



**NATIONAL TALENT SEARCH EXAMINATION  
(NTSE 2021) STAGE - 1**

**STATE : MADHYA PRADESH**

**PAPER: MAT**

**Date: 04/01/2021**

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Max. Marks : 100

**SOLUTIONS**

Time : 120 mins.

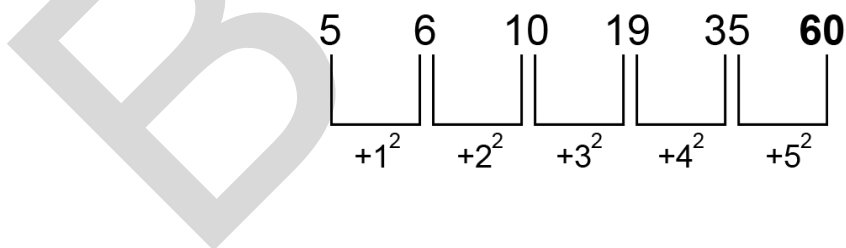
Direction : In question nos. 1 to 12 there is missing number shown by question mark (?). This term is one of the four alternatives given below the questions. Choose the correct alternative.

**Question 01. 5, 6, 10, 19, 35, ?**

- a. 55
- b. 60
- c. 51
- d. 71

Answer: (b)

Solution:



**Question 02. 6, 13, 29, 63, ?**

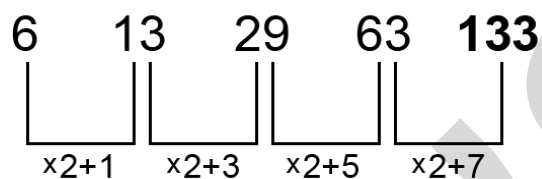
- a. 126
- b. 11
- c. 128



d. 133

Answer: (d)

Solution:

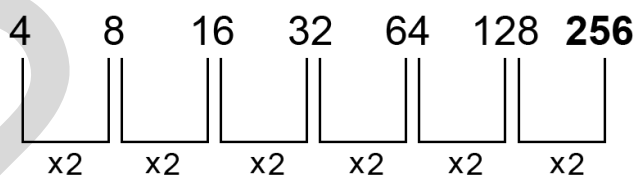


**Question 03. 4, 8, 16, 32, 64, 128, ?**

- a. 256
- b. 228
- c. 512
- d. 192

Answer: (a)

Solution:



**Question 04. 3, 5, 9, 17, 33, 65, ?**

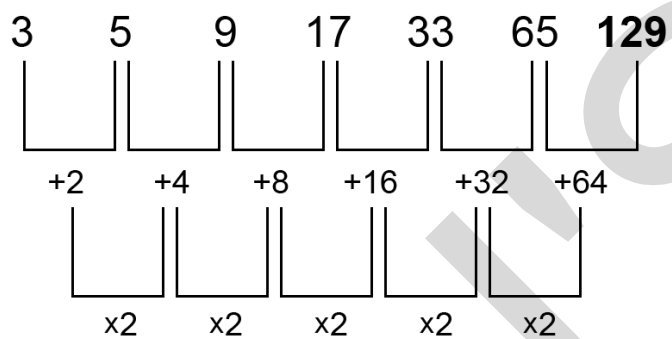
- a. 130
- b. 98
- c. 129



d. 132

Answer: (c)

Solution:

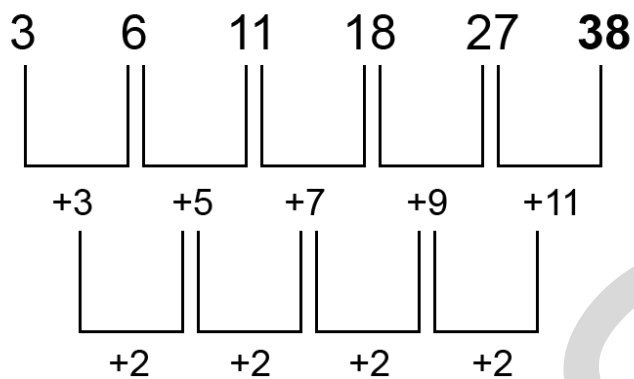


**Question 05. 3, 6, 11, 18, 27, ?**

- a. 48
- b. 38
- c. 36
- d. 56

Answer: (b)

Solution:

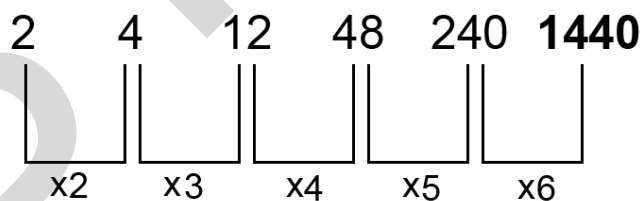


**Question 06. 2, 4, 12, 48, 240, ?**

- a. 1440
- b. 1200
- c. 480
- d. 960

Answer: (a)

Solution:



**Question 07. 15, 18, 111, 114, 117, ?**

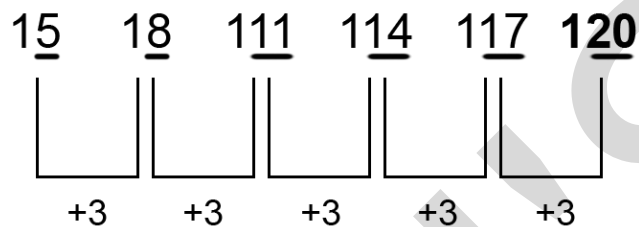
- a. 125
- b. 123
- c. 121



d. 120

Answer: (d)

Solution:



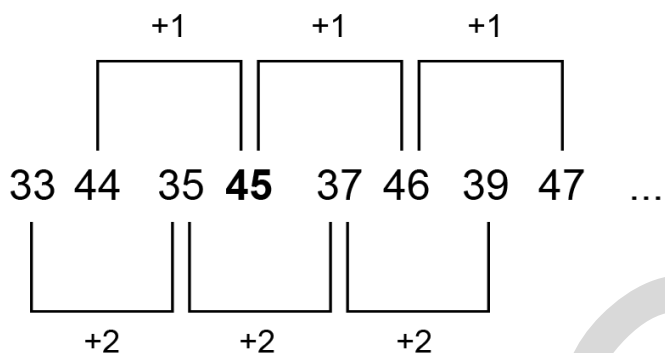
Note: The addition is performed only on the unit digit of the number and the tens digit gets pushed to the hundreds place.

**Question 08. 33, 44, 35, ?, 37, 46, 39, 47.....**

- a. 36
- b. 47
- c. 45
- d. 48

Answer: (c)

Solution:

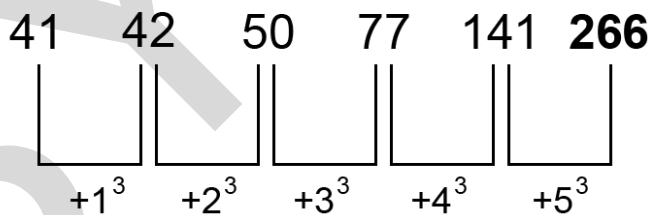


**Question 09. 41, 42, 50, 77, 141, ?**

- a. 248
- b. 266
- c. 423
- d. 218

Answer: (b)

Solution:



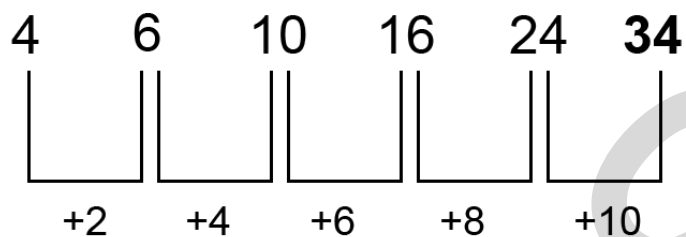
**Question 10. 4, 6, 10, 16, 24, ?**

- a. 30
- b. 40
- c. 36
- d. 34



Answer: (d)

Solution:

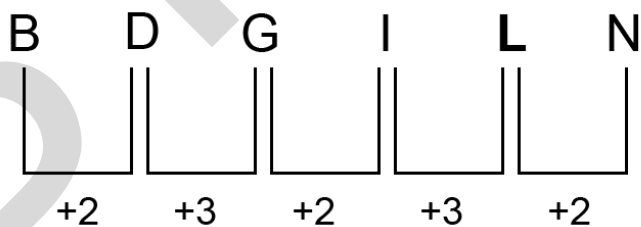


Question 11. B, D, G, I, ?, N.....

- a. L
- b. M
- c. K
- d. J

Answer: (a)

Solution:



Question 12. A, CD, GHI, ?, UVWXY

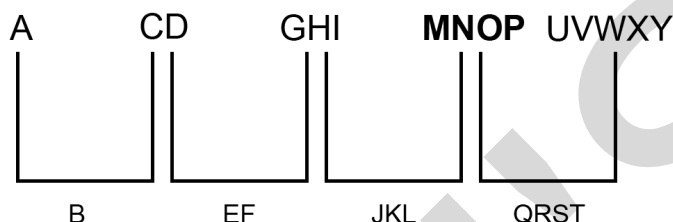
- a. NOPQ
- b. MNO
- c. MNOP



d. NOPQ

Answer: (c)

Solution:



**Directions:** In question nos. 13 to 22 there is a certain relationship between two given words on left side of :: symbol and one word is given on right hand side of :: and a question mark. Choose the correct alternative from options which shows the same relationship between these pairs of words as between the pair of words given on left hand side of :: symbol.

**Question 13. Film : Producer :: Book : ?**

- a. Director
- b. Publisher
- c. Editor
- d. Writer

Answer: (b)

Solution:

A film is produced by a producer. Similarly, a book is produced by a publisher.

**Question 14. Clock : Time :: Thermometer : ?**

- a. Heat
- b. Radiation





- c. Energy
- d. Temperature

Answer: (d)

Solution:

A clock tells us the time. Similarly, a thermometer tells us the temperature of an object.

**Question 15. Ink : Pen :: Blood : ?**

- a. Vein
- b. Donation
- c. Accident
- d. Doctor

Answer: (a)

Solution:

Pen contains ink. Similarly, the veins contain blood.

**Question 16. Ship : Captain :: Aeroplane : ?**

- a. Air-hostess
- b. Runway
- c. Pilot
- d. Airport

Answer: (c)

Solution:

A captain sails the ship. Similarly, a pilot flies the aeroplane.

**Question 17. Bat : Ball :: Badminton : ?**



- a. Ball
- b. Table
- c. Court
- d. Shuttle-cock

Answer: (d)

Solution:

Bat and ball belong to the same game. Similarly, badminton and shuttle-cock belong to the same game.

**Question 18. Mass : Kilogram :: Length : ?**

- a. Volt
- b. Kelvin
- c. Meter
- d. Ampere

Answer: (c)

Solution:

The S.I unit of mass is Kilogram. Similarly, the S.I unit of length is meter.

**Question 19. Country : President :: State : ?**

- a. Chief Minister
- b. Governor
- c. Primer Minister
- d. Mayor

Answer: (b)

Solution:



The Governor of the state has similar powers and functions at state level as those of the President of India.

**Question 20. Day : Night :: Positive : ?**

- a. Negative
- b. Sun
- c. Moon
- d. Number

Answer: (a)

Solution:

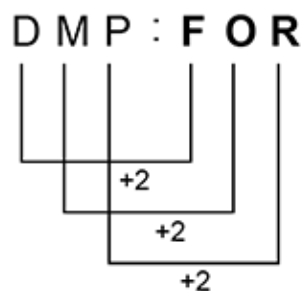
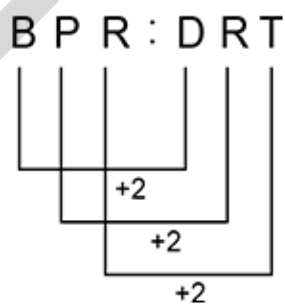
The antonym of day is night. Similarly, the antonym of positive is negative.

**Question 21. BPR : DRT :: DMP : ?**

- a. ENP
- b. EOP
- c. FOR
- d. FNQ

Answer: (c)

Solution:

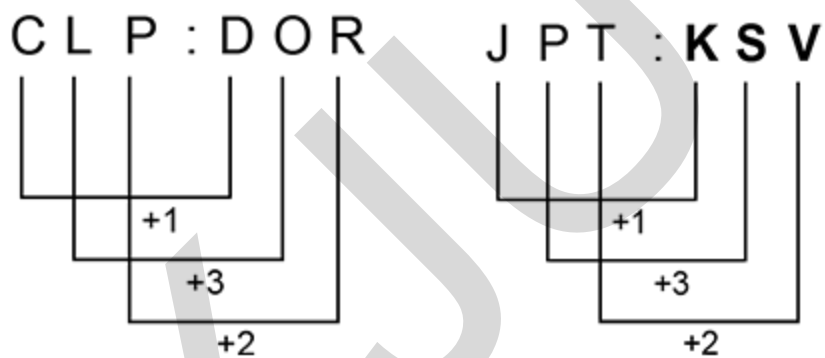


**Question 22. CLP : DOR :: JPT : ?**

- a. KQU
- b. IMS
- c. LQV
- d. KSV

Answer: (d)

Solution:



**Question 23. Bread is related to wheat in the same way as Brick is related to \_\_\_\_\_.**

- a. Fire
- b. Clay
- c. Cement
- d. Smoke

Answer: (b)

Solution:

Wheat is used to make the bread. Similarly, clay is used to make the brick.



**Question 24. Accident is related to carefulness in the same way as Disease is related to \_\_\_\_.**

- a. Treatment
- b. Medicine
- c. Absence of Sanitation
- d. Doctor

Answer: (c)

Solution:

Accidents occur when you are not careful. Similarly, absence of sanitation causes disease.

**Question 25. Choose the odd one out from following.**

- a. Sun
- b. Mars
- c. Earth
- d. Star

Answer: (d)

Solution:

Sun, Mars and Earth are a part of the solar system and are unique. There are many stars in the universe, so they are not unique.

**Question 26. Choose the odd one out from the following.**

- a. Tomato
- b. Mango
- c. Banana
- d. Apple



Answer: (c)

Solution:

All the options belong to the category of fruits. But, bananas do not contain any seeds whereas mango, apple, and tomato contain seeds.

**Question 27. Choose the odd one out from following.**

- a. Teacher
- b. Office
- c. Student
- d. Class

Answer: (b)

Solution:

The terms teacher, student, and class are related to school, but office is a general term.

**Question 28. Find the odd term.**

- a. 27
- b. 25
- c. 16
- d. 9

Answer: (a)

Solution:

Except for 27, the numbers 25, 16, and 9 are perfect squares.

**Question 29. Find the odd one out.**

- a. Solid
- b. Liquid



- c. Gas
- d. Water

Answer: (d)

Solution:

Solid, liquid, and gas are different states of matter but water is only an example of liquid.

**Question 30. Choose the odd one out.**

- a. Ear
- b. Eye
- c. Nose
- d. Throat

Answer: (d)

Solution:

Ear, eye, and nose are sensory organs but the throat is not.

**Question 31. In language, POPULAR is coded as ONOTKZQ which word would be coded as GBNPVT ?**

- a. FAMOSU
- b. FAMOUS
- c. FASOUM
- d. FOSAUM

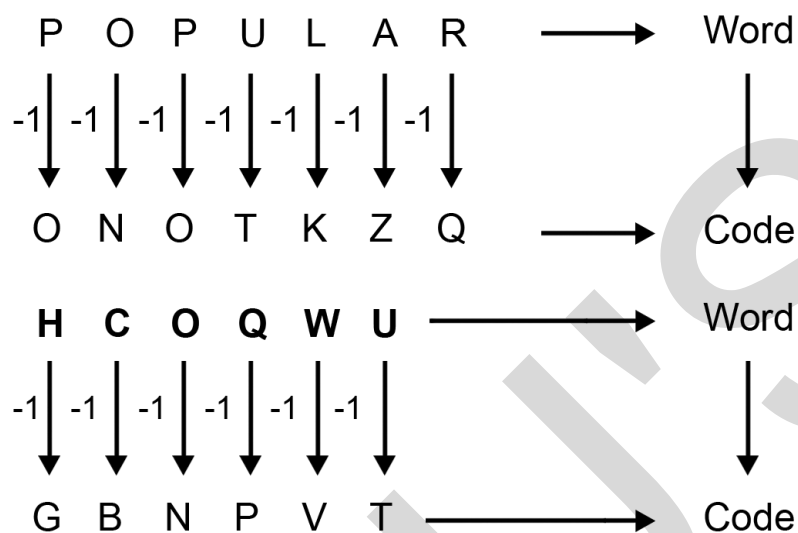
Answer: BONUS

Solution:

GBNPVT would be coded as FAMOUS.



But the question asks which word will be coded as GBNPVT. So according to the question statement, HCOQWU would be coded as GBNPVT.



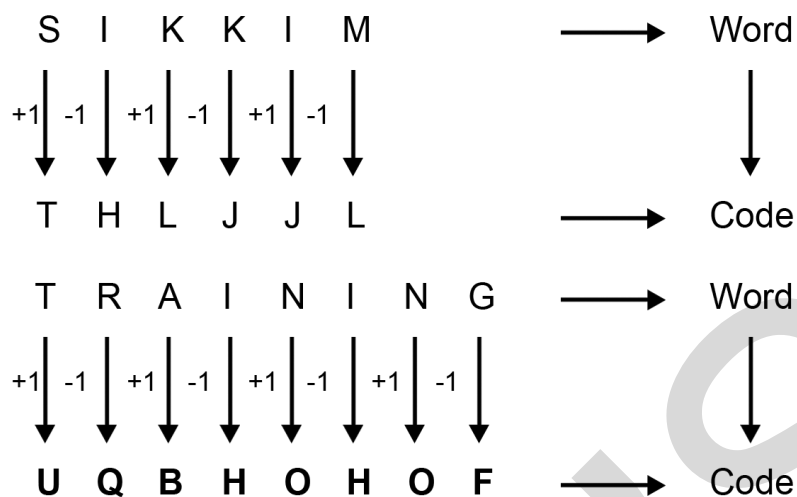
**Question 32.** In a certain code SIKKIM is written as THLJL, how is TRAINING written in that code ?

