 6
(c) 6.125   (d) 5

Ans : (a) 7, 9, 8, 6, 5, 3, 9, 2
On arranging the given numbers in asscending order–
Number of terms 2, 3, 5, 6, 7, 8, 9, 9 = 8 (even)

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{th} \text{term} + \left(\frac{n}{2}+1\right)^{th} \text{term}}{2}$$

$$= \frac{\left(\frac{8}{2}\right)^{th} \text{term} + \left(\frac{8}{2}+1\right)^{th} \text{term}}{2}$$

$$= \frac{4^{th} \text{term} + (4+1)^{th} \text{term}}{2}$$

$$= \frac{4^{th} \text{term} + 5^{th} \text{term}}{2} \qquad \left[\because 4^{th} \text{term} = 6 \atop 5^{th} \text{term} = 7\right]$$

$$= \frac{6+7}{2} = \frac{13}{2} = 6.5$$

67. **Who is the CEO of Cognizant Technology Solutions as of February 2018?**
(a) Nandan Nilekani   (b) Vishal Sikka
(c) Azim Premji   (d) Francisco D'Souza

Ans : (d) Francisco D'Souza is an Indian-American entrepreneur and businessman, who is former CEO and Vice Chairman of Cognizant - a Fortune 200 global professional services company. Cognizant is currently led by Ravi Kumar (CEO) from January 2023.

68. **In the given diagram, Set U is the universal set and Set L, M and N represent students studying History, Geography and Language, respectively.**
What is the total number of students studying History and Geography but NOT Language?
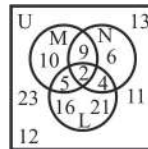
(a) 5   (b) 2
(c) 12   (d) 7

Ans : (a) It is clear from the given figure–
That total 10 students are studying only geography.
Similarly total 6 students are studying only language.
Similarly total 5 students are studying history and geography without including language, while total 4 students are studying History and Language without including Geography.

69. **Name the Indian golfer who won the Royal Cup at Pattaya on 31 December 2017. This was his third Asian Tour title of 2017.**
(a) Khalin Joshi   (b) Shiv Kapur
(c) Gaganjeet Bhullar   (d) Jyoti Randhawa

Ans : (b) Shiv Kapur, Indian golfer won the Royal Cup at Pattaya on 31 December 2017. This was his third Asian Tour title of 2017. He won 3 Asian Tour, 2 Challenge Tour and 3 other Tour. He got Arjuna Award in 2002.

70. **Which of the following statements is wrong with regard to strong acids?**
(a) Strong acids react very rapidly with other substances (such as metal carbonates and metal hydrogen carbonates)
(b) Hydrochloric Acid, Sulphuric acid and Nitric Acid are strong acids
(c) Acids are those chemical substances that have a salty taste
(d) All minerals acids are strong acids

Ans : (c) Strong Acids reacts very rapidly with substance (such as metal carbonate and metal hydrogen carbonates). Hydrochloric acid, Sulphuric acid and Nitric acid are strong acids. The pH is a measure of the concentration of Hydrogen ion, the acidity or alkalinity of a solution. Solutions having a value of pH ranging from 0 to 7 are termed as acidic and 7 to 14 are termed as basic acid have a sour taste.

71. **Which of the below given fractions is NOT equal to $\frac{9}{17}$?**
(a) $\frac{108}{221}$ (b) $\frac{27}{51}$
(c) $\frac{63}{119}$ (d) $\frac{153}{289}$

Ans : (a) From options
$$\frac{9 \times 3}{17 \times 3} = \frac{27}{51}$$
$$\frac{9 \times 7}{17 \times 7} = \frac{63}{119}$$
$$\frac{9 \times 17}{17 \times 17} = \frac{153}{289}$$

Simplifying this fraction $\frac{108}{221}$ will not $\frac{9}{17}$

Hence fraction $\frac{108}{221}$ is not equal to $\frac{9}{17}$

72.

Stu / Sub	P	C	B	M
W	70	90	50	85
X	55	80	95	60
Y	60	20	90	40
Z	90	80	40	65

The given table represents the marks obtained by four students W, X, Y and Z in four subjects P, C, B and M, with the maximum marks in each subject being 100.
Based on the given data, the student who got the lowest percentage in P, C, M and B combined is:
(a) Y (b) Z
(c) X (d) W

Ans : (a) According to the question,
Total marks of P, C, B, M = 400
Marks obtained by W in P, C, B, M =
                70+90+50+85 = 295

Marks % $= \frac{295}{400} \times 100$

         = 73.75%
Marks obtained by X in P, C, B, M = 55+80+95+60
                = 290

Marks % $= \frac{290}{400} \times 100$

         = 72.5%
Marks obtained by Y in P,C,B,M = 60+20+90+40
                = 210

Marks % $= \frac{210}{400} \times 100$

         = 52.5%
Marks obtained by Z in P,C,B,M = 90+80+40+65
                = 275

Marks % $= \frac{275}{400} \times 100$

         = 68.75%
Hence, it is clear that lowest percentage marks is obtained by Y.

73. **Bipul is 16 years younger than Saibal. 12 years hence, Saibal's age will be 1.5 times that of Bipul. Saibal is now _____ years old.**
(a) 42 (b) 45
(c) 40 (d) 36

Ans : (d) Let the present age of Saibal = x years
Then, present age of Bipul = (x–16) years
After 12 years, age of Saibal = (x+12) years
After 12 years age of Bipul = (x–16+12) = (x–4)

According to the question,
      (x+12) = 1.5 (x–4)
      x+12 = 1.5x–6
      0.5x = 18
      $x = \frac{18}{0.5}$
      x = 36 years
Hence present age of Saibal will be 36 years.

74. **Three triangles are marked out of a bigger triangle at the three vertices such that each side of each of the smaller triangles is one-fourth as long as each corresponding side of the bigger triangle. The ratio of the area of the three small triangles taken together to that of the rest of the bigger triangle is:**
(a) 3 : 13 (b) 1 : 5
(c) 3 : 16 (d) 4 : 15

Ans : (a) Let the side of big equilateral triangle = 8x unit
Side of each small equilateral traingle marked out from bigger triangle $= \frac{8x}{4} = 2x$
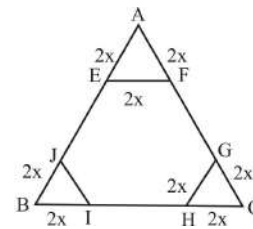
Area of equilateral triangle $= \frac{\sqrt{3}}{4} \times (8x)^2$

      $= \frac{\sqrt{3}}{4} \times 64x^2 = 16\sqrt{3}x^2$

Area of the three small equilateral triangle

      $= 3 \times \frac{\sqrt{3}}{4} \times (2x)^2 = 3\sqrt{3}x^2$

Area of rest of the bigger equilateral triangle

      $= 16\sqrt{3}x^2 - 3\sqrt{3}x^2$

         $= 13\sqrt{3}x^2$

Required ratio $= 3\sqrt{3}x^2 : 13\sqrt{3}x^2 = 3 : 13$

75. **A section of DNA that provides information for one protein is called the _____.**
(a) nucleus (b) lysosome
(c) gene (d) chromosome

Ans. (c) A gene is the basic physical and functional unit of heredity. Genes are made up of DNA and each chromosome contains many genes. Every gene comprises of the particular set of instructions for a particular function or protein coding.

1. A body has a weight W on the surface of Earth. What is its weight on a planet whose mass is 15 times that of Earth and a radius that is 4 times that of the earth?

(a) $\dfrac{16}{7}W$　　　　(b) $\dfrac{15}{16}W$

(c) $\dfrac{15}{4}W$　　　　(d) $\dfrac{16}{9}W$

Ans. (b) : We know that,

$$W = \frac{GM}{r^2} \qquad ....(i)$$

Where, G= Gravitational Constant
M = Mass of the Earth
r = Radius
On other planet, Mass = 15M, Radius = 4r

$$W_1 = \frac{G \times 15M}{16r^2}$$

$$W_1 = \frac{GM}{r^2} \times \frac{15}{16}$$

$$W_1 = W \times \frac{15}{16} \qquad \text{\{from equation (i)\}}$$

Hence, weight of the body on the planet will be 15/16 of the weight on Earth.

2. Pramod can paint a wall red in 12 hours while Brajen can whitewash the wall completely in 16 hours. If Pramod and Brajen work alternately for an hour each starting when the wall has just cement on it till when it is completely painted red, how many hours will it take to paint the entire wall red ?
(a) 95　　　　　　(b) 48
(c) 89　　　　　　(d) 96

Ans. (c) : According to the question,

Pramod (12) — 4
48
Brajen (16) — 3
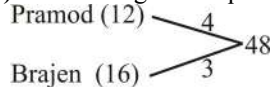
Work done by Pramod and Brazen in 2 hours-
　4–3 =　1 unit　2 hours
　　　　↓×44　↓×44
　　　　44　　　88 hours
Remaining work = 48 – 44 = 4
Now Pramod will complete remaining work.
Hence, time taken by Promod to complete the remaining work = $\dfrac{4}{4}$ = 1 hour
Total Time to paint the entire wall red = 88 + 1 = 89 hours

3. In the series 5442673314884743581, the number of 4s that are completely divisible by the number on their right but not divisible by the number on their left is:
(a) 1　　　　　　(b) 3
(c) 0　　　　　　(d) 2

Ans. (a) : According to the question,
Total number of digit '4' is only 1 in the given series '5442673314884743581' which is completely divisible by the number on their right but not divisible by the number on their left.

4. Select the option that can replace the question mark (?) in the following equation.

$$\frac{(0.3)^3 + (0.2)^3}{(0.3 - 0.2)^2} = ?$$

(a) $\dfrac{7}{2}$　　(b) 2　　(c) $\dfrac{5}{2}$　　(d) $\dfrac{3}{2}$

Ans. (a) :

$$= \frac{(0.3)^3 + (0.2)^3}{(0.3 - 0.2)^2} = \frac{(0.3 + 0.2)\left[(0.3)^2 + (0.2)^2 - 0.06\right]}{0.01}$$

$$= \frac{(0.5)(0.09 + 0.04 - 0.06)}{0.01} = \frac{0.5 \times 0.07}{0.01}$$

$$= 0.5 \times 7 = 3.5 = \frac{35}{10} = \frac{7}{2}$$

5. Who among the following is the vice-chairman of NITI Aayog?
(a) Ajit Tyagi　　　　(b) Arvind Panagariya
(c) Rajiv Kumar　　　(d) Narendra Modi

Ans. (c) : When the question was asked Shri Rajiv Kumar was the vice-chairman of NITI Aayog. However, the current vice-chairperson of NITI-Aayog is Shri Suman Bery. He is an experienced policy economist and research administrator. He took over as NITI-Aayog vice-chairperson since 1 May, 2022.

6. The selling price of an item inclusive of a 16% profit was ₹ 435. What would be the percentage loss if the item was sold for ₹ 330?
(a) 12.25　　　　　(b) 13
(c) 12　　　　　　(d) 12.5

Ans. (c) : Given, SP = 435
　　　P % = 16
Now, cost price of an item $= 435 \times \dfrac{100}{116} = ₹375$
If the item is sold for ₹330 then,
loss %$= \dfrac{(375 - 330)}{375} \times 100 = \dfrac{45}{375} \times 100 = 12\%$

7. The sum of the lengths of the edges of a cube is equal to half the perimeter of a square. If the numerical value of the volume of the cube is equal to one-sixth of the numerical value of the area of the square, then the length of one side of the square is :

   (a) 18 units   (b) 36 units
   (c) 31.5 units   (d) 27 units

Ans. (b) : Let the side of cube $= y$
     and side of square $= x$
According to the I^{st} condition,
[We know that total number of edges in a cube = 12]

$$12y = \frac{4x}{2}$$

$$y = \frac{1}{6}x \qquad ....(i)$$

According to second condition–

$$y^3 = \frac{1}{6}x^2$$

$$\left(\frac{1}{6}x\right)^3 = \frac{1}{6}x^2 \quad \text{[from equation (i)]}$$

$$\frac{1}{216}x^3 = \frac{1}{6}x^2$$

$$x = \frac{216}{6}$$

$$x = 36$$

Side of square (x) = 36 units

8. The element with the highest electron affinity among halogens is :

   (a) Cl (b) F
   (c) Br   (d) I

Ans. (a) : Halogen have high electron affinity as they have a greater tendency to gain an additional electron to change into stable configuration. The element with highest electron affinity among halogen is chlorine. Among halogens, electron affinity decreases from chlorine to Iodine. The election affinity of fluorine is much lower than that of chlorine.

9. What is the least consisting of five digits that is exactly divisible by 12, 18, 20 and 25?

   (a) 10000   (b) 10800
   (c) 11250   (d) 10680

Ans. (b) : LCM of 12, 18, 20 and 25
     $12 = 2 \times 2 \times 3$
     $18 = 2 \times 3 \times 3$
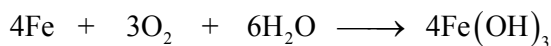 $20 = 2 \times 2 \times 5$
     $25 = 5 \times 5$
Hence, $2 \times 2 \times 3 \times 3 \times 5 \times 5 = 900$
This number 900 is three digits. The multiple of 900 which is the smallest product of five digits means $900 \times 12 = 10800$

10. When iron is exposed to moist air, a reddish brown coating of hydrated Iron (III) Oxide (Fe_2O_3) is deposited on its surface. This reddish brown coating is called :

   (a) iron   (b) alloy
   (c) rust   (d) dust

Ans. (c) : When iron is exposed to moist air for a long time, it oxidizes and forms a reddish-brown colour iron oxide, called rust on its surface. The process of forming rust is known as rooting.

$$\underset{(\text{iron})}{4Fe} + \underset{(\text{oxygen})}{3O_2} + \underset{(\text{water})}{6H_2O} \longrightarrow \underset{(\text{Rust})}{4Fe(OH)_3}$$

11. If the second half of the given series is reversed, then what will be the fifth term to the left of the ninth term from the right?

9\$YX8N6OLBUJZT@1QFD%

   (a) T   (b) O
   (c) 6   (d) Q

Ans. (c) : According to the question,
On arranging the second half of the given series in reverse order-

Hence, the fifth term to the left of the ninth term from the right will be 6.

12. Which of the following statements is INCORRECT?

  I. Bleaching powder is a pale yellow powder
  II. Dry NH_3 gas turns red litmus blue
  III. The pH of rainwater is nearly 7
  IV The pH of acid rain is nearly 5.6

   (a) I, II and III
   (b) All of the above statements are correct
   (c) Only II
   (d) I, II and IV

Ans. (b) : The colour of bleaching powder is yellowish while/pale yellow. Hence 1st statement is correct.
Dry pneumonia gas has no action on litmus paper, but moist NH_3 gas or a solution of NH_3 in water changes red litmus paper into blue. Hence 2nd statement is incorrect.
Normal clean rain water has a pH of 5.0 to 5.5 which is slightly acidic. However when rain combines with sulfur dioxide or nitrogen oxides, it becomes acid rain and it pH value rages between 4.0 to 5.0. Hence 3rd and 4th statements are also incorrect.

13. Who was the first Indian to win the 52nd Capablanca Memorial Chess tournament at Cuba?

   (a) Adhiban Baskaran   (b) Pentala Harikrishna
   (c) Krishnan Sasikiran   (d) K. Srikanth

Ans. (c) : Indian Grandmaster Krishnan Sasikiran earned 6.5 points from rounds to became the first Indian to win the 52nd Casablanca Memorial cheers townsmen at Varadero, Cuba. It is notable that Krishnan Sasikiran has been awarded 'Arjuna Award' by the Government of India in 2002.

14. Select the figure that does not belong in the following series.

    A   B   C   D
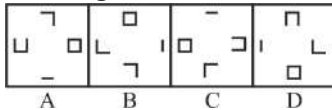
(a) C   (b) A
(c) B   (d) D

Ans. (c) : In the given series, figure B is different from the others because ⊔ is not present in the figure.

15. What percentage of 1 day is 18 minutes?
    (a) 1.25%   (b) 12.5%
    (c) 7.5%   (d) 1.8%

Ans. (a) : We know that,
1 day = 24 hours
and 1 hours = 60 minutes
So, 24 hours = 24 × 60 = 1440 minutes

Required % $= \dfrac{18 \times 100}{1440} = 1.25\%$

16. What is the square root of 5041?
    (a) 71   (b) 79
    (c) 81   (d) 69

Ans. (a) : Square root of $5041 = \sqrt{5041} = \sqrt{71 \times 71} = 71$

17. How many three digit whole numbers are there between 75 and 405?
    (a) 307   (b) 305
    (c) 306   (d) 304

Ans. (b) : In a three digit number between 75 and 405, the first number will be 100.
Three digit whole numbers between 100 to 400 = 301
Now, remaining three digit numbers = 301, 302, 303, and 304 = Four numbers
Hence, total three digit whole numbers = 301 + 4 = 305

18. The interest earned on ₹ 3,675 at the rate of 4% simple interest per annum for 2 years will be?
    (a) ₹ 289.50   (b) ₹ 292
    (c) ₹ 294   (d) ₹ 288.50

Ans. (c) : Simple interest $= \dfrac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

$= \dfrac{3675 \times 4 \times 2}{100} = \dfrac{3675 \times 2}{25} = 147 \times 2 = ₹294$

Hence, the correct answer is ₹294.

