



Your Personal Exams Guide



NDA



CDS



SSC CGL



CBSE UGC NET



IAS



SSC CHSL



CTET



MPSC



AFCAT



CSIR UDC NET



IBPS PO



UP POLICE



SSC MTS



SBI PO



BPSC



UP TET



IBPS RRB



IBPS CLERK



IES



UPSC CAPF



SSC Stenogr..



RRB NTPC



SSC GD



RBI GRADE B



RBI Assistant



DSSSB

RRB Group D 2018 Previous Year Paper (03-Oct-2018) (Shift 1)

Total Time: 1 Hour : 30 Minute

Total Marks: 100

Instructions

Sl No.	Section Name	No. of Question	Maximum Marks	Negative Marks	Positive Marks
1	CBT	100	100	0.33	1

- 1.) A total of 90 minutes is allotted for the examination.
- 2.) The server will set your clock for you. In the top right corner of your screen, a countdown timer will display the remaining time for you to complete the exam. Once the timer reaches zero, the examination will end automatically. The paper need not be submitted when your timer reaches zero.
- 3.) There will, however, be sectional timing for this exam. You will have to complete each section within the specified time limit. Before moving on to the next section, you must complete the current one within the time limits.

Prepp
Your Personal Exams Guide

CBT

1. A solution contains 33g of common salt in 320g of water. Calculate the concentration in terms of mass, by mass percentage of the solution. (+1, -0.33)
- a. 13.05%
 - b. 9.09 g
 - c. 9.35 g
 - d. 9.35%
-
2. Two numbers are in the ratio of 15 : 11. If their HCF is 13, then the greater number is: (+1, -0.33)
- a. 195
 - b. 125
 - c. 175
 - d. 120
-
3. Geneva-based International Campaign to Abolish Nuclear Weapons (ICAN) received the 2017 _____. (+1, -0.33)
- a. Nobel Peace Prize
 - b. Albert Einstein peace Prize
 - c. Gandhi Peace Award
 - d. Bruno Kreisky Award
-
4. Raghu bought an article for Rs.14,360 and spent Rs.240 on its transportation. At what amount (in Rs.) must he sell it to get a profit of 15%? (+1, -0.33)
- a. Rs. 16,000
 - b. Rs. 16,790
 - c. Rs. 16,150

d. Rs. 16,800

5. The base of a pyramid is a rectangle whose length and breadth are 16 cm and 12 cm, respectively. If the length of all the lateral edges passing through the vertex of the right rectangular pyramid is 26 cm, then find the volume of the pyramid in cubic centimeter. (+1, -0.33)

- a. 1536
b. 1024
c. 718
d. 2072

6.  (+1, -0.33)
Choose the correct picture that fit the blank place?



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

7. Which of the statements is sufficient to answer the question? (+1, -0.33)

Question :

Find the sum of the first 10 consecutive even numbers in the series.

Statements :

I. The first number 2 and 10th number is 20.

II. The common difference is 2.

- a. Only statement II is sufficient
- b. Only statement I is sufficient
- c. Both statement I and II are sufficient
- d. Either statement I or II is sufficient

8. Raghu goes to college at a speed of 4 kmph and returns at a speed of 3 kmph. If he takes 5.95 hrs in all, then what is the distance between his home and the college? (+1, -0.33)

- a. 10.2 km
- b. 10.5 km
- c. 10 km
- d. 20 km

9. $\frac{7}{9}$ of the people present in a hall are sitting in $\frac{9}{13}$ of the chairs available and the rest are standing. If there are 28 empty chairs, how many chairs would have been still empty if everyone in the hall was sitting? (+1, -0.33)

- a. 15
- b. 12
- c. 18
- d. 10

10.



(+1, -0.33)

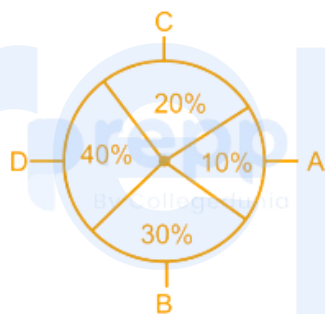
Choose the correct picture which fit the blank space form the figures given below?



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

11. The data shows the information on the number of children vaccinated in the year 2016 in different cities:

(+1, -0.33)



If the total number of children vaccinated in the year 2016 is 1,20,000, then how many children from city 'A' were vaccinated?

- a. 36,000
- b. 24,000
- c. 12,000
- d. 48,000

12. Rate of change of displacement is known as _____.

(+1, -0.33)

- a. Acceleration
- b. Velocity
- c. Speed

d. Distance

13. The zeros of the cubic polynomial $2x^3 - x^2 - 2x + 1$ are a, b and c, respectively. Find $(a + b + c)$. (+1, -0.33)

a. -1

b. 2

c. +1

d. $1/2$

14. What is the compound interest on Rs. 5000 in 3 years, if the rate of interest is 4% for the first year, 3% for the second year and 2% for the third year? (+1, -0.33)

a. Rs. 435.21

b. Rs. 453.12

c. Rs. 436.12

d. Rs. 463.12

15. From a square plate with each side 7 cm. squares of area 0.25 cm^2 are cut out at each corner and the remaining plate is folded along the cuts to form a cuboid. The volume of this open-top cuboid will be ____ cm^3 (+1, -0.33)

a. 21

b. 16

c. 18

d. 20

16. Each question given below consists of a statement, followed by two arguments numbered I & II. You have to decide which of the arguments is a 'strong argument'. (+1, -0.33)

Statement:

Is global warming a real threat?

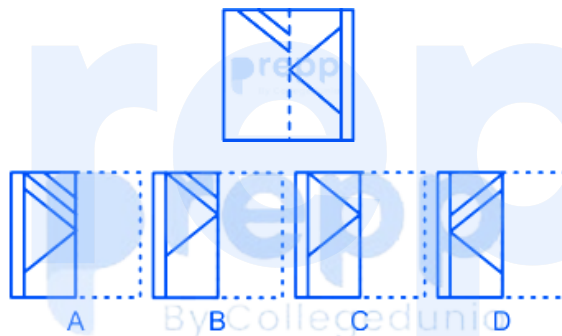
Arguments:

I. Yes, it is a threat leading to the consequences of sea level rise, extreme heat, heightened wildlife risk, and drought and other water supply issues.

II. No Global warming is misconception created by some people.

- a. Only argument II is strong
- b. Neither I nor II is strong
- c. Only argument I is strong
- d. Both I and II are strong

17. Which pattern will the given transparent sheet resemble when it is folded at the dotted line? (+1, -0.33)



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

18. Who among the following is the first Indian female gymnast ever to compete in the Olympics? (+1, -0.33)

- a. Bindu Bhosle
- b. Dipa Karmakar
- c. Jyoti More
- d. Aruna Reddy

19. Find the next number in the given series.

(+1, -0.33)

9, 11, 15, 17, 21, 23, ?

- a. 29
- b. 28
- c. 30
- d. 27

20. Which is the state animal of Andhra Pradesh?

(+1, -0.33)

- a. Mithum
- b. Ox
- c. One-horned rhinoceros
- d. Blackbuck

21. Find the next term for the series given below:

(+1, -0.33)

5G, 6H, 7I, 8J, ?

- a. 14K
- b. 9K
- c. 10K
- d. 12G

22. Find the next figure for the given series:

(+1, -0.33)

Problem Figures:



Answer Figures:



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

23. What is the least number that when divided by 63 and 105 leaves remainder 4 in each case? (+1, -0.33)

- a. 634
- b. 25
- c. 214
- d. 319

24. Who among the following inaugurated the Dr. A.P.J. Abdul Kalam Memorial in Rameshwaram? (+1, -0.33)

- a. Narendra Modi
- b. O. Panneerselvam
- c. Pranab Mukherjee
- d. K. Palani swami

25. Select the option that is related to the third word on the same basis as the second word is related to the first word (+1, -0.33)

Real : Genuine :: Fake : ?

- a. Authentic
- b. Fell

- c. Counterfeit
- d. True

26. A statement is followed by two argument. Decide which of the arguments is/are strong with respect to the statement. (+1, -0.33)

Statement:

Should too much revealing dress be banned?

Argument:

- 1. Yes, it disturbs the people and create abuse.
 - 2) No, wearing cloths of their choice is the fundamental right of the individual.
- a. Neither argument 1 and 2 is strong
 - b. Only argument 1 is strong
 - c. Only argument 2 is strong
 - d. Either argument 1 or 2 is strong

27. Read the following statement and the arguments that follow. Decide which of the arguments is strong. (+1, -0.33)

Statement:

Should written examination in primary schools be abolished?

Arguments:

- 1. Yes, young students feel the burden and such examinations do not help in the natural thinking process.
 - 2. No. without examination student will not be serious about education and learning.
- a. Both arguments 1 and 2 are strong
 - b. Only arguments 1 is strong
 - c. Neither arguments 1 nor 2 is strong
 - d. Only arguments 2 is strong

28. The magnitude of the buoyant force depends on the _____ of the fluid. (+1, -0.33)

- a. Mass
- b. Temperature
- c. Volume
- d. Density

29. Name the team which won the Santosh Trophy for the 32nd time in 2017? (+1, -0.33)

- a. Odisha
- b. West Bengal
- c. Andhra Pradesh
- d. Punjab

30. Mathur's uncle's daughter's brother is Somu. How is somu related to Mathur? (+1, -0.33)

- a. Cousin
- b. Son
- c. Brother
- d. Father

31. _____, the Sultan of Delhi shifted his capital from Delhi to Daulatabad. (+1, -0.33)

- a. Iltutmish
 - b. Akbar
 - c. Ghiyas ud-din balban
 - d. Muhammad-bin-Tughlaq
-

32. An electric iron of 750 W is used for 8 hours per day. Then the energy consumed in one day by the iron is: (+1, -0.33)

- a. 6 units
- b. 600 units
- c. 0.6 units
- d. 60 units

33. The LCM of 72 and 84 is: (+1, -0.33)

- a. $12 \times 6 \times 7$
- b. $6 \times 2 \times 7$
- c. $12 \times 7 \times 3$
- d. 72×84

34. You are given a question and statements and two statements. Which of the statements is/are necessary/sufficient to answer the question? (+1, -0.33)

Question:

What is the color of Sunflower?

Statements:

- I. Blue is called white, white is called red and red is called yellow.
- II. Yellow is called purple, purple is called black, white is called brown and brown is called orange.

- a. Data in I alone is sufficient
- b. Data either in I alone or II alone is sufficient
- c. Data in both I and II together is not sufficient
- d. Data in II alone is sufficient

35. A solar cell is made up of _____. (+1, -0.33)

- a. Carbon
- b. Gallium
- c. Silicon
- d. Teflon

36. In a class, there were 28 boys and some girls. In a test, the mean score obtained by the boys was 12.5 while that obtained by the girls was 14.5. If the overall mean score was 13.1, then what was the total number of students in the class? (+1, -0.33)

- a. 42
- b. 44
- c. 40
- d. 38

37. Coins of Rs. _____ denomination was introduced by the Reserve Bank of India (RBI) to mark MG Ramachandran's 102nd birth centenary. (+1, -0.33)

- a. 200
- b. 100
- c. 500
- d. 20

38. _____ element is presented by the given symbol. (+1, -0.33)



- a. Hydrogen

- b. Mercury
- c. Carbon
- d. Gold

39. Which of the following statements is/are true/false about speed of sound in different media at 25 °C? (+1, -0.33)

- A. In Oxygen gas, the speed of sound is 316 km/s.
- B. In water (distilled), the speed of sound is 1498 km/s

- a. Only A is true
- b. Both A and B is true
- c. Neither A nor B is true
- d. Only B is true

40. Tarun, Manav, Nitu, Hema, and Priya are standing in a row according to their height. Which of the following statements is sufficient to answer the following question? (+1, -0.33)

Who among the five is standing in the middle?

Statements:

- 1. Nitu is the tallest
 - 2. Tarun is taller than Manav
 - 3. Hema is the shortest of them all
 - 4. Manav is taller than Priya
- a. Statements 1, 2, 3 and 4 together are sufficient
 - b. Statement 1 and 3 are sufficient
 - c. Statement 1, 2 and 3 alone are sufficient
 - d. None of the statements are sufficient

41. _____ reproduces by binary fission (+1, -0.33)

- a. Amoeba
- b. Liverfluke
- c. Plasmodium
- d. Planaria

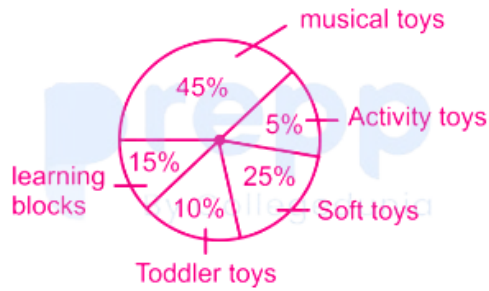
42. The ratio of the sides of a triangular shaped park is 3 : 4 : 5 and the perimeter of the park is 120 m. What is the perpendicular distance in meters from the vertex, opposite to the largest side of the park? (+1, -0.33)

- a. 25
- b. 24
- c. 48
- d. 20

43. Mathura Refinery, the _____ refinery of Indian oil was commissioned in 1982 with a capacity of 6.0 MMTPA to meet the demand of petroleum products in north western region of India. (+1, -0.33)

- a. 7th
- b. 5th
- c. 6th
- d. 9th

44. The following pie chart shows information on sales of a toy making company "XYZ" during 2017-18 financial year. (+1, -0.33)



The total revenue made by sales of the toys was Rs. 38,72,00/-. Which type of toys made the highest revenue for the company?

- a. Toddler toys
- b. Musical toys
- c. Soft toys
- d. Learning blocks

45. Which of the following is NOT true about vascular system?

(+1, -0.33)

- a. Life span of human RBC is 115-120 days.
- b. The vascular system forms about 7-8% of the body weight.
- c. Blood is white or red vascular connective tissue.
- d. There is about 5-6 liters of blood in an adult person

46. Which of the number given below is the square root of 14161?

(+1, -0.33)

- a. 119
- b. 121
- c. 131
- d. 129

47. At what time between 4 o'clock and 5 o'clock will the two hands of the clock be the right angle to each other for the first time?

