मुख्यमंत्री अभ्युदय योजना

CSAT

REASONING & GRNERAL MATHS

यह अध्ययन-सामग्री मुख्यमंत्री अभ्युदय योजना के अंतर्गत मुख्यमंत्री अभ्युदय योजना प्रकोष्ठ (उत्तर प्रदेश प्रशासन और प्रबंधन अकादमी) द्वारा उत्तर प्रदेश सरकार की सिविल सेवा परीक्षा की तैयारी कर रहे प्रतियोगियों की सहायता के लिए तैयार कराई गई है।

इस पाठ्य सामग्री को उत्तर प्रदेश प्रशासन एवं प्रबंधन अकादमी, लखनऊ में 65वें आधारभूत प्रशिक्षण कार्यक्रम के अंतर्गत प्रशिक्षण प्राप्त कर रहे प्रशिक्षु (डिप्टी कलक्टर्स-UPPCS - 2018) द्वारा प्रोजेक्ट कार्य के रूप में तैयार किया गया है।

इस सामग्री को पूर्णत: शैक्षणिक और जन कल्याणकारी-उद्देश्यों के लिए तैयार किया गया है, इसका एक मात्र उद्देश्य प्रदेश के छात्र/छात्राओं का प्रतियोगी परीक्षाओं की तैयारी में मार्गदर्शन व सहयोग करना है।

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ANALOGY

'Analogy' means 'correspondence'. In these types of questions, a particular relationship is given and another similar relationship has to be identified from the alternatives provided. Analogy tests are therefore meant to test a candidate's overall knowledge, power of reasoning and ability to think concisely and accurately. Below are given some common relationships which will help you detect most analogies better.

1. Animal and Young one: Ex. Cow: Calf. Calf is the young one of cow. Some more examples are given below:
   1. Horse: Pony
   2. Cat: Kitten
   3. Sheep: Lamb
   4. Butterfly: Caterpillar
   5. Insect: Larva

2. Quantity and Unit: Ex. Length: Metre. Metre is the unit of length. Some more examples are given below:
   1. Mass: Kilogram
   2. Force: Newton
   3. Energy: Joule
   4. Resistance: Ohm
   5. Volume: Litre
   6. Angle: Radians

Sample questions:

1. Dog: Rabies: : Mosquito 2 ?
 (a) Plague (ft) Death (c) Malaria (d) Sting

2. Man: Biography : : Nation : ?
(a) Leader (6) People (c) Geography (d) History

3. Doctor: Diagnosis : : Judge : ?
(a) Court (6) Punishment (c) Lawyer (d) Judgement

4. Horse: Jockey :: Car : ?
 (a) Mechanic (ft) Chauffeur (c) Steering ((d) Brake

5. Fog : Visibility : : AIDS : ?
(a) Health (ft) Resistance (c) Virus (d) Death

6. Porcupine : Rodent : : Mildew : ?
(a) Fungus (b) Germ (c) Insect (d) Pathogen

7. Reading : Knowledge : : Work : ?
(a) Experience (ft) Engagement (c) Employment (d)Experiment

8. Conscience : Wrong : : Police : ?
(a) Thief (ft) Law (c) Discipline (d) Crime

9. Cricket : Bat : : Hockey : ?
(a) Field (ft) Stick (c) Player (d) Ball

CODING

Coding is a process of conversion of original word or sentence or collection of character into some other form by following certain logic or rule. The resultant is known as code. Coding - Decoding is an aid to check the candidate's ability to understand the logic that converts into code, a particular message and to read the message.

TYPES OF CODING:

1. LETTER CODING

This is the code that is derived on the basis of alphabets. usually, the position of alphabets is used. For example, let us see the following question.
Example 1: In some language, "EXAM" is coded as "FYBN". In the same language, how will we code "RESULT"?

   A) SFTVMU
   B) REPTUY
   C) ERICCART
   D) KYLEBROW

Answer: The first step is to detect the code. For that, we need to focus on the word EXAM. The first letter E in code is F, similarly the code for X is Y, for A it is B and for M it is N. Thus we see that in this language the alphabet is shifted to one step to the front. Thus the code for R will be S and hence the correct option here is A) SFTVMU.

2. NUMBER CODING

In a certain code, "Delhi is capital" is coded as "7 5 9". The sentence "capital are beautiful" is coded as "3 6 9", and "Delhi is beautiful" is coded as "6 7 5". Also "Patna also capital" is coded as "9 2 4". What is the code for "beautiful" in this code?
A) 2
B) 4
C) 5
D) 6
E) 7

Answer: To solve codes like these remember the order of the numbers may be anything. For example, in "Delhi is capital" and "Delhi is beautiful", we can see that the words "Delhi is" are common and thus we can see that capital is 9 and beautiful is 6. Therefore, the correct option here is D) 6.

3. SYMBOL CODING

In the symbol coding, we use the symbols like "!@#$%^&*()_", to represent words or letters. These codes are then used to determine a code for the words that are written down. Let us see an example.

Example: If "LESD" is written as "@ $ & # ", "NAC" is written as "%? * ", how "CANDLES" is coded in the same way?
A) *&%#$&)
B) *?%&@$#
C) *&^$@()
 D) ?@$@^%@&
Answer: In the code, we can see that the code for L is @. Building on to that we can see that the option B) *?%&@$# is the correct option.

4. MISCELLANEOUS EXAMPLES

Example: In the following, a certain code is given. According to this code, "before West to mailing" is written as "ad mi ja no", "the West to Himalaya" is written as "kujaig ad". Also "mailing of the layout" is written as "be ku zo mi" and "to should of changes" is written as "be Ii yaja". Then what is the code for "should"?

A) be   B) Ii   C) ya   D) ja   E) Data insufficient
Answer: To solve these types of questions, a table may come in handy. Check for the two sentences that have the most number of similar words. Let us put all the terms in the table and see if we can get the correct answer or not. Let us see what "to" is coded as:

Important Rules About CODING-DECODING:

1. In these questions code values are given to a word in terms of letters. We have to analyse the pattern of the example and follow that pattern to find the answer.
2. Take the given pair.

3. Write the position of all letters in the given pair.
4. Try to find the relation between the letters of both part of pair.
5. Relation may be related in forward or backward order.
6. Implement the same relation on the given word for required answer.

SYLLOGISM

Syllogism questions constitute a set of sentences and conclusions. The candidates are required to understand the sentences and deduce a conclusion from the assumed set of propositions. So, syllogism can simply be defined as a typical argument that must be arrived at a conclusion through deductive reasoning.

There are two methodologies, Venn Diagrams and analytical method to solve the syllogism questions. The venn diagram method is preferred since, finding the conclusions which follow the given statements logically become easy and thus solving the related syllogism question becomes easy. Diagrams are drawn on the basis of the sentences and then conclusions are drawn by analysing the venn diagram. An example of solving syllogism questions using venn diagrams is illustrated for easy understanding of the syllogism questions and the application of venn diagram in them.

For example,

Question Statements:

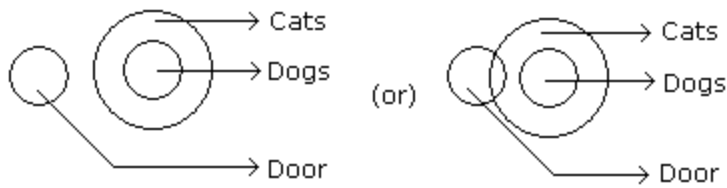(A) No door is dog.

(B) All the dogs are cats.

Conclusions:

(A) No door is cat.

(B) No cat is door.

(C) Some cats are dogs.

(D) All the cats are dogs.

