Youth Competition Times

Railway Recruitment Board

RRB ALP

CBT-2

Part A: Non Tech

&

Part B: Physics & Maths

Solved Papers

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CONTENT

RRB ALP CBT 2 Exam Pattern & Syllabus

The Second stage CBT has two steps: Part A and B. Part A has four subjects - Mathematics, Basic Science and Engineering, General Intelligence and Reasoning, and General Awareness. Part B consists of questions from the relevant trade.

- In part A, there will be a total of 100 questions to be solved in 90 minutes.
- In part B, there will be a total of 75 questions to be solved in 60 minutes.
- Part A will decide the progress of the candidates in the next stage of the selection process, where Part B will be qualifying in nature.

Exam Pattern for CBT 2

Part	Subjects	Number of Questions	Duration
Part A	Mathematics	25	90 Minutes
	General Intelligence & Reasoning	25	
	Basic Science & Engineering	40	
	General Awareness on Current Affairs	10	
Part B	Relevant Trade	75	60 Minutes
Total		175	150 Minutes

- In the first two stages of CBT, there will be negative marking.
- ⅓ rd of the allotted marks will be deducted for each wrong answer.
- If a candidate qualifies both the CBT I and CBT II stages, he will be called for Computer Based Aptitude Test and Document Verification as applicable.
- In the third stage, there will be no negative marking.
- The third stage exam will have questions both in English and Hindi.

SYLLABUS

PART A : Non Tech

Mathematics: Percentages, Number system, BODMAS, Decimals, Fractions, LCM, HCF, Ratio and Proportion, Mensuration, Time and Work; Time and Distance, Simple and Compound Interest, Profit and Loss, etc.

Reasoning and General Intelligence : Analogies, Alphabetical and Number Series, Coding and Decoding, Mathematical operations, Conclusions and Decision Making, Similarities and Differences, Analytical reasoning, Directions, Statement – Arguments and Assumptions etc.

Basic Science & Engineering: Engineering Drawing, Units, Work Power and Energy, Speed and Velocity, Heat and Temperature, Measurements, Mass Weight and Density, Basic Electricity, Levers and Simple Machines, Occupational Safety and Health, Environment Education, IT Literacy etc.

Current affairs and General awareness: Science & Technology, Sports, Culture, Personalities, Economics, Politics.

PART B (Exam Trade): Physics and Mathematics

Mathematics: Number System, Rational and Irrational numbers, BODMAS Rule, Polynomials, Quadratic Equations, Arithmetic Progression, Similar Triangles, Pythagoras Theorem, Co-ordinate Geometry, Trigonometric Ratios, Heights and Distances, Circle, Surface Area and Volume, Statistics and Probability.

Physics: Units and Dimensions, Kinematics, Force and Laws of Motion, Gravitation, Work and Energy, Sound, Current Electricity, Heating effect of current, Reflection of Light, Refraction of Light, Dispersion of Light, The Human Eye, Sources of Energy, Sun and Nuclear Energy.

RRB Assistant Loco Pilot Technicians
CBT-2 : Physics and Maths
Solved Paper

Exam Date: 22.01.2019] **[Shift-Ist]**

Section: Part-A (Non Tech)

1. Given below is a statement followed by two conclusions numbered I and II. Assume everything in the statement to be true, and then decide which of the given conclusion logically follows(s) , beyond a reasonable doubt, from the information given in the statement.

Statements - The colour of blood is red due to the presence of red blood cells.

Conclusion I : If red blood cells are removed, blood will lose its red colour.

Conclusion II: Red blood cells will be red as long as they remain in the blood.

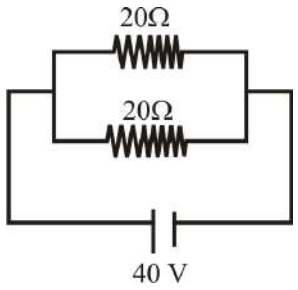
(a) Only conclusion I follow
(b) Neither conclusion I nor II follows.
(c) Only conclusion II follows.
(d) Both conclusions I and II follow.

Ans. (a) : According to the given statement one may understand that the Red blood cells are the reason for red colour of blood.
Now conclusion (I) says if we Remove Red blood cells then blood will loose its colour which is correct and can be directly predicted from the statement.
Conclusion (II) says Blood is the reason for red blood cell to be red which is in contradiction with the given statement.
Hence only conclusion (I) follows.

2. Two resistors, each of 20Ω, are connected in parallel, and this combination is connected across a 40-V supply. Find the voltage across each resistor.

(a) 10 V (b) 20 V
(c) 40 V (d) 30 V

Ans. (c) :



- We know that when Resistor /load are connected in parallel with each other then voltage across each Resistor remains same and is equal to supply voltage i.e.

$$V_{20} = V_{20} = V_S = 40V$$

- When Resistors are connected in series then current across each Resistor Remains same.

3. Chile is a part of which continent?

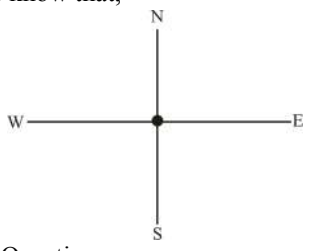
(a) South America (b) Europe
(c) Asia (d) North America

Ans. (a) : Chile is a part of South America Continent
- Chile borders Peru to the north, Bolivia to the Northeast, Argentina to the east, and the Drake Passage in the far south.
- It is Southernmost country in the world.
- Its capital is Santiago
- It current president is Gabriel Barie.

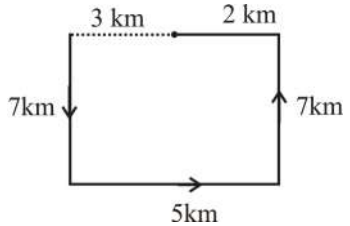
4. A taxi travels 7 km south, then turns towards the east and travels 5 km, then turns towards the north and travels 7 km and then turns to its left and travels 2 km. What is the location of the taxi now with respect to its starting position?

(a) 3 km towards the east
(b) 3 km towards the west
(c) 7 km towards the east
(d) 7 km towards the west

Ans. (a) : We know that,



According to Question



The location of the taxi with respect to its starting position is 3 km towards the east.

5. Nadia Murad and Denis Mukwege won the Nobel prize in 2018 for which discipline?

(a) physics (b) peace
(c) Economic Sciences (d) Chemistry

Ans. (b) : Nadia murad and Denis mukwege won the nobel prize in 2018 for peace

Nobel Peace prize 2022 winners - Ales Bialiatski, Organization Memorial and organisation center for civil liberties. They were Awarded for promoting the right to criticize power and protect the fundamental rights of citizens, for showing outstanding effort to document war crimes, human rights abuses, and the abuse of power.

6. Identify the conductor having the lowest resistivity.

(a) Aluminium (b) Iron
(c) Silver (d) Copper

Ans. (c) : The correct order of increasing Resistivity

Silver < Aluminium < Copper < Iron

Resistivity represents resistance to flow of current. The material having least resistivity is best conductor of electricity.

Hence, silver has lowest Resistivity and best conductor of electricity among given materials.

7. _____ is the heat per unit mass required to change a substance from solid into liquid at the same temperature and pressure.

(a) Regelation (b) Sublimation
(c) Latent heat of fusion (d) Vaporization

Ans. (c) : Latent heat of fusion is the heat per unit mass required to change the state of a substance from solid to liquid at the same temperature and pressure.

The latent heat of fusion of a solid is almost always positive in value.

8. In this question, a statement is given, followed by some conclusion given as options. Chose the conclusion that logically follows the given statement.

Statement: The fear of punishment reduces instances of cheating during exams.

(a) Invigilators are to be blamed if student are caught cheating during exams.
(b) Instances of cheating increase if exam is difficult.
(c) Punishment is a factor that controls incidences of cheating during exams.
(d) Education has become rote learning, and hence, student cheat.

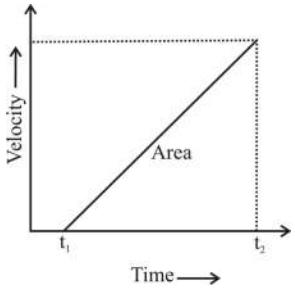
Ans. (c) : In the given statement the word 'punishment' emphasizes on chances of reducing the cheating in exam that means punishment can create a fear in student so that they will avoid cheating in exams.

This statement is clearly supported by statement given in option (c). Hence option (c) is correct answer.

9. The area under the velocity - time curve between times t_1 and t_2 is equal to the _____of the object during that interval of time.

(a) acceleration
(b) magnitude of displacement
(c) average velocity
(d) force

Ans. (b) : The magnitude of displacement is equal to distance covered in a given interval of time, if the particle moves either with a constant velocity or a variable velocity but in the same direction because if it changes direction, then the magnitude of displacement changes and does not remain equal to the distance covered.