(+1, -0.33)

- a. 58/11 min past 4 o'clock
- b. 422/11 min past 4 o'clock
- c. 60/11 min past 4 o'clock
- d. 420/11 min past 4 o'clock

48. If '+' means ' $\div$ ', '-' means '+', 'x' means '-' and ' $\div$ ' means 'x' then find the value of $27 \div 15 - 36 + 6$? (+1, -0.33)

- a. 411
- b. 414
- c. 416
- d. 412

49. In which of the following is MgCl_2 soluble? (+1, -0.33)

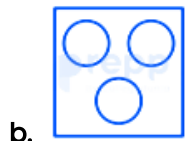
- a. Petrol
- b. Acetone
- c. Kerosene
- d. Water

50. The secretion from the prostate gland enters into the: (+1, -0.33)

- a. Kidney
- b. Ureter
- c. Urethra
- d. Testis

51. Choose the best suitable Venn diagram for the following words: (+1, -0.33)

Transport vehicle, truck, van



52. Which of the following is associated with The Government of India's 'Khelo India' programme? (+1, -0.33)

- a. Science and Technology
- b. Literature
- c. Sports
- d. Music

53. $\frac{1}{8}$ th of the audience of a program, Jabardast were children. $\frac{2}{5}$ th of the audience were men and the rest women. If the number of women is 380, find the total number of the audience in the program. (+1, -0.33)

- a. 600
- b. 500
- c. 400
- d. 800

54. A statement is followed by two arguments. Decide which of the arguments is/are strong with respect to the statement. (+1, -0.33)

Statement:

From tender age children must be trained to do household chores.

Arguments:

- I. Yes, it will make them grow responsible for their work.
II. No, it is enough that we send them to school as they learn everything there.

- a. Neither I nor II is strong.
b. Only argument I is strong.
c. Only argument II is strong.
d. Both I and II are strong.

55. A man travels 480 km in 4 hours, partially by air and partially by train if he had travelled all the way by air he would have saved $\frac{4}{5}$ of the time he would have taken to travel by train and would have arrived at his destination 2 hours early. Find the distance he covered by traveling by train. (+1, -0.33)

- a. 80 km
b. 120 km
c. 110 km
d. 90 km

56. Choose the odd one out from among the given figures? (+1, -0.33)



- a. B
b. A

c. D

d. C

57. There are _____ metalloids in the modern periodic table. (+1, -0.33)

a. 5

b. 4

c. 7

d. 6

58. The General Anti-Avoidance Rule introduced in the 2012 – 13 budget speech by the then Finance Minister Pranab Mukherjee was finally implemented on _____. (+1, -0.33)

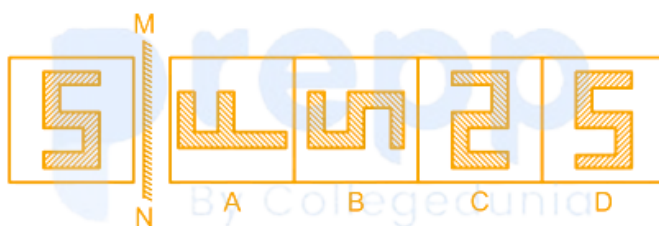
a. 1 April 2016

b. 1 April 2015

c. 1 April 2017

d. 1 April 2018

59. Find the mirror image of the given figure if the mirror is placed at line MN. (+1, -0.33)



a. C

b. A

c. D

d. B

60. Solve the following equation to find x:

(+1, -0.33)

$$(x - 2)^2 - 36 = 0: \text{ If } x \in \mathbb{N}$$

- a. 4
- b. 8
- c. -8
- d. -4

61. Anil is facing the East. He then turns 90° clockwise and then 135° anti-clockwise. In which direction is he facing now?

(+1, -0.33)

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

62. The Author of the book "The people's president: Dr. APJ Abdul kalam" is:

(+1, -0.33)

- a. Tarun Vijay
- b. Sumitra Mahajan
- c. KC Pant
- d. SM Khan

63. Who is the Chief Minister of Punjab as of 1st March 2018?

(+1, -0.33)

- a. Navjot Singh Sidhu
- b. Captain Amarinder Singh
- c. Prakash Singh Badal
- d. Naveen Mahindra

64. The two roots of quadratic are given as $x = 1/7$ and $x = -1/8$. The equation can be written as: (+1, -0.33)

- a. $(7x - 1)(8x - 1) = 0$
- b. $(7x - 1)(8x + 1) = 0$
- c. $(7x + 1)(8x - 1) = 0$
- d. $(7x + 1)(8x + 1) = 0$

65. The force exerted on an object is 200 N its mass is 100kg. Find the acceleration of the object. (+1, -0.33)

- a. 2 ms^{-1}
- b. 2 ms^{-2}
- c. 2 ms^1
- d. 2 ms^2

66. Four word have given below of which three are alike in some way and is different. Choose the odd one out. (+1, -0.33)

- a. Table
- b. Chair
- c. Cupboard
- d. Cardigan

67. What time does the mirror image of an analog clock at 5' O clock show? (+1, -0.33)

- a. 12:00
 - b. 5:00
 - c. 7:00
 - d. 6:00
-

68. Read the following statements and the conclusions that follow. Decide which of the two conclusions follow the given statements. (+1, -0.33)

Statements:

- 1) All swans are parrots
- 2) No parrot is a cuckoo

Conclusions:

- 1) No swan is a cuckoo
 - 2) All parrots are swans
- a. Only conclusions 2 follows
 - b. Only conclusion 1 follows
 - c. Either conclusion 1 or 2 follows
 - d. Both conclusions 1 and 2 follow

69. Which of the following elements has the electronic configuration 2, 8, 3? (+1, -0.33)

- a. Magnesium
- b. Sodium
- c. Aluminum
- d. Argon

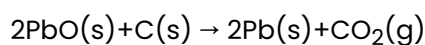
70. ABCD is quadrilateral inscribed in a circle (radius = r). The bisectors of the $\angle DAB$ and $\angle BCD$ intersect the circle at X and Y, respectively. What is the length of the straight line XY? (+1, -0.33)

- a. πr^2
- b. $2r$
- c. $(r + 2)$
- d. $\pi r^2/2$

71. The potential difference between the terminal of an electric heater is 60 V when it draws a current of 4 A from the source. What current will the heater draw if the potential difference is changed to 127.5 V? (+1, -0.33)

- a. 8.5 A
- b. 24 A
- c. 10 A
- d. 12 A

72. Which of the following statements about the reaction below are INCORRECT? (+1, -0.33)



- A. Carbon di-oxide is getting oxidized
- B. Lead is getting reduced
- C. Carbon is oxidised
- D. Lead oxide is getting reduced

- a. A and C
- b. A and B
- c. B and C
- d. A, B and C

73. Out of the four option figures, three are similar in a certain manner. However, one figure is NOT like the other three. Select the figure which is different from the rest. (+1, -0.33)



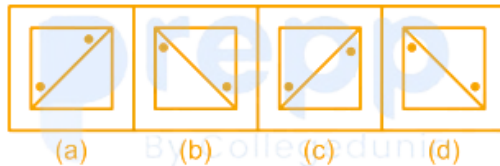
- a. C
- b. D

c. B

d. A

74. Choose the figure which is different from the rest.

(+1, -0.33)



a. b

b. c

c. a

d. d

75. Kiran swims in a 90 m long pool. She covers 360 m in two minutes by swimming from one end to the other and back along the same straight path, twice. Find the average speed of Kiran.

(+1, -0.33)

a. 4 ms^{-1}

b. 6 ms^{-1}

c. 3 ms^{-1}

d. 5 ms^{-1}

76. What type of cells is the skin made of?

(+1, -0.33)

a. Epidermal cells

b. Connective tissue

c. Permanent tissues

d. Parenchyma

77. Count the number of triangles in the following figure:

(+1, -0.33)



- a. 10
- b. 7
- c. 8
- d. 9

78. The energy obtained from atoms is known as _____.

(+1, -0.33)

- a. Solar energy
- b. Heat energy
- c. Nuclear energy
- d. Chemical energy

79. Who is India's next Ambassador to Peru?

(+1, -0.33)

- a. M. Subbarayudu
- b. Yashvardhan Kumar Sinha
- c. Dr. Rizal Sukma
- d. Sandeep Chakravorty

80. Calculate the relative molecular mass of water (H_2O).

(+1, -0.33)

- a. 18 u
- b. 1.8 u

c. 2.0 u

d. 20 u

81. Who is appointed as UNICEF's ambassador for Goodwill?

(+1, -0.33)

a. Lilly Singh

b. Iravati Dubey

c. Lillete Dubey

d. Rosa Mendes

82. Who among the following was conferred with sainthood by Pope Francis in 2016?

(+1, -0.33)

a. Mary Euphrasia

b. Kuriakose

c. Sister Alphonsa

d. Mother Teresa

83. Which film was awarded the Best Film on social Issues in the 64th National Film Awards in 2017?

(+1, -0.33)

a. Udta Punjab

b. Bobby Jassos

c. Neerja

d. Pink

84. Which is the only non-metal placed at the left side of the Modern Periodic Table?

(+1, -0.33)

a. Hydrogen

b. Carbon

- c. Neon
- d. Helium

85. If two flood gates A and B function simultaneously, the reservoir will be filled in 6 hours. Gate A fills the reservoir 5 hours faster than gate B. How many hours does the faster flood gate take to fill the reservoir? (+1, -0.33)

- a. 7 hrs
- b. 13 hrs
- c. 5 hrs
- d. 10 hrs

86. X can complete a task in 8 days, whereas Y can complete the same task in 10 days. If they work together, in how many days will the task be completed? (+1, -0.33)

- a. $4\frac{4}{9}$
- b. $9/40$
- c. $4\frac{8}{9}$
- d. 9

87. Rajaram's son's sister's mother is Ramani. How is Ramani related to Rajaram? (+1, -0.33)

- a. Aunt
- b. Wife
- c. Sister
- d. Cousin

88. _____ connects muscle to the bones. (+1, -0.33)

- a. Cartilage

- b. Areolar
- c. Ligaments
- d. Tendons

89. What is the natural source of Oxalic acid? (+1, -0.33)

- a. Tomato
- b. Sour milk
- c. Ant sting
- d. Tamarind

90. _____ is the new capital of Andhra Pradesh. (As of Oct 2018) (+1, -0.33)

- a. Amaravati
- b. Hyderabad
- c. Secunerabad
- d. Tirupati

91. 6 6 8 5 5 3 7 3 7 2 5 9 8 7 8 1 5 5 4 (+1, -0.33)

Using the above sequence find the term that does NOT belong to the group.

83, 35, 27, 81

- a. 27
- b. 83
- c. 81
- d. 35

92. Ibrahim Lodi was killed by _____ in the First Battle of Panipat in 1526. (+1, -0.33)

- a. Muhammad Shah
 - b. Firoz Shah Tughlaq
 - c. Babur
 - d. Timur
-

93. The absolute refractive index of any medium is always_____. (+1, -0.33)

- a. more than one
 - b. 0
 - c. 1
 - d. less than one
-

94. Who is the author of the book 'Why I am a Hindu' published in 2017? (+1, -0.33)

- a. Shashi Tharoor
 - b. Manmohan Singh
 - c. Arnab Goswami
 - d. Venkaith Naidu
-

95. If $a : b$ is $32 : 35$ and $b : c$ is $21 : 32$, then $a : c$ is: (+1, -0.33)

- a. $5 : 3$
 - b. $3 : 5$
 - c. $1 : 1$
 - d. $5 : 7$
-

96. The minimum value of LCM of given numbers is the product of all the given numbers. (+1, -0.33)

- a. Always greater than

- b. always less than
- c. always equal to
- d. None of the above

97. In a code language, BURN is written as YFIM. What is the code for WOUND? (+1, -0.33)

- a. DLFMD
- b. DLFMW
- c. DNFMW
- d. DPFMW

98. Which one of the following is a leguminous crop? (+1, -0.33)

- a. Mucuna
- b. Pulses
- c. Sesame
- d. Cereals

99. 1kW = ? (+1, -0.33)

- a. 1000 W
- b. 10 W
- c. 100 W
- d. 10000 W

100. In a quadrilateral PQRS, $\angle S = 90^\circ$. A circle (O, r) touches the side PQ, QR, RS, and SP at A, B, C and D, respectively, if QR = 38 cm, RS = 25 cm and QA = 27 cm, find 'r'. (+1, -0.33)

- a. 16 cm

- b. 12 cm
- c. 14 cm
- d. 10 cm

Prepp

Your Personal Exams Guide

Answers

1. Answer: d

Explanation:

Formula Used:

Mass percentage in solution = $\frac{\text{Total Salt}}{\text{Total Solution}} \times 100$

Calculation:

Quantity of salt = 33g

Quantity of water = 320 g

The total quantity of solution,

$$\Rightarrow 33 + 320 = 353 \text{ g}$$

Now by using the formula,

Percentage of salt in the solution

$$\Rightarrow \left(\frac{33}{353}\right) \times 100 = 9.35\% \text{ (approx)}$$

$\therefore$ Mass percentage of the solution is 9.35 %.

2. Answer: a

Explanation:

Given:

Two numbers are in the ratio of 15 : 11. If their HCF is 13

Calculation:

Let the number be 15x and 11x

HCF is 13

HCF of two number x = 13

Then numbers

$$\Rightarrow 15 \times 13 = 195$$

$$\Rightarrow 11 \times 13 = 143$$

$\therefore$ The greater number is 195.

3. Answer: a

Explanation:

- Geneva-based International Campaign to Abolish Nuclear Weapons (ICAN) received the 2017 Nobel Peace Prize.
- The International Campaign to Abolish Nuclear Weapons (ICAN):-
 - It is a global civil society coalition working to promote adherence to and full implementation of the Treaty on the Prohibition of Nuclear Weapons .
 - The campaign received the 2017 Nobel Peace Prize.
"for its work to draw attention to the catastrophic humanitarian consequences of any use of nuclear weapons and for its ground-breaking efforts to achieve a treaty-based prohibition of such weapons."