Answer options:

1. Only (B) and (D)
2. Only (A) and (C)
3. Only (C) and (D)
4. Only (C)
5. All the four

Solution:

From the given question statements, two possible venn diagram can be made as,

So, answer option 4 i.e. only (C) is the correct option

1. Statements:

All the poets are goats. Some goats are trees.

Conclusions:

A. Some poets are trees.

B. Some trees are goats.

2. Statements:

Some mangoes are yellow. Some tixo are mangoes.

Conclusions:

A. Some mangoes are green.

B. Tixo is a yellow.

3. Statements:

Some ants are parrots. All the parrots are apples.

Conclusions:

A. All the apples are parrots.

B. Some ants are apples.

4. Statements:

Some pearls are jewels. Some jewels are ornaments.

Conclusions:

A. Some jewels are pearls.

B. Some ornaments are jewels.

5. Statements:

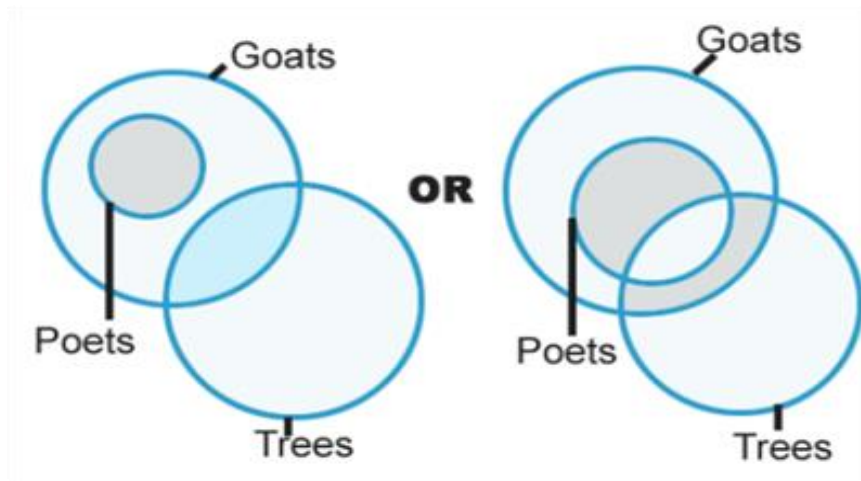Some hens are cows. All the cows are horses.

Conclusions:
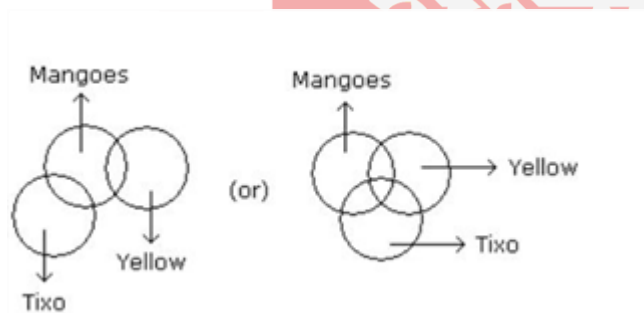
A. Some horses are hens.

B. Some hens are horses.

1. (B). Only (B) conclusion follows
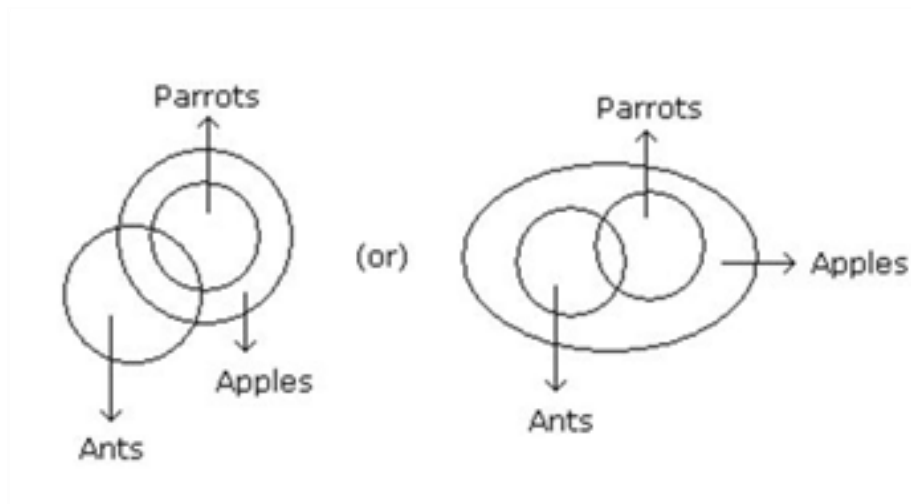
Solution:

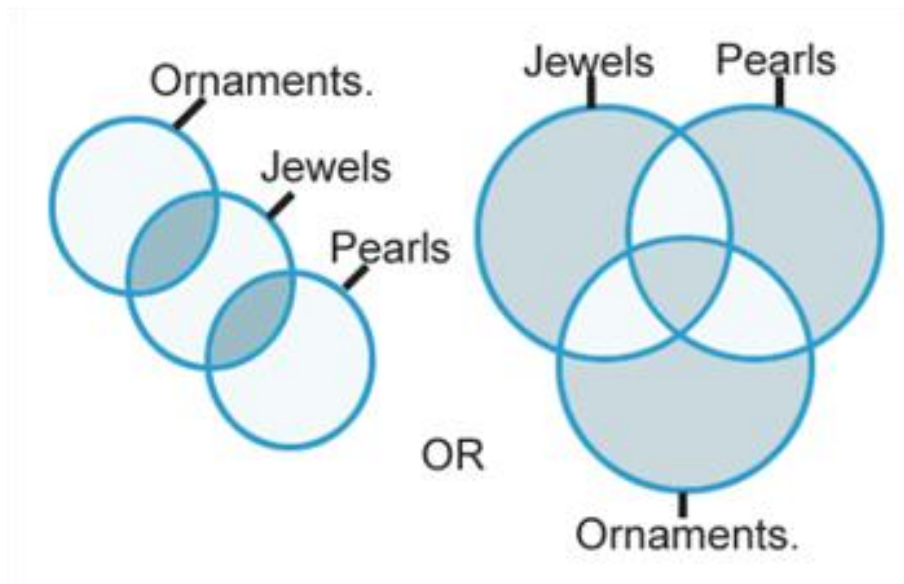**2. (D).** Neither (A) nor (B) follows

Solution:

3. (B). Only (B) conclusion follows
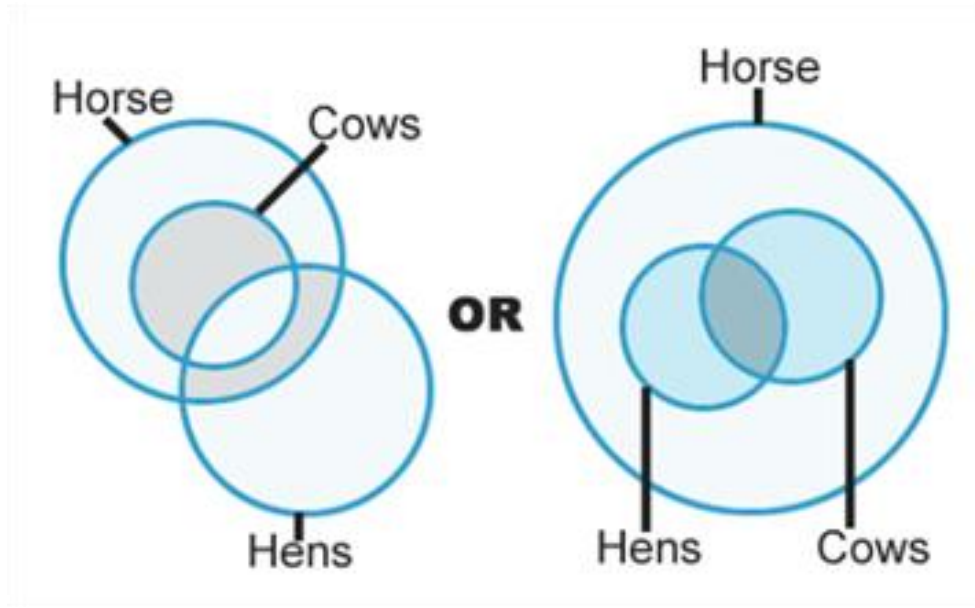
Solution:

4. (E). Both (A) and (B) follow.