10. 15% of 120% of 150 is equal to:

(a) 33 (b) 24
(c) 30 (d) 27

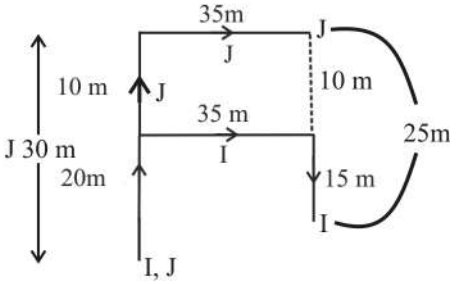
Ans. (d) : According to Question,

$$150 \times \frac{120}{100} \times \frac{15}{100} = 27$$

11. Two fielders, I and J, start from the same point on a ground I runs 20m north and then turns towards the east and runs 35 m He then turns to his right and runs 15m. Meanwhile, J runs 30 m north and then turns right and runs 35.m where is J now with respect to I?

(a) 35 m towards the south
(b) 25 m towards the north
(c) 35 m towards the north
(d) 25 m towards the south

Ans. (b) : According to Question



J with respect to I is 25 m towards the north.

Hence, option (b) is correct.

12. If '+' represents 'x' , '-' represents '+', '×' represents'÷' and '÷' represents '-' , then find the value of the following expression

6÷ 8×2-4

(a) 12 (b) 18

(c) 24 (d) 6

Ans. (d) : Given,

$+ = \times$

$- = +$

$\times = \div$

$\div = -$

The value of expression,

$6 - 8 \div 2 + 4 = 6$

13. Which of the following is NOT a power of the President of India?

(a) Appointment of the Chief Minister of Union Territories

(b) Appointment of Governors of states

(c) Appointment of the Chief Justice

(d) Declaring a national emergency

Ans. (a) : Power of the President of India

- Appointment of Governors of states (Article 155).
- Appointment of the chief justice (Article 124).
- Declaring a national emergency (Article 352).
- The president of India is the commander in - chief of the Indian Armed forces.
- The chief minister of states is appointed by the Governor of states (Article 163) and not by the president of India.

14. Which country is the largest producer of the cocoa crop, the main ingredient used to make chocolate?

(a) Brazil

(b) Ivory Coast

(c) Switzerland

(d) Ghana

Ans. (b) :

- Ivory coast leads the world in the production and export of the cocoa beans.
- Ivory coast is located in west Africa .
- It produces around 2200,000 tons of cocoa beans annually.
- It is main ingredient of producing chocolates.

15. Two taps can fill an empty cistern in 8 min and 20 min, respectively. However, together, they take 30 min to fill it because of a leak. How much time will the leak take to empty a full cistern?

(a) 140/19 min

(b) 140/17 min

(c) 120/17 min

(d) 120/19 min

Ans. (c) : According to Question

		120
A	= 8	15
B	= 20	6
A + B − C	= 30	4

Capacity of C is

A + B - C = 4

15+6-C = 4 $\Rightarrow$ C = 17

Time taken by cistern to empty the full tank

$$t = \frac{\text{Total work (LCM)}}{\text{Capacity of C}} = \frac{120}{17} \text{ min}$$

Alternate Solution :

Time taken by A alone to fill the cistern = 8 min.

Time taken by B alone to fill the cistern = 20 min Time taken by both together to fill the cistern along with hole in cistern = 30 min

There one day work

$$A \to \frac{1}{8}, B \to \frac{1}{20}, A + B - C \to \frac{1}{30}$$

One day work of C

$$\frac{1}{8} + \frac{1}{20} - \frac{1}{C} = \frac{1}{30}$$

$$\frac{1}{C} = \frac{15 + 6 - 40}{120} = \frac{17}{120}$$

C will take $\frac{120}{17}$ minutes to empty the full cistern.

16. The HCF of two numbers is 9 and their LCM is 252. The sum of number is:

(a) 90 (b) 79

(c) 78 (d) 108

Ans. (*) : Given,

HCF = 9

LCM = 252

Let, The numbers be 9x and 9y

we know that,

I^{st} Number × II^{nd} Number = HCF × LCM

$\Rightarrow$ 9x × 9y = 9× 252

$\boxed{xy = 28}$

Possible values of (x, y) = (4, 7)

The number are = 9×4 = 36

= 9×7 = 63

Sum of the numbers = (36+63) =99

17. Conduction and convection modes of heat transfer cannot operate between bodies separated by _____.

(a) water

(b) ice

(c) aluminium

(d) vacuum

Ans. (d) : Conduction and convection modes of heat transfer cannot operate between bodies separated by vacuum.
Conduction and convection require the presence of a material medium to take place.

18. Read the given question carefully and decide which of the following statement is/are sufficient to answer the question
Question : What was the share of the picnic cost to be borne by each student?
Statements:
(I) The total cost of the picnic was ₹ 12,500, and the number of students who went for the picnic was 15.
(II) If 3 fewer students would have gone , then the cost of the picnic per student would have increased by ₹ 120.
(a) II alone is sufficient while I alone is not sufficient
(b) Neither I nor II is sufficient.
(c) Either I or II is sufficient.
(d) I alone is sufficient while II alone is not sufficient

Ans. (d) : According to question statements I is correct.
• Share of picnic cost to be borne by each student = $\frac{12500}{15} = 833.33$
Hence, option (d) is correct.

19. _____ is the unit of thermal conductivity.
(a) J.s.K
(b) $J.s^{-1}.m^{-1}.K^{-1}$
(c) $J^{-1}.s^{-1}.kg^{-1}$
(d) $J.s^{-1}.K$

Ans. (b) : Thermal Conductivity
$$K = \frac{Qd}{A\Delta T}$$
Where, K = Thermal conductivity
Q = Amount of heat transferred
d = Distance between the two ends
A = Area of the surface
ΔT = difference in temperature
Unit of Thermal Conductivity-
$$\frac{J}{s} \times \frac{m}{m^2} \times \frac{1}{k} = Js^{-1}\, m^{-1}\, K^{-1}$$

20. Unsolicited electronic messages sent for marketing purpose are called_____.
(a) URL (b) spam
(c) virus (d) unzip

Ans. (b) : Spam - Spam is an e-mail sent to thousands and sometimes millions of people without prior approval promoting a particular product service, or a spam to get other people's money.

21. One mile is approximately equivalent to _____ kilometers.
(a) 1.2 (b) 0.8
(c) 1.4 (d) 1.6

Ans. (d) :
• One mile is approximately equivalent to 1.6 kilometers.
• The mile is part of the Imperial units system and the kilometer is part of the metric system.
• The largest unit to measure distance is parsec.
1 parsec = 3.26 light - year
or
3.09×10^{13} km (1.92×10^{13} miles)

22. A train travels 45 m in 3 s. What is the speed of the train in Km/h?
(a) 54 (b) 51
(c) 50.5 (d) 48

Ans. (a) : Given, Distance = 45 meter
Time = 3 sec
We know that,
$$\text{Speed} = \frac{\text{Distance}}{\text{time}} = \frac{45}{3}$$
$$\Rightarrow \quad \text{Speed} = \frac{45}{3}\text{m/sec}$$
$$\text{Speed of the train in km/h} = \frac{45}{3}\times\frac{18}{5} = 54\,\text{Km/h}$$

23. A perfect square number can never have the digit _____ at the unit's place.
(a) 6 (b) 1
(c) 3 (d) 9

Ans. (c) : A perfect square number can never have digit '3' at the unit's place.
For a perfect square number the units place is, 0,1, 4, 9, 6, 5
Ex-

$(1)^2 = 1$	$(4)^2 = 16$	$(7)^2 = 49$
$(2)^2 = 4$	$(5)^2 = 25$	$(8)^2 = 64$
$(3)^2 = 9$	$(6)^2 = 36$	$(9)^2 = 81$
		$(10)^2 = 100$

24. The efficiency of a machine can never be _____.
(a) 75% (b) 100 %
(c) 50% (d) 10%

Ans. (b) : The efficiency of a machine can never be 100%
we know that,
$$\boxed{\text{Efficiency} = \frac{\text{output work}}{\text{Input work}}}$$
The output work is always less than the input work because some of the input work is used to overcome friction. Therefore efficiency is always less than 100%.

25. A sum of ₹ 1,250 amounts to ₹ 1,550 in 4 years. What is the simple interest rate ?

(a) 6% (b) 8%
(c) 4% (d) 1%

Ans. (a) : A sum of ₹ 1250 amounts to ₹ 1550 in 4 years.
Then 4 years Interest = 1550-1250
= 300.
Now,
Principal amount = 1250
Interest = 300
Time = 4 years

$$\text{Simple Interest rate (R)} = \frac{300\times100}{1250\times4}$$

$$\boxed{R = 6\%}$$

26. An effort of 5 units is applied on a 10-unit load. The distance travelled by the effort and the load are 50 and 20 units respectively. Find the efficiency of this machine.