- a. SQBHOHOH
- b. UQBJOHHO
- c. UQBHOHOF
- d. UQBJOHOH

Answer: (c)

Solution:





**Question 33.** If  $Z = 52$ , and  $ACT = 48$ , then  $TAB$  will be equal to -

- a. 46
- b. 44
- c. 41
- d. 39

Answer: (a)

Solution:

$$Z = 2 \times 26 = 52$$

$$ACT = 2 \times (1+3+20) = 48$$

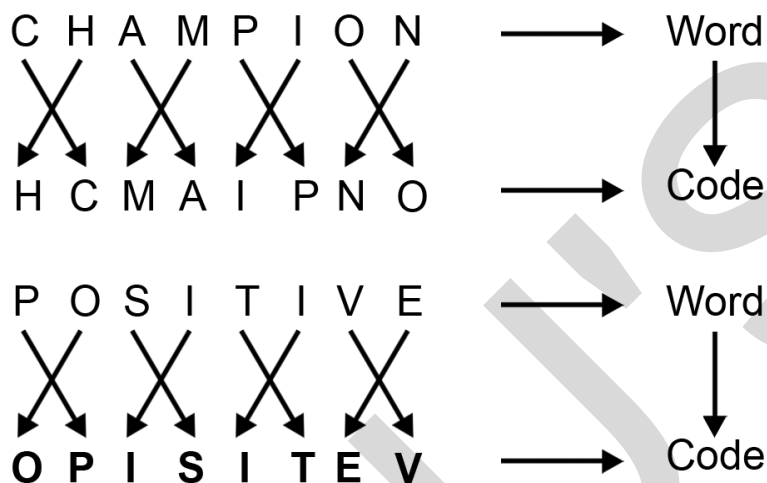
$$TAB = 2 \times (20+1+2) = 46$$

**Question 34.** In a certain language CHAMPION is coded as HCMAIPNO, how is POSITIVE coded in that language ?

- a. OPISITEV
- b. POISITEV
- c. OPSIITEV
- d. OPISTIVE

Answer: (a)

Solution:



**Question 35.** If air is called 'blue', 'blue' is called 'sky', 'sky' is called 'yellow', 'yellow' is called 'water' and 'water' is called 'pink'. Then what is the colour of 'clear sky'?

- Blue
- Yellow
- Pink
- Sky

Answer: (d)

Solution:

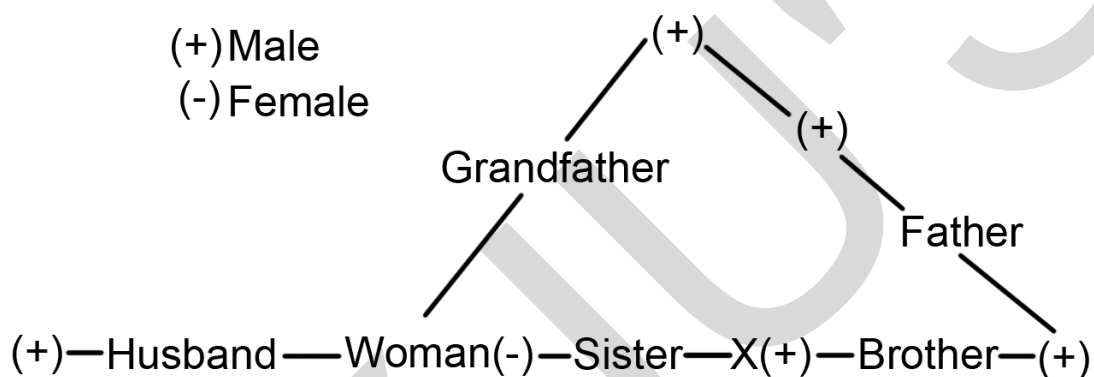
The colour of 'clear sky' is BLUE and in the question, BLUE is called SKY.

**Question 36.** Introducing a person to her husband, a woman said "his brother's father is the only son of my grandfather". How is the woman related to this person?

- a. Mother
- b. Sister
- c. Daughter
- d. Aunt

Answer: (b)

Solution: Let the person be X.



**Directions : (Question 37 and 38)**

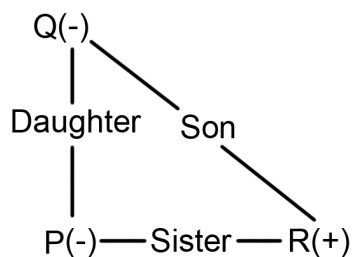
- (i)  $A + B$  means A is the son of B;
- (ii)  $A - B$  means A is the wife of B;
- (iii)  $A \times B$  means A is the brother of B;
- (iv)  $A \div B$  means A is the mother of B;
- (v)  $A = B$  means A is the sister of B;

**Question 37. What does  $P + R - Q$  means?**

- a. Q is the son of P



(+) Male  
 (-) Female



**Question 39.** Six students A, B, C, D, E and F are sitting in the field. A and B are from Gwalior, while the rest are from Bhopal. D and F are tall while others are short. A, C and D are girls while others are boys. Which is the tall girl from Bhopal?

- C
- D
- E
- F

Answer: (b)

Solution:

We can see from the table that D is the tall girl from Bhopal.

	Gwalior	Bhopal	Tall	Short	Girl	Boy
A	✓			✓	✓	
B	✓			✓		
C		✓		✓	✓	
D		✓	✓		✓	

E		✓		✓		✓
R		✓	✓			✓

**Question 40. Nitin ranks fifteen in a class of 39. What is his rank from the last ?**

- a. 23
- b. 24
- c. 25
- d. 26

Answer: (c)

Solution:

Since Nitin's rank is 15th from the front there are 14 students before him.  
So, Nitin's rank from the last will be =  $39 - 14 = 25^{\text{th}}$  rank

**Direction : Study the following number sequence and answer the Questions No.s from 41 to 43.**

5, 3, 1, 2, 2, 8, 7, 2, 4, 4, 6, 1, 3, 4, 3, 2, 2, 4, 7, 8, 6, 1, 5, 9

**Question 41. How many pairs of successive numbers have a difference of 2?**

- a. Five
- b. Six
- c. Seven
- d. Eight

Answer: (c)

Solution:

5, 3, 1, 2, 2, 8, 7, 2, 4, 4, 6, 1, 3, 4, 3, 2, 2, 4, 7, 8, 6, 1, 5, 9

If a unique successive difference was asked, it would have been 6 pairs.

**Question 42. Figures which have frequency equal to 2 are from following -**

- a. 1, 2, 3
- b. 2, 4, 7
- c. 4, 5, 6
- d. 5, 6, 8

Answer: (d)

Solution:

In the given sequence:

5, 3, 1, 2, 2, 8, 7, 2, 4, 4, 6, 1, 3, 4, 3, 2, 2, 4, 7, 8, 6, 1, 5, 9

Number	Frequency
1	3
2	5
3	3
4	4
5	2
6	2
7	2



8	2
9	1

**Question 43. How many numbers are in sequence which are written twice successively ?**

- a. Three
- b. Four
- c. Five
- d. Six

Answer: (a)

Solution:

5, 3, 1, 2, 2, 8, 7, 2, 4, 4, 6, 1, 3, 4, 3, 2, 2, 4, 7, 8, 6, 1, 5, 9

**Question 44. In the numbers from 100 to 1000, how many times digit 1 comes at the ten's place?**

- a. 9
- b. 10
- c. 90
- d. 900

Answer: (c)

Solution:

The numbers that have 1 in the tenths digit are:





$$110, 111, 112, \dots, 119 = 10$$

$$210, 211, 212, \dots, 219 = 10$$

$$310, 311, 312, \dots, 319 = 10$$

$$410, 411, 312, \dots, 419 = 10$$

$$510, 511, 512, \dots, 519 = 10$$

$$610, 611, 612, \dots, 619 = 10$$

$$710, 711, 712, \dots, 719 = 10$$

$$810, 811, 812, \dots, 819 = 10$$

$$910, 911, 912, \dots, 919 = 10$$

Total = 90

**Question 45. If the numbers from 5 to 75, which are exactly divisible by 5 are arranged in descending order, which number would come at the 12th place from the bottom ?**

- a. 45
- b. 50
- c. 55
- d. 60

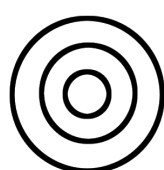
Answer: (d)

Solution:

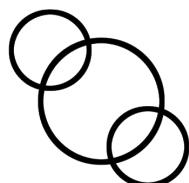
Since the numbers are arranged in descending order, the first term from the bottom is 5. Hence, the 12th number from the bottom will be  $12 \times 5 = 60$

**Direction :-** For Question Nos. 46 to 50. Each of the questions from 46 to 50 contains three elements. These elements may or may not have inter linkage. Each group of the elements fit into one of the diagram given in (P), (Q), (R) and (S).

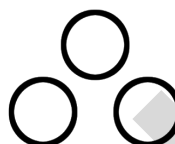
You have to indicate the group of elements which correctly fits into



(P)



(Q)



(R)



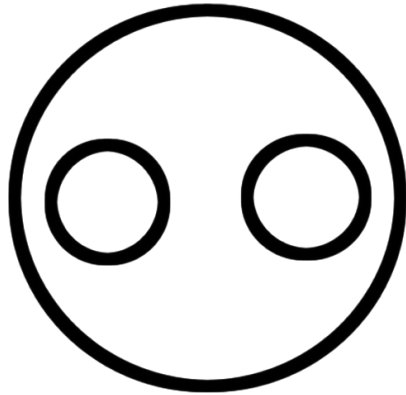
(S)

**Question 46. Fruit, Apple, Mango**

- a. P
- b. Q
- c. R
- d. S

Answer: (d)

Solution:



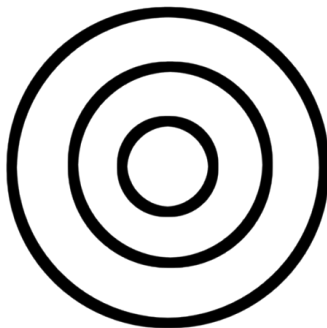
Apple and Mango are different fruits.

**Question 47. Carrot, Food, Vegetables**

- a. P
- b. Q
- c. R
- d. S

Answer: (a)

Solution:



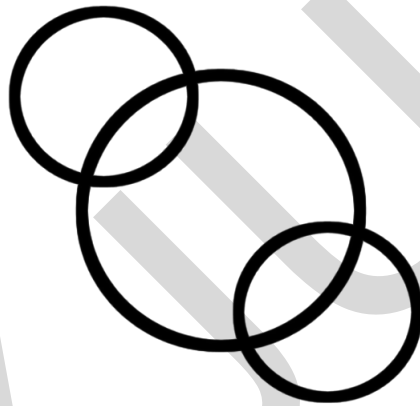
All carrots are vegetables and all vegetables are food.

**Question 48. Traveller, Train, Bus**

- a. P
- b. Q
- c. R
- d. S

Answer: (b)

Solution:



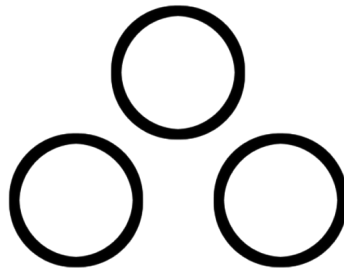
Travellers can travel in any of the two vehicles: train or bus.

**Question 49. Author, Lawyer, Singer**

- a. P
- b. Q
- c. R
- d. S

Answer: (c)

Solution:



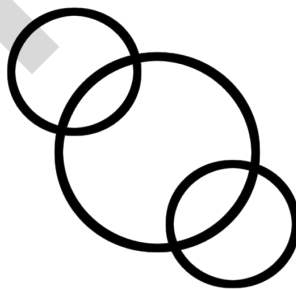
All three are different professions.

**Question 50. Truck, Ship, Goods**

- a. P
- b. Q
- c. R
- d. S

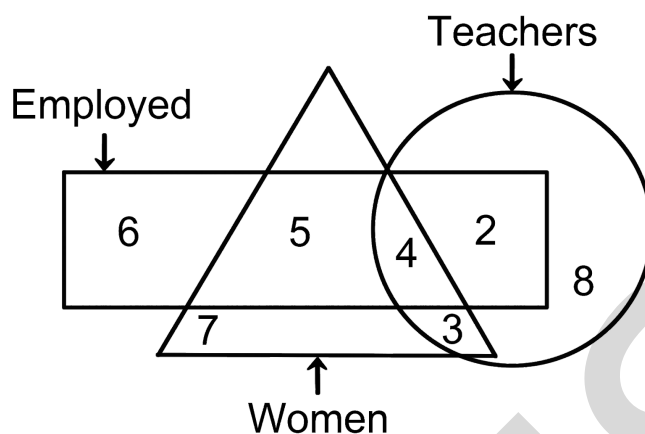
Answer: (b)

Solution:



Goods can be transported with the help of trucks and ships.

**Direction: Study the following figure and choose the correct options for questions from 51 to 53.**



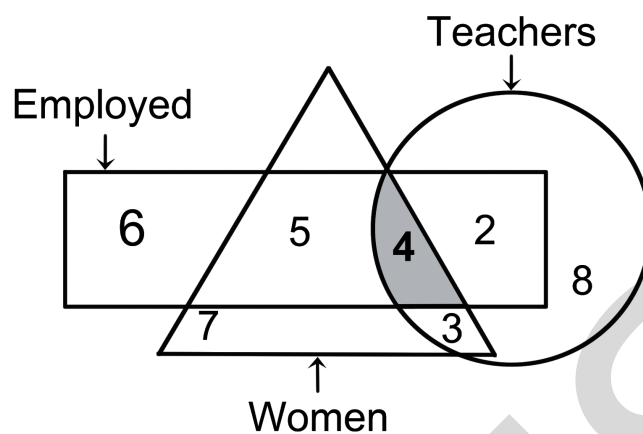
**Question 51. Number of women teachers who are employed?**

- a. 6
- b. 5
- c. 4
- d. 3

Answer: (c)

Solution:

To find the women teachers who are employed, we have to see the area which is common for all the three shapes.



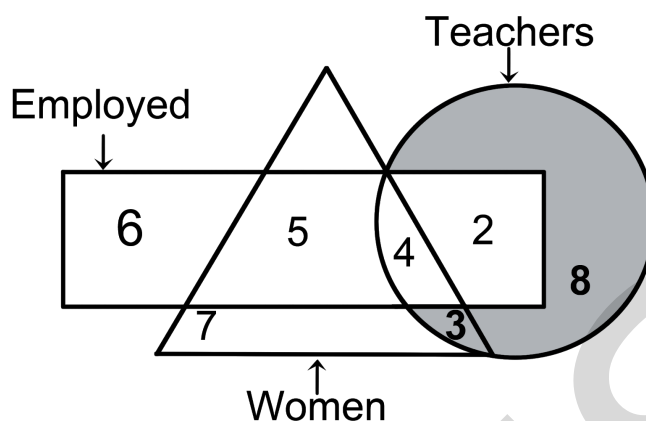
**Question 52. Number of teachers, who are not employed?**

- a. 8
- b. 7
- c. 6
- d. 5

Answer: BONUS

Solution:

Teachers not employed = Region of circle outside the rectangle =  $8 + 3 = 11$ .



None of the options is correct as 11 is not given in any option.

**Question 53. Number of women who are not teachers?**

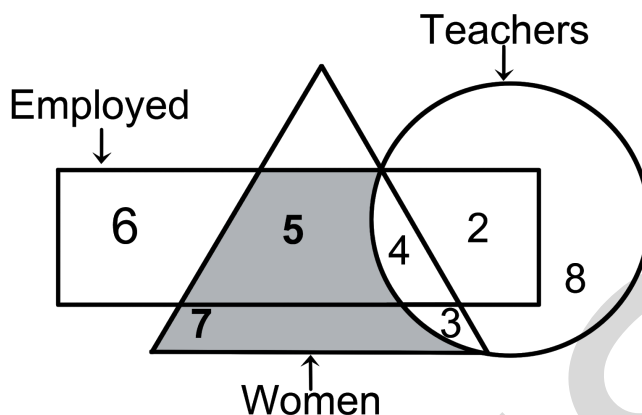
- a. 7
- b. 9
- c. 10
- d. 12

Answer: (d)

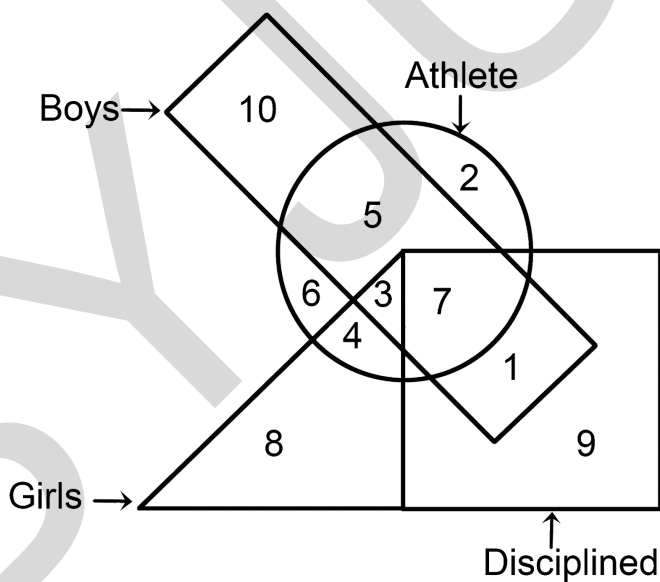
Solution:

Women who are not teachers = Region of triangle excluding the circle =  $7 + 5 = 12$ .