Solution:

**5. (E).** Both (A) and (B) follow.

Solution:

DIRECTION SENSE REASONING

The questions based on directions require the candidates to identifying the direction of an individual or shadow from a set of statements. Some important points are given which can help to understand and solve the related question easily.

- **Know about the Directions Thoroughly**

In general, there are four main directions i.e. North, South, East and West. Apart from these four, there are four additional directions derived from the main ones. They are called North-East, North-West, South-East and South-West. A chart is given below for reference.
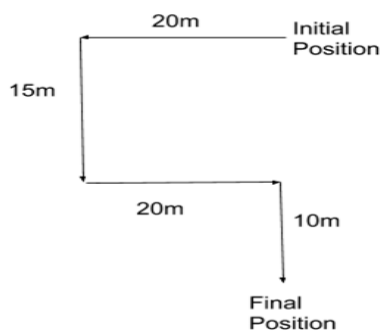
Direction Chart:
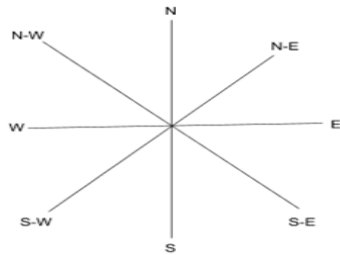
Direction Questions: Example 1

A is standing on the east of B who is standing in the north of C. In which direction is D with respect to A If D is standing in the south of C?

Solution:

From the above statement, a direction diagram can be made as follows.

From the diagram, it is clear that D is standing in the south-west direction of A.

- **Get Acquainted with the casting of Shadows**

Often the questions are asked when the candidates need to identify the direction where one's shadow is cast. Some of the important points are given below which can help the candidates to solve the questions related to shadows effectively.

1. If a man faces a rising sun, his shadow will always be in the west.

2. During sunset, one's shadow will always be casted in the east.

3. Similarly, if a man faces north, his shadow will be on his right during sunrise and on his left during sunset.

4. In mid-noon, no shadows are seen as the sun's rays are vertically downwards.

Direction Questions: Example 2

Mr. X and Mr. Y are facing each other and are enjoying the sunrise. If Mr. X's shadow falls on his left side, then which direction is Mr. Y facing?

Solution:

As it is sunrise, any shadow has to fall in the west direction. As it is given that Mr. X's shadow falls on his left side, it can easily be interpreted that Mr. X is facing North (since his left side is facing west). Now as Mr. X and Mr. Y are facing each other, Mr. Y has to face South.

- **Get well-versed with the rotations**

Often some statements are given where the subject rotates either to the left or to the right. It should always be remembered that rotating right implies clockwise rotation while rotating left implies rotating anti-clockwise.

Direction Questions: Example 3

Mr. A moves North and then turns to his right and keep walking. After that, he again turns right and walks a certain distance and then finally walks to the left. In which direction is he walking now?

Solution:

The problem becomes simple if a diagram is constructed according to the given statements.
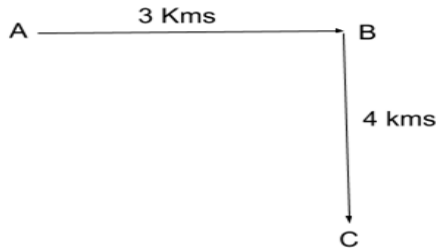
From the diagram, it can be easily interpreted that Mr. A is now walking towards the east.

Distance Related Questions

In most of the direction and distance questions, the candidates are required to calculate a certain parameter from the question statement. The questions can be related to the total distance walked, the shortest path, the distance between two entities, etc.

While solving the distance related question, one must be thorough with the *Pythagorean Theorem* to be able to solve most of the questions. The Pythagorean Theorem is used to calculate the shortest path travelled, the minimum distance between two points, etc. A couple of examples are given below to illustrate the direction and distance questions better.

Direction and Distance Reasoning Questions: Example 1

Mr. P walked 3 km towards east. After that, he moved clockwise and walked 4 Kms. What would have been the distance if he took the shortest path from his initial position to his final position?

Solution:

At first, one must construct the diagram of his movement. The movement route of Mr. P is given below.
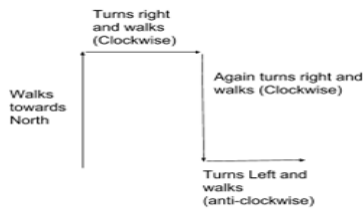
In this diagram, the positions of Mr. P are marked as A, B and C where A is the initial position and C is the final position. From the diagram, the shortest path from his initial position to the final position will be AC.

AC= √ (AB²+ BC²)

So, AC= 5.

Therefore, the shortest path from the initial distance to the final distance will be 5 Kms.

Direction and Distance Reasoning Questions: Example 2

Mr. M walked 20m towards the west and turned left and again walked 15m. Then he moved anti-clockwise and walked 20m. At last, he moved clockwise and walked another 10m. How far is Mr. M now from his initial position?

Solution:

First, a diagram should be constructed taking all his movements into consideration. The diagram will come up as:
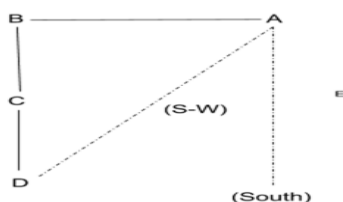
From this diagram, the distance between initial and final position can be easily calculated which will be: 15m + 10m= 25m.

PUZZLES

Seating Arrangements:

A. Nine persons Anu, Bablu, Cheenu, Dona, Esha, Faria, Gaurav, Harish and Ishita are sitting in a row and all are facing north. It is known that Cheenu sits exactly in the middle and there is no person to the right of Ishita. Dona is fourth to the right of Faria. Gaurav and Harish are sitting next to each other. Esha is the neighbor of Dona but not of Cheenu. Harish doesn't sit at any extreme corner. Dona is not sitting adjacent to either Cheenu or Ishita. Anu is second to the right of Harish.

1. Who is sitting to the immediate left of Cheenu?
A. Faria
B. Anu
C. Harish
D. Dona E. None of these

2. Who is sitting between Bablu and Esha?
A. Dona
B. Faria
C. Gaurav
D. Cheenu E. None of these

3. Four of the following five are alike in a certain way and thus forms a group. Which of the following does not belong to that group?
A. Gaurav and Harish
B. Cheenu and Bablu
C. Faria and Gaurav
D. Dona and Esha
E. Esha and Ishita

4. Who is sitting third to the right of Harish?
A. Bablu
B. Dona
C. Faria
D. Cheenu
E. None of these

5. Who is sitting at the left most seat of the row?
A. Faria
B. Bablu
C. Gaurav
D. Dona
E. None of these

Sol:

1. "Anu is sitting to the immediate left of Cheenu".
Option B, is hence the correct answer.

2. "Dona is sitting between Bablu and Esha".
Option A, is hence the correct answer.

3. "Faria and Gaurav do not belong to that group".
Option C, is hence the correct answer.

