SSC CGL 16th August 2021 Shift-2

1. **In a certain code language, 'ALPINE' is coded as '171' and 'SPRING' is coded as '83'. How will 'CAPITAL' be coded in that language?**

A **186**

B 93

C 62

D 24

Solution

ALPINE=1+12+16+9+14+5=57

Now, 57 * number of vowels in ALPINE

=57*3

=171

and

SPRING = 19+16+18+9+14+7=83

Now, 83 * number of vowels in SPRING

=83*1

=83

Similarly,

CAPITAL = 3+1+16+9+20+1+12 =62

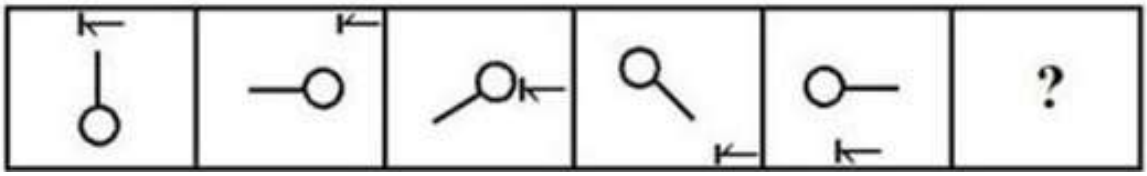
Now, 62 * number of vowels in CAPITAL

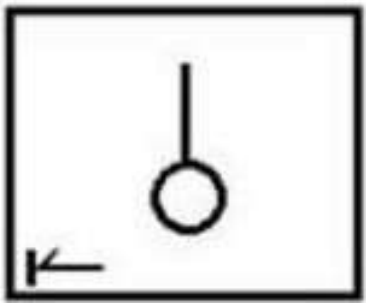
=62*3

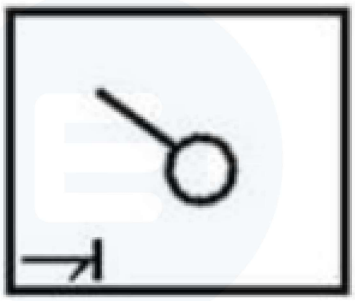
=186

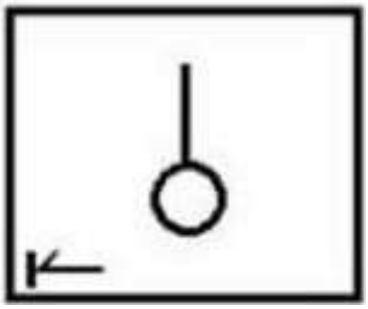
Hence, option A is the correct answer.

Select the figure's from among the given options that can replace the question mark (?) in the following series.

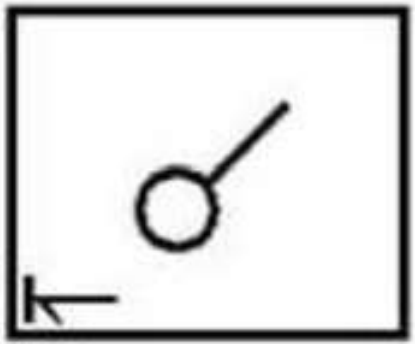
2. 

A 

B 

C 

D

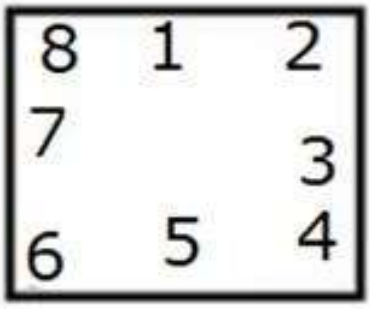


Solution

Rotating pattern of  is:

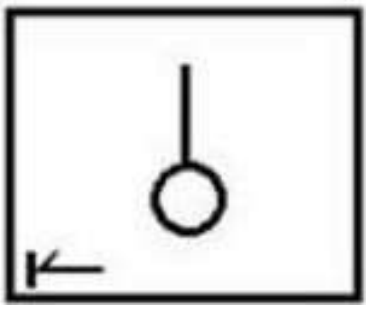
90° left, 45° right, 90° left, 45° right, etc.

Moving order of  is: 1, 2, 3, 4,……



inclined line is added in  downside and upside alternately.

So, the next figure is:



Hence, Option A is the correct answer.

Select the option that is related to the third number in the same way as the second number is related to the first number and the sixth number is related to the fifth number.

3. **15 : 135 :: 16 : ? :: 18 : 189**

A 131

B 141

C **152**

D 121

Solution

as,

(15+3)*(15/2)

=18*(15/2)

=9*15

=135

and

(16+3)*(16/2)

=19*8

=152

Similarly,

(18+3)*(18/2)

=21*9

=189

Hence, option C is the correct answer.

4. **Four number-pairs have been given, out of which three are alike in some manner and one is different. Select the number-pair that is different.**

A 289 : 70

B **324 : 64**

C 169 : 55

D 256 : 61

Solution

$324 : 64 = 18^2 : 8^2$ is odd one.

No other options follows the pattern.

Hence, option B is the correct answer.

5. **The present age of a father is three times that of his elder son. Four years hence, the age of the father will be four times that of his younger son. If the difference between the present ages of the elder and younger child is 6 years, what is the present age of the father?**

A 38 years

B 42 years

C 32 years

D **36 years**

Solution

Let the present age of father be F and that of elder's son be E.

So, $F = 3 \times E$ _(1)

Let the present age of younger son be Y.

So, $F + 4 = 4 \times (Y + 4)$ __(2)

ATQ,

$E - Y = 6$

$\Rightarrow E = Y + 6$ _(3)

From above three statements,

⇒ F = 3Y + 18 (from (1) and (3))

⇒ Y = (F - 18) ÷ 3

Now, substituting Y in (2)

⇒ F+4 = 4*[{(F-18)/3}+4]

⇒ F = 3 × 12

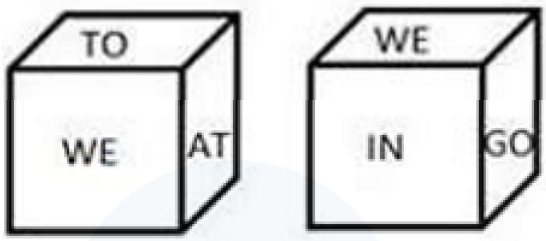
⇒ F = 36

Hence, the present age of father is 36 years

Hence, option D is the correct answer.

Two different positions of the same dice are shown, the six faces of which are marked as 'AT', 'IN', 'SO', 'WE', 'GO' and 'TO'. Select the word that will be on the face opposite to the face showing the word 'TO'.

6.



A AT

B **GO**

C IN

D SO

Solution

WE is common face in both dices.

so, IN, GO, AT and TO are four consecutive side face of WE.

from IN, GO, AT and TO:

So, GO will be opposite to TO.

Hence, option B is the correct answer.

Select the correct option that indicates the arrangement of the given words in the order in which they appear in an English dictionary.

7. **1. Umbilical**

2. Urgent

3. Unaltered

4. Umbrella

5. Unanimous

A 1, 4, 2, 3, 5

B 4, 1, 3, 5, 2

C 4, 1, 5, 3, 2

D **1, 4, 3, 5, 2**

Solution

correct order as they would appear in the English dictionary is:

1. Umbilical

2. Umbrella

3. Unaltered

4. Unanimous

5. Urgent

Hence, Option D is the correct answer.

8. **Introducing Rajat to a guest, Ajay said, "He is the only son of my father's daughter-in law". How is Ajay related to Rajat?**

A Maternal grandfather

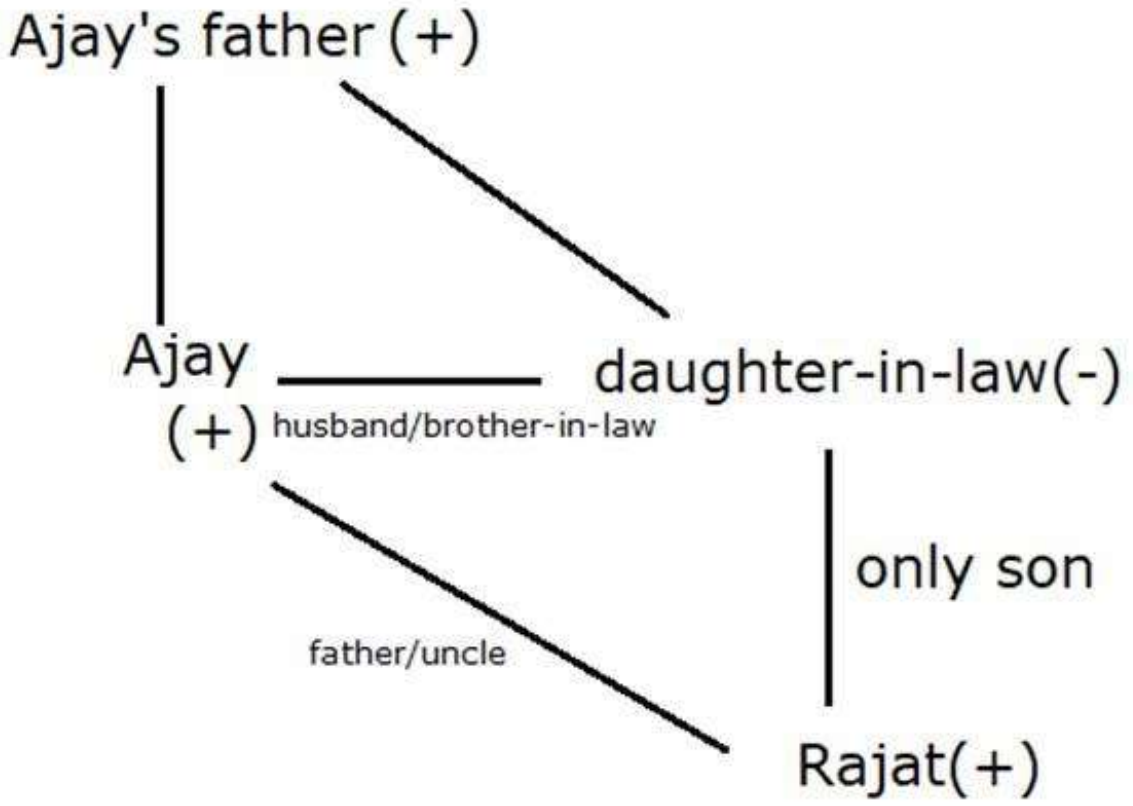
B Paternal grandfather

C Brother

D **Either father or uncle**

Solution

Following family tree can be drawn:

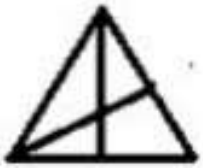


from the above figure, it is clear that Ajay is either father or uncle of Rajat.

Hence, option D is the correct answer.

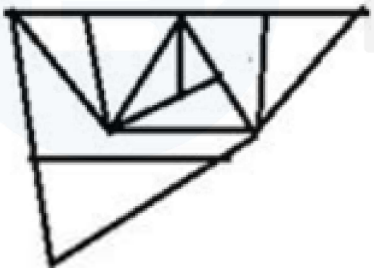
Select the option in which the given figure is embedded (rotation is NOT allowed).

9.



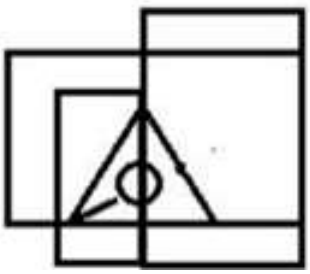
A

B



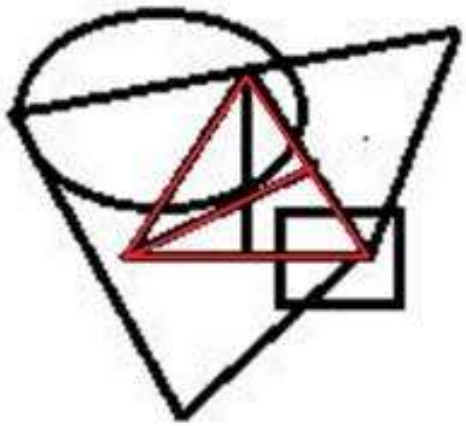
C

D



Solution

After carefully observing the figures given in the question and answers, it is very clear that the question figure given is embedded in the answer figure(A). It is shown as given below:



Hence, option A is the correct answer.

10. **Four letter-clusters have been given, out of which three are alike in some manner and one is different. Select the letter-cluster that is different.**

A **FJQL**

B IDWG

C EMNK

D BTGN

Solution

Let A=1, B=2, C=3,……..z=26

A. FJQL = 6+10+17+12=45

B. IDWG = 9+4+23+7=43

C. EMNK = 5+13+14+11=43

D. BTGN = 2+20+7+14=43

Hence, option A is the correct answer.

