Prepp.in

Prepp

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
- UPTET
- IBPS RRB
- IBPS CLERK
- IES
- UPSC CAPF
- SSC Stenogr..
- RRB NTPC
- SSC GD
- RBI GRADE B
- RBI Assistant
- DSSSB

RRB Group D 2018 Prev. Yr. Paper (10 Dec 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.

CBT

1. _____ propagates through stem. (+1, -0.33)

   a. Bryophyla

   b. Tamarind

   c. Rose

   d. Bryophyllum

---

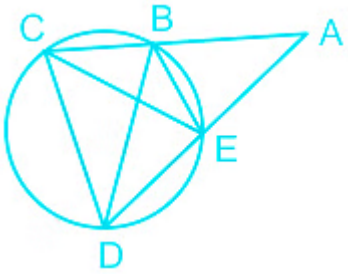
2. If sin θ = cos θ, then what will be the value of sec θ? (+1, -0.33)

   a. $\sqrt{2}$

   b. $\frac{1}{\sqrt{2}}$

   c. 1

   d. 2



3. (+1, -0.33)

   In the above figure, ∠BAE = 30°, ∠ABE = 80°and ∠DBE = 50°. What is the value of ∠BCE?

   a. 25°

   b. 5°

c. 10°

d. 20°

---

4. Read the following statements and decide which of the two conclusions logically follows them. **(+1, -0.33)**

Statement:

Freedom and discipline are very important for a good society.

Conclusions:

1. Society has to face problems because of people who lack freedom and discipline.

2. No one has freedom and discipline in society.

a. Only conclusion (1) follows.

b. Both conclusions (1) and (2) follow.

c. Only conclusion (2) follows.

d. Neither (1) nor (2) follows.

---

5. Which of the following number is divisible by 6? **(+1, -0.33)**

a. 12346

b. 12348

c. 12344

d. 12340

---

6. 'g' (acceleration due to gravity) = ? **(+1, -0.33)**

a. GR^2/M

b. GM/R^2

c. G/MR^2

d. R^2M/G

---

7. What will be come in place of '?' mark? **(+1, -0.33)**

5.4 × 0.0015 = _____?

a. 0.81

b. 0.00081

c. 0.081

d. 0.0081

---

8. The highest common factor of 117 and another number is 13. The second number cannot be which of the following: **(+1, -0.33)**

a. 169

b. 143

c. 156

d. 130

---

9. The chemical formula of sodium carbonate is _____. **(+1, -0.33)**

a. Na_2CO_3

b. $NaCO_3$

c. Na_3CO_2

d. $NaCO_2$

---

10. A cosmetic shop has different brands of cosmetics and ingredients. 50% of the shop's sales are made from hair material. 40% of sales are from personal hygiene products. The store sales average Rs.15,00,000 every quarter. What is the average monthly sales per store for personal hygiene products? **(+1, -0.33)**

a. Rs. 3,00,000

b. Rs. 2,50,000

c. Rs. 5,00,000

d. Rs. 2,00,000

---

11. Which of the following is **not** true about manganese? **(+1, -0.33)**

a. It is used in heating elements of electric irons, toasters etc.

b. Manganese is an electronegative element.

c. Temperature affects its resistance at high levels.

d. It does not oxidize easily.

---

12. In the year 1778, the British established the first printing press in _____. **(+1, -0.33)**

a. Madras

b. Bombay

c. Ahmedabad

d. Calcutta

---

13. Which of the following is gymnosperm? **(+1, -0.33)**

a. Fern

b. Pine

c. Mango

d. Moss

---

14. Superman is flying over the home krypton. Krypton is spherical in shape. It is in Pune city, which is situated on the equator. It is now facing towards the North Pole. He crosses the equator and flies to his left and reaches Mumbai, which is just opposite the equator of Pune city. He decides to fly to the South Pole, but he stops in Delhi on half way. What are the measurements of the following angles, considering the center of the krypton as a reference point? **(+1, -0.33)**

1. Pune-Center-Delhi

2. Pune-Center-Mumbai

3. Mumbai-Center-Delhi

a. 120, 180, 45

b. 120, 0, 45

c. 135, 180, 45

d. 45, 180, 135

---

15. What is the number of triangles in the following figure? **(+1, -0.33)**

a. 7

b. 9

c. 11

d. 5

---

16. Three of the four options below are related in a particular way. Choose the option which is different or mismatched from the others. **(+1, -0.33)**

a. Sutlej

b. Ravi

c. Chenab

d. Yamuna

---

17. Raksha can do a work in 27 days while Esther takes 45 days to do it herself. They start working together, but Raksha leaves 9 days before the work is over. How many days does Esther work? **(+1, -0.33)**

a. 18

b. 27

c. 13.5

d. 22.5

---

18. _____ is a Pacific form of phytochrome. **(+1, -0.33)**

a. P760

b. P730

c. P660

d. P630

---

19. What will be the next term in the following category? **(+1, -0.33)**

5E, 7G, 9I, 11K, _____

a. 14N

b. 13N

c. 13M

d. 14M

---

20. Rani and Radha were walking in opposite directions. If Radha was moving towards the north-east direction, then towards which direction was the Rani moving? **(+1, -0.33)**

a. South-West

b. South-East

c. North-West

d. North-East

---

21. Who played the lead role in the movie "Hindi Medium" released in 2017? **(+1, -0.33)**

a. Nawazuddin Siddiqui

b. Raj Kumar Rao

c. Irrfan Khan

d. Akshay Kumar

---

22. A is standing at the entrance of the mall waiting for his friend to come. He is facing east. He then turns his head to the right to see that his friend has arrived. From which direction is he expecting his friend to come? **(+1, -0.33)**

a. South

b. West

c. North

d. East

---

23. The pH scale measures the hydrogen ion concentration in a solution. What does p mean in this? **(+1, -0.33)**

a. Power

b. Potential, Which means comfort in German.

c. Potency, Which means power in German.

d. Potenz, Which means power in German.

---

24. Consider the following question and decide which of the statements is/are sufficient to answer the question. **(+1, -0.33)**

Statement:

Find the value of Z from the statements.

Statement:

I) A + Z = 19

II) Z + P = 12

a. Only statement II is sufficient.

b. Neither statement I nor II is sufficient.

c. Either statement I or II is sufficient.

d. Only statement I is sufficient.

---

25. Read the given statements and conclusions carefully and select which conclusions logically follow the statements. **(+1, -0.33)**

Statement:

Some jaguars are cheetahs, some cheetahs are leopards.

Conclusions:

1. No leopard is Jaguar.

2. Some jaguars are leopards.

a. Only conclusion 1 follows.

b. Both conclusions 1 and 2 follow.

c. Either 1 or 2 follows.

d. Only conclusion 2 follows.

---

26. George Soders, an American writer, won the 2017 Man Booker Award for Fiction for his novel _____. **(+1, -0.33)**

a. Lincoln in the Bardo

b. Lincoln the Lone Walk

c. Lincoln Letters

d. Speech and Writing

---

27. Mayurbhanj mines are known for which of the following metals? **(+1, -0.33)**

a. Copper

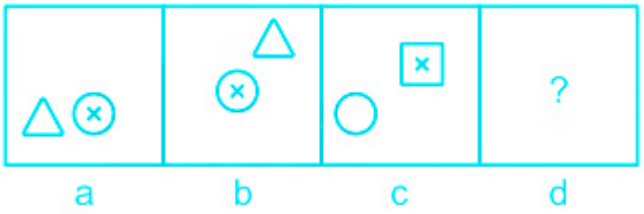
b. Aluminum

c. Iron-ore

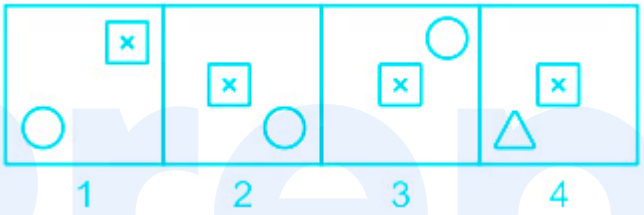
d. Bauxite

28. Which answer figure will replace the question mark (?) given in the question figure. **(+1, -0.33)**

Question figure:



Answer figures:



a. 1

b. 3

c. 2

d. 4

29. The velocity of a wave is 'v', frequency 'f', and wavelength 'λ' is _____? **(+1, -0.33)**

a. $v = 1/f\lambda$

b. $v = f/\lambda$

c. $v = f\lambda$

d. $v = \lambda/f$

30. The capillaries of collenchyma tissue become thick due to the deposit of _____. **(+1, -0.33)**

a. Cellulose and Pectin

b. Lignin and Cutin

c. Pectin and Chitin

d. Suberin and Cellulose

---

31. Three resistors of value 9Ω, 4Ω and 12Ω are connected in parallel. What will be the equivalent resistance of the circuit? **(+1, -0.33)**

a. 0.8

b. 2.2

c. 1.9

d. 2.6

---

32. Select the correct option to complete the following series. **(+1, -0.33)**

2, 5, 9, 19, _____?

a. 41

b. 43

c. 37

d. 36

---

33. Anantnag is a city in _____. **(+1, -0.33)**

a. Himachal Pradesh

b. Jammu and Kashmir

c. Uttarakhand

d. Sikkim

---

34. Ankita is two years younger than Anu. After four years from today, Anu's age will be two times of Ankita's age three years ago. Find the present age of Ankita and Anu. **(+1, -0.33)**

a. 13 years and 15 years

b. 14 years and 16 years

c. 12 years and 14 years

d. 15 years and 17 years

---

35. 276x1 is divisible by 3. What is the sum of the possible values of x? **(+1, -0.33)**

a. 18

b. 15

c. 12

d. 21

---

36. Find the next word in the series. **(+1, -0.33)**

3X24C, 5V22E, _____.

a. 8T20G

b. 9T21G

c. 8T21G

d. 7T20G

---

37. A tank can be filled with a tap in 10 hours. However it takes 11 hours to fill the tank due to a leak. The tap is closed when the tank is full. How many hours will the tank take to empty due to leakage? **(+1, -0.33)**

a. 50

b. 130

c. 100

d. 110

---

38. In 2018, the Ministry of Drinking Water and Sanitation has started the second project of the Swajal Scheme in which village? **(+1, -0.33)**

a. Bhikampura, Karauli, Haryana

b. Bhikampura, Karauli, Rajasthan

c. Bhikampura, Karauli, Himachal Pradesh

d. Bhikampura, Karauli, Gujarat

---

39. Which country will host the 2023 Rugby World Cup? **(+1, -0.33)**

a. Argentina

b. France

c. Brazil

d. England

---

40. If a mirror is placed to the left of the figure, indicate the appropriate mirror image of the given figure. **(+1, -0.33)**

a. 

b. 

c. 

d. 

---

41. Select the option that is related to the third term in the same way as the second term is related to the first term. **(+1, -0.33)**

Vacant : Empty :: Sedate : ?

a. Defect

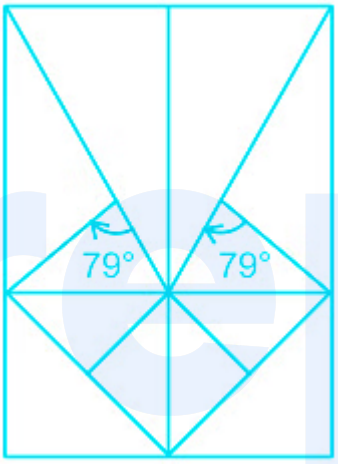
b. Car

c. Cat

d. Calm

---

42. How many right-angled triangles exist in the picture below? **(+1, -0.33)**



a. 12

b. 5

c. 4

d. 8

---

43. Narmada and Tapi are the rivers flowing towards _____. **(+1, -0.33)**

a. South

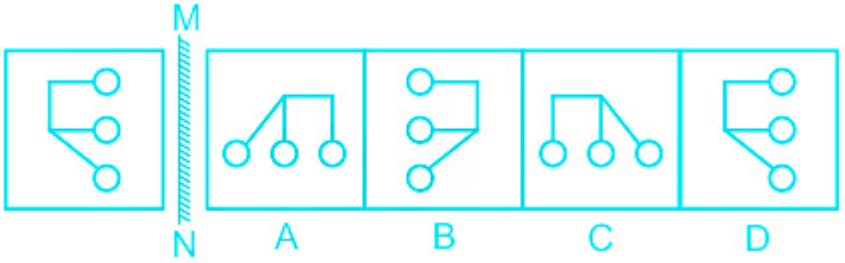
b. East

c. West

d. North

---

44. What will be the mirror image of the given image if the mirror is on MN? **(+1, -0.33)**



a. A

b. C

c. B

d. D

---

45. Sangai deer recently seen in the news is the state animal of which state? **(+1, -0.33)**

a. Manipur

b. Jammu & Kashmir

c. Gujarat

d. Tamilnadu

---

46. You have to decide which of these assumptions is/are implicit in the statement, considering the statement and the assumptions that follow it. **(+1, -0.33)**

Statement:

I like the soldiers.

I want to become a soldier.

Assumptions:

I) I am not a soldier.

II) I am a soldier.

a. Neither assumption I nor II is implicit.

b. Only assumption II is implicit.

c. Only assumption I is implicit.

d. Either assumption I or II is implicit.

---

47. A block of 2 kg slides on a parallel surface at a speed of 4 m/s. It falls on an unpressed spring and presses it until the block is completely motionless. The amount of kinetic friction is 15 N and the spring constant is 10,000 N/m. Spring presses with _____. **(+1, -0.33)**

a. 5.5 m

b. 8.5 m

c. 5.5 cm

d. 8.5 cm

---

48. All samples of carbon dioxide contain carbon and oxygen in the mass ratio of 3 : 8. This is an agreement with the Law of _____. **(+1, -0.33)**

a. Conservation of Mass

b. Constant Proportion

c. Reciprocal proportion

d. Conservation of Energy

---

49. Find the next number in the following series. **(+1, -0.33)**

71, 63, 55, _____?

a. 47

b. 45

c. 46

d. 48

---

50. Consider the following question and decide which of the statements is/are sufficient to answer the question. **(+1, -0.33)**

Question:

Find the value of x, if

Statement:

1) $\frac{1}{x} + \frac{1}{9} = \frac{1}{27}$

2) $a^2 + p^2 = q^2$

a. Neither 1 nor 2 is sufficient.

b. Only 2 is sufficient.

c. Only 1 is sufficient.

d. Either 1 or 2 is sufficient.

51. A tent is such that its lower part is like a cylinder of 24 m height, which is 126 m in diameter. Its apex is like a cone with a base of the same diameter of 126 m and is 80 m slant high. Its canvas is 8 m wide. Calculate the length of the canvas required to make the tent. **(+1, -0.33)**

a. 3168 m

b. 3020 m

c. 3296 m

d. 3190 m

---

52. Which of the following metals does not react with air? **(+1, -0.33)**

a. Gold, Platinum

b. Silver, Platinum

c. Potassium, Mickel

d. Gold, Silver

---

53. Read the following information carefully and answer the question given below: **(+1, -0.33)**

Abinav and Barani play golf and volleyball.