Direction:-Study the following diagram and choose the correct option for questions from 54 to 55.

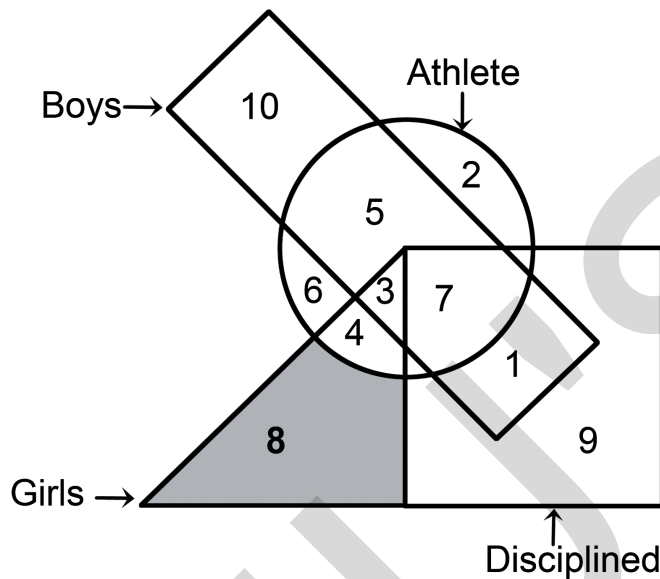


Question 54. Number of boys who are athletes and are disciplined?

- a. 1
- b. 7



Solution:



Number of girls who are not athletes = Region of triangle excluding the circle = 8

**Question 56.** A man is facing South-West and then he turns  $135^\circ$  in the anti-clockwise direction and then again he turns  $180^\circ$  clockwise. In which direction is he facing now?

- a. West
- b. East
- c. South
- d. North

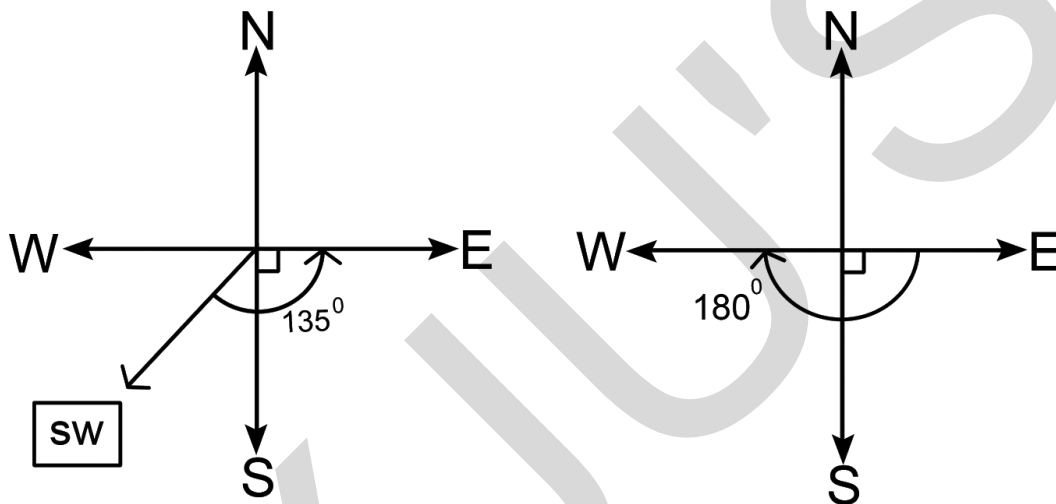
Answer: (a)

Solution:

South-West means halfway between South and West, i.e. at  $45^\circ$  from South and West.

On turning  $135^\circ$  anti-clockwise from S-W, the man will face East.

Now, on turning  $180^\circ$  clockwise from East, the man will be facing West.



**Question 57.** A girl goes 40 meters North, then turns right and walks 20 meters, then again she turns right and walks 20 meters and again she turns right and walks 20 meters. How many meters is she from her original position?

- a. 10 m
- b. 30 m
- c. 20 m
- d. 0 m

Answer: (c)

Solution:

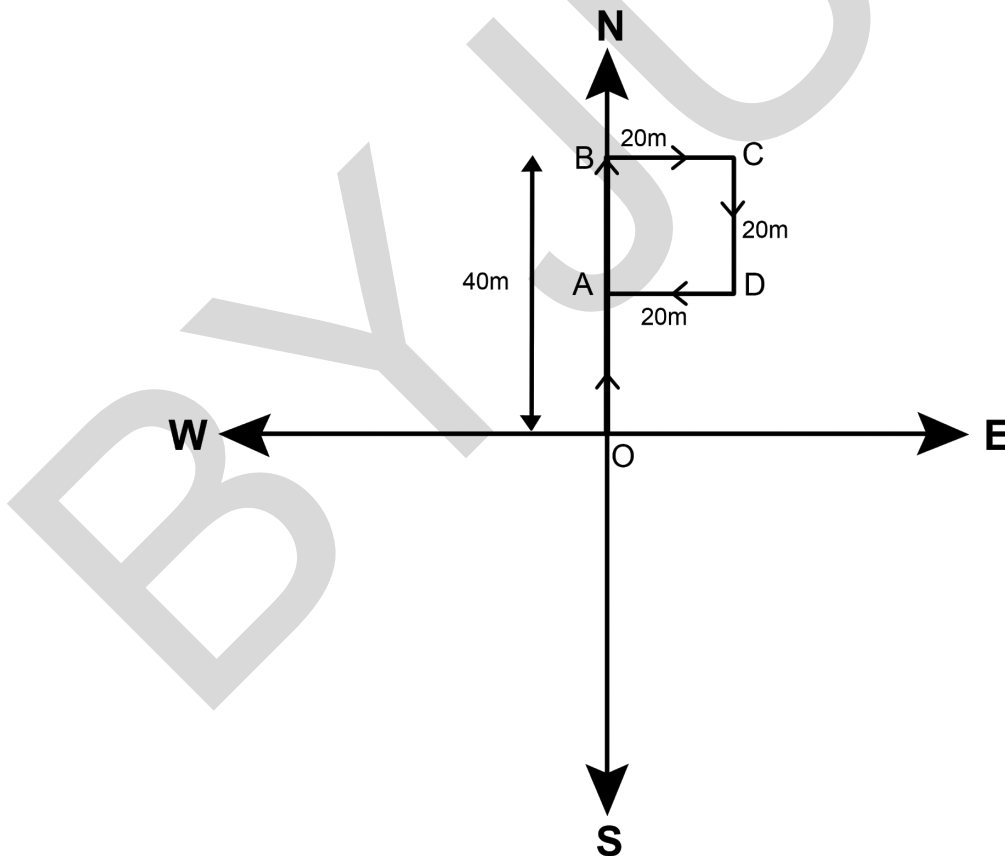
Starting from the centre O, 40 m North = OB

Turns right from B and walks 20 m = BC

Again turns right from C and walks 20 m = CD

At last, she turns right from D and walks 20 m = DA or AD

Distance between starting point (O) and end point (A) = OA = OB - AB = OB - CD = 40 - 20 = 20 m.



Question 58. If '+' means '÷', '÷' means '-', '-' means 'x' and 'x' means '+' then  
 $15 + 3 \div 2 - 5 \times 12 = ?$

- a. -43.5
- b. 18
- c. 11
- d. 7

Answer: (d)

Solution:

Given expression :  $15 + 3 \div 2 - 5 \times 12$

The expression becomes  $15 \div 3 - 2 \times 5 + 12$

$$= 5 - 2 \times 5 + 12$$

$$= 5 - 10 + 12$$

$$= 17 - 10$$

$$= 7$$

**Question 59.** If 'Q' means "add to", 'K' means "multiply by", 'S' means "subtract from" and 'L' means "divide by" then,  $20L2Q3K7S8 = ?$

- a. 3
- b. 23
- c. 22
- d. 39

Answer: (b)

Solution:



Given expression :  $20L2Q3K7S8$

The expression becomes  $20 \div 2 + 3 \times 7 - 8$

$$= 10 + 3 \times 7 - 8$$

$$= 10 + 21 - 8$$

$$= 31 - 8$$

$$= 23$$

**Question 60.** A father is now 2 times as old as his son. Five years back, he was 3 times as old as his son. The son's age is -

- a. 5
- b. 10
- c. 15
- d. 20

Answer: (b)

Solution:

Let the present age of son be  $x$ .

Then, Father's age =  $2x$

5 years ago, son's age =  $x - 5$  and Father's age =  $2x - 5$

Now,  $2x - 5 = 3(x - 5)$

$$2x - 5 = 3x - 15$$

$$x = 10$$

**Question 61.** Today is Rakesh's birthday. Two years from today he will be thrice as old as he was 10 years ago. How old is Rakesh today ?

- a. 14
- b. 15
- c. 16
- d. 25

Answer: (c)

Solution:

Let the present age of Rakesh be  $x$ .

According to the statement,  $3(x - 10) = x + 2$

$$3x - 30 = x + 2$$

$$2x = 32$$

$$x = 16$$

**Direction:** Find the missing number in each of the following questions from 62 to 66 and choose the correct options.

**Question 62.**

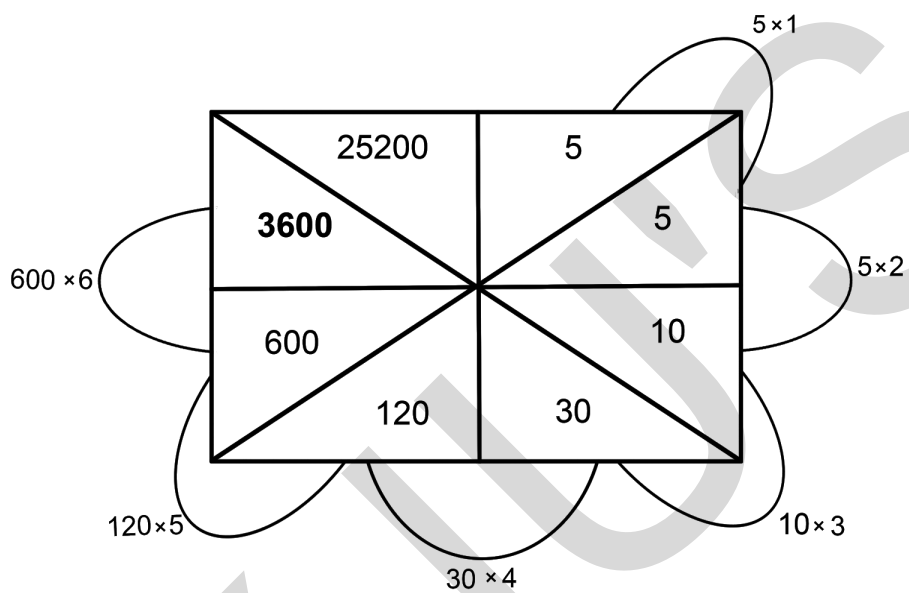
25200	5
?	5
600	10
120	30

- a. 2400
- b. 3000
- c. 4200
- d. 3600

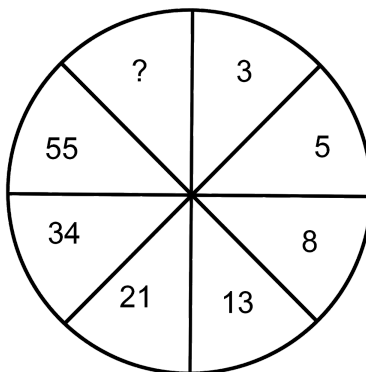


Answer: (d)

Solution:



Question 63.



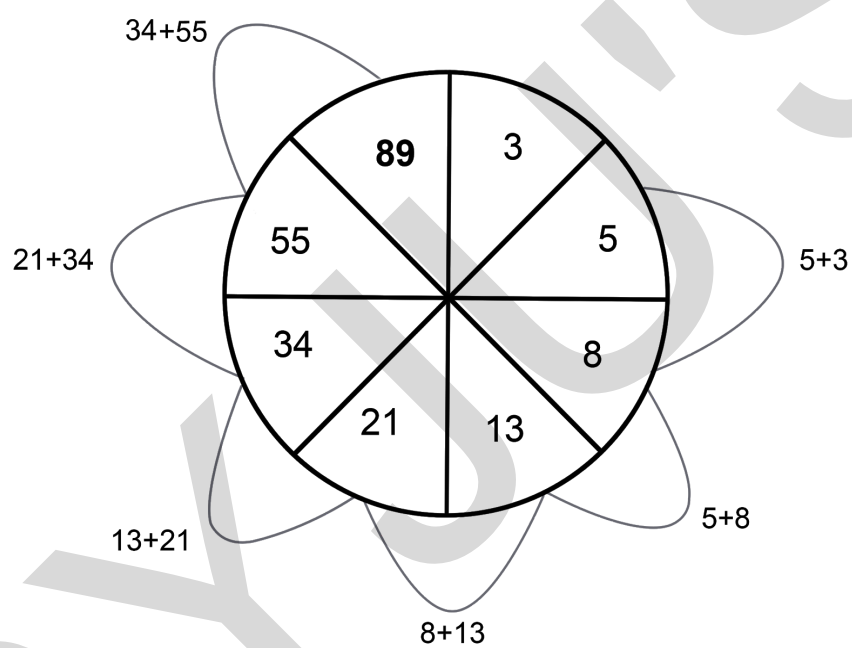
a. 89



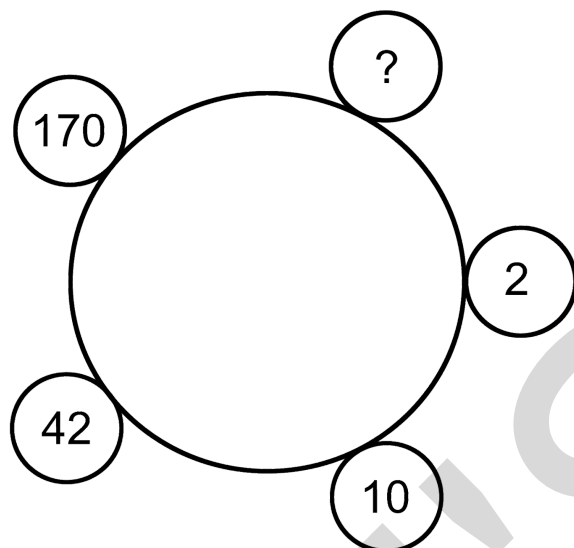
- b. 76
- c. 110
- d. 63

Answer: (a)

Solution:



Question 64.



- a. 680
- b. 682
- c. 512
- d. 580

Answer: (b)

Solution:

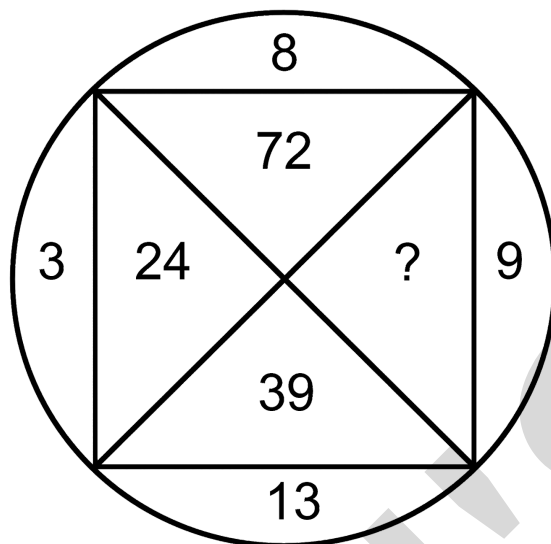
$$2 \times 4 + 2 = 10$$

$$10 \times 4 + 2 = 42$$

$$42 \times 4 + 2 = 170$$

$$170 \times 4 + 2 = \mathbf{682}$$

**Question 65.**



- a. 27
- b. 104
- c. 117
- d. 130

Answer: (c)

Solution:

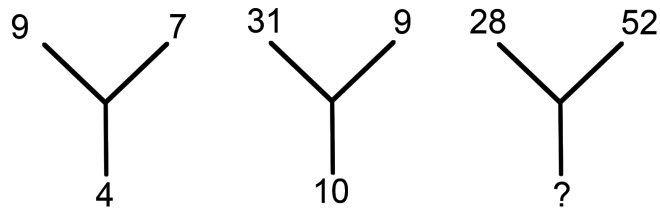
$$3 \times 8 = 24$$

$$8 \times 9 = 72$$

$$9 \times 13 = \mathbf{117}$$

$$13 \times 3 = 39$$

**Question 66.**



- a. 25
- b. 20
- c. 15
- d. 10

Answer:( b)

Solution:

$$(9+7)/4 = 4$$

$$(31+9)/4 = 10$$

$$(28+52)/4 = ? = \mathbf{20}$$

**Question 67. Calendar for 2016 will also serve for the year-**

- a. 2021
- b. 2020
- c. 2022
- d. 2023

Answer: BONUS

Solution:



2016 is a leap year, so the next same leap year will be after 28 (L.C.M of 7 and 4) years.

Therefore, the answer should be  $2016 + 28 = 2044$

None of the options is correct.

**Question 68. Number of times the hands of clock are in a straight line in 24 hours is-**

- a. 22
- b. 24
- c. 42
- d. 44

Answer: (d)

Solution:

In every 12 hours, the hands of a clock are in a straight line at:

(i)  $0^\circ$  (coincide)= 11 times

Between 11 and 1, they coincide only once, at 12 o'clock.

(ii)  $180^\circ$  (opposite direction)= 11 times

Between 5 and 7 they point in opposite directions at 6 'o' clock only.

So, in 24 hours, the hands of a clock are in a straight line (coincide or in opposite direction) 44 times (22+22).