19. Arzoo was born on 25th January 2015, while Aastha was born 554 days later. On which date was Aastha born?
    (a) 3rd August 2016   (b) 1st August 2016
    (c) 31st July 2016   (d) 2nd August 2016

Ans. (b) : Arzoo was born on = 25 January 2015
∴ Aastha will be born = 25 January 2015 + 554 days later

$\begin{bmatrix} 1\,\text{year} = 365\,\text{days} \\ 554 - 365 = 189 \end{bmatrix}$ = 25 January 2015 + 1 year + 189 days

           = 25 January 2016 + 189 days
           = 1 August 2016

20. Which international tyre company has recently appointed ace badminton queen PV Sindhu as their brand ambassador?
    (a) Pirelli   (b) Bridgestone
    (c) Michelin   (d) Continental

Ans. (b) : Bridgestone India, a subsidiary of the world's largest tyre and rubber company, and a world wide Olympic Partner, appointed Ms. P.V. Sindhu to be the company's brand ambassador on 30th August 2017.

21. Which Malayalam actress won the National Film Award for the film 'Minnaminungu' in 2017?
    (a) Amala Paul   (b) Gopika
    (c) Surabhi Lakshmi   (d) Mamta Mohandas

Ans. (c) : Malayalam actress Surabhi Lakshmi won the National Film Award for the best actress for her role in the film 'Minnaminungu'. Surabhi Lakshmi is the 6th Malayalam actress to win the National Award for the best actress.

22. Which of the following numbers is divisible by 12?
    (a) 93412   (b) 63412
    (c) 73412   (d) 83412

Ans. (d) : A number which is divisible by 12 must be divisible by 3 and 4.
Divisibility rule of 3– If the sum of digits of a number is a divisible by 3 then the number will be completely divisible by 3.
Divisibility rule of 4– If the last two digits of a number are divisible by 4, then the number is completely divisible by 4.
From option (d), 83412
8+3+ 4+1+2 = 18 which is divisible by 3 and the last two digits of the numbers are 12 which is divisible by 4 i.e. the numbers 83412 is divisible by 12.

23. Which state organised India's first Tribal Entrepreneurship Summit in November 2017
    (a) Odisha   (b) Chhattisgarh
    (c) West Bengal   (d) Jharkhand

Ans. (b) : Chhattisgarh organized India's first Tribal Entrepreneurship Summit in November 2017 is Dantewada district of the state. The summit was a part of 8th Global Entrepreneurship summit held in India. The summit in Dantewada was organized with motive to inspire, nurture and promote spirit of entrepreneurship in tribal youth.

24. In the Modern Periodic Table elements present in the same period will have the same :
    (a) atomic weight   (b) number of shells
    (c) valence electrons   (d) atomic number

Ans. (b) : In modern periodic table elements present in the same period will have the some number of filled shells and also the same number of valence shell.

25. **If the momentum of a body is tripled, its KE will :**
   (a) become three times its original value
   (b) remain the same
   (c) become nine times its original value
   (d) become six times its original value

Ans. (c) : The relationship between Kinetic Energy (KE) and momentum (P) is given by –

$$K.E. = \frac{(3P)^2}{2m} \quad \text{(where m = mass of the body)}$$

Therefore if the momentum (P) is tripled then

$$K.E. = \frac{(3P)^2}{2m} = \frac{9P}{2m}$$

Hence if the momentum of a body is tripled its kinetic energy will become nine times its original value.

26. **An unbalanced chemical equation is called a :**
   (a) complex chemical equation
   (b) skeletal chemical equation
   (c) natural chemical equation
   (d) rough chemical equation

Ans. (b) : An unbalanced chemical equation is called a skeletal equation. Skeletal equations are simply the chemical formulas of the products and reactants, without any mention of state, and atom balancing on either side of the equation.

27. **Consider the given statements to be true and decide which of the conclusions logically follow(s) from the given statements.**
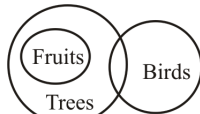   **Statement :**
   All fruits are trees. Some trees are birds.
   Conclusions :
   1. Some birds are trees.
   2. Some trees are fruits.
   (a) Only conclusion 2 follows.
   (b) Either conclusion 1 or 2 follows.
   (c) Both conclusions 1 and 2 follow.
   (d) Only conclusion 1 follows.

Ans. (c) : According to the question,

Conclusions-   (1) ✓
                (2) ✓

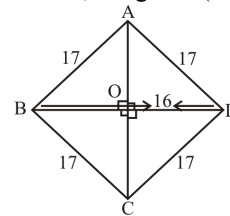Hence, both conclusions 1 and 2 follow.

28. **The length of one side of a rhombus is 17cm and one of the diagonals was 16 cm. Find the length of the other diagonal.**
   (a) 30 cm   (b) 20 cm
   (c) 32 cm   (d) 16 cm

Ans. (a) : In a Rhombus ABCD,
          AB = BC = CD = DA = 17 cm
Diagonal (BD) = 16 cm, Diagonal (AC) = ?

So, $OB = \frac{1}{2}BD = \frac{1}{2} \times 16 = 8$ cm
In right angled triangle $\triangle AOB$–
          $(AB)^2 = (AO)^2 + (OB)^2$
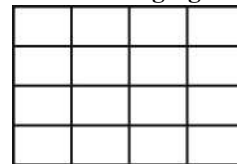 $(17)^2 = (AO)^2 + 8^2$
          $(AO)^2 = 289 - 64$
          $AO = \sqrt{225} = 15$ cm
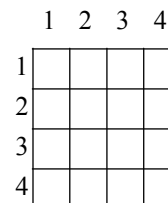Then diagonal $AC = 2 \times AO$
          $AC = 2 \times 15 = 30$ cm

29. **Select the option that represents the number of squares in the following figure.**

   (a) 30   (b) 16
   (c) 64   (d) 32

Ans. (a) : According to the question,

Total number of squares = $4^2 + 3^2 + 2^2 + 1^2$
                        $= 16 + 9 + 4 + 1 = 30$

30. **Consider the given statement to be true and decide which of the following assumptions is/are implicit.**
   Statement :
   A leading school in Mumbai has increased its fees by 150% from the next academic year.
   Assumptions :
   1. Students may change school due to more fees.
   2. The school may still have the same demand among the students.
   (a) Either assumption 1 or 2 is implicit.
   (b) Only assumption 2 is implicit.
   (c) Only assumption 1 is implicit.
   (d) Both assumptions 1 and 2 are implicit.

Ans. (a) : According to given statement either assumption 1 or 2 is implicit.

31. The radius of curvature of a concave mirror is 30 cm. Following Cartesian Sign Convention, its focal length is expressed as :
  (a) –15 cm   (b) –30 cm
  (c) +15 cm   (d) +30 cm

Ans. (a) : The relation with focal length and radius of curvature is given as f = $\dfrac{R}{2}$

So when R = 30 cm

Its focal length will be $\dfrac{30}{2}$ = 15 cm

As the mirror is concave, its focal length will be represented as –15 cm (following Cartesian sigh convention)

32. If the frequency of a sound wave of given velocity is increased, how will it affect its wavelength?
  (a) Wavelength will keep increasing and decreasing alternately.
  (b) Its wavelength will increase.
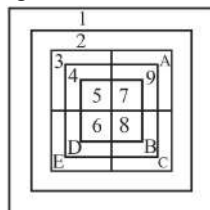 (c) The wavelength will not be affected.
  (d) Its wave length will decrease.

Ans. (d) : As the wavelength is inversely proportional to the frequency. If the frequency of sound wave of given velocity is increased, its wavelength will decrease.

33. Select the option that represents the number of squares in the given figure.
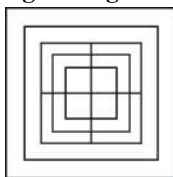
  (a) 17   (b) 15   (c) 14   (d) 13

Ans. (a) : Given figure-

Number of squares is as follows-
□1, □2, □3AEC, □345, □79A, □45, □79, □5, □7, □49DB, □5678, □ED6, □D6, □6, □8, □8B, □8BC.
Hence number of squares in the given figure is 17.

34. Consider the given statement to be true and decide which of the given courses of action logically follow(s) from the statement.
  Statement :
  Many private schools in Bangalore charge fees than the government-prescribed limits.

Course of Action:
  1. **Strict action should be taken against such schools.**
  2. **Such schools should be shut down.**
  (a) Neither 1 nor 2 follows.
  (b) Only 2 follows.
  (c) Both 1 and 2 follow.
  (d) Only 1 follows.

Ans. (d) : If a private school charges more fees for the education of children than the fee limit set by the government, then it will have a direct impact on the expenses of the parents and due to the high fees, poor parents will not be able to teach their children in these private schools. Therefore, strict action should be taken against such schools for charging fees so that they charge fees within the limits set by the governments. But closing the schools will not be justified. Hence only action (1) is true.

35. A tendon is made up of :
  (a) only collagen fibres
  (b) elastic connective tissue fibres
  (c) inelastic connective tissue fibres
  (d) inelastic and elastic connective tissue fibres

Ans. (a) : A tendon is a fibrous connective tissue that attaches muscle to bone. A Tendon is mainly composed of collagen fibers.

36. Consider the given statement to be true and decide which of the courses of action logically follow(s) from the statement.
  Statement :
  Teachers in India still teach using traditional methods and are not aware of modern methods of teaching.
  Course of Action :
  1. **Orientation should be done for teachers to change their method of teaching.**
  2. **There should be a pay hike for teachers who teach in modern methods.**
  (a) Only 1 follows.
  (b) Neither 1 nor 2 follows.
  (c) Both 1 and 2 follow.
  (d) Only 2 follows.

Ans. (a) : According to the question, it is clear that only course of action (1) follows.

37. What is the difference between the place value and face value of 3 in 273965?
  (a) 2035   (b) 3962
  (c) 2997   (d) 0

Ans. (c) : In given number 273965
Place value of 3 in the given number = 3000
and face value = 3
Hence, difference between place value and face value
  = 3000 – 3 = 2997

38. The total percentage of illiterates in all the four cities is ------- (round to one decimal place).

City	Population	Literate	illiterate	% of literate
A	200	150	50	–
B	–	200	100	66.6
C	150	50	100	–
D	120	–	90	25

(a) 44.1   (b) 44.3
(c) 44.5   (d) 44.2

Ans. (d) : Total population in city B = 200 + 100 = 300

Total population of all the four cities
$$= 200 + 300 + 150 + 120 = 770$$
And total number of illiterates in all four cities
$$= 50 + 100 + 100 + 90 = 340$$
Required % $= \dfrac{340 \times 100}{770} = 44.2\%$

39. Who launched 'Shramdaan movement' as part of Swachh Bharat and Swachh Puducherry initiative at Seliamedu village in Puducherry?
(a) Lt Governor Kiran Bedi
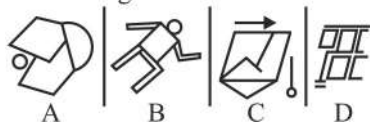(b) Nitish Kumar
(c) Prakash Javdekar
(d) Rajiv Bansal

Ans. (a) : Lt. Governor Kiran Bedi launched 'Shramadaan Movement' as part of Swachh Bharat and Swachh Pudueherry initiative at Seliamedee village in Puducherry.

40. The given Problem Figure is embedded in one of the given Answer Figures. Which is that Answer Figure?
Problem Figure

Answer Figures

(a) A   (b) D
(c) B   (d) C

Ans. (c) : Hence it is clear that the given problem figure is embedded in given answer figure B.

So option (c) is correct.

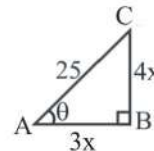**41.** A right-angled triangle ABC is right-angled at B, and tan A = $\dfrac{4}{3}$. If AC = 25 cm, the length of BC is :
(a) 20 cm   (b) 18.75 cm
(c) 33.3 cm   (d) 24 cm

Ans. (a) : Given, tan A = $\dfrac{4}{3}$

In ΔABC, $\tan A = \dfrac{BC}{AB}$ $\left(\dfrac{\text{Perpendicular}}{\text{Base}} \right)$

$$\dfrac{4x}{3x} = \dfrac{BC}{AB}$$

So, AB = 3x, BC = 4x
By Pythogoras Theorem–
$$(AC)^2 = (BC)^2 + (AB)^2$$
$$(25)^2 = (4x)^2 + (3x)^2$$
$$625 = 16x^2 + 9x^2$$
$$x^2 = \dfrac{625}{25}, \ x = \sqrt{25}, \ x = 5$$
Then length of BC = 4x = 4 × 5 = 20 cm

42. When large quantities of -------- are consumed, it tends to slow metabolic processes and to depress the central nervous system.
(a) Methanol   (b) Propanol
(c) Ethanol   (d) Butanol

Ans. (c) : When large quantity of Ethanol (Ethyl Alcohol) is consumed it tends to slow metabolic processes and depress the central nervous system. 21 can also lead to malnutrition and can exert a direct toxicological effect due to its interference with hepatic metabololism and immunological functions.

43. A high jumper runs for a while before taking a high jump so that the inertia of ------- helps him take the long jump.
(a) rest   (b) direction
(c) shape   (d) motion

Ans. (d) : The inertia of motion helps an athlete to gain the momentum that would help them to take a long jump. Momentum is the product of mass and velocity. Hence increase in velocity results in the increase in momentum.

44. By selling a table for ₹ 16,870, a shopkeeper suffers a loss of ₹ 1,080. His loss percentage (rounded off to one decimal place) is :
(a) 6.1%   (b) 6.2%
(c) 6.4%   (d) 6.0%

Ans. (a) : Selling price of table = ₹16,870
Loss = ₹1080
Then, Cost price of table = 16870 + 1080
= ₹17,950

Loss % $= \dfrac{\text{Loss}}{\text{Cost Price}} \times 100 = \dfrac{1080}{17950} \times 100 = \dfrac{108000}{17950}$
$= 6.0167$
Loss % = 6.1%

45. Name the only US president who also served as the Chief Justice of the US Supreme Court.
(a) Lyndon B. Johnson
(b) Zachary Taylor
(c) John Quincy Adams
(d) William Howard Taft

Ans. (d) : William Howard Taft is the only person to have served both President and Chief Justice of the United States. He was 27th President of the United States from 1909 to 1913 and 10th Chief Justice of the Supreme Court of the United States from 1921 to 1930.

46. Two pipes X and Y can individually fill a tank in 48 and 72 minutes, respectively. If they are opened simultaneously, how long will it take for the tank to fill?
(a) 39.4 minutes (b) 60 minutes
(c) 28.8 minutes (d) 24 minutes

Ans. (c) : According to the question-
(X) 48 — 3
(Y) 72 — 2
144 unit (Total work)
One minute work of (X+Y) = 3 + 2 = 5 unit
Time taken by pipe (X + Y) to fill the tank =

$$\frac{144}{5} = 28.8 \text{ minutes}$$

47. 0.296 + 2.96 + 29.6 + 296 = ?
(a) 327.756 (b) 328.856
(c) 327.856 (d) 328.756

Ans. (b) : 0.296 + 2.96 + 29.6 + 296 = 328.856

48. Read the following question and decide which of the given statements is/are sufficient. Are women emotionally stronger than men?
Statements :
1. Women think men's thinking cannot change any problem.
2. Women are equal to men in all issues.
(a) 2 alone is sufficient while 1 alone is not sufficient to answer the question.
(b) Neither 1 nor 2 is sufficient to answer the question.
(c) 1 alone is sufficient while 2 alone is not sufficient to answer the question.
(d) Both 1 and 2 together are sufficient to answer the question.

Ans. (b) : According to the statements it is clear that Neither 1 nor 2 is sufficient to answer the question.

49. Which of the following is NOT an example of potential energy?
(a) A compressed spring
(b) Running water
(c) A raised hammer
(d) Water stored in a dam

Ans. (b) : Potential energy is the energy that is stored in an object due to its position relative to some zero position. Out of given options, a compressed spring, a raised hammer, water stored in a dam are examples of potential energy. Running water possess the energy due to its motion and not due to its position. Hence running water is an example of kinetic energy.

50. In the word ACCUMUATES, if the 1st letter is interchanged with the 2nd, 3rd letter with the 4th, 5th with the 6th, 7th with the 8th and 9th with the 10th, then the 6th letter from the left will be :
(a) A (b) L
(c) M (d) U

Ans. (c) : According to the question,
On changing the letters-
↓
(Left) C A U C U M T A S E (Right)
Hence, the 6th letter from the left will be M.