(a) 60% (b) 50%
(c) 80% (d) 70%

Ans. (c) : Efficiency is given by -

$$\eta = \frac{\text{Output}}{\text{Input}} = \frac{(\text{Force}\times\text{displacement})_{\text{output}}}{(\text{Force}\times\text{displacement})_{\text{effort}}}$$

$$\eta = \frac{10\times20}{5\times50} = \frac{200}{250} = 0.8 \approx 80\%$$

27. What will be the simple interest on ₹ 1,450 invested for 5 years at a rate of 5% pa?

(a) ₹ 365 (b) ₹ 362.5
(c) ₹ 365.5 (d) ₹ 360

Ans. (b) : Given,
Principal amount (P) = 1450
Time (T) = 5 years
Rate (R) = 5%

$$\text{Then, Simple Interest} = \frac{P\times T\times R}{100}$$

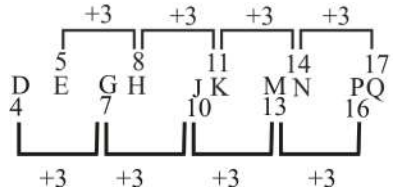
$$= \frac{1450\times5\times5}{100}$$

= 362.5 Rs.

28. A series is given, with one term missing. Choose the correct alternative from the given ones that will complete the series.
DE, GH, JK, MN, ?

(a) PQ (b) RP
(c) OP (d) QR

Ans. (a) :

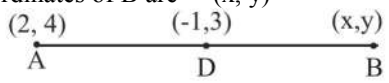


• The correct alternative from the given ones PQ will complete the series.

29. D is the midpoint of line segment AB. The co-ordinates of A and D are (2, 4) and (-1, 3) respectively. The co-ordinates of B are:

(a) (-4, 2) (b) (-5, 4)
(c) (3, 1) (d) (4, -5)

Ans. (a) : Given
A = (2,4) , D = (-1,3)
The co-ordinates of B are = (x, y)



Then, $\frac{2+x}{2} = -1 \Rightarrow \boxed{x = -4}$

$\frac{4+y}{2} = 3 \Rightarrow \boxed{y = 2}$

30. A 100-g block of lead is heated from 20ºC to 50ºC. Calculate the amount of heat transferred to the block (specific heat of lead = 127 J-kg^{-1} K^{-1})

(a) 321 J (b) 127 J
(c) 381 J (d) 230 J

Ans. (c) : Given,

$$\text{Mass} = 100\text{g} = \frac{100}{1000} = 0.1\text{kg}$$

Temperature difference (ΔT) = 50º-20º=30ºC
Specific heat of lead = 127J kg^{-1} K^{-1}
We know that,
Heat transferred to block = mass ×specific heat ×Δt
= 0.1 ×127×30º
$\Rightarrow$ $\boxed{\text{Heat transferred} = 381\text{J}}$

31. Identify the conductor having the highest resistivity.

(a) Copper (b) Mercury
(c) Silver (d) Aluminium

Ans. (b) : Materials that do not conduct electricity easily are called insulators and these materials have a high resistivity.
The resistivity of a material depends on its nature and the temperature of the conductor, but not on its shape a size.
Among the given options the conductor having the highest resistivity is mercury since Mercury is liquid among them.

32. Select the option that is related to the third number in the same way as the second number is related to the first number.
400: 20 :100: ?

(a) 5 (b) 50
(c) 10 (d) 1

Ans. (c) : The pattern followed here is,
400 : 20 :: 100 :
$\Rightarrow 400 = \sqrt{400} = 20$
Similarly,
$\Rightarrow 100 = \sqrt{100} = 10$
Hence, the correct answer is (10).

33. The Fahrenheit and Celsius scales converge at _____.

(a) -30º (b) -40º
(c) -50º (d) -20º

Ans. (b) : The Fahrenheit and Celsius scales Converge at - 40º.
we know that

$$\frac{C-0}{100}=\frac{F-32}{212-32}=\frac{F-32}{180}$$

$\Rightarrow 9C = (C-32)\times 5$ ($\because$ F = C)
$\Rightarrow 9C - 5C = -160$
$\Rightarrow \boxed{C = -40^\circ}$

34. Two runners, A and B, cover the same distance at the speed of 15km/h and 16km/h respectively. If A takes 16min more than B, then the distance (in km) is:

(a) 48 (b) 54
(c) 64 (d) 70

Ans. (c) : A and B cover the same distance-
Then

Time taken by A, $T_A = T+\left(\frac{16}{60}\right)=\frac{D}{15}$

Time taken by B , $T_B = T=\frac{D}{16}$

Now, $\frac{D}{15}-\frac{D}{16}=\frac{16}{60}$

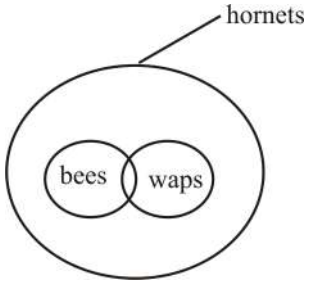
$16D - 15D = \frac{16\times 15\times 16}{60}$

$\Rightarrow \boxed{D = 64\,Km}$

35. Two statements are given, followed by two conclusions I and II. Consider the statements to be true even if they seem to be at variance with commonly known facts, and decide which of the given conclusions, if any, follow (s) from the given statements.
Statements 1 : All bees are hornets
Statements 2 : Some bees are wasps.
Conclusion I : Some hornets are wasps.
Conclusion II: Some wasps are bees.

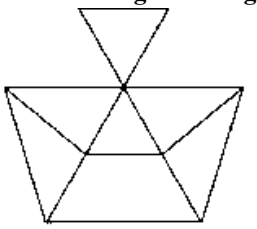
(a) Both conclusions I and II follow.
(b) Only conclusions I follows.
(c) Neither conclusion I nor II follows.
(d) Only conclusion II follows.

Ans. (a) :



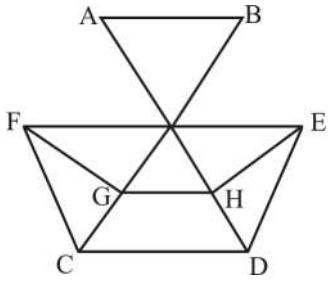
Conclusion I : Some hornets are wasps.
II : Some wasps are bees
Hence option (a) is correct.

36. What is the minimum number of lines required to make the given image?
What is the minimum number of lines required to make the given image?



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

Ans. (b) :



The minimum number of lines
$\Rightarrow$ AB, FE, CD, AD, BC, DE, CF, EH, GH, GF
$\Rightarrow$ 10
Hence option (b) is correct.

37. Find the odd word out of the given alternatives.

(a) Shrub (b) Flower
(c) Herb (d) Tree

Ans. (b) : All option except 'flower' are different varieties of plants while 'flower' grows on plants.
Hence, 'flower' is the odd one out.

38. Let W_e and W_m be the weight of an object on the Earth and the Moon, respectively. Then, the ratio W_e/W_m is equal to _____.

(a) 6 (b) 2
(c) 4 (d) 1

Ans. (a) : We know that-

Gravity of moon $g_m = \frac{1}{6}\times$ Gravity of earth g_e

$\Rightarrow$ Weight on moon $W_m = \frac{1}{6}\times$ Weight on earth W_e

Then, $\boxed{\frac{W_e}{W_m}=6}$

39. The force applied to overcome a load is called_____.

(a) Velocity ratio
(b) Weight
(c) Effort
(d) Mechanical advantage

Ans. (c) : The force applied to overcome a load is called effort.

Effort :- For any machine to do some amount of work there is a need of force and some displacement should take place due to that force. This force, that is applied or supplied to the machine for the purpose of making the machine to do some work is called effort.

40. The unit's digit of $(1373)^{36}$ - $(1442)^{20}$ is:

(a) 2 (b) 4
(c) 5 (d) 3

Ans. (c) : To find the unit digit , consider the unit digit of the given number& find its Cyclicity from the power.
Given no- $(1373)^{36}$, Its unit digit = 3
$\because$ 3 as a unit digit repeat after every 4 power.
$\therefore$ Cyclicity of 3 = 4.
Next number- $(1442)^{20}$, Its unit digit = 2
$\because$ 2 as a unit repeats after every 4 power.
$\therefore$ Cyclicity of 2 = 4
Now,
Unit digit of $(1373)^{36} - (1442)^{20}$
$\Rightarrow$ unit digit of $3^{36} - 2^{20}$
$\Rightarrow$ unit digit of $3^{9\times4} - 2^{5\times4}$
$\Rightarrow$ unit digit of $\{3^4 - 2^4\}$
$\Rightarrow$ unit digit of $(18 - 16)$
$\Rightarrow$ unit digit of $65 = 5$

41. Under whose rule was the Charminar monument built in Hyderabad?

(a) Jahangir
(b) Qutb-ud -din Aibak
(c) Akbar
(d) Muhmmad Quli Qutb Shah

Ans. (d) : • Charminar is located on the banks of River Musi in Hyderabad.
• It was built by Muhammad quli qutb shah to celebrate the end of a deadly plague.
• Architect of Charminar were Mir-Momin Astarawadi.

42. _____ states that electric current flowing through a metallic wire is directly proportional to the potential difference 'V' across its ends provided its temperature remains the same.

(a) Ohm's law (b) Joule's law
(c) Ampere's law (d) Coulomb's law

Ans. (a) : Ohm's law : The electric current flowing through a metallic wire is directly proportional to the potential difference "V" across its ends provided its temperature remains the same.