**Question 69. Find the number which when added to itself 15 times gives 144.**

- a. 7



- b. 8
- c. 9
- d. 10

Answer: (c)

Solution:

Let the number be  $x$

Then,  $x + 15x = 144$

$$16x = 144$$

$$x = 9$$

**Question 70. A group of 420 persons consisting of coaches and players are there to participate in an event. For every 20 players there is a coach. Find the number of coaches in the group.**

- a. 20
- b. 19
- c. 18
- d. 17

Answer: (a)

Solution:

Total number of people = 420

There is one coach for 20 players.

20 players + 1 coach = 21 people in 1 group.



$420/21 = 20$  groups

20 groups will have 20 coaches.

**Direction: From Question Nos. 71 to 75. Arrange the words given in each question in a meaningful sequence and choose the correct options.**

**Question 71.**

**(1) Word (2) Paragraph (3) Sentence (4) Letters (5) Phrase**

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

Answer: (b)

Solution:

Letters are combined to form a word. Words are combined to form phrases.

Phrases are combined to get sentences. And sentences are combined to make a paragraph.

So the sequence is: Letters, Word, Phrase, Sentence, Paragraph, i.e. 4, 1, 5, 3, 2.

**Question 72.**

**(1) Police (2) Punishment (3) Crime (4) Judge (5) Judgement**

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





d. (1),(3),(5),(4),(2)

Answer: (c)

Solution:

To punish someone, they should have first committed the crime. Then, the police catch them and take them to judge. The judge gives the judgement and gives the punishment.

So the sequence is: Crime, Police, Judge, Judgement, Punishment, i.e. 3, 1, 4, 5, 2.

**Question 73.**

**(1) Poverty (2) Population (3) Death (4) Unemployment (5) Disease**

a. (2),(1),(4),(3),(5)

b. (1),(2),(4),(5),(3)

c. (2),(4),(5),(1),(3)

d. (2),(4),(1),(5),(3)

Answer: (d)

Solution:

Due to rising population, unemployment is increasing. Due to unemployment, poverty increases. Due to poverty there are more chances of getting disease which ultimately leads to death in absence of proper medical care.

So the sequence is: Population, Unemployment, Poverty, Disease, Death, i.e. 2, 4, 1, 5, 3.



**Question 74. (1) Leaf (2) Fruit (3) Stem (4) Root (5) Flower**

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

Answer: (b)

Solution:

We are listing the parts of the plant based on which grows first. After planting a seed, first the root starts to grow downwards. Then, we get a stem and then from the stem, we get the leaves. After that, the flowers bloom and turn into a fruit.

So the sequence is: Root, Stem, Leaf, Flower, Fruit, i.e. 4, 3, 1, 5, 2.

**Question 75.**

**(1) Nation (2) Village (3) City (4) District (5) State**

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

Answer: (a)

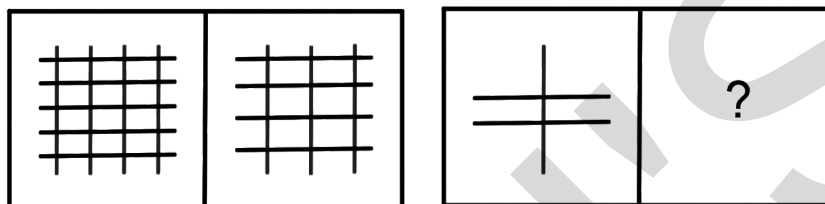
Solution:

Villages combine to form a city. Some cities together may come under the same district. Districts combine to form a state and states combine to form a nation.

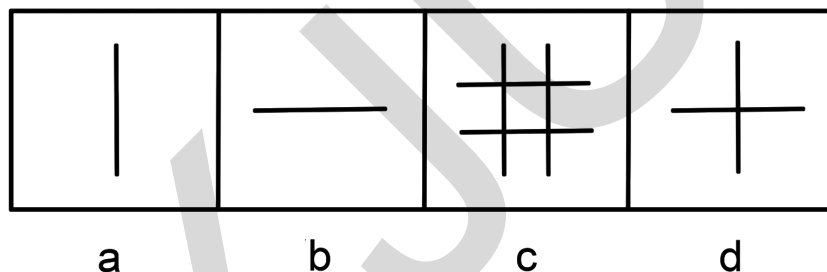
So the sequence is: Village, City, District, State, Nation, i.e. 2, 3, 4, 5, 1.

**Direction :** From question Nos. 76 to 80, study and analyse the figures and identify the rule which they follow. Choose the correct option for ? place.

**Question 76. Question figure**



**Answer figures**

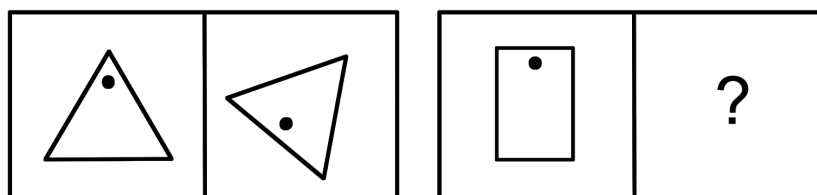


Answer: (b)

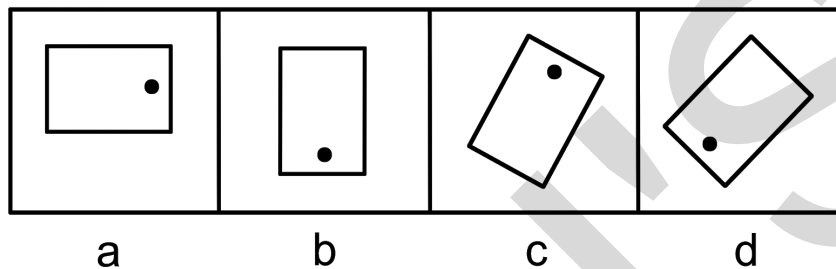
Solution:

From figure I to II, one horizontal and one vertical line segment is removed. Similarly, from figure III to IV also, one horizontal and one vertical line segment will be removed. So, the answer is (b).

**Question 77. Question figure**



Answer figures

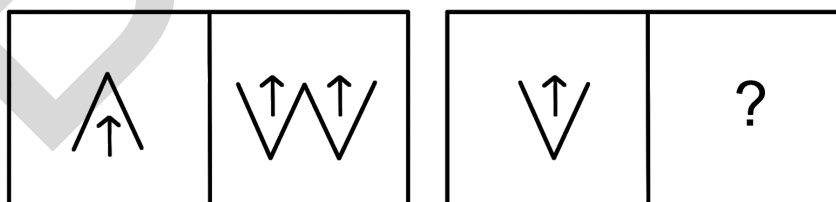


Answer: (d)

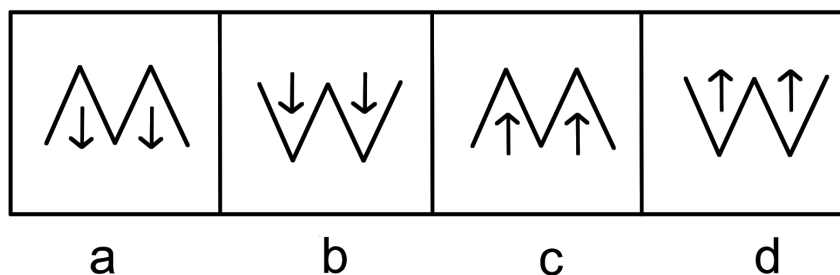
Solution:

From figure I to II, it is rotated clockwise by  $45^\circ$  and the dot is shifted to the opposite side. Similarly, from III to IV, rotate it clockwise by  $45^\circ$  and shift the dot to the opposite side. So it is option (d).

Question 78. Question figure



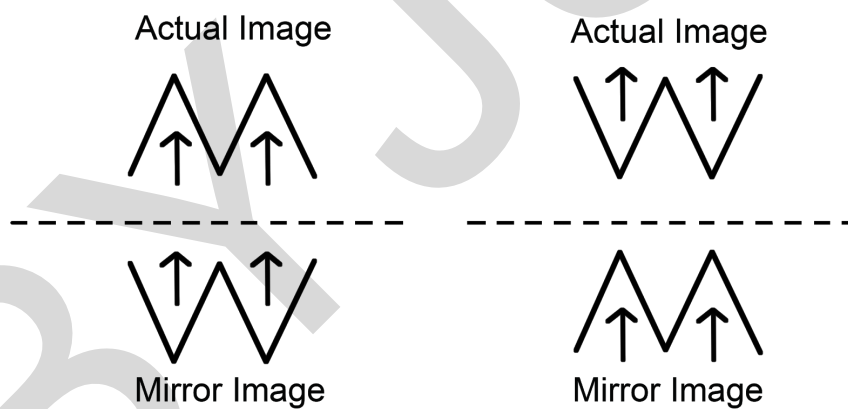
Answer figures



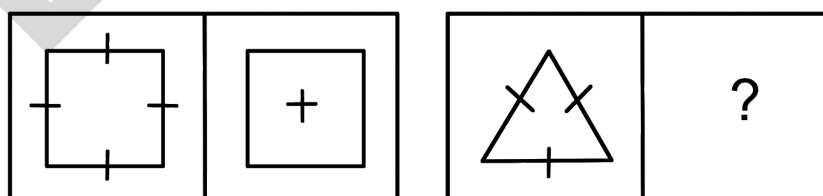
Answer: (c)

Solution:

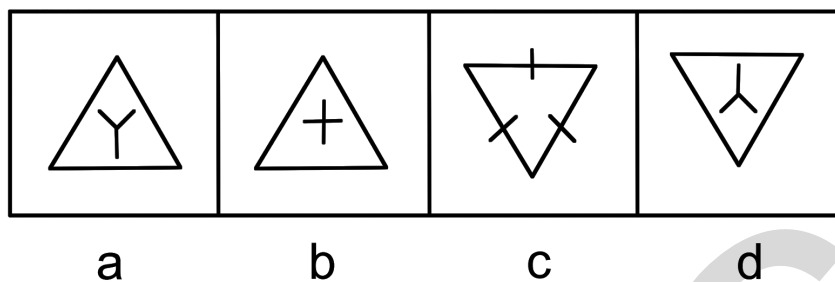
Water image of  $\wedge$  when combined two times and double of  $\uparrow$  in figure I forms figure II. Similarly we have for III and IV. So, it is option (c).



Question 79. Question figure



Answer figures

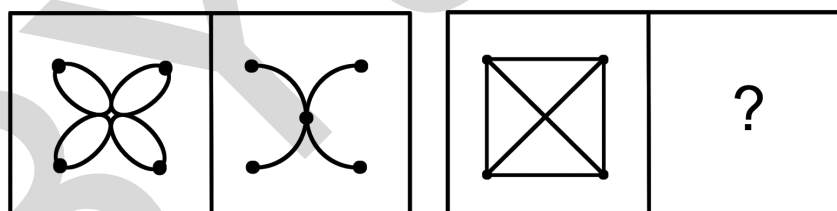


Answer: (a)

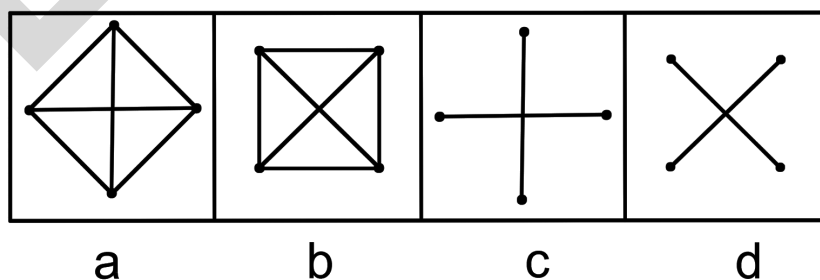
Solution:

The line segment cutting the sides of figure I comes and joins at the centre of figure II. Similarly, the line segment cutting the sides of figure III will come and join at the centre of figure IV.

**Question 80. Question figure**



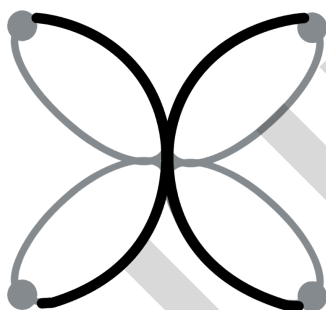
**Answer figures**



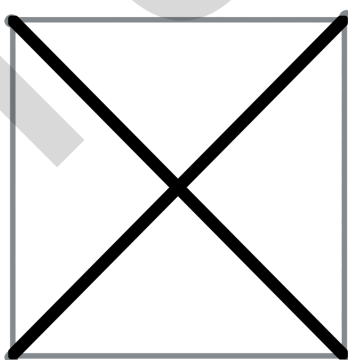
Answer: (d)

Solution:

Second figure is part of the first figure.

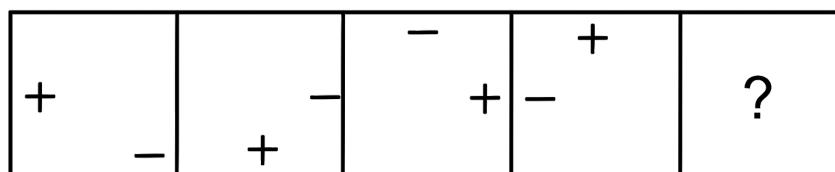


Similarly,

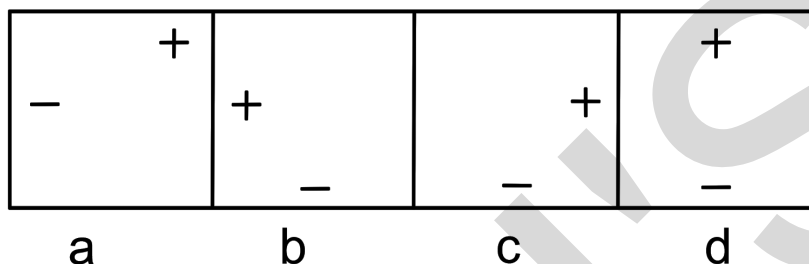


**Direction :** In question Nos. 81 to 90, Problem figures have a sequence. Find the rule and select the appropriate figure from Answer figures for ? place.

**Question 81. Problem Figures**



Answer figures

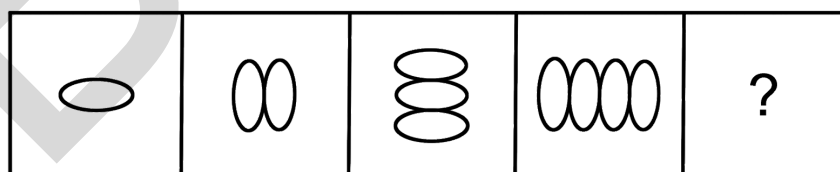


Answer: (b)

Solution:

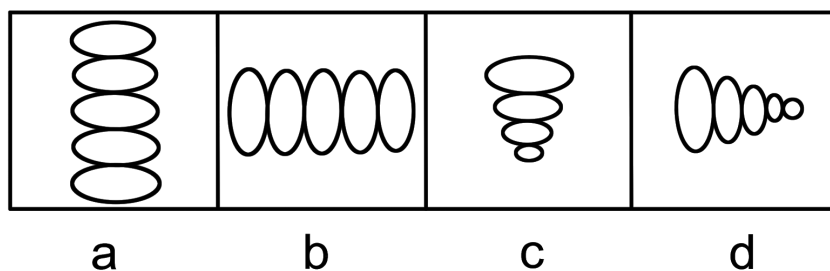
Both the symbols '+' and '-' are moving in an anticlockwise direction from the mid of one side to the mid of adjacent side.

Question 82. Problem Figures



Answer figures



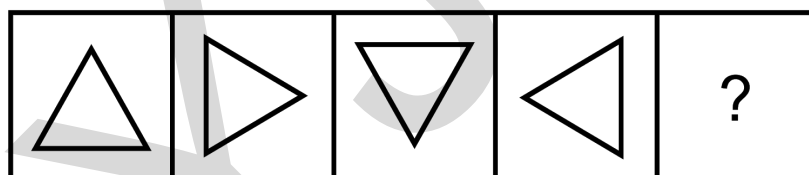


Answer: (a)

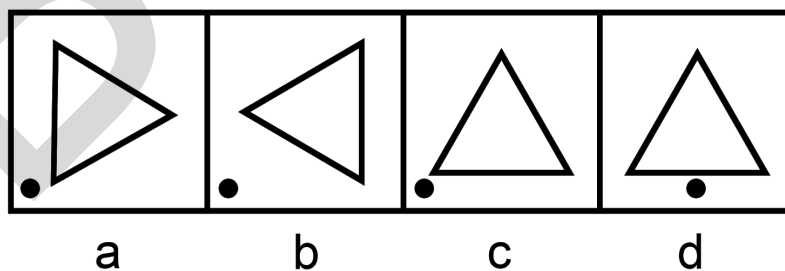
Solution:

On going from left to right, the number of figures increases by 1 and rotates by  $90^\circ$  every time.

**Question 83. Problem Figures**



Answer figures

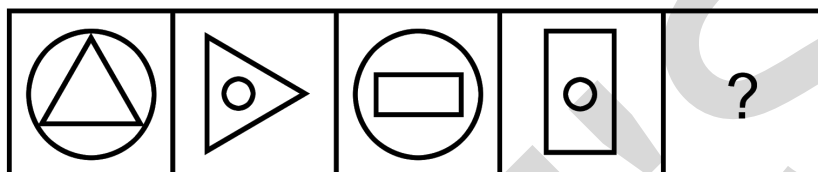


Answer: BONUS

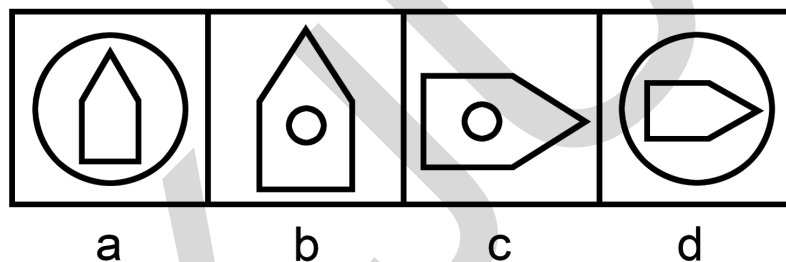
Solution:

Triangle rotates by  $90^\circ$  clockwise every time but the dot is not part of the question figures. So its position is not clear and none of the options is correct.