Foundation Year	2007
Founded at	Melbourne, Australia
Headquarters	Geneva, Switzerland
Executive Director	Beatrice Fihn

- The 2019 Winners of Nobel Prize are:-

Field	Recipient	Awarded For
The Nobel Peace Prize 2019	Abiy Ahmed Ali	"for his efforts to achieve peace and international cooperation , and in particular for his decisive initiative to resolve the border conflict with neighbouring Eritrea "
The Nobel Prize in Literature 2019	Peter Handke	"for an influential work that with linguistic ingenuity has explored the periphery and the specificity of human experience"
The Nobel Prize in Physics 2019	James Peebles, Michel Mayor and Didier Queloz	James Peebles "for theoretical discoveries in physical cosmology" Michel Mayor and Didier Queloz "for the discovery of an exoplanet orbiting a solar-type star"
The Nobel Prize in Chemistry 2019	John B. Goodenough, M. Stanley Whittingham and Akira Yoshino	"for the development of lithium-ion batteries"
The Nobel Prize in Physiology or Medicine 2019	William G. Kaelin Jr, Sir Peter J. Ratcliffe and Gregg L. Semenza	"for their discoveries of how cells sense and adapt to oxygen availability"
The Nobel Prize in Economic Sciences 2019	Abhijit Banerjee, Esther Duflo and Michael Kremer	"for their experimental approach to alleviating global poverty."

4. Answer: b

Explanation:

Given:

Raghu bought the article = Rs. 14,360

He spent on its transportation = Rs. 240

Formula used:

Selling Price = $\text{Cost Price}(100 + \text{profit\%})/100$

Calculation:

According to the question,

Total cost price = article C.P + Transportation

$\Rightarrow 14,360 + 240$

$\Rightarrow 14600$

Selling price at 15% profit

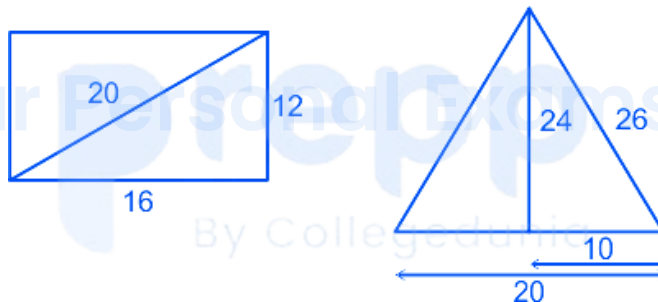
$\Rightarrow 14600(100 + 15)/100$

$\Rightarrow \text{Rs, } 16790$

$\therefore$ He sell Rs. 16,790.

5. Answer: a

Explanation:



Length of the rectangle $l = 16$ cm

Breadth of the rectangle $b = 12$ cm

Diagonal of the rectangle = $\sqrt{l^2 + b^2} = \sqrt{12^2 + 16^2} = 20$

Length of lateral edge = 26 cm

Let the height of the pyramid be H .

As we know,

$$(\text{Length of lateral edge})^2 = (\text{Height of the pyramid})^2 + [(\text{Length of diagonal of the base})/2]^2$$

$$26^2 = H^2 + (20/2)^2$$

$$\Rightarrow H^2 = 26^2 - 10^2$$

$$\Rightarrow H = \sqrt{576} = 24$$

As we know,

$$\text{Volume of the pyramid} = (1/3) \times \text{Area of Base} \times \text{height}$$

$$\text{Volume of the pyramid} = (1/3) \times 16 \times 12 \times 24 = 1536 \text{ cm}^3$$

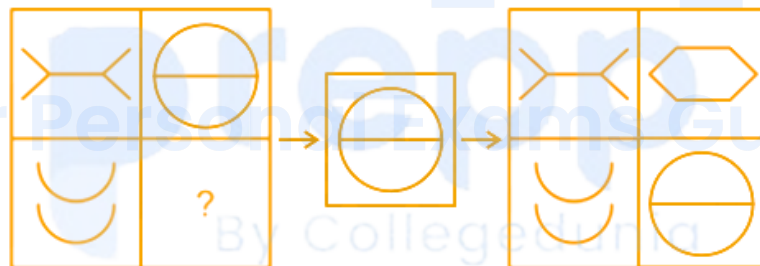
6. Answer: d

Explanation:

The logic follows here is:

Here, in the given figure, the two figures are inverted and joined with one extra line. In the figure 5 lines are given while one extra line is added in the related figure.

Similarly, if we consider the two semi circles, we need to join them after inverting them with one additional line as a diagonal.



Hence, **option 4** is the correct answer.

7. Answer: b

Explanation:

Given:

Number of terms in the series = 10

Quantity I:

The first number = 2

The 10th number = 20.

Quantity II:

The common difference = 2.

Calculation:

Quantity I:

Sum of any series of AP = $[(\text{First term} + \text{Last term})/2] \times \text{Number of terms}$

So, using the given data we can find the sum of 10 numbers of an AP.

Even though the series is not mentioned the given data can be used to find the solution.

Quantity II:

Using II alone we cannot find the sum to 10 terms of the series.

So, we can say the only statement I is sufficient to give the answer.

∴ Statement I is sufficient.

8. Answer: a

Explanation:

Given:

Raghu goes to college at a speed of 4 kmph and returns at a speed of 3 kmph.

Total time is 5.95 hrs

Formula used:

Time = Distance/Speed

Calculation:

Let the distance between the college and his house be 'x' km

According to the question,

$$\Rightarrow x/4 + x/3 = 5.95$$

$$\Rightarrow (3x + 4x)/12 = 5.95$$

$$\Rightarrow 7x/12 = 5.95$$

$$\Rightarrow x = 5.95 \times (12/7)$$

$$\Rightarrow 10.2 \text{ km.}$$

$\therefore$ The distance between his home and the college is 10.2 km.

9. Answer: d

Explanation:

Let the number of people be x and number of the chair be y .

$$\text{Number of available chair} = y \times (9/13) = 9y/13$$

$$\text{Number of empty chair} = y - (9y/13) = 4y/13$$

$$\text{Given, Number of empty chairs} = 28$$

According to the question

$$4y/13 = 28$$

$$y = 28 \times (13/4) = 91$$

$$\text{Total number of chairs} = 91$$

$$\text{Number of chairs in which people are sitting} = 91 - 28 = 63$$

$$\text{Number of people who sit} = x \times (7/9) = 7x/9$$

According to the question

$$7x/9 = 63$$

$$x = 63 \times (9/7) = 81$$

$$\text{Total number of people are} = 81$$

$$\text{Chairs would have been still empty if everyone in the hall was sitting} = 91 - 81 = 10$$

10. Answer: a

Explanation:

From figure 1 to 2 – one line is added and .

Similarly,

From 3 to 4 – One line is added.

Internal lines of figure A is related to the third figure in the same way as the internal lines of the second figure is related to the first figure.



Hence, option 1 is the correct answer.

11. Answer: c

Explanation:

Total number of children vaccinated in the year 2016 = 1,20,000

Number of children were vaccinated in 2016 from city A = 10% of 1,20,000 = $1,20,000 \times (10/100) = 12,000$

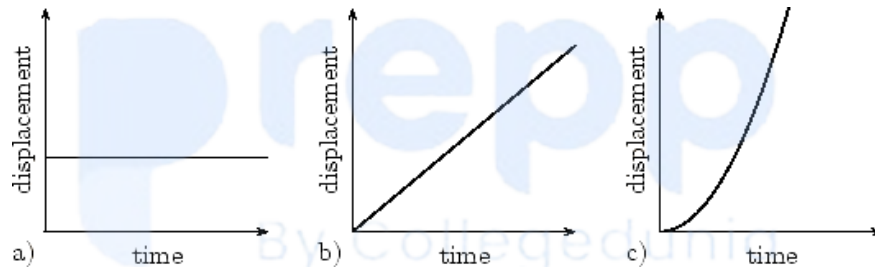
12. Answer: b

Explanation:

The correct answer is Velocity.

★ Key Points

- Rate of change of displacement is known as **Velocity**.
- Velocity is a physical **vector quantity**, both magnitude and direction are needed to define it.
- The scalar absolute value of velocity is called *speed*, which has only magnitude and not direction.
- *For example, "10 meters per second" is a scalar, whereas "10 meters per second east" is a vector.*
- In the displacement time graph, displacement is the dependent variable and is represented on the y-axis while time is the independent variable and is represented on the x-axis and is also known as a position–time graph.
- There are three different plots for displacement time graph and they are given below:



- The **first graph** explains that the object is stationary for a period of time such that the slope is zero which means that the velocity of the object is zero.
- The **second graph** explains that the velocity of the object is constant and increases with time such that the slope of the graph remains constant and positive.
- The **third graph** explains that the acceleration, velocity, and displacement are constant. The slope of the graph increases with time.

13. Answer: d

Explanation:

Given:

The zeros of the cubic polynomial $2x^3 - x^2 - 2x + 1$ are a , b and c

Concept used:

Sum of zeroes $(a + b + \delta) = (-\text{coefficient of } x^2)/\text{coefficient of } x^3$

Calculation:

As we know,

If α , β and δ are the zeroes of the cubic equation of $ax^3 + bx^2 + cx + d = 0$,

Then

Sum of zeroes $(a + b + \delta) = (-\text{coefficient of } x^2)/\text{coefficient of } x^3$

If a , b and c are the zeroes of the cubic equation of $2x^3 - x^2 - 2x + 1$,

Then

$$\Rightarrow (a + b + c) = (-\text{Coefficient of } x^2) / (\text{Coefficient of } x^3)$$

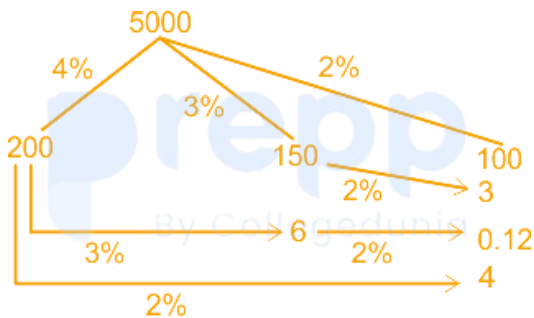
$$\Rightarrow -(-1)/2 = 1/2$$

$$\therefore (a + b + c) \text{ is } 1/2.$$

14. Answer: d

Explanation:

Short Trick:



$$\text{Compound interest} = 200 + 150 + 100 + 6 + 4 + 3 + 0.12$$

$$= \text{Rs. } 463.12$$

Detailed Solution:

Principal = Rs. 5000

Interest rate for the first year $R_1 = 4\%$

Interest rate for the second year $R_2 = 3\%$

Interest rate for the third year $R_3 = 2\%$

As we know,

$$A = P \times (1 + R_1/100) \times (1 + R_2/100) \times (1 + R_3/100)$$

$$A = 5000 \times (1 + 4/100) \times (1 + 3/100) \times (1 + 2/100)$$

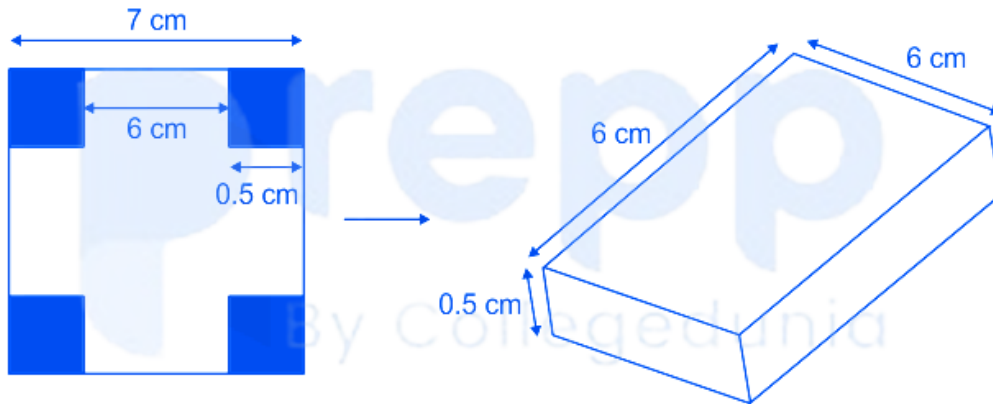
$$A = 5000 \times (104/100) \times (103/100) \times (102/100)$$

$$A = 5463.12$$

$$\text{Compound interest} = 5463.12 - 5000 = 463.12$$

15. Answer: c

Explanation:



Side of the square = 7 cm

Area of each small square which cut out from the plate = 0.25 cm^2

Side of the each smaller square which cut out from the plate = $\sqrt{0.25} = \sqrt{(0.5 \times 0.5)} = 0.5 \text{ cm}$

If remaining plate folded along the cuts to form a cuboid, then

Length of the cuboid = 6 cm

Breath of the cuboid = 6 cm

Height of the cuboid = 0.5 cm

As we know, volume of the cuboid = $l b h$

Volume of the cuboid = $6 \times 6 \times 0.5 = 18 \text{ cm}^3$

16. Answer: c

Explanation:

Global warming is the gradual heating of Earth's surface, oceans and atmosphere due to man-made causes.

The direct consequences of global warming are sea-level rise, increase in temperatures, risk to flora and fauna, water shortage etc.

Since these effects are already visible in our daily life, global warming has to be a real threat and not a misconception.

Hence only argument I is strong.

17. Answer: b

Explanation:



Hence, figure A is the correct answer.

18. Answer: b

Explanation:

- **Dipa Karmakar** is the **first Indian female gymnast** ever to compete in the Olympics.
- **Dipa Karmakar:-**
 - She is an **Indian artistic gymnast**.
 - She hails from **Agartala, Tripura**.
 - She won a **bronze medal** at the **2014 Commonwealth Games in Glasgow**, becoming the **first Indian female gymnast** to do so in the history of the Game.
 - She also won a **bronze medal** at the **Asian Gymnastics Championships**.
 - Karmakar represented India at the **2016 Summer Olympics in Rio de Janeiro**, becoming the **first Indian female gymnast ever to compete in the Olympics**.
 - In July 2018, Karmakar became the **first Indian gymnast to win a gold medal at a global event**, when she finished first in the vault event of the **FIG Artistic Gymnastics World Challenge Cup at Mersin, Turkey**.
 - She has been awarded the **Padma Shri in 2017**.
 - For her performance in Rio Olympics 2016, she was awarded the **Rajiv Gandhi Khel Ratna award** in August 2016.

19. Answer: d

Explanation:

The pattern followed here is:

$$9 \xrightarrow{+2} 11 \xrightarrow{+4} 15 \xrightarrow{+2} 17 \xrightarrow{+4} 21 \xrightarrow{+2} 23 \xrightarrow{+4} 27$$

Hence, **27** is the correct answer.

20. Answer: d

Explanation:

- Blackbuck is the state animal of Andhra Pradesh.
- Andhra Pradesh facts:-

Capital	Amravati, Hyderabad
CM	Y S Jaganmohan Reddy
Governor	Biswabhushan Harichandan
Lok Sabha Seats	25
Rajya Sabha Seats	11

- Symbols of Andhra Pradesh-

State Language	Telugu
State Bird	Rose-ringed parakeet
State Flower	Jasmine
State Tree	Neem
State Dance	Kuchipudi

21. Answer: b

Explanation:

Alphabetical sheet with its Placed Value:



Hence, 9K is the correct answer.