Krish and Dev play tennis and cricket.

Barani and Krish play cricket and volleyball.

Abinav and Dev play golf and tennis.

Who plays tennis, volleyball and golf?

a. Dev

b. Krish

c. Abinav

d. Barani

---

54. If $\frac{\sqrt{3}-1}{\sqrt{3}+1} = a + b\sqrt{3}$, then what will be the value of $a^2 + b^2$? **(+1, -0.33)**

a. 7

b. 6

c. $\sqrt{8}$

d. 5

---

55. Which of the following words is related to basketball? **(+1, -0.33)**

a. Upper cut

b. Penalty corner

c. Flagrant foul

d. Bicycles kick

---

56. A 141.5 m long train, at a speed of 57 km/h, crosses a platform in 39 seconds. What is the length of the platform? **(+1, -0.33)**

a. 476 m

b. 586 m

c. 613.5 m

d. 461 m

---

57. Calculate the acceleration produced when a force of 100 N is applied to an object of mass 50 kg. **(+1, -0.33)**

a. 0.2 ms^{2}

b. 0.2 ms^{-2}

c. 2 ms^{-2}

d. 2 ms^{2}

---

58. _____ tissue cells separate to form different types of permanent tissue. **(+1, -0.33)**

a. Parenchyma

b. Collenchyma

c. Meristem

d. Sclerenchymas

---

59. If $\text{cosec}\ \theta = \alpha \Rightarrow \text{cosec}^{-1}\alpha = \theta$ and $\sec\Phi = \beta \Rightarrow \sec^{-1}\beta = \Phi$ then what will be the value of $\text{cosec}^{-1}y + \sec^{-1}y$? **(+1, -0.33)**

a. 45°

b. 90°

c. 60°

d. 30°

---

60. Choose the odd. **(+1, -0.33)**

A	B	C	D
3C6F	6G10J	11K14N	15O18R

a. B

b. D

c. A

d. C

---

61. If equation $20x + 5y + 11 = 0$ and $50x - ky - 9 = 0$ has no solution, then the value of k is: **(+1, -0.33)**

a. 18

b. 12.5

c. - 12.5

d. 18

---

62. Who said, "The present changes the past. Looking back you do not find what you left behind."? **(+1, -0.33)**

a. Vikram Seth

b. Khushwant Singh

c. RK Narayan

d. Kiran Desai

---

63. The Comptroller and Auditor General of India is appointed by- **(+1, -0.33)**

a. Chief Minister

b. Vice President

c. Prime minister

d. President

---

64. The radius of a sphere is three times the radius of the base of a cylinder. The height of the cylinder is nine times the radius of its base. If the total surface area of the cylinder and the numerical values of the volume of the sphere are equal, then what is the height of the cylinder? **(+1, -0.33)**

a. 4.5 units

b. 5 units

c. 2.25 units

d. 3 units

---

65. In a certain language, if BOXER is coded as CQAIW, which word will be coded as BEWSW? **(+1, -0.33)**

a. ADTOR

b. ACSOR

c. ACTOR

d. AFTOR

---

66. The ratio of two numbers is 19 : 26. If 2 is added to a small number, the ratio will be 3 : 4. What is the big number? **(+1, -0.33)**

a. 91

b. 104

c. 130

d. 78

---

67. Between Shivani and Parinita, a money was distributed in the ratio of 5 : 7. If Parinita gives Rs. 5 to Shivani, the ratio will change to 3 : 4. What is the amount divided? **(+1, -0.33)**

a. Rs. 396

b. Rs. 408

c. Rs. 420

d. Rs. 432

---

68. 4 W X Z 8 Q P O J 6 G T M V E U H 5 3 B **(+1, -0.33)**

In the above series, which term is 8th to the left of 5th term from the right is:

a. 5

b. P

c. O

d. H

---

69. Raman said to Anant, "Day before yesterday I taught the only brother of my paternal grandmother's daughter". Who did Raman teach? **(+1, -0.33)**

a. Son

b. Father-in-Law

c. Father

d. Bother

---

70. Starting from point O, a person walks towards west facing 4 km and reaches point A. From there, he walks 4 km to the right and reaches point B, then he walks 4 km to the right and reaches point C. After that, he again turns right and walks 3 km to reach point D. Now he walks 4 km to the left and reaches point E. Then he turns right and walks 5 km and reaches F. The minimum distance (in km) between point A and point E is: **(+1, -0.33)**

a. $5\sqrt{65}$

b. $\sqrt{68}$

c. $\sqrt{65}$

d. $2\sqrt{65}$

---

71. Which schedule of the Indian constitution is about scheduled languages? **(+1, -0.33)**

a. VIII

b. V

c. I

d. VII

---

72. Which famous scientist has been appointed as the Chairman of the Space Agency (ISRO) for three years in 2018? **(+1, -0.33)**

a. Dr. A. P.J. Abdul Kalam

b. A. S. Kiran Kumar

c. Dr. K. Siwan

d. Rakesh Sharma

---

73. Name the physical quantity that is equal to the product of force and velocity. **(+1, -0.33)**

a. Energy

b. Acceleration

c. Work

d. Power

---

74. What is the square root of 16129? **(+1, -0.33)**

a. 137

b. 117

c. 127

d. 143

---

75. The car's odometer states 2,000 km at the start of the journey and 2,400 km at the end of the journey. If the journey takes 8 hours, find the average speed of the car (in ms^{-1}). **(+1, -0.33)**

a. 14.9 ms^{-1}

b. 13.9 ms^{-1}

c. 15.9 ms^{-1}

d. 12.9 ms

---

76. The mean of three numbers is 21. The range of this data set is 12 and difference between the two smallest numbers is 3. The greatest of three numbers is: **(+1, -0.33)**

a. 27

b. 24

c. 25

d. 28

---

77. Suppose the given statements are true when they seem to be different from the commonly known facts and decide which of the conclusions completely follows the statement. (+1, -0.33)

Statement:

To get involved in a long and complicated dispute, one has to be very intelligent, because they are very talkative and boring.

Conclusions:

I. All intelligent people are boring.

II. All intelligent people are quite capable of handling long and complicated disputes.

a. Either conclusion I or II follows.

b. Both conclusions I and II do not follow.

c. Only conclusion I follows.

d. Only conclusion II follows.

---

78. If an atom of an element has 11 protons and 12 neutrons in its nucleus, the mass number of the element is: (+1, -0.33)

a. 35

b. 12

c. 23

d. 11

---

79. How many districts are there in Uttar Pradesh? (+1, -0.33)

a. 79

b. 77

c. 73

d. 75

---

80. At the railway platform crossing before sunset, Sachin and Anjali were talking to each other face to face. If Sachin's shadow was exactly to Anjali's right, then in which direction did Sachin facing? (+1, -0.33)

a. North

b. South

c. West

d. East

---

81. At which of the following places is the gravitational acceleration zero? (+1, -0.33)

a. At sea level

b. At the poles

c. At the equator

d. At the center of the earth

---

82. What products are formed when ferrous sulfate crystals are heated in a test tube? (+1, -0.33)

a. Ferric oxide + water + sulfur trioxide

b. Ferric oxide + water + sulfur dioxide + sulfur trioxide

c. Ferric oxide + sulfur dioxide

d. Ferric oxide + sulfur dioxide + water

---

83. Ramesh has coins of 50 paise, Rs. 1 and Rs. 5 in the ratio of 2 : 3 : 5 respectively. He has a total amount of Rs. 116. How many coins does he have for 50 paise? (+1, -0.33)

a. 12

b. 4

c. 6

d. 8

---

84. Moti Masjid or Pearl Mosque is the most beautiful structure of _____ fort. (+1, -0.33)

a. Agra

b. Golkunda

c. Red

d. Amer

---

85. Who was appointed as the Chairman of DRDO in August 2018? **(+1, -0.33)**

a. K. Siwan

b. Malti Verma

c. Satish Dhawan

d. Dr. G. Satish reddy

---

86. What do helium and argon have in common? **(+1, -0.33)**

a. Both elements are liquid metals.

b. The outermost shells of both are fully filled.

c. Both have high diffusion rates.

d. Both metals are used in balloons.

---

87. Consider the given statement and decide which of the given assumptions is implicit in the statement. **(+1, -0.33)**

Statement:

This container contains gas.

Assumptions:

(I) Container contains oxygen.

(II) Container contains helium.

a. Only II is implicit.

b. Only I is implicit.

c. Both I and II are implicit.

d. Neither I nor II are implicit.

---

88. $3\sqrt{147} - \frac{7}{3}\sqrt{\frac{1}{3}} + 7\sqrt{\frac{1}{3}} = ?$ **(+1, -0.33)**

a. $\frac{400}{9}\sqrt{3}$

b. $\frac{203}{9}\sqrt{3}$

c. $\frac{403}{9}\sqrt{3}$

d. $\frac{200}{9}\sqrt{3}$

---

89. If an airplane covers a distance of 4000 m and the work done is 20000 J, find the force applied. **(+1, -0.33)**

a. 50 N

b. 0.2 N

c. 10 N

d. 5 N

---

90. A tank can be filled by tap A in 3 hrs and B can fill it in 4 hrs. Tap C can empty this filled tank in 6 hrs. If all three taps are opened simultaneously, how long will it take to fill the tank completely? **(+1, -0.33)**

a. 8 hrs

b. $\frac{10}{7}hrs$

c. 5 hrs

d. $\frac{12}{5} hrs$

---

91. Which country did not participate in the 2018 Champions Trophy hockey? **(+1, -0.33)**

a. Malaysia

b. Pakistan

c. India

d. Netherlands

---

92. The $5/12$ of a number is $3/4$. What is the number? **(+1, -0.33)**

a. $1\frac{4}{5}$

b. $3\frac{1}{5}$

c. $1\frac{7}{15}$

d. $1\frac{5}{16}$

---

93. Whose name is associated with the modern periodic table? **(+1, -0.33)**

a. Newland

b. Hund

c. Mendeleev

d. Alfred Nobel

---

94. Abhay Bang and Rani Bang are known for revolutionizing the health care sector in the _____ district of Maharashtra. **(+1, -0.33)**

a. Nanded

b. Latur

c. Gadchiroli

d. Gondia

---

95. Rajdeep Sardesai is known for which of the following roles? **(+1, -0.33)**

a. Politician

b. Actor

c. Journalist

d. Doctor

---

96. What is the relationship between frequency and duration? **(+1, -0.33)**

a. T = 1 + υ

b. T = υ

c. T = 1/υ

d. T = 1 × υ

---

97. A and B can complete a work in 1.8 days. However, if A works alone, then half of the work is done and he takes a break and then B alone finishes **(+1, -0.33)**

the remaining work, it takes 3.75 days to complete the work. If B is more efficient than A, how much time would B have taken to complete this task himself?

a. 3.3

b. 2.25

c. 3.0

d. 2.7

---

98. Which of the following numbers is divisible by 3? **(+1, -0.33)**

a. 1711

b. 1311

c. 1411

d. 1111

---

99. Gold is mixed with copper _____. **(+1, -0.33)**

a. To make gold soft

b. To make gold more yellow

c. To harden gold

d. To give gold shine

---

100. Read the given statements and conclusions carefully and choose which of the statements logically follows the conclusions. **(+1, -0.33)**

Statement:

The owner says to his daily wage workers, "Late workers will not be given extra time to complete their work for the day."

Conclusions:

I. Daily wage workers are expected to complete the work allotted by the end of the day.

II. Those whom the owner is addressing used to come late for work.

a. Both conclusions follow.

b. Only conclusion I follows.

c. Only conclusion II follows.

d. No conclusion follows.

Answers

1. **Answer: c**

Explanation:

The correct answer is **Rose**.

- Rooting stem cuttings is a common way of propagating herbaceous plants.
  - But it also can work with woody-stemmed plants, including roses.
  - Native roses root easily, more so than grafted varieties, though you shouldn't expect every cutting to be successful.

⭐ Additional Information

- Most rose varieties grow readily from stem cuttings, which allows you to expand your garden with minimal out-of-pocket costs.
- A cutting from a healthy, productive stem can produce its own root system and quickly grow into a new flowering bush.
- **The propagation of roses can be performed in different ways: - By plant division and layering (for hardwood species**). - By seeding (as for all species giving grains). - "in vitro" propagation: a very short time, 1 to 2 months instead of 12 to 18 months with upper methods.
- **Wild roses (Rosa spp.) propagate through either sexual reproduction -- pollination and seeding -- or asexual reproduction** , such as when their stems root as they trail along the ground in fertile soil or when their roots send up new shoots from underground.

---

2. **Answer: a**

Explanation:

Given:

$\sin\theta = \cos\theta$

Formula Used:

$\text{Sin}\theta/\text{Cos}\theta = \text{Tan}\theta$

$\text{Sec}^2\theta - \text{Tan}^2\theta = 1$

Calculation:

$(\text{Sin}\theta/\text{Cos}\theta) = \text{Tan}\theta = 1$

$\text{Tan}\theta = 1$

$\text{Sec}^2\theta - (1)^2 = 1$

$\Rightarrow \text{Sec}^2\theta = 1 + 1 = 2$

$\Rightarrow \text{Sec}\theta = \sqrt{2}$

∴ The value of Secθ is √2.

Alternate method:

Put $\theta = 45°$

Because Only at 45° the value of Sinθ and Cosθ is equal.

So,

$\text{Sec}\theta = \text{Sec}45°$

$\Rightarrow \text{Sec}\ 45° = \sqrt{2}$

∴ The value of Secθ is √2.

---

3. **Answer: d**

Explanation:

Given:

∠BAE = 30°, ∠ABE = 80°, and ∠DBE = 50°

Concept Used;

Sum of angles of a triangle is 180°

Sum of Linear pair angles is 180°

A Chord subtends Equal angle at the same side of the circumference.

Calculation:

In ΔABE,

∠BAE + ∠ABE + ∠AEB = 180°

⇒ 30° + 80° + ∠AEB = 180°

⇒ 110° + ∠AEB = 180°

⇒ ∠AEB = 180° − 110° = 70°

∠DEB = 180° − ∠AEB

⇒ ∠DEB = 180° − 70° = 110° (Linear Pair)

In ΔDEB,

∠DBE + ∠DEB + ∠BDE = 180°

⇒ ∠BDE = 180° − (110° + 50°)

⇒ ∠BDE = 20°

∠BDE = ∠BCE (Chord subtends Equal angle at the same side of the circumference)

⇒ ∠BCE = 20°

∴ The value of ∠BCE is 20°

---

4. Answer: a

Explanation:

Given,

Statement:

Freedom and discipline are very important for a good society.