11. **In a certain code language, 'MORBID' is written as 'THGMID'. How will 'OBTAIN' be written in that language?**

A JGOFDS

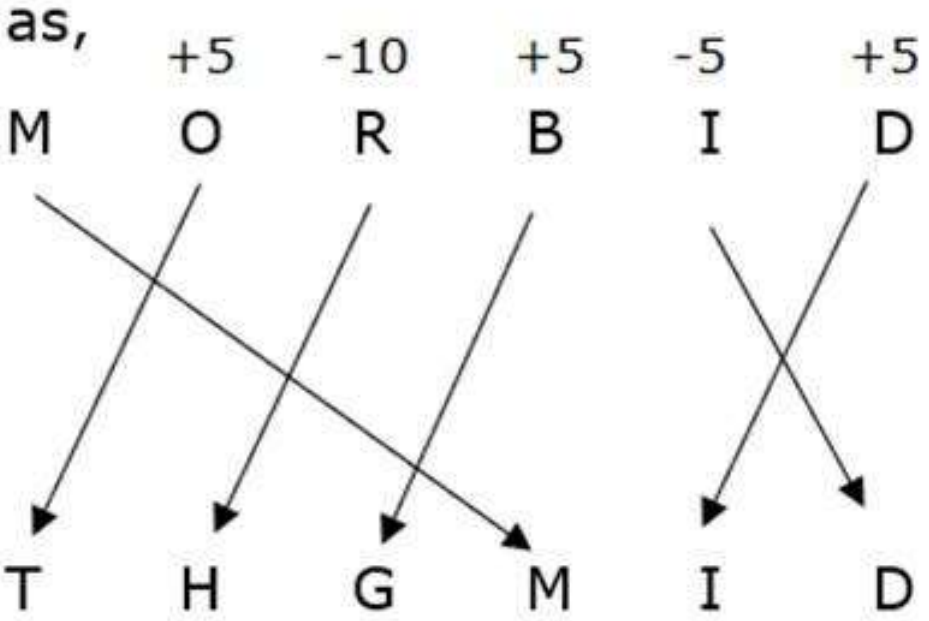
B JOFGSD

C **GJFOSD**

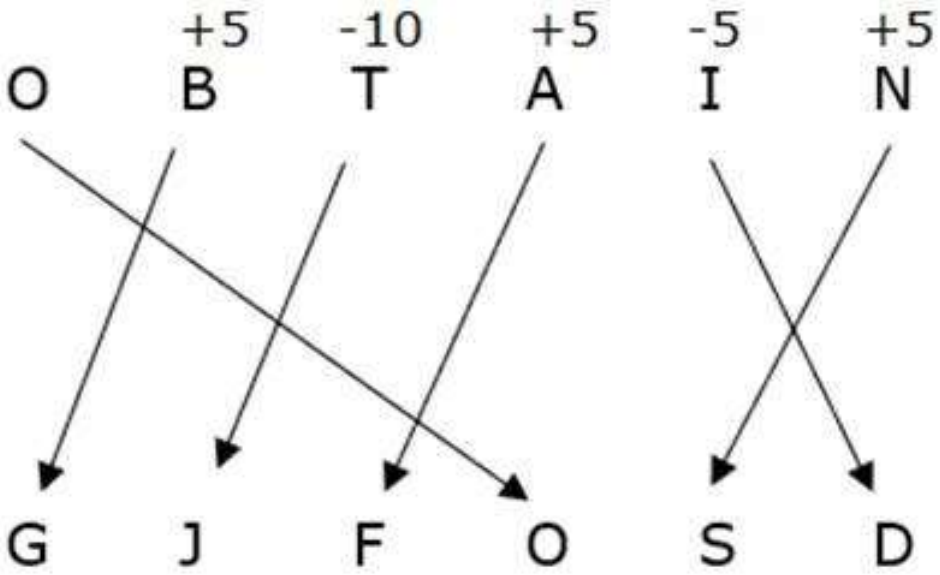
D GFOJDS

Solution

as,



Similarly,



Hence, option C is the correct answer.

Select the correct sequence of mathematical signs that can sequentially replace the * signs and balance the given equation.

12. **6 *10* 55 *162* 9 = 23**

A ÷, +, ×, −

B +, −, ÷, ×

C ×, ÷, −, +

D ×, −, +, ÷

Solution

By checking option A:

6 *10* 55 *162* 9 = 23

After interchanging:

6 10 + 55 162 - 9 = 23

here, 6 is perfectly not divisible by 10, so it will be resulted in decimal.

so, it is not correct option.

By checking option B:

6 *10* 55 *162* 9 = 23

After interchanging:

6 + 10 - 55 162 9 = 23

here, 55 is perfectly not divisible by 162, so it will be resulted in decimal. so, it is not correct option.

By checking option C:

6 *10* 55 *162* 9 = 23

After interchanging:

6 10 55 - 162 + 9 = 23

here, 10 is perfectly not divisible by 55, so it will be resulted in decimal.

so, it is not the correct option.

By checking option D:

6 *10* 55 *162* 9 = 23

After interchanging:

6 10 - 55 + 162 9 = 23

now,

60 - 55 + 18 = 23

or, 23=23

so, its the correct option.

Hence, option D is the correct answer.

Select the number from among the given options that can replace the question mark (?) in the following series.

13. **5, 13, 22, 34, 51, 75, 108, 152, ?**

A 290

B 203

C **209**

D 230

Solution

Pattern is:

5+8=13

13+9=22

22+12=34

34+17=51

51+24=75

75+33=108

108+44=152

$152+57=209$

Hence, option C is the correct answer.

Select the letter from among the given options that can replace the question mark (?) in the following series.

14. **B, E, G, J, L, ?**

A Q

B P

C N

D **O**

Solution

Pattern is:

B+3=E

E+2=G

G+3=J

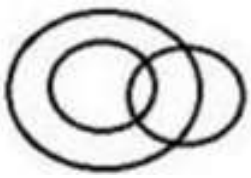
J+2=L

L+3=O

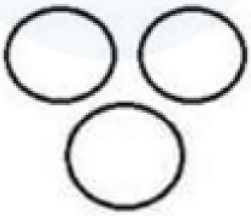
Hence, option D is the correct answer.

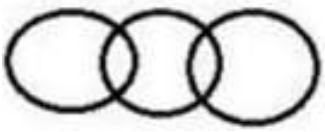
Select the Venn diagram that best illustrates the relationship among the following classes.

15. **Whisk, Utensil, Sickle**

A 

B 

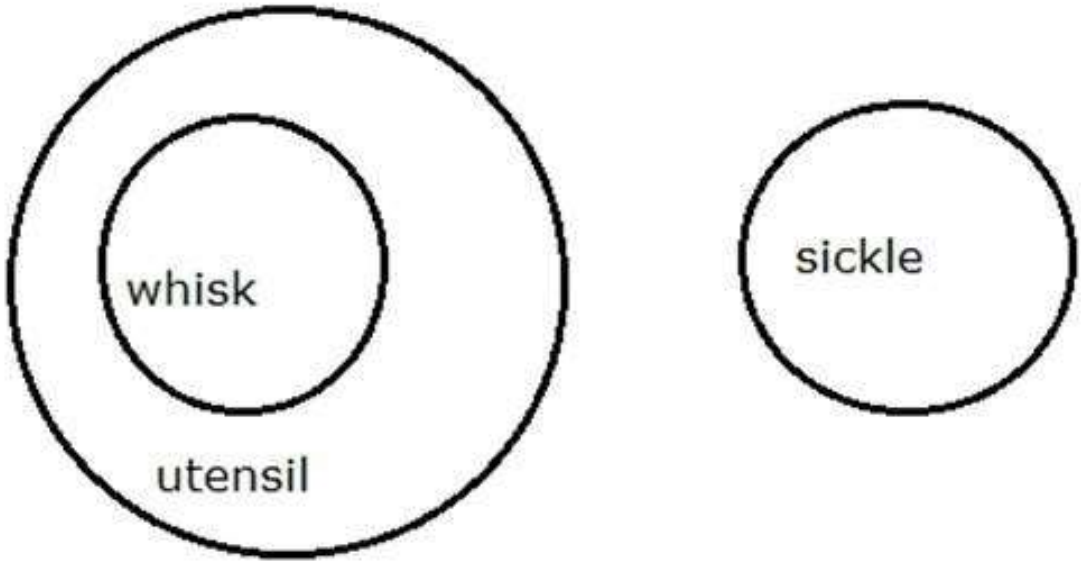
C 

D 

Solution

Whisk is a Utensil used in kitchen. A sickle is a single-handed agricultural tool.

So, the best representation is:



Hence, option B is the correct answer.

Select the letter-cluster from among the given options that can replace the question mark (?) in the following series.

16. **GCB, JHE, MMH, PRK, ?**

A **SWN**

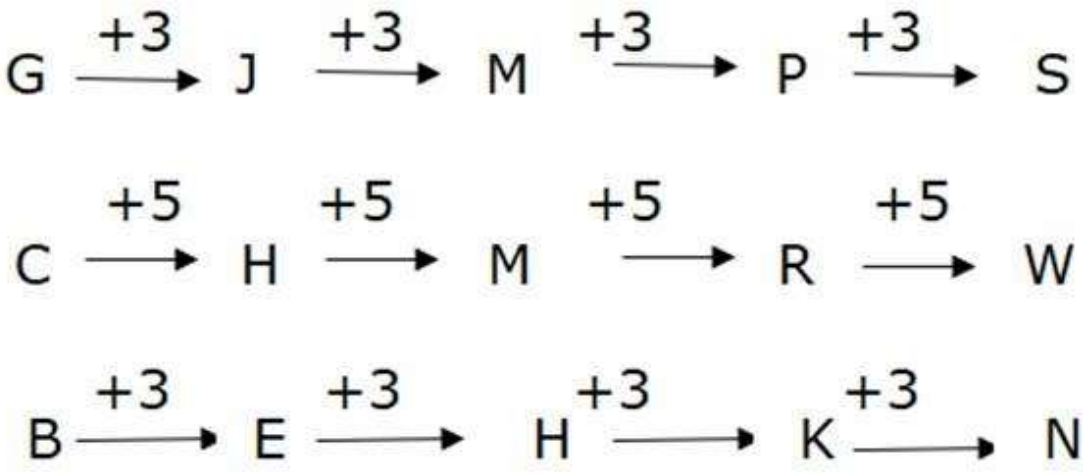
B TXO

C RVM

D SXM

Solution

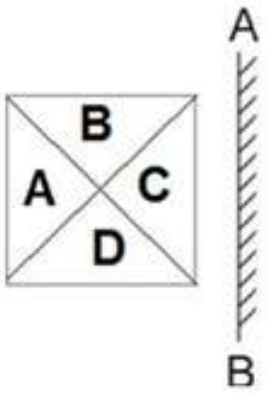
Pattern is:

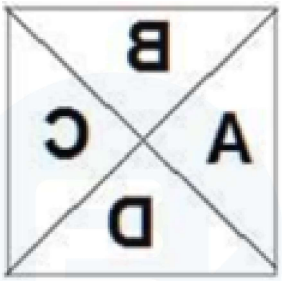


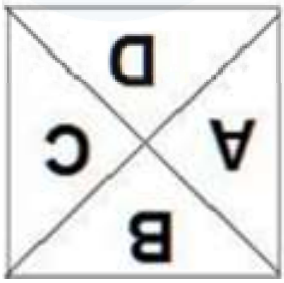
Hence, option A is the correct answer.

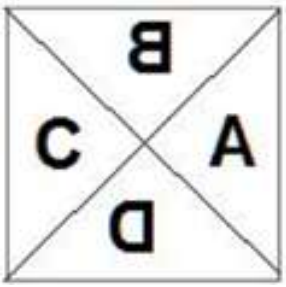
Select the correct mirror image of the given figure when the mirror is placed at 'AB' as shown.

17.

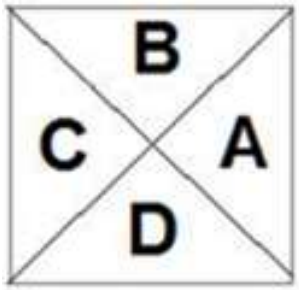


A 

B 

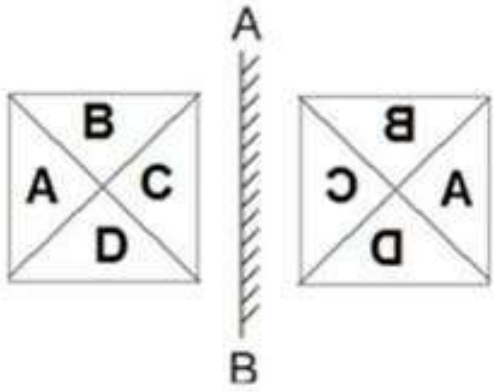
C 

D



Solution

In a plane mirror, a mirror image is a reflected duplication of an object that appears almost identical, but it is reversed in the direction perpendicular to the mirror surface. As an optical effect it results from reflection of substances such as a mirror or water.



Hence, option A is the correct answer.

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

18. **Chicken : Flock :: Bear : ?**

A **Sleuth**

B Clutter

C Drove

D Ambush

Solution

as,

group of Chicken is called as Flock.

Similarly,

group of Bear is called as Sleuth.

Hence, option A is the correct answer.

19. **Four words have been given, out of which three are alike in some manner and one is different. Select the word that is different.**

A **Prowl**

B Yowl

C Howl

D Growl

Solution

Except Prowl, all are sound of different wild animals while fighting.

Prowl means to move around quietly in a place trying not to be seen or heard, such as an animal does when hunting.

Hence, option A is the correct answer.

Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follows from the statements.

20. **Statements:**

All computers are laptops.

All hard disks are pen drives.

No pen drive is a keyboard.

No computer is a hard disk.