51. What is the process of production of ovum in the females called?
(a) Oogenesis (b) Menarche
(c) Adolescence (d) Menstruation

Ans. (a) : Oogenesis is the process of the production of ovum in the Oogenesis in females. Oogenesis is initiated in the embryonic stage.

52. Pipe A can fill an empty cistern in 4 hours while along with Pipe B it can fill it up in 3 hours. Only Pipe A is turned on for an hour after which Pipe B is also turned on. How much total time will it take to fill up the cistern?
(a) 3 hours (b) 3 hours 15 minutes
(c) 3 hours 25 minutes (d) 3 hours 20 minutes

Ans. (b) : Tank filled by pipe A in 1 hour $= \frac{1}{4}$ part

And pipe A and B together fill the tank in 1 hour $= \frac{1}{3}$ part

Empty part of tank $= 1 - \frac{1}{4} = \frac{3}{4}$ part

Time taken by A and B fill together $= \frac{3}{4} \times 3 = \frac{9}{4} = 2.25$ hours

i.e. time taken to fill the tank = 1 + 2.25

$$= 3.25 \text{ hours} = 3\frac{1}{4} \text{ hours}$$

Hence it will take 3 hours 15 minutes.

53. Which of these two water bodies are connected by the Suez Canal?
(a) Pacific Ocean and Atlantic Ocean
(b) Black Sea and Red Sea
(c) Mediterranean Sea and Red Sea
(d) Mediterranean Sea and Black Sea

Ans. (c) : Suez Canal is an artificial sea-level water way in Egypt that connects the Mediterranean Sea to the Red sea through the Isthmus of Suez. It also separates Africa and Asia.

54. The given table represents the marks obtained by four students W, X, Y and Z in four subjects P, C, B and M, with the maximum marks in each subject being 100.

Based on the given data, W's marks percentage in P, C and B combined is :

Stu/Sub	P	C	B	M
W	70	90	50	85
X	55	80	95	60
Y	60	20	90	40
Z	90	80	40	65

(a) 75 (b) 72
(c) 68 (d) 70

Ans. (d) : Total marks of three subjects of P, C and B are 300.

Then W's marks percentage in P, C and B

$$=\frac{(70+90+50)}{300}\times100=\frac{210}{300}\times100=70\%$$

55. If $3x^2 + kx + k = 0$ has no solution, then the value of k will satisfy:

(a) $k > 12$ (b) $k < 12$
(c) $k > -12$ (d) $0 < k < 12$

Ans. (d) : If $3x^2 + kx + k = 0$ has no solution
then roots of the given equation will be imaginary.
i.e by discriminant
$b^2 - 4ac < 0$
$k^2 - 4 \times 3k < 0$
$k(k - 12) < 0$
$k - 12 < 0, k < 0$
$k < 12$
If $k < 0$ then $k^2 - 12k > 0$
Hence required relation will be $0 < k < 12$

56. A train crosses a 550m long platform in 36 seconds. How long was the train if it was travelling at the speed of 70 km/h?

(a) 525m (b) 160m
(c) 140m (d) 150m

Ans. (d) : Let the length of train be x meter.

Speed = 70 km/h = $70 \times \dfrac{5}{18}$ m/sec

According to the question,

Then, $70 \times \dfrac{5}{18} = \dfrac{550 + x}{36}$

$70 \times 5 \times 2 = 550 + x$
$700 = 550 + x$
$x = 150$ m.
Hence, Length of train = 150 m.

57. Select the missing word based on the given related pair of words.

Butter : Milk :: Book : ———

(a) Author (b) Chapter
(c) Printing (d) Paper

Ans. (d) : Just as, Butter is made by Milk, Similarly, Book is made by Paper. Hence, option (d) is correct.

58. Five angles of a hexagon measure 116^0 each. What is the measure of the remaining angle?

(a) 152° (b) 126°
(c) 116° (d) 140°

Ans. (d) : Sum of interior angle of polygon = $(n - 2)\pi$
$= (6 - 2) \times 180°$
$= 4 \times 180° = 720°$
Given, sum of five angles = $116° \times 5$
$= 580°$
Measure the remaining angle of hexagen = $720° - 580° = 140°$

59. The Brownian Motion was discovered by :

(a) Isaac Newton (b) Mandel Brown
(c) Robert Brown (d) John Brown

Ans. (c) : In 1827, Robert Brown noticed that pollen seeds suspended in water moved in an irregular swarming motion. This irregular motion was later called as Brownian Motion.

60. Assuming that the numbers in each of the following figures follow a similar pattern, select the option that can replace the question mark (?) in figure C.
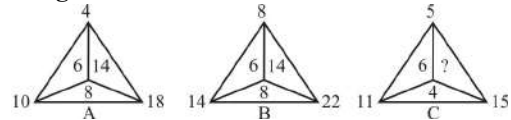
(a) 10 (b) 8
(c) 6 (d) 14

Ans. (a) : Just as,
In figure A,
$10 - 4 = 6$
$18 - 10 = 8$
$18 - 4 = 14$
In figure B,
$14 - 8 = 6$
$22 - 14 = 8$
$22 - 8 = 14$
Same as,
In figure C,
$11 - 5 = 6$
$15 - 11 = 4$
$\boxed{15 - 5 = 10}$
Hence, ? = 10

61. There are 15 protons and 22 neutrons in the nucleus of an element. What is its mass number?

(a) 7 (b) 15
(c) 22 (d) 37

Ans. (d) : The mass number is defined as the sum of the total number of protons and neutrons present in the nucleus of an atom.
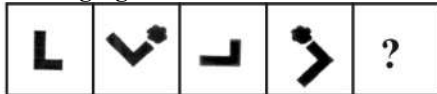Therefore, mass number = 15 + 22
$= 37$

62. Select the option that will come next in the following figure series.

(a) A   (b) C
(c) D   (d) B

Ans. (b) : According to the given figure, option (b) will come next in the following figure series.

63. Select the option that will come next in the following figure series.

(a) A   (b) D
(c) B   (d) C

Ans. (d) : According to the given figure,
Option (d) will come in place of question mark.

64. Roshan Lal, who won the Guru Dronacharya Award for 2017, is associated with which stream of sport?

(a) Volleyball   (b) Wrestling
(c) Football   (d) Hockey

Ans. (b) : Roshan Lal, who won the Guru Dronacharya Award for 2017, is associated with wrestling, The Dronacharya Award is an annual award presented by the Ministry of Youth Affairs and sports in India to honor excellent coaching in various sports disciplines.
Dronacharya Award for outstanding coaches in sports and Games 2022 (Lifetime Category):
1. Dinesh Jawahar Lad (Cricket)
2. Bimal Prafulla Ghosh (Football)
3. Raj Singh (Wrestling)

65. Select the figure that will come next in the following series.
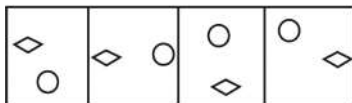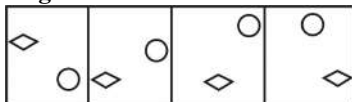
(a) B   (b) C
(c) A   (d) D

Ans. (d) : According to the given figure option (d) will come next in the following series.

66. ---- is the liquid part of the blood of which 92% is water and the remaining 8% is proteins, minerals, hormones, enzymes, and so on.

(a) RBC   (b) WBC
(c) Blood platelet   (d) Plasma

Ans. (d) : Plasma is a straw coloured, viscous fluid constituting nearly 55% of the blood. 90 – 92 % of plasma is water and proteins contribute 6 – 8% of it . Fibrinogen, Globulins and Albumins are the major proteins. Plasma also contains small amounts of minerals like Na^+, Ca^{++}, Mg^{++}, HCO_3^-, Cl^- etc. Glucose, amino acids, lipids etc. are also present in the plasma as they are always in transit in the body.

67. Consider the given statement and decide which of the given assumptions is/are implicit in the statement.
Statement :
The class teacher announced in the class that those who are going to the museum should deposit ₹ 200 by tomorrow 3 pm.
Assumptions :
  1. It is mandatory to go to the museum.
  2. All students should deposit ₹ 200.
(a) Both assumptions 1 and 2 are implicit.
(b) Only assumption 2 is implicit.
(c) Only assumption 1 is implicit.
(d) Neither assumption 1 nor 2 is implicit.

Ans. (d) : According to the given statement it is clear that neither assumption 1 nor 2 is implicit.

68. Select the option that depicts the correct mirror image of the given word when the mirror is placed horizontally below the word.
POSITIVE

(a) ƎVITISOꟼ   (b) ƎVILISOꟼ
(c) EVITISOP   (d) ꟼOSILIVE

Ans. (d) : When the mirror is placed horizontally below the word POSITIVE, the correct mirror image of the given word is option (d).

69. COULD : BNTKC :: MOULD : ————
Select the missing term based on the given related pair of terms.

(a) LNKTC   (b) CHMFI
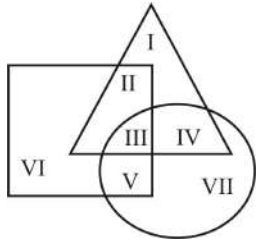(c) LNTKC   (d) NITKH

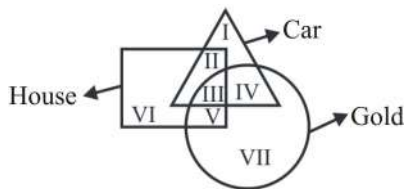**Ans. (c) :** Just as,   Same as,

70.

In the given diagram, the triangle represents the set of people who possess a car; the square represents the set of people who possess a house; and the circle represents the set of people who possess gold.

What is the total number of people who possess a house and gold but do not have a car?

(a) V + VI (b) V

(c) V + VII (d) V + III

Ans. (b) : According to the question,

Hence the total number of people who possess a house and gold but do not have a car is V.

71. The study of human evolution indicates that all of us belong to a single species that evolved in :

(a) West Asia (b) Central Asia

(c) Africa (d) America

Ans. (c) : All the different species of human that have ever existed were descended from ape-like creatures that walked upright in Africa more than six million years ago. These creatures had many descendants, most of which became extinct, but the first creature we would recognize as human first appeared in Africa two million years ago.

72. According to Ohm's Law, which of the following is true?

(a) The current flowing through a wire is indirectly proportional to its length.

(b) The current flowing through a wire is directly proportional to the Potential Difference applied across its ends.

(c) The current flowing through the wire is indirectly proportional to the Potential Difference applied acros its ends.

(d) The current flowing through a wire is directly proportional to its Resistance.

Ans. (b) : Ohm's law states that the voltage across a conductor is directly proportional to the current flowing through it, provided all physical conditions and temperatures remain constant.

$$V = IR$$

Hence, we can say that the current through a conductor is directly proportional to the electric potential difference across the conductor.

73. Which male cricketer has been appointed as the UNICEF and Cricket for Good ambassador for the ICC Women's Cricket World Cup 2017?

(a) Clive Lloyd (b) Shane Warne

(c) Brian Lara (d) Sachin Tendulkar

Ans. (d) : On International Women's Day (8 March 2017), the International Cricket Council (ICC) has reaffirmed its commitment to the spirit of cricket in bringing about a positive social change through the sport, by appointing Sachin Tendulkar, as the UNICEF Cricket for Good ambassador for the Women's World Cup 2017.

74. When a number of resistance are connected in ----------, their combined resistance is less than the smallest individual resistance.

(a) parallel (b) box

(c) horizontal (d) series

Ans. (a) : When a number of resistance are connected in parallel then combined resistance is less than the smallest individual resistance. When resistors are connected in parallel to each other, then the combination is called parallel combination of resistors. In parallel combination, the effective (equivalent) resistance (R) is given by

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4}$$

75. Select the figure that does NOT belong in the following group.
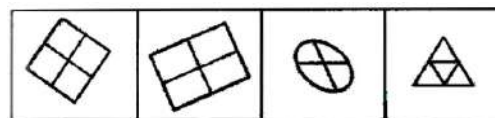
(a) D (b) B

(c) A (d) C

Ans. (d) : Option (d) is different from all other figures because in all other figures, the internal parts are divided equal while in figure C it is not so. Hence, option (d) is correct.

Railway Recruitment Boards
RRB ALP & Technicians 2018

Date : 31/08/2018   **Time : 4.00 – 5.00 PM**

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1. Evaluate: $\sqrt{93+\sqrt{32+\sqrt{274+\sqrt{225}}}}$

   (a) 9   (b) 11
   (c) 12   (d) 10

Ans : (d) $=\sqrt{93+\sqrt{32+\sqrt{274+\sqrt{225}}}}$

$=\sqrt{93+\sqrt{32+\sqrt{274+15}}}$

$=\sqrt{93+\sqrt{32+\sqrt{289}}}$

$=\sqrt{93+\sqrt{32+17}}$

$=\sqrt{93+7}=10$

2. The average marks obtained by a group of 16 students was 20. One student left the group as a result of which the average of the remaining students rose to 21. But another student joined, as a result of which the average marks of the group dropped a bit and became 20.5. What was the average marks obtained by the student who left and the one who joined?

   (a) 10   (b) 11
   (c) 8   (d) 9

Ans : (d) Sum of marks of 16 students $=20\times16 = 320$
Sum of marks of 15 students (one student leaves)
$= 15\times21= 315$
Marks of student who left $= 320 – 315 = 5$
Again Sum of marks of 16 student (one student appeared)
$= 16\times20.5=328$
Marks of student who joined $= 328–315= 13$
Average marks of the student who left group and who joined the group $=\dfrac{13+5}{2}=9$

3. Calculate the current flowing through a resistor of 10Ω when a potential difference of 140V is applied across it.

   (a) 14 Amperes   (b) 140 Amperes
   (c) 1400 Amperes   (d) 1.4 Amperes

Ans : (a) Given :
   Resistance (R) = 10Ω
   Potential difference (V) = 140V
   Current (I) = ?

According to Ohm's law,
$$V = IR$$
or $I = \dfrac{V}{R}$

$I = \dfrac{140}{10}$

I = 14 Amperes

4. In a longitudinal wave, the distance between two consecutive compressions and two consecutive rarefactions is called:

   (a) Matter   (b) Wavelength
   (c) Magnitude   (d) Energy

Ans : (b) In a longitudinal wave, the distance between two consecutive compressions and two consecutive rarefactions is called wavelength. This same wavelength seems to be the shortest distance over which the waves may be repeated.

5. Consider the given statement to be true and decide which of the following assumptions is/are implicit in the statement.
Statement: When your dress is excellent, many people ask which tailor has stitched that dress.
Assumptions:
1. If the dress is bad, people don't ask about the tailor.
2. People want to know how to stitch the same dress.

   (a) Only assumption 2 is implicit
   (b) Either assumption 1 or 2 is implicit
   (c) Both assumptions 1 and 2 are implicit
   (d) Only assumption 1 is implicit

Ans : (d) According to the given statement only assumption 1 is implicit of the given statement.

6. Which of the following Indian women cricket openers scored 320 in 45.3 overs to become the world's first pair to achieve a 300-run opening wicket partnership in one-day internationals (ODIs)?

   (a) Deepti Sharma and Poonam Raut
   (b) Diana Edulji and Mitali Raj
   (c) Mitali Raj and Deepti Sharma
   (d) Poonam Raut and Mitali Raj

Ans : (a) On 15 May, 2017 Deepti Sharma and Poonam Raut, Indian women cricket openers, scored 320 in 45.3 overs to become the world's first pair to achieve a 300 run opening wicket partnership in one-day internationls (ODIs). They made this record against the Ireland women's cricket team.

7. Sir Charles Wilkins is known and remembered for which of the following translations?
(a) 'The Old Testament' to Hindi
(b) 'The Bible' to Hindi
(c) 'Bhagavad Gita' to English
(d) 'Shakuntalam' to English

Ans : (c) Sir Charles Wilkins is remembered for his translation of Bhagavat Gita to English Wilkins' book was published by the prestigious Nourse printing press in central London in 1785. Bhagwat Gita was the first Sanskrit text to be translated in to English.

8. Select the option that represents the number of triangles in the given figure.
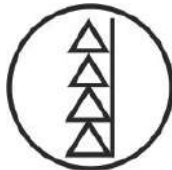
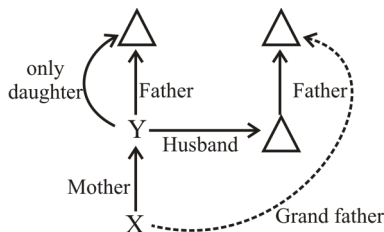(a) 6   (b) 5
(c) 4   (d) 7

Ans : (d) In the given figure four triangles are drawn in sequence and a line is drawn touching those triangles which forms three triangles.
Hence, total number of trinagles = 4 + 3 = 7

9. If X's mother is the only daughter of Y's father, then Y's husband's father is X's _____.
(a) Grandfather   (b) Great-grandfather
(c) Uncle   (d) Father

Ans. (a) On making blood relation diagram is as follows-

Hence, Y husband's father is X's grandfather.