**Question 84. Problem Figures**



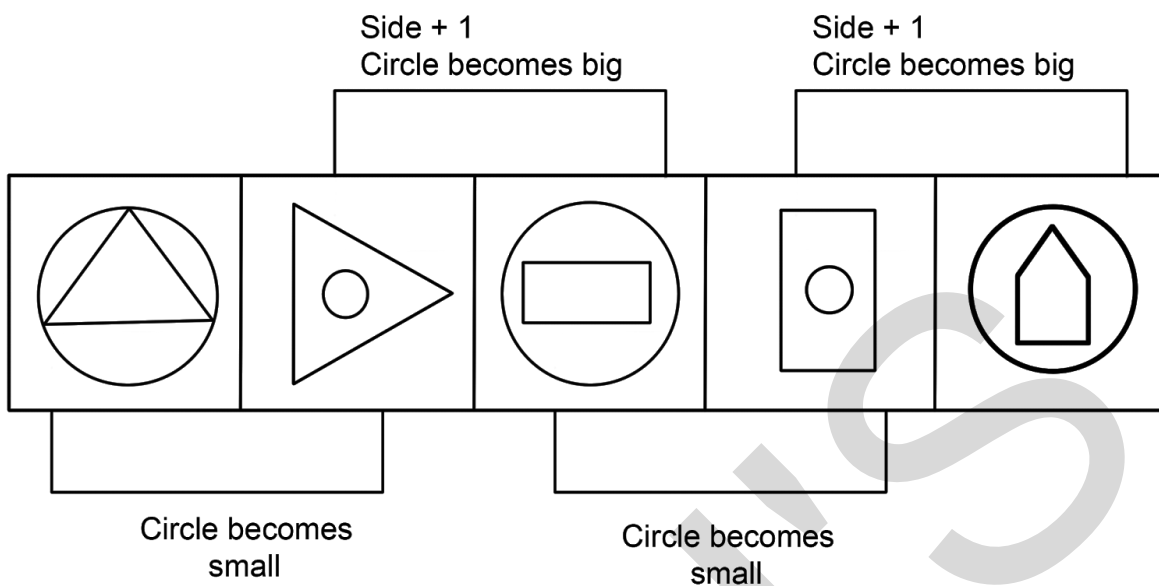
**Answer figure**



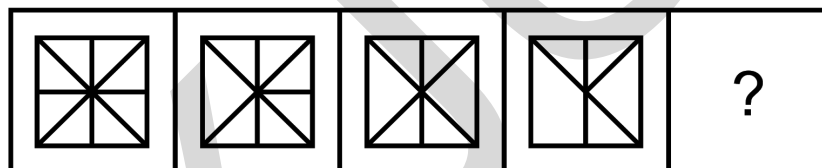
Answer: (a)

Solution:

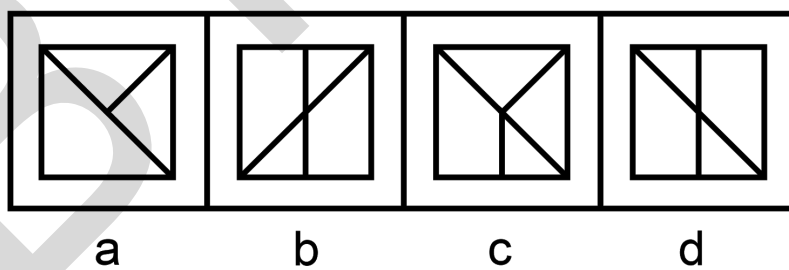
On going from left to right, the circle is changing alternatively big and small and the number of sides in the polygon increases by 1 in every two times.



**Question 85. Problem Figures**



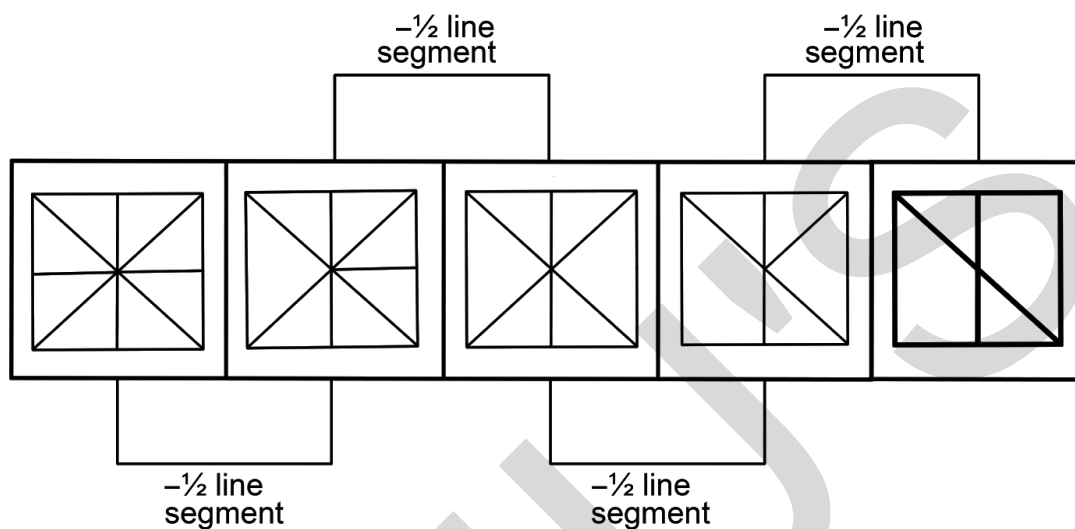
**Answer figures**



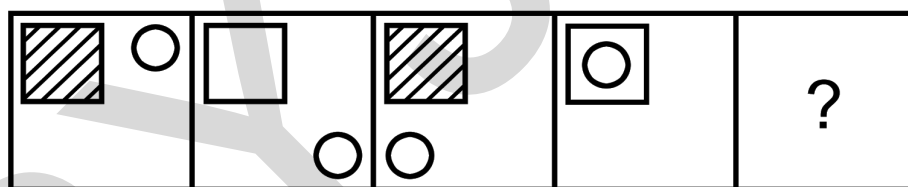
Answer: (d)

Solution:

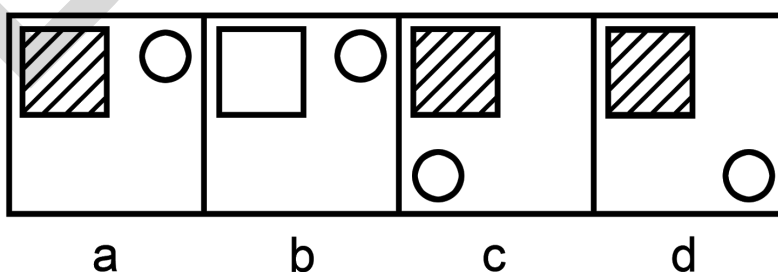
On going from figure I to II, half line segment is removed. From II to III, the half line segment opposite to the previously removed half line segment gets removed. Figure IV to V will follow the same pattern as from figure II to III.



**Question 86. Problem Figures**



**Answer figures**

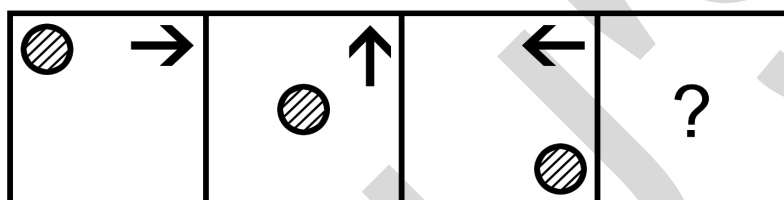


Answer: (a)

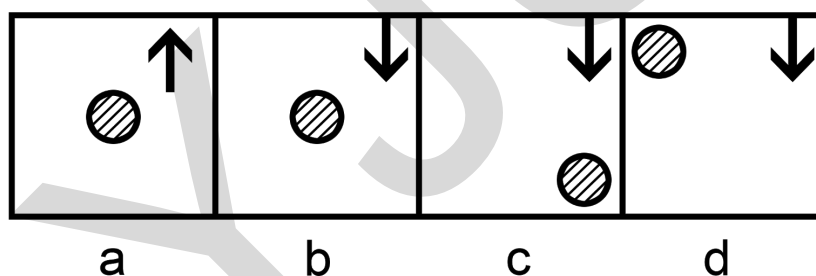
Solution:

Circle moves clockwise at the corners, and the square alternately becomes shaded and unshaded.

**Question 87. Problem Figures**



**Answer figures**

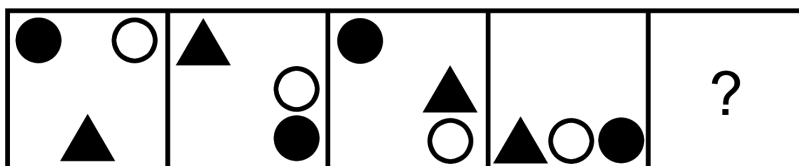


Answer: (b)

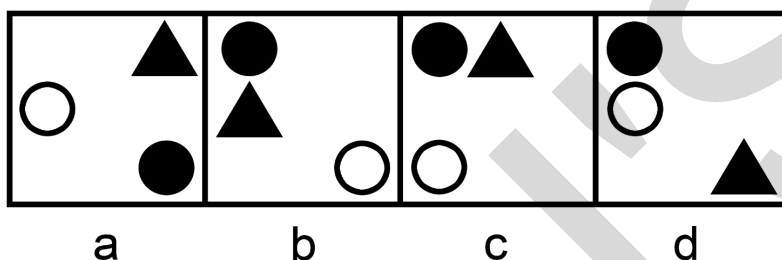
Solution:

By observation it can be determined that on going from left to right, the arrow is rotating anticlockwise by 90 degrees and the shaded circle is moving halfway through the diagonal. So it is option (b).

**Question 88. Problem Figures**



**Answer figures**



Answer: (c)

Solution:

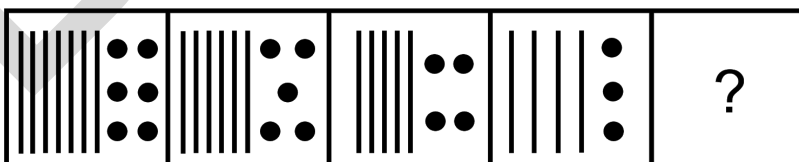
By observation it can be determined that on moving from left to right,

● moves anticlockwise for two sides

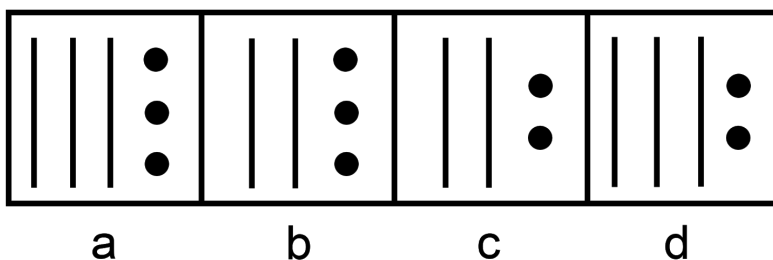
○ moves clockwise for half a side

▲ moves clockwise for one and a half side

**Question 89. Problem Figures**



**Answer figures**

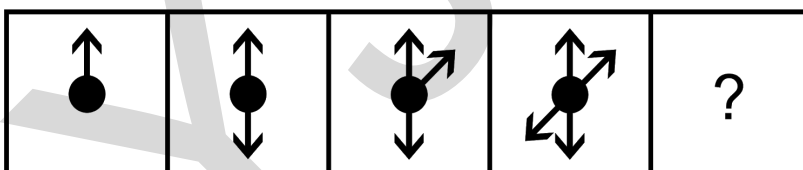


Answer: (d)

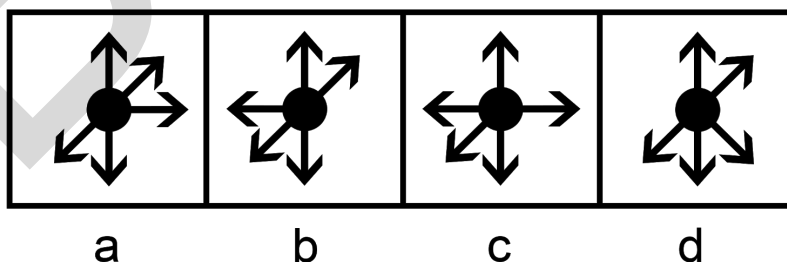
Solution:

On going from left to right, both the number of line segments and number of dots decreases by 1.

**Question 90. Problem Figures**



Answer figures



Answer: (a)

Solution:

From figure I to II, ↓ is added opposite to ↑.

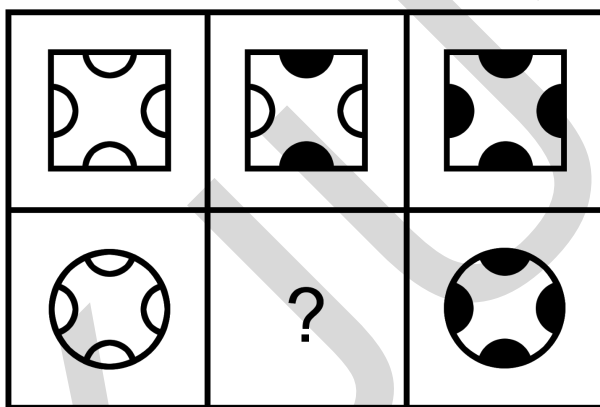
From figure II to III, ↑ is added at 45° clockwise.

From figure III to IV, ↓ is added opposite to ↑ added in the above step.

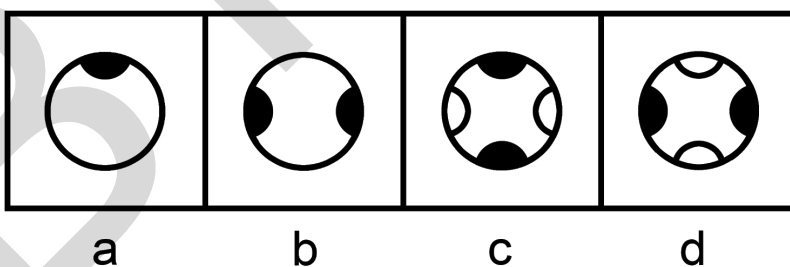
So, from figure IV to V → is added at 45° clockwise.

**Direction :** From question Nos. 91 to 95, complete the figures by choosing appropriate figure from answer figures

**Question 91.**



**Answer figures**



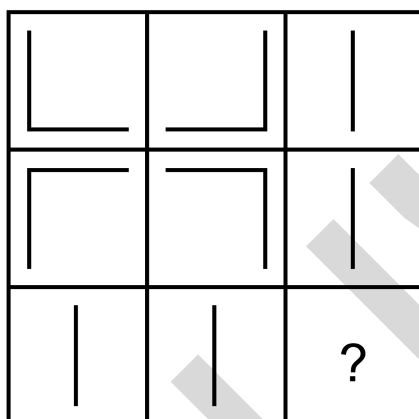
Answer: (c)

Solution:

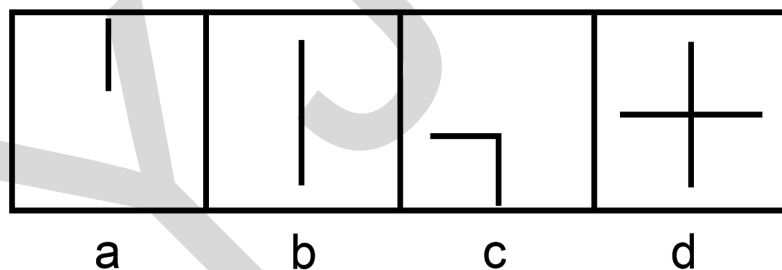


By observation it can be determined that in row 1, on going from first to second figure, upper and lower semicircles darken. Similarly, in row 2 for the second figure, the upper and lower semicircle will darken. So it is option (c).

**Question 92.**



**Answer figures**

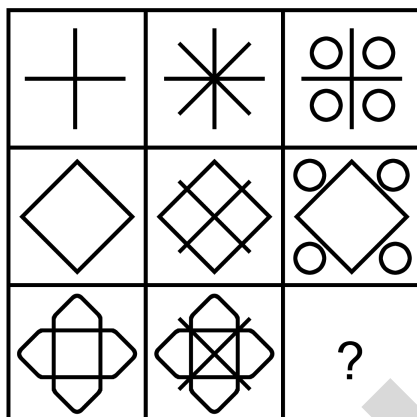


Answer: (b)

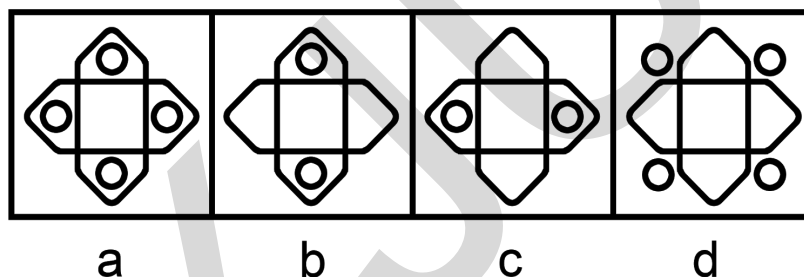
Solution:

Figure in column III is a part of figures in columns I and II.