Conclusions:

I. Some pen drives are not laptops.

II. No keyboard is a computer.

III. No hard disk is a laptop.

IV. All pen drives are not keyboards.

A Only conclusion III follows

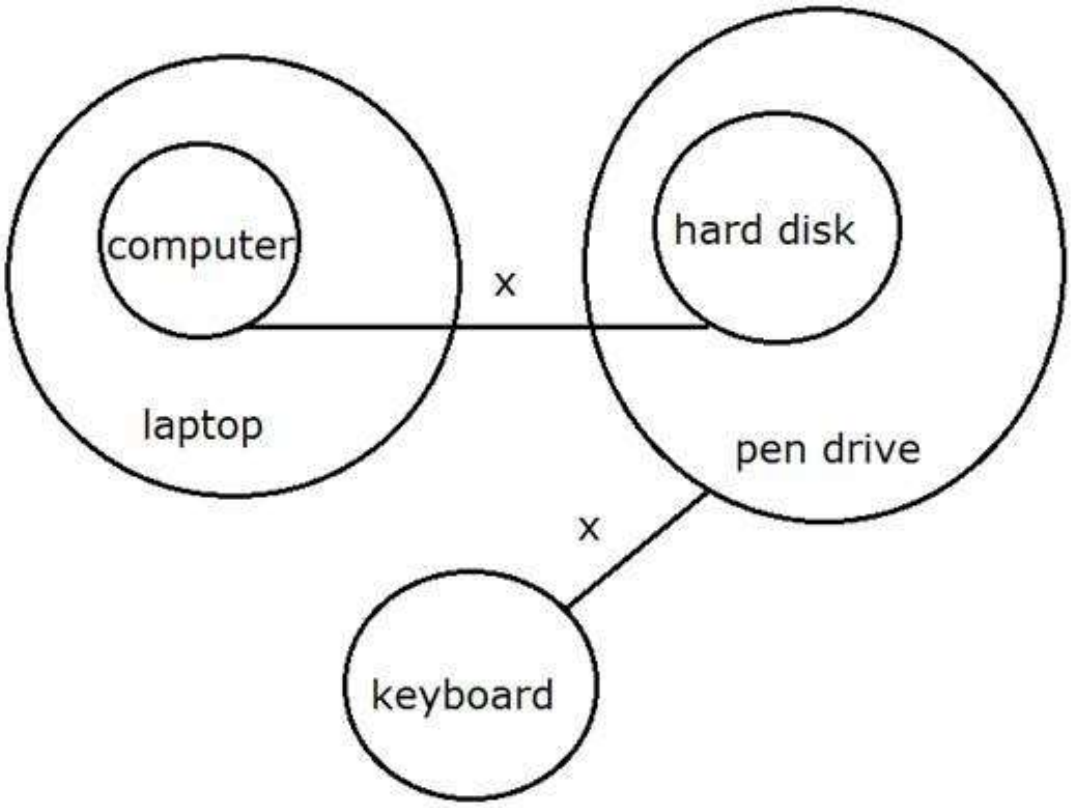
B Only conclusion IV follows

C Only conclusion I follows

D Only conclusion II follows

Solution

Minimum Possible diagram is-



Conclusions:

I. Some pen drives are not laptops. (It does not follow as it is just a possibility, not surety.)

II. No keyboard is a computer. (It also does not follow as it is just a possibility, not surety.)

III. No hard disk is a laptop. (It also does not follow as it is just a possibility, not surety.)

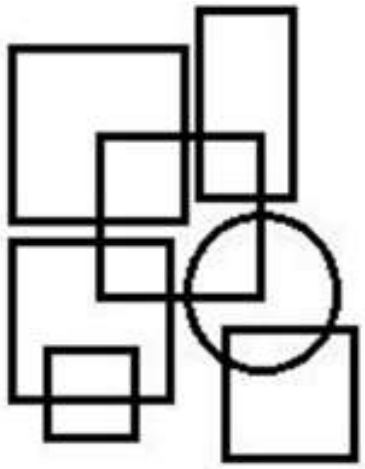
IV. All pen drives are not keyboards. (It follows because No pen drive is a keyboard.)

So, only conclusion IV follows.

Hence, option B is the correct answer.

Find the number of squares in the given figure. (Rectangles NOT to be included)

21.



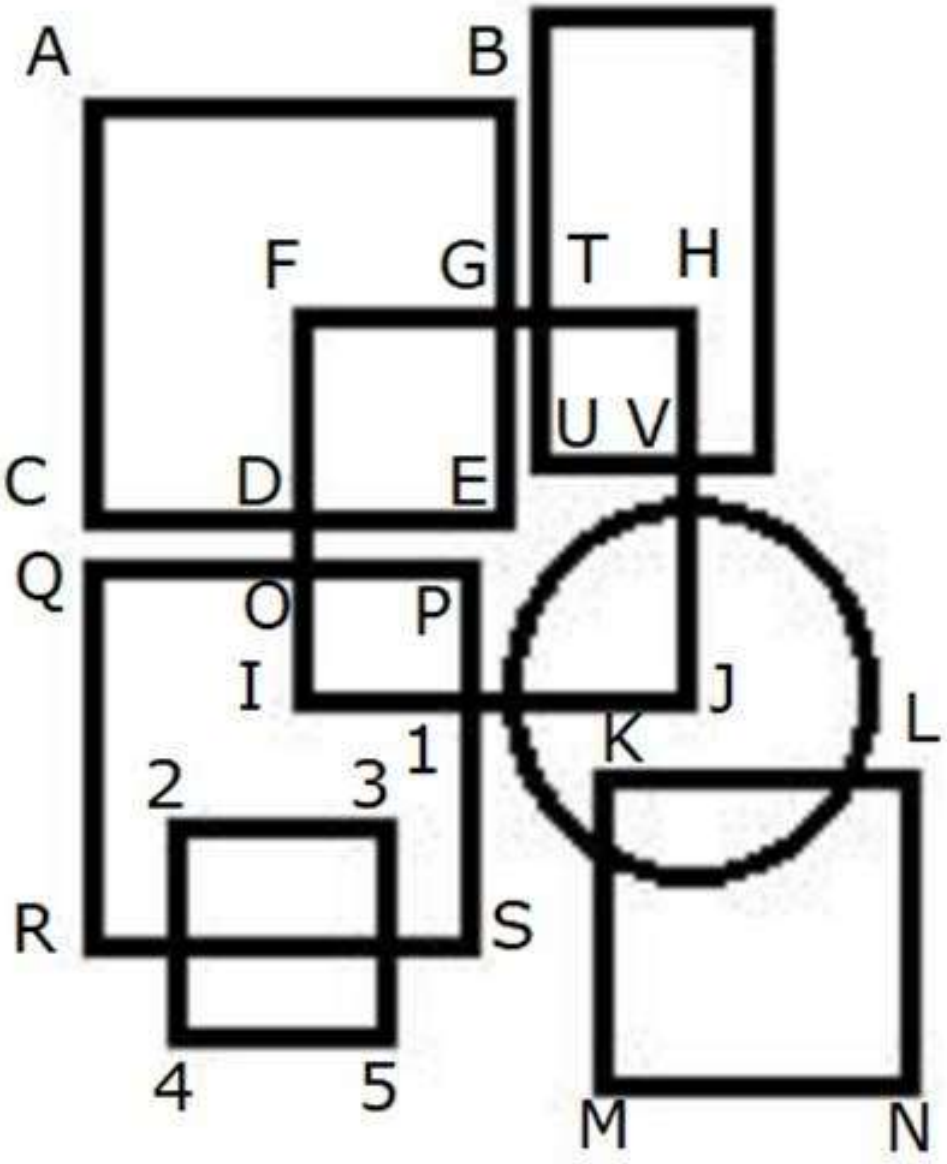
A 16

B 7

C 9

D 5

Solution



Total 7 squares are there.

ABEC, FGED, THVU, QPSR, KLNM, OP1I, 2354

Hence, Option B is the correct answer.

Select the option in which the words share the same relationship as that shared by the given pair of words.

22. **Raj Ghat : Mahatma Gandhi**

A Shanti Vana : Rajiv Gandhi

B **Vijay Ghat : Lal Bahadur Shastri**

C Shakti Sthal : Sanjay Gandhi

D Veer Bhoomi : Indira Gandhi

Solution

as,

Raj Ghat is a memorial dedicated to Mahatma Gandhi in Delhi, India.

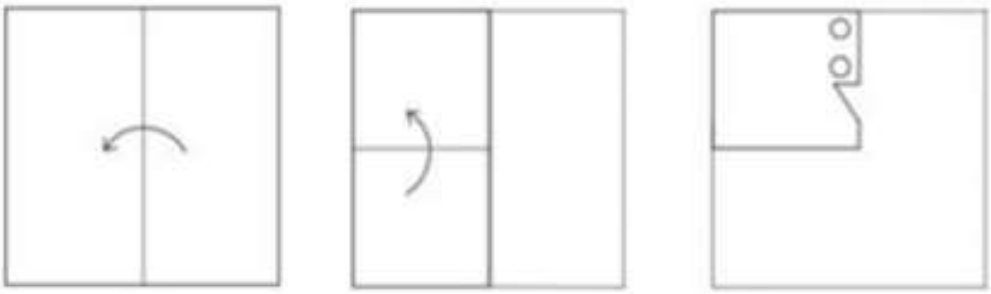
Similarly,

Vijay Ghat is the memorial of India's second Prime Minister Lal Bahadur Shastri.

Hence, option B is the correct answer.

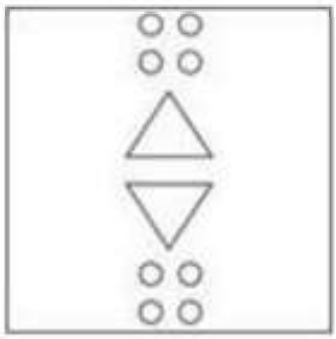
The sequence of folding a piece of paper and the manner in which the folded paper has been cut is shown in the following figures. How would this paper look when unfolded?

23.

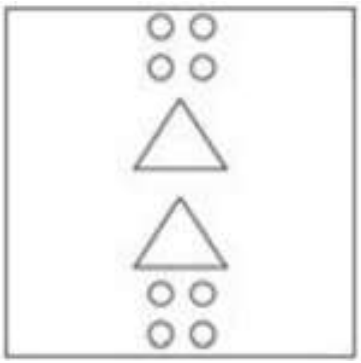


A

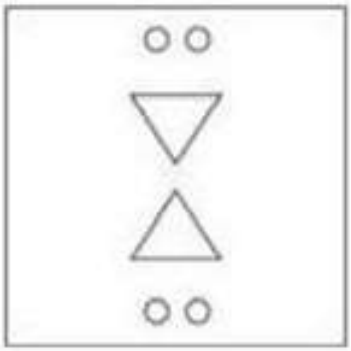
B



C

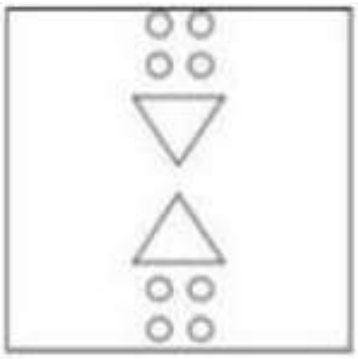


D



Solution

As given in the figure, we need to fold it in the given manner and Option C would appear when unfolded.



Hence, option C is the correct answer.

Study the given pattern carefully and select the number that can replace the question mark(?) in it.

24. **22 32 7**

18 24 5

32 40 ?

A 10

B 4

C **8**

D 12

Solution

The pattern followed is: \(18 \times2 -(22-18) = 32 \)

\(24\times2 -(32-24) = 40\)

Similarly,

\(5\times2 -(7-5) = 8\)

Hence, option C is the correct answer.

Study the given pattern carefully and select the number that can replace the question mark (?) in it.

25. **6 11 14**

8 3 ?

62 47 89

A 5

B 6

C 15

D 4

Solution

Column 1:

[(6+1)*(8+1)*]-1=[79]-1=63-1=62

Column 2:

[(11+1)*(3+1)*]-1=[124]-1=48-1=47

Column 3:

[(14+1)*(?+1)]-1=89

or, [(15)*(?+1)]-1=89

or, [(15)*(?+1)]=89+1

or, 15*(?+1)=90

or, (?+1)=90/15=6

or, ?=6-1=5

Hence, option A is the correct answer.

26. **Who among the following is the author of the book 'Interpreter of Maladies'?**

A Anita Nair

B Sudha Murty

C Arundhati Roy

D **Jhumpa Lahiri**

Solution

● Jhumpa Lahiri is the author of the book ‘Interpreter of Maladies’.

● She is known for her short stories, novels and essays in English.

● Interpreter of Maladies is a book collection of nine short stories and It was published in 1999.

● It won the Pulitzer Prize for Fiction and the Hemingway Foundation/PEN Award in the year 2000.

● Arundhati Roy is an Indian author best known for her novel The God of Small Things.

● Anita Nair is best known for her novels A Better Man, Mistress, and Lessons in Forgetting.

27. **In February 2021, the Defence Ministry of India awarded a co Light Combat Aircraft (LCA) Tejas fighters to __.**

A Defence Research and Development Organisation

B Bharat Dynamics Limited

C **Hindustan Aeronautics Limited**

D Bharat Electronics Limited

Solution

● The Defence Ministry of India awarded a contract to manufacture 83 Light Combat Aircraft (LCA) Tejas fighters to Hindustan Aeronautics Limited in February 2021.

● They will deliver Light Combat Aircraft Tejas to the Indian Air Force by March 2024.

● The HAL Tejas is an Indian multirole light fighter designed by the Aeronautical Development Agency and Aircraft Research & Design Centre.

● It is the smallest and lightest in its class of contemporary supersonic combat aircraft.

● Hindustan Aeronautics Limited is an Indian state-owned aerospace and defence company.

28. **__ organised his trusted nobles into a group of forty known as Turkani-Chahalgani.**

A **Iltutmish**

B Ala-ud-Din Khilji

C Qutub-Ud-Din Aibak

D Balban

Solution

● Iltutmish organised his trusted nobles into a group of forty known as Turkani-i-Chahalgani.

● It was the council of 40 Turkic and non-Turkic slave emirs who administered the Delhi Sultanate as per the wishes of the sultan.

● It was the first regular ministerial body in the history of the Indian subcontinent.

● Iltutmish was the first Muslim sovereign to rule from Delhi and He is considered the effective founder of the Delhi Sultanate.

● Alauddin Khilji was one of India's greatest kings and one of the world's greatest military geniuses.

29. **__ is a branch of biology that studies fungi.**

A Morphology

B Virology

C Kalology

D **Mycology**

Solution

● Mycology is a branch of biology that studies fungi.

● Fungi can be single-celled or very complex multicellular organisms.

● They reproduce by making spores through both asexual and sexual processes.

● Virology is the study of viruses and the first viruses were discovered in 1898.

● Kalology is the study of facial beauty and the way in which our beauty affects our lifestyle.

● Morphology is a branch of biology dealing with the study of the form and structure of organisms and their specific structural features.

30. **Who among the following was the Australian Open 2020 women's**

A Garbine Muguruza

B Simona Halep

C Serena Williams

D **Sofia Kenin**

Solution

● Sofia Kenin was the Australian Open 2020 women's singles winner.