Conclusions:

1. Society has to face problems because of people who lack freedom and discipline. → Follow as freedom and discipline are very important for a good society, a lack of the same can cause problems.

2. No one has freedom and discipline in society. → Does not follow as it is not known how many people are lacking freedom and discipline.

Hence, the correct answer is Only conclusion (1) follows.

---

5. **Answer: b**

Explanation:

Given:

Four numbers are given 12346, 12348, 12344, and 12340

Concept Used:

We check the divisibility of 2 and 3. The number which is divisible by 2 and 3 simultaneously will be divisible by 6.

Divisibility of 2: The number must end with 0, 2, 4, 6, 8.

Divisibility of 3: Sum of all digits of the given number should be divisible by 3

Calculation:

12346 : Last digit is 6 so divisible by 2 but sum of digits (1 + 2 + 3 + 4 + 6 = 16) is not divisible by 3, so number is not divisible by 6.

12348 : Last digit is 8 so divisible by 2 but sum of digits (1 + 2 + 3 + 4 + 8 = 18) is divisible by 3, so number is divisible by 6.

12344 : Last digit is 4 so divisible by 2 but sum of digits (1 + 2 + 3 + 4 + 4 = 14) is not divisible by 3, so number is not divisible by 6.

12340 : Last digit is 0 so divisible by 2 but sum of digits (1 + 2 + 3 + 4 + 0 = 10) is not divisible by 3, so number is not divisible by 6.

∴ 12348 is the number that is divisible by 6.

---

6. **Answer: b**

Explanation:

The correct answer is GM/R2.

- **The gravity of Earth, which is denoted by g, refers to the acceleration that the Earth imparts to objects** on or near its surface. In SI units this acceleration is measured in meters per second squared (in symbols, m/s^2) or equivalently in newtons per kilogram (N/kg).

⭐ Additional Information

- Here, g is the acceleration due to gravity on the surface of the earth. g' = g Thus acceleration due to gravity is least at the equator and maximum at the poles.
- The acceleration of an object changes with altitude.
- **As the distance is tripled, the gravitational acceleration decreases by a factor of 9, and so on.**
- At the surface of the Earth, the acceleration due to gravity is roughly **9.8 m/s2 (32 ft/s2).**
- **The average distance to the center of the Earth is 6,371 km (3,959 mi).**

---

7. **Answer: d**

Explanation:

Given:

5.4 × 0.0015

Concept Used:

Change the decimal into Fraction and Simplify.

Calculation:

(54/10) × (15/10000)

⇒ (54 × 15)/100000 = 810/100000

⇒ 810/100000 = 0.0081

∴ **The value of given expression is 0.0081**

---

8. **Answer: c**

Explanation:

Given:

HCF = 13

One number = 117

Concept Used:

Number 1 = HCF× (a)

Number 2 = HCF× (b)

Calculation:

Let the ratio of two numbers be a : b

here 'a' and 'b' are co-prime numbers.

1st number = 117 and HCF = 13

⇒ 117 = 13 × a

⇒ a = 9

Now b will be a co-prime number of 9

Now comparing with the options,

Option 1 = 169

⇒ 169 = 13 × b

⇒ b = 13

9 and 13 are co-prime numbers.

Hence the second number can be = 169

Now option 2 =143

⇒ 143 = 13 × b

⇒ b = 11

9 and 11 are co-prime numbers.

Hence the second number can be = 143

Now option 4 = 130

⇒ 130 = 13 × b

⇒ b = 10

9 and 10 are co-prime numbers.

Now option 3 = 156

⇒ 156 = 13 × b

⇒ b = 12

9 and 12 are not co-prime numbers.

∴ 156 cannot be a second number.

---

9. Answer: a

Explanation:

The correct answer is Na_2CO_3.

⭐ Key Points

- The **washing soda** formula is written as **Na 2CO 3. 10H 2O** . The chemical name of washing soda is **sodium carbonate** .
- Chemically soda ash is a hydrated salt of sodium carbonate.

⭐ Additional Information

- The basic test for the presence of carbonate salts is a reaction with a diluted acid solution that leads to the release of bubbles of the gas carbon dioxide and follows the reaction: NaHCO 3 + HCl = NaCl + H 2O + CO 2.
- An additional test is required to distinguish between sodium bicarbonate and sodium carbonate.
- **Sodium carbonate** is a chemical compound with the **molecular formula**Na 2CO 3.
- It's commonly referred to as **washing soda and is used in cleaning products, glass production, as a food additive, and more** .

---

10. Answer: d

Explanation:

Given:

50% of the shop's sales are made from hair material.

40% of sales are from personal hygiene products.

The store sales average Rs.15,00,000 every quarter.

Concept Used:

Quarter = 1/4× 12 months

⇒ 1/4 × 12 = 3 months

Calculation:

for 3 months,

profit = 15,00,000

⇒ for 1 month,

profit = 15,00,000/3

⇒ for 1 month,

profit = 5,00,000

Now,

40% of sales are from personal hygiene products

⇒ 40/100 × total 1 month profit

⇒ 40/100 × 5,00,000

⇒ 2/5 × 5,00,000

⇒ 2,00,000

average monthly sales per store,

for hygiene products =Rs. 2,00,000

---

11. Answer: c

Explanation:

The correct answer is **Temperature affects its resistance at high levels.**

- **Manganese is a naturally occurring element and an essential mineral nutrient.**
  - It's important for maintaining good health, though manganese can be toxic at high levels.
  - **Manganese** is the fifth most abundant metal in the Earth's crust.
  - Its minerals are widely distributed, with pyrolusite (**manganese** dioxide) and rhodochrosite (**manganese** carbonate) being the most common.
  - Manganese is a **chemical element with the symbol Mn and atomic number 25.**
  - It is not found as a **free element in nature; it is often found in minerals in combination with iron.**
  - Manganese is a **transition metal with a multifaceted array of industrial alloy uses, particularly in stainless steel.**
  - The main mining areas for **manganese** are in **China, Africa, Australia, and Gabon.**
  - An element's electronegativity is the power of an atom when in a molecule to attract electron density to itself. The electronegativity depends upon a number of factors and in particuler as the other atoms in the molecule.
  - Electronegativity of Manganese is **1.55** (Pauling Scale).

⭐ **Additional Information**

- Our body contains numerous proteins called enzymes.
  - **Enzymes help to speed up chemical reactions** .
  - Manganese is a necessary component of several important enzymes in your body that work to process carbohydrates, amino acids, and cholesterol.

- Manganese is essential for enzymes that help form bone and cartilage.
- **Manganese is present in an enzyme that provides an amino acid called proline .**
- **Proline is necessary for the production of collagen in our skin cells .Collagen formation is essential to wound healing .**

---

12. Answer: d

Explanation:

The correct answer is **Calcutta**.

- The first press was established in Calcutta, Bengal.
  - The establishment of the Baptist Mission press is the printing press in the **Fort William College in Calcutta** .

⭐ Additional Information

- **Printing came to Bengal in 1777 when two presses were set up almost simultaneously,** one in Calcutta by James Augustus Hicky (famous for later printing India's first newspaper, Hicky's Bengal Gazette) and another in the small town of Hooghly by Nathaniel Brassey Halhed and Charles Wilkins (famous for printing Grammar of the Bengal Language).
- It is unclear which press was established first.
- **In November 1777, a missionary named Johann Zachariah Kiernander approached Hicky** to print calendars for the next year. Kiernander had been importing calendars from South India and was looking for a cheaper alternative.

---

13. Answer: b

Explanation:

The correct answer is **Pine**.

- **Gymnosperms are vascular plants of the subkingdom Embyophyta and include conifers, cycads, ginkgoes, and gnetophytes.**
    - Some of the most recognizable examples of these woody shrubs and trees include pines, spruces, firs, and ginkgoes.

⭐ Additional Information

- **The gymnosperms, also known as Acrogymnospermae, are a group of seed-producing plants that includes conifers, cycads, Ginkgo, and gnetophytes. Pinus gerardiana** , known as the chilgoza pine is a king of Gymnosperm.
- In gymnosperms, pollination involves pollen transfer from the male cone to the female cone.
- Upon transfer, the pollen germinates to form the pollen tube and the sperm for fertilizing the egg.
- **Pollination takes two forms: self-pollination and cross-pollination.**

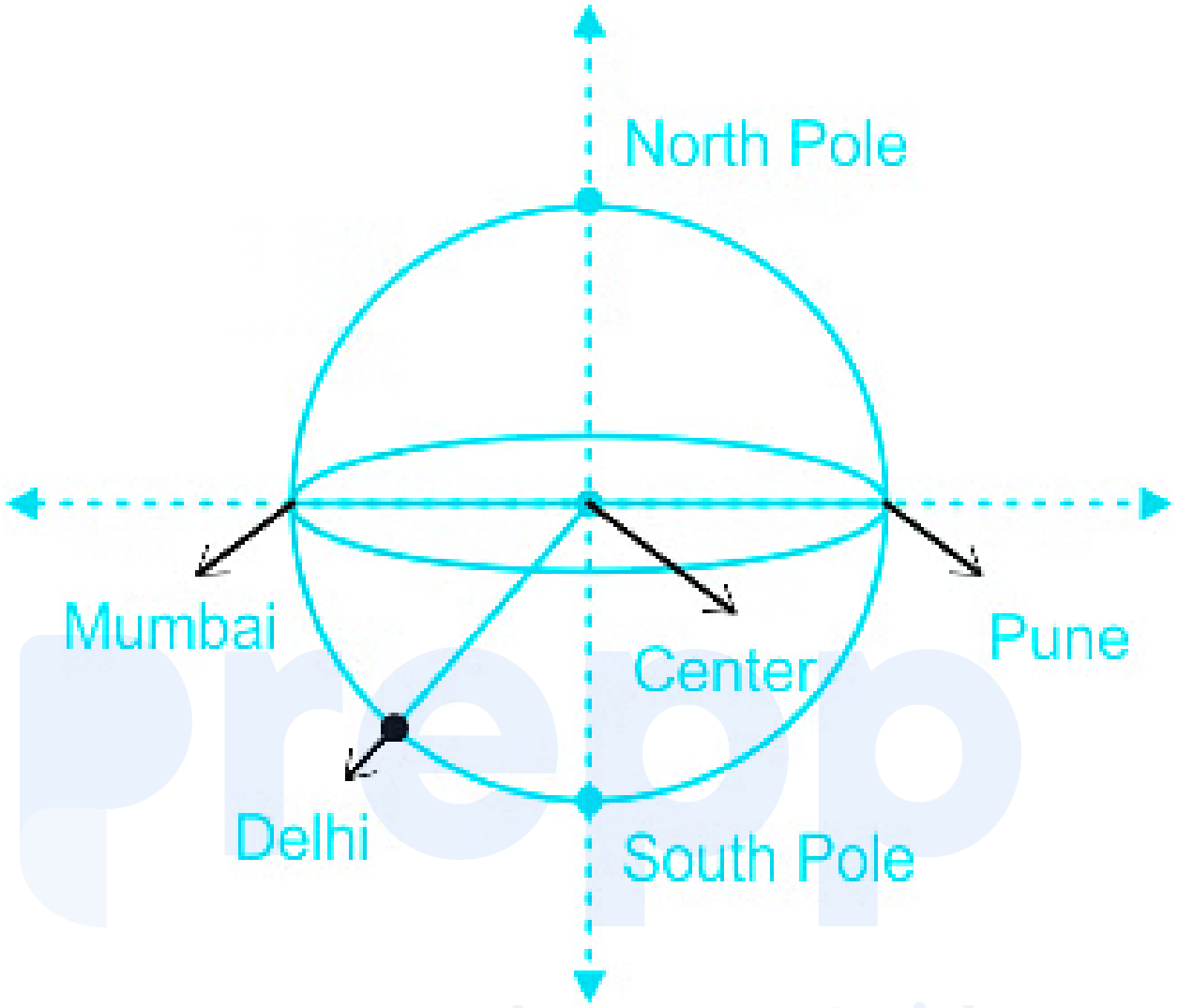
---

14. **Answer: c**

Explanation:

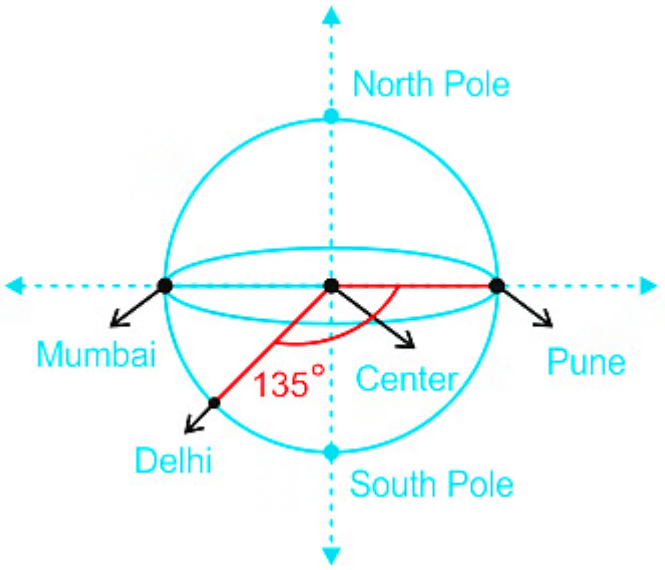
Given,

- Superman is flying over the home krypton. Krypton is spherical in shape.
- It is in Pune city, which is situated on the equator. It is now facing towards the North Pole.
- He crosses the equator and flies to his left and reaches Mumbai, which is just opposite the equator of Pune city.
- He decides to fly to the South Pole, but he stops in Delhi halfway

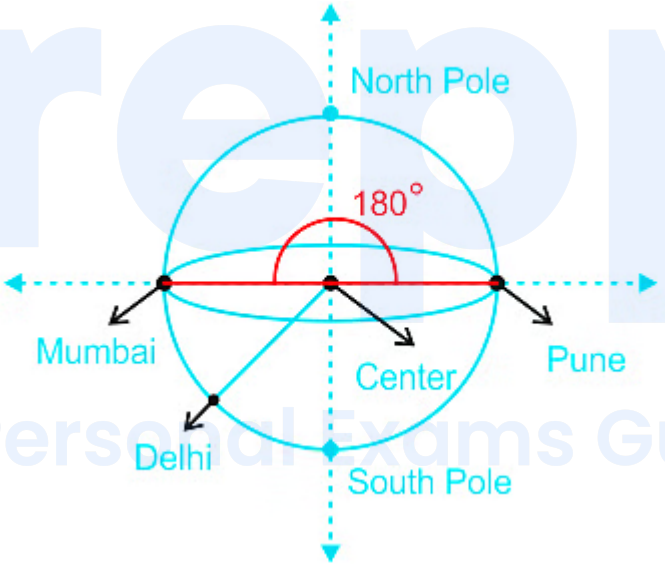


The angles are represented by the following diagram,

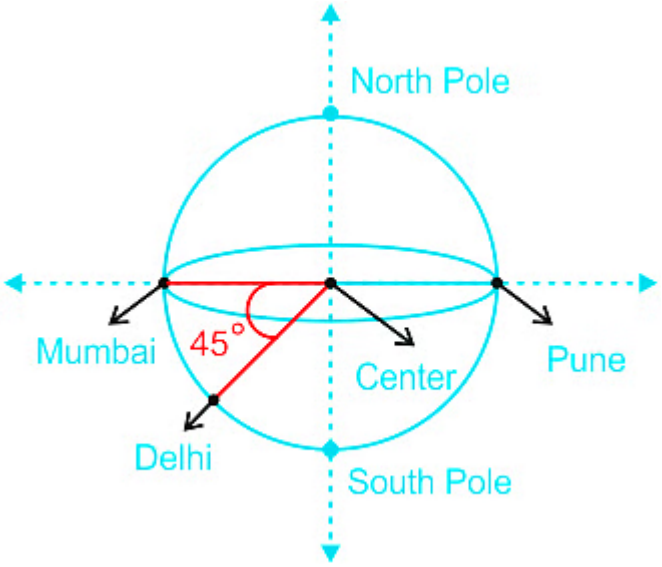
- Pune-Center-Delhi



- Pune-Center-Mumbai



- Mumbai-Center-Delhi



Thus, we get

1. Pune-Center-Delhi → 135 ^{0}

2. Pune-Center-Mumbai → 180 ^{0}

3. Mumbai-Center-Delhi → 45 ^{0}

Therefore, the correct angles are 135, 180, 45.