10. What is the SI unit of Charge?
(a) Coulomb   (b) Amperes
(c) Watts   (d) Joules

Ans : (a)

Quantities		SI Unit
Charge	–	Coulomb
Electric current	–	Ampere
Power	–	Watt
Work or energy	–	Joule

11. A shopkeeper purchased some eggs at Rs. 19.20 per dozen and sold them at a profit of 25%. What is the selling price per egg?
(a) ₹2.20   (b) ₹1.60
(c) ₹2.00   (d) ₹1.80

Ans : (c) Cost price of 1 dozen eggs = ₹19.20

$$\therefore \text{Cost price of 1 egg} = \frac{19.20}{12} = 1.6$$

Selling price of 1 egg at 25% profit $= 1.6 \times \frac{125}{100} = 0.4 \times 5 = ₹2$

12. What marks the onset of puberty in females?
(a) Menopause   (b) Adolescence
(c) Menstruation   (d) Menarche

Ans : (d) Puberty or sexual maturity in females is marked by the onset of menstruation, also called Menarche. Puberty usually occurs in girls between the ages of 10 and 14 years. It is also associated with the development of secondary sexual characteristics like growth of mammary glands, widening of hips, growth of pubic hair and increase in the size of uterus.

13. If $12x^2 - ax + 7 = ax^2 + 9x + 3$ has only one (repeated) solution, then the positive integral solution of a is:
(a) 2   (b) 4
(c) 3   (d) 5

Ans : (c) $12x^2 - ax + 7 = ax^2 + 9x + 3$
$$x^2(12-a) - x(9+a) + 4 = 0 \quad ....(i)$$
On comparing equation (i) from quadratic equation $ax^2 + bx + c = 0$
$$a = (12 - a), b = -(9 + a), c = 4$$
$$[-(9 + a)]^2 = 4 \times (12 - a) \times 4$$
$$81 + a^2 + 18a = 192 - 16a$$
$$a^2 + 34a - 111 = 0$$
$$a^2 + 37a - 3a - 111 = 0$$
$$a(a + 37) - 3(a + 37) = 0$$
$$(9 + 37(a - 3) = 0$$
$$a - 3 = 0, \quad a + 37 = 0$$
$$a = 3, \quad a = -37 \text{ (invalid)}$$
Roots of equation (i) will be equal (repeated)
If $b^2 = 4ac$
Hence on taking a = 3 from option (c) roots will be equal (repeated).

14. Select the missing term from the following series.
GPW, GPUW, GIPUW, GIPSUW, _____
(a) GIPKSUW   (b) GIJPSUW
(c) GIKPSW   (d) GIKPSUW

Ans : (d) The given series is as follows-

GPW

GPUW → GP(W–2)W

GIPUW → G(G+2)PUW

GIPSUW → GIP(W–4)UW

So, the next letter will be added to the right of previously added letter from the start.

Thus the letter will be = GI (G+4)PSUW = GIKPSUW
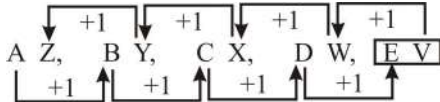
Hence the missing term will be GIKPSUW

15. **In the following series, one term is missing as shown by the question mark (?). Select the missing term from the given options.**

AZ, BY, CX, DW, ?

(a) EV   (b) EX

(c) EY   (d) EW

Ans : (a) The given series is as follows-

Hence missing term of the given series will be option (a).

16. **The least number that must be subtracted from 7577 to get a perfect square is:**

(a) 7   (b) 6

(c) 5   (d) 8

Ans : (d) From option (d)

7577–8 = 7569 which is the square of the number 87.

i.e. $(87)^2 = 7569$ which will be obtained by substracting 8 from the number 7577.

17. **As a sailor jumps in the forward direction, the boat moves backwards. This example illustrates Newton's:**

(a) Second Law of Motion

(b) First and Second Law of Motion

(c) Third Law of Motion

(d) First Law of Motion

Ans : (c) As a sailor jumps in the forward direction, the boat moves backwards. This example illustrates Newton's Third Law of Motion. According to Newton's third law of motion, for every action, there is an equal and opposite reaction. When the sailor jumps from a boat, he applies force on the boat due to which boat moves backward. An equal force is exerted by the boat on the sailor which helps the sailor to jump out of the boat.

18. **Which of the following statements is/are INCORRECT?**

A. **The value of G on the moon is equal to that on the earth.**

B. **26.68 × 10^{-11} N is the force of gravitation between two point masses of 2 kg and 2 kg kept 1 m apart.**

C. **Newton's law of gravitation is valid in the laboratory only.**

D. **Force is inversely proportional to the square of the distance between two bodies.**

(a) B, C and D   (b) C and D only

(c) Only C   (d) Only A

Ans : (c) Newton's law of gravitation is valid in the laboratory only, is the incorrect statement. According to the universal law of gravitation, the force between two objects is directly proportional to the product of their masses. That is,

$$F \propto M \times m \qquad ....(i)$$

And the force between two objects is inversely proportional to the square of the distance between them, that is,

$$F \propto \frac{1}{d^2} \qquad ....(ii)$$

Combinning equation (i) and (ii) we get,

$$F \propto \frac{M \times m}{d^2}$$

or $\qquad F = G\dfrac{M_1 M_2}{R^2} \qquad .....(iii)$

Where G is the constant of proportionality and is called the universal gravitation constant. The accepted value of G is 6.673×10^{-11} Nm^2/kg^2. The value of G on the earth as well as on the moon is same. If M = 2 kg and m = 2 kg and distance between them is 1 metre, then from equation (iii)

$$F = \frac{6.673 \times 10^{-11} \times 2 \times 2}{(1)^2}$$

$$F = 26.68 \times 10^{-11} \text{ N}$$

19. **A sum of Rs. 2,000, invested at the rate of 8.5% simple interest per annum for 6 years will yield an interest of:**

(a) ₹935   (b) ₹1,020

(c) ₹510   (d) ₹1,275

Ans : (b) Simple interest $= \dfrac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

$$= \frac{2000 \times 8.5 \times 6}{100}$$

$$= 1020$$

Simple interest $= ₹1020$

20. **If 3 dozen guavas cost ₹ 90, how many guavas can be bought for ₹ 240?**

(a) 98   (b) 96

(c) 102   (d) 90

Ans : (b) Price of 3 dozen guavas (36 guavas) = 90

∴ Price of 1 guava $= \dfrac{90}{36} = 2.5$

∴ Number of guavas bought in ₹240 $= \dfrac{240}{2.5} = 96$

21. Select the missing number based on the given related pair of numbers.

1990 : 1394 :: _____ : 2017

(a) 2361   (b) 2613
(c) 2163   (d) 2631

Ans : (b) Just as,

$$1990 : 1394$$
$$1990 \xrightarrow{-596} 1394$$

Same as,

$$\_\_\_\_\_ : 2017$$
$$? \xrightarrow{-596} 2017$$
$$= 2017+596 = \boxed{2613}$$

22. Name the Scientific Adviser to the Defence Minister and DRDO's DG (Missiles & Strategic Systems) who has won the first IEI-IEEE Award for Engineering Excellence-2015 in recognition of his significant national contributions towards missiles and aerospace technologies.

(a) Avinash Chander
(b) A S Kiran Kumar
(c) Dr. G. Satheesh Reddy
(d) K K Radhakrishnan

Ans : (c) Dr. G. Satheesh Reddy, Scientific Adviser to the Defence Minister and DRDO's DG (Missiles & Strategic Systems) who has won the first IEI-IEEE Award for Engineering Excellence-2015 in recognition of his significant national contributions towards missiles and aerospace technologies.

23. Which of the following statements is/are true or false?

Statements:

A) Natrium is the Latin name of Sodium
B) Argentum is the Latin name of Silver

(a) Only statement A is true
(b) Only statement B is true
(c) Both statements A and B are true
(d) Both statements A and B are false

Ans : (c) Both statements A and B are true. Symbols for some elementsand their latin name are given as follows-

Element	Latin name	Symbol
Sodium	Natrium	Na
Silver	Argentum	Ag
Copper	Cuprum	Cu
Potassium	Kalium	K
Iron	Ferrum	Fe
Gold	Aurum	Au

24. What is the value of $|3(1) - 6|$?

(a) 3   (b) 0
(c) –3   (d) 4

Ans : (a) $= |3(1)–6|$
              $= |3–6|= 3$

The number always comes out positive from (Modulus).

25. Which of the following statements is/are true or false?

Statements:

A) H_2SO_4 is used in the refining of petroleum to remove sulphur and other compounds.
B) The basic nature of Sodium Hydroxide (NaOH) is due to the presence of Hydrogen ions in the solution.

(a) Both statements are false
(b) Only statement A is true
(c) Only statement B is true
(d) Both statements are true

Ans : (b) Only statement A is true because H_2SO_4 is used in the refining of petroleum to remove sulphur and other compounds. Sodium hydroxide is a strong base with components Na^+ and OH^-. The basic nature of sodium Hydroxide (NaOH) is due to the presence of negative hydroxide (OH^-) ions in the solution.

26. Consider the given statement and decide which of the given assumptions is (are) implicit.

Statement: Kindly check the availability of one ticket from Tumkur to Mangalore.

Assumptions:

1. The person who is checking knows the mode of transport.
2. The person who is checking knows the passenger who is travelling very well.

(a) Only assumption 1 is implicit
(b) Only assumption 2 is implicit
(c) Either assumption 1 or 2 is implicit
(d) Both assumptions 1 and 2 are implicit

Ans : (a) According to the given statement it is clear that only assumption 1 is implicit.

27. Two partners M and N buy a car. M pays his share of $\frac{3}{7}$ th of the total cost of the car. M pays ₹31,540 less than N. What is the cost of the car?

(a) ₹2,32,680   (b) ₹2,03,175
(c) ₹2,20,780   (d) ₹1,85,780

Ans : (c) Let the cost of the car = ₹x

According to the question,

$$\text{Share of M} = \frac{3x}{7}$$

$$\text{Share of N} = \frac{3x}{7} + 31540$$

Then, $= \frac{3x}{7} + 31540 + \frac{3x}{7} = x$

$$x = 31540 \times 7$$
$$x = ₹2,20,780$$

28. **Young Indian shuttler Siddharth Pratap Singh has won which of the following series by defeating Denmark's Mads Christophersen in the finals by 21-15, 21-11 in Uppsala?**
  (a) The 2018 Australian Open Junior International
  (b) The 2018 US Open Junior International
  (c) The 2018 Swedish Open Junior International
 (d) The 2018 Denmark Open Junior International

Ans : (c) On January 22, 2018 Young Indian shuttler Siddharth Pratap Singh has won the 2018 Swedish open Junior International Series by defeating Denmark's Mads Christophersen in the finals by 21−15, 21−11 in Uppsala, Sweden.

29. **Which of the given answer figures is embedded in the given problem figure?**
Problem Figure

Answer Figures

  A   B   C   D
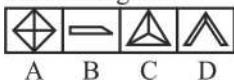
  (a) D   (b) B
  (c) A   (d) C

Ans : (b) According to the question it is clear that the given answer figure (b) is embedded in the given problem figure.

30. **In which of the following metioned activities is the potential energy (P.E.) converted into kinetic energy (K.E.)?**
  (a) The explosion of a fire cracker
  (b) The switching on of a torch
  (c) The switching off of a torch
 (d) The swinging of a pendulum

Ans : (d) The Swinging of a pendulum is an example of the conversion of potential energy (PE) to kinetic energy (KE). Explosion of firecracker is an example of conversion of chemical energy into sound energy, 'switching on of a torch is an example of conversion of chemical energy into light energy.

31. **Select the option that represents the number of squares in the given figure.**

  (a) 2   (b) 1
  (c) 4   (d) 3

Ans : (a) ▢ ABER and ▢ PCDQ are two squares in the given figure.
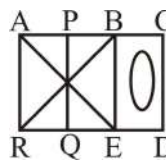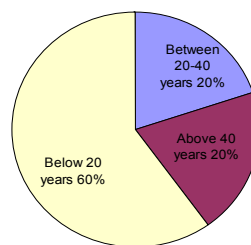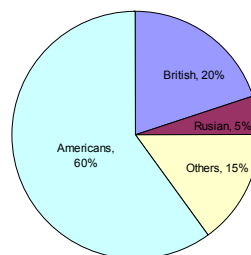

32. **Saturated Hydrocarbons are called:**
  (a) alkynes   (b) isomers
  (c) alkanes   (d) alkenes

Ans : (c) Saturated Hydrocarbons are called alkanes. Alkanes are saturated compounds because they have a single bond between carbon and Hydrogen. Among alkane, alkyne, alkene, the alkanes are the least reactive and thus alkanes are called saturated compounds.

33.

The given figures depict the country-wise and age-wise distribution of the people who visit China for business setup.
If in a given year, 500,000 people visited China, then the ratio of the number of Americans with the age group between 20 and 40 years to the Russians with the age group below 20 years who visited China is:
  (a) 4 : 1   (b) 1 : 2
  (c) 2 : 1   (d) 1 : 4

Ans : (a) Number of Americans = $500000 \times \dfrac{60}{100}$

$$= 300000$$

Number of Americans with the age group between 20 and 40 years
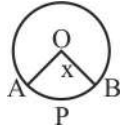
$$= 300000 \times \dfrac{20}{100} = 60000$$

and

Number of Russians with the age group below 20 years
$$= \left(500000 \times \frac{5}{100}\right) \times \frac{60}{100} = 15000$$

Hence required ratio $= \dfrac{60000}{15000}$

$$= \frac{4}{1} = 4:1$$

34. In figure 'O' is the centre of a circle. The area of sector OAPB is $\dfrac{5}{18}$ of the area of the circle find x.

(a) 120 degrees   (b) 100 degrees
(c) 125 degrees   (d) 115 degrees

Ans : (b) According to the question,
$$\frac{\pi r^2 x}{360^o} = \pi r^2 \times \frac{5}{18}$$
$$\frac{x}{20^o} = 5$$
$$x = 100^o$$

35. In the following diagram, Set U is the universal set, and Set L, M and N represent students studying History, Geography and Language, respectively.
Based on the given data, what is the total number of students studying Language and Geography but not History?
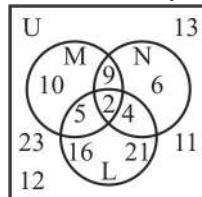
(a) 9   (b) 11
(c) 19   (d) 2

Ans : (a) L = Student studying History
M = Student Studying Geography
N = Student studying language
No. of students who studying language and Geography but not History = 9

36. Rickets is caused due to the deficiency of:
(a) Vitamin D   (b) Vitamin A
(c) Vitamin B   (d) Vitamin C

Ans : (a)

Vitamin	Deficiency disease
Vitamin D	Rickets and Osteomalacia
Vitamin A	Night blindness
Vitamin B1	Beriberi
Vitamin B6	Anemia
Vitamin C	Scurvy, Swelling of Gums
Vitamin K	Non-clotting of Blood

37. Pipes A, B and C are attached to an empty cistern. While the first two can fill the cistern in 4 and 10 hours, respectively, the third can drain the cistern, when filled, in 6 hours. If all the three pipes are opened simultaneously when the cistern is half-full, how many hours will be needed to fill the cistern?

(a) $\dfrac{30}{11}$ (b) $\dfrac{60}{11}$
(c) $\dfrac{120}{11}$ (d) $\dfrac{90}{11}$

Ans : (a) According to the question,
$$= \frac{1}{4} + \frac{1}{10} - \frac{1}{6}$$
$$= \frac{15 + 6 - 10}{60} = \frac{11}{60} \text{ part}$$

Time taken to fill the cistern completely $= \dfrac{60}{11}$ hours

When the cistern is half-full then time taken to fill the cistern
$$= \frac{60}{2 \times 11} = \frac{30}{11} \text{ hours}$$

38. Which country hosted the 'Bodhi Parva: BIMSTEC Festival of Buddhist Heritage' from 8-10 December 2017 as part of BIMSTEC's 20th anniversary celebrations?
(a) Nepal   (b) China
(c) Bhutan   (d) India

Ans : (d) India hosted the 'Bodhi Parva'. BIMSTEC Festival of Buddhist Heritage' from 8-10 December 2017 as part of BIMSTEC's 20th anniversary celebrations. In 2022, the 25th anniversary of the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) was celebrated in Dhaka, Bangladesh.

39. The Karnataka government launched the Bengaluru city logo – making Bengaluru the first Indian city to get its own logo – on 24 December 2017 for branding the city as a:
(a) tribal destination
(b) art and craft destination
(c) tourism destination
(d) spiritual destination

Ans : (c) The Karnataka government launched the Bengaluru city logo-making Bengaluru the first Indian city to get its own logo-on 24 December 2017 for branding the city as a tourism destination. The logo was designed by Rushi Patel and M Venkateswara Rao, founders of Nammur, a creative design start-up, which won a contest and received a prize money of ₹5 lakh from the government.