I (current) $\propto$ V (Potential difference)

43. In which year was the Eiffel Tower built, to celebrate the 100- year anniversary of the French Revolution?

(a) 1889 (b) 1913
(c) 1886 (d) 1900

Ans. (a) : Eiffel Tower is a wrought iron lattice tower located in Paris, France.
• Construction begins in 1887 and completed in 1889.
• It was built to celebrate the 100 year anniversary of the French Revolution.

44. A small angled surface formed between two surfaces is called a _____.

(a) chuck (b) collar
(c) contour (d) chamfer

Ans. (d) : A small angled surface formed between two surfaces is called a chamfer.
• Chamfers are used in furniture such as counters and table tops to ease their edges to keep people from bruising themselves in the otherwise sharp corner.

45. _____ is defined as the total path length travelled by an object divided by the total time interval during which the motion has taken place.

(a) Uniform acceleration
(b) Instantaneous acceleration
(c) Instantaneous velocity
(d) Average speed

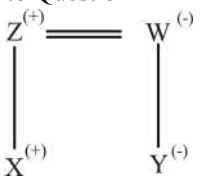
Ans. (d) : Average speed : The ratio of total path length traveled by an object and the total time interval during which the motion has taken place.

$$\text{Average speed (v)} = \frac{\text{Total path length (s)}}{\text{Total time taken (t)}}$$

46. If C $ D means C is the husband of D, C & D means C is the mother of D and C % D means C is son of D, then what does X % Z $ W & Y mean if W has only one son?

(a) X is the son of Y
(b) X is the brother of Y
(c) Y is the son of X
(d) Y is the brother of X

Ans. (b) : Given,
C $ D means C is the husband of D.
C & D means C is the mother of D
C % D means C is the son of D
Then
According to Question-



(+) → Male
(-) → female
(=) → Married couple
(|)→ Difference of generation.
Hence, option (b) is correct.

47. Who is the Admiral of the Indian Navy as of December 2018?

(a) Birender Singh Dhanoa
(b) Sunil Lanba
(c) Arup Raha
(d) Robin K Dhowan

Ans. (b) : Sunil Lanba was the Admiral of the Indian navy as of December 2018.

• The current Admiral of the Indian navy is R. Hari Kumar, who is the 25th navy chief of India.

48. Find the odd letter cluster out of the given alternatives.

(a) UWY (b) OQS
(c) IKM (d) GEC

Ans. (d) : The odd letter cluster out of the given alternatives.

Option -

1- U W Y
21 23 25
+2 +2

2- O Q S
15 17 19
+2 +2

3- I K M
9 11 13
+2 +2

4- G E C
7 5 3
-2 -2

49. A and B can complete a task in 30 days, whereas A,B and C can complete the same task in 21 days. In how many days can C alone complete the task?

(a) 70 (b) 72.5
(c) 65 (d) 67.5

Ans. (a) : Given,

A and B $\rightarrow$ 30

A, B and C $\rightarrow$21

Solution,

Total work = 210

$A+B=30$ | 7 unit efficiency

$A+B+C=21$ | 10 unit efficiency

Capacity of C,

A + B+ C = 10 and A + B = 7

$\Rightarrow$ C = 10-7 =3

Then total work can be completed by C in $=\frac{210}{3}=70$ days

50. The mass density or density of a material is defined as its_____.

(a) Mass per unit area
(b) Mass per ampere
(c) Mass per unit length
(d) Mass per unit volume

Ans. (d) : The mass density or density of a material is defined as its mass per unit volume.

The symbol most often used for density is 'ρ'

$$\boxed{\text{Density}=\frac{\text{mass}}{\text{volume}}}$$

SI Unit of density is Kgm^{-3}

51. An object of mass 1 kg is moving with a velocity 10m/s. Find the kinetic energy of the object.

(a) 5 J (b) 10 J
(c) 50 J (d) 100 J

Ans. (c) : Given $\Rightarrow$ An object of mass = 1 kg

Velocity = 10 m/s

Kinetic energy = K

We know that, $K=\frac{1}{2}mv^2=\frac{1}{2}\times1\times10\times10$

$\Rightarrow$ $\boxed{K=50J}$

52. If a+ b =7 and ab = 12, then a^2+b^2 is equal to:

(a) 24 (b) 25
(c) 24.5 (d) 25.5

Ans. (b) : Given

a + b = 7 -------(i)

ab = 12 ----- (ii)

Square of equation (i)

$(a+b)^2=49$

$a^2+b^2+2ab=49$ $\quad\because ab=12$

$a^2+b^2=49-24=25$

$\boxed{a^2+b^2=25}$

Hence option (b) is correct.

53. A television set was purchased for ₹ 650, and another ₹ 50 were spent on its transportation At what price should it be sold so that the profit earned would be 20%?

(a) ₹ 870 (b) ₹ 810
(c) ₹ 840 (d) ₹ 780

Ans. (c) : Given,

A television set was purchased Rs. = 650

Spent on its transportation = 50

Total cost of the television = 700

Profit earned would be = 20%

Then,

Selling price = (1+%P)×cost price $=\frac{700\times120}{100}=840$

54. _____ is a mode of heat transfer by actual motion of matter.

(a) Conduction (b) Vaporisation
(c) Radiation (d) Convection

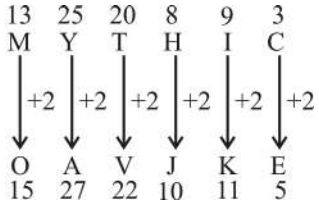
Ans. (d) : Convection: Convection is a mode of heat transfer by actual motion of matter.

- Convection occurs on a large scale in atmospheres, oceans, planetary mantles.
- Convection occurs mostly in gases and liquids since they have flowing feature in them.

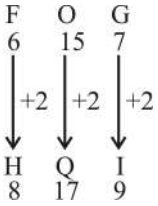
55. In a code language, if MYTHIC is written as OAVJKE, then how will FOG be written as in the same language?

(a) PNM (b) KIH
(c) HQI (d) FDC

Ans. (c) :



Then,



56. An object starts from rest at x = 0 m and t = 0 s. It moves with a constant acceleration of 2 m/s^2 along the x-axis, What is its average velocity between time 1s and 5s ?

(a) 2 m/s (b) 4 m/s
(c) 6 m/s (d) 8 m/s

Ans. (c) : we know that,

$$V_{avg} = \frac{\frac{1}{2}a\left(t_2^2 - t_1^2\right)}{t_2 - t_1}$$

Given,

$a = 2\ m/s^2$

$t_2 = 5$ sec, $t_1 = 1$ sec.

Put the value-

$$V_{avg} = \frac{1}{2} \times 2 \times (5+1)$$

$\Rightarrow$ 6 m/s

57. Two resistors, one of 20 Ω and the other of 30 Ω are connected in parallel. This combination is connected in series with an 8-Ω resistor and a 12-V battery. The current through the 20-Ω resistor is:

(a) 0.36A (b) 0.60 A
(c) 0.24 A (d) 0.12 A

Ans. (a) : 20Ω and 30Ω resistance Connected in parallel.

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{20} + \frac{1}{30} = \frac{50}{600}$$

$\Rightarrow$ $\boxed{R = 12\Omega}$

Total Resistance = 8 +12 = 20Ω

Now,

$V = IR$

$$I = \frac{12}{20} \Rightarrow \boxed{I = 0.6\,A}$$

The voltage drop across 12Ω is

$12 \times 0.6 = 7.2$ volts

Current in 20 Ω resistor is-

$V = IR$

$$I = \frac{7.2}{20} = \frac{72}{2 \times 100}$$

$\Rightarrow$ $\boxed{I = 0.36\,A}$

58. Heat supplied to a system is measured in _____.

(a) Amperes (b) Degrees Kelvin
(c) Kilowatts (d) Joules

Ans. (d) : Joules:-

Heat supplied to a system is measured in Joules.

SI unit of heat energy is Joules.

1Joule is equal to Kg m^2 - s^{-2}

59. Find the mean of the mode and the median of the given data.

15, 3, 8, 7, 6, 5, 5, 7, 18, 7

(a) 5 (b) 8
(c) 7 (d) 6

Ans. (c) : Mode: Mode is the most repeated value in a data.

- Mode of given data: 7
- Median of given data,

Arranging the terms is ascending order.

3 , 5, 5, 6, 7, 7, 7,8, 15, 18

Then,

$n = 10$

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

$$= \frac{5^{th}\,\text{term} + 6^{th}\,\text{term}}{2}$$

$$= \frac{7+7}{2} = \frac{14}{2} = 7$$

Mean of mode and median

$$\text{Mean} = \frac{(\text{Median} + \text{Mode})}{2} = \frac{7+7}{2} = 7$$

60. ₹ 150 of Amit's pocket money was spent on a pair of shoes and ₹ 75 on a watch. The total amount spent was three fourth of his total pocket money. What was the amount received by Amit as pocket money?