● He is an American professional tennis player and ranked world no 4 by the Women's Tennis Association.

● Australian Open 2020 was a Grand Slam tennis tournament and It took place from 20 January to 2 February 2020.

● It was the 108th edition of the Australian Open and It was the first Grand Slam of the year.

● The tournament is run by the International Tennis Federation and is played on hard courts.

● It has grown to become one of the biggest sporting events in the Southern Hemisphere.

31. **The elements of the groups 3 to 12 are called __ element**

A **d-block**

B a-block

C c-block

D b-block

Solution

● The elements of groups 3 to 12 are called d-block elements or transition elements.

● They are placed between S and P block elements.

● The ionization potential of d-block elements increases from left to right.

● They have a similar number of electrons in the furthest shell and They have a lot of electrons & distribute them in different ways.

● These metals are both ductile & malleable and conduct electricity & heat.

● Group 3 is the first group of transition metals in the periodic table and This group is closely related to the rare-earth elements.

32. **How many people were awarded the Padma Vibhushan in January**

A 4

B 10

C 7

D 29

Solution

- 7 people were awarded the Padma Vibhushan in January 2021.
- The names of the Padma Vibhushan in January 2021 are:

a) Shri Shinzo Abe

b) Shri B. B. Lal Others

c) Shri Sudarshan Sahoo

d) Dr. Belle Monappa Hegde

e) Maulana Wahiduddin Khan

f) Shri Narinder Singh Kapany (Posthumous)

g) Shri S P Balasubramaniam (Posthumous)

● Padma Vibhushan is the second-highest civilian award of the Republic of India.

● It was instituted on 2 January 1954 and it is given for exceptional and distinguished service.

● The first recipients of the award were Satyendra Nath Bose, Nand Lal Bose, Zakir Hussain, Balasaheb Gangadhar Kher, Jigme Dorji Wangchuck and V. K. Krishna Menon.

33. **Where is the headquarters of the International Hockey Federation (FIH) located?**

A **Switzerland**

B Bhutan

C Australia

D Nepal

Solution

● The headquarters of the International Hockey Federation (FIH) is located in Switzerland.

● International Hockey Federation is the international governing body of field hockey and indoor field hockey.

● It is responsible for field hockey's major international tournaments.

● It was founded on 7 January 1924 in Paris by Paul Leautey.

● Switzerland is a landlocked country at the confluence of Western, Central and Southern Europe.

● Australia is the largest country by area in Oceania and the world's sixth-largest country.

● Bhutan is a landlocked country in the Eastern Himalayas and It is located between China and India.

34. **Who among the following had written the book 'Char Chaman', Shah Jahan, describing the Mughal nobility?**

A Gulbadan Begum

B Abu'l Dazl

C **Chandrabhan Brahman**

D Muhammad Waris

Solution

● Chandrabhan Brahman had written the book 'Char Chaman', during the reign of Shah Jahan, describing the Mughal nobility.

● He was an Indian poet of the Urdu language born in Lahore during the Mughal era.

● He was appointed as court chronicler and he was given responsibility for maintaining Shah Jahan's personal diary.

● Chahar Chaman is a history of the rule of Shah Jahan and It was written during the reign of Shah Jahan.

● Shah Jahan was the fifth Mughal emperor of India and reigned from 1628 to 1658.

● He was an able military commander and he was known for his prosperous architectural monuments.

35. **In which of the following years was the origin and enactment of the Indian Age of Consent Act passed?**

A 1901

B 1889

C **1891**

D 1834

Solution

● The origin and enactment of the Indian Age of consent act were passed in 1891.

● It was legislation enacted in British India on 19 March 1891.

● It received support from Indian reformers such as Behramji Malabari and women social organisations.

● It raised the age of consent for sexual intercourse for all girls, married or unmarried, from ten to twelve years in all jurisdictions.

● It was introduced as a bill on 9 January 1891 by Sir Andrew Scoble.

● The law was signed by Governor-General Sir Andrew Scoble and Viceroy Lord Lansdowne.

36. **Which of the following is private good?**

A Non-rival in consumption and non-excludable

B A good that is consumed by a single person or household

C Spillover benefits

D
A good that is available to everyone to consume, regardless of who pays for it and who does not

Solution

● A private good is a good that is consumed by a single person or household.

● These are the goods whose ownership is restricted to the group or individual that purchased the good for their own consumption.

● It is an item that is purchased for the benefit or utility of the buyer.

● The market demand curve for a private good is a horizontal summation of individual demand curves.

● A public good is a good that is both non-excludable and non-rivalrous.

● It is a good that is available to everyone to consume regardless of who pays for it and who does not.

37. **Who is the ex-officio President of the Indian Parliamentary Group (IPG), set up in 1949, which functions as the national group of the Inter-Parliamentary Union (IPU) and the main branch of the Commonwealth Parliamentary Association (CPA) in India?**

A Vice President

B Prime Minister

C President

D Speaker of the Lok Sabha

Solution

● Speaker of the Lok Sabha is the ex-officio President of the Indian Parliamentary Group (IPG), set up in 1949, which functions as the national group of the Inter-Parliamentary Union (IPU) and the main branch of the Commonwealth Parliamentary Association (CPA) in India.

● He is the presiding officer and the highest authority of the Lok Sabha.

● He also presides over the joint sitting of both houses of the Parliament of India.

● He is responsible for presiding over assembly debates and maintains order & discipline of the house during legislative sessions.

● The President is the ceremonial head of the state of India and the commander-in-chief of the Indian Armed Forces.

● The prime minister is the senior-most member of the cabinet in the executive branch of the federal government in the parliamentary system.

38. **In which state is Ponu Yoksi, a sword-like instrument, used performed by priests?**

A **Arunachal Pradesh**

B Madhya Pradesh

C Uttar Pradesh

D Himachal Pradesh

Solution

● Pony Yoksi, a sword-like instrument used by priests in Arunachal Pradesh.

● There are two iron plates in the centre with holes and they make clanging sounds which are used by the priest to keep rhythm during ceremonial dances

● Arunachal Pradesh is the largest of the Seven Sister States of Northeast India by area.

● It is known for its pristine beauty & the lush green forests and It is also known as the Land of the Rising Sun.

● Madhya Pradesh is the second-largest Indian state by area and the fifth largest state by population.

● Uttar Pradesh is the most populated state in India and the most populous country subdivision in the world.

39. **Of the known elements in the periodic table, only __ are gases under normal atmospheric conditions.**

A 10

B 13

C **11**

D 12

Solution

● There are 11 gases under normal atmospheric conditions of the known elements in the periodic table.

● These are gases under ordinary conditions hydrogen, nitrogen, oxygen, fluorine, chlorine, neon, helium, argon, krypton, xenon and radon.

● Hydrogen is the lightest element and the most abundant chemical substance in the universe.

● Oxygen is Earth's most abundant element and it is the third-most abundant element in the universe.

● Fluorine is a pale yellow gas and is the most reactive of all elements.

● Helium is the first in the noble gas group in the periodic table and It is the second most abundant element in the universe.

40. **Which of the following nations is NOT a part of the Quad Group?**

A Australia

B India

C Japan

D **Canada**

Solution

● Canada is not a part of the Quad Group.

● It is a country in North America and It is the world's second-largest country by total area.

● The Quad group comprises Australia, US, India and Japan.

● It is a security alliance between four countries and It was formed in 2007.

● Australia is the largest country by area in Oceania and the world's sixth-largest country.

● The USA is the third most populous country in the world.

● India is the second-most populous country and the most populous democracy in the world.

41. **Which of the following countries' former Prime Ministers was awarded the Padma Vibhushan award in 2021?**

A **Japan**

B Bangladesh

C Nepal

D Sri Lanka

Solution

● Japan's former Prime Minister was awarded the Padma Vibhushan award in 2021.

● Shinzo Abe is the longest-serving prime minister in Japanese history.

● Japan is one of the most densely populated and the eleventh most populous countries in the world.

● It is known for its neon lights, high-tech robots and commitment to innovation and creativity.

● Padma Vibhushan is the second-highest civilian award of the Republic of India.

● It was instituted on 2 January 1954 and it is given for exceptional and distinguished service.

42. **In which Indian state will you find the Borail Wildlife Sanctuary?**

A Odisha

B **Assam**

C Karnataka

D West Bengal

Solution

● The Borail Wildlife Sanctuary is found in Assam.

● It consists of the North Cachar Reserved Forest and Barail Reserved Forest, located within the Cachar district.

● It spreads over 326.24 km2 and The altitude ranges between 55–1500 m above mean sea level.

● It is one of the largest sanctuaries in Assam and It is one of the worth visiting places in Assam.

● It is an ideal place for both mammals and reptiles.

● Assam is known for Assam tea & Assam silk and It was the first site for oil drilling in Asia.

43. **The __ rate measures rising prices in everything except food and energy.**

A **Core inflation**

B Wage inflation

C Deflation

D Stagflation

Solution

● The Core inflation rate measures rising prices in everything except food and energy.

● It is most often calculated using the consumer price index which is a measure of prices for goods and services.

● Deflation is a decrease in the general price level of goods and services.

● It is usually associated with a contraction in the supply of money and credit.

● Stagflation is a situation in which the inflation rate is high, the economic growth rate slows and unemployment remains steadily high.

● It is very costly and difficult to eradicate once it starts both in social terms and in budget deficits.

44. **Which of the following is one of the metals used in LED semiconductor technology?**

A Iron

B Zinc

C **Gallium**

D Copper

Solution

● Gallium is one of the metals used in LED semiconductor technology.

● It is predominantly used in electronics and does not occur as a free element in nature.

● Zinc is the first element in group 12 of the periodic table and It is the 24th most abundant element in Earth's crust.

● Iron is the fourth most common element in the Earth's crust.

● Copper is a reddish-gold coloured metal and It is ductile, malleable and an effective conductor of heat & electricity.

● It is an essential trace mineral that occurs in all body tissues.

45. **The place of Gautama Buddha's birth was a grove known as __**

A Kavus

B Mangar Bani

C **Lumbini**

D Mawphlang

Solution

● The place of Gautama Buddha's birth was a grove known as Lumbini.

● Gautama Buddha is regarded as the founder of the world religion of Buddhism.

● He was an ascetic, a religious leader and a teacher who lived in ancient India.

● He gave his first sermon in Sarnath and He died in Kushinagar, India.

● He is regarded as the founder of the world religion of Buddhism.

● Lumbini is one of the holiest places of one of the world's great religions.

● It is one of the four main pilgrimage sites of Buddhism in the world.

46. **__ is a practice of establishing and managing individual trees generally for amenity purposes.**

A **Arboriculture**

B Viniculture

C Floriculture

D Silviculture

Solution

● Arboriculture is a practice of establishing and managing individual trees generally for amenity purposes.

● It is the cultivation, management and study of individual trees, shrubs, vines and other perennial woody plants.

● Viticulture is the cultivation & harvesting of grapes and It is a branch of the science of horticulture.

● Floriculture is a discipline of horticulture concerned with the cultivation of flowering and ornamental plants for gardens & for floristry.

● Silviculture is the practice of controlling the growth, structure and quality of forests to meet values and needs.

47. **When is the Hindi Diwas observed annually?**

A 2 October

B 14 September

C 14 March

D 6 April

Solution

● The Hindi Diwas observed annually on 14 September.

● It is celebrated for the upliftment of Hindi and to promote Hindi in the country.

● April 6 is observed as the International Day of Sport for Development and Peace.

● Gandhi Jayanti is celebrated annually in India on 2 October.

● It is celebrated annually in India to mark the birthday of Mahatma Gandhi.

● International Day of Non-Violence is also observed on 2 October.

● National Pi Day is observed on March 14th and It recognizes the mathematical constant π.

48. **Who among the following was the first Vice President of India?**

A Zakir Hussain

B Varahagiri Venkata Giri

C **Sarvepalli Radhakrishnan**

D Gopal Swarup Pathak

Solution

● Sarvepalli Radhakrishnan was the first Vice President of India.

● He also served as the second president of India from 1962 to 1967.

● He was one of the most distinguished twentieth-century scholars of comparative religion and philosophy.

● Zakir Hussain served as the 3rd president of India and 2nd Vice President of India.

● V. V. Giri was the fourth president of India and the only president to be elected as an independent candidate.

● Gopal Swarup Pathak was the fourth vice president of India from August 1969 to August 1974.

● The Vice president is the second-highest constitutional office.

49. **What is the name of the river formed by the confluence of Sankh River and South Koel River at Vedvyas in Odisha?**

A Pennar

B Sabarmati

C Subarnarekha

D **Brahmani**

Solution

● Brahmani is the name of the river formed by the confluence of the Sankh River and South Koel River at Vedvyas in Odisha.

● It is a major seasonal river in the Odisha state of eastern India.

● Odisha is the 8th largest state by area and the 11th largest by population.

● The Subarnarekha River flows through the Indian states of Jharkhand, West Bengal and Odisha.

● The Sabarmati river is one of the major west-flowing rivers in India and It originates in the Aravalli Range.

● Penna is a unique river in the world where after originating from Nandi hills, it flows as two different streams, one in North and South directions.

50. **Which of the following is also called ‘green algae’?**

A Phaeophyceae

B Rhodophyceae

C Porphyridium

D **Chlorophyceae**

Solution

● Chlorophyceae is also called ‘green algae’.

● They are usually green due to the dominance of pigments chlorophyll a and chlorophyll b.

● They usually have a cell wall made up of an inner layer of cellulose and an outer layer of pectose.

● Phaeophyceae is a brown algae and It is generally found in a coastal, temperate and marine environment.

● Porphyridium cruentum is a species of red algae in the family Porphyridium Phyceae.

● Algae is an informal term for a large and diverse group of photosynthetic eukaryotic organisms.

Select the option that expresses the given sentence in passive voice.