22. Answer: b

Explanation:



Hence, figure 2 is the correct answer.

23. Answer: d

Explanation:

$$63 = 3 \times 3 \times 7$$

$$105 = 3 \times 5 \times 7$$

$$\text{LCM of } 63 \text{ and } 105 = 3 \times 3 \times 5 \times 7 = 315$$

The least number that when divided by 63 and 105 leaved remainder 4 in each case is = $315 + 4 = 319$

24. Answer: a

Explanation:

- **Narendra Modi** inaugurated the **Dr. A.P.J. Abdul Kalam Memorial** in **Rameshwaram**.
- The memorial for Dr. Kalam showcases his life and times in a remarkable manner.
- The Prime Minister also flagged off the **Kalam Sandesh Vahini**, an exhibition bus which shall travel across various States of the country and reach Rashtrapati Bhavan in New Delhi on October 15, which marks the birth anniversary of the former President.
- **APJ Abdul Kalam –**
 - His full name was **Avul Pakir Jainulabdeen Abdul Kalam**.
 - He was born and raised in **Rameswaram, Tamil Nadu** and studied physics and aerospace engineering.
 - He was a scientist, a visionary, a writer, and a public servant.
 - He came to be known as the **Missile Man of India** for his work on the development of **ballistic missile and launch vehicle technology**.
 - He also played a pivotal organisational, technical, and political role in **India's Pokhran-II nuclear tests in 1998**.
 - Kalam was elected as the **11th President of India in 2002**.
 - He was widely referred to as the **"People's President"** for his humbleness and connection with the people.
 - He was honoured with the **Padma Bhushan in 1981** and the **Padma Vibhushan in 1990** for his **work with ISRO and DRDO** and his role as a **scientific advisor to the Government**.
 - In 1997, Kalam received India's highest civilian honour, the **Bharat Ratna**, for his **contribution to the scientific research and modernisation of defence technology in India**.
 - While delivering a lecture at the IIM Shillong, Kalam collapsed and died from a cardiac arrest **on 27 July 2015 at the age of 83**.
 - **Some of his famous book are –**
 - *Wings of Fire, India 2020, Ignited Minds, Target 3 Billion.*

25. Answer: c

Explanation:

Since Genuine is the meaning of word Real,

Similarly, Counterfeit is the meaning of the word Fake,

Hence, option 3 is the correct answer.

26. Answer: c

Explanation:

Choice of dress should not be considered as an excuse to abuse a person. Hence the argument 1 which suggests that revealing dresses causes or provokes a person to abuse another is not strong.

Undoubtedly, a person has the right to choose what to wear. Therefore argument 2 is strong.

Hence, only argument 2 is strong.

27. Answer: a

Explanation:

- The stress and pressure of examination might lead to students engaging in rote learning. This will suppress the abilities of critical thinking and creativity among students.

Hence argument 1 is strong.

- Examinations create a sense of competition and provide insight into one's ability to perform
- The realization of one's abilities through self-analysis thus obtained along with the spirit of competition can help improve one's personality and confidence.

Therefore, argument 2 is strong.

★ **Important Points**

- Both arguments can be strong at a time because we can have an examination that is not in the written form and yet evaluates the students' learning and progress

28. Answer: d

Explanation:

Concept:

- The **magnitude** of the **buoyant force** depends on the **density** of the fluid.
- **Buoyancy** or **upthrust** is an upward force exerted by a fluid that opposes the weight of an immersed object.
- In a column of fluid, pressure increases with depth as a result of the weight of the overlying fluid.
- Thus the **pressure at the bottom of a column of fluid is greater than at the top of the column**.
- If the object is less dense than the liquid, the force can keep the object afloat.
- **Ex :-** A ship will float even though it may be made of steel (which is much denser than water), because it encloses a volume of air (which is much less dense than water), and the resulting shape has an average density less than that of the water.
- **Archimedes' principle:-**
 - The concept of **buoyancy** can be traced back to **Archimedes' principle** given in 212 BC.
 - "Any object, wholly or partially immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object".

29. Answer: b

Explanation:

- **West Bengal** won the **Santosh Trophy** for the **32nd** time in 2017.
- West Bengal defeated Goa 1-0 to lift the trophy.
- Santosh Trophy:-
 - It is a **football knock-out competition** contested by the regional state associations and government institutions under the **All India Football Federation (AIFF)**.
 - The tournament is held **every year** with **31 teams** who are divided into groups and who must qualify for the tournament proper through the preliminary round.
 - The tournament was started in **1941** and is named after the president of the then West Bengal's football association **Sir Manmatha Nath Roy Chowdhary of Santosh**.
- Recent winners:-

Year	Teams in Final	Winner
2017-2018	Kerala v/s West Bengal	Kerala
2018-2019	Services v/s Punjab	Services

- Player records
 - **Tournament top scorer:** Inder Singh (Punjab) (45 goals)
 - **Most goals in a single tournament:** Inder Singh (Punjab) (23 goals – 1973–74)
 - **Most goals in a single match:** N. Pagsley (West Bengal) and Inder Singh (Punjab) (7 goals).

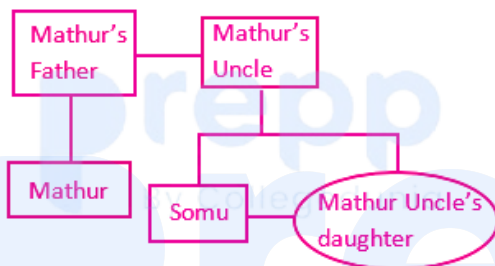
30. Answer: a

Explanation:

Using the following notations, we can draw the family tree:

Symbol in Diagram	Meaning
○	Female
□	Male
==	Married Couple
—	Siblings
	Difference of A Generation

The best possible diagram is as follows,



Hence, Somu and Mathur are cousins of each other.

31. Answer: d

Explanation:

- Muhammad-bin-Tughlaq, the Sultan of Delhi shifted his capital from **Delhi to Daulatabad**.
- **Muhammad bin Tughluq** (also **Prince Fakhr Malik Jauna Khan** , **Ulugh Khan** ; died 20 March 1351) was the Sultan of Delhi from 1325 to 1351.
- He was the eldest son of **Ghiyas -ud -Din -Tughlaq** , the founder of the Tughluq dynasty.
- **Ibn Battuta**, the famous traveler, and jurist from Morocco was a guest at his court and wrote about his suzerainty in his book.
- He attempted to shift his capital from Delhi to Daulatabad, which was supposed to be a more central location, but it was a disastrous decision.

Ruler	Reign
Ghiasuddin Tughlaq	1321 – 1325
Muhammad Bin Tughlaq	1325 – 1351
Firuz Shah Tughlaq	1351 – 1388
Various subsequent rulers	1388 – 1413

32. Answer: a

Explanation:

- 1 unit = 1 Kwh (Kilo Watt hour)
- Total consumption = $750W \times 8 \text{ hours} = 6000 \text{ watt hour}$
- as $1 \text{ KW} = 1000W$
- Hence, $6000 \text{ watt hour} = 6 \text{ KWh} = 6 \text{ units}$
- Total Energy consumed = 6 units

33. Answer: a

Explanation:

LCM of 72 and 84

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

$$84 = 2 \times 2 \times 3 \times 7$$

$$\text{LCM of the 72 and 84} = 2 \times 2 \times 2 \times 3 \times 3 \times 7 = 2 \times 2 \times 3 \times 2 \times 3 \times 7 = 12 \times 6 \times 7$$

34. Answer: d

Explanation:

Given Stat ements:

We know that the color of Sunflower is yellow.

From statement I, we cannot determine what is yellow called and hence it is not sufficient to answer the question.

From statement II, we see that yellow is called purple.

Therefore, the colour of Sunflower as per the coding must be purple.

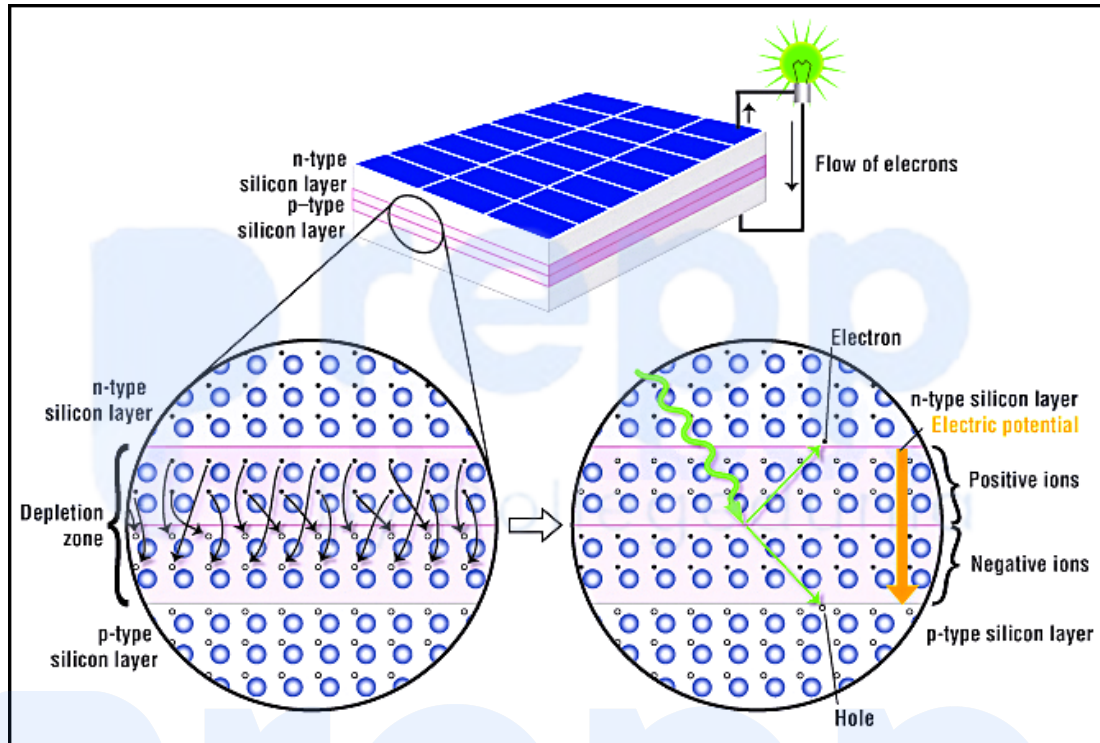
Thus, data in statement II is sufficient to answer the question.

Hence, data in statement II alone is sufficient to answer the question.

35. Answer: c

Explanation:

- A **solar cell** is made up of **Silicon**.
- A **solar cell**, or **photovoltaic cell**, is an electrical device that converts the energy of **light directly into electricity** by the **photovoltaic effect**.
- Photovoltaic modules often have a sheet of glass on the sun-facing side, allowing light to pass while protecting the semiconductor wafers.
- The **photovoltaic effect** was experimentally demonstrated first by French physicist **Edmond Becquerel**.
- **The solar cell works in several steps:**
 - Photons in sunlight hit the solar panel and are absorbed by semiconducting materials, such as doped silicon.
 - Electrons are excited from their current molecular/atomic orbital.
 - The excited electron travels leaving **holes** behind.
 - The potential difference thus produces current.
 - The chemical bonds of the material are vital for this process, and usually, silicon is used in two layers, one layer being doped with boron, the other phosphorus.
 - An array of solar cells converts solar energy into a usable amount of direct current (DC) electricity.
 - An inverter converts direct current to alternating current (AC).



36. Answer: c

Explanation:

Given:

Number boys in the class = 28 boys

Mean (average) score obtained by boys = 12.5

Mean score obtained by girls = 14.5

Mean score of all students in the class = 13.1

Formula used:

Average = Sum of observation/number of observation

Calculation:

Sum of scores obtained by 28 boys = $28 \times 12.5 = 350$

Let the number of girls in the class be 'x'

Mean score obtained by girls = 14.5

Sum of scores obtained by 'x' girls

$$\Rightarrow x \times 14.5 = 14.5x$$

Total students in the class = $(x + 28)$

Mean score of all students in the class = 13.1

Sum of score of all students in the class

$$\Rightarrow (x + 28) \times 13.1 = 13.1x + 366.8$$

According to the question,

$$\Rightarrow 350 + 14.5x = 13.1x + 366.8$$

$$\Rightarrow 14.5x - 13.1x = 366.8 - 350$$

$$\Rightarrow 1.4x = 16.8$$

$$\Rightarrow x = 16.8/1.4 = 12$$

Number of the girls in the class = 12

$\therefore$ Total number of the students in the class = 12 + 28 is 40.

★ Shortcut Trick

Using Allegation Method



Let the number of girls be x and number of boys 28 then,

$$\Rightarrow x/28 = 3/7$$

$$\Rightarrow x = 12$$

Total students

$$\Rightarrow 12 + 28 = 40$$

$\therefore$ Total number of the students in the class = 12 + 28 is 40.

37. Answer: b

Explanation:

- Coins of Rs. **100 denomination** were introduced by the **Reserve Bank of India (RBI)** to mark **MG Ramachandran's 102nd birth centenary**.
- MG Ramachandran's –
 - His full name was **Maruthur Gopala Ramachandran**, and was popularly known as **MGR**.
 - He was an **Indian actor, filmmaker and politician**.
 - He served as the **Chief Minister of Tamil Nadu** for ten years between **1977 and 1987**.
 - He was popularly known as "**Makkal Thilagam**" (**People's King**) as he was popular with the masses.
 - He became a member of the **C. N. Annadurai-led Dravida Munnetra Kazhagam (DMK party)** and rapidly rose through its ranks, using his enormous popularity as a film star.
 - In 1972, he left the DMK, then led by Karunanidhi, to form his own party—the **All India Anna Dravida Munnetra Kazhagam (AIADMK)**.
 - After his death in **1987**, he became the third Chief Minister from the state of Tamil Nadu to receive the **Bharat Ratna** after **C. Rajagopalachari** and **K. Kamaraj**.

38. Answer: b

Explanation:

Element **Mercury** is represented by the given symbol.