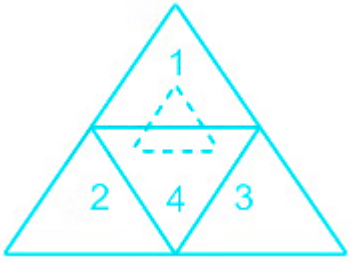
Hence, the correct answer is 135, 180, 45.

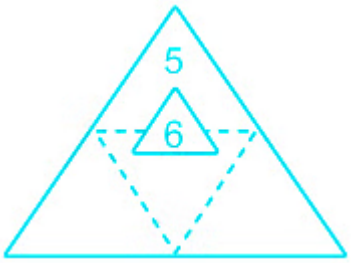
---

15. **Answer: a**

Explanation:

Given,





The number of triangles are,

Small triangles = 6

Large triangle = 1

∴ Total number of triangles = 7

Hence, the correct answer is 7.

---

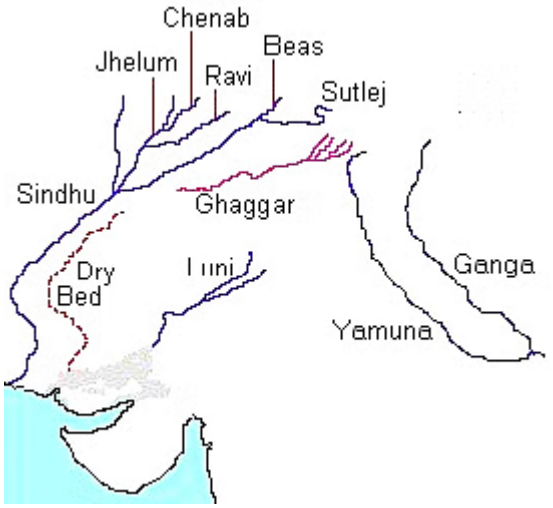
16. **Answer: d**

Explanation:

Given,

Sutlej, Ravi, Chenab, Yamuna

The following shows the map of indian rivers,



Here we see all are West flowing rivers except Yamuna.

Hence, the correct answer is Yamuna.

---

17. **Answer: d**

Explanation:

Given:

Raksha completes work in 27days.

Esther completes work in 45days.

Raksha leaves 9 days before the work is over.

Formula Used:

Efficiency = total work / time taken

Total work = LCM of time taken

Calculation:

Total work = LCM of time taken

⇒ Total work = LCM of 27days and 45 days.

⇒ Total work = 135units.

⇒ Efficiency $_{(Raksha)}$ = 135 / 27 = 5

⇒ Efficiency $_{(Esther)}$ = 135/45 = 3

Efficiency	Subject	Time taken	Total work
5	Raksha	27	135
3	Esther	45	135

Raksha leaves 9 days before the work is over.

last 9 days Esther alone worked.

⇒ Total units of work completed by Esther in 9days

⇒ 9× 3 = 27 units

units of work completed by Raksha and Esther together,

⇒ 135 - 27 = 108 units

108 units of work completed by Raksha and Esther together,

⇒ Time taken by Raksha and Esther together = 108/8

⇒ Time taken by Raksha and Esther together = 13.5 days.

⇒ Esther worked for 13.5days + 9days = 22.5days

∴ Esther works for 22.5 days.

---

18. Answer: c

Explanation:

The correct answer is **P660.**

- Phytochromes are a class of photoreceptors in plants, bacteria, and fungi used to detect light.
    - **They are sensitive to light in the red and far-red region of the visible spectrum and can be classed as either Type I, which are activated by far-red light, or Type II that are activated by red light.**

⭐ Additional Information

- Phytochrome regulates the expression of many plant genes, and it may control plant development primarily through its role in regulating gene expression.
    - As a result, it is important to determine the specific mechanism by which phytochrome regulates gene expression.
    - **Phytochrome has been found in most of the organs of seed plants and free-sporing plants.**
    - It has also been found in green algae. Although phytochrome is an important plant pigment.
    - **It occurs in very low concentrations and is not visible unless chemically purified.**

---

19. Answer: c

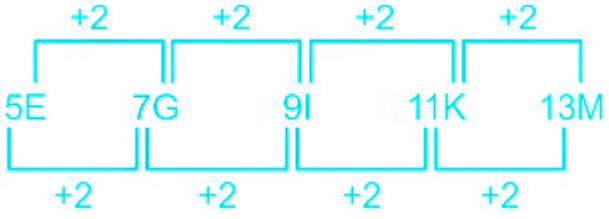
Explanation:

We know,

Given,

5E, 7G, 9I, 11K, _____

The pattern followed here is,



Hence, the correct answer is 13M.

---

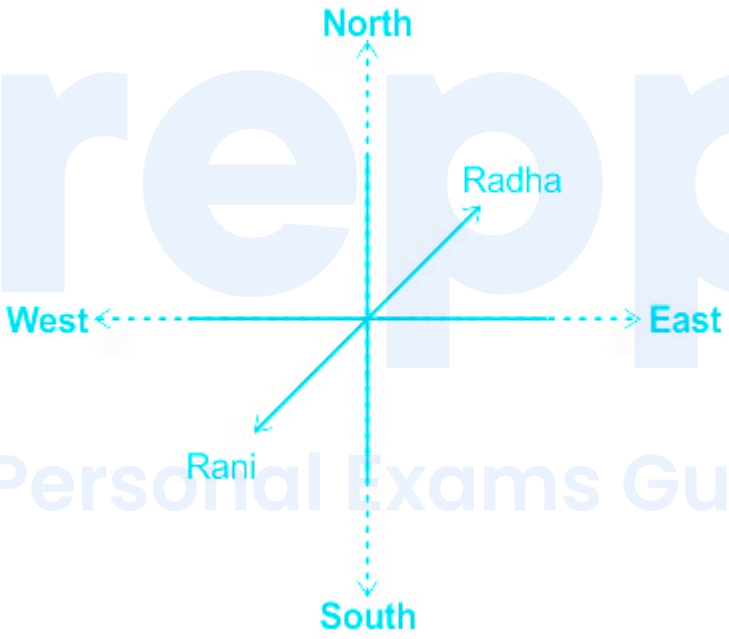
20. Answer: a

Explanation:

Given,

Rani and Radha were walking in opposite directions. If Radha was moving towards the north-east direction.

∴



Here we see Rani is moving in the South-West direction.

Hence, the correct answer is South-West.

---

21. Answer: c

Explanation:

The correct answer is **Irrfan Khan.**

- At the **63rd Filmfare Awards, the film garnered six nominations, winning for Best Film and Best Actor for Khan.**

⭐ **Additional Information**

- Filmmaker Saket Chaudhary, who helmed the sleeper hit Hindi Medium starring **Irrfan and Saba Qamar in 2017, revealed that he was approached to direct its sequel Angrezi Medium.**
- Hindi Medium follows the story of **a couple want to give their daughter the best education so she will be accepted by the elite** . Brilliant performances by Irrfan Khan & Saba Qamar.
- The film emerged as a sleeper hit at the box office.
- Its worldwide gross was ₹ **1.09 billion (US$15 million) by July 2017.**

---

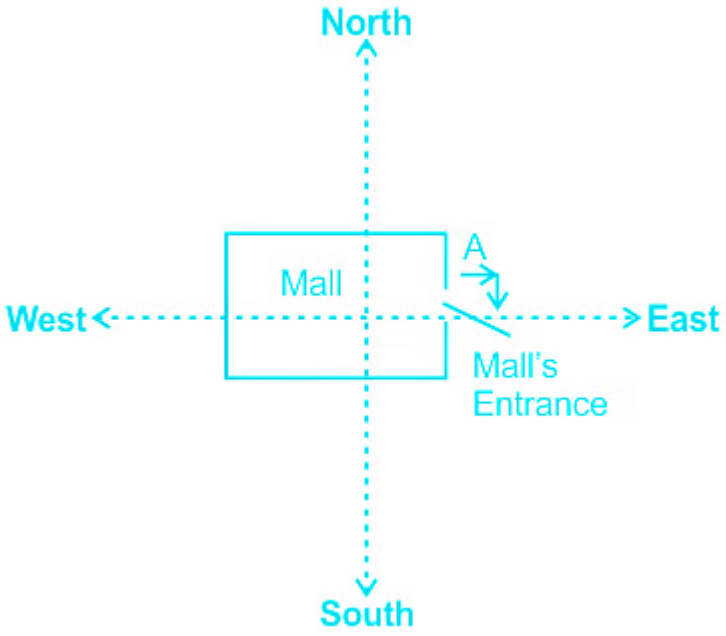
22. Answer: a

Explanation:

Given,

A is standing at the entrance of the mall waiting for his friend to come. He is facing east. He then turns his head to the right to see that his friend has arrived.

∴



Here we see A is expecting his friend to come from the South.

Hence, the correct answer is South.

---

23. **Answer: d**

Explanation:

The correct answer is **Potenz, Which means power in German.**

- **pH is the negative log of hydrogen ion concentration in a water-based solution.**
  - pH is an abbreviation for "power of hydrogen" where "p" is short for the German word for power, potenz and H is the element symbol for hydrogen.

⭐ **Additional Information**

- To calculate the pH of an aqueous solution you need to know the concentration of the hydronium ion in moles per liter (molarity).
  - The pH is then calculated using the expression: **pH = - log [H3O+]. On a calculator, calculate 10-8.34, or "inverse" log (- 8.34).**

- The pH of pure water (H_20) is 7 at 25 ^oC, but when exposed to the carbon dioxide in the atmosphere this equilibrium results in a pH of approximately 5.2.

⭐ Mistake Points

- A scale for measuring hydrogen ion concentration in a solution called the pH scale has been developed.
- **The p in pH stands for 'Potenz' in German, meaning power. On the pH scale. According to NCERT.**

---

24. Answer: b

Explanation:

Given:

A + Z = 19

Z + P = 12

Calculation:

substracting equations,

A + Z = 19

-Z – P = -12

⇒ A – P = 7

Thus, 'Z' get canceled and,

We don't have any other equation carrying 'Z' in it.

⇒ We cannot solve further to find the value of Z.

Neither statement I nor II is sufficient .

25. **Answer: c**

Explanation:

Given,

Statement:

Some jaguars are cheetahs, some cheetahs are leopards.

Conclusions:

1. No leopard is Jaguar.

2. Some jaguars are leopards.

The least possible Venn diagram for the given statements is as follows,

Conclusions:

1. No leopard is Jaguar → False (It is possible but not definite)

2. Some jaguars are leopards → False (It is possible but not definite)

Conclusion 1 and 2 form a complementary pair.

Hence, the correct answer is **Either 1 or 2 follows.**

26. **Answer: a**

Explanation:

The correct answer is **Lincoln in the Bardo**.

- Lincoln in the Bardo by George Saunders was named winner of the **2017 Man Booker Prize for Fiction.**

⭐ **Additional Information**

- **The Man Booker Prize was open only to writers from the Commonwealth, Ireland, and Zimbabwe.**
  - The International Prize was open to all nationalities who had work available in English including translations.
- Margaret Atwood and Bernardine Evaristo have been named the joint winners of the **2019 Booker Prize after the judges broke their rules by declaring a tie. Atwood's The Testaments, the Canadian writer's follow-up to The Handmaid's Tale, was recognized alongside Londoner Evaristo's novel Girl, Woman, Other.**
- **The Booker Prize, formerly known as the Booker Prize for Fiction (1969–2001) and the Man Booker Prize (2002–2019),** is a literary prize awarded each year for the best novel written in English and published in the United Kingdom or Ireland.

---

27. Answer: c

Explanation:

The correct answer is **Iron-ore.**

- The town is famous for iron ore mines, which were the first iron ore mines developed in India in **1910, by Maharaja Sriram Chandra Bhanj Deo ruler of Princely State of Mayurbhanj.**
  - He appointed Pramatha Nath Bose, a leading geologist in 1908 to survey the ore deposits.

    ⭐ **Additional Information**

  - Mayurbhanj is famous for its Chhau dance.
  - North Orissa University is located at Takatpur, Baripada (District Headquarter) in Mayurbhanj District.

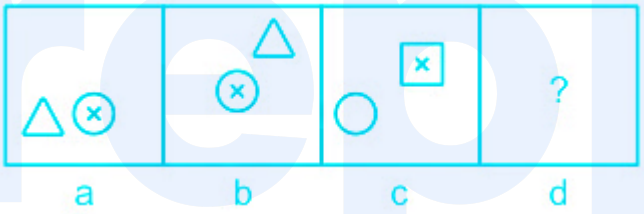
- Baripada is the district headquarters of Mayurbhanj. The Mayurbhanj palace, temples of Lord Jagannath & Mata Ambika are situated here among others.
- **Badampahar in mayurbhanj is the place where the iron ore mine located in the Indian sub-continent.**
- When taking into consideration, it is noted that in India, leading iron core manufacturing is made in the state of Orissa.

---

28. Answer: b

Explanation:

Given,



Here we see figure b is related to figure a, in which the triangle is shifted on the opposite corner.