4. "Cheenu sits third to the right of Harish".
Option D, is hence the correct answer.

5. "Gaurav is seated at the left most corner of the row". Option C, is hence the correct answer

Logical Selection:

1 - 1. Bus stand 2. Office 3. Bus 4. Home
Options −
A - 3, 2, 1, 4
B - 4, 1, 3, 2
C - 1, 3, 4, 2
D - 2, 1, 3, 4
Answer - Option B
Explanation −
First we will come out from home then go to bus stand to catch the bus then we can reach the office.

2 - 1. Russia 2. Brazil 3. Germany 4. Maldives
Options −
A - 2, 1, 3, 4
B - 3, 2, 1, 4
C - 4, 3, 2, 1
D - 1, 3, 2, 4

Answer − Option C
Explanation −
We can arrange it both in ascending or descending order of their area. Only option C is correct. Because it represents the sequence in ascending order.

NUMBER RANKING AND TIME SEQUENCE

1. In a queue, Amrita is 10th from the front while Mukul is 25th from behind and Mamta is just in the middle of the two. If there be 50 persons in the queue, what position does Mamta occupy from the front?
A. 20th
B. 19th
C. 18th
D. 17th
Sol: Answer: Option C
Explanation:
Number of persons between Amrita and Mukul = 50 -(10 + 25) = 15. Since Mamta lies in middle of these 15 persons, soMamta's position is 8th from Amrita i.e. 18th from the front.

2. Raman ranks sixteenth from the top and forty ninth from the bottom in a class. How many students are there in the class?
A. 64
B. 65
C. 66
D. Cannot be determined
E. None of these
Answer: Option A
Explanation:
Clearly, number of students in the class = (15 + 1 + 48) = 64.

3. Asish leaves his house at 20 minutes to seven in the morning, reaches Kunal's house in 25 minutes, they finish their breakfast anither 15 minutes and leave for their office which takes another 35 minutes. At what time do they leave Kunal's house to reach their office?
A. 7.40 a.m.
B. 7.20 a.m.
C. 7.45 a.m.
D. 8.15 a.m.
E. 7.55 a.m.
Answer: Option B

Explanation:

Asish leaves his house at 6.40 a.m.

He reaches Kunal's house in 25 minutes i.e., at 7.05 a.m. Both leave for office 15 minutes after 7.05 a.m. i.e., at 7.20 a.m.

Mathematical Operations:

1.If '+' ='×', '- '='+', '×' ='/','/' = '- '

Then answer the following questions based on this information

1. 23 - 3/1 + 15 × 5 =

A - 22

B - 23

C - 24

D – 25

Explanation −

If the actual operators will be replaced as per the direction of the question, then the series will be −

23 + 3 - 1 × 15/5

Now we can apply the rule to solve the above. 1st "15/5" section will be solved.

15/5=3

Now (1 × 3) section will be solved.

1 × 3 = 3

Series will reduce to 23 + 3 - 3 = 23

Hence our answer will be option B.

2. If + stands for 'division', × stands for 'addition', – stands for 'multiplication' and ÷ stands for subtraction, then which of the following equations is correct?

(a) $36 \times 6 + 7 \div 2 - 6 = 20$

(b) $36 + 6 - 3 \times 5 \div 3 = 24$.

(c) $36 \div 6 + 3 \times 5 - 3 = 45$.

(d) $36 -6 + 3 \times 5 \div 3 = 74$.

Ans. d

Solution

$36 - 6 + 3 \times 5 \div 3$

$\rightarrow 36 \times 6 \div 3 + 5 - 3$.

$\rightarrow 36 \times 2 + 5 - 3 = 74$.

$\rightarrow 72 + 5 - 3 = 74$.

Data Sufficiency:

1. Question: In which year was Rahul born?

Statements:
Rahul at present is 25 years younger to his mother.
Rahul's brother, who was born in 1964, is 35 years younger to his mother.

   A. I alone is sufficient while II alone is not sufficient

   B. II alone is sufficient while I alone is not sufficient

   C. Either I or II is sufficient

   D. Neither I nor II is sufficient

   E. Both I and II are sufficient

Answer: Option **E**

2. From both I and II, we find that Rahul is (35 - 25) = 10 years older than his brother, who was born in 1964. So, Rahul was born in 1954

Question: What will be the total weight of 10 poles, each of the same weight?

Statements:

One-fourth of the weight of each pole is 5 kg.

The total weight of three poles is 20 kilograms more than the total weight of two poles.

   A. I alone is sufficient while II alone is not sufficient

   B. II alone is sufficient while I alone is not sufficient

   C. Either I or II is sufficient

   D. Neither I nor II is sufficient

   E. Both I and II are sufficient

Answer: Option **C**

Explanation:

From I, we conclude that weight of each pole = (4x5) kg = 20 kg.

So, total weight of 10 poles = (20 x 10) kg = 200 kg.

From II, we conclude that:

Weight of each pole = (weight of 3 poles) - (weight of 2 poles) = 20 kg.

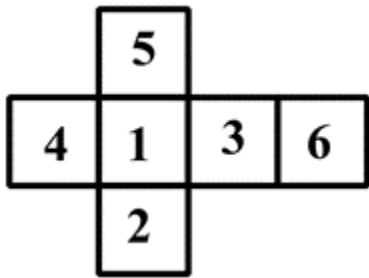So, total weight of 10 poles = (20 x 10) kg = 200 kg.

DICE AND CUBES

Cube and Dice Tricks

Question 1

When the following figure is folded to form a cube, then which of the following shows a pair of faces opposite to each other?
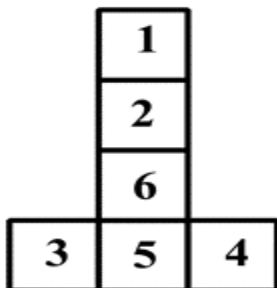

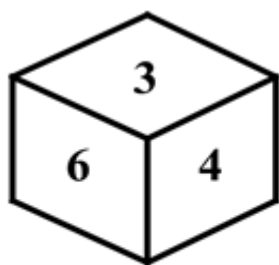(1) 2 – 3

(2) 4 – 6

(3) 5 – 6

(4) 5 – 2

(5) 4 – 2

Answer key: (4)

Solution: Here, faces 1 and 6, faces 4 and 3, faces 5 and 2 are opposite to each other.
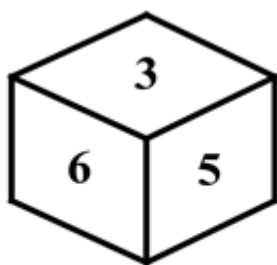
Question 2

When the following figure is folded to form a cube, which of the following options can be the folded cube?
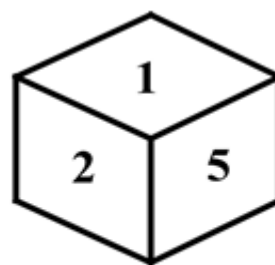
I   II   III

(1) Only I

(2) Only II

(3) Only III

(4) Both I and II

(5) Both II and III

Answer key: (2)

Solution: In the given flattened-out figure, faces 1 and 6, faces 4 and 3, faces 5 and 2 are opposite to each other.

In figure I faces 3 and 4 are adjacent to each other and in figure III, faces 2 and 5 are adjacent to each other.

Hence, figures I and III cannot be the folded cube.

In figure II, faces 6, 3, and 5 can be adjacent to each other. Figure II can be the folded cube.

Finding sequence:

Q 1 − Which figure must continue series of figure?

Answer - Figure (1)

Explanation

In each step, one leaf is getting added on either side of line and after each two steps, figure is rotating through an angle of 45° clockwise. During rotation no leaf is added.