40. Rs. x invested at 9% simple interest per annum for 5 years yields the same interest as that on Rs. y invested at 6.25% simple interest per annum for 8 years. Find x : y.

(a) 16 : 15   (b) 10 : 9
(c) 45 : 50   (d) 5 : 8

Ans : (b) According to the question,

$$\frac{5 \times 9 \times x}{100} = \frac{8 \times 6.25 \times y}{100}$$

$$\frac{x}{y} = \frac{8 \times 6.25}{5 \times 9}$$

$$\frac{x}{y} = \frac{8 \times 1.25}{9} = \frac{8 \times 125}{900} = \frac{8 \times 125}{9 \times 100}$$

$$\frac{x}{y} = \frac{8 \times 5}{9 \times 4} = \frac{10}{9}$$

$$x : y = 10 : 9$$

41. Read the following question and decide which of the given statements is/are sufficient.

If X is a natural number, is X + 6 odd?

Statements:

1. X–15 is a whole number.

2. X–6 is an odd number.

(a) 2 alone is sufficient while 1 alone is not sufficient to answer the question

(b) Both 1 and 2 together are sufficient to answer the question

(c) Either 1 or 2 is sufficient to answer the question

(d) 1 alone is sufficient while 2 alone is not sufficient to answer the question

Ans : (a) From statement – 1 it is said that the (X – 15) is whole number it means X can be any integer, then we get X as an odd number or an even number. Hence, statement 1 is not true.

From statement – 2 (X – 6) is an odd number this shows that X is an odd number

Hence statement 2 is alone sufficient to answer the question.

42. (5x – 3) (x + 4) – (2x + 5) (3x – 4) = ?

(a) $-x^2 + 10x - 8$ (b) $-x^2 + 10x + 8$
(c) $x^2 + 10x - 8$ (d) $x^2 + 10x + 8$

Ans : (b) $(5x - 3)(x + 4) - (2x + 5)(3x - 4)$

$(5x^2 + 20x - 3x - 12) - (6x^2 - 8x + 15x - 20)$

$(5x^2 + 17x - 12) - (6x^2 + 7x - 20)$

$= -x^2 + 10x + 8$

43. What is the name of the southernmost tip of the continent of South America? At this place the Pacific and Atlantic oceans converge.

(a) Cape Town
(b) Cape of Good Hope
(c) Cape Horn
(d) Cape Canaveral

Ans : (c) Cape Horn is the name of the southermost tip of the continent of South America. At this place, the pacific and Atlantic Oceans Converge. It is a headland situated on the small Hornos Island in Southern Chile. It was discovered and first rounded in the year 1616 by the Dutchman willem schouten.

44. Raj takes $2\frac{1}{3}$ hours to complete a certain distance at a speed of 51 km/hr. What time would Kiran take to complete the same distance at a speed of 68 km/hr?

(a) $1\frac{2}{3}$ hours   (b) $1\frac{3}{4}$ hours

(c) 2 hours   (d) $1\frac{1}{2}$ hours

Ans : (b)

Total distance covered by Raj $= 51 \times \frac{7}{3} = 119$ km.

Time taken by Kiran to cover a distance of 119 km

$$= \frac{119}{68} \text{ hours}$$

$$= \frac{7}{4} = 1\frac{3}{4} \text{ hours}$$

45. 15 years ago, Shyam was twice as old as Prabhat. Five years from now Prabhat's age will be $\frac{5}{8}$ of Shyam's age. What is Shyam's current age?

(a) 72 years   (b) 75 years
(c) 80 years   (d) 64 years

Ans : (b) Let,
Present age of Prabhat = x years
Present age of Shyam = y years
According to the question,
15 years ago

$$2(x–15) = (y–15)$$
$$2x–30 = y–15$$
$$2x–y = 15 \qquad .... (1)$$

After five years from now,

$$(x+5) = \frac{5}{8}(y+5)$$
$$8x+40 = 5y+25$$
$$8x–5y = –15 \qquad .... (2)$$

On multiplying by 5 in equation (1),

$$5(2x–y) = 15 \times 5$$
$$10x–5y = 75 \qquad .... (3)$$

On subtracting equation (3) from equation (2)–

$$8x - 5y = -15$$
$$10x - 5y = 75$$
$$\underline{-\quad +\quad -}$$
$$-2x = -90$$
$$x = 45$$

On putting the value of x in equation (1)–

$$2x - y = 15$$
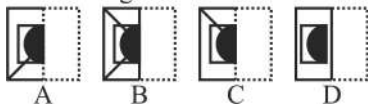$$y = 90 - 15$$
$$y = 75 \text{ years}$$

Hence Shyam's present age is 75 years.

46. **Select the option that depicts the following transparent sheet (Problem Figure) when folded at the dotted line shown.**

Problem Figure

Answer Figures

```
    A       B       C       D
```

(a) C   (b) D
(c) A   (d) B

Ans : (d) If the given figure is folded along the dotted line then problem figure appeared as answer figure B.

47. **_____ has naked seeds.**

(a) Pinus   (b) Lemon
(c) Carrot   (d) Wheat

Ans : (a) The gymnosperms are plants in which the ovules are not enclosed by any ovary wall and remain exposed, both before and after fertilisation. The seeds that develop post-fertilization, are not covered, i.e. are naked. Gymnosperms include medium-sized trees or tall trees and shrubs. Sequoia, Pinus, Cycas, Cedrus and Ginkgo comes under Gymnosperms.

48. **Consider the given statement and decide which of the given assumptions is (are) implicit in the statement.**

Statement: Mr. X said to Mr. Y, "I want to become a doctor because I want to serve the mankind".

Assumptions:
1. Mr. X is lying to Mr. Y.
2. Mr. Y knows that Mr. X is lying.

(a) Only assumption 2 is implicit
(b) Both assumption 1 and 2 are implicit
(c) Either assumption 1 or 2 is implicit
(d) Only assumption 1 is implicit

Ans : (c) According to the question, it is clear from statement either assumption 1 or 2 is implicit.

49. **Which of the following metals is found in free state?**

(a) Sodium   (b) Gold
(c) Potassium   (d) Calcium

Ans : (b) Platinum, Gold, Silver and Copper are some of the metals found in the free state. Metals are found in nature both in the free and combined state. The reason for their occurrence in the free state is that they are less reactive.

50. **Select the option that correctly matches the contents of the first column with the contents of the second column.**

A.	Calcium, Oxygen	I.	Formula of Calcium Phosphide
B.	Ca_3P_2	II.	Elements present in Quicklime
C.	0.1 Moles	III.	This number is known as the Avogadro constant
D.	The fixed number of atoms or molecules present in gram atomic mass of an atom or molecules is 6.022×10^{23}	IV.	Are present in 2.3 g of Na

(a) A-II, B-IV, C-I, D-III
(b) A-II, B-I, C-III, D-IV
(c) A-I, B-II, C-IV, D-III
(d) A-II, B-I, C-IV, D-III

Ans : (d)

First column		Second column	
A.	Calcium, Oxygen	II.	Elements present in Quicklime
B.	Ca_3P_2	I.	Formula of Calcium Phosphide
C.	0.1 Moles	IV.	Are present in 2.3 g of Na
D.	The fixed number of atoms or molecules present in gram atomic mass of an atom or molecules is 6.022×10^{23}	III.	This number is known as the Avogadro constant

51.
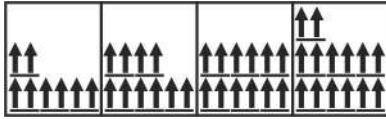
The above figures are arranged in some order. The next figure that follows the same order is
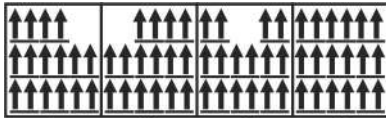
(a) C   (b) B
(c) A   (d) D

Ans : (c) The next term in the given figures will follow the figure A because in the figure the stick with two arrows is being extended from the left.

52.   Which of the following can do more work?

(a) A rotating wheel   (b) A moving bullet
(c) A speeding stone   (d) A raised hammer

Ans : (b) A moving bullet can do more work because according to Newton's Third Law of motion, every action has an equal and opposite reaction. When a gun fires a bullet, the gun puts a force on the bullet that propels it forward. The bullet likewise exerts an equal and opposing force on the gun in the backward direction.

53.   Ajay can do a painting in 12 days. Amit is 70% more efficient than Ajay. What is the number of days Amit would need to finish the same painting?

(a) $6\dfrac{4}{15}$ (b) $5\dfrac{1}{13}$

(c) $3\dfrac{3}{5}$ (d) $7\dfrac{1}{17}$

Ans : (d) Let the efficiency of Ajay = 100
Efficiency of Amit = 170
Time taken by Ajay to do the work = 12 days
and time taken by Amit to do the work = x days

$\therefore \quad \dfrac{\text{Efficiency of Ajay}}{\text{Efficiency of Amit}} = \dfrac{\text{No. of days by Amit}}{\text{No. of days by Ajay}}$
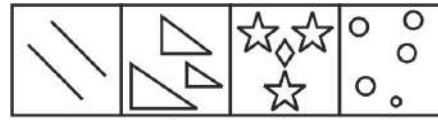
$$\dfrac{100}{170} = \dfrac{x}{12}$$

$$\therefore \quad x = \dfrac{120}{17} = 7\dfrac{1}{17} \text{ days}$$

54.   How many groups and periods are present in the Modern Periodic Table?

(a) 9 groups, 9 periods
(b) 7 groups, 8 periods
(c) 18 groups, 7 periods
(d) 8 groups, 7 periods

Ans : (c) The Modern periodic Table has 18 vertical columns known as 'groups' and 7 horizontal rows known as 'periods'.

55.   Select the figure that does NOT belong to the following group.

(a) A   (b) B
(c) D   (d) C

Ans : (d) In the given figure series the designs inside all the figures are similar while in the figure C one design is different.

56.   Read the given statement and decide which of the suggested courses of action logically follow(s) on the the basis of the information given in the statement.
Statement: During natural calamities, many departments blame each other for any wrong-doing due to overlapping functions of these departments.
Course of Action:
1. Only one department should be there to take charge during natural calamities.
2. All departments should be held responsible for wrong-doings and punished.
(a) Neither 1 nor 2 follows
(b) Both 1 and 2 follow
(c) Only 2 follows
(d) Only 1 follows

Ans : (a) According to the question, it is clear from statement that neither action 1 nor 2 follows.

57.   Salil Parekh, who took charge as the new CEO of Infosys, is moving out from which company to join and lead Infosys?
(a) IBM   (b) Accenture
(c) Capgemini   (d) Wipro

Ans : (c) Since January 2018, Salil parekh, who took charge as the new CEO of Infosys, is moving out from capgemini company to join and lead Infosys. It is significant that, on May 22, 2022 Infosys board extends salil parekh's term for five more years. The CEO's of major companies are as follows-
Arvind Krishna   - IBM
Julie Sweet   - Accenture
Thierry Delaporte   - Wipro

58.   The speed of the light is maximum in:
(a) Air   (b) Vacuum
(c) Water   (d) Glass

Ans : (b) Medium   Speed of light
    Vacuum 3×10^8 m/s
    Water 2.25×10^8 m/s
    Glass 2×10^8 m/s
    Air 2.9×10^8 m/s
Hence, the speed of the light is maximum in vacuum.
	61. To which country does the celebrated author and leadership speaker Robin Sharma belong?
	  (a) Canada (b) India
	  (c) Britain (d) USA

59. Take the given statements to be true and decide which of the conclusions logically follows from the given statements.
Statement: Some ponds are lakes.
Some lakes are rivers.
Some rivers are seas.
Conclusions:
1. Some seas are lakes
2. No sea is a lake
(a) Both 1 and 2 follow.
(b) Either 1 or 2 follows
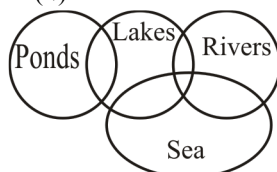(c) Only conclusion 1 follows
(d) Only conclusion 2 follows

Ans : (b)

Conclusions-   I. (X)
              II-(√)
     or

Conclusion-   I. (√)
             II-(X)
Hence, option (b) is correct.

60. Which of the following statements is/are true or false?
Statements:
A) H_2S burns in air to give H_2O and SO_2
B) The decomposition of Ferrous Sulphate into Fe_2O_3, SO_2 and SO_3 occurs in the presence of heat.
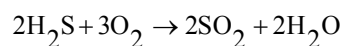(a) Statements A and B both are true
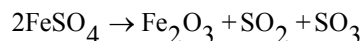(b) Statement A is true, while B is false
(c) Statements A and B are false
(d) Statement B is true, while A is false

Ans : (a) Statements A and B both are true because Hydrogen sulphide gas burns in air to give water and sulphur dioxide.
$$2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$$
The decomposition of ferrous sulphate into ferric oxide (Fe_2O_3), Sulphur dioxide (SO_2) and Sulphur trioxide (SO_3).
$$2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$$

Ans : (a) Robin Sharma is a Canadian writer, best known for his, the monk who sold His Ferrari book series.

62. What is the obtuse angle formed by the hands of a clock when the time in the clock is 2:30?
  (a) 95°   (b) 120°
  (c) 105°   (d) 165°

Ans : (c) By formula, $\theta = \dfrac{1}{2}(11m - 60h)$
Where,   m = minutes
                 h = hours
$$\theta = \frac{11\times30 - 60\times2}{2} = \frac{330 - 120}{2}$$
$$= \frac{210}{2} = 105°$$

63. Name the state in which the village Gumthala Garhu near Pehowa in Kurukshetra district has become the first Wi-Fi hotspot village under bulk plan of Bharat Sanchar Nigam Limited (BSNL).
  (a) Gujarat   (b) Himachal Pradesh
  (c) Uttar Pradesh   (d) Haryana

Ans : (d) In 2016, Gumthala Garhu near Pehowa became the first Wi-Fi hotspot village in Haryana circle under the bulk plan of Bharat Sanchar Nigam Limited (BSNL) for the state.

64. Which of the following statements is true?
(a) In grasshoppers and some insects, the male has only four sex chromosomes
(b) A male individual contains one X and two Y chromosomes
(c) In human beings, there are 46 chromosomes, of which 42 (21 pairs) are autosomes
(d) In diploid organisms having separate sexes, a specific pair of chromosomes in each diploid cell determines the sex of the individual; they are called sex chromosomes

Ans : (d) Statement (d) is true because in diploid organisms having separate sexes, a specific pair of chromosomes in each diploid cell determines the sex of the individual; they are called sex chromosomes.
Statement (a) is incorrect because the sex determining mechanism in Grasshopper is XX-XO type. The males have only one X chromosomes besides the autosomes where as female has two X chromosomes.

Statement (b) is incorrect because each male person normally has one pair of XY sex chromosomes in each cell a while females have two X chromosomes.

Statement (c) is incorrect because in humans, each cell normally contains 23 pairs of chromosomes, for a total of 46. Twenty-two of these pairs, called autosomes, look the same in both males and females. The 23rd pair, the sex chromosomes, differs between males and females.

65. **Three bells ring at intervals of 15, 30 and 45 minutes respectively. At what time will they ring together again, if they rang simultaneously at 8.00 AM?**

(a) 8.30 AM   (b) 9.30 AM
(c) 9.00 AM   (d) 8.45 AM

Ans : (b) LCM of 15, 30 and 45 = 90 minutes
So the time will increase by 1 hour and 30 minutes
Next time they ring together at
$$= 8 \text{ am} + 1 \text{ hour } 30 \text{ minutes}$$
$$= 9:30$$

66. $45 - [38 - \{80 \div 4 - (8 - 12 \div 3) \div 4\}] = ?$
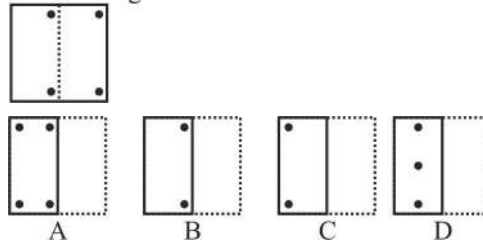
(a) 25   (b) 27
(c) 26   (d) 28

Ans : (c) $\because 45 - [38 - \{80 \div 4 - (8 - 12 \div 3) \div 4\}]$
$$= 45 - [38 - \{80 \div 4 - 4 \div 4\}]$$
$$= 45 - [38 - \{20 - 1\}]$$
$$= 45 - [38 - 19]$$
$$= 45 - 19 = 26$$

67. **If $3\cos^2 x - 2\sin^2 x = -0.75$ and $0° \leq x \leq 90°$, then x = ?**

(a) 30°   (b) 90°
(c) 60°   (d) 45°

Ans : (c) $3\cos^2 x - 2\sin^2 x = -0.75$

$\because \quad 3 - 3\sin^2 x - 2\sin^2 x = -\dfrac{3}{4}$

$\because \quad 3 + \dfrac{3}{4} = 5\sin^2 x$

$\because \quad \dfrac{15}{4} = 5\sin^2 x$

$\because \quad \sin^2 x = \dfrac{3}{4}$

$\because \quad \sin x = \dfrac{\sqrt{3}}{2}$

$\because \quad \sin x = \sin 60°$

$\because \quad \boxed{x = 60°}$

68. **Select the option that depicts the following transparent sheet (Problem Figure) when folded at the dotted line shown.**

Problem Figure

(a) A   (b) C
(c) D   (d) B

Ans : (a) If the given figure is folded along the dotted line then problem figure appeared as answer figure (A).