Similarly, figure d will be related to figure c in the same manner as figure b is related to figure a.

∴ The figure that will replace the question mark (?) will be

Hence, the correct answer is 3.

---

29. Answer: c

Explanation:

The correct answer is **v = fλ**.

- The wave velocity and the wavelength are related to the wave's frequency and period by **vw=λT or vw=fλ.**
  - The time for one complete wave cycle is the period T.
  - The number of waves per unit time is the frequency *f*.
  - The wave frequency and the period are inversely related to one another.

⭐ **Additional Information**

- Wavelength is the measure of the length of a complete wave cycle. The velocity of a wave is the distance traveled by a point on the wave.
- **The velocity of light, v, is the product of its wavelength, λ, and its frequency, f.**
  - This means that the wavelength is the velocity, v, divided by the frequency, f.
- In the electromagnetic spectrum, there are many different types of waves with varying frequencies and wavelengths.
  - They are all related by one important equation: **Any electromagnetic wave's frequency multiplied by its wavelength equals the speed of light.**

---

30. Answer: a

Explanation:

The correct answer is **Cellulose and Pectin**.

- Collenchyma, in plants, supports tissue of living elongated cells with irregular cell walls.
  - Collenchyma cells have thick deposits of cellulose in their cell walls and appear polygonal in cross-section.
  - **The strength of the tissue results from these thickened cell walls and the longitudinal interlocking of the cells.**

⭐ Additional Information

- Collenchyma tissue is composed of elongated living cells of uneven primary thick walls, which possess hemicellulose, cellulose, and pectic materials.
- It provides support, structure, mechanical strength, and flexibility to the petiole, leaf veins, and stem of young plants, allowing for easy bending without breakage.
- Collenchyma is a supporting tissue characteristic of the growing organs of many **herbaceous and woody plants** , and it is also found in stems and leaves of mature herbaceous plants, including those that are only slightly modified by **secondary growth.**

---

31. Answer: b

Explanation:

The correct answer will be**2.2Ω**.

⭐ Key Points

Concept:

When the resistances are connected in **series** , the equivalent resistance is given by

$R_{eq} = R_1 + R_2 + \ldots + R_n$

The equivalent resistance is **greater than the largest resistance** in the series circuit

When the resistances are connected in **parallel** , the equivalent resistance is given by

$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots + \frac{1}{R_n}$

The equivalent resistance is **lesser than the smallest resistance** in the series circuit

Calculation:

R 1 = 9 ohm, R 2 = 4 ohm, R 3 = 12

$\frac{1}{R_{eq}} = \frac{1}{9} + \frac{1}{4} + \frac{1}{12}$

⇒ Req = 2.2 Ω

---

32. Answer: c

Explanation:

Given:

2, 5, 9, 19, __?

Calculation:

2× 2 + 1 = 5

5× 2 – 1 = 9

9× 2 + 1 = 19

⇒ 19× 2 – 1 = 37

---

33. Answer: b

Explanation:

The correct answer is **Jammu and Kashmir**.

- **Anantnag was called Islamabad when Pakistan did not even exist.**
  - The town was named Islamabad after governor Islam Khan during the Mughal era in the 1600s.
  - It was renamed to Anantnag only in the 1950s. Everyone in Kashmir calls it Islamabad.

⭐ **Additional Information**

- The top attractions to visit in Anantnag District are Amarnath Cave. Aru Valley. Betaab Valley.
    - **Anantnag or the land of several springs is a beautiful and historic town, situated about 55 km south of Srinagar on the banks of Jhelum** .
    - The name Anantnag is thought to originate from the Sanskrit term Ananta, meaning "infinite", and Kashmiri word nāga, "water spring"; Anant-nāg would thus mean "numerous springs", as there are indeed many springs in the town.
    - The total area of Anantnag is **189 km² including 143.12 km² rural area and 45.71 km² urban area** . Anantnag has a population of 3,64,763 peoples. There are **48,726 houses in the sub-district. There are about 104 villages in the Anantnag block.**

---

34. Answer: c

Explanation:

Given:

Ankita is two years younger than Anu.

After four years Anu's age will be two times of Ankita's age three years ago

Calculation:

Let the age of Ankita be x

⇒ age of Anu will be = x+2

After four years Anu's age will be two times of Ankita's age three years ago.

⇒ (x + 2) + 4 = 2 (x − 3)

⇒ x + 6 = 2x − 6

⇒ x = 12

⇒ x + 2 = 12 + 2 = 14

∴ Age of Ankita is 12 years and age of Anu is 14 years.

---

35. **Answer: b**

Explanation:

Given:

276x1 is divisible by 3

Concept used:

Divisibility rule of 3:

A number is completely **divisible** by **3** if the sum of its digits is **divisible** by **3.**

Calculation:

Addition of digits of the given number = 2 + 7 + 6 + x + 1

⇒ 16 + x

⇒ values of x will be,

x= 2, 5, 8

Sum of the possible numbers = 2 + 5 + 8

∴ **Sum of the possible numbers is 15**

---

36. **Answer: d**

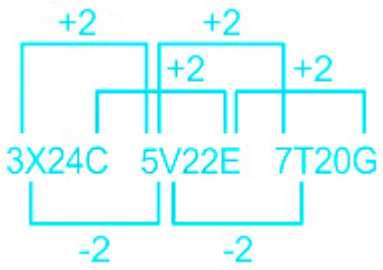
Explanation:

We know,

Given,

3X24C, 5V22E, _____.

The pattern followed here is,



Here we see the letters are written in a particular pattern and positional values are also written.

Hence, the correct answer is 7T20G.

---

37. Answer: d

Explanation:

Given:

Tap fills the tank in 10 hours.

And with the leak tank fills in 11 hours.

Formula Used:

Efficiency = Total work done / total time taken

Total work = LCM of time taken

Calculation:

Let the tap be 'A' and leak be 'B'

Now,

Total work = LCM of time taken

⇒ LCM of 10 and 11

As 10 and 11 are co-prime numbers.

⇒ LCM of 10 and 11 = 10 × 11 = 110

Now,

Efficiency of tap $_{(A)}$ = 110/10 = 11

Efficiency of leak $_{(A-B)}$ = 110/11 = 10

Efficiency	Subject	Time taken	Total work
11	A	10	110
10	A – B	11	110

⇒ Efficiency of A = 11

⇒ Efficiency of A – B = 10

⇒ Efficiency of B = 1

⇒ Efficiency of leak $_{(B)}$ = 1

⇒ Time taken to empty the tank by leakage = 110/1

∴ Time taken to empty the tank by leakage is 110 hours.

---

38. Answer: b

Explanation:

The correct answer is **Bhikampura, Karauli, Rajasthan**.

- Union Minister of Drinking Water and Sanitation, **Sushri Uma Bharti, today launched the Swajal pilot project at Village Bhikampura, Karauli, Rajasthan.**

⭐ Additional Information

- Ministry of Jal Shakti aims to provide every rural person with adequate safe water for drinking, cooking, and other domestic basic needs on a sustainable basis.
    - This basic requirement should meet minimum water quality standards and be readily and conveniently accessible at all times and in all situations.
- Under the National Rural Drinking Water Programme, the Ministry in **February 2018 has initiated a project in the name of "Swajal" that is designed as a demand-driven** and community-centred program to provide sustainable access to drinking water to people in rural areas.
- Initially **"Swajal" scheme was launched in February 2018 as a pilot scheme in six states of Bihar, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, and Uttarakhand.**

---

39. Answer: b

Explanation:

The correct answer is **France**.

- **The 2023 Rugby World Cup, to be hosted by France, is scheduled to be the tenth men's Rugby World Cup,** taking place in the year of the 200th anniversary of the 'invention' of the sport by William Webb Ellis from 8 September to 21 October.

⭐ Additional Information

- The Russian Rugby Federation (FRR) has announced it is looking to bid for the 2031 Rugby World Cup, as well as the 2027 edition.
- **On 14 September 2019, President of Colombia** Ivan Duque confirmed Colombia would bid to host the 2030 FIFA World Cup along with Ecuador and Peru.
- **The highest World Cup score was when the All Blacks beat Japan 145-17 in South Africa on 4 June 1995.**
- The final will take place at the Stade de France.

- It will be the second time France has hosted the Rugby World Cup, having previously hosted the 2007 event.
- **It precedes the 2024 Summer** Olympics in Paris and will take place less than a year before the Olympic opening ceremony.

---

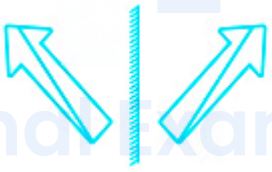
40. Answer: a

Explanation:

Given,

In the mirror image the top and bottom part of the figure remains the same and left and right part of the figure interchanges.

∴



Here we see the mirror image is

Hence, the correct answer is option 1.

---

41. Answer: d

Explanation:

Given,

Vacant : Empty :: Sedate : ?

Here we see empty is synonym of vacant.

Similarly, the word **calm** is the synonym of sedate.

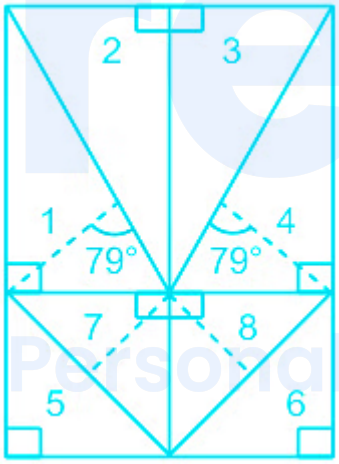
Hence, the correct answer is Calm.

---

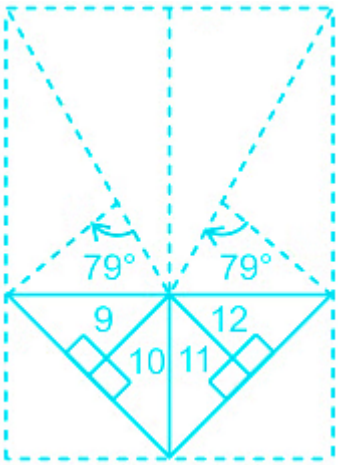
42. Answer: a

Explanation:

Given,



The right-angled triangles are denoted by blue as follow,



∴ The total number of right-angled triangles = 12

Hence, the correct answer is 12.

---

43. **Answer: c**

Explanation:

The correct answer is **West.**

- It originates from **Mount Amarkantak in Madhya Pradesh** .
  - As it flows down the hill, it is trapped in a rift valley between the Vindhya and the Satpura mountain ranges which leads it to the west towards Gujarat, where it drains into the Gulf of Khambat

⭐ **Additional Information**

- The two major west-flowing rivers are the Narmada and the Tapi.
  - This exceptional behaviour is because these rivers didn't form valleys and instead they flow through faults (linear rift, rift valley, trough) created due to the bending of the northern peninsula during the formation process of Himalayas.
  - **Narmada rises from Amarkantak Plateau in Anuppur district Madhya Pradesh.**
  - It forms the traditional boundary between North India and South

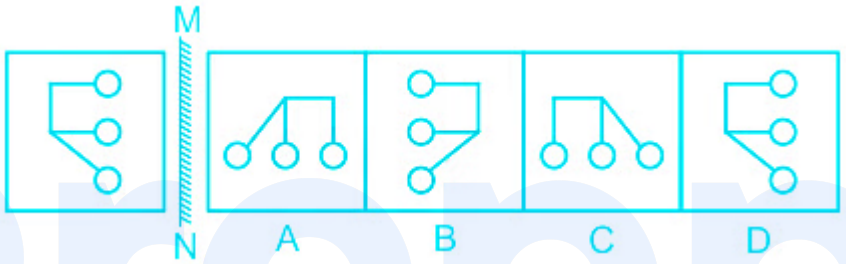
- India and flows westwards over a length of **1,312 km (815.2 mi) before draining through the Gulf of Khambhat into the Arabian Sea, 30 km (18.6 mi) west of Bharuch city of** Gujarat.

---

44. Answer: c

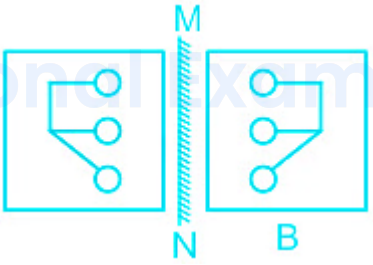
Explanation:

Given,



In the mirror image top and bottom part of the figure remains the same and left and right part of the figure interchanges.

∴



Hence, the correct answer is B.

---

45. Answer: a

Explanation:

The correct answer is **Manipur**.

- The **brow-antlered deer** is found in Keibul Lamjao National Park in Manipur.
- It is largely seen over the floating biomass, locally called “phumdi” in the South-Eastern part of Loktak Lake inside the park.

⭐ Additional Information

- Dancing Deer is the popular name of Sangai Deer, which is found only in Keibul Lamjao National Park (KLNP) in Loktak Lake in Manipur.
  - **Loktak is known for Phumdis (floating vegetation) and the deer** often needs to balance itself on them, so it appears that they are dancing.
  - Sangai is one of the three subspecies of Eld's deer found in South and Southeast Asia.
  - **It has adapted itself to a unique habitat of the floating meadows or phumdi at KLNP,** a mark difference from the other two.

---

46. **Answer: c**

Explanation:

Given,

Statement:

- I like the soldiers.
- I want to become a soldier.

Assumptions:

I) I am not a soldier → Implicit as statement states that "I want to become a soldier."

II) I am a soldier → Not implicit as it is a contradiction to the statement "I want to become a soldier."

Here we see only the assumption I, is implicit.

Hence, the correct answer is the Only assumption I, is implicit.

---

47. **Answer: c**

Explanation:

The correct answer is **5.5 cm.**

- The total kinetic energy possessed by the block goes into the potential energy of the spring and the work done against friction.
- **K.E. supplied = Work done against friction + P.E. of spring**
  - $\frac{1}{2}mv^2 = Fx + \frac{1}{2}kx^2$
- Suppose x be the compression of the spring.
- Here:
  - mass=2 kg,u = 4 m/s
  - Force of kinetic friction, F = 15 N
  - spring constant, K = 10000 N/m
- $\frac{1}{2} \times 2 \times 4^2 = 15x + \frac{10000}{2}x^2$
- $5000x^2 + 15x - 16 = 0$
- $x = 0.055m = 5.5cm$

⭐ **Additional Information**

- Kinetic energy, the form of energy that an object or a particle has by reason of its motion.
  - If work, which transfers energy, is done on an object by applying a net force, the object speeds up and thereby gains kinetic energy.
- Kinetic friction is defined as a force that acts between moving surfaces.
  - A body moving on the surface experiences a force in the opposite direction of its movement.
  - **The magnitude of the force will depend on the coefficient of kinetic friction between the two materials.**

---

48. **Answer: b**

Explanation:

The correct answer is **Constant Proportion.**

- **The Law of Conservation of Mass dates from Antoine Lavoisier's 1789** discovery that mass is neither created nor destroyed in chemical reactions.
    - In other words, the mass of any one element at the beginning of a reaction will equal the mass of that element at the end of the reaction.