(a) ₹ 300 (b) ₹ 250
(c) ₹ 400 (d) ₹ 375

Ans. (a) : Given,
Money Spent on a pair of shoes = 150
Money Spent on a watch = 75
Total spent = 225
According to question,

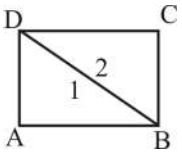
$$\text{Total pocket money} \times \frac{3}{4} = 225$$

$$\boxed{\text{Pocket Money} = 300}$$

61. The sum of all internal angles of a quadrilateral is:

(a) 540º (b) 360º
(c) 180º (d) 720º

Ans. (b) :



The sum of all integral angles of a quadrilateral is given by = (n -2)×180
Where, n = Total number of sides.

$$(4-2) \times 180 = 2 \times 180 = 360^\circ$$

62. Calculate the length of the diagonal of a square if the area of the square is 32 cm^2.

(a) 8 cm (b) 16 cm
(c) 12 cm (d) 4 cm

Ans. (a) : Given,-
The area of the square = 32 cm^2.

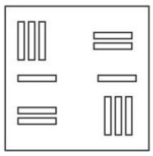
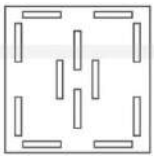
$$a^2 = 32$$

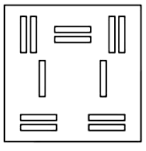
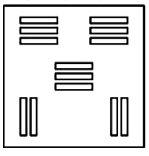
$$\boxed{a = 4\sqrt{2}}$$

We know that,
Length of the diagonal of a square is $\sqrt{2}$ times the side of square i.e. $\sqrt{2}a$

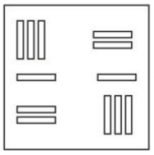
$$\Rightarrow \text{Length of diagonal} = \sqrt{2} \times 4 \times \sqrt{2} = 8$$

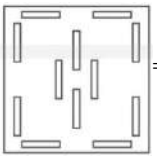
63. Choose the figure that is different from the rest.

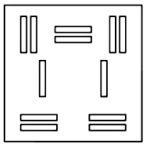
(a)  (b) 

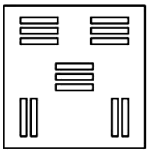
(c)  (d) 

Ans. (d) :

(a)  =Total Number of rectangle ⇒12

(b)  =Total Number of rectangle ⇒ 12

(c)  = Total Number of rectangle ⇒ 12

(d)  = Total Number of rectangle ⇒ 13

64. The smallest number that can be added to 56789 to make it divisible by 345 is x. What is the sum of the digits of x?

(a) 11 (b) 13
(c) 9 (d) 10

Ans. (d) :

$$\begin{array}{r} 345\overline{)\,56789\,(164} \\ 345 \\ \hline 2228 \\ 2070 \\ \hline \times 1589 \\ 1380 \\ \hline \times\ 209 \end{array}$$

The smallest number that can be added to 56789 to make it divisible by 345 is X.
Then, X = 345-209

$$\boxed{X = 136}$$

The sum of the digits of X-
⇒ 1+3+6 = 10

65. When 1 kg of water is cooled from 4ºC to 0ºC, its volume_____.

(a) First decrease and then increase
(b) Remains the same
(c) Decreases
(d) Increase

Ans. (d) : Generally any substance which is freezed to 0ºC the density of that substance increases but water shows some abnormal behaviour. Its density decreases when it is freeze below 4ºC
We know that density is inversely proportional to volume. So when density decrease volume increases.

66. A block of wood floats on water, with 65% of its volume under water. Its density (in kgm^3) is approximately.

(a) 0.65×10^3 (b) 0.55×10^3
(c) 0.35×10^2 (d) 0.25×10^2

Ans. (a) : According to Archimedes principle
Buoyant force F_B = Total weight of wooden block

$$\rho\times g\times V_{sub} = \rho_w\times g\times V_{Total}$$

Where ρ = density of water

$$\text{Given, } V_{sub} = \frac{65}{100}\times V_{Total}$$

$$\Rightarrow \rho\times g\times\frac{65}{100}\times V_{Total} = \rho_w\times g\times V_{Total}$$

$$\rho_w = \frac{65}{100}\times1000 \Rightarrow \boxed{\rho_w = 0.65\times10^3\,kg/m^3}$$

67. _____ is defined as the time rate at which work is done or energy is transferred.

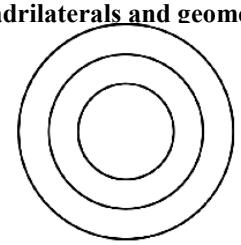
(a) Force (b) Power
(c) Distance (d) Displacement

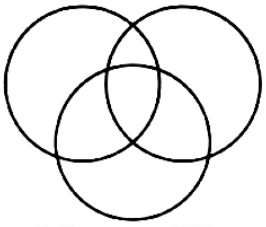
Ans. (b) : Power is defined as the time rate at which work is done or energy is transferred.

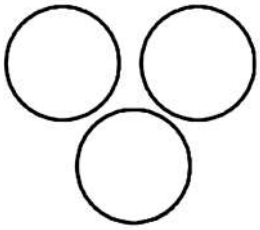
$$\boxed{P = \frac{W}{t}}$$

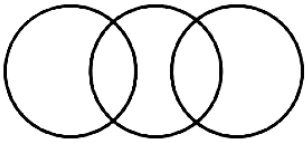
Where, P = Power
W = Work
t = Time
The SI unit of Power is the watt (w)

68. Which of the following Venn diagrams best represents the relationship between square, quadrilaterals and geometrical figures?

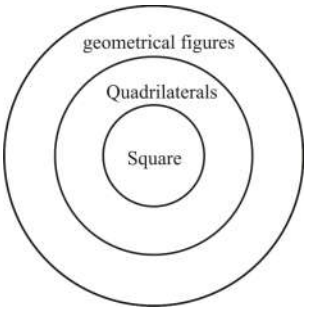
(a) 

(b) 

(c) 

(d) 

Ans. (a) :



- All squares are quadrilaterals
- All squares and quadrilaterals are geometrical figures.

Hence, option (a) is correct.

69. What is the area of a square whose diagonal measures 4 cm?

(a) 10 cm^2 (b) 6 cm^2
(c) 4 cm^2 (d) 8 cm^2

Ans. (d) : Diagonal measures = 4 cm
We know diagonal of square is $\sqrt{2}a$ where 'a' is side of square. So,

$$\sqrt{2}a = 4 \Rightarrow \boxed{a = 2\sqrt{2}}$$

Then, Area of a square = $(2\sqrt{2})^2 = 4\times2 = 8\ cm^2$

70. Which two signs should be interchanged to correct the given equation?
$3 \times 6 + 2 - 4 \div 8 = 13$

(a) + and - (b) + and ×
(c) ÷ and + (d) × and -

Ans. (c) : Going by the option
(a) $3\times6-2+4\div8 = 16.5 \neq 13$
(b) $3+6\times2-4\div8 = 14.5 \neq 13$
(c) $3\times6\div2-4+8 = 13=13$
(d) $3-6+2\times4\div8 = -2 \neq 13$
Hence correct answer is option (c)

71. Tap A can fill an empty swimming pool in 10 h. Tap B can fill it in 15 h. How much time will the two taps take to fill the empty pool together?

(a) 8 h (b) 7 h
(c) 5 h (d) 6 h

Ans. (d) :

	A	B
Time taken-	10hr	15hr
Total work -	30unit	
∴ Efficiency-	3	2

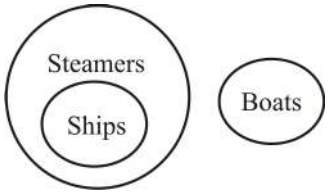
⇒ Efficiency of A = 3 & Efficiency of B = 2
∴ Efficiency of A + B = 5

The two taps take to fill the empty pool = $\frac{30}{5} = 6hr$

72. Two statements are given, followed by three conclusions, I, II and III. Consider the statements to be true even if they seem to be at variance with commonly known facts and decided which of the given conclusions, if any, follow (s) from the given statements.

Statements 1 : No boats are ships.
Statements 2 : All ship are steamers
Conclusion I : Some boats are steamers
Conclusion II : No Ships are boats
Conclusion III : Some steamers are ships.
(a) Only conclusions II and III follows.
(b) All the conclusions, I, II and III, follow.
(c) Only conclusions I and III follows.
(d) Only conclusions I and II follow.

Ans. (a) : According to Question



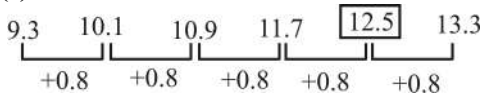
Conclusion I- Some boats are steamers Hence conclusion I is not true.
Conclusion II- No ships are boats. Hence conclusions II is true.
Conclusion III - Some steamers are ships hence conclusion III is true
Hence option (a) is correct.

73. A/an _____ angle is the angle between two planes.
(a) Offset (b) Spline
(c) Dihedral (d) Polar

Ans. (c) : A dihedral angle is the angle between two planes.
The purpose of dihedral effect is to contribute to stability in the roll axis.

74. A series is given, with one number missing. Choose the correct alternative from the given ones that will complete the series.
9.3, 10.1, 10.9, 11.7, ? 13.3
(a) 12.9 (b) 12.2
(c) 12.5 (d) 12.7

Ans. (c) :



Hence, option (c) is correct.