51. **The postman had delayed the letter.**

A. The letter was delayed by the postman.

B. **The letter had been delayed by the postman.**

C. The postman had been delayed by the letter.

D. The letter had delayed the postman

Solution

The given sentence is an assertive sentence. The sentence is in past perfect tense.

The structures for active/passive voices are:

Active voice= Subject + had + v3+ object.

Passive voice= Object+ had +been +V3+ by + subject

So, with the help of the above instructions, we can convert the given sentence into passive voice: The letter had been delayed by the postman.

Hence, option B is the correct answer.

Select the most appropriate option to substitute the underlined segment in the given sentence. If no substitution is required, select 'No substitution'.

52. **Sholay is one in the most popular Hindi movies.**

A is one in the more popular

B is in the most popular

C No substitution

D is one of the most popular

Solution

The given sentence is grammatically incorrect.

The sentence has incorrect preposition.

'In' is used to show place, inside or to a position inside a particular area or object.

'Of' is used as a function word to indicate a point of reckoning.

Thus, 'is one of the most popular' is the most suited one.

The correct sentence is: 'Sholay is one of the most popular Hindi movies'.

Hence, option D is the correct answer.

53. **Select the INCORRECTLY spelt word.**

A **Luxuriaus**

B Recluse

C Virtuous

D Profuse

Solution

Option A has the incorrectly spelt word.

“Luxurious” is the correctly spelt word for “luxurious”. It means very comfortable; full of expensive and beautiful things.

Meaning of the other words are :-

Recluse = a person who lives alone and who maintains very little contact with other people or society.

Virtuous = having good moral qualities and behaviour.

Profuse = produced or given in large amounts.

Select the most appropriate synonym of the given word.

54. **Chaos**

A Dirt

B Confusion

C Tension

D Fusion

Solution

- Let us understand the meaning of the given words:-
- Chaos= a state of total confusion with no order.
- E.g.: Snow and ice have caused chaos on the roads.
- Dirt= a substance that is not clean, such as dust or mud.
- Confusion= the state of not being able to think clearly or not understanding something.
- E.g.: He stared in confusion at the exam paper.
- Tension= the condition of not being able to relax because you are worried or nervous.
- Fusion= the process or the result of joining different things together to form one.
- Hence, option B is the correct answer.

55. **Select the INCORRECTLY spelt word.**

A Perfectionist

B **Pessymist**

C Optimist

D Fatalist

Solution

Option B has the incorrectly spelt word.

“Pessimist” is the correctly spelt word for “pessimist”. It means a person who always thinks that bad things will happen or that something will be not be successful.

Meaning of the other words:-

Perfectionist= a person who always does things as well as he/she possibly can and who expects others to do the same.

Optimist= someone who always believes that good things will happen.

Fatalist= a person who believes that all events are inevitable.

Select the most appropriate ANTONYM of the given word.

56. **Elated**

A Proud

B Depressed

C Excited

D Thrilled

Solution

Let us understand the meaning of the given words:-

Elated= very happy and excited.

E.g.: I was elated that my second heart bypass had been successful.

Proud= feeling pleased and satisfied about something that you own or have done.

Depressed= very unhappy, often for a long period of time.

E.g.: He's been very depressed since he lost his job.

Excited= feeling or showing happiness and enthusiasm; not calm.

Thrilled= extremely happy about something.

Hence, option B is the correct answer.

Select the most appropriate meaning of the following idiom.

57. **To the nines**

A. To great depths

B. To perfection

C. To be exalted

D. To be jealous

Solution

The given idiom “to the nines” means to a great or elaborate extent.

E.g.: The women were dressed to the nines.

According to the given options, the idiom can be defined as to perfection.

Hence, option B is the correct answer.

Sentences of a paragraph are given below in jumbled order. Arrange the sentences in the right order to form a meaningful and coherent paragraph.

58. **A) There are many secondary reasons as well along with increasing levels of carbon.**

B) The term is used to describe the unnatural rise in earth's average temperature.

C) Increased carbon dioxide is the primary driver of global warming.

D) Global warming is the single biggest threat to life on earth today.

A DABC

B DBCA

C ACBD

D ABCD

Solution

The first in the sequence should be the one that introduces us to the theme of the passage. Here, the passage is about global warming. Thus, D will be the first sequence.

B will be the next in the sequence as it talks about the meaning of the term global warming.

C will be the next as it talks about the main reason behind global warming.

A will be the final sentence of the sequence as it is in continuation with the sentence C.

Thus, the correct sequence is DBCA.

Sentences of a paragraph are given below in jumbled order. Arrange the sentences in the right order to form a meaningful and coherent paragraph.

59. **A) This awareness has motivated everyone to go for physical exercise.**

B) These days people are more aware of their health.

C) In addition to physical exercises, some prefer taking supplements.

D) It is advisable, but one should consult a trainer/doctor before supplements.

A DBCA

B BACD

C BADC

D ADBC

Solution

The first in the sequence should be the one that introduces us to the theme of the passage. Here, the passage is about health awareness. Thus, B will be the first sequence.

A will be the next in the sequence as it talks about awareness for exercise.

C will be the next as it talks about the consumption of supplements.

D will be the final sentence of the sequence as it is in continuation with the sentence C.

Thus, the correct sequence is BACD.

After arranging the sentences, the passage will be: - These days people are more aware of their health. This awareness has motivated everyone to go for physical exercise. In addition to physical exercises, some prefer taking supplements. It is advisable, but one should consult a trainer/doctor before supplements.

Hence, option B is the correct answer.

Select the most appropriate meaning of the following idiom.

60. **Apple of one's eye**

1. **Someone who plays all sports**
2. **Someone who behaves courteously**
3. **Someone very precious or dear**

A **Only 3**

B Only 2

C Only 1

D None of the above

Solution

The given idiom “apple of one’s eye” means a person of whom one is extremely fond and proud.

According to the given options, the given idiom can be explained as someone very precious or dear.

Hence, option C is the correct answer.

The following sentence has been divided into parts. One of them contains an error. Select the part that contains the error from the given options.

61. **"Would you liked / to have / some fries / along with your coffee, / sir?" / asked the waiter.**

A some fries

B along with your coffee

C asked the waiter

D Would you liked

Solution

The sentence is grammatically incorrect, and the error lies in option D.

Would is a modal auxiliary verb. We use would mainly to: talk about the past, talk about the future in the past, express the conditional mood.

Here, we used 'would' for polite requests.

E.g. :- would like or would you mind doing…?

The main verb is usually in the base form after it.

Thus, replace ‘liked’ with ‘like’ to make the sentence grammatically correct.

The correct sentence will be:- Would you like to have some fries along with your coffee, sir?” asked the waiter.

Select the most appropriate option to substitute the underlined segment in the given sentence. If no substitution is required, select 'No substitution.

62. **Much of the truth about the mysterious death of her pet was not revealed.**

A. were not being revealed

B. have not revealed

C. **No substitution**

D. were not revealed

Solution

The sentence is grammatically and contextually correct.

Hence, option C is the correct answer.

Select the most appropriate option to fill in the blank.

63. **I read some __ of properties for sale on the Internet before I called the agent.**

A monologues

B descriptions

C arguments

D spaces

Solution

The given blank needs to be filled with a noun.

Let us understand the meaning of the given word :-

Monologues = a long speech by one person, for example in a play.

Descriptions = a statement, picture in words, or account that describes; descriptive representation.

Arguments = an angry discussion between two or more people who disagree with each other.

Spaces = to arrange things so that there are empty spaces between them.

The given sentence talks about the descriptive representation of the flats.

Thus, ‘descriptions’ is the most suited one.

Hence, option B is the correct answer.

The following sentence has been split into four segments. It contains a grammatical error.

64. **The supervisor / wanted to known / the pros and cons / of the internet.**

A The supervisor

B **wanted to known**

C of the issue

D the pros and cons

Solution

The sentence is grammatically incorrect and the error lies in option B.

Known is the third form of verb and the sentence is in past tense.

Using known with wanted is grammatically incorrect.

Moreover, we put base form of the verb after preposition ‘to’.

Thus, replace ‘known’ with ‘know’ to make the sentence grammatically correct.

The correct sentence will be:- The supervisor wanted to know the pros and cons of the internet.

65. **Select the most appropriate one-word substitution for the given group of words.**

A large bedroom for a number of people in an institution.

A Assembly

B **Dormitory**

C Creche

D Hostel

Solution

- Dormitory- a large bedroom for a number of people in a school or institution.
- Auditorium- the part of a theater, concert hall, or other public building in which the audience sits.
- Chamber- a large room used for formal or public events.
- Apartment- a suite of rooms forming one residence, typically in a building containing a number of these.

Select the option that expresses the given sentence in indirect speech.

66. **The teacher said, “Man is mortal.”**

A. The teacher instructed that man was mortal.

B. The teacher said that men were mortal.

C. The teacher said that man was mortal.

D. The teacher said that man is mortal.

Solution

The given sentence is in direct speech of an assertive sentence.

- The comma and inverted commas will be replaced by a conjunction ‘that’.
- The given sentence is in past tense.
- There is no change in the tense if there is a universal truth.

So, with the help of the above rules, we can convert the given sentence into indirect speech as: - The teacher said that man is mortal.

Hence, option D is the correct answer.

Select the most appropriate ANTONYM of the given word.

67. **Harmony**

A Concord

B **Conflict**

C Amity

D Accord

Solution

Let us understand the meaning of the given options:-

Harmony= a state of agreement or of peaceful existence together.

E.g.: We need to live more in harmony with our environment.

Concord= peace and agreement.

Conflict= a fight or an argument.

Amity= friendly relations.

Accord= an agreement, especially between countries.

Hence, option B is the correct answer.

Select the option that can be used as a one-word substitute words.

68. **A group of people, typically with vehicles or animals, travelling**

A Gang

B Troop

C **Caravan**

D Circus

Solution

Gang= an organized group of criminals.

Troop= a large group of people or animals.

Caravan= a large vehicle that is pulled by a car. You can sleep, cook, etc. in a caravan when you are travelling or on holiday.

Circus= a show performed in a large tent by a company of people and animals.

Hence, option C is the correct answer.

Select the most appropriate option to fill in the blank.

69. **The jungle was nearly __, so the progress was slow.**

A **impenetrable**

B immaterial

C immortal immobile

D immobile

Solution

The given blank needs to be filled with an adjective.

Let us understand the meaning of the given words :-

Impenetrable= impossible to enter or go through.

Immaterial= not important

Immortal= living or lasting for ever.

Immobile= not moving or not able to move

The given sentence talks about the difficulties takes place during entering the jungle.

Thus, ‘impenetrable’ is the most suited one.

Hence, option A is the correct answer.

Select the most appropriate synonym of the given word.

70. **Rejuvenate**

A Reset

B Retake

C Retell

D **Refresh**

Solution

Let us understand the meaning of the given words :-

Rejuvenate = to make someone look or feel young and energetic again.

E.g. :- She felt rejuvenated by her fortnight in the Bahamas.

Reset = to turn a piece of electronic equipment off and then on again when it does not work correctly, to make it start working correctly again.

Retake = to take an exam again because you failed it the first time.

Retell = to tell someone about something again.

Refresh = to make someone less hot or tired.

E.g. :- It was such a hot night that I had a cold shower to refresh myself.

Hence, option D is the correct answer.

71.

Direction:- In the following passage, some words have been deleted. Fill in the blanks with the help of the alternatives given. Select the most appropriate option for each blank.

It is essential to form a link between formal education and skill (96)__. Multidisciplinary and personality enhancement skills are the (97)__ requirement reforms are being (98)__ in higher education to co-relate academics to the (99)__ of various service sectors. Innovative models can help to (100)__ the varied needs of skilled and unskilled labour.

A. **Select the most appropriate option to fill in blank no.2**

A domestic

B essential

C external

D needless

Solution

The passage is all about the link between formal education and skill development.

Let us understand the meaning of the given words:-

Domestic= not international; only within one country.

Essential= completely necessary; that you must have or do.

External= connected with the outside of something.

Needless= that is not necessary and that you can easily avoid.

In the given passage, enhancing skills are the necessary or needed requirement.

Thus, 'essential' is the most suited one.

Hence, option B is the correct answer.

B. **Select the most appropriate option to fill in blank no.3**

A related

B introduced

C settled

D improved

Solution

The passage is all about the link between formal education and skill development.

Let us understand the meaning of the given words:-

Related= connected with somebody/something.

Introduced= to bring in something new, use something, or take something to a place for the first time.

Settled= not changing or not likely to change.

Improved= to become or to make something better.

Here, the sentence talks about the involvement of these skills in higher education.

Thus, 'introduced' is the most suited one.

Hence, option B is the correct answer.

C. **Select the most appropriate option to fill in blank no.4**

A charge

B duty

C urgency

D **need**

Solution

The passage is all about the link between formal education and skill development.

Let us understand the meaning of the given words:-

Charge= for something to ask somebody to pay a particular amount of money.

Duty= something that you have to do because people expect you to do it or because you think it is right.

Urgency= the quality or state of requiring immediate action or attention.

Need= if you need something, you want it or must have it.

Here, necessity of these skills are being shown.

Thus, 'need' is the most suited one.

Hence, option D is the correct answer.

D. **Select the most appropriate option to fill in blank no.5**

A **meet**

B meeting

C met

D meets

Solution

The passage is all about the link between formal education and skill development.

The given sentence is in present tense and the verb will be used in present tense as well.

Moreover, we require base form of the verb after preposition ‘to’.

Thus, ‘meet’ is the most suited one.

Hence, option A is the correct answer.

E. **Select the most appropriate option to fill in blank no.1**

A maturity

B development

C ripening

D progress

Solution

The passage is all about the link between formal education and skill development.

Let us understand the meaning of the given words:-

Maturity= the state of being mentally and emotionally well-developed, and therefore responsible.

Development= the process of becoming bigger, stronger, better etc., or of making somebody/something do this.

Ripening= to develop to a suitable condition for something to happen.