69. **Given in the options are sets of particular characteristics of elements and how they vary across the period and down the group in the following format:**
Characteristic of an element – across the period – Down the group
Select the correct set from the given options.

(a) Electropositive character/metallic character – Increase – Decrease
(b) Electropositive character/metallic character – Increase – Increase
(c) Electropositive character/metallic character – Decrease – Increase
(d) Electropositive character/metallic character – Decrease – Decrease

Ans : (c) The tendency of atoms to lose electrons and to form positive ion is known as electropositivity. In a period, electropositivity decreases from left to right because the atomic size decreases and nuclear attraction experienced by the outer shell electrons increases, therefore, ionization energy increases. While in a group, electropositivity increases because the size of an atom increases and therefore ionization energy decreases when moving down in a group. It is significant that, Metals are highly electropositive. Alkali metals have the highest electropositivity in a period.

70.

Students/Subject	P	C	B	M
W	70	90	50	85
X	55	80	95	60
Y	60	20	90	40
Z	90	80	40	65

The given table represents the marks obtained by four students W, X, Y and Z in four subjects P, C, B and M, with the maximum marks in each subject being 100.

The student who got the highest percentage of marks in P, C, M and B combined is:

(a) W   (b) X

(c) Y   (d) Z

Ans : (a) It is clear from table that total marks of students-

$\quad$ W = P+C+B+M

$\qquad$ = 70+90+50+85 = 295

$\quad$ X = 55+80+95+60 = 290

$\quad$ Y = 60+20+90+40 = 210

$\quad$ Z = 90+80+40+65 = 275

The sum of marks of student W is maximum.

Hence P, C, M and B combined, student W has secured the highest percentage of marks.

71.

Student/Subject	P	C	B	M
W	70	90	50	85
X	55	80	95	60
Y	60	20	90	40
Z	90	80	40	65

The above table represents the marks obtained by 4 students W, X, Y, Z in 4 subjects P, C, B, M with maximum marks in each subject being 100.

If these four students are given ranks according to their total percentage of marks in PCMB then _____ gets the 3rd rank.
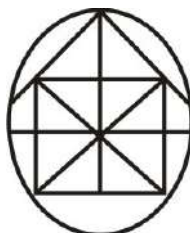
(a) W   (b) X

(c) Y   (d) Z

Ans : (d) According to the rank in total number in subject P, C,B and, M

(1st) W = 70+90+50+85 = 295

(2nd) X = 55+80+95+60 = 290

(3rd) Z = 90+80+40+65 = 275

Required percentage of 3rd rank sudent

$\quad = \dfrac{275}{400} \times 100 = 68.75\%$

72. Select the option that represents the number of squares in the given figure.

(a) 4   (b) 6

(c) 5   (d) 7

Ans : (b) Number of squares in the given figure is 6.

73. $\{8 - (28 - 53)\} \div \{- 4 \times 5 - (-9)\} = ?$
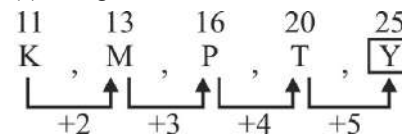
(a) 11   (b) −3

(c) 3   (d) −11

Ans : (b) $\{8 - (28 - 53)\} \div \{-4 \times 5 - (-9)\}$

$\quad = \{8 - (-25)\} \div \{-20 + 9\}$

$\quad = \{33\} \div \{-11\} = -3$

74. Select the letter missing from the given letter series.

K, M, P, T, _____

(a) X   (b) S

(c) Y   (d) Z

Ans : (c) The given series is as follows-

75. A man starts from point 'O', travels 20 km towards east to reach point 'A', turns right and travels 10 km to reach point 'B', turns right and travels 9 km to reach point 'C', turns right and travels 5 km to reach point 'D', turns left and travels 12 km to reach point 'E' and then turns right and travels 6 km to reach point 'F'. What is the shortest distance between point 'E' and point 'C'?

(a) 13   (b) $\sqrt{2}$

(c) $\sqrt{20}$ (d) $\sqrt{145}$

Ans : (a)
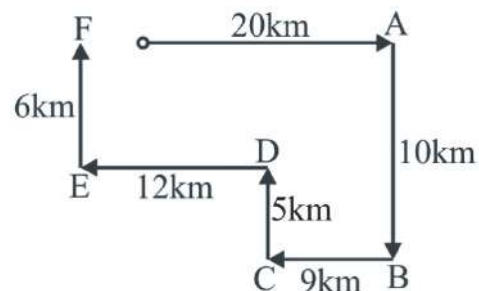
$(EC)^2 = (CD)^2 + (ED)^2$

$\qquad = 5^2 + 12^2$

$\qquad = 25 + 144$

$EC = \sqrt{169} = 13$ km.

Hence, the shortest distance between point E and point C = 13 km.

Railway Recruitment Boards
RRB ALP & Technicians 2018

Date : 30/08/2018   Time : 10.00 – 11.00 AM

1. **The state of matter can be changed into another state by changing the:**
   (a) Volume   (b) Density
   (c) Shape   (d) Temperature

Ans : (d) We can see that matter around us exists in three different states viz. Solid, liquid and gas. These states of matter arise due to the variation in the characteristics of the particles of matter. On increasing the temperature of solids, the kinetic energy of the particles increases. Due to the increase in kinetic energy, the particles start vibrating with more speed. The energy supplied by heat overcomes the forces of attraction between the particles. The particles leave their fixed positions and start moving more freely. The minimum temperature when the solid melts and is converted to a liquid at the atmospheric pressure is called melting point. So, we infer that the state of matter can be changed into another state by changing the temperature.

2. **Select the option that can replace the? Symbol in the following figure.**
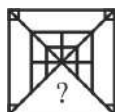
(a)   (b)

(c)   (d)

Ans : (b) Option figure (b) will replace the question mark. Hence, option (b) is correct answer.

3. **The Kochi-Muziris Biennial held in Kochi, Kerala is an exhibition of which of the following?**
   (a) Kerala martial art of Kalaripayattu
   (b) Old Malayalam movies
   (c) Kathakali dance
   (d) Contemporary art

Ans : (d) The Kochi-Muziris Biennial is an international exhibition held in Kochi, Kerala. It is India's largest art exhibition and the largest contemporary art festival in Asia.

4. **The chemical formula of Sodium Carbonate is:**
   (a) Na_3CO_2 (b) Na_2CO
   (c) $NaCO_3$ (d) Na_2CO_3

Ans : (d) Chemical formula of Sodium carbonate is Na_2CO_3. Sodium carbonate also known as washing soda, is an inorganic water soluble compound. It is used in manufacturing of detergents, soaps etc.

5. **Consider the given statement to be true and decide which of the conclusions logically follow(s) from the statements.**
   Statement: Public smoking has increased in the current year.
   Conclusions:
   1. Government should ban public smoking.
   2. Government should create awareness about ill effects of public smoking.
   (a) Only conclusion 1 follows
   (b) Only conclusion 2 follows
   (c) Neither 1 nor 2 follows
   (d) Both 1 and 2 follow

Ans : (d) Government should ban smoking in public places because smoking is the cause of serious and dangerous diseases. It is dangerous not only for those who smoke but also for those one who is in contact with its smoke. So the government should be made aware of people smoking in public places and its bad effects, the result of this implementation that the increase in smoking in public places can be stopped. Thus here both conclusion (1) and conclusion (2) follow from the given statement.

6. **In a certain code, if ZIGZAGGING is written as AZGIZGNIGG, then how will BLIZZARDLY be written as in the same code?**
   (a) ZZILBYLDRA   (b) ZZILBIYLDRA
   (c) ZZILLBYLDRA   (d) ZZILBYDRA

Ans : (a) Just as,

Same as,

Hence, option (a) is correct.

7. The Charter of Liberties - popularly known as 'The Magna Carta' - was signed in England in which year?
(a) 1415 AD   (b) 1315 AD
(c) 1215 AD   (d) 1115 AD

Ans : (c) Charter of Liberties is a document, popularly known as 'The Magna Carta'. the written by king John of England as a practical solution to the political crisis he faced in 1215 AD.

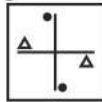**8.** Which of the given Answer Figures depicts the correct water image of the given Problem Figure?
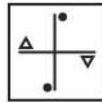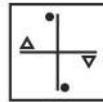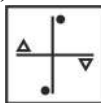
Problem Figure

Answer Figures

(a) A   (b) D
(c) C   (d) B

Ans : (c) In the above question,

 water image

The answer figure (C) will be the water image of the question figure.
Hence option (c) is correct.

9. What would be the smaller of the two angles formed by the hour hand and the minute hand at 4 : 52 p.m.?
(a) 162°   (b) 164.5°
(c) 165°   (d) 166°

Ans : (d) According to the question

Angle $(\theta) = \left| \frac{1}{2}M - 30H \right|$ Where M = minute

Given,   H = Hour
    H = 4 M = 52
Then,

$\theta = \frac{11}{2} \times 52 - 30 \times 4$

$= 286 - 120$

$= 166°$

10. Vistara airline is a joint venture between Tata Sons and which international airlines?
(a) Lufthansa
(b) Malaysian Airlines
(c) British Airways
(d) Singapore Airlines

Ans : (d) Vistara airline is a joint venture between Tata Sons and Singapore Airlines. Vistara airline is a domestic airline headquartered in Gurugram, India.

11. While releasing the arrow from a stretched bow, the PE of the bow is converted into?
(a) chemical energy   (b) kinetic energy
(c) sound energy   (d) heat energy

Ans : (b) When the arrow is drawn or bow has stretched the energy from its arms is converted to elastic energy and stored in the form of potential energy. While releasing the arrow from a stretched bow, this potential energy of the bow is converted into kinetic energy.

12. Consider the given question and decide which of the following statements is sufficient to answer the question.
If LIKE GOOD HABITS is coded as 126, then what will be the code for HABITS?
Statements:
1. I LOVE PICTURES is coded as 785.
2. THOUGHT BECOMES HABIT is coded as 856.
(a) Neither 1 nor 2 is sufficient to answer the given question
(b) 2 alone is sufficient while 1 alone is not sufficient to answer the given question
(c) Both 1 and 2 are sufficient to answer the given question
(d) 1 alone is sufficient while 2 alone is not sufficient to answer the given question

Ans : (b) According to the question,
    LIKE GOOD $\boxed{\text{HABITS}}$ $\longrightarrow$ 12 $\boxed{6}$
Statement-
(1) I LOVE PICTURES $\longrightarrow$ 7 8 5
(2) THOUGHT BECOMES $\boxed{\text{HABIT}}$ $\longrightarrow$ 8 5 $\boxed{6}$
Hence the code for HABITS will be 6.
Thus here statement (2) is sufficient while statement (1) alone is not sufficient to answer the given question.

13. Which of the following is used to get relief when you have been stung by a honeybee?
(a) Common salt   (b) Baking soda
(c) Acetic acid   (d) Washing soda

Ans : (b) Sodium Bicarbonate or Sodium Hydrogen carbonate ($NaHCO_3$) is used to get relief from honey bee sting. When bee stings a person, its acidic solution enter into the person's body. On applying mild base like baking soda, on the affected area, it makes neutral effect and gives relief.

14. If $\frac{2}{3}$ of a pizza costs Rs. 300, then $\frac{3}{5}$ of a pizza will cost:

(a) ₹180   (b) ₹250

(c) ₹225   (d) ₹270

Ans : (d) Cost of $\dfrac{2}{3}$ part of pizza = ₹300

Then, cost of 1 part of a pizza = $\dfrac{300 \times 3}{2}$ = ₹450

Now, Cost of $\dfrac{3}{5}$ part of a pizza = Rs. $450 \times \dfrac{3}{5}$

$= 90 \times 3 = ₹270$

15. Select the option that will correctly fit in the blank space in the given figure series.

(a)   (b)

(c)   (d)

Ans : (b) The given figure series is as follows-

4 4 4 3 3 3 3 2 2 2 1

Hence the figure of option (b) will fill in the blank space.

16. On which river's bank is Panaji located?

(a) Mandovi   (b) Zuari

(c) Sal   (d) Terekhol

Ans : (a) Panaji, the capital city of Goa is situated on the banks of Mandovi river. Goa was freed from Portuguese in 1961 and got statehood in May 1987.

17. 72% of a number is 90. What is the number?

(a) 120   (b) 125

(c) 130   (d) 124

Ans : (b) If the value of a number is x

then,

From question,

$$90 = \frac{x \times 72}{100}$$

$$10 = \frac{x \times 8}{100}$$

$$x = \frac{1000}{8}$$

$$\boxed{x = 125}$$

18. Consider the given statement true and decide which of the given assumptions is/are implicit.
Statement: It is desirable to start writing from 6 years of age.
Assumptions:
1. Fine motor skills are well developed by 6 years of age.
2. Children cannot write before 6 years of age.

(a) Neither assumption 1 nor 2 is implicit
(b) Only assumption 2 is implicit
(c) Both assumptions 1 and 2 are implicit
(d) Only assumption 1 is implicit

Ans : (d) According to the sentence, one should start writing form the age of 6 years. So it is not the mean that children below the age of 6 cannot write. Children as young as 6 can also write, but writing or working skills are will developed in children of 6 years of age or older, they can work more efficiently than children under 6 years of age. So here only assumption (1) is implicit in the statement.

19. Split 69 into three parts such that they are in A.P. and the product of their smaller parts is 483.

(a) 19,23,27   (b) 17,23,29

(c) 15,23,31   (d) 21,23,25

Ans : (d) Let three parts are a − d, a, and a + d are in A. P then,

According to the question,

a − d + a + a + d = 69

3a = 69

a = 23

and (a − d) × a = 483

(23 − d) × 23 = 483

(23 − d) = 21

d = 2

Now three parts respectively.

(23 − 2), 23 and (23 + 2)

⇒ 21, 23 and 25

20. Choose the correct figure from the answer figures to replace the question mark. Problem Figure

(a) 3   (b) 1

(c) 2   (d) 4

Ans : (a) In the above question, in place of question mark, the answer figure (3) will complete figure series. Hence, option (a) is correct.

21. The length of one side of a rhombus is 61 cm and its area is 1320 cm². Find the sum of the lengths of its diagonals.

(a) 120 cm   (b) 122 cm

(c) 142 cm   (d) 71 cm

Ans : (c) Let the side of rhombus is 'a' and diagonal is d_1 and d_2 then-

$a = 61$ cm and Area of rhombus $= 1320$ cm^2

Area of rhombus $= \dfrac{1}{2} \times d_1 \times d_2$

then $\quad 1320 = \dfrac{d_1 \times d_2}{2}$

or $\quad d_1 \times d_2 = 2640$

and $\quad 61^2 = \left(\dfrac{d_1}{2}\right)^2 + \left(\dfrac{d_2}{2}\right)^2$

$\qquad 3721 = \dfrac{d_1^2 + d_2^2}{4}$

$\qquad d_1^2 + d_2^2 = 14884$

$\qquad (d_1 + d_2)^2 = 14884 + 2 \times 2640$

$\qquad (d_1 + d_2)^2 = 20164$

$\qquad (d_1 + d_2)^2 = (142)^2$

$\boxed{d_1 + d_2 = 142 \text{ cm}}$

22. In 2017, which Indian scientist was honoured with the Living Legend Award by the International Union of Nutritional Sciences (IUNS) for stellar contributions in the area of nutrition?
(a) Rohini Godbole   (b) Tessy Thoms
(c) Mahtab Bamji   (d) Suman Sahaia

Ans : (c) Indian scientist Mahtab Bamji was honoured with the living Legend Award by the International Union of Nutritional Sciences (IUNS) for stellar contribution in the area of nutrition.

23. The given chart shows men's and women's average daily earning in Company X.

Multiple Bar Chart showing men's and women's Average Daily Earnings (in Rs.)

□ = Men (21 years and above)
▨ = Women (18 years and above)
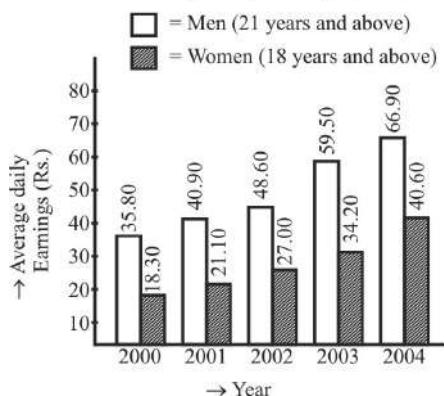
Year -
Average daily earnings -
Men (21 years and above) -
Women (18 years and above)-
Based on the depicted data, in which year was the percentage increase of the average daily earning of men maximum over the preceding year ?
(a) 2003   (b) 2001
(c) 2002   (d) 2004

Ans : (a) Average daily earning of men in year 2000 = Rs. 35.80
Increase in average daily earning of men in 2001 = 40.90 − 35.80 = Rs.5.10
Increase in 2002 = 48.60 − 40.90 = Rs.7.7
Increase in 2003 = 59.50 − 48.60 = Rs.10.9 (maximum)
Increase in 2004 = 66.90 − 59.50 = Rs.7.4
So it is clear that in the year 2003 the average daily earning of men was maximum.