75. Who was the captain of the India Men's National Field Hockey Team during the 2018 Men's Hockey World Cup held in Bhubaneswar?
(a) Manoj Kumar (b) Shiva Thapa
(c) Devendro Singh (d) Manpreet Singh

Ans. (d) :
2018 men's Hockey world cup:
- Organized in Bhubaneswar.
- Captain of the India Men's National field Hockey team was Manpreet Singh for 2018.
- It was held from 28 November to 16 December. 2018.
- India last won the men's hockey world cup in 1975.
- India will host the 2023 men's hockey world cup.
- For 2023 Hockey world cup Harmanpreet singh will be the captain of Indian Hockey team.

76. Which of the following is the approximate ratio of length to breadth of any standard Engineering drawing sheet?
(a) $3 : \sqrt{3}$ (b) $1 : \sqrt{3}$
(c) $2 : \sqrt{2}$ (d) $1 : \sqrt{2}$

Ans. (c) : The approximate ratio of length to breadth of any standard engineering drawing sheet is $2 : \sqrt{2}$.
The size is defined as having an area of one square meter ($1m^2$). Paper weight is expressed in grams per square meter. Each smaller sheet size is exactly half the area of the previous size.

77. The density of fresh water is _____ the density of salt water.
(a) More than
(b) Negligible compared with
(c) Less than
(d) Equal to

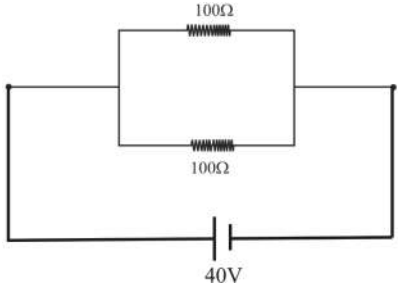
Ans. (c) :
- The density of fresh water is less than the density of salt water.
- Density is defined as mass per unit volume.
- SI unit of density is $kg/meter^3$.

78. Raising the head to straighten the neck is called_____.
(a) Wrist stretch (b) Chin tuck
(c) Pectoral stretch (d) Finger fan

Ans. (b) : Raising the head to straighten the neck is called chin tuck.
Sit upright and look straight ahead with the sears directly over the shoulders.
Chin tucks help stretch your neck muscles and they also help you maintain better posture.

79. Two 100-Ω resistor are connected in parallel, and this combination is connected across a 40-V supply. Find the current supplied by the voltage source.
(a) 1.5A (b) 0.8 A
(c) 1.1 A (d) 1.75A

Ans. (b) : Given,



$$\frac{1}{R}=\frac{1}{100}+\frac{1}{100}=\frac{2}{100} \Rightarrow \boxed{R=50\Omega}$$

Given, V= 40Volt

Then, Current $i=\frac{V}{R}=\frac{40}{50}=0.8 \Rightarrow \boxed{i=0.8A}$

80. Which of the following is NOT a traditional dance of Rajasthan?

(a) Ghoomar (b) Dumhal
(c) Kathputli (d) Gair

Ans. (b) : Traditional dance of Rajasthan-
- Ghoomar, Kathputli , Gair.
- Dumhal is traditional dance of Jammu and Kashmir performed by the watal tribe.

81. An article was sold for ₹ 576 when its cost price was ₹ 600. What is the percentage loss?

(a) 4.50% (b) 3.50%
(c) 3% (d) 4%

Ans. (d) : Given,

An article was sold = 576
Cost price = 600

We know that,

$$\% \text{ loss} = \frac{\text{loss}}{\text{cost price}} \times 100$$

Then,

loss = cost price -sold price = 600 -576 = 24

$$\% \text{ loss} = \frac{24}{600} \times 100 \Rightarrow \boxed{\% \text{loss} = 4\%}$$

82. The potential energy of a 20-kg object at height is 600 J. The value of h is _____. (Take g = 10 m/s^2.)

(a) 3 m (b) 1 m
(c) 30 m (d) 2 m

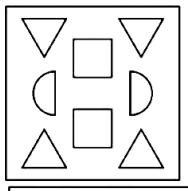
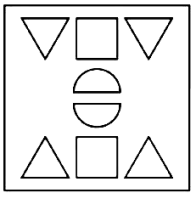
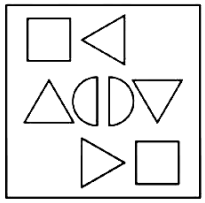
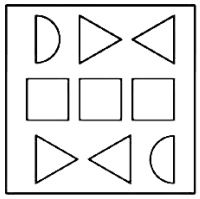
Ans. (a) : Given,

Potential energy = 600 J
Mass of object = 20 kg
$g = 10\ m/s^2$
h = ?

We know that,

$U = mgh$
$600 = 20 \times 10 \times h$
$\boxed{h = 3m}$

83. Choose the figure that is different from the rest.

(a) 
(b) 
(c) 
(d) 

Ans. (d) : In figure a, b, c the number of triangle, square, semi circle is same and in figure d number of square is one more. So figure d is different from other picture.

Hence option (d) is correct.

84. The difference between the roots of the equation $x^2 - 6x - 16 = 0$ is :

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

Ans. (c) : The roots of the equation

$x^2 - 6x - 16 = 0$
$x^2 - 8x + 2x - 16 = 0$
$x(x-8) + 2(x-8) = 0$
$(x+2)(x-8) = 0$
$\boxed{x = -2, +8}$

The difference between the roots of the equation

$= 8 - (-2) = 10.$

85. The average age of a family of 5 members is 20 years, with the youngest member being 5 years old. What was the average age (in year) of the family just before the birth of the youngest member?

(a) 18.5 (b) 18.75
(c) 19 (d) 18.25

Ans. (b) : Total age of 5 members = 5×20 = 100 years

Total age of other 4 members = (100-5)= 95 years

Age of youngest member is 5 years.

Total age of 4 members before 5 years = 95-4×5 = 75 years.

Average age of the family just before the birth of the youngest member $\frac{75}{4} = 18.75$ years

86. In third -angle projection, _____.

(a) The object lies between the observer and the plane of projection
(b) The object lies in the first quadrant
(c) The object lies in the second quadrant
(d) The plane of projection lies between the object and the observer

Ans. (d) : In third -angle projection the plane of projection lies between the object and the observer.

In this type of projection, the object is imagined to be in the third quadrant.

- In first angle projection the object lies in first Quadrant and also it lies between observer and plane of projection.

87. Select the option that is related to the third term in the same way as the second term is related to the first term.

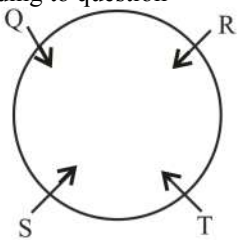
Nose : Smell : Ears:?

(a) Ear -ring (b) Deaf
(c) Two (d) Sound

Ans. (d) : As nose is used to sense smell similarly ears are used to hear sound.
Hence option (d) is correct.

88. Read the given information carefully and answer the question that follows.
Q,R,S and T sitting around a round table. Q is sittings next to R, S is sitting to the left of T. Q is not sitting next to T. Which of the following statements is INCORRECT?
(a) S is facing R.
(b) S is to the right of Q
(c) Q is facing T.
(d) Q is to the left of R.

Ans. (d) : According to question



- S is facing R. Hence statement (a) is correct.
- S is to the right of Q. Hence statement (b) is correct.
- Q is facing T. Hence statement (c) is correct.
- Q is to the left of R. This statement is wrong, since Q is to the right of R.

89. In code language, 349 means 'painting is art', 749 means 'drawing is art' and 573 means 'painting and drawing' . Find the code for 'and'.
(a) 7 (b) 3
(c) 9 (d) 5

Ans. (d) : Given,

$$\left.\begin{array}{l}\text{Painting is art} = 349\\ \text{drawing is art} = 749\end{array}\right] \Rightarrow \text{Painting} = 3$$

Painting and drawing = 573] $\Rightarrow$ drawing = 7
Then the code for and is 5 i.e. $\boxed{\text{and} = 5}$
Hence option (d) is correct.

90. A ball is thrown vertically upward with a speed of 30 m/s. The magnitude of its displacement after 4 s will be _____ (Take $g = 10\ m/s^2$.)
(a) 15 m (b) 50 m
(c) 30 m (d) 40 m

Ans. (d) : Given,

$u = 30$ m/s
$g = 10 m/s^2$
$t = 4s$.

We know that,

$$S = ut - \frac{1}{2}gt^2$$

$$S = 30\times4 - \frac{1}{2}\times10\times16$$
$$S = 120 - 5\times16$$
$$S = 120 - 80$$
$$\boxed{S = 40m}$$

91. How many degrees does the minute hand of a clock cover in the same time in which the second hand cover 3240º?
(a) 51 (b) 45
(c) 54 (d) 48

Ans. (c) : For second Hand
1 minute = 60 second $\rightarrow$ 360º rotation
$\Rightarrow$ 360º $\rightarrow$ 1 min

$$1^\circ \rightarrow \frac{1}{360^\circ}\text{min}$$

$$3240^\circ \rightarrow \frac{1}{360^\circ}\times3240^\circ = 9\,\text{min}$$

For minute Hand
60 min $\rightarrow$ 360º rotation

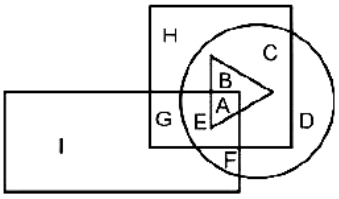
$$1\ \text{min} \rightarrow \frac{360}{60}\ \text{rotation} = 6^\circ\ \text{rotation}$$

9 min $\rightarrow 9\times6 = 54^\circ$ rotation.