Progress= movement forwards or towards achieving something.

Here, we talked about the process in which skill grows or changes and becomes more advanced.

Thus, ‘development’ is the most suited one.

Hence, option B is the correct answer.

72. **If one the angles of a triangles is 74o, then the angle between the bisectors of the other two angles is:**

A 106o

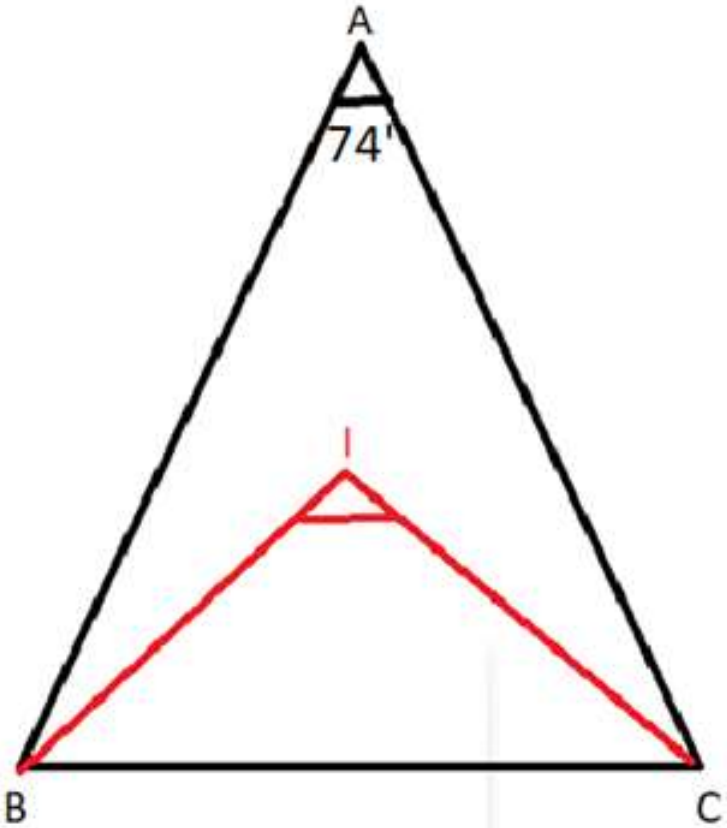
B **127o**

C 16o

D 53o

Solution

Let ABC is a triangle such that \(\angle A=74^{\circ}\)



In triangle \

(\mathrm{ABC}\) \(\Rightarrow \angle A+\angle B+\angle C=180^{\circ}\) \(\Rightarrow \angle A=180^{\circ}-(\angle B+\angle C)\) \(\Rightarrow \frac{74^{\circ}}{2}=90^{\circ}-\left(\frac{\angle B}{2}+\frac{\angle C}{2}\right)\) \(\Rightarrow\left(\frac{\angle B}{2}+\frac{\angle C}{2}\right)=90^{\circ}-37^{\circ}=53^{\circ}\)

In triangle BIC \[\Rightarrow \angle B I C+\angle B C I+\angle C B I=180^{\circ} \] \[\begin{aligned} &\Rightarrow \angle B I C+\left(\frac{\angle B}{2}+\frac{\angle C}{2}\right)=180^{\circ} \\ &\Rightarrow \angle B I C+53^{\circ}=180^{\circ} \\ &\Rightarrow \angle B I C=127^{\circ} \end{aligned} \]

73. **What is the ratio of the average of first eight prime numbers to the average of first ten even natural numbers?**

A **7 : 8**

B 1 : 7

C 8 : 70

D 7 : 80

Solution

First eight prime numbers = 2 ,3, 5 , 7 , 11 , 13 , 17 , 19 Average of first eight prime numbers = \(\frac{2+3+5+7+11+13+17+19}{8}=\frac{77}{8}\)

We know that

Average of first ‘n’ even natural numbers = \((n+1)\)

Average of first ten even natural numbers = \(10+1=11\)

Ratio of the average of first eight prime numbers to the average of first ten even natural numbers = \(=\frac{77}{8}: 11=7: 8\)

Table shows the number of trees planted in 4 cities from 2016 to 202.

Years	Chandigarh	Ahmadabad	Pune	Kolkata
2016	1800	2500	1800	2000
2017	2500	2300	1850	1800
2018	2300	2400	1840	1760
2019	2440	1950	1900	1600
2020	2250	2100	2000	1750

74. **In which year were the maximum number of trees planted?**

A 2018

B 2017

C 2020

D 2016

Solution

Number of trees planted in 2016 = 1800 + 2500 + 1800 + 2000 = 8100

Number of trees planted in 2017 = 2500 + 2300 + 1850 + 1800 = 8450

Number of trees planted in 2018 = 2300 + 2400 + 1840 + 1760 = 8300

Number of trees planted in 2019 = 2440 + 1950 + 1900 + 1600 = 7890

Number of trees planted in 2020 = 2250 + 2100 + 2000 + 1750 = 8100

Hence, Maximum number of trees is planted in 2017.

75. **\(\frac{\cot ^{3} \theta}{\operatorname{cosec}^{2} \theta}+\frac{\tan ^{3} \theta}{\sec ^{2} \theta}+2 \sin \theta \cos =?\)**

A \(\sin \theta \cos \theta\)

B \(\operatorname{cosec} \theta \sec \theta\)

C \(\operatorname{cosec}^{2} \theta \sec ^{2} \theta\)

D \(\sin ^{2} \theta \cos \theta\)

Solution

\[\frac{\cot ^{3} \theta}{\operatorname{cosec}^{2} \theta}+\frac{\tan ^{3} \theta}{\sec ^{2} \theta}+2 \sin \theta \cos \theta \] \(\Rightarrow \frac{\cos ^{3} \theta \cdot\left(\sin ^{2} \theta\right)}{\sin ^{3} \theta}+\frac{\sin ^{3} \theta \cdot\left(\cos ^{2} \theta\right)}{\cos ^{3} \theta}+2 \sin \theta \cdot \cos \theta\) \[\Rightarrow \frac{\cos ^{3} \theta}{\sin \theta}+\frac{\sin ^{3} \theta}{\cos \theta}+2 \sin \theta \cdot \cos \theta \] \[\Rightarrow \frac{\cos ^{4} \theta+\sin ^{4} \theta+2 \sin ^{2} \theta \cdot \cos ^{2} \theta}{\sin \theta \cdot \cos \theta} \] \[\Rightarrow \frac{\left(\cos ^{2} \theta+\sin ^{2} \theta\right)^{2}}{\sin \theta \cdot \cos \theta}=\frac{1}{\sin \theta \cdot \cos \theta}=\operatorname{cosec} \theta \cdot \sec \theta \]

76. **A and B complete a work in 15 days and 10 days respectively. They started doing the work together but after 4 days B had to leave. Then A working with a new worker C completed the remaining work in 3 days. If C works alone, in how many days he can do 40% of the same work?**

A 10

B **9**

C 8

D \(8 \frac{1}{2}\)

Solution

Number of days taken by A to complete the work = 15 days Number of days taken by B to complete the work = 10 days

Let Total work = LCM (10,15) = 30 unit

Efficiency of \(A=\frac{30}{15}=2\) unit/day Efficiency of \(B=\frac{30}{10}=3\) unit/day

They started doing the work together but after 4 days B had to leave. Then A working with a new worker C completed the remaining work in 3 days.

Let Efficiency of C = x unit/day

According to question

$\Rightarrow(4)(2+3)+(2+x) 3=30$ $\Rightarrow 20+6+3 x=30$ $\Rightarrow 3 x=4$ $\Rightarrow x=\frac{4}{3}$

Number of days taken by C to complete the work$=\frac{30}{4} \times 3=\frac{90}{4}$ unit/day

Number of days taken by C to complete 40% of the work $=k=\frac{90}{4} \times \frac{40}{100}=9$ days

77. **A train leaves station A at 8 am and reaches station B at 12 noon. A car leaves station B at 8:30 am and reaches station A at the same time when the train reaches station B. At what time do they meet?**

A 9 : 52 am

B 10 : 22 am

C **10 : 08 am**

D 9 : 38 am

Solution

A train leaves station A at 8 am and reaches station B at 12 noon. A car leaves station B at 8:30 am and reaches station A at the same time when the train reaches station B. Time taken by train to complete journey = 4 hours

Time taken by car to complete journey = \(=\frac{7}{2}\) hours

Let Total distance = LCM \((4,7)=28\) unit

Speed of train = \(\frac{28}{4}=7 \mathrm{unit} / \mathrm{hr}\)

Speed of car \(=\frac{28}{\frac{7}{2}}=8 \mathrm{unit} / \mathrm{hr}\)

Distance travelled by train in 30 minutes = $7 \times \frac{1}{2}=3.5$ unit

Remaining distance between train and car at 8.30 AM = 28 unit – 3.5 unit = 24.5 unit

Relative speed of train and car = 8 + 7 = 15 unit/hr

Time taken to travel 24.5 unit at relative speed = $\frac{24.5}{15}=\frac{49}{30} \times 60=98 \mathrm{~m}$

Time of meeting of train and car = 8.30 AM + 1 hour 38 minutes = 10.08 AM

78. **Three shopkeepers A, B and C marked an identical article at Rs. 4820. A, B and C sold their article on successive discounts of 20% and 20%; 25% and 15%; 30% and 10% respectively. Which shopkeeper gives the maximum discount and how much (in Rs)?**

A C, 1780

B B, 1800

C **C, 1783.40**

D A, 1735.20

Solution

Three shopkeepers A, B and C marked an identical article at Rs. 4820. A, B and C sold their article on successive discounts of 20% and 20%; 25% and 15%; 30% and 10% respectively.

Selling price of article sold by shopkeeper \(A=4820 \times \frac{(100-20)}{100} \times \frac{(100-20)}{100}=R s .3084 .8\)

Discount offered by shopkeeper A = Rs. 4820 – Rs. 3084.8 = Rs. 1735.2

Selling price of article sold by shopkeeper B =\(4820 \times \frac{(100-25)}{100} \times \frac{(100-15)}{100}=R s .3072 .75\)

Discount offered by shopkeeper B = Rs. 4820 – Rs. 3072.75 = Rs. 1747.25

Selling price of article sold by shopkeeper C = \(4820 \times \frac{(100-30)}{100} \times \frac{(100-10)}{100}=R s .3036 .6\)

Discount offered by shopkeeper C = Rs. 4820 – Rs. 3036.6 = Rs. 1783.4

Clearly, Shopkeeper C offered maximum discount of Rs. 1783.4

79. **If \(\left(16 \sqrt{2} x^{3}+81 \sqrt{3} y^{3}\right) \div(2 \sqrt{2} x+3 \sqrt{3} y)=A x^{2}+B y^{2}+C x y\), the find the value of \(2 A-3 B-2 \sqrt{6} C\)**

A 137

B 79

C 25

D 7

Solution

\(\frac{\left(16 \sqrt{2} x^{3}+81 \sqrt{3} y^{3}\right)}{(2 \sqrt{2} x+3 \sqrt{3} y)}=\frac{(2 \sqrt{2} x)^{3}+(3 \sqrt{3})^{3}}{(2 \sqrt{2} x+3 \sqrt{3} y)}\) \(\Rightarrow \frac{(2 \sqrt{2} x)^{3}+(3 \sqrt{3})^{3}}{(2 \sqrt{2} x+3 \sqrt{3} y)}=\frac{(2 \sqrt{2} x+3 \sqrt{3} y)\left(8 x^{2}+27 y^{2}-6 \sqrt{6} x y\right)}{(2 \sqrt{2} x+3 \sqrt{3} y)}=\left(8 x^{2}+27 y^{2}-6 \sqrt{6} x y\right)\)

Compare \(A x^{2}+B y^{2}+C x y\) with \(\left(8 x^{2}+27 y^{2}-6 \sqrt{6} x y\right)\) \(\Rightarrow A=8, B=27\) and \(C=-6 \sqrt{6}\) \(\Rightarrow 2 A-3 B-2 \sqrt{6} C=2(8)-3(27)-2 \sqrt{6}(-6 \sqrt{6})=16-81+72=7\)

80. **From an external point A, two tangents AB and AC have been drawn to a circle touching the circle at B and C respectively. P and Q are point on AB and AC respectively such that PQ touches the circle at R. If AB = 11 cm, AP = 7cm and AQ = 9 cm, then find the length of PQ (in cm).**

A 6

B 8

C 7

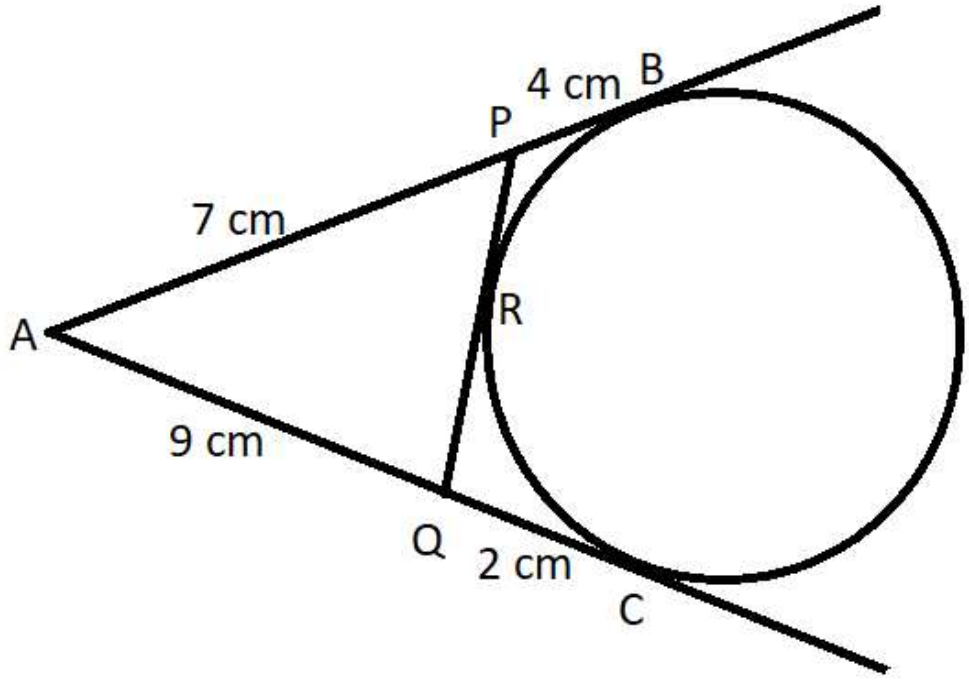
D 5

Solution

From an external point A, two tangents AB and AC have been drawn to a circle touching the circle at B and C respectively. P and Q are point on AB and AC respectively such that PQ touches the circle at R. AB = 11 cm, AP = 7cm

⇒ PB = 11 cm – 7 cm = 4 cm

and AQ = 9 cm



We know that tangents drawn from an external point to a circle are equal in length.