Q 2 − Which figure must continue series of figure?

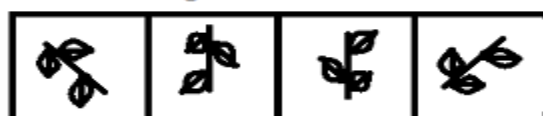**Ques tion figure**

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

answer figure

(1) (2) (3) (4)
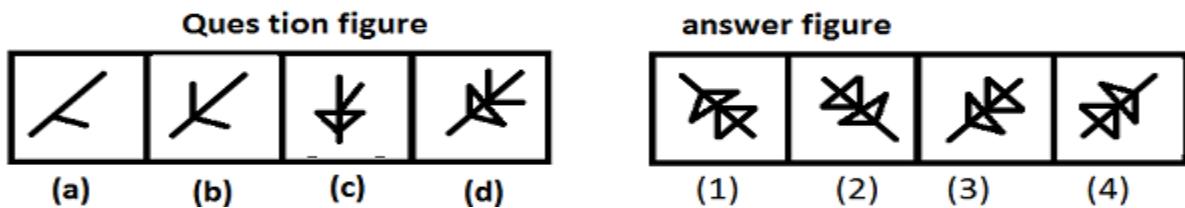
Answer - Figure (3)

Explanation

In each step one line is added to either side of inclined line to make triangular shape and figure is rotating through an angle of 45° anti clockwise.

Q 3 − Which figure must replace question mark?

Ques tion figure

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

answer figure

(1) (2) (3) (4)
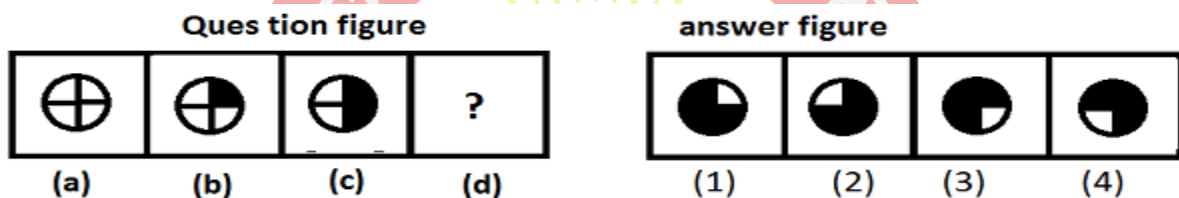
Answer - Figure (2)

Explanation

In each step one quarter of the figure is shaded in clockwise direction.

Q 4 − Which figure must replace question mark?

Ques tion figure

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

answer figure

(1) (2) (3) (4)
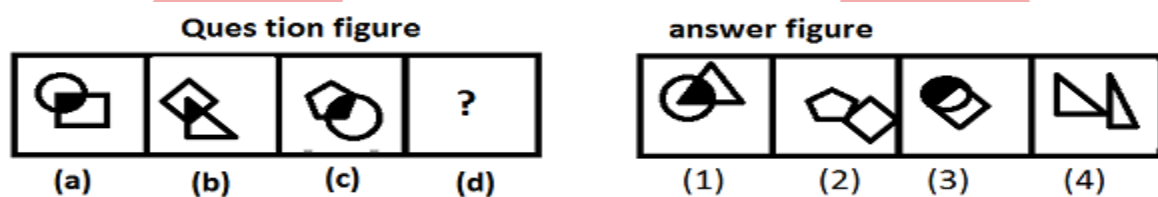
Answer - Figure (1)

Explanation

Each figure has shaded common area.

Q 5 − Which figure is not following the same sequence as followed by figures in question figure?
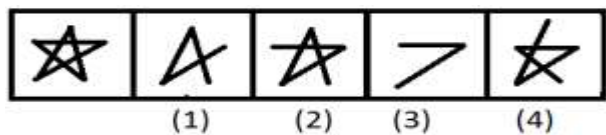
Answer - Figure (4)

Explanation

In each step 2 lines are getting omitted while one line is added in following step.

MISSING ALPHABET SERIES

Example 1: The missing letter of the series O, R, U, __ is:

a) V   b) W   c) X   d) Y   e) Z

Answer: If you take a look at the table, you will see that the letter O corresponds to number 15 and the letter R to the number 18. Similarly, you will notice that the letter U corresponds to the number 21. Therefore, the missing alphabet should be X which corresponds to the number 24 as per the rule of the sequence. Hence the correct option is c) X.

Example 2: What should be the alphabet that follows the order of the sequence: A, D, I, __

a) L   b) M   c) N   d) O   e) P

**Answer:** Once we convert the alphabet series into number series, the question will become very easy. The alphabet A corresponds to the number 1, alphabet D corresponds to the number 4. Similarly, the alphabet 'I', corresponds to the number 9. Thus the number series that we want to solve here is 1, 4, 9, ___. You can see that each of the numbers is a square and that the sequence is a perfect square series. 1, 22, 32, 42 (=16). The alphabet that corresponds to 16 is P. Therefore, the sequence is O, R, U, P. Thus the correct option is e) P.

Practice Questions

Q 1: What is the next term in the series: SCD, TEF, UGH, ___?

A) VIJ   B) VUK   C) IJK   D) JIV

Ans: A) VIJ

Q 2: Which of the following is not right?

A) ADH, BEI, CFJ, DGK

B) Z, V, R, N

C) F, P, Z, J

D) B, L, V, E

Ans: D) B, L, V, E

Q 3. Look at the below-given series and fill in the required blank.

KAL, LBM, MCN, NDO, _____

The above series given is divided into three different sequences. All the letters in the series are the sequence. The 1st letter in all the series is K, L, M, N, so the next letter will be O. So, the second and third letter will be followed by an E and P. So, the final answer here will OEP.

Practice Questions on Letter & Symbol Series

Q 4. Complete the given blank in the series below.

SCD, TEF, UGH, _____ , WKL

A. UJI

B. IJT

C. VIJ

D. CMN

Answer: C. VIJ

Q 5. FAG, GAF, HAI, IAH, _____.

A. HAL

B. JAK

C. JAI

D. HAK

Answer: B. JAK

MATHEMATICS (RATIO AND PROPORTION)

Example 1: An amount of money is to be divided between P, Q and R in the ratio of 3:7:12. If thedifference between the shares of P and Q is Rs.X, and the difference between Q and R's share is Rs.3000. Find the total amount of money?

A.11000

B.12400

C.13200

D.14300

E. None of these

Answer & Explanation

Answer – C.13200

Explanation:

12a-7a = 3000

5a = 3000

a = 600

7a-4a = x

3a = x

x = 1800

22*600 = 13200

Example 2: If a certain amount X is divided among A, B, C in such a way that A gets 2/3 of what B gets and B gets 1/3 of what C gets, which of the following is true

A. C's Share = 1053 and X = 1666

B. A's Share = 238 and X = 1638

C.B's Share = 234 and X = 1666

D.C's Share = 1053 and X = 1638

E. A's Share = 351 and X = 1638

Answer & Explanation

Answer –D. C's Share = 1053 and X = 1638

Explanation: A= 2/3 B; B= 1/3C; A: B = 2:3

B:C = 1:3; A: B:C = 2:3:9 C = 9/14 * 1638 = 1053

Example 3: Seats for Mathematics, Science and arts in a school are in the ratio 5:7:8. There is a proposal to increase these seats by X%, Y% and Z% respectively. And the ratio of increased seats is 2:3:4, which of the following is true?