92. Where was the BRICS Summit held in 2018?
(a) South Africa (b) Brazil
(c) China (d) India

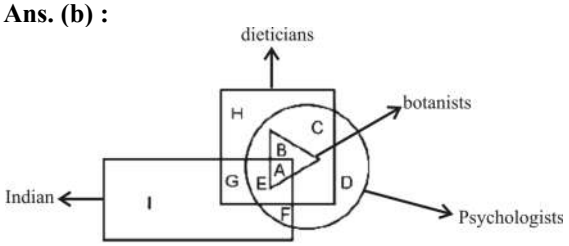
Ans. (a) : The BRICS Summit 2018 was held in Johannesburg, (South Africa)
- The place of summit to be held is followed in the sequence of letter in the name.
- In 2022 BRICS summit was held in china.
- In 2023 BRICS summit will again be held in South Africa.
- The foreign ministers of the initial four BRIC nations (Brazil, Russia, India and China) met in New York city in September 2006 and began a series of high-level meetings.

93. In the following figure, the square represents dieticians, the triangle represents botanists, the circle represents psychologists and the rectangle represents Indians. Which set of letter represents the psychologists who are also botanists?



(a) AGE (b) AB
(c) ABEC (d) AEF

Ans. (b) :



Set of letters AB represents the Psychologists who are also botanists.

94. If (4x+5) : (3x +11) = 13 : 17, then (5x + 4) : (4x -1) =?

(a) 3 : 2 (b) 5 : 2
(c) 4 : 3 (d) 2 : 1

Ans. (d) : $\frac{4x+5}{3x+11}=\frac{13}{17}$

$\Rightarrow 68x + 85 = 39x + 143$

$68x - 39x = 143 - 85$

$29x = 58$

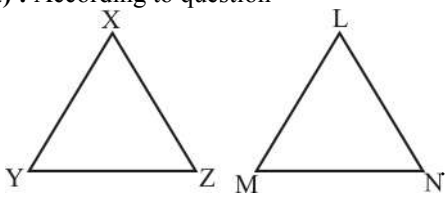
$\boxed{x = 2}$

Then, $\frac{5x+4}{4x-1}=\frac{5\times2+4}{4\times2-1}=\frac{14}{7}=2:1$

95. The areas of two similar triangles ΔXYZ and ΔLMN are 49 cm^2 and 9 cm^2 , respectively . If LM = 9 cm, then the length of XY is :

(a) 21 cm (b) 14 cm
(c) 7 cm (d) 49 cm

Ans. (a) : According to question



we know that,

$$\frac{\text{ar.}\Delta XYZ}{\text{ar.}\Delta LMN}=\frac{(XY)^2}{(LM)^2}$$

$\Rightarrow \frac{49}{9}=\frac{(XY)^2}{9\times9}$

$\Rightarrow XY = \sqrt{49\times9}$

$\Rightarrow XY = 7\times3 \Rightarrow \boxed{XY = 21}$

96. A brick wall having a thickness of 24 cm has an inner surface temperature of 25ºC and an outer surface temperature of 5ºC. The rate of heat loss through per square meter of the wall (thermal conductivity = 0.15 J/ (s.m.K) is:

(a) 12.5 J/s (b) 23.0 J/s
(c) 20.0 J/s (d) 18.2 J/s

Ans. (a) : The conduction heat transfer through a solid surface is given by

$$Q=\frac{T_1-T_2}{\frac{b}{KA}}$$

Where T_1 and T_2 are inner and outer surface temperature b is thickness of brick.

For per unit area,

$$Q=\frac{T_1-T_2}{(b/K)}$$

$$Q=\frac{25-5}{\frac{0.24}{0.15}}$$

$\Rightarrow \boxed{Q = 12.5\,J/s}$

97. A cylindrical wire of length L and radius r has resistance R. The resistance of another wire of the same material but half its length and half its radius will be:

(a) R/2 (b) R
(c) 2R (d) 4R

Ans. (c) : Resistance of original wire, $R=\frac{\rho L}{\pi r^2}$

Resistance of new wire $R'=\frac{\frac{\rho L}{2}}{\frac{\pi\times r^2}{4}}$

$\Rightarrow R'=\frac{4\rho L}{2\pi r^2}=\frac{2\rho L}{\pi r^2} \Rightarrow \boxed{R' = 2R}$

98. A video or photo experiencing a sudden spike in popularity in a short period of time is termed as _____.

(a) spam (b) viral
(c) virus (d) Wi - Fi

Ans. (b) : A video or photo experiencing a sudden spike in popularity in a short period of time is termed as viral.

Viral means sharing something via email or social media that spreads quickly to millions of people online.

99. If G + H means G is the son of H, G - H means G is the husband of H and G * H means G is the sister of H, which of the following shows that J is the mother -in -law of N ?

(a) N + M - K * J (b) N * M - K +J
(c) N + M * K -J (d) N- M * K + J

Ans. (d) : Given,

G + H → G is the Son of H.

G - H → G is the husband of H

G * H → G is the sister of H

Checking option (d)

$$N^+ \text{——} M^- * \overset{J}{\underset{+}{K}}$$

The outcome is J is mother in law of N.

Hence option (d) is correct.

100. In practice, the work output of a machine is _____ the work input due to the effect of friction

(a) always more than
(b) always less than
(c) opposite to
(d) always zero to

Ans. (b) : $\left[\text{Efficiency}=\frac{\text{Output work}}{\text{Input work}}\right]$

In practices the work output of a machine is always less than the work input due to the effect of friction.

Section : Part-B (Physics & Maths)

101. What is the missing term in the Arithmetic progression?
243, 255, ..., 279, 291
(a) 265 (b) 264
(c) 267 (d) 261

Ans. (c) :
243 255 267 279 291
+12 +12 +12 +12
Hence option (c) is correct.

102. A boy throws two balls in air in such a manner that when the first ball is at maximum height he throws the second ball. If the balls are thrown with the time difference of one second, the maximum height attained by each ball is ($g = 10m/s^2$)
(a) 2.5 m (b) 5 m
(c) 10 m (d) 3.5 m

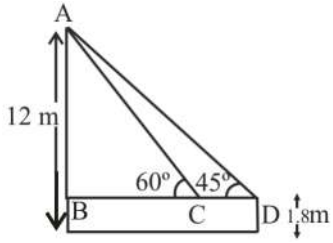
Ans. (b) : Given t = 1 second
$g = 10\ m/s^2$
Then, from Newton's first equation of motion
$v = g\,t = 1\times10 \Rightarrow (v = 10m/s)$
From Newton's third equation of motion
$$h = \frac{v^2}{2g} = \frac{10\times10}{2\times10} = 5m \Rightarrow \boxed{h = 5m}$$

103. Two resistor 1 ohm and 2 ohm are connected in series. The effective resistance is
(a) 2/3 ohm (b) 3 ohm
(c) 1 ohm (d) 2 ohm

Ans. (b) : $R_1 = 1\Omega$
$R_2 = 2\Omega$
R = ?
The effective resistance is.
$R = R_1 + R_2$
$= 1 + 2 = 3$
$\boxed{R = 3\Omega}$

104. A 1.8 m tall boy is standing at some distance from a 12 m tall building . The angle of elevation from his eyes to the top of the building increase from 45° to 60° as he walks towards the building. Find the distance (in meters) he walked towards the building.
(a) $\frac{51(\sqrt{3}+1)}{5\sqrt{3}}$ (b) $\frac{51(\sqrt{3}-1)}{5\sqrt{3}}$
(c) $\frac{12(\sqrt{3}-1)}{\sqrt{3}}$ (d) $\frac{12(\sqrt{3}+1)}{\sqrt{3}}$

Ans. (b) :



AB = 12-1.8 = 10.2 m
$\boxed{AB = 10.2m}$
In Δ ABD,
$\tan 45^\circ = \frac{AB}{BD}$
$1 = \frac{10.2}{BD} \Rightarrow \boxed{BD = 10.2m}$
In ΔABC,
$\tan 60 = \frac{AB}{BC}$
$\sqrt{3} = \frac{10.2}{BC} \Rightarrow \boxed{BC = \frac{10.2}{\sqrt{3}}m}$
Then
CD = BD- BC
$= 10.2 - \frac{10.2}{\sqrt{3}} = 10.2\left(1-\frac{1}{\sqrt{3}}\right) = \frac{10.2(\sqrt{3}-1)}{\sqrt{3}}$
$= \frac{102(\sqrt{3}-1)}{10\times\sqrt{3}}$
$\Rightarrow \boxed{CD = \frac{51(\sqrt{3}-1)}{5\sqrt{3}}}$

105. Solve for x in $12x^2 + 45x = 0$
(a) $x = 0, x = \frac{-15}{4}$ (b) $x = 0, x = \frac{15}{4}$
(c) x = 0, x = -12 (d) x = 0 , x = -45

Ans. (a) : $12x^2 + 45x = 0$
$x[12x+45] = 0$
$\Rightarrow 12x + 45 = 0$
$\Rightarrow 12x = -45$
$\Rightarrow x = \frac{-45}{12}$
$\Rightarrow \boxed{x = \frac{-15}{4}}$
$\Rightarrow \boxed{x = 0}$
Hence, two roots are = 0, –15/4.