**Question 93.**



Answer figures

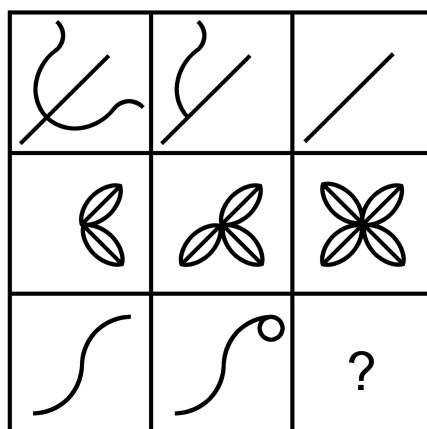


Answer: (d)

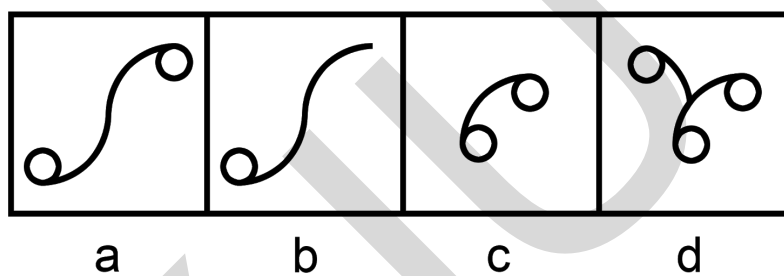
Solution:

By observation it can be determined that in a particular row, the base of all the three figures is the same as figure one. Also, on going from second figure to third figure, the cross over the base figure gets replaced by four small exterior circles. So it is option (d).

Question 94.



Answer figures

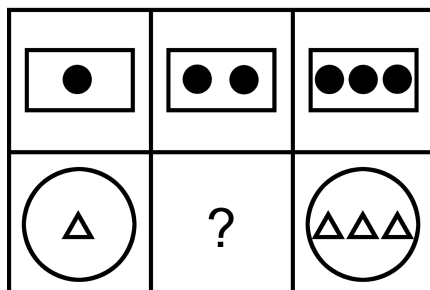


Answer: (a)

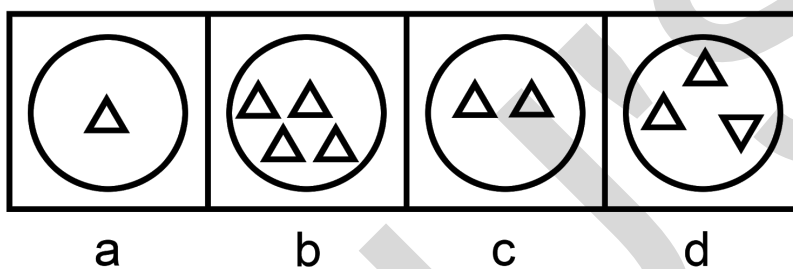
Solution:

By observation it can be determined that in a particular row, the complete figure has the other two figures of that row as its parts. So it is option (a).

Question 95.



Answer figures



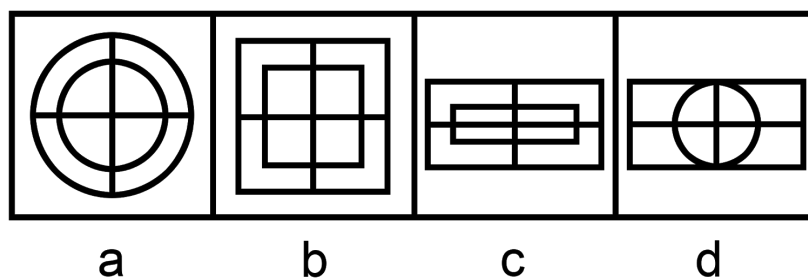
Answer: (c)

Solution:

By observation it can be determined that the number of dots are increasing by one on moving from left to right in row 1. So it is option (c).

**Direction :** Choose the odd figure out from the figures in Question number 96 to 100.

**Question 96.**

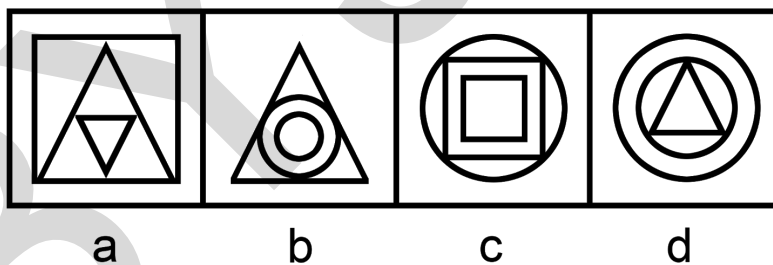


Answer: (d)

Solution:

By observation it can be determined that for all the figures except the last one, the inner and the outer shape on the cross boundary is the same. So it is option (d)

**Question 97.**

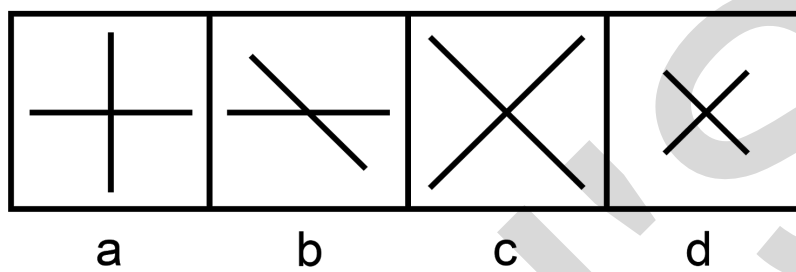


Answer: (d)

Solution:

By observation it can be determined that for the first three figures, the inner two elements have the same shape, whereas the last figure follows the opposite trend. So it is option (d).

**Question 98.**

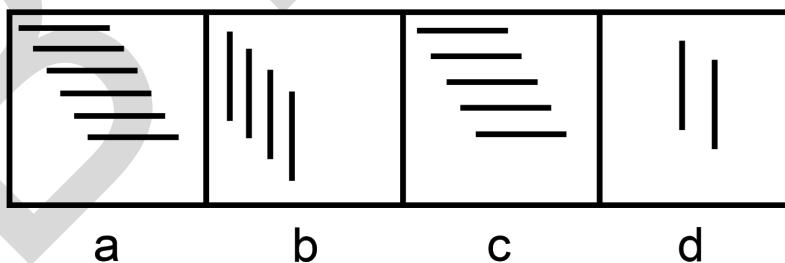


Answer: (b)

Solution:

Except option (b), the angles between the lines is  $90^\circ$ .

**Question 99.**

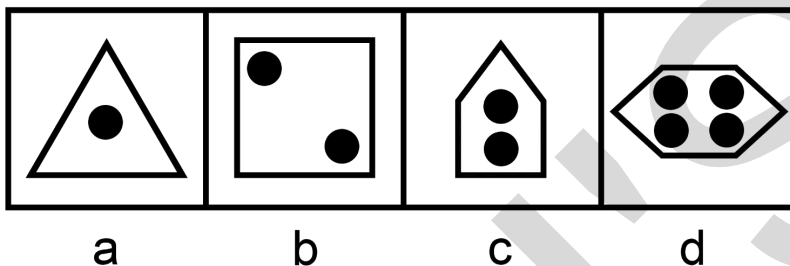


Answer: (c)

Solution:

By observation it can be determined that all the figures except the third one have an even number of lines. So it is option (c).

**Question 100.**



Answer: (c)

Solution:

All the figures except option c follows the trend:

No. of sides - 2 = No. of dots



**NATIONAL TALENT SEARCH EXAMINATION  
(NTSE 2021) STAGE - 1**

**STATE : Madhya Pradesh**

**PAPER: SAT**

**Date: 06/01/2021**

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Max. Marks : 100

**SOLUTIONS**

Time : 120 mins.

**PHYSICS**

**Question 01. Which of the following term does not represent electric power ( $P$ ) in electric circuit?**

- a.  $\frac{V^2}{R}$
- b.  $IR^2$
- c.  $I^2R$
- d.  $VI$

Answer: (b)

Solution:

Electrical power is voltage times ampere, which is  $VI$ .

$$I = \frac{V}{R}, \quad P = \frac{V^2}{R}$$

$$\text{Since } V = IR, \quad P = I^2R$$

**Question 02. S. I. Unit of magnetic field B is:**

- a. Newton / Ampere  $\times$  metre
- b. Newton / Ampere
- c. Ampere  $\times$  metre
- d. Ampere  $\times$  Coulomb

Answer: (a)





Solution:

$$F = BIL$$

$$\text{Magnetic field } B = \frac{F}{IL}$$

Thus, unit of magnetic field is Newton per Ampere per Metre i.e.,  $\frac{N}{Am}$ .

**Question 03. Which of the following is an equation for position. Time relation?**

- a.  $v = u + at$
- b.  $2as = v^2 - u^2$
- c.  $E = mc^2$
- d.  $S = ut + \frac{1}{2}at^2$

Answer: (d)

Solution:

Out of three equations of motion, the equation which gives position time relation is  $S = ut + \frac{1}{2}at^2$ .

**Question 04. Value of 1 eV is:**

- a.  $1.602 \times 10^{-15} J$
- b.  $1.602 \times 10^{-19} J$
- c.  $1.602 \times 10^{-16} C$
- d.  $1.602 \times 10^{-23} Ergs$

Answer: (b)

Solution:

An electron volt (eV) is the energy gained by an electron when it travels through a potential of one volt.  $1 \text{ eV} = 1.602 \times 10^{-19} J$

**Question 05. The least distance of distinct vision for healthy eye is:**

- a. 25 km

- b. 25 m
- c. 25 cm
- d. 25 mm

Answer: (c)

Solution:

The least distance from the eyes up to which a person can have a clear vision is called least distinct vision, which is 25 cm for a normal eye.

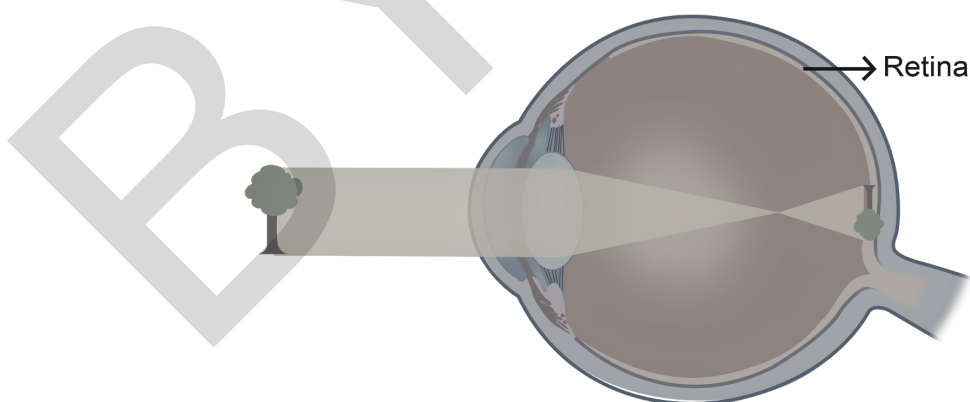
**Question 06. Where does image form in the human eye?**

- a. Cornea
- b. Pupil
- c. Iris
- d. Retina

Answer: (d)

Solution:

The image is formed on the retina of the human eye.



**Question 07. An object of mass 15 kg is moving with uniform velocity of  $4 \text{ m s}^{-1}$ . What is the kinetic energy possessed by the object?**



- a.  $15 \text{ kg} \cdot \text{m}^2$
- b.  $120 \text{ kg} \cdot \text{m}^2/\text{s}^2$
- c.  $120 \text{ J/s}$
- d.  $240 \text{ J}$

Answer: (b)

Solution:

The formula for Kinetic Energy is  $KE = \frac{1}{2}mv^2$

$$KE = \frac{1}{2} \times 15 \times 4^2 = 120 \frac{\text{kgm}^2}{\text{s}^2}$$

**Question 08. The acronym 'SONAR' stands for**

- a. Sound Navigation and Ranging
- b. Solar Navigation and Ranging
- c. Sound Navigation and Nuclear Reaction
- d. Sound Navigation and Rectification

Answer: (a)

Solution:

SONAR stands for Sound Navigation and Ranging

**Question 09. Equivalent resistance in parallel combination of resistances is:**

- a.  $R = R_1 + R_2 + R_3 + \dots$
- b.  $\frac{1}{R} = R_1 + R_2 + R_3 + \dots$
- c.  $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$
- d.  $R = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$

Answer: (c)

Solution:



Equivalent resistance in parallel combination is given by  $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$

**Question 10. Focal length of thin lens is given by:**

- a.  $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$
- b.  $f = u + v$
- c.  $f^2 = \frac{1}{v} - \frac{1}{u}$
- d.  $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

Answer: (d)

Solution:

The thin lens formula is given by  $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

**Question 11. The device / machine to produce electric current is:**

- a. Generator
- b. Motor
- c. Galvanometer
- d. Ammeter

Answer: (a)

Solution:

Device used to generate electric current is a generator. Motor is used to generate mechanical energy from electric current, galvanometer is used to detect the presence of electric current and ammeter is used to measure the amount of electric current.

**Question 12. Which of the following is used to make Solar panel?**

- a. Cobalt
- b. Silicon
- c. Nickel



d. Manganese

Answer: (b)

Solution:

Silicon, a semiconductor, is used to make solar panels. It has its conductivity in between that of a conductor and an insulator.

**Question 13. Which of the following is a major constituent of Biogas?**

- a. Ethane
- b. Oxygen
- c. Carbon dioxide
- d. Methane

Answer: (d)

Solution:

The major constituent of Biogas is Methane. Some other gases which are present with it are hydrogen, carbon dioxide and hydrogen sulphide.

## **CHEMISTRY**

**Question 14. Fatty foods become rancid due to process of**

- a. Oxidation
- b. Corrosion
- c. Reduction
- d. Hydrogenation

Answer: (a)

Solution:



Fatty food becomes rancid due to the process of oxidation. Rancidity is marked by the presence of an unpleasant smell and taste.

**Question 15. Which of the following are physical changes?**

- A. Melting of iron metal
- B. Rusting of iron
- C. Bending of an iron rod
- D. Drawing a wire of iron metal

- a.  $A + B + C$
- b.  $A + B + D$
- c.  $A + C + D$
- d.  $B + C + D$

Answer: (c)

Solution:

Melting of iron metal, bending of iron rod and drawing a wire of iron metal are physical changes as in the mentioned processes iron does not change its chemical form. It only changes its physical form. In the process of rusting, iron changes its chemical composition.

**Question 16. Milk is the example of the following type of colloid -**

- a. Sol
- b. Emulsion
- c. Aerosol
- d. Foam

Answer: (b)

Solution:

Milk is an example of Emulsion. Both the dispersed phase and dispersed medium is liquid in case of milk.

**Question 17. The nucleus of an atom contains-**

- a. Protons
- b. Electrons
- c. Protons and neutrons
- d. Neutrons

Answer: (c)

Solution:

The nucleus of an atom contains neutrons (neutral in charge) and protons (positive in charge).

**Question 18. By whom was neutron discovered?**

- a. Bohr
- b. Chadwick
- c. Rutherford
- d. Dalton

Answer: (b)

Solution:

Neutron was discovered by James Chadwick. He discovered neutrons by bombarding beryllium with alpha particles from the radioactive decay of polonium.

**Question 19. A chemical equation is said to be balanced if number of**

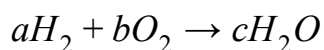
- a. Compounds are same in both side.
- b. Molecules are same in both side.
- c. Number of atoms are same in both side.
- d. Number of electrons are same in both side.

Answer: (c)

Solution:

A chemical equation is said to be balanced if the number of different types of atoms is equal on both sides of the equation.

**Question 20. Write values of  $a$ ,  $b$  and  $c$  so that the following chemical equation is balanced.**

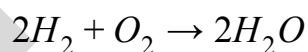


- a.  $a = 2, b = 1, c = 2$
- b.  $a = 1, b = 1, c = 2$
- c.  $a = 1, b = 2, c = 1$
- d.  $a = 2, b = 2, c = 1$

Answer: (a)

Solution:

By putting the values of  $a$ ,  $b$  and  $c$  as 2, 1 and 2 respectively in the chemical equation, we can see that the number of different types of atoms is equal on both sides of the equation.



**Question 21. Name the element which is common to all acids?**

- a. Sulphur
- b. Chlorine
- c. Nitrogen
- d. Hydrogen

Answer: (d)

Solution:





Acids are substances which dissociate to give  $H^+$  ions in aqueous solutions. Thus, Hydrogen is the element common to all acids.

**Question 22. A solution turns red litmus into blue, its is likely to be**

- a. 1
- b. 4
- c. 5
- d. 10

Answer: (d)

Solution:

Red litmus turns blue whenever it is placed in a basic or alkaline medium. The pH corresponding to the basic medium is 10.

**Question 23. Dilution is the process of -**

- a. Mixing acid with water
- b. Mixing strong acid with strong base
- c. Mixing acid or base with water
- d. Mixing strong acid with weak base

Answer: (c)

Solution:

The process of mixing acid or base to water is called dilution. The addition of water to acid or base reduces the number of  $H^+$  or  $OH^-$  ions in the solution.

**Question 24. What type of reaction takes place when an acid is dissolved in water?**

- a. Exothermic
- b. Endothermic
- c. Substitution



d. Elimination

Answer: (a)

Solution:

Whenever acid is dissolved in water heat is evolved. Thus, it is called an exothermic reaction.

**Question 25. The ability of metals to be drawn into thin wire is known as:**

- a. Ductility
- b. Malleability
- c. Sonority
- d. Conductivity

Answer: (a)

Solution:

The ability of metals to be drawn into thin wires is known as ductility.