% increase $= \dfrac{10.9 \times 100}{48.60} = 22.43\%$

24. What is the range of frequencies of sound waves audible to human beings?
(a) 16kHz to 200kHz
(b) 16Hz to 16kHz
(c) 16Hz to 20kHz
(d) 14Hz to 20kHz

Ans : (c) Sound wave is a longitudinal mechanical wave. The longitudinal mechanical waves which lie in the range 20 Hz to 20,000 Hz are often known as audible waves. Waves having frequencies less than 20 Hz, are called infrasonic and waves having frequencies more than 20,000 Hz are called ultrasonic waves.

25. In a test, Charan secured 54 marks that was also equivalent to obtaining 72% marks. How many marks was the test out of?
(a) 75   (b) 85
(c) 80   (d) 65

Ans : (a) Marks obtained by charan in the exam = 54 = 72% of total marks
If the total marks in the exam is x then

$\qquad 54 = \dfrac{x \times 72}{100}$

$\qquad x = \dfrac{100 \times 54}{72}$

$\boxed{x = 75}$

26. Select the odd term out of the following.
0.02, 0.020, 2/100, 0.002
(a) 0.002   (b) 0.020
(c) 0.02   (d) 2/100
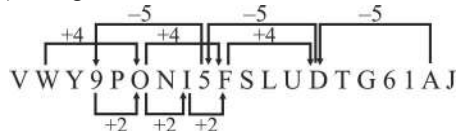
Ans : (a) In the above given terms,

$\qquad 0.02, \ 0.020, \ \dfrac{2}{100} = 0.02, \ 0.002$

In the given values of first three term are same but fourth term is $\dfrac{1}{10}$ times of all other. Hence the term 0.002 is odd.

27. Using the expression VWY9PONI5FSLUDTG61AJ, find the missing term from the following series.
9WA, OOD, _____, FD9
(a) NSI   (b) IF5
(c) FI5   (d) NFL

Ans : (b) The given series is as follows-

Hence the missing term of the given series is IF5.

28. **Consider the given statement as true and decide which of the given conclusions can definitely be drawn from the given statements.**
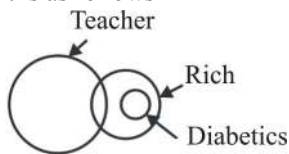**Statements:**
Some teachers are rich.
All diabetics are rich.
Conclusions:
1. Some diabetics are teachers.
2. Some rich people are diabetic.
(a) Only conclusion 2 can be drawn
(b) Neither 1 nor 2 can be drawn
(c) Both 1 and 2 can be drawn
(d) Only conclusion 1 can be drawn

Ans : (a) On making venn diagram according to the statement is as follows-

Hence it is clear from venn diagram that only conclusion (2) can be drawn.

29. **In a class consisting of boys and girls, there are 45 students. If three fifth of the students are boys, find the number of boys in the class.**
(a) 25   (b) 26
(c) 27   (d) 18

Ans : (c) Total numbers of boys and girls in Class = 45

Number of boys is $\frac{3}{5}$ of 45

Number of boys = $\boxed{45 \times \frac{3}{5} = 27}$

30. **Consider the given statement and decide which of the following assumption(s) is/are implicit.**
Statement: You are expected to be honest before the advocate — an instruction to be followed in front of a defence lawyer.
Assumptions:
1. Unless cautioned, the clients tend to hide certain vital facts to save themselves.
2. At times, the vital facts are required to strategies the defence argument.
(a) Both assumptions 1 and 2 are implicit
(b) Only assumption 2 is implicit
(c) Neither assumption 1 nor 2 is implicit
(d) Only assumption 1 is implicit

Ans : (a) In court the defense client is expected to be honest before his public prosecutor because unless cautioned, the clients tries to hide some important facts to save himself. For this, the client of the defense side needs important facts for the strategy of the dispute. So that they can avoid the allegations made by the accused party. Hence both assumption (1) and (2) are implicit in the statement.

31. **Mechanical energy is equal to:**
(a) Kinetic energy + Chemical energy
(b) Kinetic energy + Potential energy
(c) Kinetic energy + Heat energy
(d) Kinetic energy + Electrical energy

Ans : (b) Mechanical energy is sum of kinetic and potential energy. Kinetic energy is the energy possessed by a body by virtue of its motion whereas potential energy is the energy possessed by a body by virtue of its position.

$$\boxed{M_e = K_e + U_e}$$

32. **Which of the following is added to iron to make iron hard and strong?**
(a) Zinc   (b) Copper
(c) Carbon   (d) Sodium

Ans : (c) To make iron hard, carbon is added in a small amount. By adding the impurity of carbon it stops the dislocation of the iron atoms in the crystal lattice from sliding past one another. In alloy of stainless steel, 0.5% carbon is used with the composition of Iron (72%), Chromium (17-19%) and Nickel (7-9%) with Si and Mn.

33. **The value of $122 + 345 - 3 \div 1116 \times 372$ is:**
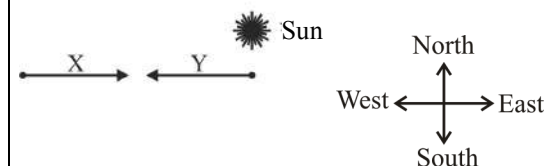(a) 466   (b) 469
(c) 446   (d) 460

Ans : (a) The given expression is -
$$\Rightarrow 122 + 345 - 3 \div 1116 \times 372$$
$$= 122 + 345 - \frac{3 \times 372}{1116}$$
$$= 467 - \frac{1116}{1116}$$
$$= \boxed{467 - 1 = 466}$$

34. **In the morning X and Y are walking towards each other in a park. When they meet, Y's shadow falls upon X. In which direction was X facing?**
(a) North   (b) South
(c) East   (d) West

Ans : (c) In the morning the sun rises in the east -

Hence it is clear from the diagram that Y's shadow will fall on X only when X is facing east and Y is facing west.

35. A watch loses 5 minutes every hour and was set right at 6 a.m. on a Monday. When will it show the correct time again?
(a) 6 a.m. on next Sunday
(b) 3 a.m. on next Monday
(c) 3 a.m. on next Sunday
(d) 6 a.m. on next Monday

Ans : (a) It loses 5 minutes in 1 hour
It will lose 24 hour = $24 \times 5 = 120$ minutes = 2 hours
It will lose 6 days = $6 \times 2 = 12$ hours
i.e. in this manner again after 6 days the correct time will be at 6 : 00 AM on Monday, it will again show the correct time after 6 days from Monday at 6 :00 AM on Sunday.

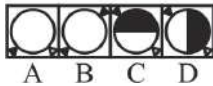**36.** Who was the UPA candidate for the Vice President's post in the 2017 elections?
(a) Arun Gandhi
(b) Gopalkrishna Gandhi
(c) Varun Gandhi
(d) Sonia Gandhi

Ans : (b) Gopalkrishna Gandhi was the UPA candidate for the Vice-Presidential election in 2017.

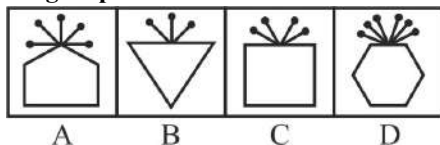**37.** Select the Answer Figure that correctly fits in the blank space in the given Problem Figure.
Problem Figure
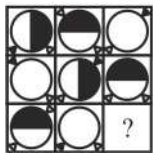
Answer Figures

(a) D   (b) B
(c) C   (d) A

Ans : (a) The figure given in answer figure (D) can be filled in correctly and appropriately in the blank space of the given question figure.
Hence, option (a) is correct.

38. Select the picture which does NOT belong to the group.

(a) B   (b) D
(c) C   (d) A

Ans : (d) In the group of figures, all the black dots of the figure of box A are connected at the joining points of the two sides of the figure. While all the black dots in the figures of box B, C and box D are connected in the middle of one of the sides of the figures.

39. A wooden block of mass m_1 kg accelerates at 10 ms^{-2} when a force of 5 N acts on it. Another block of mass m_2 kg accelerates at 20 ms^{-2} when the same force acts on it. If both the blocks are tied together and the same force acts on their combination, the acceleration will be about:
(a) 6.67 ms^{-2} (b) 1.67 ms^{-2}
(c) 5.67 ms^{-2} (d) 4.67 ms^{-2}

Ans : (a) From the first condition
$$F = m \times a$$
$$5 = m_1 \times 10$$
$$m_1 = \frac{5}{10} = \frac{1}{2} kg$$
From the second condition,
$$F = m \times a$$
$$5 = m_2 \times 20$$
$$m_2 = \frac{5}{20} = \frac{1}{4} kg$$
On combined the both masses
$$m_1 + m_2 = \frac{1}{2} + \frac{1}{4} = \frac{6}{8} kg$$
$F = m \times a$ (Since for is equal in all condition)
$$5 = \frac{6}{8} \times a$$
or $$\boxed{a = \frac{5 \times 8}{6} = 6.67 \text{ m/s.}^2}$$

40. Which of the following statements is INCORRECT?
(a) Atomic size increases from top to bottom
(b) All the elements of a group have same valency
(c) Isotopes of the same elements are placed in the same group
(d) Atomic radius generally decreases from left to right

Ans : (*) When we move down the group, the additional shell gets added and hence atomic size increases down the group.
Different isotopes of the same element have the same atomic number.
They have same number of protons therefore isotopes of the same elements are placed in the same group.
As the elements in a group have the same number of electrons in the outermost shell and valiancy depends upon the valence electrons in an atom. Therefore all elements of a group have the same valiancy.
Atomic radius decreases along a period from left to right due to the increase in nuclear change which tends to pull the electrons closer to the nucleus and reduce the size of atom.

41. Solve the following:

$$72 \div \frac{1}{2}\left\{15 + 12 - \left(9 + 6 - \overline{5+7}\right)\right\} = ?$$

(a) 6   (b) 9
(c) 12   (d) 8

Ans : (a) The given expression-

$$\Rightarrow 72 \div \frac{1}{2}\left\{15 + 12 - \left(9 + 6 - \overline{5+7}\right)\right\} = ?$$

$$? = 72 \div \frac{1}{2}\left\{15 + 12 - \left(9 + 6 - 12\right)\right\}$$

$$= 72 \div \frac{1}{2}\left\{15 + 12 - \left(15 - 12\right)\right\}$$

$$= 72 \div \frac{1}{2}\left\{15 + 12 - 3\right\} = 72 \div \frac{1}{2}\left\{27 - 3\right\}$$

$$= 72 \div \frac{1}{2} \times 24 = 72 \div 12$$

$$\boxed{? = 6}$$

42. Which of the following numbers is irrational?

(a) $\sqrt[3]{64}$ (b) $\sqrt{64}$
(c) $\sqrt[6]{64}$ (d) $\sqrt[4]{64}$

Ans : (d) From the given options-

(a) $\sqrt[3]{64} = (64)^{\frac{1}{3}} = \left(4^3\right)^{\frac{1}{3}} = 4$ (rational number)

(b) $\sqrt{64} = (64)^{\frac{1}{2}} = \left(8^2\right)^{\frac{1}{2}} = 8$ (rational number)

(c) $\sqrt[6]{64} = (64)^{\frac{1}{6}} = \left(2^6\right)^{\frac{1}{6}} = 2$ (rational number)

(d) $\sqrt[4]{64} = \sqrt[4]{16} \times \sqrt[4]{4} = 2 \times \sqrt[4]{4} =$ (Irrational number)
     Hence option (d) is correct.

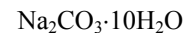**43. A girl child has which of the following combinations of chromosomes in her cells?**

(a) 44 autosomes + XX
(b) 22 autosomes + XX
(c) 44 autosomes + XY
(d) 22 autosomes + XY

Ans : (a) In human beings, there are 23 pairs of chromosome. Out of these 22 pairs of chromosome are called autosomes and the last pair of chromosomes which helps in deciding gender of a individual so, it is called sex chromosome. In female there are 22 pairs of autosomes and XX pair of sex chromosome are present. While in male there are 22 pairs of autosoms and XY pair of sex chromosomes are present. Therefore sex of the child depends on the type of chromosome donated by male. So, a girl child has a combination of 44 autosomes +XX chromosomes and a boy has a combination of 44 autosomes +XY chromosomes.

44. The percentage of water of crystallisation in washing soda is _____.

(a) 1.80   (b) 37.06
(c) 10.6   (d) 62.9

Ans : (d) Molecular formula of washing Soda =
$$Na_2CO_3 \cdot 10H_2O$$
and,
Atomic mass = $2 \times 23 + 12 + 3 \times 16 + 10 (2 + 16)$
            $= 46 + 12 + 48 + 180$
            $= 286$
Atomic mass of water = $10 (2 + 16)$
            $= 180$
Required percentage = $\frac{180}{286} \times 100$
            $= 62.9\%$

45. Read the following question and decide which of the given statements is/are sufficient.
What is the total number of illegal immigrants?
Statements:
1. 30% of the total illegal immigrants are from Bangladesh.
2. Remaining are from India.

(a) 1 alone is sufficient while 2 alone is not sufficient to answer the question
(b) Both 1 and 2 together are sufficient to answer the question
(c) Neither 1 nor 2 is sufficient to answer the question
(d) 2 alone is sufficient while 1 alone is not sufficient to answer the question

Ans : (c) The question asked the total number of illegal immigrants are from Bangladesh and the rest (100% - 30% = 70%) are form India. From this the total number of illegal immigrant is not known completely. Hence, neither statement (1) nor (2) is sufficient to answer the question.

46. Who is the Bengali writer who won the 31st Moortidevi Award for the year 2017?

(a) Joy Goswami
(b) Taslima Nasreen
(c) Subhro Bandhopadhyay
(d) Baby Halder

Ans : (a) Bengali poet Joy Goswami won the 31st Moortidevi Award for the year 2017 for his poetry collection titled "Du Dondo Phowara Matro". The Moortidevi Award is an annual literary award in India presented by the Bharatiya Jnanpith organization.
Taslima Nasreen, who hails from Bangladesh is the author of famous novel named Lajja.

47. Based on the given table, the percentage salary increase per year during the period 2001-2006 was _____ (round off to the nearest integer).

| Year	Items of Expenditure			
	Salary	**Food**	**Medicine**	**Tax**
2001	Rs. 1,500	Rs. 200	Rs. 500	Rs. 100
2002	Rs. 2,600	Rs. 300	Rs. 600	Rs. 200
2003	Rs. 3,200	Rs. 150	Rs. 700	Rs. 150
2004	Rs. 4,100	Rs. 250	Rs. 650	Rs. 125
2005	Rs. 5,000	Rs. 200	Rs. 800	Rs. 150
2006	Rs. 5,200	Rs. 100	Rs. 750	Rs. 175

(a) 248　　　　　　　　(b) 247
(c) 246　　　　　　　　(d) 245

Ans : (b) Salary in year 2001 = Rs. 1500
　　　Salary in year 2006 = Rs. 5200
　　　Increase = 5200 – 1500 = Rs. 3700
　　　Percentage increase = $\dfrac{3700}{1500} \times 100$
　　　= 246.67 or (Approximate 247%)

48.　NaCl is a salt which is made up of:
(a) Strong acid and weak base
(b) Weak acid and weak base
(c) Strong acid and strong base
(d) Weak acid and strong base

Ans : (c) NaCl is a salt which is made of strong acid (HCl) and strong base (NaOH).
$$NaOH + HCl \longrightarrow NaCl + H_2O$$
　(strong　　(Strong　　(Salt)　　(Water)
　Base)　　　Acid)
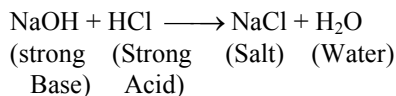
49.　The mean of the 5 smallest numbers from a group is 15 while the mean of all the 13 members of the group taken together is 17. What is the mean of the 8 largest numbers?
(a) 18.50　　　　　　　(b) 17.75
(c) 18.75　　　　　　　(d) 18.25

Ans : (d) Sum of the 5 smallest numbers of group
　　　= 5 × 15 = 75
Sum of all 13 numbers of group
　　　= 13 × 17 = 221
Now sum of the 8 largest number of the group
　　　= 221 – 75 = 146
Hence the mean of the 8 largest numbers = $\dfrac{146}{8} = 18.25$

50.　A and B together can do a piece of work in 10 days. If A can do the work in 15 days, find in how many days that B alone can do the same work. Given below are the steps involved in solving the above problem. Arrange them in sequential order.