⇒ AB = AC = 11 cm

Now, AQ + QC = 11 cm

⇒ 9 cm + QC = 11 cm

⇒ QC = 2 cm

Also, PB = PR = 4 cm

And QC = QR = 2 cm

Now, PQ = PR + RQ = 4 cm + 2 cm = 6 cm

81. **In \(\triangle A B C, A B=20 \mathrm{~cm}, B C=21 \mathrm{~cm}\) and \(A C=29 \mathrm{~cm}\). What is the value of \(\cot C+\operatorname{cosec} C-2 \tan A\) ?**

A \(\frac{7}{10}\)

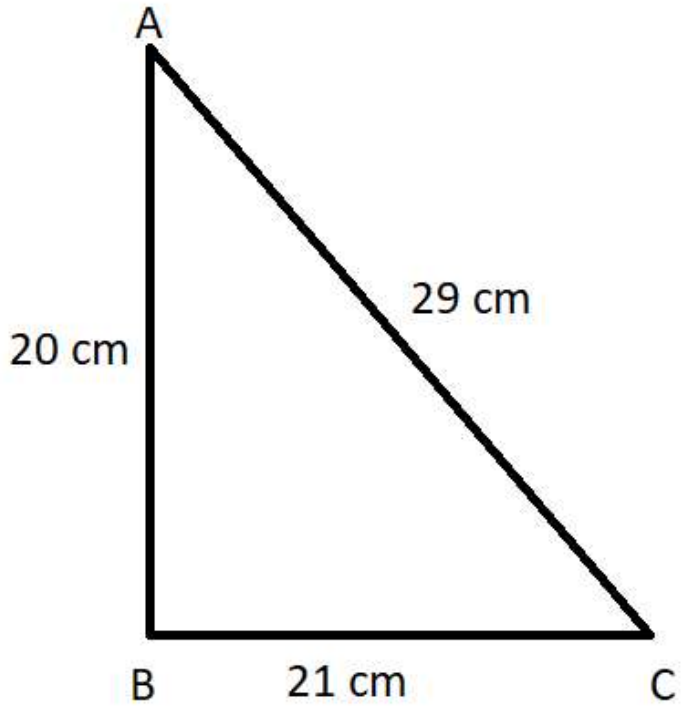
B \(\frac{9}{20}\)

C \(\frac{3}{5}\)

D \(\frac{2}{5}\)

Solution

In \(\triangle \mathrm{ABC}, \mathrm{AB}=20 \mathrm{~cm}, \mathrm{BC}=21 \mathrm{~cm}\) and \(A C=29 \mathrm{~cm}\).



As $(29)^{2}=(21)^{2}+(20)^{2}$ Therefore, ABC is a right angled triangle Hence, $\cot \mathrm{C}+\operatorname{cosec} \mathrm{C}-2 \tan \mathrm{A}=\frac{21}{20}+\frac{29}{20}-2\left(\frac{21}{20}\right)=\frac{8}{20}=\frac{2}{5}$

Table shows income (in Rs) received by 4 employees of a company during the month of December 2020 and all their income sources.

Source	Amit	Suresh	Nitin	Varun
Salary	35000	38500	29000	42000
Arrears	6000	6300	5000	7500
Bonus	1000	1100	1000	1240
Overtime	1800	1950	1400	1500

82. **By what percent is the bonus of Varun less than the bonus of Amit and Nitin taken together?**

A 45

B 38

C 48

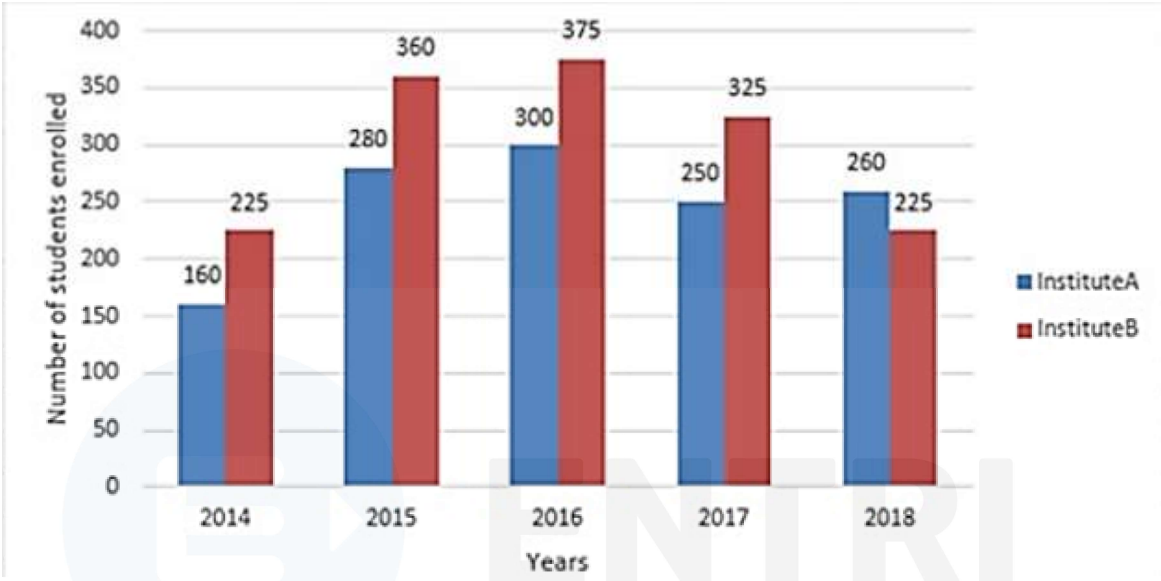
D 40.9

Solution

Bonus of Varun = Rs. 1240 Bonus of Amit and Nitin taken together = Rs. 1000 + Rs. 1000 = Rs. 2000

Required percentage = =\frac{2000-1240}{2000} \times 100=\frac{760}{2000} \times 100=38 \%

The bar graph shows the number of students enrolled for a science course in institutes A and B during 5 years from 2014 to 2018



83. What is the ratio of the total number of students enrolled in institute B in 2015 and 2017 to that of students enrolled in institute A in 2014 and 2016?

A 92 : 137

B 111 : 91

C **137 : 92**

D 91 : 111

Solution

Total number of students enrolled in institute B in 2015 and 2017 =360 + 325 = 685 Total number of students enrolled in institute A in 2014 and 2016 = 160 + 300 = 460

Required ratio = 685 : 460 = 137 : 92

84. **Chamanlal, Arshad and Jagjit Singh contested an election. All the votes polled were valid. Arshad got 35% of the total votes. For every 35 votes Chamanlal got 14 votes. The winner got 4950 more votes than the person who received the least number of votes. Find the total number of votes polled.**

A 13378

B 38000

C 99000

D **33000**

Solution

Chamanlal, Arshad and Jagjit Singh contested an election. All the votes polled were valid. Arshad got 35% of the total votes. Let total number of polled votes be 100.

Total number of votes obtained by Arshad =\(=\frac{35}{100} \times 100=35\)

For every 35 votes Chamanlal got 14 votes.

35 votes = 100

1 vote \(=\frac{100}{35}\) 14 vote \(=\frac{100}{35} \times 14=40\)

Total number of votes obtained by Chamanlal = 40

Now, Number of votes obtained by Jagjit singh = 100 – 40 – 35 = 25

According to question:

40 votes – 25 votes = 4950

15 votes = 4950

1 vote = 330

100 vote = 33000

Hence, total number of votes polled = 33000

85. **If $4 x^{4}-37 x^{2}+9=0, x>\sqrt{\frac{3}{2}}$, then what is the value of $8 x^{3}-\frac{27}{x^{3}}$?**

A -35

B 35

C -215

D **215**

Solution

$$\begin{aligned} &4 x^{4}-37 x^{2}+9=0, x>\sqrt{\frac{3}{2}} \\ &\Rightarrow 4 x^{2}-37+\frac{9}{x^{2}}=0 \\ &\Rightarrow 4 x^{2}+\frac{9}{x^{2}}=37 \\ &\text { Now, }\left(2 x-\frac{3}{x}\right)^{2}=4 x^{2}+\frac{9}{x^{2}}-2(2 x)\left(\frac{3}{x}\right)=37-12=25 \\ &\Rightarrow\left(2 x-\frac{3}{x}\right)=\sqrt{25}=5 \end{aligned}$$

Cubing both side: Now, $\left(8 x^{3}-\frac{27}{x^{3}}-3\left(2 x \times \frac{3}{x}\right)\left(2 x-\frac{3}{x}\right)=125\right)$

$$\Rightarrow 8 x^{3}-\frac{27}{x^{3}}=125+3(6)(5)=125+90=215$$

86. **If the nine-digit number 7p5964q28 is completely divisible by 88, what is the value of (\(p^{2}-q\)), for the largest value of q, where p and q are natural numbers?**

A 9

B 0

C 81

D **72**

Solution

The nine-digit number 7p5964q28 is completely divisible by 88 We know that if a number is divisible by 88 then it must be divisible by 8 And 11.

Divisibility by 8:

A number is divisible by 8 if number formed using last three digits of the given number is divisible by 8.

Number under consideration = 7p5964q28

Number phone by last three digits = q28

using hit and trial method

Take q = 9

Clearly, 928 is divisible by 8 therefore largest possible value of q will be 9.

Resultant number = 7p5964928

Divisibility by 11:

Sum of digits at odd place – Sum of digits at even place = 11k , where k can be any whole number

⇒ (7 +5+6+9+8) – (p +9+4+2) = 11k , where k can be any whole number

⇒ 35 – (p + 15) = 11k , where k can be any whole number

⇒ 20- p = 11k , where k can be any whole number

Take k = 1

⇒ 20 - p = 11

⇒ p = 9

Now, \(p^{2}-q=(9)^{2}-9=81-9=72\)

87. **A heap of wheat is in the form of a cone whose base diameter is 8.4 m and height is 1.75 m. The heap is to be covered by canvass. What is the area \(\left(\right.\) in \(\left.\mathrm{m}^{2}\right)\) of the canvas required? \(\left(\right.\) Use \(\left.\pi=\frac{22}{7}\right)\)**

A **60.06**

B 115.05

C 115.5

D 60.6

Solution

A heap of wheat is in the form of a cone whose base diameter is 8.4 m and height is 1.75 m. Base radius of the cone = $\frac{8.4}{2}=4.2 \mathrm{~m}$

Slant height of the cone = $\sqrt{(4.2)^{2}+(1.75)^{2}}=\sqrt{17.64+3.0625}=\sqrt{20.7025}=4.55 \mathrm{~m}$

Curved surface area of the cone = $\pi \mathrm{r} \mathrm{l}=\frac{22}{7} \times 4.2 \times 4.55=60.06 \mathrm{~m}^{2}$

Hence, area (in m^{2}) of the canvas required $=60.06 \mathrm{~m}^{2}$

88. **Hridaya opened her piggy bank and found coins of denomination Rs. 1, Rs. 2, Rs.5 and Rs 10 in the ratio 10 : 5 : 2 : 1. If there are 72 coins in all, then how much money (in Rs) was there in the piggy bank in the form of coins?**

A **160**

B 72

C 90

D 100

Solution

Hridaya opened her piggy bank and found coins of denomination Rs. 1, Rs. 2, Rs.5 and Rs 10 in the ratio 10 : 5 : 2 : 1. Number of Rs. 1 coins = 10x

Number of Rs. 2 coins = 5x

Number of Rs. 5 coins = 2x

Number of Rs. 10 coins = x

Total number of coins = 72

According to question :

$\Rightarrow 10x + 5x + 2x + x = 72$

$\Rightarrow 18x = 72$

$\Rightarrow x = 4$

Hence, Money (in Rs) in the piggy bank in the form of coins =

\(40(1)+20(2)+8(5)+4(10)=40+40+40+40=R s .160\)

89. **If \(a-\frac{12}{a}=1\), where \(a>0\) then the value of \(a^{2}+\frac{16}{a^{2}}\) is:**

A 15

B 11

C **17**

D 19

Solution

\(a-\frac{12}{a}=1\) \(\Rightarrow a^{2}-12=a\) \(\Rightarrow a^{2}-a-12=0\) \(\Rightarrow a^{2}-4 a+3 a-12=0\) \(\Rightarrow a(a-4)+3(a-4)=0\) \(\Rightarrow(a-4)(a+3)=0\) But a > 0

Therefore, a = 4

Now, \(a^{2}+\frac{16}{a^{2}}=16+\frac{16}{16}=16+1=17\)

90. **A sum at a certain rate of simple interest becomes Rs. 14880 after 3 years and Rs. 16800 after 5 years. Find the simple interest on the same sum at 10% per annum for 4 years (in Rs).**

A 4740

B 5184

C 4860

D **4800**

Solution

A sum at a certain rate of simple becomes Rs. 14880 after 3 years and Rs. 16800 after 5 years. Simple interest for two years = Rs. 16800 – Rs. 14880 = Rs. 1920