106. Which of the following force is conservative?
(a) Frictional force (b) Air resistance
(c) Electrostatic force (d) Viscous force

Ans. (c) : A conservative force is one for which the work done is independent of path.
For example - Gravity force, Electrostatic force.
The electrostatic force is an attractive as well as repulsive force caused by the electric charge particles. It is also known as Coulomb's force.

107. Reduce to linear form

$$\frac{5x+1}{2x}=\frac{5}{4}$$

(a) 5x- 2 = 0 (b) 5x+2 = 0
(c) 5x-4 = 0 (d) 5x+1 = 0

Ans. (b) :

$$\frac{5x+1}{2x}=\frac{5}{4}$$

$20x + 4 = 10x$

$20x + 4 - 10x = 0$

$10x + 4 = 0$

$\Rightarrow \boxed{5x + 2 = 0}$

108. The ability of eye to focus on both near and far objects is called

(a) Power of accommodation
(b) Myopia
(c) Hypermetropia
(d) Prebyopia

Ans. (a) : The ability of eye to focus on both near and far objects is called power of accommodation. It do so by adjusting the focal length of eye.

109. A current through a horizontal power line flow in east to west direction. The direction of magnetic field at a point directly below it is

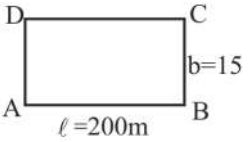
(a) South to north (b) North to south
(c) west to east (d) east to west

Ans. (b) : According to Right - hand thumb rule when the thumb points in the direction of the electric current , the direction in which the rest of the fingers curl gives the direction of the induced magnetic field. If the current through a horizontal power line flows in the east to west direction then the direction of the magnetic field at a point directly below it will be from north to south.

110. A farmer wants to fence his rectangular field of length 200 m and area 3000 m^2. If the cost of fencing per meter is 5 rupees, what is the total cost of fencing in rupees?

(a) 500 (b) 1000
(c) 2150 (d) 2500

Ans. (c) : According to Question



Given,

$\ell = 200\,m$

$\ell \times b = 3000\,m^2$

$\Rightarrow 200 \times b = 3000$

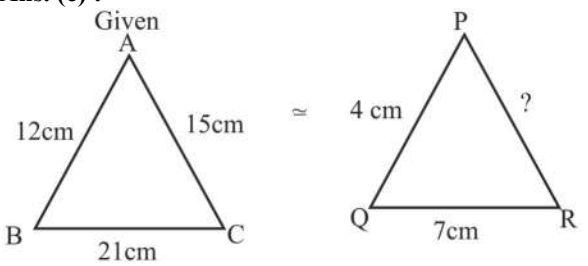
$\boxed{b = 15}$

$\Rightarrow$ If the cost of fencing per meter is 5 rupees, Then the total cost of fencing in rupees = cost per (m) × perimeter of field= 2×(200+15)×5= 2150 Rs

111. Triangles PQR and ABC are similar triangles. Triangle ABC have the following sides
AB = 12 cm
AC = 15 cm
CB = 21 cm
Triangle PQR have the following sides:
PQ = 4 cm
RQ = 7 cm
What is the length of side PR?

(a) 3 cm (b) 12 cm
(c) 5 cm (d) 15 cm

Ans. (c) :



Triangles PQR and ABC are similar triangles,

Then, $\frac{AB}{PQ}=\frac{BC}{QR}=\frac{AC}{PR}$

Now , $PR=\frac{PQ\times AC}{AB}=\frac{4\times 15}{12}$

$\Rightarrow \boxed{PR = 5cm}$

112. An electric bulb is connected to 200 V generator. The current is 0.5 A. The power of the bulb is

(a) 10 W (b) 1000 W
(c) 1 W (d) 100 W

Ans. (d) : Given,

V = 200 V

i = 0.5 A

P = ?

we know that,

$P = V i = 200\times 0.5 \Rightarrow \boxed{P = 100W}$

113. If 'c' is the velocity of light in free space, the time taken by light to travel a distance x in medium of refractive index μ is given by

(a) μxc (b) $\frac{\mu x}{c}$

(c) $\frac{\mu c}{x}$ (d) $\frac{x}{\mu c}$

Ans. (b) :

Refractive index of a medium is given by $\mu=\frac{c}{v}$

Where v is velocity of light in given medium

Distance = speed × time

$\Rightarrow$ Time (t) = $\frac{\text{distance}\ (x)}{\text{speed}(v)}$

$\Rightarrow \boxed{t=\frac{\mu x}{c}}$

114. The heat generated while transferring 96000 coulomb of charge is one hour through a potential difference of 50 V is

(a) 4.8×10^4 J (b) 1.33×10^3J

(c) 4.8×10^6J (d) 1.33×10^4 J

Ans. (c) : Given,

V = 50 V

Q = 96000

t = 1 hour = 3600 sec

We know that-

$$H = V\,I\,t = \frac{V \times Q.t}{t} = V \times Q = 50 \times 96000$$

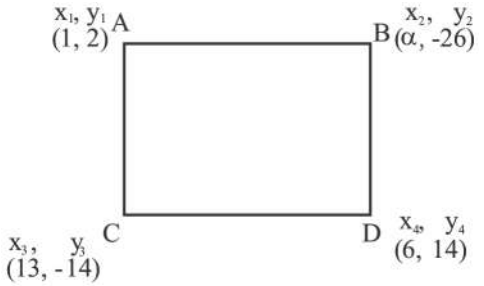
$$\Rightarrow \quad \boxed{H = 4.8 \times 10^6\,J}$$

115. A (1, 2) B(α, -26) , C (13, -14) and D (6, 14) s are the vertices of parallelogram, taken in order, find the value of α.

(a) 14 (b) 8

(c) 22 (d) 6

Ans. (b) :



we Know that,

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(x_4 - x_3)^2 + (y_4 - y_3)^2}$$

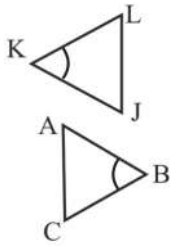
$$\Rightarrow \sqrt{(\alpha - 1)^2 + (-26 - 2)^2} = \sqrt{(6 - 13)^2 + (14 + 14)^2}$$

$\Rightarrow (\alpha\text{-}1)^2 + (-28)^2 = (-7)^2 + (28)^2$

$\Rightarrow \alpha\text{-}1 = 7$

$\Rightarrow \boxed{\alpha = 8}$

116. What is the angle at B in the triangle ABC, if the angle made at K is 60º? The triangles shown in the figure are similar.

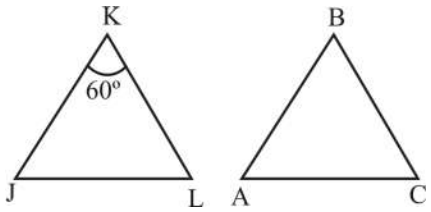


(a) 20º (b) 75º

(c) 60º (d) 40º

Ans. (c) : The triangles Shown is the figure are similar,

Then



Given,

$\angle K = 60º$

$\angle K = \angle B = 60º$

$\Rightarrow \quad \angle B = 60º$

117. Let $y = \frac{1}{10}x$ and x + 50y = 120. What is the value of x and y ?

(a) x = 2 and y = 20 (b) x = 20 and y = 2

(c) x = 10 and y = 2 (d) x = 60 and y = 6

Ans. (b) : Given,

$$y = \frac{1}{10}x \text{ ---------(i)}$$

$$\Rightarrow \quad \boxed{x = 10y}$$

x + 50 y = 120------(ii)

10y +50y = 120

$$\Rightarrow \quad \boxed{y = 2}$$

$x = 10 \times y$

$x = 10 \times 2$

$$\Rightarrow \quad \boxed{x = 20}$$

118. The Table given below represents the ages of students in a private music school. What is the average age of the student?

Age Band	Student
0 – 10	4
10 – 20	5
20 – 30	15
30 – 40	4

(a) Approximately 22 years

(b) Approximately 15 years

(c) Approximately 20 years

(d) Approximately 26 years

Ans. (a) : Average age = $\frac{\text{Total sum of age of student}}{\text{Total student}}$

Age Band	Student	Sum of age of student
0 – 10	4	$5 \times 4 = 20$
10 – 20	5	$15 \times 5 = 75$
20 – 30	15	$25 \times 15 = 375$
30 – 40	4	$35 \times 4 = 140$
	28	610

Average age = $\frac{610}{28} = 21.78$

$$\Rightarrow \quad \boxed{\text{Average age} \approx 22}$$