A.X = 50; Z = 40 B.Y = 40; Z = 50 C.X = 40; Z = 75 D.X = 50; Z = 40 E.Y = 50; X = 75

Answer & Explanation

Answer – C.X = 40; Z = 75 Explanation: Number of increased seats are (140% of 5x), (150% of 7x) and (175% of 8x) i.e., (140/100 * 5x), (150/100 * 7x) and (175/100 * 8x) i.e., 7x, 21x/2 and 14x Required ratio = 7x:21x/2:14x = 14x : 21x : 28x = 2:3:4

Example 4: Two candles of same height are lighted at the same time. The first is consumed in 3 hours and second in 2 hours. Assuming that each candles burns at a constant rate, in how many hours after being lighted, the ratio between the first and second candles becomes 2:1?

 A.2 hour

B.2.5 hour

C.4-hour

 D.4.5-hour

 E. None of these

Answer & Explanation

Answer – D.4.5 hour

Explanation: Height of both candles are same i.e. h First one takes 6 hours to burn completely, so in one hour = h/3 Similarly second one will burn in one hour = h/2 Let after t time, ratio between their height is 2:1 so, remaining height of first candle = h – t*(h/3) similarly for second candle = h – t*(h/2) ratio given 2:1, h – t*(h/3) / h – t*(h/2) = 2/1 Solving we get t = 9/2 = 4.5

AVERAGE

Example 1: The average weight of 39 Students in a class is 23. Among them Sita is the heaviest while Tina is the lightest. If both of them are excluded from the class still the average remains same. The ratio of weight of Sita to Tina is 15:8. Then what is the weight of the Tina?

1. 15

2. 16

3. 18

4. 19

5. Cannot be determined

Answer & Explanation

Answer – 2. 16

Explanation: S+T = 23*(39-37) = 46 S/T = 15/8 T = 16

Example 2: The ages of Four members of a family are in the year 2010 are „X‟,‟X+12‟,‟X+24‟ and „X+36‟. After some years Oldest among them was dead then average reduced by 3. After how many years from his death, the average age will same as in 2010?

1. 2 Years

2. 3 Years

3. 4 years

4. 6 Years

5. Cannot be determined

Answer & Explanation

Answer – 2. 3 Years

Explanation: In 2010: 4x+72/4 = x+18 After death: 3x+36+3N/3 = x+18-3 N = 3 years 3x+36+3N/3 = (x+18) N = 6 years 6-3 = 3 years from his death

Example 3: The average of Four numbers is 24.5. of the four numbers, the first is 1.5 times the second, the second is 1/3 rd of the third, and the third is 2 times the fourth number. Then what is smallest of all those numbers?

1. 12

2. 13

3. 14

4. 15

 5. 16

Answer & Explanation

Answer – 3. 14

Explanation: First = 1.5x Second = x Third = 3x Fourth = 1.5x average = 24.5 = (1.5x+x+3x+1.5x)/4 x = 14

Example 4: There are 459 students in a hostel. If the number of students increased by 36, the expenses of the mess increased by Rs .81 Per day while the average expenditure per head reduced by 1. Find the original expenditure of the mess?

1. 7304

2. 7314

3. 7324

4. 7334

5. 7344

Answer & Explanation

Answer – 5. 7344

Explanation: Total expenditure = 459x 36 students joined then total expenditure = 459x+81 average = 459x+81/495 = x-1 x = 16 original expenditures = 16*459 = 7344

PROBLEM ON AGES

Example 1: A person 's present age is two-ninth of the age of his mother. After 10 years, he will be four-eleventh of the age of his mother. How old is the mother after 15 years?

A) 48yrs

B) 60yrs

C) 55yrs

D) 53yrs

E) None

View Answer Option B

Solution: Present ratio P:M ==>2:9 After 10years P:M=4:11 Then (2x+10)/(9x+10) = 4/11 22x+110=36x+40 X=5. Then Mother's present age=9*5=45yrs. After 15 yrsMother 's age is=60yrs.

Example 2: Ratio of the ages of A and B is 5: x. A is 18 years younger to C. After nine years C will be 47 years old. If the difference between the ages of A and B is same as the age of C, what is the value of x?

A) 13

B) 12

C) 14.5

D) 13.25

E) None

View Answer Option C

Solution: Given A: B=5:x –1 A = C – 18 —2 C + 9 = 47 =>C=47-9=38yrs. A – B = C —3 From 2 A=38-18=20yrs.

From 1 20/B=5/x==> B=4x from 3 4x-20=38 X=14.5.

Example 3: 16 years ago, my Uncle was 8 times older than me. After 8 years from today, my uncle will be thrice as old as I will be at that time. Eight years ago, what was the ratio of my age and my uncle's age?

A) 11:53

B) 13:45

C) 8:29

D) 5:32

E) None

View Answer Option A

Solution: Let 16 yrs ago the age of mine was=x $(x+24)/(8x+24)=1/3$ $X=48/5=9.6$ My present age is $9.6+16=25.6$ Present age of my Uncle $=8*9.6+16=92.8$

Required ratio = $(25.6-8)/(92.8-8) = 17.6/84.8 = 11:53$.

Example 4: The sum of present ages of A and B is 11 times the difference of their ages. 5 years hence, their total ages will be 13 times the difference of their ages. What is the present age of elder one?

A) 35yrs

B) 20yrs

C) 25yrs

D) 30yrs

E) None

View Answer Option D

Solution: $A+B=11(A-B)$ A: B=6:5

According to 2nd condition $6x+5x+10=13(6x-5x) = 5$ A's age $=6*5=30$.

PERCENTAGE

Example 1: Veena bought a watch costing Rs. 1404 including sales tax at 8%. She asked the shopkeeper to reduce the price of the watch so that she can save the amount equal to the tax. The reduction of the price of the watch is?

A. Rs.108

B. Rs.104

C. Rs.112

D. Rs.120

E. None of these

Answer & Explanation

Answer-B. Rs.104

Explanation: 1.08x = 1404 x = 1300 The reduction of the price of the watch = 104

Example 2: A Sales Executive gets a commission on total sales at 8%. If the sale is exceeded Rs. 10,000 he gets an additional commission as a bonus of 4% on the excess of sales over Rs. 10,000. If he gets the total commission of Rs.950, then the bonus he received is?

A. 40

B. 50

C. 36

D. 48

E. None of these

Answer & Explanation

Answer-B. 50

Explanation: Commission up to 10000 = 10000 * 8/100 = 800 Ratio = 2x:x ; Commission = 2x, Bonus = x ; Bonus = 950 – 800 * 1/3 = 150 * 1/3 = 50

Example 3: In a College there are 1800 students. Last day except 4% of the boys all the students were present in the college. Today except 5% of the girls all the students are present in the college, but in both the day's number of students present in the college, were same. The number of girls in the college is?

A. 1000

B. 400

C. 800

D. 600

E. 1200

Answer & Explanation

Answer -C. 800

Explanation: From Options; let Number of girls = 800 Number of boys = 1000 96% of 1000 + 800 = 95% of 800 + 1000[satisfies the condition; Check the condition with other options also]

Example 4: In a library 60% of the books are in Hindi, 60% of the remaining books are in English rest of the books are in Malayalam. If there are 4800 books in English, then the total number of books in Malayalam are?

 A. 3400

B. 3500

C. 3100

D. 3200

E. None of these

Answer & Explanation

Answer-D. 3200

Explanation: Let there are X books in the library. Hindi books = 60% of X = 60X /100 = 0.6X Remaining Books = X – 0.6X = 0.4X English books = 40% of reaming books = 60% of 0.4X = 0.24X. Malayalam Books = X-0.6X -0.24X = 0.16X Given, 0.24X = 4800 X = 4800/0.24 = 20000 Malayalam Books = 0.16X = 0.16*20000 = 3200

PROFIT & LOSS

Example 1: A Shopkeeper buys two bicycles for Rs. 750. He sells first bicycle at a profit of 22% and the second bicycle at a loss of 8%. What is the SP of first bicycle if in the whole transaction there is no profit no loss?