⭐ **Additional Information**

- In chemistry, the law of definite proportion, sometimes called Proust's law, or the law of constant composition states that a given chemical compound always contains its component elements in a fixed ratio (by mass) and does not depend on its source and method of preparation.
- If two different elements combine separately with a fixed mass of a third element, the ratio of the masses in which they do so are either the same as or a simple multiple of the ratio of the masses in which they combine with each other.
- **The combination which illustrates the law of reciprocal proportion is CS_2, SO_2, CO_2.**
- The law of reciprocal proportion is also known as the law of equivalent proportion.
- **This law states that there is a constant proportion of the two substances which combine to form a compound.**

---

49. Answer: a

Explanation:

Given:

71, 63, 55, ?

Calculation:

Let the number be 'x'

71 – 63 = 8

63 – 55 = 8

Now we can see that the difference between,

1st and 2nd is same as of the difference between,

2nd and 3rd, that is 8.

⇒ 55 – x = 8

⇒ x = 55 – 8

⇒ x = 47

∴ The next value is 47

---

50. Answer: c

Explanation:

Given:

$\frac{1}{x} + \frac{1}{9} = \frac{1}{27}$

a 2 + p 2 = q 2

Calculation:

In the 1st condition,

$\frac{1}{x} + \frac{1}{9} = \frac{1}{27}$

⇒ $\frac{9+x}{9x} = \frac{1}{27}$

⇒ 9x = 27(9 + x)

⇒ x = 3(9 + x)

⇒ x = 27 + 3x

⇒ -2x = 27

⇒ x = -13.5

In the second statement, 'x' is not given.

⇒ We cannot find 'x' using the second statement.

Hence 'x' can find using 1st statement .

---

51. Answer: a

Explanation:

Given:

Height of cylinder, h = 24 m

Diameter of cylinder, d = 126 m.

Slant height of cone, l = 80 m.

Diameter of the cone, d = 126 m.

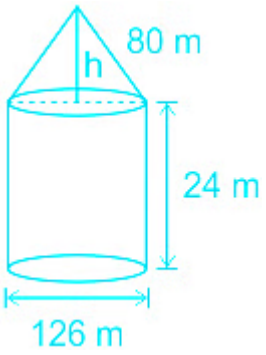
Breadth of canvas = 8 m.

Formula used:

Curved surface area of cylinder = 2πrh.

Curved surface area of cone = πrl

Calculation:



Diameter of cylinder, d = 126 m.

Radius of cylinder, r = 63 m.

Total area of tent = Curved surface area of cylinder + Curved surface area of cone

⇒ 2πrh + πrl

⇒ [2 × (22/7) × 63 × 24] + (22/7) × 63 × 80

⇒ 9504 + 15840

⇒ 25344 m

Length of canvas = (Total area of tent)/(Breadth of canvas)

⇒ 25344/8

⇒ 3168 m

∴**The length of the canvas required to make the tent is 3168 m.**

---

52. Answer: a

Explanation:

The correct answer is **Gold, Platinum.**

- Metals are **lustrous, malleable, ductile, good conductors of heat and electricity.**
  - Metals are solids at room temperature with the exception of mercury, which is liquid at room temperature (Gallium is liquid on hot days).

⭐ Additional Information

- Many chemical elements are referred to as metals.
  - These are the bulk of the periodic table elements. Generally, such components have the following characteristics: these can conduct heat and electricity. They can be easily shaped.
- Oxygen is a non-metal that is used for breathing by plants and animals.
  - It is essential to maintain our life.
  - It is used in the process of fuel-burning in homes, factories, and vehicles for transport.
- **Oxygen is an essential non-metal for our life and it is inhaled during breathing by all living beings.**
- The non-metal used in the rockets is liquid hydrogen.
- **They are separate hydrogen and oxygen tanks that combine and burn to start the rocket.**
- Due to its high calorific value, hydrogen is used.

---

53. **Answer: c**

Explanation:

Given,

Abinav and Barani play golf and volleyball.

Krish and Dev play tennis and cricket.

Barani and Krish play cricket and volleyball.

Abinav and Dev play golf and tennis.

∴

Name	Games played
Abinav	Golf, Volleyball, Tennis
Barani	Golf, Volleyball, Cricket
Krish	Tennis, Cricket, Volleyball
Dev	Tennis, Cricket, Golf

Here we see **Abinav** plays tennis, volleyball and golf.

Hence, the correct answer is Abinav.

---

54. Answer: d

Explanation:

Given:

$\frac{\sqrt{3}-1}{\sqrt{3}+1} = a + b\sqrt{3}$

Concept used:

Rationalization method and comparing method used.

Calculation:

$\frac{\sqrt{3}-1}{\sqrt{3}+1} = a + b\sqrt{3}$

$\Rightarrow \frac{(\sqrt{3}\ -1\ )}{(\sqrt{3}+1\ )} \times \frac{(\sqrt{3}\ -1\ )}{(\sqrt{3}\ -1\ )} = a + \ b\sqrt{3}$

$\Rightarrow \frac{(\sqrt{3}-1)^2}{(3-1)} = a + b\sqrt{3}$

$\Rightarrow \frac{3+1-2\sqrt{3}}{2} = a + b\sqrt{3}$

$\Rightarrow \frac{4-2\sqrt{3}}{2} = a + b\sqrt{3}$

$\Rightarrow 2 - \sqrt{3} = a + b\sqrt{3}$

Comparing the equation both side we get,

a = 2 and b = -1

∴ The value of a 2 + b ^{2} = 4 + 1 = 5

---

55. Answer: c

Explanation:

The correct answer is **Flagrant foul.**

- These five fundamental skills of basketball are dribbling, passing, shooting, rebounding, and defence.

⭐ **Additional Information**

- Basketball is a game played **between two teams of five players each on a rectangular court, usually indoors** .
- Each team tries to score by tossing the ball through the opponent's goal, an elevated horizontal hoop and net called a basket.
- Basketball has had a number of players that have helped make basketball popular as a spectator sport including Magic Johnson, Larry Bird, Wilt Chamberlain, and Oscar Robinson.
- Perhaps the most famous and arguably the greatest basketball player of all time is **Michael Jordan.**

---

56. **Answer: a**

Explanation:

Given:

Length of train = 141.5 m

Speed of train = 57 km/h

Time = 39 seconds

Formula used:

Speed = (distance)/(time)

Calculation:

Let the length of the platform be 'x' m.

Speed of train = 57 km/h

⇒ (57 × 1000)/(3600) m/s

⇒ 95/6 m/s

Total length = (length of train) + (length of the platform)

⇒ 141.5 + x

Speed = (distance)/(time)

⇒ distance = speed × time

⇒ 141.5 + x = (95/6) × 39

⇒ x = 617.5 − 141.5

⇒ x = 476m

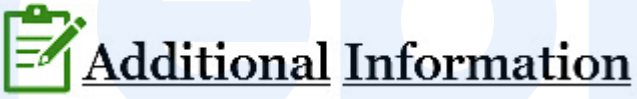
∴The length of the platform is 476 m.

57. **Answer: c**

Explanation:

The correct answer is **2 ms $^{-2}$**

- We know that according to **Newton's 2 nd law,**
  - **Force = Mass × Acceleration**
  - or $(\vec{F} = m \times \vec{a})$
- Here **, F = 100 N** and **Mass = 50 Kg**
- So, **100 = 50x a ⇒ a = 100/50 = 2.**
- Hence, the **acceleration** will be **2 ms $^{-2}$**.



- **Force:** A force is something that changes the **state of rest or motion** of a body.
  - It causes the body to start moving if it is at rest or stops if it is in motion or deflects from the initial path.
  - Force is a **vector quantity** having SI unit **Newton (N)** and dimension **(MLT $^{-2}$).**
- According to **Newton's Second law of motion**
  - **The rate of change of momentum** of a body is directly proportional to the resulting force acting on a body
  - **Mathematically it can be expressed as**
- $\vec{F} \propto \frac{d\vec{p}}{dt}$ *or* $\vec{F} = m \times a$

58. **Answer: c**

Explanation:

The correct answer is **Meristem.**

- **Permanent tissues are derived from meristematic tissue once they lose the ability to divide.**
- They are classified as simple and complex tissues.
- Parenchyma, collenchyma and sclerenchyma are three types of simple tissues.
    - Parenchyma tissue is involved in photosynthesis, secretion, food storage , and other activities of plant life.
    - Collenchyma tissue provides support, structure, mechanical strength, and flexibility to the petiole, leaf veins, and stem of young plants, allowing for easy bending without breakage .
    - Sclerenchyma is one of the three types of ground, or fundamental, tissue in plants; the other two types are parenchyma (living thin-walled tissue) and collenchyma (living support tissue with irregular walls).
- Xylem is planted vascular tissue . It transports water and dissolved minerals from the roots to the rest of the plant and also provides physical support .

⭐ **Additional Information**

- 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.
    - The permanent tissue cells are also fully differentiated. The cells are large and a definite shape and size.
    - The metabolism that occurs in the cells of the permanent tissue is fairly at a lower rate.
    - **The permanent tissue in plants mainly helps in providing support, protection as well as in photosynthesis and conduction of water, minerals, and nutrients. Permanent tissue cells may be living or dead.**

---

59. **Answer: b**

Explanation:

Given:

cosec θ = α ⇒ cosec −1 α = θ

secΦ = β ⇒sec $^{-1}$β = Φ

Formula used:

Sec x =cosec(90° − x)

Calculation:

Let sec $^{-1}$y be x

⇒ sec x = y

⇒ cosec(90° − x) = y

⇒ 90° − x = cosec $^{-1}$ y

⇒ cosec −1 y + x = 90°

⇒ cosec −1 y + sec −1y = 90°

∴ **The value of cosec −1 y + sec −1y is 90°**

---

60. **Answer: a**

Explanation:

We know,

Given,

A	B	C	D
3C6F	6G10J	11K14N	15O18R

Here we see the letters are in a particular pattern and the respective positional value are written.

A	B	C	D
3 → C 6 → F	6→ G 10 → J	11 → K 14 → N	15 → O 18 → R

But in 'B' the positional value of G is 6.

∴ The odd one is 6G10J.

Hence, the correct answer is B.

---

61. Answer: c

Explanation:

Given:

$20x + 5y + 11 = 0$

$50x - ky - 9 = 0$

Formula Used:

Two line are parallel then Equation is,

$a_1/b_1 = a_2/b_2 \neq a_3/b_3$

Calculation:

$20x + 5y + 11 = 0$

$50x - ky - 9 = 0$

The linear equation is in the following form:

$a_1x + b_1y + c_1 = 0$

$a_2x + b_2y + c_2 = 0$

Where $a_1 = 20$, $b_1 = 5$, $c_1 = 11$ and $a_2 = 50$, $b_2 = -k$, $c_2 = -9$

If they have no solution they have parallel system of equation,

$a_1/b_1 = a_2/b_2 \neq a_3/b_3$

$\Rightarrow 20/50 = 5/(-k)$

$\Rightarrow -2k = 25$

$\Rightarrow k = -12.5$

$\therefore$ **The value of k is -12.5.**

---

62. Answer: d

Explanation:

The correct answer is **Kiran Desai.**

- Kiran Desai was born in **India in 1971 and grew up there before moving to England, aged fourteen years.**

⭐ **Additional Information**

- She was educated in India, England and the US.

- **Her first novel, Hullabaloo in the Guava Orchard (1998) won a 1998 Betty Trask Award** , and her second novel, The Inheritance of Loss (2006), set in the mid-1980s in a Himalayan village, won the 2006 Man Booker Prize for Fiction.
- **Her first novel, Hullabaloo in the Guava Orchard (1998**), is a pacy, fresh look at life in the sleepy provincial town of Shahkot in India.
- The central character of the novel, Sampath Chawla, failed postal clerk and pathological dreamer, escapes from his work and his oppressive family to live in a guava tree.

---

63. Answer: d

Explanation:

The correct answer is **President.**

- The Union Audit Reports prepared by **the Comptroller and Auditor General of India show the findings of the transaction audit and performance audit in the areas of Civil Audit, Audit of Autonomous Bodies, Defence Services, Railways, Receipts of the Government and Central Commercial.**

⭐ Additional Information

- **Shri Girish Chandra Murmu** assumed office as the Comptroller and Auditor General of India on **8th August 2020.**
  - Prior to this, **Shri Murmu was the first Lieutenant Governor of the Union Territory of Jammu and Kashmir.**
  - There are several provisions in the Constitution for safeguarding the independence of CAG.
  - CAG is appointed by the President by warrant under his hand and seal and provided with **tenure of 6 years or 65 years of age, whichever is earlier.**
  - CAG shall be removed from office in like manner and on like grounds as a Judge of the Supreme Court.

---

64. **Answer: b**

Explanation:

Given:

The radius of a sphere = three times the radius of the base of a cylinder.

The height of the cylinder = nine times the radius of its base.

The total surface area of the cylinder = volume of the sphere

Formula Used:

The total surface area of the cylinder = $2\pi r(r + h)$

The volume of the sphere = $(4/3)\pi r^3$

Calculation:

Let the radius of the base of a cylinder be r.

The radius of a sphere = 3r

The height of the cylinder = 9r

According to the question.

The total surface area of the cylinder = Volume of the sphere

$\Rightarrow 2\pi r(r + h) = (4/3)\pi r\ 3$

$\Rightarrow 2 \times r(r + 9r) = (4/3)\ (3r)^3$

$\Rightarrow 2 \times 10r^2 = (4/3) \times 27r^3$

$\Rightarrow 20/(4 \times 9) = r$

$\Rightarrow r = 5/9$

So, the height of the cylinder = $9r = 9 \times (5/9) = 5$ unit.

∴The height of the cylinder is 5 unit.

---

65. Answer: c

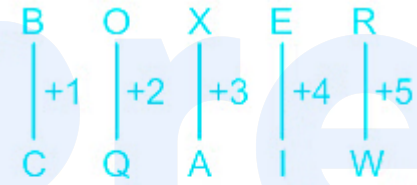
Explanation:

We know,

Given,

BOXER is coded as CQAIW.

The pattern followed here is,



Similarly,

Here we see the word 'ACTOR' is coded as 'BEWSW'.

Hence, the correct answer is the ACTOR.

---

66. Answer: b

Explanation:

Given:

The ratio of two numbers be 19 : 26.

New ratio will be 3 : 4.

Concept Used:

Ratio concept used.

Calculation:

Let the two numbers be 19x and 26x.

If 2 added to 19x = 19x + 2.