A) One day's work of B is $\dfrac{1}{10} - \dfrac{1}{15}$

B) One day's work of A and B is $\dfrac{1}{10}$ and one day's work of A is $\dfrac{1}{15}$

C) B alone can do the work in 30 days

D) One day's work of B is $\dfrac{1}{30}$

(a) BADC　　　　　　　(b) ABDC
(c) BCAD　　　　　　　(d) BDAC

Ans : (a) 1 day work of (A + B) = $\dfrac{1}{10}$

And 1 day work of A = $\dfrac{1}{15}$

Now 1 day work of B = $\dfrac{1}{10} - \dfrac{1}{15} = \dfrac{15-10}{150} = \dfrac{5}{150} = \dfrac{1}{30}$
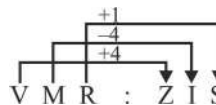
So B alone can do the work in 30 days.
Hence option (a) BADC is correct.

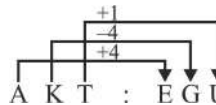**51.　Select the related letters from the given alternatives:**
　　VMR : ZIS : : AKT : _____
(a) HIR　　　　　　　(b) EOU
(c) FHS　　　　　　　(d) EGU

Ans : (d) Just as,

Same as,

Hence options (d) is correct.

52.　Akash's monthly income is Rs. 9600. His monthly expenditure is 60% of his income. What is his saving per month?
(a) ₹3,840　　　　　　(b) ₹3,870
(c) ₹3,940　　　　　　(d) ₹3,850

Ans : (a) According to the question,
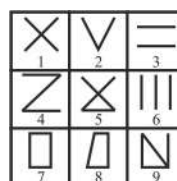　　　Monthly income = ₹9600
Monthly expenditure = Monthly income of 60% of 9600
　　　= $9600 \times \dfrac{60}{100}$ = Rs.5760
Now monthly saving of Akash = 9600 – 5760
　　　= ₹3840

53.　Use each of the below figures only once and form three groups. The three groups thus formed are:

(a) (1,4,3), (2,5,6), (9,7,8)
(b) (1,2,3), (4,5,6), (9,7,8)
(c) (1,2,6), (4,5,3), (9,7,8)
(d) (1,2,3), (4,7,6), (9,5,8)

Ans : (b) In the given figures-
Figure (1, 2, & 3) = constructed using 2 straight lines.
Figure (4, 5, & 6) = constructed using 3 straight lines.
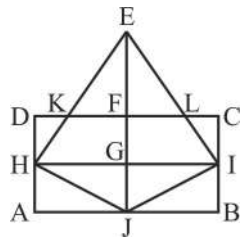Figure (9, 7, & 8) = constructed using 4 straight lines.
Hence option (b) is correct.

54. Select the option that represents the number of triangles in the given figure.

(a) 14   (b) 15
(c) 13   (d) 17

Ans : (b) Number of triangles in the given series is as follows-

ΔEKF, ΔEFL, ΔEKL, ΔEHG, ΔEGI, ΔEHI, ΔEHJ, ΔEJI, ΔDKH, ΔHAJ, ΔHGJ, ΔLIC, ΔJIB, ΔJGI, ΔHJI,
Hence total number of triangles is 15.

55. Which former Indian cricket player has taken charge as the Indian cricket team's head coach in 2017?
(a) Bishen Singh Bedi
(b) Sunil Gavaskar
(c) Ravi Shastri
(d) Chetan Chauhan

Ans : (c) Ravi Shastri has taken charge as the Indian team's head coach in 2017. At present Rahul Dravid is a lead Coach of the Indian cricket team.

56. 'Battery is related to 'Terminals' in the same way as 'Magnet' is related to _____.
(a) Repel   (b) Pole
(c) Pointing north   (d) Attract

Ans : (b) Just As, Battery is related to Terminals, same as, Magnet is related to pole.

57. Pick the odd one out from the following:
(a) Glass   (b) Aluminum
(c) Silver   (d) Copper

Ans : (a) Aluminum, Silver, and Copper are metals whereas Glass is a non-metal.
Hence, Glass is odd.

**58.** _____ tissue changes the diameter of a blood vessel.
(a) Heart   (b) Muscle
(c) Epithelial   (d) Bone

Ans : (b) Muscle tissue is responsible for changing the diameter of a blood vessel.

59. Two pipes namely A, B can fill a sump in 25 minutes and half an hour respectively and a pipe C can empty 3 gallons per minute. All the three pipes working together can fill the tank in 15 minutes. The capacity of the tank is:
(a) 450 gallons
(b) 300 gallons
(c) 240 gallons
(d) 600 gallons

Ans : (a) According to the question,
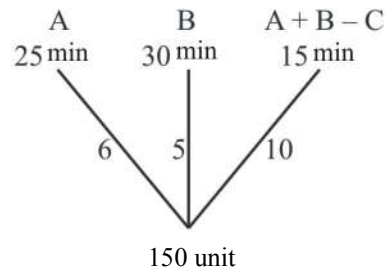
$A + B - C = 10$
$6 + 5 - C = 10$
$C = 1$

Time taken by C to empty the tank $= \dfrac{150}{1} \min = 150$ min

Hence efficiency of tank $= 150 \times 3$ gallons $\Rightarrow 450$ gallons

60. Which of the following quantities remains constant and does NOT change from place to place?
(a) Mass
(b) Force due to friction
(c) Weight
(d) Gravity

Ans : (a) Mass is defined as the amount of matter in an object. It remains constant everywhere. Weight is the force applied on a mass by gravity. If gravity changes then weight changes.

61. Which of the following Venn diagrams correctly represents the following classes: Karnataka, India, Asia

(a)

(b)

(c)

(d)
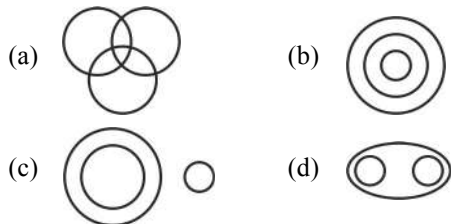
Ans : (b) On making Venn diagram is as follows-

Hence option (b) is correct.

62. Select the appropriate combination of letters that when sequentially placed in the gaps of the given letter series will complete the series.

_vww_uuv_wvuu_w

(a) uvwu   (b) uvwv

(c) uwvu   (d) vwuv

Ans : (b) The given series is as follows-

uvww vuuvw wvuu vw

Hence option (b) is correct.

63. In human beings, the respiratory pigment is:

(a) Chlorophyll

(b) Melanin

(c) Rhodopsin

(d) Haemoglobin

Ans : (d) Haemoglobin is a protein molecule made up of iron (Haem) and protein (globin) It is a respiratory pigment and helps in transporting oxygen as oxyhaemoglobin from the lungs to different parts of the body.

64. $8 \times \{5 - (-2) \times (-3)\} = ?$

(a) 8   (b) – 168

(c) 88   (d) –8

Ans : (d) The given expression is -

$\Rightarrow 8 \times \{5 - (-2) \times (-3)\} = ?$

$? = 8 \times \{5 - (6)\}$

$= 8 \times \{-1\}$

$\boxed{? \Rightarrow -8}$

65. The HCF of 56, 140 and 168 is:

(a) 28   (b) 7

(c) 14   (d) 4

Ans : (a) HCF of 56, 140 and 168

$56 = 2 \times 2 \times 2 \times 7$

$140 = 2 \times 2 \times 5 \times 7$

$\underline{168 = 2 \times 2 \times 2 \times 7 \times 3}$

$HCF = 2 \times 2 \times 7$

Hence, HCF = $\boxed{4 \times 7 = 28}$

66. Two particles with charges q_1 and q_2 are kept at a certain distance to exert force F on each other. If the distance is reduced to one-fifth, then the force between them is:

(a) F/25   (b) 5F

(c) F/5   (d) 25 F

Ans : (d) In the first case if,

Distance $r_1 = r$ and force is F_1

then, $F_1 = k \dfrac{q_1 \times q_2}{r^2}$

In second case,

When distance $R_2 = r$ and Force is F_2

$F_2 = k \dfrac{q_1 \times q_2}{\left(\dfrac{r}{5}\right)^2} = k \cdot \dfrac{(q_1 \times q_2) \times 25}{r^2}$

Now, in both cases the value of K remains same.

or, $\dfrac{F_1}{F_2} = \dfrac{k \times q_1 \times q_2 \times r^2}{k \times q_1 \times q_2 \times r^2 \times 25}$

or, $\dfrac{F_1}{F_2} = \dfrac{1}{25}$ या $\boxed{F_2 = 25 F_1}$

67. Alkali metals are assigned which group in the Modern Periodic Table?

(a) Second group

(b) Eighteenth group

(c) Third group

(d) First group

Ans : (d) Alkali metals (Li, Na, K, Rb, Cs and Fr) are the most active metals in the periodic table. They all react vigorously with water form hydrogen gas and hydroxide ions. All alkali metals belong to the first group of the modern periodic table.

68. A boy raises a box with a weight of 120 N through a height of 2 m. The work done by him is:

(a) 60 J   (b) 120 J

(c) 240 J   (d) 180 J

Ans : (c) Weight raised by boy (mg) = 120 N

Height (h) = 2m

Now, work = mgh

$= 120 \times 2$

$= 240$ Joule.

69. In a class when a test is conducted, mean of 25 students marks is 60. if mean of first 13 students marks is 70 and mean of last 13 students marks is 50 find the marks of the middle student when arranged in the ascending order.

(a) 70   (b) 40

(c) 50   (d) 60

Ans : (d) Here the marks of the students are arranged in ascending order

∴ The sum of marks of total 25 students

⇒ $25 \times 60 = 1500$

Sum of marks of first 13 students

⇒ $13 \times 70 = 910$

Sum of marks of last 13 students

      $13 \times 50 = 650$

Hence, the marks of the middle students $= (910 + 650) - 1500$

      $= 1560 - 1500 = 60$

70. Which Indian Maharatna Company has been the title sponsor of Hockey Indian League since 2016?

(a) Gas Authority of India (GAIL)

(b) National Thermal Power Corporation (NTPC)

(c) Coal India Limited (CIL)

(d) Oil and Natural Gas Corporation (ONGC)

Ans : (c) Coal India Limited (CIL) is an Indian Maharatna company which been chosen for title sponsor of Hockey India League since 2016.

71. The value of k, for which the quadratic equation $4x^2 + 4\sqrt{3}x + k = 0$ has equal roots is:

(a) −2   (b) 3

(c) 2   (d) −3

Ans : (b) The roots of a quadratic equation will be equal if the discriminate $D = b^2 - 4ac = 0$

Here $4x^2 + 4\sqrt{3}x + k = 0$

    $a = 4, b = 4\sqrt{3}$ and $c = k$

    $\left(4\sqrt{3}\right)^2 - 4 \times 4 \times k = 0$

    $48 - 16k = 0$

    $16k = 48$

    $\boxed{k = 3}$

72. 15 years ago Cynthia was thrice as old as Brittany. The sum of their present ages is 94 years. How old is Brittany now?

(a) 33 years   (b) 32 years

(c) 30 years   (d) 31 years

Ans : (d) Let the present age of Cynthia and Brittany is x and y year respectively.

    $x + y = 94$ ....(i)

Their ages 15 years ago are (x -15) years and (y − 15) years respectively.

then

    $(x - 15) = 3(y - 15)$

    $x - 15 = 3y - 45$

    $x - 3y = -30$ ....(ii)

from eqⁿ. (i) × 3 + eqⁿ. (ii) -

    $3x + 3y = 282$

    $\underline{x - 3y = -30}$

      $4x = 252$

      $x = 63$ years

Present age of Brittany $= 63 + y = 94$

    $\boxed{y = 94 - 63 = 31 \text{ years}}$

73. By selling a used phone for Rs. 6,160 Rajan got 44% less than what it cost him to buy it a few years ago. At what price should Rajan have been able to sell it to make a profit of 5%?

(a) ₹12,550   (b) ₹11,550

(c) ₹12,000   (d) ₹10,550

Ans : (b) Selling price of the phone = Rs.6160

Sale loss% of the cost price of the phone = 44%

If the selling price of the phone at 5% profit is P then.

    $P = \dfrac{6160(100 + 5)}{100 - 44}$

    $P = \dfrac{6160 \times 105}{56} = ₹11550$

74. Which of the following characters is recessive in a pea plant?

(a) Wrinkled seed   (b) Green pod

(c) Round pod   (d) Round seed

Ans : (a) Wrinkled seed is a recessive characteristic in a pea plant. A dominant factor or allele expresses itself in the presence or absence of a recessive trait.

For example - tall plant, round seed etc.

A recessive trait is able to express itself only in the absence of a dominant trait.

For example - dwarf plant, wrinkled seed, etc.

75. Who is the Chairman of the Film and Television Institute of India as of February 2018?

(a) Jaya Prada   (b) Anupam Kher

(c) Mithun Chakraborty (d) Jaya Bachchan

Ans : (b) Anupam Kher was the chairman of film and Television Institute of India (FTII) as of February 2018. At present, Shekhar Kapur is the Chairman of FTII. FTII is a film institute under the Ministry of Information and Broadcasting of Govt. of India.

1. In Newlands' table, the elements .... were placed with the halogens.
(a) Mn and As   (b) Fe and Se
(c) Ce and La   (d) Co and Ni

Ans : (d) Newland propounded the rule of octet and according to this rule he prepared a table in which Cobalt (Co-27) and Nickel (Ni-28) were placed in the category of halogen elements. According to Newlands law of Octaves, every eighth element hold the properties as same that of the first elements.

2. What is the cost price of an article when selling price is ₹ 2592 and the gain is 8%?
(a) ₹ 2385   (b) ₹ 2264
(c) ₹ 2400   (d) ₹ 2200

Ans : (c) $CP = SP \times \dfrac{100}{(100 \pm P/L)}$

$CP = 2592 \times \dfrac{100}{(100 + 8)}$

$CP = 2592 \times \dfrac{100}{108}$

$CP = 24 \times 100$

$CP = ₹\ 2400$

3. Find the value of the given expression :

6–36 × 3 ÷ 6 + 5 = ?

(a) $\dfrac{42}{11}$ (b) 7

(c) $\dfrac{-42}{11}$ (d) –7

Ans : (d) Given,

$6 – 36 \times 3 \div 6 + 5$

$= 6 - 36 \times \dfrac{3}{6} + 5$

$= 6 - 36 \times \dfrac{1}{2} + 5$

$= 6 - 18 + 5$

$= -7$

4. 9800 joule of energy was spent to raise a mass of 80 kg. The mass was raised to a height of :
(a) 12.5 m   (b) 22.5 m
(c) 15.0 m   (d) 10.5 m

Ans : (a) Potential Energy (U) = mgh

$9800 = 80 \times 9.8 \times h$

$h = \dfrac{9800}{80 \times 9.8} = 12.5m$

5. Which famous actor/actress who has worked Merchant Ivory Productions in various English movies died in December 2017 ?
(a) Shashi Kapoor   (b) Om Puri
(c) Vinod Khanna   (d) Reema Lagoo

Ans : (a) Shashi Kapoor was the famous actor who worked with Merchant Ivory production in various English movies died in December 2017.

6. A sphere is split in the ratio 1 : 3 . The larger part is molded into a cone having a height equal to the radius of its base, while the smaller part is molded into a cylinder having a height equal to the radius of its base. What would be the ratio of the radius of the base of the cone to the height of the cylinder?

(a) $1 : \sqrt[3]{3}$ (b) $\sqrt[3]{9} : 1$

(c) $\sqrt[3]{3} : 1$ (d) $3 : 1$

Ans : (b) Let the radius of the cone formed by the larger part be r_1 and height be h_1.

Then volume of the cone $= \dfrac{1}{3}\pi r_1^2 h_1$

$= \dfrac{1}{3}\pi r_1^3$ $[\because h_1 = r_1]$

Again, let the radius of the cylinder formed by the smaller part be r_2 and height be h_2

then,

Volume of cylinder $= \pi r_2^2 h_2$

$= \pi r_2^3$ $[\because h_2 = r_2]$

According to the question,

$\dfrac{\text{Volume of larger part of cone }\left(\frac{1}{3}\pi r_1^3\right)}{\text{Volume of smaller part of Cylinder}\left(\pi r_2^3\right)} = \dfrac{3}{1}$

$\Rightarrow \dfrac{\frac{1}{3}\pi r_1^3}{\pi r_2^3} = \dfrac{3}{1}$

$\Rightarrow \left(\dfrac{r_1}{r_2}\right)^3 = \dfrac{9}{1}$

$\Rightarrow r_1 : r_2 = \sqrt[3]{9} : 1$ or $r_1 : h_2 = \sqrt[3]{9} : 1$ --- $\{\because r_2 = h_2\}$

Hence required ratio of radius of base of the cone to the height of the cylinder $= \sqrt[3]{9} : 1$