- Mercury:-
 - It is commonly known as **quicksilver** and was formerly named **hydrargyrum**.
 - Mercury is the **only metallic element** that is **liquid at room temperature**.
 - Mercury occurs in deposits throughout the world mostly as **cinnabar (mercuric sulfide)**.
- Mercury is used in –
 - **thermometers, barometers, manometers, sphygmomanometers, float valves, mercury switches, mercury relays, fluorescent lamps etc.**
 - Mercury dissolves many metals such as gold and silver to form **amalgams**.

Symbol	Hg
Atomic Number (Z)	80
Block in periodic table	d block
Melting Point	-38.8°C
Boiling Point	356.7°C

★ Additional Information

- Dalton was the first scientist to use symbols to represent elements in a short way.

Element	Dalton's symbol	Element	Dalton's symbol
Hydrogen		Iron	
Carbon		Copper	
Oxygen		Silver	
Phosphorus		Gold	
Sulphur		Lead	
Platinum		Mercury	

39. Answer: c

Explanation:

None of the given statements are true.

- In Oxygen gas, the speed of sound is **316 m/s** and not 316 km/s.
- In water (distilled), the speed of sound is around **1498 m/s** and not 1498 km/s.

★ Key Points

- Sound travels at different speeds depending on what it is traveling through.
- Of the three mediums (gas, liquid, and solid) **sound waves travel the slowest through gases**, faster through liquids, and **fastest through solids**. Temperature also affects the speed of sound.
- At freezing (0° Celcius), sound travels through air at 331 meters per second, but, at 20°C, room temperature, sound travels at 343 meters per second.
- Sound travels **faster in liquids** than in gases because **molecules are more tightly packed**.
- Sound travels **fastest through solids**. This is because **molecules in a solid medium are much closer together than those in a liquid or gas**, allowing sound waves to travel more quickly through it.

★ Additional Information

Speed of sound in different media at 25 °C		
State	Medium	Speed of sound (m/s)
Solid	Solids Aluminium	6420
	Nickel	6040
	Steel	5960
	Iron	5950
	Brass	4700
liquid	Glass (Flint)	3980
	Liquids Water (Sea)	1531
	Water (distilled)	1498
	Ethanol 1207	1207
	Methanol	1103
gas	Gases Hydrogen	1284
	Helium	965
	Air	346
	Oxygen	316
	Sulfur dioxide	213

<https://ncert.nic.in/ncerts/l/iesc112.pdf>

40. Answer: a

Explanation:

Let us check every statement individually,

1. Nitu is the tallest → Data in this statement is inadequate since, only 1 person is mentioned here. Therefore statement 1 alone is not sufficient.

2. Tarun is taller than Manav → Data in this statement is inadequate since, only 2 persons are mentioned here. Therefore statement 2 alone is not sufficient.

3. Hema is the shortest of them all → Data in this statement is inadequate since, only 1 persons is mentioned here. Therefore statement 3 alone is not sufficient.

4. Manav is taller than Priya → Data in this statement is inadequate since, only 2 persons are mentioned here. Therefore statement 4 alone is not sufficient.

Since, no statement alone is sufficient now we can go through the options given,

From 1st option combining all 1, 2, 3, and 4 statement together we get,

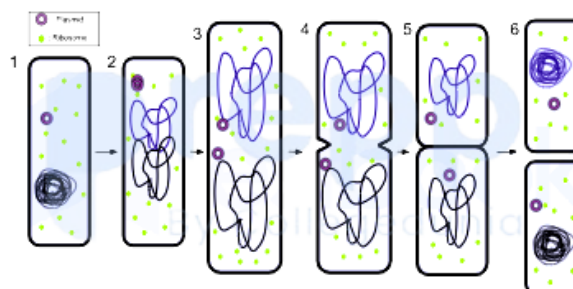
Nitu > Tarun > Manav > Priya > Hema

Hence, "Statements 1, 2, 3 and 4 together are sufficient".

41. Answer: a

Explanation:

- **Amoeba** reproduces by **binary fission**.
- An **amoeba** is a type of **unicellular organism** which has the ability to alter its shape, primarily by extending and retracting **pseudopods**.
- **Binary Fission:-**



- It is a kind of **asexual reproduction** in which the organism divides itself in two.

- It occurs in some single-celled Eukaryotes like the **Amoeba** and the **Paramecium** .
- In binary fission, the fully grown parent cell splits into two halves, producing two pools.
- After replicating its genetic material, the parent cell divides into **two equal sized daughter cells** .
- The daughter cells are **genetically identical**.

42. Answer: b

Explanation:

Given:

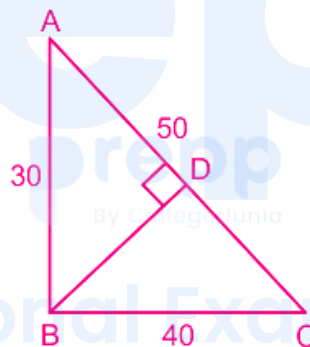
The ratio of the sides of a triangular shaped park is $3 : 4 : 5$ and the perimeter of the park is 120 m.

Formula used:

Perimeter of the triangle = sum of all sides

Area of triangle = $(1/2) \times BC \times AB$

Calculation:



Let the ratio of the sides of a triangular shaped park be $3x : 4x : 5x$

Given, perimeter of the park = 120 m

As we know,

Perimeter of the park = sum of all three sides

$$3x + 4x + 5x = 120$$

$$\Rightarrow x = 120/12 = 10 \text{ m}$$

First side of the triangle

$$\Rightarrow 3x = 3 \times 10 = 30$$

Second side of the triangle

$$\Rightarrow 4x = 4 \times 10 = 40$$

Third side of the triangle

$$\Rightarrow 5x = 5 \times 10 = 50$$

Suppose, ABC is a triangle and AC = 50 cm, AB = 30 cm and BC = 40 cm

BD perpendicular to AC, then find the length of the BD

As we know,

Area of the triangle = $(1/2) \times \text{Base} \times \text{height}$

$$\text{Area of the triangle} = (1/2) \times BC \times AB \quad \text{----(1)}$$

$$\text{Area of the triangle} = (1/2) \times AC \times BD \quad \text{----(2)}$$

Where BD is perpendicular to AC

From equation (1) and equation (2)

$$\Rightarrow (1/2) \times AC \times BD = (1/2) \times BC \times AB$$

$$\Rightarrow 50 \times BD = 40 \times 30$$

$$\Rightarrow BD = (40 \times 30)/50$$

$$\Rightarrow 24 \text{ m}$$

$\therefore$ The perpendicular distance in meters from the vertex, opposite to the largest side of the park is 24 m.

43. Answer: c

Explanation:

- **Mathura Refinery**, the 6th refinery of Indian oil was commissioned in 1982 with a capacity of 6.0 MMTPA to meet the demand of petroleum products in north western region of India.
- **Indian Oil Corporation Limited:-**
 - It is an Indian state government owned oil and Gas Company.
 - It is **the largest commercial oil company** in the country.
 - In May 2018, IOCL become **India's most profitable state-owned company for the second consecutive year**.

Headquarter	New Delhi
Founded	30 June 1959
Chairman	Sanjiv Singh

• Refineries of IOCL:-

- Barauni Refinery
- Bongaigaon Refinery
- CPCL, Chennai
- CPCL, Narimanam
- Digboi Refinery
- Guwahati Refinery
- Haldia Refinery
- Koyali Refinery
- Mathura Refinery
- Panipat Refinery
- Paradip Refinery

44. Answer: b

Explanation:

The highest revenue for the company is Musical toys (45% of the total revenue). Revenue of other toys are lesser than Musical toys.

45. Answer: c

Explanation:

- Blood is a fluid connective tissue because it has a matrix.
- The Blood consists of **red blood cells also called erythrocytes, and white blood cells also called leukocytes and Plasma.**
- The life span of human RBC is 115-120 days.
- There is about 5-6 litres of blood in an adult person.
- The vascular system is also known as the circulatory system.
- Heart, artery veins and capillaries with all body fluids are part of this system.

46. Answer: a

Explanation:

Square root of 14161

$$\sqrt{14161} = \sqrt{(7 \times 7 \times 17 \times 17)} = 7 \times 17 = 119$$

47. Answer: c

Explanation:

Angle between 4 o'clock and 5 o'clock will 90° if minute hands cover 5 min

Distance covered by hours hands in 5 min

At 4 o'clock the minute hands is 20 minute spaces apart from the hour hand.

To be 90° between 4 o'clock and 5 o'clock, the minute hands must gain 5 minute

As we know,

55 minute are gained in = 60 min

5 minute are gained in = $(60/55) \times 5 = 60/11$ minute

Required time = $60/11$ min past 4 o'clock.

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48. Answer: a

Explanation:

B	Brackets in order {}, {}, []	ब्रैकेट {}, {}, [] क्रम में
O	of	का
D	Division (÷)	विभाजन (÷)
M	Multiplication (×)	गुणा (×)
A	Addition (+)	जोड़ (+)
S	Subtraction (-)	घटाव (-)

Given Expression: $27 \div 15 - 36 + 6$

Decoding the information,

Symbols	+	-	×	÷
Codes	÷	+	-	×

On converting given expression: $27 \times 15 + 36 \div 6$

Applying bodmas rule,

$$= 27 \times 15 + 36 \div 6$$

$$= 27 \times 15 + 6$$

$$= 405 + 6$$

$$= 411$$

Hence, 411 is the correct answer.

49. Answer: d

Explanation:

- MgCl_2 is highly soluble in water.
- MgCl_2
- **Natural Extraction:-**
 - The hydrated magnesium chloride **can be extracted from brine (highly saline water) or sea water.**
 - Magnesium chloride, as the natural mineral **bischofite**, is also extracted out of **ancient seabeds.**
 - Some magnesium chloride is made from **solar evaporation of seawater.**
- **Preparation from the Dow process:-**
 - In the Dow process, magnesium chloride is regenerated from magnesium hydroxide using hydrochloric acid.
 - $\text{Mg}(\text{OH})_2 (\text{s}) + 2 \text{HCl} \rightarrow \text{MgCl}_2(\text{aq}) + 2 \text{H}_2\text{O} (\text{l})$
- **Applications of MgCl_2 :-**
 - MgCl_2 is the main **precursor to metallic magnesium.** Metallic magnesium can be obtained by electrolysis of MgCl_2 .

- Magnesium chloride is one of many substances used for **dust control, soil stabilization, and wind erosion mitigation.**
- It is also used **as a catalyst to speed up certain reactions.**
- It is used for low-temperature **de-icing of highways, sidewalks, and parking lots.**

50. Answer: c

Explanation:

- The secretion from the **prostate gland** enters into the **Urethra.**
- **The Prostate:-**
 - The prostate is an **exocrine gland (glands with ducts)** of the **male reproductive system** in most mammals
 - It is a **walnut-sized gland** located **between the bladder and the penis.**
 - The prostate is just in front of the rectum. The urethra runs through the center of the prostate, from the bladder to the penis, letting urine flow out of the body.
 - The function of the prostate is to **secrete a fluid that contributes to the volume of the semen .**
 - The secreted fluid **nourishes and protects sperm.**
 - During ejaculation, the prostate squeezes this fluid into the urethra, and it's expelled with sperm as semen.

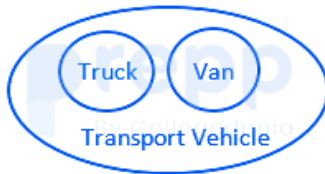


51. Answer: c

Explanation:

Truck and Van both are transport vehicles.

So, the least Possible Venn Diagram:



Hence, figure 3 is the correct answer.

52. Answer: c

Explanation:

The Government of India's 'Khelo India' programme is related to **Sports** category.



• **Khelo India:-**

- It was introduced by **Ministry of Sports and Youth affairs** to **revive sports culture in India at grass-root level**.
- Its objective is to build strong framework for all sports played in our country and **establish India as great sporting nation**.
- It is expected to help scout young talent from schools in various disciplines and **groom them as future sports champions**.
- Talented players will be identified under it in priority sports disciplines at various levels by High-Powered Committed and each will be provided **annual financial assistance of Rs. 5 lakh for 8 years**.

53. Answer: d

Explanation:

Let the total number of the audience be x.

Number of children in program = $x \times (1/8) = x/8$

Number of men in program = $x \times (2/5) = 2x/5$

Number of women in program = $x - (1/8) - (2x/5) = 19x/40$

According to the question

$$19x/40 = 380$$

$$x = 380 \times (40/19) = 800$$

The total audience in the program is 800.

★ Alternate Method

Let the the number of audience be 40 (LCM of 8 and 5)

Then, Number of children = $1/8 \times 40 = 5$

Number of Men = $2/5 \times 40 = 16$

Therefore, number of women = $40 - 21 = 19$

Actual number of women = 380

On comparing,

$$19 \text{ ----- } 380$$

$$1 \text{ ----- } 20$$

Total audience in the program = $20 \times 40 = 800$

Therefore, the total audience in the program was **800** .

54. Answer: b

Explanation:

Household chores are not a part of formal education and hence cannot be learned from schools. Therefore, argument II is not strong.

On the other hand, participating in household chores helps children develop a greater sense of responsibility, accomplishment and well-being. They might also develop fine motor skills during the process. Therefore, argument I is strong.

Hence only argument I is strong.

55. Answer: b

Explanation:

Given:

Total distance = 480 km

Total time taken = 4 hrs

Formula used:

Distance = Speed $\times$ Time

Calculation:

According to the question,

Time taken if he travels only by air = $4 - 2 = 2$ hr

Speed of man if he travels by air

$$\Rightarrow 480/2 = 240 \text{ km/hr}$$

He saved $4/5^{\text{th}}$ of time taken by train = 2

Time taken by train

$$\Rightarrow 2 \times (5/4) = 5/2 \text{ hrs}$$

So, time taken by air

$$\Rightarrow 4 - (5/2) = 3/2 \text{ hrs}$$

Condition satisfied

Distance covered by air

$$\Rightarrow 240 \times (3/2) = 360$$

So, distance covered by train

$$\Rightarrow 480 - 360 = 120 \text{ km}$$

$\therefore$ The distance he covered by traveling by train is 120 km.

★ Key Points

We can find the out the destination covered by train with the help of option after finding out the speed of air.

★ Alternate Method

Since he saves $\frac{4}{5}$ of the time taken to travel by train and reaches destination 2 hours earlier.