According to the question,

$(19x + 2)/26x = 3/4$

$\Rightarrow 4(19x + 2) = 3 \times 26x$

$\Rightarrow 76x + 8 = 78x$

$\Rightarrow 2x = 8$

$\Rightarrow x = 4$

So, Big number = $26 \times 4 = 104$

∴The big number is 104.

---

67. **Answer: c**

Explanation:

Given:

Money was distributed in the ratio of 5 : 7.

New ratio = 3 : 4

Concept used:

Using linear equation.

Calculation:

The money distributed between Shivani and Parinita be 5x and 7x.

Parinita gives Rs. 5 to Shivani ,

Parinita's money = 7x – 5.

Shivani's money = 5x + 5.

According to question,

$(5x + 5)/(7x – 5) = 3/4$

$\Rightarrow 4(5x + 5) = 3(7x – 5)$

$\Rightarrow 20x + 20 = 21x – 15$

$\Rightarrow 20 + 15 = 21x – 20x$

$\Rightarrow x = 35$

Total amount = 5x + 7x

= 12x

= 12 × 35

= 420

∴ **The amount divided is Rs.420.**

---

68. **Answer: c**

Explanation:

Given series:

Left end: 4 W X Z 8 Q P O J 6 G T M V E**U H 5 3 B :Right end**

5th from the right end = U

Left end: 4 W X Z 8 Q P**O J 6 G T M V E U**H 5 3 B : Right end

8th from the left of U = O

Thus we see the **8th to the left of the 5th term from the right is O.**

Hence, the correct answer is **"O".**

---

69. **Answer: c**

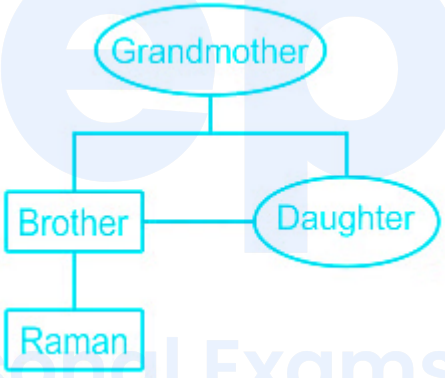
Explanation:

Given,

Raman said to Anant, "Day before yesterday I taught the only brother of my paternal grandmother's daughter"

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

The family tree is as follows,



Here we see Raman taught his **father** .

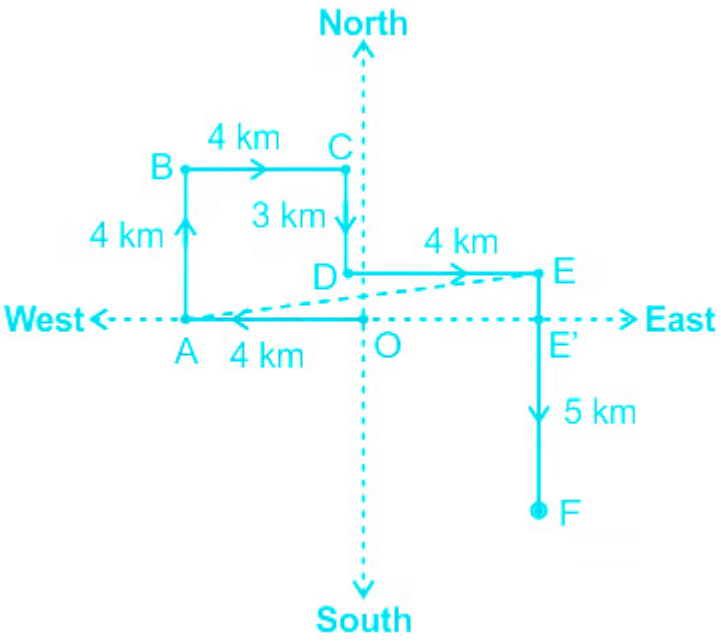
Hence, the correct answer is Father.

---

70. Answer: c

Explanation:

The direction and distance diagram is given below -



By Pythagoras theorem,

$AE^2 = AE'^2 + E'E^2$

$\therefore AE^2 = 8^2 + 1^2$

$\therefore AE = \sqrt{65}$

Hence, the correct answer is $\sqrt{65}$

---

71. Answer: a

Explanation:

The correct answer is **VIII**.

Key Points

- The scheduled languages of according to the Constitution: **Assamese, Bengali, Bodo, Dogri, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Maithili, Malayalam, Manipuri, Marathi, Nepali, Oriya, Punjabi, Sanskrit, Santhali, Sindhi, Tamil, Telegu, Urdu.**

⭐ Additional Information

- There are **22 official languages in India and they are covered under the 8th schedule of the Indian Constitution.**
  - The Eighth Schedule of the Indian Constitution lists 22 languages, which have been referred to as scheduled languages and given recognition, status, and official encouragement.
  - In addition, the Government of India has awarded the distinction of classical language to Kannada, Malayalam, Odia, Sanskrit, Tamil, and Telugu.
  - Bodo, Dongri, Maithili, and Santhali were added to it by the **92nd Amendment Act of 2003.**
  - **However, the long-standing demand** for the recognition and inclusion of the Bhoti language in the 8th Schedule has not been met.

---

72. Answer: c

Explanation:

The correct answer is **Dr. K. Siwan.**

- **Sivan was appointed the chief of ISRO in January 2018 and he assumed office on 15 January.**
  - Under his chairmanship, ISRO launched Chandrayaan 2, the second mission to the moon on July 22, 2019.
  - On December 30, his chairmanship was extended by a year to January 2022, his early tenure was up to January 2021.

⭐ Additional Information

- Satish Dhawan was the longest-serving Chairman for 12 years from 1972 to 1984 and the shortest stint was held by Shailesh Nayak, who was at the helm for just 12 days from January **1-12, 2015.**
  - ISRO develops and delivers application-specific satellite products and tools to the Nation: broadcasts, communications, weather forecasts, disaster management tools, Geographic Information Systems,

cartography, navigation, telemedicine, dedicated distance education satellites being some of them.
    - The prime objective of ISRO is to develop space technology and its application to various national needs.
    - **ISRO has established two major space systems, INSAT for communication, television broadcasting, and meteorological services, and Indian Remote Sensing Satellites (IRS) system for resources monitoring and management.**

---

73. Answer: d

Explanation:

The correct answer is **Power.**

- The physical quantity obtained by the product of force and velocity is Power.
    - It is a **Scalar quantity.**

Additional Information

- Work done is generally referred to relate to the force applied while energy is used in reference to other factors such as heat.
- **Power is defined as work done per unit time.**
- Energy is the ability to perform work. Energy can neither be created nor destroyed.
- It can only be transformed from one kind to another.
- **The unit of energy is the as of Work i.e. Joules.**
- Energy is found in many things and thus there are different types of energy.
- **Power is a physical concept that has several different meanings, depending on the context and the information that is available** .
- We can define power as the rate of doing work. It is the amount of energy consumed per unit of time.

---

74. **Answer: c**

Explanation:

Given:

The number = 16129

Concept Used:

Prime factorization method is used.

Calculation :

Prime factorization of 16129,

16129 = 127 × 127

√16129 = √(127 × 127)

⇒ 127

∴ The square root of 16129 is 127.

---

75. **Answer: b**

Explanation:

The correct answer is **13.9 ms-1**

- It is given that the total distance travelled by car is
  - 2400 km - 2000 km
  - 400 km, i.e. 400000 m
- The total time is taken = **8 hours,**
  - that is, 8×60×60= **28800 seconds.**
- Average speed in m/s = **total distance/total time**
  - 400000/28800 = **13.89 m/s.**

76. **Answer: d**

Explanation:

Given:

The mean of three numbers = 21.

Range = 12

Difference between the two smallest numbers = 3

Formula used:

Mean = (sum of observations)/(number of observations)

Range = (Highest observation) - (lowest observation)

Calculation:

Let the three numbers be x, y and z.

Wherex be the smallest number and z be the greatest number.

According to the question,

Mean = (sum of observations)/(number of observations)

⇒ 21 = (x + y + z)/3

⇒ x + y + z = 63 .....(1)

The range of this data set is 12,

Range = Highest observation - lowest observation

z – x = 12

⇒ z = 12 + x .....(2)

Difference between the two smallest numbers = 3

$y - x = 3$

$\Rightarrow y = 3 + x$ ....(3)

Using Equation(2) and (3) in (1) we get

$x + (3 + x) + (12 + x) = 63$

$\Rightarrow 3x + 15 = 63$

$\Rightarrow 3x = 63 - 15$

$\Rightarrow 3x = 48$

$\Rightarrow x = 16$

Putting the value of x in (3),

$y = 3 + 16 = 19$

Putting the value of x in (2),

$z = 12 + 16 = 28$

∴The greatest of three numbers is28.

---

77. Answer: d

Explanation:

Given,

Statement:

To get involved in a long and complicated dispute, one has to be very intelligent, because they are very talkative and boring.

Conclusions:

I. All intelligent people are boring → Does not follow as this conclusion is irrelevant.

II. All intelligent people are quite capable of handling long and complicated disputes → Follow as this conclusion supports the statement.

Hence, the correct answer is the Only conclusion II follows.

---

78. Answer: c

Explanation:

The correct answer is **23.**

- The mass number is the **total of the protons and neutrons** together, and it is given the symbol A.

Number of protons = **ATOMIC NUMBER (Z)** of the atom

No. of protons + no. of neutrons = **MASS NUMBER (A)** of the atom

The mass number is also called the nucleon number.

$$A = Z + N$$

- Example: A sodium atom contains **11 protons and 12 neutrons** ; its mass number is **23.**

⭐ **Additional Information**

- The atomic number is the number of protons in the nucleus of an atom.
  - **The number of protons determines how many electrons surround the nucleus** , and it is the arrangement of these electrons that determines most of the chemical behaviour of an element.

- **Atomic number, the number of a chemical element in the periodic system** , whereby the elements are arranged in order of increasing number of protons in the nucleus.
- Accordingly, the number of protons, which is always equal to the number of electrons in the neutral atom, is also the atomic number.
- **The atomic symbol is used to identify the element to which an atom belongs and the number of electrons, protons, and neutrons it contains.**

---

79. Answer: d

Explanation:

The correct answer is **75.**

- Uttar Pradesh is divided into **75 Districts and 18 Divisions** .

⭐ **Additional Information**

- **Lakhimpur Kheri is the largest district in Uttar Pradesh, India, on the border with Nepal.**
  - Its administrative **capital is the city of Lakhimpur** .
  - Lakhimpur Kheri district is a part of Lucknow division, with a total area of **7,680 square kilometres (2,970 sq mi).**
  - Bhadohi district is a district of Uttar Pradesh state in northern India.
  - It is the smallest district by area in Uttar Pradesh and city of Gyanpur is the district headquarters.
  - The city is **45 km west of Varanasi and 82 km east of Allahabad.** Distance between Bhadohi to Lucknow is **234 KM.**

---

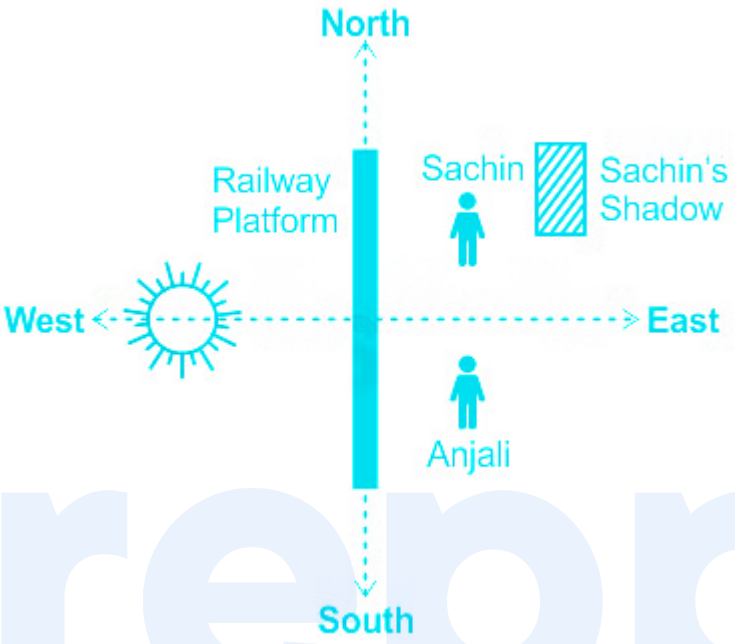
80. Answer: b

Explanation:

Given,

At the railway platform crossing before sunset, Sachin and Anjali were talking to each other face to face. If Sachin's shadow was exactly to Anjali's right.

∴



Here we see Sachin is facing **South** direction.

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

---

81. **Answer: d**

Explanation:

The correct answer is **At the centre of the earth.**

- If you are at the centre of the earth, **gravity is zero because all the mass around you is pulling "up" (every direction there is up!).**

⭐ **Additional Information**

- **Zero Gravity or Zero-G** can simply be defined as the state or condition of weightlessness.

- **It also refers to the state in which the net or an apparent effect of gravity** (i.e. the gravitational force) is zero.
- The condition of apparent weightlessness occurs when a body in a gravitational field changes places to neutralize its gravitational force.
- For example, astronauts are seen floating around in outer space because of this phenomenon.
- **Astronauts orbiting the Earth in a space station experience zero gravity or weightlessness** because their spacecraft continuously undergoes changes in velocity in its orbit in order to prevent it from being pulled into the atmosphere.
- **This acceleration, which is often known as a centrifugal force, counterbalances gravity** . Hence, they experience Zero Gravity or weightlessness.

---

82. Answer: b

Explanation:

The correct answer is **Ferric oxide + water + sulfur dioxide + sulfur trioxide.**

- On heating, ferrous sulphate crystals lose water and anhydrous ferrous sulphate (**$FeSO_4$**) **is formed** .

The reactions involved are:

$$\underset{\text{Ferrous sulphate crystals (Green)}}{FeSO_4.7H_2O(s)} \xrightarrow{\text{Heat}} \underset{\text{Ferrous sulphate (white)}}{FeSO_4(s)} + \underset{\text{Water vapour}}{7H_2O(g)}$$

$$\underset{\text{Ferrous sulphate (white)}}{2FeSO_4(s)} \xrightarrow{\text{Heat}} \underset{\text{Ferric oxide (Brown colour)}}{Fe_2O_3(s)} + \underset{\text{Sulphur dioxide}}{SO_2(g)\uparrow} + \underset{\text{Sulphur trioxide}}{SO_3(g)\uparrow}$$

- So their colour changes from light green to white. On further heating, anhydrous ferrous sulphate decomposes to form **ferric oxide (Fe_2O_3), sulphur dioxide (SO_2) and sulphur trioxide (SO_3).**

⭐ Additional Information

- Ferrous sulphate crystals contain water molecules ($FeSO_4.7H_2O$).
  - On heating, **ferrous sulphate crystals lose water** and anhydrous ferrous sulphate ($FeSO_4$) is formed.
  - So their colour changes from light green to white.
- On further heating, anhydrous ferrous sulphate decomposes to form ferric oxide (Fe_2O_3), sulphur dioxide (SO_2) and sulphur trioxide (SO_3).
  - So, the gas emitted smells like burning sulphur.
- In this reaction, **the single reactant $FeSO_4$ decomposes to form three different products** .
  - So, the reaction is a decomposition reaction.