**Question 26. Which of the following non-metal is good conductor of electricity?**

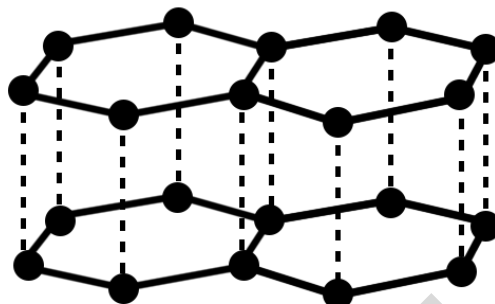
- a. Graphite
- b. Phosphorus
- c. Hydrogen
- d. Bromine

Answer: (a)

Solution:

The non-metal “graphite” is a good conductor of electricity. Graphite has 4 valence electrons in its outer shell. In the graphite crystal, each carbon atom is connected to 3 other carbon atoms by covalent bonds which means that the 4th

valence electron is free. The presence of this free electron makes graphite conductive in nature.



Graphite Structure

## BIOLOGY

**Question 27. Synthesis of Bile Juice take place in which of the following part of Body?**

- a. Gall Bladder
- b. Liver
- c. Nephron
- d. Hypothalamus

Answer: (b)

Solution:

The synthesis of bile juice takes place in the liver and is stored in the gallbladder.

**Question 28. Which is Phytohormone?**

- a. Auxin
- b. Gibberellin
- c. Cytokinin
- d. All of the above

Answer: (d)

Solution:

Phytohormones or plant hormones regulate plant growth and development. Examples: Auxin, gibberellin, cytokinin, abscisic acid, and ethylene.

**Question 29. pH of which of the following is acidic in nature?**

- a. Gastric Juice
- b. Bile Juice
- c. Pancreatic Juice
- d. Intestinal Juice

Answer: (a)

Solution:

Gastric juices are acidic in nature having a pH of approximately 1-3. The juice is acidic because of its hydrochloric acid content.

**Question 30. Which of the following have Naked Seed?**

- a. Algae
- b. Bryophyta
- c. Gymnosperm
- d. Angiosperm

Answer: (c)

Solution:

Gymnosperms are called naked seeded plants because they do not have any fleshy part to enclose the seed. Examples of such plants include, conifers such as *Pinus*, *Cycas* etc.



**Question 31. Kreb's cycle found in which part of cell?**

- a. Mitochondria
- b. Cell membrane
- c. Golgi body
- d. Nucleus

Answer: (a)

Solution:

The Krebs cycle is a chain of reactions which occurs in the mitochondria of the cell by which most living cells generate energy during the process of aerobic respiration.

**Question 32. Which of the following is not found in Prokaryotes except?**

- a. Endoplasmic reticulum
- b. Mitochondria
- c. Ribosome
- d. Golgi body

Answer: (c)

Solution:

Prokaryotes do not possess a true nucleus or membrane bound cell organelles. Ribosomes are non-membrane bound organelles found in both prokaryotes and eukaryotes.

**Question 33. Which of the following characters are found in mammals?**

- a. Hair
- b. Mammary gland
- c. Air-sack
- d. Both (A) and (B)



Answer: (d)

Solution:

Mammals are characterized by the presence of hairs on skin and possess mammary glands for feeding their young ones. Air sacs are present in birds.

**Question 34. DNA of Eukaryotes have -**

- a. Fatty acid
- b. Cholesterol
- c. Histone
- d. All of the above

Answer: (c)

Solution:

In eukaryotes, DNA is wrapped around positively charged proteins known as histones. Histones are proteins responsible for DNA packaging.

**Question 35. Which of the following is monocotyledon?**

- a. Wheat
- b. Maize
- c. Banana
- d. All

Answer: (d)

Solution:

The plants in which the seed consists of only one cotyledon is called monocotyledons. Examples of monocots include wheat, rice, banana, maize, etc.

**Question 36. Deficiency of which hormone causes diabetes mellitus?**

- a. Thyroid
- b. Insulin
- c. Relaxin
- d. Parathormone

Answer: (b)

Solution:

Deficiency of insulin resulting in high levels of sugar in the bloodstream leads to a condition called diabetes mellitus.

**Question 37. Which of the following is / are correct statement (s)?**

- a. Synthesis of urea takes place in liver.
- b. Eukaryotes have mitochondria
- c. Virus is prokaryote
- d. Both (A) and (B)

Answer: (d)

Solution:

The urea cycle is a cycle of biochemical reactions that takes place in the liver to produce urea from ammonia.

All eukaryotes possess membrane bound cell organelles like mitochondria, chloroplasts, endoplasmic reticulum, etc.

**Question 38. Which of the following is responsible for Green house effect?**

- a.  $O_2$
- b.  $H_2$
- c.  $CO_2$
- d. All

Answer: (c)



Solution:

The greenhouse gases like  $\text{CO}_2$  and  $\text{CH}_4$  are responsible for the greenhouse effect.

**Question 39. Tracheal ring in Human consist of following -**

- a. Hyaline Cartilage
- b. Fibrous Cartilage
- c. Bone
- d. Muscle

Answer: (a)

Solution:

Hyaline cartilage is found in joints, ribs, nose, larynx, tracheal rings. Trachea is surrounded by 16-20 rings of hyaline cartilage.

**Question 40. Human Evolution was suppose to take place in -**

- a. America
- b. Asia
- c. Africa
- d. Australia

Answer: (c)

Solution:

Human evolution was supposed to take place in Africa since the oldest fossils for human ancestors were found in Africa.

## **SOCIAL SCIENCE**

**Question 41. Which is the oldest 'Veda'?**





- a. Rigveda
- b. Samveda
- c. Yajurveda
- d. Atharvaveda

Answer: (a)

Solution:

Rigveda is the oldest Veda. It is believed to be composed during the early 1500 BCE. It contains 1028 hymns written in praise of various gods.

**Question 42. "Tripatika" is related to**

- a. Jainism
- b. Vaishya
- c. Sanatan
- d. Buddhism

Answer: (d)

Solution:

Buddha's teachings were compiled into 'Tripatikas', *ti*, meaning "three," and *Pitaka*, meaning "baskets." Vinaya Pitaka, Sutta Pitaka, and Abhidhamma Pitaka are considered as the holy scriptures in Buddhism.

**Question 43. Which dynasty started coins with the Veena emblem?**

- a. Maurya dynasty
- b. Gupta dynasty
- c. Vardhan dynasty
- d. Rajput dynasty

Answer: (b)

Solution:

The Gupta dynasty started coins with the Veena emblem. It was issued by Samudragupta, who was a great patron of art and literature.

**Question 44. "Prayag Prashasti" was written by-**

- a. Aryabhata
- b. Vishnu Sharma
- c. Harishen
- d. Kalidas

Answer: (c)

Solution:

Harishen wrote the Prayag Prashasti. It praises Samudragupta and lists out his political and military achievements. It is considered as "the most important historical document of the classical Gupta age".

**Question 45. Who wrote Padmavat?**

- a. Kalidas
- b. Prithviraj
- c. Malik Mohammad Jayasi
- d. Dhananand

Answer: (c)

Solution:

Sufi poet Malik Mohammad Jayasi composed the epic poem 'Padmavat' around 1540 C.E. It is a piece of literature written in Awadhi language.

**Question 46. Battle of Haldighati was fought in-**

- a. 1576 AD
- b. 1580 AD



- c. 1528 AD
- d. 1572 AD

Answer: (a)

Solution:

The Battle of Haldighati was a battle fought on 18 June 1576 between the armies of the Rana of Mewar, Maharana Pratap, and the Mughal emperor Akbar's forces, led by Man Singh I of Amber.

**Question 47. Who was Shivaji's mother?**

- a. Jija Bai
- b. Kamla Bai
- c. Putli Bai
- d. Durga Devi

Answer: (a)

Solution:

Shivaji was born to Jija Bai. She was an exemplary woman, military-trained and well-educated. She supervised the education and military training of Shivaji.

**Question 48. Which ruler's reign is called Golden Age of Mughal Paintings?**

- a. Babur
- b. Jahangir
- c. Aurangzeb
- d. Shahjahan

Answer: (b)

Solution:



The Mughals were great patrons of art, architecture, literature, and culture. Emperor Jahangir's reign is called the Golden Age of Mughal Paintings.

**Question 49. British East India Company was established in-**

- a. 1600 AD
- b. 1540 AD
- c. 1650 AD
- d. 1700 AD

Answer: (a)

Solution:

The British East India Company was established on 31st December 1600 AD. The company later went on to colonise the Indian subcontinent.

**Question 50. Who was the last Mughal king?**

- a. Shershah
- b. Aurangzeb
- c. Bahadur Shah Zafar - II
- d. None of the above

Answer: (c)

Solution:

Bahadur Shah Zafar II was the last Mughal emperor. He is remembered for his role in the Revolt of 1857.

**Question 51. Which Governor General started Subsidiary Alliance?**

- a. Lord Cornwallis
- b. Lord Rippon
- c. Lord Wellesely



d. Lord Curzon

Answer: (c)

Solution:

Lord Wellesley started the Subsidiary Alliance system to expand the British empire in India. It was an annexation policy according to which the Indian ruler had to pay a subsidy to the British for the maintenance of the British army.

**Question 52. Anand Math was written by-**

- a. Swami Vivekanand
- b. Deenbandhu Mishra
- c. Bankimchandra Chatterjee
- d. Ravindranath Tagore

Answer: (c)

Solution:

Bankimchandra Chatterjee wrote the Bengali novel 'Anand Math'. The Sanyasi Rebellion inspired the novel.

**Question 53. Who established the Khalsa Organisation?**

- a. Guru Nanak Dev
- b. Guru Kripal Singh
- c. Guru Govind Singh
- d. None of these

Answer: (c)

Solution:

Guru Govind Singh established the Khalsa Organisation in 1699 CE. It is a Sikh brotherhood organisation.



**Question 54. Who was the President of first session / conference of congress?**

- a. Dadabhai Naoroji
- b. Arvind Ghosh
- c. Gopal Krishna Gokhle
- d. Vyomesh Chandra Banerjee

Answer: (d)

Solution:

The first session of the Indian National Congress was held at Bombay in December 1885 CE. Vyomesh Chandra Bonnerjee was the President of the first conference of Congress.

**Question 55. Founder of 'Satya Shodhak Samaj' was-**

- a. Swami Vivekanand
- b. Atmaram
- c. Jyotiba Phule
- d. Mahatma Gandhi

Answer: (c)

Solution:

Jyotiba Phule founded the Satya Shodhak Samaj in 1873 CE. It was a non-Brahmin social reform movement established to create awareness among downtrodden classes of Maharashtra.

**Question 56. Unit of measuring noise is-**

- a. Centimeter
- b. Decibel
- c. Celsius
- d. Millibar



Answer: (b)

Solution:

The unit of measuring noise is Decibel. Decibels (dB) are named in honor of Alexander Graham Bell.

**Question 57. Chipko Movement was started in --**

- a. Karnataka
- b. North-East India
- c. Uttarakhand
- d. Kerala

Answer: (c)

Solution:

The Chipko movement was a non-violent agitation that aimed at the protection and conservation of trees in Chamoli district of today's Uttarakhand.

**Question 58. The standard time of India is calculated from -**

- a.  $72^{\circ}$  East Longitude
- b.  $80^{\circ} 30^{\circ}$  East Longitude
- c.  $82^{\circ} 30^{\circ}$  East Longitude
- d.  $85^{\circ}$  East Longitude

Answer: (c)

Solution:

Indian Standard Time is calculated on the basis of  $82.5^{\circ}$  East longitude which is just west of the town of Mirzapur, near Allahabad in Uttar Pradesh. The longitude difference between Mirzapur and Greenwich ( $0^{\circ}$ ) translates to a time difference of 5 hours and 30 minutes.



**Question 59. The Tropic of Cancer does not pass through which State of India?**

- a. Gujarat
- b. Maharashtra
- c. Chhattisgarh
- d. Madhya Pradesh

Answer: (b)

Solution:

The Tropic of Cancer passes through eight states in India. The states are Gujarat (Jasdan), Rajasthan (Kalinjarh), Madhya Pradesh (Shajapur), Chhattisgarh (Sonhat), Jharkhand (Lohardaga), West Bengal (Krishnanagar), Tripura (Udaipur) and Mizoram (Champhai).

**Question 60. Which of the following river is known Ganga of South India?**

- a. Narmada river
- b. Krishna river
- c. Kaveri river
- d. Godavari river

Answer: (d)

Solution:

River Godavari is the largest peninsular river. It rises from the slopes of western ghats near Nashik district of Maharashtra. Because of its length and the area it covers it is also known as Ganga of south India.

**Question 61. State with the minimum forest area in India.**

- a. Assam
- b. Rajasthan
- c. Jharkhand





d. Haryana

Answer: (d)

Solution:

Haryana has the minimum forest area in India. The state had the lowest forest cover with respect to total geographical area in India at 6.79 percent, in 2017.

**Question 62. According to the 2011 census which is the most densely populated State?**

- a. Uttar Pradesh
- b. Bihar
- c. Kerala
- d. West Bengal

Answer: (b)

Solution:

According to the 2011 census, Bihar is the most densely populated state in India. The population density of Bihar is 1102 persons per sq km.

**Question 63. Conventional signs are certified by -**

- a. Central Information Department
- b. Indian Constitution
- c. Survey Department
- d. Parliament of India

Answer: (c)

Solution:

Conventional signs are symbols used on maps to represent different features. The Survey of India prepares India's topographical maps for the entire country where



the conventional signs are used. These conventional signs are certified by the Survey department.

**Question 64. Keoladeo Ghana Bird Sanctuary is located in -**

- a. Kerala
- b. Rajasthan
- c. West Bengal
- d. Madhya Pradesh

Answer: (b)

Solution:

Keoladeo Ghana Bird Sanctuary is located in Bharatpur, Rajasthan. It is one of the world's most important bird breeding and feeding grounds. It is also famous for migratory birds.

**Question 65. The cheapest means of transport is -**

- a. Road Transport
- b. Rail Transport
- c. Water Transport
- d. Air Transport

Answer: (c)

Solution:

Waterways are the cheapest means of transportation. It is suitable for transporting heavy and bulky goods. It can cover long distances with minimum transport infrastructure. The risk of accidents in water transport is also less. It also comparatively consumes less fuel. Therefore, it is the cheapest means of transportation.

**Question 66. The main gas pipeline is -**

- a. Barauni - Haldia
- b. Barauni - Jalandhar
- c. Naharkatia - Barauni
- d. Hajira - Jagdishpur

Answer: (d)

Solution:

HVJ Hajira-Vijaypur-jadishpur is the first cross state gas pipeline of India. It was formed in 1986. It connects the states of Gujrat, Madhya Pradesh, Uttar Pradesh, Rajasthan And Haryana.

**Question 67. The longest railway route of the world is -**

- a. Trans Siberian Railway
- b. Canadian Pacific Railway
- c. Trans Indian Railway
- d. All of the above

Answer: (a)

Solution:

The Trans Siberian Railway route is the longest in the world, spanning a length of almost 9,289km. It connects the Russian city of Moscow in the west to Vladivostok in the east.

**Question 68. Weather maps are published in India -**

- a. Kolkata
- b. Delhi
- c. Pune
- d. Hyderabad

Answer: (c)

Solution:

A weather map represents conditions related to weather elements such as temperature, rainfall, sunshine and cloudiness, direction and velocity of winds, etc. Indian Meteorological Department prepares these maps from its Central Observatory at Pune after collecting data from observatories located in various places.

**Question 69. Name the area of India where earthquakes often occur (high incidence zones)**

- a. Kutch
- b. Aravali mountain
- c. Orissa coast
- d. Goa

Answer: (a)

Solution:

Indian subcontinent is divided into four seismic zones (II, III, IV, and V). Kutch is included in the Very High Damage Risk Zone. Earthquakes often occur in the areas included in this zone.

**Question 70. Name the most flood affected State -**

- a. Bihar
- b. Punjab
- c. Rajasthan
- d. Madhya Pradesh

Answer: (a)

Solution:



The National Flood Commission has identified 40 million hectares of land as flood-prone in India. Bihar is the most flood-affected state in India among the given options.

**Question 71. In a democracy Sovereignty resides in the -**

- a. President
- b. Parliament
- c. Prime Minister
- d. People

Answer: (d)

Solution:

Sovereignty in political theory is equivalent to the meaning of 'supreme power'. In a democracy, the supreme power rests with its people. For example, in a democracy, people choose their representatives through elections periodically. The elected representatives work for the people.

**Question 72. The Chief Election Commissioner of India is appointed by -**

- a. President
- b. Prime Minister
- c. Governor
- d. Deputy Prime Minister

Answer: (a)

Solution:

The Chief Election Commissioner of India is appointed by the President of India. The Election Commissioner of India shall serve his/her term for up to 6 years. He/She can hold the office up to an age of 65.

**Question 73. According to which article untouchability has been abolished by the Constitution of India ?**



- a. Article - 14
- b. Article - 15
- c. Article - 16
- d. Article - 17

Answer: (d)

Solution:

Article 17 of the constitution of India states that "Untouchability" is abolished and its practice in any form is forbidden. The enforcement of any disability arising out of "Untouchability" shall be an offence punishable in accordance with the law.

**Question 74. The term of Lok Sabha is -**

- a. 3 Years
- b. 4 Years
- c. 5 Years
- d. 6 Years

Answer: (c)

Solution:

The term of Lok Sabha is five years. However, it can be dissolved early in certain situations. The Parliament can also extend the term for a period not exceeding one year at a time in case of National emergency.

**Question 75. Where is the High Court of Madhya Pradesh state situated?**

- a. Bhopal
- b. Indore
- c. Jabalpur
- d. Gwalior

Answer: (c)



Solution:

The high court of Madhya Pradesh is located in Jabalpur. Justice Sanjay Yadhav is currently serving as the Chief Justice of the high court of Madhya Pradesh.