Let the time taken via train be t ,

$$\therefore \frac{4}{5} \times t = 2$$

$$\Rightarrow t = \frac{5}{2}$$

Time taken via train = $\frac{5}{2}$

Time taken via Air = $4 - \frac{5}{2} = \frac{3}{2}$

Speed via air(all the way) = $\frac{480}{2} = 240 \text{ km/hr}$

Distance covered via air = $240 \times \frac{3}{2} = 360 \text{ km}$

Distance covered via train = Total distance - Distance covered via air

$$\Rightarrow 480 - 360$$

$$\Rightarrow 120 \text{ km}$$

$\therefore$ The correct answer is **120 km**.

56. Answer: c

Explanation:

In each figure, except figure D the arrow is attached at the corner of the figure, where in figure D, it is attached to the one of the sides of hexagon.

Hence, figure D is odd one out.

57. Answer: c

Explanation:

The correct answer is 7.

★ Mistake Points

- But depending on the author in some books they don't consider boron and polonium as metalloids due to their major inclined behavior towards one side.
- Either being non metallic or metallic.
- Also polonium being radioactive as well.

- There are seven metalloid or semi-metals – Boron (B), Silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te), Polonium.
- The zig-zag line separates them, You can see the NCERT Class 10 science book, page 89 under section Metal and metallic properties for more details.

★ Key Points

- There are 7 **metalloids** in the modern periodic table.
- **The seven commonly recognized metalloids are:-**
- *Boron (B), Silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te), Polonium.*
- Metalloids **Silicon and Germanium** are widely used in the **semiconductor industry**.

★ Additional Information

Metalloid:-

- A metalloid is a type of chemical element which has **properties in between, or that are a mixture of, those of metals and nonmetals.**

Properties of Metalloids:-

- Most of their other physical properties and chemical properties are intermediate in nature.
- Typical metalloids have a **metallic appearance**.
- They are **brittle** and **only fair conductors of electricity**.
- Chemically, they behave mostly as nonmetals.
- They **can form alloys with metals**.
- They are **lustrous in appearance**.
- Their oxides are **amphoteric or weakly acidic**.

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Table: Modern Periodic table

The zig zag line separates the metals from the non metals

GROUP NUMBER

1 2

1 2

3 4

5 6 7 8 9 10 11 12

13 14 15 16 17 18

1 2

3 4

5 6 7 8 9 10 11 12

13 14 15 16 17 18

19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54

55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86

87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118

PERIODS

1 2 3 4 5 6 7

Alkali metals

Alkaline Earth Metals

Halogens

Nobel gases

Transition Metals

GROUP NUMBER

1 2

3 4 5 6 7 8 9 10 11 12

13 14 15 16 17 18

1 2

3 4

5 6 7 8 9 10 11 12

13 14 15 16 17 18

19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54

55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86

87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118

*Lanthanoides 6

**Actinoides 7

58. Answer: c

Explanation:

- The **General Anti-Avoidance Rule (GAAR)** introduced in the 2012 – 13 budget speech by the then Finance Minister Pranab Mukherjee was finally implemented on 1 April 2017.
- **General anti-avoidance rule (GAAR):-**
- The General Anti-Avoidance Rule (GAAR) introduced in the 2012 – 13 budget speech by the then Finance Minister Pranab Mukherjee was finally implemented on 1 April 2017.
- **General anti-avoidance rule (GAAR):-**
- It is an anti-tax avoidance law under the Income Tax Act, 1961 of India.
- It scans the deals and arrangements specifically made to avoid taxes.
- GAAR was originally proposed in the Direct Tax Code 2009.
- GAAR was finally introduced in India by then Finance Minister, Pranab Mukherjee, on 16 March 2012 during the Budget session.
- However, it was considered controversial because it had provisions to seek taxes from past overseas deals involving local assets retrospectively.
- GAAR is finally applicable from assessment year 2018-19.
- It is an **anti-tax avoidance law** under the Income Tax Act, 1961 of India.
- It scans the deals and arrangements specifically made to avoid taxes.
- GAAR was originally proposed in the Direct Tax Code **2009**.
- GAAR was finally introduced in India by then Finance Minister, **Pranab Mukherjee**, on 16 March 2012 during the Budget session.
- However, it was considered controversial because it had provisions to seek taxes from **past overseas deals** involving local assets **retrospectively**.
- GAAR is finally applicable from **assessment year 2018-19**.
- **Features of GAAR:-**
 - The regulation allows tax officials to deny tax benefits, if a deal is found without any commercial purpose other than tax avoidance.
 - It allows tax officials to target participatory notes. Under GAAR, the investor has to prove that the participatory note was not set to avoid taxes.
 - It also allows officials to deny double taxation avoidance benefits, if deals made in tax havens were found to be avoiding taxes.
- **Vodafone-Hutchison Essar Case –**
 - The first big profile case, that highlighted the need of GAAR.
 - In 2007, Vodafone entered the Indian market by buying Hutchison Essar.
 - The deal took place in far off Cayman Islands, where Indian authorities had no say.
 - The Indian government claimed that over US\$2 billion (INR 20,000 crores) were intentionally avoided as tax.
 - In September 2007, a notice was sent to Vodafone regarding tax avoidance.
 - Vodafone claimed that the transaction was not taxable as it was between two foreign firms.

- The government claimed that the deal was taxable as the underlying assets involved were located in India.
- In 2012, the Supreme Court of India gave the verdict in favour of Vodafone, saying that Vodafone did not owe any capital gain taxes.

59. Answer: a

Explanation:



Hence, figure 1 is the correct answer.

60. Answer: b

Explanation:

Given:

$$(x - 2)^2 - 36 = 0: \text{ If } x \in \mathbb{N}$$

Calculation:

$$(x - 2)^2 - 36 = 0$$

$$\Rightarrow (x - 2)^2 = 36$$

$$\Rightarrow (x - 2) = \sqrt{36}$$

$$\Rightarrow (x - 2) = 6$$

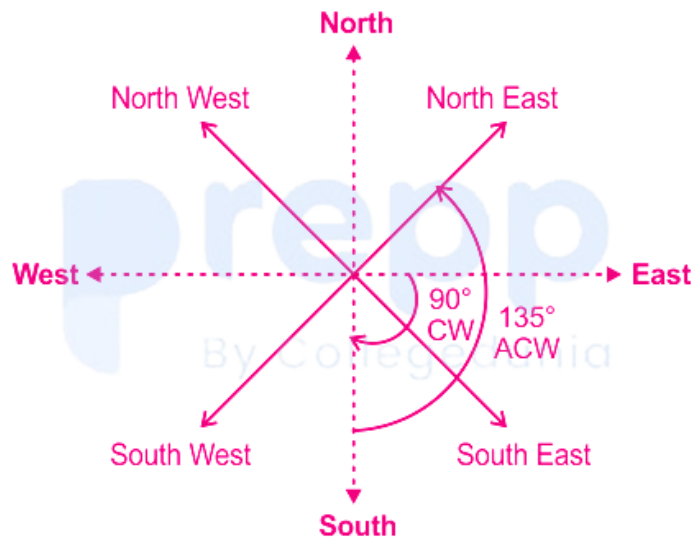
$$\Rightarrow x = 6 + 2 = 8$$

$\therefore$ The value of x is 8.

61. Answer: c

Explanation:

Drawing the diagram according to the given information:



From the diagram,

Here Anil is facing in east direction, after turning 90° clockwise, he will face south direction,

From South if he again turns 135° in anti-clockwise direction, he will be face north-east direction,

Hence, '**North-east**' is the correct answer.

62. Answer: d

Explanation:

- SM Khan is the Author of the book "The people's president: Dr. APJ Abdul kalam".
- About the book:-
 - SM Khan has written his debut book on the "People's President Dr. APJ Abdul Kalam".
 - The book shares his experiences with Dr. Kalam during and post presidency.
 - It provides insight into various facets of Dr. Kalam's life including important highlights of his travel in India and abroad.
- S.M. Khan:-
 - He is a 1982 -batch **Indian Information Service (IIS)** officer of Government of India currently serving as **Director General (Press Registrar and Head of Department), Registrar of Newspapers for India**.
 - Khan served as **Press Secretary** to the Hon'ble President of India (2002 to 2007) Dr. APJ Abdul Kalam.

63. Answer: b

Explanation:

The correct answer is Captain Amarinder Singh.

★ Key Points

- Captain **Amarinder Singh** is the **Chief Minister of Punjab** as of 1st March 2021.
- **Navjot Singh Sidhu**– Navjot Singh Sidhu is an Indian politician, television personality, and former cricketer. He was the Minister of Local Government, Tourism & Cultural Affairs of the State of Punjab from 2017 to 2019.
- **Prakash Singh Badal**– Parkash Singh Badal is an Indian politician who was Chief Minister of Punjab state from 1970 to 1971, from 1977 to 1980, from 1997 to 2002, and from 2007 to 2017. He is also the patron of Shiromani Akali Dal (SAD), a Sikh-centered regional political party.

★ Additional Information

- Basic Information about Punjab:
 - Capital: Chandigarh
 - Governor: **Banwarilal Purohit**
 - Chief Minister: **Bhagwant Mann**
 - State Animal: Blackbuck
 - State Bird: Baaz
 - State Aquatic Animal: Indus River Dolphin

64. Answer: b

Explanation:

The two roots of the quadratic are $x = 1/7$ and $x = (-1/8)$

taking, $x = 1/7$

$$7x = 1$$

$$(7x - 1) = 0$$

Taking, $x = (-1/8)$

$$8x = (-1)$$

$$(8x + 1) = 0$$

Now, we can write,

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$$(7x - 1) (8x + 1) = 0$$

So, option (2) is right.

65. Answer: b

Explanation:

CONCEPT:



- Force: The interaction which after applying on a body changes or try to change the state of rest or state of motion of the body is called force.

$$\text{Force (F)} = \text{Mass (m)} \times \text{acceleration (a)}$$

CALCULATION:

Given that:

$$\text{Force} = 200 \text{ Newton (N)}$$

$$\text{Mass} = 100 \text{ kg}$$

We know that, $F = ma$

$$\text{putting values, } 200 \text{ N} = 100 \text{ kg} \times a$$

$$a \text{ (acceleration)} = F/m = 200/100 = 2 \text{ ms}^{-2}$$

Thus, an object weighing 100 kg, when subjected to a force of 200 N, is accelerated by 2 ms^{-2}

66. Answer: d

Explanation:

Table, Chair and Cupboard all three are made up of furniture.

Whereas Cardigan is one type of winter wear.

Hence, **Cardigan** is the correct answer.

67. Answer: c

Explanation:

For every mirror image based on a clock,

If it is a 12 hours clock, then subtract the given time from 11:60 hrs.

And if it is a 24 hr clock, then subtract the given time from 23:60 hrs.

Here, it is a 12 - hr analog clock, hence, $11:60 - 5:00 = 6:60$ i.e. 7:00

Hence, the mirror image time will be 7'O clock.

Hence, **7:00** is the correct answer.

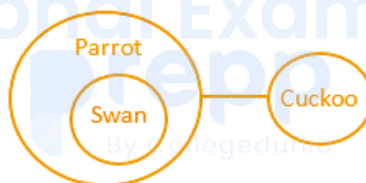
★ **Additional Information**

- Real time + Water image time = 18 : 30 (If the water image time is 6 more than the imaginary time).
- If the imagery time in water image time is less than 6, then the given imagery time is subtracted to 6:30.

68. Answer: b

Explanation:

The least possible Venn diagram is as follows,



Conclusions:

1) No swan is a cuckoo → True, as all swans are parrots and no parrot is cuckoo, no swan will be a cuckoo

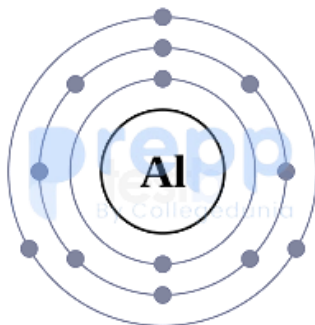
2) All parrots are swans → False, it is possible but not definite.

Hence, only conclusion 1 follows.

69. Answer: c

Explanation:

Aluminum is the elements which has the electronic configuration 2, 8, 3.



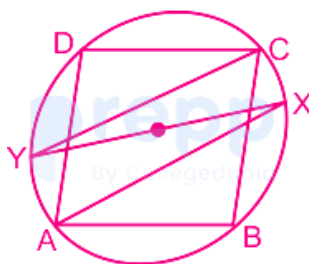
Chemical Symbol	Al
Atomic Number	13
Block in Periodic table	P block
Discovered by	Hans Christian Ørsted in 1824

- It is a silvery-white, soft, non-magnetic and ductile metal in the **boron group**.
- It is the **third most abundant element after oxygen and silicon**.
- It is the **most abundant metal in the Earth's crust**.
- **Bauxite** ore is the main source of aluminium.

70. Answer: b

Explanation:

As we know,



Given, ABCD is a quadrilateral inscribed in a circle of centre O.

Bisectors of the $\angle DAB$ intersect the circle at X and bisectors of $\angle BCD$ intersect the circle at Y.

If we join point X to Y, then centre O lie on the straight line XY. So, we can say XY is a diameter of the circle which is 2 times ($2r$).

71. Answer: a

Explanation:

CONCEPT:

- Ohm's law: At constant temperature and other physical quantities, the potential difference across a current-carrying wire is directly proportional to the current flowing through it.

$$V = R I$$

Where V is the potential difference, R is resistance and I is current

CALCULATION:

Given that:

In first instance, $V = 60$ volts, $I = 4$ Ampere

Therefore, Resistance (R) = $V/I = 60/4 = 15$ Ohms

In second instance, $V = 127.5$ Volts and R (as calculated above) = 15 Ohms.

Therefore, Current (I) = $V/R = 127.5/15 = 8.5$ Ampere.

- Thus, the heater will draw a current of 8.5 Ampere, if the potential difference is changed to 127.5 V. So option 1 is correct.

72. Answer: b

Explanation:

- Statement A and B are Incorrect.
 - The correct statements are:-
 - A - Elemental carbon (and not carbon dioxide) is being oxidized into carbon dioxide.
 - B - Lead Oxide (and not Lead) is getting reduced to Elemental Lead.
 - C - **Correct** - Carbon is getting oxidized.
 - D - **Correct** - Lead oxide is getting reduced.
-

73. Answer: b

Explanation:

Here except figure D, all figures consist of different mathematical shapes.

Whereas figure D consists of same mathematical shape.

Hence, figure D is odd one out.

74. Answer: c

Explanation:

In all figures except figure a, the dots are on either side of the line,

Whereas, in figure a, dots are on the same side of the line.

Hence, option 3 is the correct answer.