A) Rs506

B) Rs244

C) Rs185

D) Rs230

E) None

View Answer Option B

Solution: CP of 1st bicycle =x Then CP of 2nd bicycle is 750-x. Their SP be 122/100*x and 92/100*(750-x) Given that there is no profit no loss. 122/100*x + 92/100*(750-x) =750 122x +750*92 -92x=750*100 122x − 92x=750*100 − 750*92 30x = 750 * (100-92) X=200. SP of 1st bicycle =122/100 *200=Rs244.

Example 2 : The cost price of item B is Rs. 200/- more than the cost price of item A. Item A was sold at a profit of 20% and item B was sold at a loss of 30%. If the respective ratio of selling prices of items A and B is 6 : 7, what is the cost price of item B?

A) Rs520

B) Rs430

C) Rs400

D) Rs360

E) None

View Answer Option C

Solution: Let the CP of item A be x CP of item B is x+200. (120/100*x)/(x+200)*70/100 =6/7 120x/(x+200)*70=6/7 20x/10(x+200)=1 X=Rs200. CP of item B is 200+200 =Rs400.

Example 3: Two Mangoes, three grapes and four apples cost Rs. 15. Three Mangoes, two grapes and one apple cost Rs. 10. I bought 3 Mangoes, 3 grapes and 3 apples. How much did I pay?

A) Rs15

B) Rs18

C) Rs20

D) Rs25

E) None

View Answer Option A

Solution: Mango=X;. Grape = Y; Apple =Z ; 2X+3Y+4Z= 15— 1 3X+2Y+Z= 10— 2 Adding (1) and (2) 5X+5Y+5Z= 25 Clearly, X+ Y+Z = 5. So cost of 3 Mangoes, 3 grapes and 3 apples will be 3X+3Y+3Z i.e, 15

Example 4: A watch dealer incurs an expense of Rs. 150 for producing every watch. He also incurs an additional expenditure of Rs. 30,000, which is independent of the number of watches produced. If he is able to sell a watch during the season, he sells it for Rs. 250. If he fails to do so, he has to sell each watch for Rs. 100.If he produces 1500 watches, what is the number of watches that he must sell during the season in order to breakeven, given that he is able to sell all the watches produced? A) 580 B) 620 C) 650 D) 700 E) None

View Answer Option D

Solution: Total cost to produced 1500 watches = (1500 × 150 + 30000) = Rs. 2,55,000 Let he sells x watches during the season, therefore number of watches sold after the season = (1500 – x) 250 × x + (1500 – x) × 100 = 150x + 150000 Now, break-even is achieved if production cost is equal to the selling price. 150x + 150000 = 2,55,000 x = 700

SIMPLE & COMPOUND INTEREST

Example 1: Out of a sum of Rs 850, a part was lent at 6% SI and the other at 12% SI. If the interest on the first part after 2 years is equal to the interest on the second part after 4 years, then the second sum is

A) Rs350

B) Rs280

C) Rs170

D) Rs220

E) None

View Answer Option C Solution: Let the first part be x then second part be 850-x. (x*6*2)/100 = [(850-x)*12*4]/100 x= 850*4 -4x 5x=850*4 x=680 Then second part 850-680=Rs 170.

Example 2: A sum of Rs. 550 was taken as a loan. This is to be paid back in two equal installments. If the rate of interest be 20% compounded annually, then the value of each installment is:

A) Rs360

B) Rs280

C) Rs250

D) Rs320

E) None

View Answer Option A) Rs360 **Solution:** Let x = equal installment at the end of one year (rate% annually). Now 1st year, P =550, Interest = (550*20*1)/100 = 110. Now, at the beginning of 2nd year, P =550 + 110 – x Interest at the end of 2nd year, = [(660 – X) *20*1]/100 = 132 –x/5. Hence, total installment, 2x = 550 + 110 + 132 – x/5 2x + x/5= 792 x = 360.

Example 3: A certain sum of money amounts to Rs.1300 in 2 years and to Rs. 1525 in 3.5 years. Find the sum and the rate of interest.

A) Rs850, 10%

B) Rs900, 12%

C) Rs800, 13%

D) Rs1000,15%

E) None

View Answer Option D Solution: 1525-1300= 225 for 1.5 yrs (3.5-2) so for one yr 225/1.5= 150 then for 2 yrs interest is 150+150=300 Then principal 1300-300=1000. Now 150/1000*100= 15%

Example 4: The simple interest on a certain sum of money for 3 years at 8% per annum is half the compound interest on Rs. 4000 for 2 years at 10% per annum. The sum placed on simple interest is:

A) Rs1800

B) Rs1750

C) Rs2000

D) Rs1655

E) None

View Answer Option B Solution: CI =[4000 *(1 + 10/100)2 – 4000] =4000*11/10*11/10 – 4000 =Rs840. Then Sum in SI 420 (ie840/2)= (P*3*8)/100 =Rs1750.

Example 5: A Woman took a loan of Rs. 15,000 to purchase a mobile. She promised to make the payment after three years. The company charges CI at 20% per annum for the same. But, suddenly the company announces the rate of interest as 25% per annum for the last one year of the loan period. What extra amount she has to pay due to the announcement of new rate of interest?

A) Rs1230

B) Rs1135

C) Rs1080

D) Rs1100

E) None

View Answer Option C

Solution: 15,000 *(1+20/100)2 [(1+25/100) – (1+20/100)] 15,000*120/100*120/100 [125/100-120/100] 15000*144/100(5/100) 150*144*5/100=1080

PARTNERSHIP

Example 1: The investment of A is twice as that of B and thrice as that of C. B invested for twice the months than A and thrice the months than C. Who will earn the highest profit?

A) B

B) C

C) A

D) Both A and B

E) Both B and C

View Answer Option D Solution: Investment ratio 6:3:2 Month ratio 3:6:2 Then 6*3: 6*3: 2*2 18:18:4==>9:9:2 Both A and B gets equal and highest profits.

Example 2: A, B and C start a business and their investments are in the ratio 4: 3: 6. Both A and B starts the business and C joins them after 6 months. It was decided that C will get a monthly salary of Rs 600 from the annual profits. C's total salary came out to be 10% of the annual profit after a year. What is the share of B in the total profits?

A) Rs8500

B) Rs9720

C) Rs9650

D) Rs10100

E) None

View Answer Option B Solution: C's monthly salary Rs600. Then annual salary =600*6=3600(Because he works for 6 months only) Rs3600is 10% of total profit. Then total profit is Rs36000. Ratio of their shares 4*12: 3*12: 6*6 =4:3:3 Profit left after reducing salary of C = 36,000 − 3,600 = 32,400 B's share 3/10*32400=Rs9720.

Example 3: A, B and C started a business where their initial capital was in the ratio of 4:5:6. At the end of 8 months, A invested an amount such that his total capital became half to C's initial capital investment. If the annual profit of B is Rs. 7500 then what is the total profit?

A) Rs22000

B) Rs18000

C) Rs20000

D) Rs19500

E) None

View Answer Option A Solution: Initial Ratio 4:5:6 Now, 4*8 +3*4 :5*12 : 6*12 44:5*12 :6*12==>11:15:18. B's share is Rs7500 ie 15 7500 (11+15+18)44 ? ==>22000

Example 4: P start a business with Rs. 10000, Q joins him after 2 months with 20% more investment than P, after 2-month R joins him with 40% less than Q. If the profit earned by them at the end of the year is equal to the twice of the difference between investment of P and ten times the investment of R. Find the profit of Q?