---

83. Answer: d

Explanation:

Given:

Ratio of 50 paise, Rs 1 and Rs 5 is 2 : 3 : 5

Ramesh has a total of Rs. 116

Calculation:

Let number of 50 paise coins be 2a

Let number of Rs 1 coins be 3a

Let number of Rs 5 coins be 5a

Hence, the value of 50 paise coins = 2a × 50p = 1a rupees

The value of Rs 1 coins = 3a × 1 = 3a rupees

The value of Rs 5 coins = 5a × 5 = 25a rupees

According to the question,

1a + 3a + 25a = 116

⇒ 29a = 116

⇒ a = 116/29 = 4

Number of 50 paise coins = 2 × 4 = 8

∴ Ramesh has 8 coins of 50 paise.

---

84. Answer: c

Explanation:

The correct answer is**Agra**

- **The Moti Masjid is a white marble mosque inside the agra Fort complex in Delhi, India.**
  - The name translates into English as "Pearl Mosque."
  - It is located to the west of the Hammam and close to the Diwan-i-Khas.
  - It was built by the **Mughal emperor Aurangzeb from 1659-1660.**

⭐ Additional Information

- During the rule of Shah Jahan the Mughal emperor, numerous architectural wonders were built, the most famous of them being the Taj Mahal.
  - **Moti Masjid earned the epithet Pearl Mosque for it shone like a pearl.**
  - The mosque is plastered in white on the outside.
  - Inside is the white marble courtyard and a prayer hall, which stands on a higher level than the courtyard.
  - The floor of the prayer-hall is inlaid with outlines of small carpets for prayers (musalla) in black marble.
  - In the middle of the courtyard is a small, square ablution fountain.
  - **The courtyard measures 40 x 35 feet.**

---

85. Answer: d

Explanation:

The correct answer is **Dr G. Satish Reddy.**

- **Dr G. Satheesh Reddy, Head of the Defence Research and Development Organisation (DRDO)** , has been given a two-year extension as the Secretary, Department of Defence Research and Development and Chairman DRDO beyond his tenure of August 26, 2020.
    - This was approved by the Appointments Committee of the Cabinet.

⭐ **Additional Information**

- Defence Research and Development Organisation (DRDO) is a defence R&D hub which develops defence technologies, systems/products that are required for Indian Armed Forces.
    - DRDO develops defence technologies in the project mode.
    - **Avinash Chander is an Indian scientist who was Scientific Adviser to the Defence Minister** , the Director-General of Defence Research and Development Organisation (DRDO), and Secretary, Department of Defence Research and Development.
    - He had succeeded **V. K. Saraswat** to this post.

---

86. Answer: b

Explanation:

The correct answer is **The outermost shells of both are fully filled** .

- The filled outer shells of Group **VIIA of the noble gases make all members of this family (including Helium, Neon, and Argon) the most stable of all the elements.**
    - These three elements have this property in common, a filled stable outer electron shell.

⭐ **Additional Information**

- These gases all have similar properties under standard conditions: they are all odorless, colorless, monatomic gases with very low chemical reactivity.
- The six noble gases that occur naturally are **helium (He), Neon (Ne), Argon (Ar), Krypton (Kr), Xenon (Xe), and Radon (Rn).**
- Argon makes blue light, and neon makes the clear orange-red that is familiar in neon signs, said Bill Concannon, a neon-sign artist, and owner of Aargon Neon, a sign shop in Crockett, California.
- **Argon is neither flammable nor reactive** . If a tank of argon is heated or punctured, the tank may rupture and cause physical injury.

---

87. Answer: d

Explanation:

Given,

Statement:

This container contains gas.

Assumptions:

(I) Container contains oxygen → Not implicit as we don't know the container contains which gas.

(II) Container contains helium → Not implicit as we don't know the container contains which gas.

Hence the correct answer is Neither I nor II is implicit.

---

88. Answer: b

Explanation:

Given:

$3\sqrt{147} - \frac{7}{3}\sqrt{\frac{1}{3}} + 7\sqrt{\frac{1}{3}}$

Calculation:

$\Rightarrow 21\sqrt{3} - \frac{7}{3}\sqrt{\frac{1}{3}} + 7\sqrt{\frac{1}{3}}$

$\Rightarrow 21\sqrt{3} + \sqrt{\frac{1}{3}}\left(7 - \frac{7}{3}\right)$

$\Rightarrow 21\sqrt{3} + \frac{14}{3\sqrt{3}}$

$\Rightarrow \frac{189 + 14}{3\sqrt{3}}$

$\Rightarrow \frac{203}{3\sqrt{3}}$

Rationalizing, we get

$\Rightarrow \frac{203}{9}\sqrt{3}$

Hence the correct answer is $\frac{203}{9}\sqrt{3}$

---

89. **Answer: d**

Explanation:

The correct answer is **5N**.

Given Data:

Distance d = 4000m

Work done W= 20000J

Work Done = F × d

F=work done/d

F=20000/4000=5

F= 5N .

90. **Answer: d**

Explanation:

Given:

Time taken by tap A to fill the tank = 3hrs

Time taken by tap B to fill the tank = 4hrs

Time taken by tap C to empty the tank = 6hrs

Calculation:

Amount of tank filled by A in 1hr = 1/3

Amount of tank filled by B in 1hr = 1/4

Amount of tank emptied by C in 1hr = −1/6

Amount of tank filled by A, B and C in 1hr = 1/3 + 1/4 − 1/6

⇒ (4 + 3 − 2)/12 = 5/12

∴ Together they will take 12/5 days to fill the tank

91. **Answer: a**

Explanation:

The correct answer is Malaysia.

- Following a two-year gap between the first (1978) and second (1980) editions of the Hockey Champions Trophy, **the competition was played on an annual basis until 2012.**
    - The Champions Trophy reverted to a biennial event in 2014.

⭐ Additional Information

- It was held from **23 June to 1 July 2018 in Breda, Netherlands** .
  - The tournament replaced by the Hockey Pro League (HPL) in 2019.
  - **Australia** won their 15th title by defeating India in the final after penalties.
  - On March 17, in the first-ever Stanley Cup playoff game, the Montreal Hockey Club (Montreal HC) defeated the Montreal Victorias, 3–2. Five days later, in the first Stanley Cup Finals game, Montreal HC beat the Ottawa Hockey Club 3–1.
  - **The 2018 Champions Trophy hockey tournament** featured six of the top hockey-playing nations in the World.
  - The FIH tournament was played in the Netherlands from June 23-July 1, 2018.

---

92. **Answer: a**

Explanation:

Given:

The 5/12 of a number is 3/4

Calculation:

Let the number be 'n'

According to the question,

5/12 × n = 3/4

⇒ n = 3/4 × 12/5

⇒ n = 9/5

Hence, the number is $1\frac{4}{5}$

---

93. **Answer: c**

Explanation:

The correct answer is **Mendeleev**.

- **In 1869 Russian chemist Dimitri Mendeleev** started the development of the periodic table, arranging chemical elements by atomic mass.
  - He predicted **the discovery of other elements and left spaces open in his periodic table for them** .

⭐ **Additional Information**

- The history of the periodic table reflects over two centuries of growth in the understanding of the chemical and physical properties of the elements, with major contributions made by **Antoine-Laurent de Lavoisier, Johann Wolfgang Döbereiner, John Newlands, Julius Lothar Meyer, Dmitri Mendeleev, Glenn T.**
  - The periodic law was developed independently by Dmitri Mendeleev and Lothar Meyer in 1869.
  - Mendeleev created the first periodic table and was shortly followed by Meyer.
  - They both arranged the elements by their mass and proposed that certain properties periodically reoccur.
  - **Galileo Galilei is regarded as the father of Science** .
- Alfred Nobel, a Swedish chemist, engineer, and industrialist who invented dynamite and other more powerful explosives and who also founded the Nobel Prizes.

---

94. **Answer: c**

Explanation:

The correct answer is **Gadchiroli**.

- **Dr. Abhay Bang and Dr. Rani Bang are Indian social activists,** researchers working in the field of community health in the Gadchiroli district of Maharashtra, India.
    - Dr. Abhay Bang and Dr. Rani Bang have helped revolutionize healthcare for the poorest people in India and have substantially reduced infant mortality rates in one of the most poverty-stricken areas in the world.

⭐ Additional Information

- Dr. Abhay Bang grew up in the Sevagram Ashram of Mahatma Gandhi.
    - **He was inspired by the social ideals and trained in India (MD)** and at the Johns Hopkins School of Public Health, **(MPH).**
    - He was a top notcher in the University and won 3 Gold Medals.
    - Along with his wife Dr. Rani Bang, he founded the voluntary organization, SEARCH, **(Society for Education, Action, and Research in Community Health) 17 years ago in one of the most underdeveloped districts, Gadchiroli** , in the state of Maharashtra in India, where they have been working with the people in 150 villages to provide community-based health care and conduct research.
    - They have developed a village health care program which has now become a nationally and internationally famous model.

---

95. **Answer: c**

Explanation:

- The correct answer is **Journalist**.
- Rajdeep Sardesai (**born 24 May 1965) is an Indian news anchor, journalist, and author.**
- He is a consulting editor at the India Today group and is an anchor for India Today Television.
- He was the Editor-in-Chief of Global Broadcast News, which included **CNN-IBN, IBN7, and IBN-Lokmat, before resigning in July 2014.**

⭐ Additional Information

- Rajdeep Sardesai is a senior journalist and author of the best-selling book, '2014: The Election that Changed India'.
    - With 26 years of journalistic experience in print and TV, Sardesai was managing editor of the NDTV network before he set up the IBN 18 network with channels like CNN IBN as founder editor.
    - He began his career with the **Times of India and was the city editor of its Mumbai edition at the age of 26** . He is presently a consulting editor with the India Today Group and anchors a prime time show on India Today.
    - Specializing in national politics, Sardesai has won numerous awards for journalistic excellence including the prestigious **Padma Shri for Journalism in 2008, the International Broadcasters Award for coverage of the 2002 Gujarat riots, and the Ramnath Goenka Excellence in Journalism Award for 2007.**

---

96. **Answer: c**

Explanation:

The correct answer is **T = 1/υ**.

- The period is **the duration of time of one cycle in a repeating event, so the period is the reciprocal of the frequency.**
    - For example: if a newborn baby's heart beats at a frequency of **120 times a minute (2 hertz), its period, T, — the time interval between beats—is half a second (60 seconds divided by 120 beats).**

⭐ **Additional Information**

- Frequency is the number of occurrences of a repeating event per unit of time.
    - Frequency is measured in **hertz (Hz) which is equal to one occurrence of a repeating event per second.**
    - The period is the duration of time of one cycle in a repeating event, so the period is the reciprocal of the frequency.
    - The total dose or amount is determined by the three components of activity: frequency, duration, and intensity. Frequency is commonly

expressed in sessions, episodes, or bouts per day or per week.
- **Duration is the length of time for each bout of any specific activity.**

---

97. **Answer: c**

Explanation:

Given:

A and B can complete a work in 1.8 days.

A completes the half work and B completes the other half work and it takes 3.75 days to complete the work.

B is more efficient than A.

Calculation:

Let A works for 'a' days to complete the half of the job.

Hence, B takes (3.75 – a) days to complete the remaining half of the work

∴ A's one day work = 1/2a

∴ B's one day work = 1/[2(3.75 – a)]

Amount of work done by A and B in 1 day = 1/1.8 = 5/9

⇒ 1/2a + 1/[2(3.75 – a)] = 5/9

⇒ 1/a + 1/(3.75 – a) = 10/9

⇒ (3.75 – a + a)/(a)(3.75 – a) = 10/9

⇒ 9 × 3.75 = 10 × (a)(3.75 – a)

⇒ 33.75 = 37.5a – $10a^2$

⇒ $10a^2$ – 37.5a + 33.75 = 0

⇒ (a – 2.25)(a – 1.5) = 0

⇒ a = 2.25, 1.5

As B is more efficient, A will take more days to complete the work

a = 2.25

⇒ B's one day work = 1/[2(3.75 – a)] = 1/3

∴ B will take 3 days to complete the task himself.

---

98. Answer: b

Explanation:

Concept used:

If the sum of digits of a number is divisible by 3, then the number is also divisible by 3.

Calculation:

Sum of digits of 1711 = 1 + 7 + 1 + 1 = 10

⇒ 10 is not divisible by 3

Sum of digits of 1311 = 1 + 3 + 1 + 1 = 6

⇒ 6 is divisible by 3

Sum of digits of 1411 = 1 + 4 + 1 + 1 = 7

⇒ 7 is not divisible by 3

Sum of digits of 1111 = 1 + 1 + 1 + 1 = 4

⇒ 4 is not divisible by 3

∴ 1311 is divisible by 3

99. **Answer: c**

Explanation:

The correct answer is **To harden gold.**

- Pure gold is very soft and the most malleable metal. It is mixed with metals such as copper and nickel **to make it harder and cheaper.**

⭐ **Additional Information**

- Mixing alloys makes the texture of gold harder and hence jewellery becomes durable.
  - **The 18 Karat gold comprises of 75% gold mixed with 25% of other metals** such as copper, silver, and other alloys.
  - This type of gold is used to make stone studded jewellery and other diamond jewellery.
  - Rose gold is an alloy made from a combination of pure gold and copper. **The blend of the two metals changes the color of the final product and its karat.**
  - KDM gold is a type of gold alloy where 92 percent gold and 8 percent cadmium alloy are mixed.
  - this is where the term KDM gold came from. This mixture was used to attain a high standard of purity in gold.
  - Now **cadmium is replaced with advanced solder metal such as Zinc and other metals.**

100. **Answer: b**

Explanation:

Statement:

- The owner says to his daily wage workers, "Late workers will not be given extra time to complete their work for the day."

Conclusions:

- Daily wage workers are expected to complete the work allotted by the end of the day → logically follows. (***As extra time will not be allotted***, the workers will have no choice but to complete the work before the day ends.)
- Those whom the owner is addressing used to come late for work → Logically does not follow (It is mentioned that the owners are speaking with their daily wage workers.***These workers could include those who come late and those who don't. The statement of the owner might just be him informing the rules of the workplace to the workers.***Because we are not certain about the people whom the owner is addressing, conclusion II does not follow.)
- **Hence, the correct answer is "Only conclusion I follows."**