75. Answer: c

Explanation:

Given:

Kiran covers 360 m in = 2 min

Kiran back 360 m in = 2 min

Formula used:

Average Speed = Total distance/total time

Calculation:

According to the question,

Total distance = $360 + 360 = 720 \text{ m}$

Total time = $2 + 2 = 4 \text{ min}$

Average Speed = Total distance/total time

$\Rightarrow (360 + 360)/(2 + 2)$

1 min = 60 sec

$\Rightarrow 180/60$

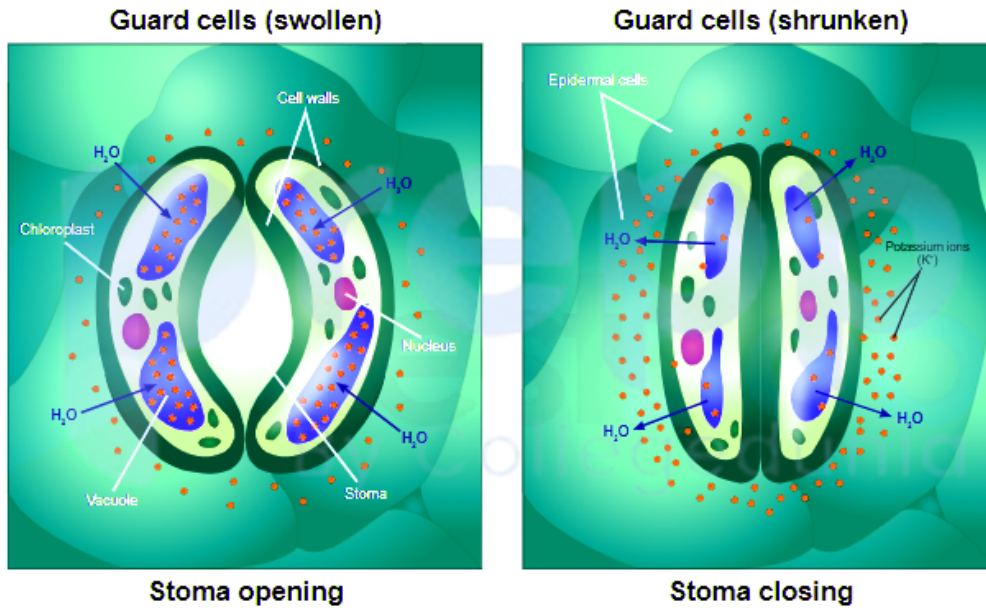
$\Rightarrow 3 \text{ ms}^{-1}$

$\therefore$ The average speed of Kiran is 3 ms^{-1} .

76. Answer: a

Explanation:

- Skin is made up of Epidermal cells.
- Epidermal cells:- The epidermis is the outer of the two layers that make up the skin.
 - The epidermal cells **perform a barrier function in the human body**, protecting against the invasion of bacteria and foreign particles and regulating the amount of water released from the body.
- Connective Tissues:-
 - The human body is composed of just four basic kinds of tissue: **nervous, muscular, epithelial, and connective tissue**.
 - Connective tissue is the **most abundant, widely distributed, and varied type**.
 - It includes **fibrous tissues, fat, cartilage, bone, bone marrow, and blood**. As the name implies, connective tissues often bind other organs together, hold organs in place, cushion them, and fill space.



★ Additional Information

Your Personal Exams Guide

Type of connective Tissue	Function
Areolar (loose) connective tissue	Nourishes and cushions epithelia, provides arena for immune defense against infection, binds organs together, allows passage for nerves and blood vessels through other tissues.
Adipose Tissue (Fat)	Stores energy, conserves body heat, cushions and protects many organs, fills space, shapes body
Dense Irregular connective tissue	Toughness; protects organs from injury; provides protective capsules around many organs
Dense regular connective tissue	Binds bones together and attaches muscle to bone; transfers force from muscle to bone.
Cartilage	Eases joint movements; resists compression at joints; holds airway open; shapes outer ear; moves vocal cords; forerunner of fetal skeleton; growth zone of children's bones
Bone	Physically supports body, provides movement, encloses and protects soft organs, stores and releases calcium and phosphorus
Blood	Transports nutrients, gases, wastes, hormones

- **Parenchyma:-**

- Parenchyma is a term used to describe the functional tissues in plants and animals.
- This tissue is “functional” – performing tasks such as photosynthesis in plants or storing information in the human brain – as opposed to “structural” tissues like wood in plants or bone in animals.
- In animals “parenchyma” refers to the cells that perform the biological function of the organ – such as lung cells that perform gas exchange, liver cells that clean blood, or brain cells that perform the functions of the brain.

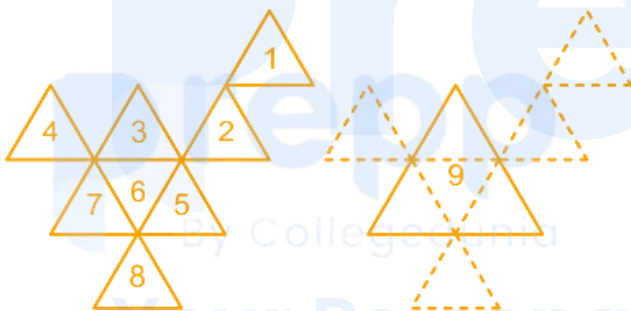
- **Permanent Tissues:-**

- In simple words, the permanent tissues in a plant are those tissues that contain non-dividing cells.
- The cells are also modified to perform specific functions in the plants. The cells of the permanent tissue are derived from the meristematic tissue.
- **Simple permanent tissue:-** These tissues are simple and are made up of only one type of cell. Here, all the cells that make up the tissue are similar and have the same structure, with the same type parts.
 - Some simple permanent tissues are:- **parenchyma, collenchyma, sclerenchyma.**
- **Complex Permanent tissue:-** The complex permanent tissues are made up of more than one type of cell.
 - They coordinate together to perform the same specialized functions in the plant body.
 - They are classified into two types – **Xylem and Phloem**

77. Answer: d

Explanation:

We can count the triangles as follows,



Hence, 9 triangles are present in the given figure.

78. Answer: c

Explanation:

★ Key Points

- The energy obtained from atoms is known as **Nuclear energy**.
- Some Types of Energy:-
 - **Thermal Energy:-** Thermal energy (also called heat energy) is produced when a rise in temperature causes atoms and molecules to move faster and collide with each other.
 - The energy that comes from the temperature of the heated substance is called thermal energy.

- **Chemical energy:**—Energy stored in the bonds of chemical compounds, like atoms and molecules. This energy is released when a chemical reaction takes place.
- **Nuclear Energy:**—Nuclear energy comes from the **nucleus of atoms** . The energy is released by **nuclear fusion** (nuclei are **fused together**) or nuclear fission (nuclei are **split apart**).
- **Nuclear plants** use nuclear fission of a radioactive element called **uranium** to generate **electricity** .
- **Electrical Energy:**—Electrical energy is caused by **moving electric charges** called electrons. The faster the charges move, the more electrical energy they carry.
- As the charges that cause the energy are moving, electrical energy is a form of kinetic energy.
- **Gravitational Energy:**—Gravitational energy is energy associated with gravity.
- It is the potential energy stored by an object because of its higher position compared to a lower position.
- **Magnetic Energy:**—Potential energy due to or stored in magnetic fields.
- **Sound Wave Energy:**—Sound is the **movement of energy** through a substance – like air or water – and is caused by **vibrations** .
- **Radiant energy:**—Radiant energy is a form of electromagnetic energy.
- It can take the form of visible waves – which is what we call light energy – or invisible waves such as radio waves or x-rays.
- **Mechanical Energy:**—Mechanical energy is the sum of kinetic and potential energy in an object that is used to do work. In other words, it is energy in an object due to its motion or position, or both.

79. Answer: a

Explanation:

- M. Subbarayudu is India's next Ambassador to Peru.
- He is a 1994 batch IFS officer.
- He is presently Joint Secretary in the Ministry of External Affairs.
- Peru facts:—

Capital	Lima
Official Language	Spanish
President	Martin Vizcarra
Prime Minister	Vicente Zaballos
Currency	Sol (PEN)
Highest Peak	Huascarán

80. Answer: a

Explanation:

- Relative molecular mass of water (H_2O) is 18.
- The relative molecular mass is **unit-less**.
- How to find relative molecular mass?
 1. Determine the chemical formula of the molecule.
 2. Use the Periodic Table to determine atomic mass of each element.
 3. Multiply the atomic mass with number of atoms of each element in the molecule.
 4. Add the values to get the relative molecular mass.
- Relative molecular mass of water:-
 - The formula for water is H_2O . Each molecule contains 2 hydrogen atoms and 1 oxygen atom.
 - Relative atomic masses: (H (Hydrogen) = 1, O (Oxygen) = 16).
 - **Thus, The relative molecular mass of water is -**
 - $M_r(H_2O) = 2 * A_r(H) + A_r(O) = 2 \times 1 + 16 = 18$

81. Answer: a

Explanation:

- **Lilly Singh** is appointed as **UNICEF's ambassador for Goodwill**.
- **Lily Singh:-**
 - She is an **Actress, comedian, and author**.
 - She is known by her digital alias **Superwoman**.
 - In her role as a Goodwill Ambassador, Lilly will use her unique digital presence to engage children and young people and empower them to speak out about the challenges they face.
 - Lilly joins an impressive list of other UNICEF Goodwill Ambassadors that includes **David Beckham, Orlando Bloom, Jackie Chan, Muzoon Almellehan, Danny Glover, Liam Neeson, Priyanka Chopra, Ricky Martin and Shakira**.
 - Lilly, 28, has gained a huge fan base of over 11 million YouTube subscribers.
 - She has also released her international and *New York Times* bestselling book **How To Be A Bawse**, and was recently cast in HBO's film adaptation of **"Fahrenheit 451."**
 - Additionally, Lilly was **ranked 1 st on the Forbes Magazine Top Influencers List in the entertainment category**.
- **UNICEF:-**
 - It was founded at the behest of Polish physician **Ludwik Rajchman**, to provide immediate hunger relief and healthcare to children and mothers in countries **devastated by World War II**.
 - UNICEF was awarded the **Nobel Peace Prize in 1965**, the **Indira Gandhi Prize in 1989** and the **Prince of Asturias Award of Concord in 2006**.

Formation	11 Dec 1946
Headquarters	New York City, US
Head(Executive Director)	Henrietta H Fore

82. Answer: d

Explanation:

- **Other Teresa** was conferred with sainthood by **Pope Francis in 2016**.
- **Mother Teresa:-**
 - She was born in **Skopje (now the capital of North Macedonia)**, then part of the Kosovo Vilayet of the Ottoman Empire.
 - She was born on **26th August 1910**.
 - She **arrived in India in 1929**.
 - She was **canonised on 4 September 2016**, and the anniversary of her death (5 September) is her **feast day**.

- Teresa received a number of honors, including the **1962 Ramon Magsaysay Peace Prize** and **1979 Nobel Peace Prize**.
- She has also been awarded the **Padma Shri in 1962** and the **Jawaharlal Nehru Award for International Understanding in 1969**.
- She was awarded the **Bharat Ratna in 1980**.
- Missionaries of Charity
 - In 1950, Teresa founded the **Missionaries of Charity**, a Roman Catholic religious congregation.
 - The congregation manages homes for people who are dying of **HIV/AIDS, leprosy and tuberculosis**.
 - It also runs **soup kitchens, dispensaries, mobile clinics, children's and family counselling programmes**, as well as **orphanages and schools**.

83. Answer: d

Explanation:

- Pink was awarded the **Best Film on social Issues** in the **64th National Film Awards** in 2017.
- **Directorate of Film Festivals** presented its annual National Film Awards to honour the **best films of 2016 in the Indian cinema**.
- The awards were awarded by the then President, **Pranab Mukherjee**.
- Other awardees:-

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Best Popular Film Providing Wholesome Entertainment	Sathamnam Bhavathi
Best Actor	Akshay Kumar (Rustom)
Best Actress	Surabhi Lakshmi (Minnaminungu)
Best Supporting Actress	Zaira Wasim (Dangal)
Best Direction	Rajesh (Ventilator)
Best Children's Film	Dhanak (Hindi)
Best Feature Film	Kaasav
Best Animated Film	Mahayodha Rama

84. Answer: a

Explanation:

- **Hydrogen** is the only **non-metal** placed at the left side of the Modern Periodic Table.
- **Hydrogen:-**
 - At standard temperature and pressure, it is a **colorless, odorless, tasteless, non-toxic, nonmetallic, highly combustible diatomic gas** with the molecular formula H_2 .
 - It is the **lightest element** in the periodic table.
 - It is also the **most abundant chemical substance in the Universe**.
 - The two largest use of Hydrogen include **Fossil fuel processing** and **Ammonia production**, mostly for the fertilizer market.

Symbol	H
Appearance	Colorless Gas
Atomic Number (Z)	1
Block in periodic Table	S block
Discovered By	Henry Cavendish (1766)
Named By	Antoine Lavoisier (1783)

• Isotopes:-

- ^1H – Protium – It is the **most common hydrogen isotope** with an **abundance of more than 99.98%**.
- Because the nucleus of this isotope consists of only a single proton, it is given the name protium
- ^2H , Deuterium – the other stable hydrogen isotope, and contains **one proton and one neutron in the nucleus**.
- ^3H Tritium – It contains **one proton and two neutrons in its nucleus**.

85. Answer: d

Explanation:

Calculation:

Let the faster flood gate A alone can fill the reservoir in = x hours

So, Flood gate B alone can fill the reservoir in = (x + 5) hours

According to the question

$$1/x + 1/(x + 5) = 1/6$$

$$\Rightarrow (x + 5 + x)/x(x + 5) = 1/6$$

$$\Rightarrow (2x + 5)/(x^2 + 5x) = 1/6$$

$$\Rightarrow (2x + 5) \times 6 = (x^2 + 5x)$$

$$\Rightarrow 12x + 30 = x^2 + 5x$$

$$\Rightarrow x^2 - 7x - 30 = 0$$

$$\Rightarrow x^2 - 10x + 3x - 30 = 0$$

$$\Rightarrow x(x - 10) + 3(x - 10) = 0$$

$$\Rightarrow (x + 3)(x - 10) = 0$$

Taking, $(x + 3) = 0$

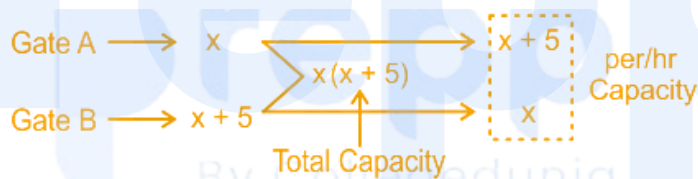
$x = -3$ (not possible)

Taking, $(x - 10)$

$x = 10$

$\therefore$ The faster take to fill the reservoir 10 hrs.