Simple interest for one year = =\frac{1920}{2}=\text { Rs. } 960

Simple interest for three year = \(3 \times 960=\) Rs. 2880

Now, Principal + Simple Interest = Amount

⇒ Principal + 2880 = 14880

⇒ Principal = 14880 – 2880 = Rs. 12000

Now, Simple Interest \(=\frac{\text { Principal } \times \text { Rate } \times \text { time }}{100}\) \[\Rightarrow \text { Simple Interest }=\frac{12000 \times 10 \times 4}{100}=\text { Rs. } 4800 \]

91. **The value of $3 \frac{5}{6}+\left[3 \frac{2}{3}+\left\{\frac{15}{4}\left(5 \frac{4}{5} \div 14 \frac{1}{2}\right)\right\}\right]$ is equal to:**

A 9

B 6

C 7

D 8

Solution

$3 \frac{5}{6}+\left[3 \frac{2}{3}+\left\{\frac{15}{4}\left(5 \frac{4}{5} \div 14 \frac{1}{2}\right)\right\}\right]$ Using BODMAS

$\Rightarrow \frac{23}{6}+\left[\frac{11}{3}+\left\{\frac{15}{4}\left(\frac{29}{5} \div \frac{29}{2}\right)\right\}\right]$ $\Rightarrow \frac{23}{6}+\left[\frac{11}{3}+\left\{\frac{15}{4} \times \frac{2}{5}\right\}\right]$ $\Rightarrow \frac{23}{6}+\left[\frac{11}{3}+\frac{3}{2}\right]$ $\Rightarrow \frac{23}{6}+\frac{31}{6}=\frac{54}{6}=9$

92. **AB is diameter of a circle. C and D are points on the opposite sides of the diameter AB, such that . E is a point on the minor arc BD. Find the measure of (in degrees).**

A 125

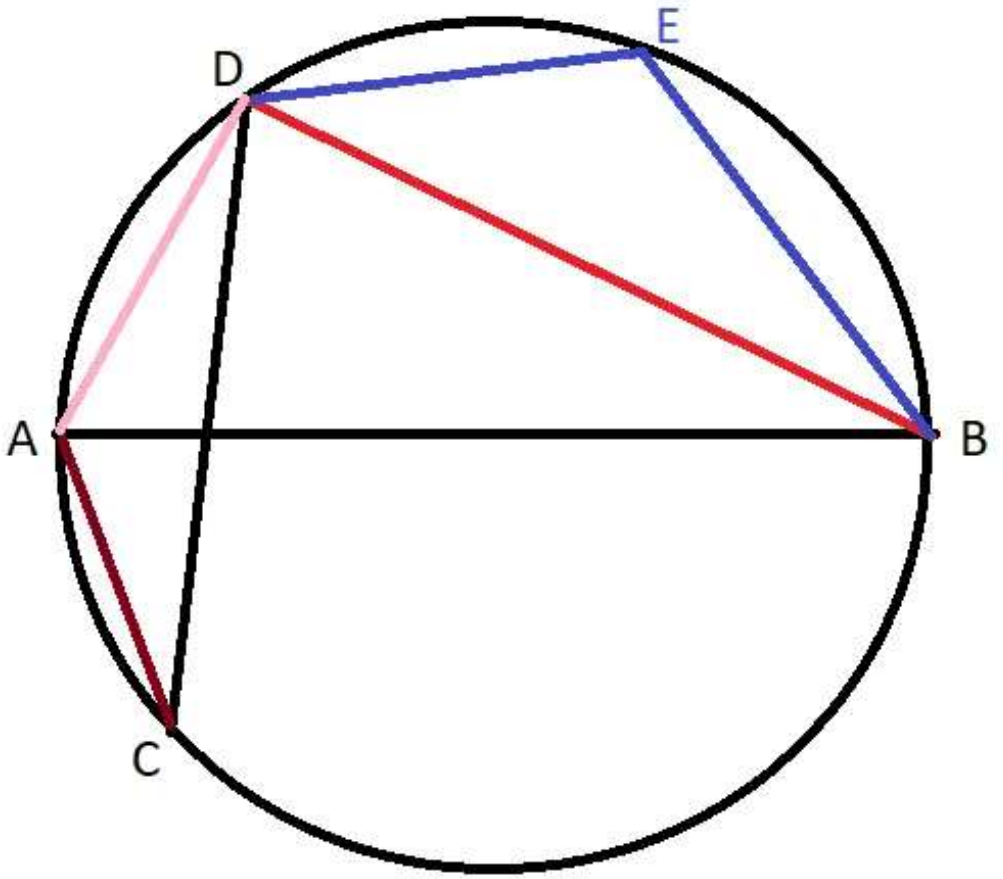
B 105

C 130

D **115**

Solution

AB is diameter of a circle. C and D are points on the opposite sides of the diameter AB, such that \(\angle \mathrm{ACD}=25^{\circ}\) . E is a point on the minor arc BD as shown in figure :



As we know,

An arc in the circle subtends equal angles anywhere on the circumference

$\Rightarrow \angle \mathrm{ACD}=\angle \mathrm{ABD}=25^{\circ}$

Also, Angle in a semicircle is a right angle.

$\Rightarrow \angle \mathrm{ADB}=90^{\circ}$

In triangle ADB

$\Rightarrow \angle \mathrm{ADB}+\angle \mathrm{DAB}+\angle \mathrm{DBA}=180^{\circ}$ $\Rightarrow 90^{\circ}+\angle \mathrm{DAB}+25^{\circ}=180^{\circ}$ $\Rightarrow \angle \mathrm{DAB}=180^{\circ}-115^{\circ}=65^{\circ}$

In cyclic quadrilateral ADEB

As we know, some of opposite angle of a cyclic quadrilateral is 180 degree.

$\Rightarrow \angle \mathrm{DAB}+\angle \mathrm{DEB}=180^{\circ}$ $\Rightarrow \angle \mathrm{DEB}=180^{\circ}-65^{\circ}=115^{\circ}$

93. **Radha purchased a computer table for rupees 10,000 and a Centre table for Rs. 5000. She sold Computer table at 8% profit. With what profit percent should she sell the centre table so as to gain 10% on the whole transaction?**

A 18%

B 10%

C **14%**

D 12%

Solution

Radha purchased a computer table for rupees 10,000 and a Centre table for Rs. 5000. She sold Computer table 8% profit.

Selling price of computer table = \(10000 \times \frac{108}{100}=\) Rs. 10800

Total cost price of a computer table and centre table = Rs. 10000 + Rs. 5000 = Rs. 15000

Overall profit = 10%

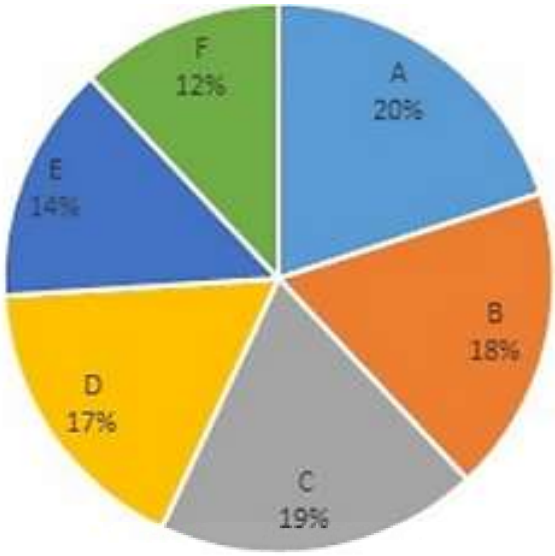
Total selling price of computer table and centre table = \(15000 \times \frac{110}{100}=\) Rs. 16500

Selling price of centre table = Rs. 16500 – Rs. 10800 = Rs. 5700

Gain on centre table = Rs. 5700 – Rs. 5000 = Rs. 700

Gain $\%=\frac{700}{5000} \times 100=14 \%$

The following Pie represent the percentage-wise distribution of 300 students of class X in a school in six different sections A, B, C, D, E and F.



The table given below shows the number of boys of class X in six different sections A, B, C, D, E and F.

Section	A	B	C	D	E	F
No. of boys	36	26	34	28	x	20

94. If in section E, the ratio of the number of boys to the number of girls is 3 : 4, then the ratio of number of boys in section E to the number of girls in section C is:

A 24 : 23

B 18 : 23

C 23 : 18

D 23 : 24

Solution

Number of students in section E = $300 \times \frac{14}{100}=42$

If in section E, the ratio of the number of boys to the number of girls is 3 : 4

Let Number of girls in section E =4x

Number of boys in section E = 3x

⇒ 7x = 42

⇒ x = 6

Number of boys in section E $=6 \times 3=18$

Number of students in section C = $=300 \times \frac{19}{100}=57$

Number of boys in section C = 34

Number of girls in section C = 57 – 34 = 23

Ratio of number of boys in section E to the number of girls in section C = 18 : 23

95. **In a triangle ABC, point D lies on AB, and point E and F lie on BC such that DF is parallel to AC and DE is parallel to AF. If BE = 4 CM, CF = 3 cm, then find the length (in cm) of EF.**

A 3

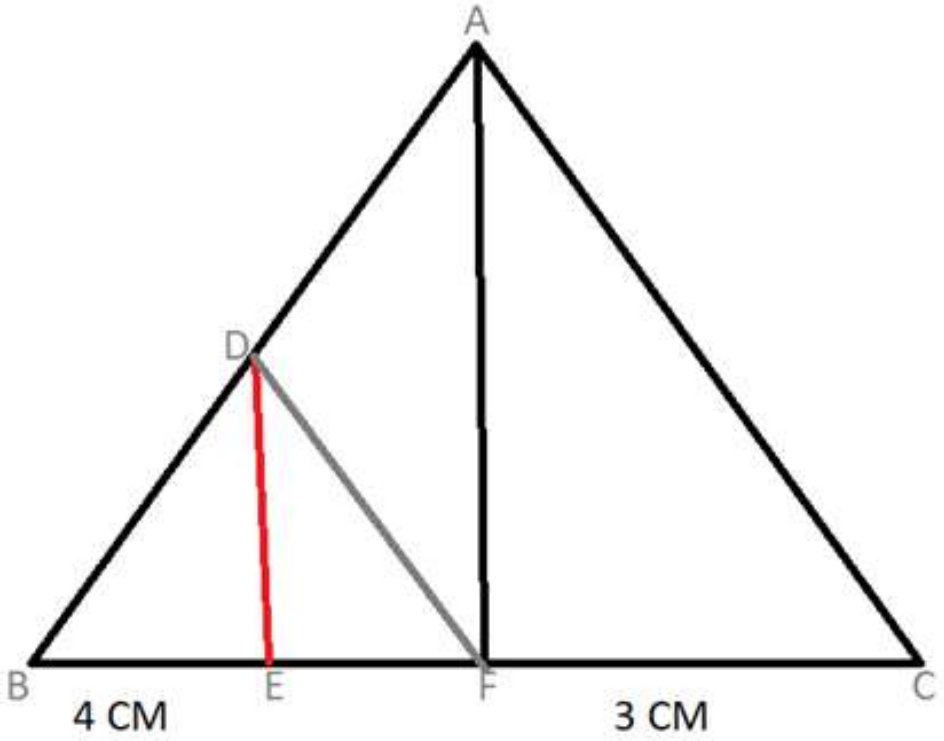
B 1.5

C **2**

D 5

Solution

In a triangle ABC, point D lies on AB, and point E and F lie on BC such that DF is parallel to AC and DE is parallel to AF. If BE = 4 CM, CF = 3 cm Let EF = x cm



DF is parallel to AC

$\Rightarrow \mathrm{R} \cap \mathrm{F} \cap \mathrm{R} \Delta \Gamma$ $\Rightarrow \frac{\mathrm{BD}}{\mathrm{BA}}=\frac{\mathrm{DF}}{\mathrm{AC}}=\frac{\mathrm{BF}}{\mathrm{BC}}$

and DE is parallel to AF.

$$\begin{aligned} &\Rightarrow \text { DEN DEN } \\ &\Rightarrow \frac{B E}{B F}=\frac{E D}{F A}=\frac{B D}{B A} \end{aligned}$$

From (1) and (2)

$$\begin{aligned} &\Rightarrow \frac{B F}{B C}=\frac{B E}{B F} \\ &\Rightarrow \frac{4+x}{7+x}=\frac{4}{4+x} \\ &\Rightarrow 16+x^{2}+8 x=28+4 x \\ &\Rightarrow x^{2}+4 x-12=0 \end{aligned}$$

$\Rightarrow x^{2}+6 x-2 x-12=0$ $\Rightarrow x(x+6)-2(x+6)=0$ $\Rightarrow(x+6)(x-2)=0$ $\Rightarrow x=-6$ OR $x=2$

But x can not be negative.

Therefore, x = 2

Hence, EF = 2 cm

96. **If \(2 \sin (3 x-15)^{\circ}=1,0^{\circ}<(3 x-15)<90^{\circ}\), then find the value of \(\cos ^{2}(2 x+15)^{\circ}+\cot ^{2}(x+15)^{\circ}\)**

A \(\frac{2}{5}\)

B \(\frac{5}{2}\)

C 1

D \(-\frac{7}{2}\)

Solution

\(\begin{aligned} &2 \sin (3 x-15)^{\circ}=1,0^{\circ}<(3 x-15)<90^{\circ} \\ &\Rightarrow \sin (3 x-15)^{\circ}=\frac{1}{2} \\ &\Rightarrow \sin (3 x-15)^{\circ}=\sin 30^{\circ} \\ &\Rightarrow(3 x-15)^{\circ}=30^{\circ} \\ &\Rightarrow 3 x=45^{\circ} \\ &\Rightarrow x=15^{\circ} \end{aligned}\)

Now,

\(\cos ^{2}(2 x+15)^{\circ}+\cot ^{2}(x+15)^{\circ}=\cos ^{2}(45)^{\circ}+\cot ^{2}(15+15)^{\circ}=\frac{1}{2}+3=\frac{7}{2}\)

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