**Question 76. The State having maximum population of poor, in India is -**

- a. Meghalaya
- b. Assam
- c. Bihar
- d. Madhya Pradesh

Answer: (c)

Solution:

The state of Bihar contains a population of 9.9 crores in which around 40% of them live in Below Poverty Line or BPL. People who earn less than 1,059.42 Indian rupees per month in rural areas and 1,286 Indian rupees per month in urban areas are considered to be poor.

**Question 77. Which of the following scheme provides 100 days of employment?**

- a. National Rural Employment Guarantee Scheme
- b. National Rural Health Mission
- c. National rural Livelihood Mission Scheme
- d. Prime Minister Jan Dhan Scheme

Answer: (a)

Solution:

The Mahatma Gandhi National Rural Employment Guarantee Scheme or famously known as MGNREGA was launched in the year 2006 in India as a social security measure to ensure 100 days of employment in rural areas on demand basis.



**Question 78. Main function of money is -**

- a. Medium of exchange
- b. Mode of payment
- c. Price holding
- d. All of the above

Answer: (d)

Solution:

Money can be defined as a medium of economic exchange. It is a measure of value, a unit of measurement. Money becomes tangible in the form currency which represents the price and value of a commodity.

**Question 79. Which bank is known as Central Bank of India?**

- a. Reserve Bank of India
- b. State Bank of India
- c. Foreign Exchange Bank
- d. International Bank

Answer: (a)

Solution:

The Reserve Bank of India, commonly known as RBI is responsible for print and supply of money or currency notes in India. It was established on 1 April 1935 by the RBI Act 1934 and functions as India's central bank.

**Question 80. Producers can be arbitrary with respect to the quality and price of goods in -**

- a. Competitive market
- b. Monopoly
- c. Agricultural product
- d. None of the above



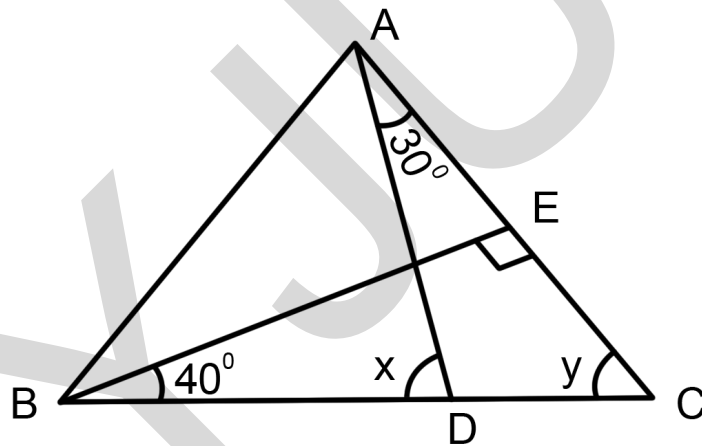
Answer: (b)

Solution:

Monopoly is the domination of the market by a producer over a single product or a group of products. Such a condition gives rise to arbitrary prices fixed at the will of the producer which monopolises the market.

## MATHEMATICS

**Question 81.** In the given figure, if  $BE \perp AC$ ,  $\angle EBC = 40^\circ$  and  $\angle DAC = 30^\circ$ , then the value of  $\angle x$  and  $\angle y$  are:



- a.  $80^\circ$  and  $30^\circ$
- b.  $80^\circ$  and  $50^\circ$
- c.  $40^\circ$  and  $50^\circ$
- d.  $70^\circ$  and  $40^\circ$

Answer: (b)

Solution:

In  $\triangle ADC$ ,  $\angle x$  is the exterior angle of the triangle.

Hence,  $\angle x = 30^\circ + \angle y$

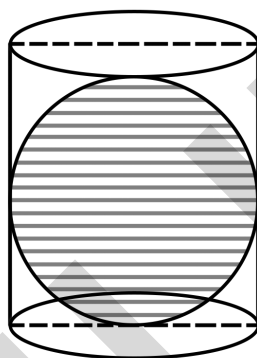
Also, in  $\triangle EBC$ , applying triangle angle sum property.

$$40^\circ + \angle y + 90^\circ = 180^\circ$$

$$\angle y = 50^\circ$$

Therefore,  $\angle x = 80^\circ$

**Question 82.** A right circular cylinder is just enclosing a sphere of radius  $r$ , then:

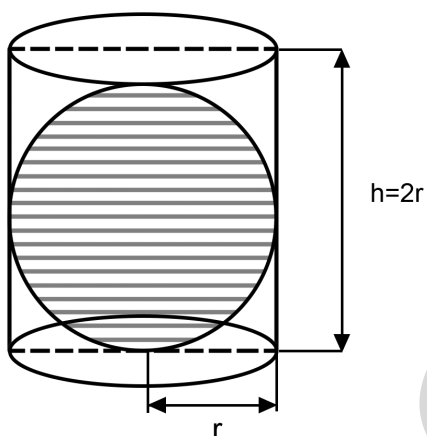


- Surface area of the sphere is equal to the curved surface area of the cylinder.
- Surface area of the sphere is equal to the total surface area of the cylinder.
- Surface area of the sphere is less than the curved surface area of the cylinder.
- Surface area of the sphere is greater than the curved surface area of the cylinder.

Answer: (a)

Solution:

Let the radius of the sphere be  $r$ .



Surface area of sphere =  $4\pi r^2$

Since, the diameter of the sphere is the height of the cylinder,

Curved surface area of cylinder =  $2\pi r h = 2\pi r(2r) = 4\pi r^2$

Total surface area of cylinder =  $CSA + 2(\pi r^2) = 6\pi r^2$

Hence, CSA of cylinder = Surface area of sphere

**Question 83. Zeros of polynomial  $x^2 - 2x$  are:**

- a. only 2
- b. 0, 2
- c. 2, 2
- d. 0, 0

Answer: (b)

Solution:

Given that,  $f(x) = x^2 - 2x = 0$

$x(x - 2) = 0$

$x = 0$  or  $x = 2$

**Question 84. The median and mode of 14, 25, 14, 28, 18, 17, 18, 14, 23, 22, 14, 18 are:**

- a. 18 and 14
- b. 17 and 18



- c. 18.5 and 14
- d. 18 and 18.5

Answer: (a)

Solution:

Arrange the data set in the ascending order:

14, 14, 14, 14, 17, 18, 18, 18, 22, 23, 25, 28

There are a total of 12 numbers. So, the average of the numbers in  $\frac{12}{2} = 6^{th}$  and  $\frac{12}{2} + 1 = 7^{th}$  rank will be the median.

$$\text{Median} = \frac{18+18}{2} = 18$$

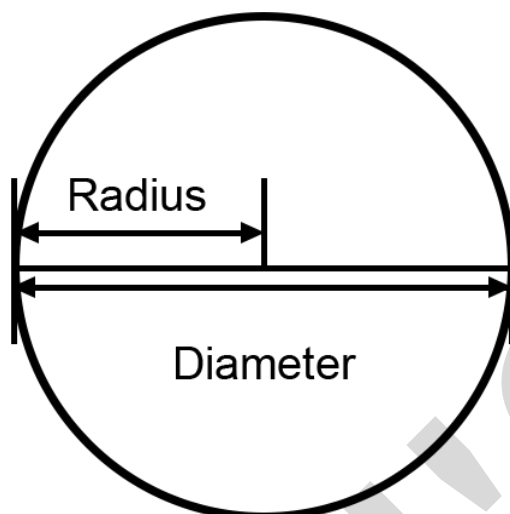
The number 14 has the highest frequency of occurrence. Hence, mode = 14

**Question 85. Largest chord of the circle is:**

- a. Radius
- b. Diameter
- c. Both (a) and (b)
- d. None of the above

Answer: (b)

Solution:



**Question 86.** In Euclid's division lemma, for given positive integer  $a$  and  $b$ , there exist unique integer's  $q$  and  $r$  satisfying  $a = bq + r$ , here :

- a.  $r \neq 0$
- b.  $0 \leq r < b$
- c.  $r > b$
- d.  $r = q$

Answer: (b)

Solution:

The condition  $a = bq + r$  can be compared to the formula:

Dividend ( $a$ ) = Quotient ( $q$ ) x Divisor ( $b$ ) + Remainder ( $r$ )

Now, remainder = 0, when Dividend is a multiple of Divisor.

Also,  $0 < \text{Remainder} < b$  when Dividend is not a multiple of Divisor.

Hence, option b is correct.

**Question 87.** If  $3, -1, -\frac{1}{3}$  are zeros of cubic polynomial  $p(x)$ , where  $p(x)$  is :

- a.  $3x^3 + 5x^2 - 11x - 3$
- b.  $3x^3 + 5x^2 - 11x + 3$
- c.  $3x^3 - 5x^2 - 11x - 3$
- d.  $3x^3 + 5x^2 + 11x + 3$

Answer: (c)

Solution:

Given a polynomial  $f(x)$ , such that,

$$f(x) = (x - 3)(x - (-1))(x - (-\frac{1}{3})) = 0$$

$$f(x) = (x - 3)(x + 1)(3x + 1) = 0$$

Solving the equation given above gives the polynomial

$$3x^3 - 5x^2 - 11x - 3$$

**Question 88.** The value of  $p$  for which pair of equations  $4x + py + 8 = 0$ ,  $2x + 2y + 2 = 0$ , have unique solution is :

- a.  $p = 4$
- b.  $p = 8$
- c.  $p \neq 4$
- d.  $p \neq 2$

Answer: (c)

Solution:

A pair of linear equations in two variables have a unique solution for:

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

The pair of equations are

$$L1: 4x + py + 8 = 0$$

$$L2: 2x + 2y + 2 = 0$$

$$\frac{4}{2} \neq \frac{p}{2}$$

$$p \neq 4$$

**Question 89.** Which of the following is not a quadratic equation?

- a.  $(x - 2)^2 + 1 = 2x - 3$
- b.  $x(x + 1) + 8 = (x + 2)(x - 2)$
- c.  $x(2x + 3) = x^2 + 1$
- d.  $(x + 2)^3 = x^3 + 4$

Answer: (b)

Solution:

Solving each equation

- a.  $(x - 2)^2 + 1 = 2x - 3$   
 $x^2 - 4x + 4 + 1 = 2x - 3$   
 $x^2 - 6x + 8 = 0$ : Quadratic equation
- b.  $x(x + 1) + 8 = (x + 2)(x - 2)$   
 $x^2 + x + 8 = x^2 - 4$   
 $x = -12$ : Linear equation
- c.  $x(2x + 3) = x^2 + 1$   
 $2x^2 + 3x = x^2 + 1$   
 $x^2 + 3x - 1 = 0$ : Quadratic equation
- d.  $(x + 2)^3 = x^3 + 4$   
 $x^3 + 8 + 6x^2 + 12x = x^3 + 4$   
 $8 + 6x^2 + 12x = 4$   
 $6x^2 + 12x + 4 = 0$ : Quadratic equation

**Question 90. How many two digit numbers are there which are divisible by 3?**

- a. 29
- b. 30
- c. 33
- d. 35

Answer: (b)

Solution:

The biggest two-digit number divisible by three is 99.

Total numbers divisible by three till 99 is 33.

Total number of single digit numbers divisible by three is 3.

Hence, total number of two-digit numbers divisible by three is  $33 - 3 = 30$

**Question 91. The sum of first  $n$ -positive integers is:**

- a.  $\frac{(n^2+1)}{2}$
- b.  $\frac{(n+1)(n+2)}{2}$
- c.  $\frac{n(n+1)}{2}$
- d.  $2n$

Answer: (c)

Solution:

Sum of first  $n$  positive integers can be calculated as the sum of arithmetic progression upto  $n$  terms.

$$1+2+3+\dots+n$$

$$a=1, d=1$$

$$S_n = \frac{n}{2}(2a + (n-1)d) = \frac{n}{2}(2 + (n-1)) = \frac{n(n+1)}{2}$$

**Note:** This is an important formula used in multiple areas.

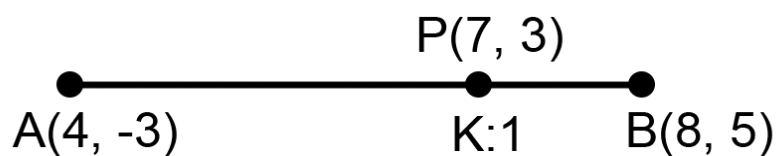
**Question 92. The point (7, 3) divides the line segment joining the points (4, -3) and (8, 5) internally in ratio :**

- a. 2 : 3
- b. 7 : 4
- c. 3 : 2
- d. 3 : 1

Answer: (d)

Solution:





The formula for this situation is

$$x = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}$$

Where  $m_1 = k$ ,  $m_2 = 1$

$$7 = \frac{k(8) + (1)(4)}{k+1}$$

$$7(k+1) = 8k + 4$$

$$k = 3$$

$$k:1 = 3:1$$

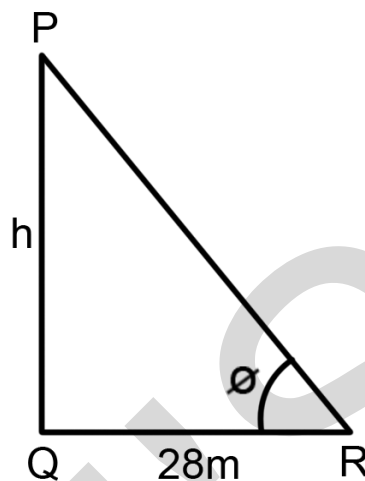
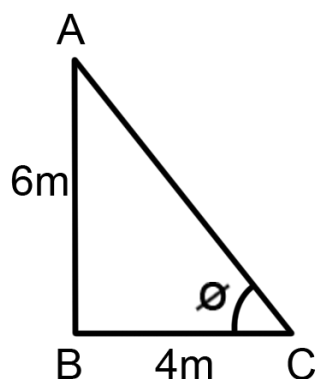
**Question 93.** A vertical pole of length 6 m casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long, then the height of the tower is :

- a. 28 m
- b. 48 m
- c. 53 m
- d. 42 m

Answer: (d)

Solution:

Let the angle made by the shadow on the ground be  $\theta$



$$\tan \theta = \frac{AB}{BC} = 1.5$$

Also,

$$\tan \theta = \frac{PQ}{QR} = 1.5$$

$$\frac{h}{28} = 1.5$$

$$h = 42 \text{ m}$$

**Question 94.** The length of an arc of a sector of angle  $\theta$  of circle with radius  $r$  is :

- a.  $\frac{\theta}{180} \times \pi r^2$
- b.  $\frac{\theta}{360} \times \pi r^2$
- c.  $\frac{\theta}{180} \times \pi r$
- d.  $\frac{\theta}{360} \times \pi r$

Answer: (c)

Solution:

The circumference of a circle =  $2\pi r$ , which corresponds to  $360^\circ$  in the centre of a circle.

$$1^\circ \text{ of the circle corresponds to } \frac{2\pi r}{360} = \frac{\pi r}{180}$$

$$\theta^\circ \text{ of the circle corresponds to } \frac{2\pi r}{360} = \frac{\theta}{180} \pi r$$

**Question 95.** The value of  $\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ$  is :

- a. 0
- b.  $\frac{\sqrt{3}}{2}$
- c. 1
- d.  $\sqrt{3}$

Answer: (c)

Solution:

$$\begin{aligned} \tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ &= \tan (90 - 42)^\circ \tan (90 - 67)^\circ \tan 42^\circ \tan 67^\circ \\ &= \cot 42^\circ \cot 67^\circ \tan 42^\circ \tan 67^\circ = 1 \times 1 = 1 \end{aligned}$$

**Question 96.** An iron rod of diameter 1 cm and length 8 cm is drawn into a wire of length 18 m of uniform thickness, then the radius of the wire will be :

- a.  $\frac{1}{30}$  cm
- b.  $\frac{1}{900}$  cm
- c.  $\frac{1}{3}$  cm
- d. 3 cm

Answer: (a)

Solution:

Given,  $d_1 = 1$  cm,  $r_1 = 0.5$  cm

$h_1 = 8$  cm

$h_2 = 18$  m = 1800 cm

$r_2 = ?$

$$V_1 = \pi r_1^2 h_1 = 8(0.5)^2 \pi = 2\pi = V_2$$

$$V_2 = \pi r_2^2 h_2 = \pi r_2^2 (1800)$$

Since the iron rod is drawn into a wire, the volume remains constant.

$$V_1 = V_2$$

$$2\pi = \pi r_2^2 (1800)$$

$$r_2^2 = \frac{1}{900}$$

$$r_2 = \frac{1}{30} \text{ cm}$$



**Question 97. Number of terms in A.P. 23, 21, 19, ..... 5 are :**

- a. 11
- b. 10
- c. 9
- d. 8

Answer: (b)

Solution:

AP given is: 23, 21, 19, ..., 5

$$a = 23$$

$$d = -2$$

where last term is 5.

Let the last term be  $a_n$

$$a_n = 5 = a + (n-1)d$$

$$23 + (n-1)(-2) = 5$$

$$n = 10$$

**Question 98. One card is drawn from a well-shuffled deck of 52 cards, the probability that the card drawn is not an ace.**

- a.  $\frac{12}{13}$
- b.  $\frac{1}{13}$
- c.  $\frac{1}{52}$
- d.  $\frac{4}{13}$

Answer: (a)

Solution:

In a deck of 52 cards there are 4 ace cards.

So, the number of cards that are not ace =  $52 - 4 = 48$

The probability that drawn card is not ace =  $\frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{48}{52} = \frac{12}{13}$





Solution:

- a. Zero is a whole number but not a natural number.
- b. Every integer can be represented in the form of  $\frac{p}{q}$ , where p and q are coprime.
- c. Not every rational number is an integer as  $\frac{p}{q}$  may be a fraction which is not an integer. E.g.  $\frac{1}{2}$

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