★ Alternate Method



According to the question,

$$\Rightarrow x(x + 5)/(x + x + 5) = 6$$

$$\Rightarrow x^2 + 5x = 6(2x + 5)$$

$$\Rightarrow x^2 + 5x = 12x + 30$$

$$\Rightarrow x^2 - 7x - 30 = 0$$

$$\Rightarrow x^2 - 10x + 3x - 30 = 0$$

$$\Rightarrow x(x - 10) + 3(x - 10) = 0$$

$$\Rightarrow (x + 3)(x - 10) = 0$$

Taking, $(x + 3) = 0$

$x = -3$ (not possible)

Taking, $(x - 10)$

$$x = 10$$

∴ The faster take to fill the reservoir 10 hrs.

Other method:

Given : **A + B** fill reservoir in 6 hours

also A fill it in 5 hour faster than B

fill in time t_2 then both will fill it in $(t_1 \cdot t_2) / (t_1 + t_2)$

time t then B fill it in time $(t+5)$ hence A is faster.

will fill it in 6 hrs By question .

shortcut method : if A fill in time t_1 and B

.....(1)

so if A fill it in

Hence we have to find the value of t , so that both

	A+B	A	B
1.	$(12 \cdot 7) / (12 + 7)$ not equal to 6	7	$7 + 5 = 12$
2.	$(13 \cdot 18) / (13 + 18)$ not equal to 6	13	$13 + 5 = 18$
3.	$(5 \cdot 10) / (5 + 10)$ not equal to 6	5	$5 + 5 = 10$
4.	$(10 \cdot 15) / (10 + 15) = 6$	10	$10 + 5 = 15$

Hre only option 4 satisfy condition . Hence A= 10 is answer.

86. Answer: a

Explanation:

X alone can complete the task in = 8 days

X alone can complete the task in 1 day = $1/8$

Y alone can complete the task in = 10 days

Y alone can complete the task in 1 day = $1/10$

X and Y both can complete the task in 1 day = $1/8 + 1/10 = (5 + 4)/40 = 9/40$

X and Y both can complete the whole task in = $40/9 = 4\frac{4}{9}$ days

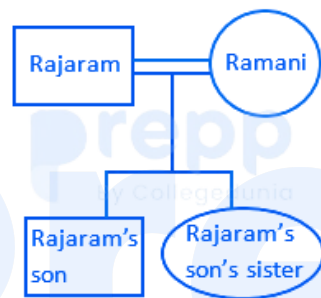
87. Answer: b

Explanation:

Using the following notations, we can draw the family tree:

Symbol in Diagram	Meaning
○	Female
□	Male
==	Married Couple
—	Siblings
	Difference of A Generation

The best possible diagram as per the given information is as follows,



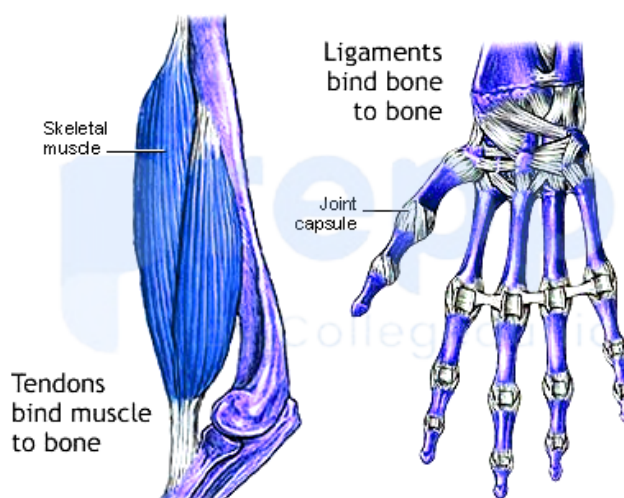
Hence, Ramani is wife of Rajaram.

88. Answer: d

Explanation:

Concept:

- **Tendons** are fibrous connective tissues, and connects **muscle to the bones**.
- **Ligaments** join one **bone to bone**, while tendons connect muscle to bone for a proper functioning of the body.
- Both Tendons and Ligaments are made of **collagen**.
- **Cartilage**
 - is a resilient and smooth elastic tissue, rubber-like padding that covers and protects the ends of long bones at the joints.
 - It is a structural component of the **rib cage, the ear, the nose, the bronchial tubes, the intervertebral discs**, and many other body components.
 - It is not as hard and rigid as bone, but it is much stiffer and much less flexible than muscle.
- Areolar tissue is a type of loose connective tissue.
 - It holds organs in place and **attaches epithelial tissue to other underlying tissues**.
 - It also surrounds the **blood vessels and nerves**.



89. Answer: a

Explanation:

- Tomato is one of the natural sources of Oxalic Acid.
- Oxalic Acid:-
 - Oxalic acid is a **crystalline solid** which forms colourless solution in water.
 - Food articles like spinach, cabbage Broccoli, parsley, tomato are some good sources of Oxalic acid.
 - Main use of Oxalic Acid is in **cleaning and removal of rust**.

★ Important Points

Some other naturally occurring organic acids and their sources are:-

Acid	Source
Citric Acid	Citrus fruits like Lemon, Lime, Orange etc
Acetic Acid	Vinegar
Malic Acid	Apple, Apricot, Blueberries, cherries etc
Formic Acid	Ants and sting-less bees
Tartaric Acid	Grapes, Banana, Tamarind
Lactic Acid	Fermented or sour milk products
Ascorbic acid (Vitamin C)	Amla, Citrus fruits, Kiwi, Mango, Papaya, Green leafy vegetables

90. Answer: a

Explanation:

The correct answer is Amaravati.

★ Key Points

- Amaravati is the new capital of **Andhra Pradesh**.

★ Mistake Points

In **January 2023**, **Andhra Pradesh**, India, has designated **Visakhapatnam** as its new capital under a three-capital plan.

- The three-capital strategy aims to enhance the state's infrastructure and economy.
- The plan involves dividing the state capital functions into three parts:
 - **Legislative capital:** Amaravati
 - **Executive capital:** Visakhapatnam

- Judicial capital: Kurnool

★ Additional Information

- Andhra Pradesh facts:-

Capital	Amravati, Kurnool, Visakhapatnam
CM	Y S Jaganmohan Reddy
Governor	Justice Syed Abdul Nazeer
Lok Sabha Seats	25
Rajya Sabha Seats	11

- Symbols of Andhra Pradesh-

State Language	Telugu
State Bird	Rose-ringed parakeet
State Flower	Jasmine
State Tree	Neem
State Dance	Kuchipudi
State Mammal	Blackbuck

91. Answer: a

Explanation:

Second element in every pair is third to the right of first element except 27.

6 685 5373 7 2 598 7 8 15 5 4

There is a gap of two digits in every number like, there are 5 and 5 between 8 and 3 in 83.

Similarly, there are 7 and 2 between 3 and 5 in 35 and 7 and 8 between 8 and 1 in 81. But there are 5, 8, 8, and 7 between 2 and 7 in 27.

Hence, 27 does not belong to the group.

92. Answer: c

Explanation:

- Ibrahim Lodi was killed by Babur in the First Battle of Panipat in 1526.
- The First Battle of Panipat:-
 - It was fought between the invading forces of Babur and the Lodi Kingdom in 1526.
 - It took place in north India and marked the beginning of the Mughal Empire and the end of the Delhi Sultanate.
 - This was one of the earliest battles involving gunpowder firearms and field artillery in the Indian subcontinent which were introduced by Mughals in this battle.
 - Babur's guns proved decisive in battle, firstly because Ibrahim lacked any field artillery, but also because the sound of the cannon frightened Ibrahim's elephants, causing them to trample his own men.
- Famous ruler chronologically are-
 - Babur (1526 - 1530), Humayun (1530 - 1540), Akbar (1556 - 1605), Jehangir (1605 - 1627), Shah jahan (1628 - 1658), Aurangzeb (1658 - 1707).

93. Answer: a

Explanation:

- The absolute refractive index of any medium is always more than one.
- Absolute refractive index:-
 - The refractive index of a material describes how fast light travels through that material.
 - More specifically, it is the ratio of the speed of light in a vacuum to the speed of light in that medium.
 - It is always greater than one.

- Refractive Index = $\frac{\text{Speed of light in Vacuum}}{\text{Speed of light in the medium}}$
- $n = \frac{c}{v}$
- For example, the refractive index of water is 1.333, meaning that light travels 1.333 times as fast in a vacuum as in water.
- The refractive index is a **unit-less, dimensionless quantity**.
- The concept of refractive index applies within the **full electromagnetic spectrum**, from X-rays to radio waves.

94. Answer: a

Explanation:

- **Shashi Tharoor** is the author of the book 'Why I am a Hindu' published in 2017.
- In the book, Tharoor writes about the **history of Hinduism and its core tenets**.
- He also traced the socio-cultural developments in India that relate to the religion, while elucidating his own religious convictions.
- **Shashi Tharoor:-**
 - He is an Indian **politician, writer and a former career international diplomat**.
 - He is also famous for his **extraordinary oratory skills**.
 - He was born in **London, UK in 1956**.
 - He is currently serving as **Member of Parliament, Lok Sabha** from **Thiruvananthapuram, Kerala**, since 2009.
 - From 1978 to 2007, Tharoor was a career official at the **United Nations**, rising to the rank of **Under-Secretary General** for Communications and Public Information in 2001.
 - He announced his retirement from UN after finishing second in the 2006 selection for U.N. Secretary-General to Ban Ki-moon.
 - He is a member of **Indian National Congress Party (INC)**.
 - Tharoor served as **Minister of State for External Affairs (2009–2010)** and **Minister of Human Resource Development (2012–2014)** under UPA government.
- **Some of his famous books are:-**
 - *Why I Am A Hindu (2018)* and *The Paradoxical Prime Minister (2018)*, *An Era Of Darkness*, *The Great Indian Novel*.

95. Answer: b

Explanation:

Ratio of a : b = 32 : 35 ----(1)

Ratio of b : c = 21 : 32 ----(2)

Multiply by 3 in equation (1) and multiply by 5 in equation (2)

$$\Rightarrow a : b = 96 : 105$$

$$\Rightarrow b : c = 105 : 160$$

b is same, then $a : b : c$

$$\text{Ratio of } a : b : c = 96 : 105 : 160$$

$$\text{Ratio of } a : c = 96 : 160 = 3 : 5$$

96. Answer: d

Explanation:

Suppose the numbers are 4 and 7.

$$\text{The product of these numbers} = 4 \times 7 = 28$$

$$\text{And, the LCM of 4 and 7} = 28$$

$\therefore$ The value of LCM is equal to the product of the given numbers.

Now, suppose the numbers are 6 and 9.

$$\text{The product of these numbers} = 6 \times 9 = 54$$

$$\text{And, the LCM of 6 and 9} = 18$$

$\therefore$ The value of LCM is less than the product of the given numbers.

$\therefore$ We cannot be sure that the minimum value of LCM of the given numbers is greater, lesser or equal to the product of the given numbers.

97. Answer: b

Explanation:

The positions of the letters according to the English alphabet series:

The pattern followed here is;

B U R N
Y F I M — opposite letters

Similarly,

W O U N D
D L F M W — opposite letters

Hence, 'DLFMW' is the correct answer.

98. Answer: b

Explanation:

- Pulses are one of the leguminous crops.
- Legumes/Leguminous crops:-
 - **Legumes** are notable in that most of them have **symbiotic nitrogen-fixing bacteria** in structures called **root nodules**.
 - They are **able to take nitrogen**, one of the most important plant foods, from the air while all other plants have to rely on nitrogen available in the soil.
 - This has an important consequence: **They do not compete with other crops for nitrogen.**
 - They **even enrich the soil with nitrogen** they do not use up themselves.
 - The plants have root nodules. The nodules are filled with bacteria.
 - These bacteria feed on sugars and starches supplied by the plant.
 - They fix nitrogen and make it available to the plant whose roots they are living in.
 - By living together, plant and bacteria both gain. Each of them produces something the other needs. This living together is called **symbiosis**.
 - Each nodule functions for only four weeks. Afterwards, it dies and breaks open, releasing nitrogen into the surrounding soil and thus enriching it.
 - In this way, the plant gets so much nitrogen that additional nitrogen from chemical fertilizers is not necessary.
 - Some common legumes:-
 - *alfalfa, clover, beans, peas, chickpeas, lentils, lupins, mesquite, carob, soybeans, peanuts, and tamarind.*

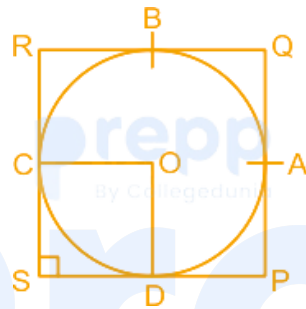
99. Answer: a

Explanation:

- 1 kilo Watt (KW) = 1000 Watt
- **Extra:-**
 - The **watt (W)** is the SI unit of power.
 - It is named after James **Watt**, the inventor of the steam engine.
 - One **watt** is defined as the energy consumption rate of one joule per second.
 - $1W = 1J / 1s$.

100. Answer: c

Explanation:



PQRS is a quadrilateral, O is centre and r is the radius of the circle.

Given, $\angle S = 90^\circ$, $QR = 38$ cm, $RS = 25$ cm and $QA = 27$ cm

As we know,

$$QR = QB + BR$$

$$38 = QA + BR \quad [QA = QB \text{ (Tangent of the circle)}]$$

$$38 = 27 + BR$$

$$BR = 38 - 27 = 11 \text{ cm}$$

$$RS = RC + CS$$

$$25 = BR + CS \quad [RC = BR \text{ (Tangent of the circle)}]$$

$$25 = 11 + CS$$

$$CS = 25 - 11 = 14$$

As we know,

$$\angle S = 90^\circ$$

OC perpendicular to RS and OD perpendicular to PS

So, $\angle OCS$ and $\angle ODS$ are 90° , then

$$\angle COD = 90^\circ$$

$$CS = SD = OC = OD = 14 \text{ cm}$$

So, we can say SCOD is a square.

$$\text{Radius } (r) = 14 \text{ cm}$$

Prepp

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