A) Rs35500

B) Rs42000

C) Rs38000

D) Rs41100

E) None

View Answer Option C Solution: P: Q: R = (10000×12): (12000×10): (7200×8) = 25: 25: 12

Now the Profit = $2 \times (72000\text{-}10000)$ = 124000 Q's share 25/62*12400=Rs50000 Then profit of Q=50000-12000=Rs38000.

TIME & WORK

Example 1: A completes 40% of a task in 10 days and then takes the help of B and C. B is 50% as efficient as A is and C is 50% as efficient as B is. In how many more days will they complete the work?

A) 13 1/3

B) 8 4/7

C) 10 2/3

D) 9 E) None

View Answer Option B

Solution: A completes 40% of work in 10days. Given, A:B is 2:1 and B:C is 2:1 Now A:B:C=4:2:1 A's work 4*10(days)=40% Remaining 60%=60/(4+2+1)7=8 4/7 days.

Example 2: Ram and Ravi can do a job together in 8 days. Ram is 11/8 times as efficient as Ravi. The same job can be done by Ravi alone in

A) 21

B) 25

C) 19

D) 16

E) None

View Answer Option C

Solution: Ram: Ravi 11: 8(Efficiency) (11+8) = 19 8(both completed in 8days) Then Ravi 8? = (Efficiency and days are reciprocal)19*8/8=19days.

Example 3: The work done by a woman in 8 hours is equal to the work done by a man in 6 hours and by a boy in 12 hours. If working 6 hours per day 9 men can complete a work in 6 days then in how many days can 12 men, 12 women and 12 boys together finish the same work working 8 hours per day?

A) 3/2

B) 5/3

C) 3

D) 6

E) None

View Answer Option A

Solution: 8W=6M=12B Then 1M=2B, 1W=3/2B, 1W=3/4M Then 12 M+12W+12B=12M+9M+6M=27M Given 9men work 6hrs /day and complete in 6days 9*6*6/1=27*8*x/1 ==>x=3/2.

Example 4: M and N can do a piece of work in 30 days, while N and O can do the same work in 24 days and O and M in 20 days. They all work together for 10 days when N and O leave. How many days more will M take to finish the work?
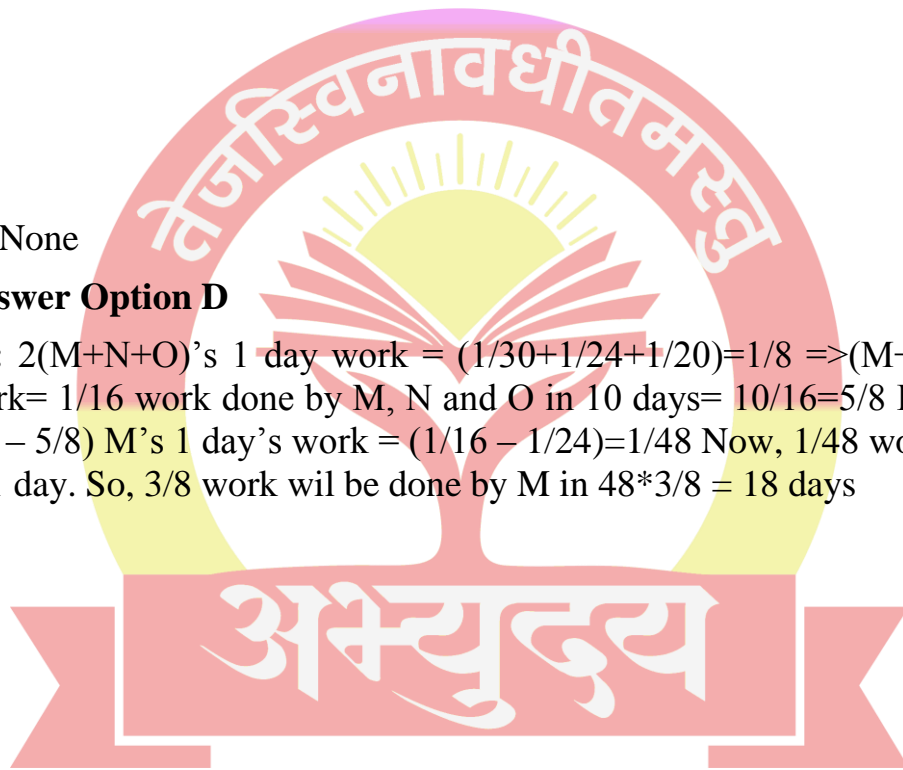
A) 35

B) 15

C) 22

D) 18 E) None

View Answer Option D

Solution: 2(M+N+O)'s 1 day work = (1/30+1/24+1/20)=1/8 =>(M+N+O)'s 1 day's work= 1/16 work done by M, N and O in 10 days= 10/16=5/8 Remaining work= (1 – 5/8) M's 1 day's work = (1/16 – 1/24)=1/48 Now, 1/48 work is done by M in 1 day. So, 3/8 work wil be done by M in 48*3/8 = 18 days

MENSURATION

Example 1: What will be the area of trapezium whose parallel sides are 22 cm and 16 cm long, and the distance between them is 11 cm?

A) 209 cm2

B) 282 cm2

C) 265 cm2

D) 179 cm2

E) 302 cm2

View Answer Option A

Solution: Area of a trapezium = 1/2 (sum of parallel sides) * (perpendicular distance between them) = 1/2 (22 + 16) * (11) = 209 cm2

Example 2: The perimeter of a rectangle is 42 m. If the area of the square formed on the diagonal of the rectangle as its side is 1 1/12 % more than the area of the rectangle, find the longer side of the rectangle.

A) 19 m

B) 16 m

C) 9 m

D) 5 m

E) 12 m

View Answer Option E

Solution: Let the sides of the rectangle be l and b respectively. From the given data,

$\sqrt{} (l2 + b2) = (1 + 1\ 1/12)$ lb

=> l2 + b2 = (1 + 13/12) lb = 25/12 * lb 12(l2 + b2) = 25 lb

Adding 24 lb on both sides 12 l2 + 12b2 + 24lb = 25 lb 12(l2 + b2 + 2lb) = 49 lb 12(l + b)2 = 49lb but 2(l + b) = 42 => l + b = 21 So 12(21)2 = 49lb Solve, we get lb = 108 Since l + b = 21, longer side = 12 m

Example 3: At the rate of Rs. 2 per sq m, cost of painting a rectangular floor is Rs 5760. If the length of the floor is 80% more than its breadth, then what is the length of the floor?

A) 25 m

B) 72 m

C) 67 m

D) 56 m

E) 46 m

View Answer Option B

Solution: Let the length and the breadth of the floor be l m and b m respectively. l = b + 80% of b = 1 + 0.8 b = 1.8b

Area of the floor = 5760/2 = 2880 sq m l*b = 2880 i.e., l * l/1.8 = 2880 l = 72

Example 4: A 7 m wide path is to be made around a circular garden having a diameter of 7 m. What will be the area of the path in square metre?

A) 298

B) 256

C) 308

D) 365

E) 387

View Answer Option C

Solution: Area of the path = Area of the outer circle – Area of the inner circle = $\pi\{7/2 + 7\}2 – \pi [7/2]2 = 308$ sq m

Example 5: What is the volume of a cylinder whose curved surface area is 1408 cm2 and height is 16 cm?

A) 7715 cm3

B) 9340 cm3

C) 8722 cm3

D) 7346 cm3

E) 9856 cm3

View Answer Option E

Solution: $2\pi rh = 1408$, h = 16 Solve both, so r = 14 Volume = $\pi r^2 h$ = (22/7) * 14 * 14 * 16 = 9856