# RRC Group D Previous Year Paper 10 (Held On: 28 Sep 2018 Shift 1)

RRB Group D • 2018 • 100 questions • 90 minutes • Answer key and solutions

**Take this paper as a timed mock test**

Practise under exam conditions, then review your answers after you submit.

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## CBT

**Q1.** An object travels 10 m in 4 s and then another 14 m in 2 s. What is the average speed of the object?

**(a)** 4.5 ms^(-1)
**(b)** 4 m
**(c)** 4 s^(-1)
**(d)** 4 ms^(-1)

**Q2.** The molten material mixed with gases in the mantle of the Earth is called _____.

**(a)** Magma
**(b)** Helium
**(c)** Core
**(d)** Lava

**Q3.** How many groups and periods are there in the Modern Periodic Table?

**(a)** 7 group and 18 periods
**(b)** 7 groups and 7 periods
**(c)** 18 groups and 7 periods
**(d)** 18 groups and18 periods

**Q4.** What is the sum of the reciprocals of the values of zeroes of the polynomial $6x^2 + 3x^2 – 5x + 1$?

**(a)** 2
**(b)** 3
**(c)** 4
**(d)** 5

**Q5.** Find the odd one out.

| A | B | C | D |
|---|---|---|---|
| O15 | C3 | G7 | N15 |

**(a)** C
**(b)** B
**(c)** D
**(d)** A

**Q6.** What is the valency of copper in cuprous oxide?

**(a)** 4
**(b)** 3
**(c)** 2
**(d)** 1

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**Q7.** 315 marbles are distributed among Aman, Ashok and Alok in the ratio 7 : 3 : 5, respectively. How many more marbles did Aman get compared to Ashok?

**(a)** 84
**(b)** 42
**(c)** 147
**(d)** 63

**Q8.** _____ does NOT contain carbonyl group.

**(a)** Aldehyde
**(b)** Carboxyl acid
**(c)** Ketone
**(d)** Ethanol

**Q9.** One of the two inlet pipes works twice as efficiently as the other. The two can fill the empty cistern in 12 hours. A drain pipe can empty a cistern all by itself in 12 hours. How many hours will the more efficient inlet pipe take to fill the empty cistern by itself?

**(a)** 9
**(b)** 15
**(c)** 12
**(d)** 18

**Q10.** The Battle of Plassey was fought on _____.

**(a)** 23^(rd) June 1557
**(b)** 23^(rd) June 1657
**(c)** 23^(rd) June 1857
**(d)** 23^(rd) June 1757

**Q11.** Which assumptions are implied from the below statement?

Statement: “In 10 years, the real impact of unscrupulous use of plastics would be felt”, says an ecologist.

Assumptions:

I. Plastic is non-decomposable

II. Plastic affects the ecological balance

**(a)** Only assumption II is implicit
**(b)** Only assumption I is implicit
**(c)** Both I and II are implicit
**(d)** Neither I nor II is implicit

**Q12.** The point at which all rays converge is termed as _____.

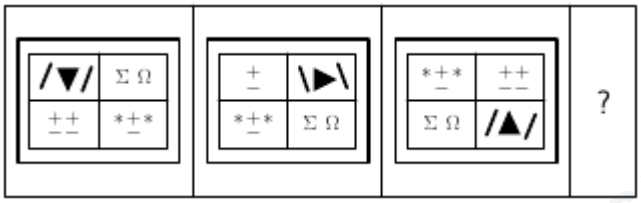
**(a)** Principle axis
**(b)** Pole
**(c)** Aperture
**(d)** Focus

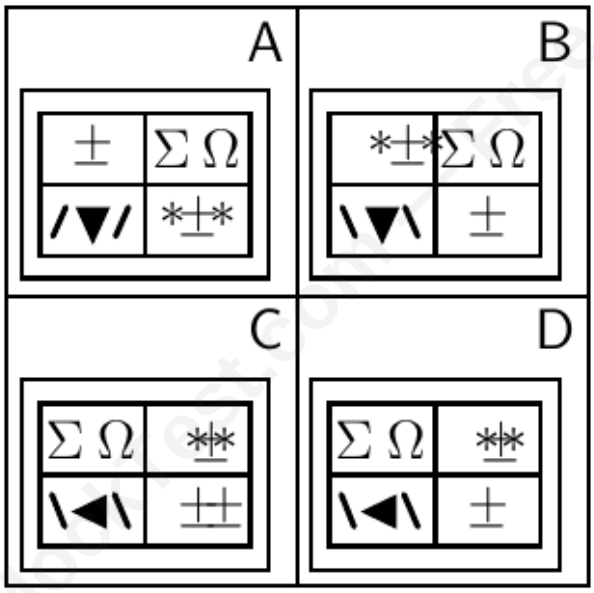
**Q13.** If E and A are daughters of B and A is married to V, then how is V related to E?

**(a)** Son-in-law
**(b)** Father-in-law
**(c)** Brother-in-law
**(d)** Mother-in-law

**Q14.** Select the option that can replace the question mark (?) in the following series.

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**(a)** C
**(b)** D
**(c)** A
**(d)** B

**Q15.** $4x^2 + kx + 5$ is divisible by $x + 1$. The same expression is also divisible by:

**(a)** $4x + 5$
**(b)** $4x – 1$
**(c)** $4x – 5$
**(d)** $x – 5$

**Q16.** Garima and her sister together can paint the walls of their house in 45 days. If Garima alone did the job, it would have taken her 81 days. If the duo started painting together but Garima's sister had to leave 9 days before the completion of the work, how many days in all would it take the sisters to paint their house?

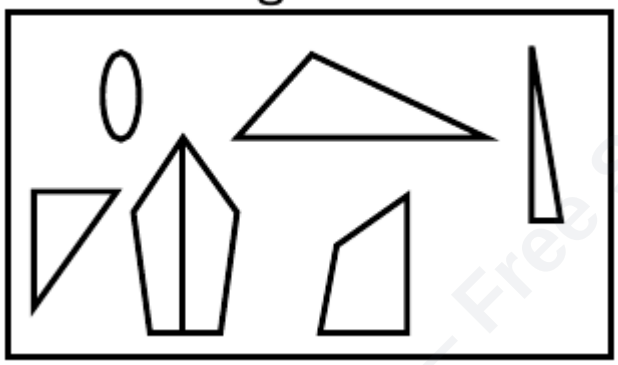
**(a)** 49
**(b)** 48
**(c)** 52
**(d)** 50

**Q17.** _____ has the greatest electron affinity.

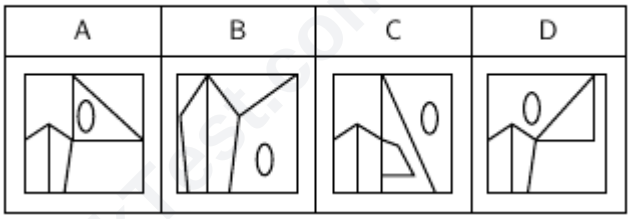
**(a)** Br
**(b)** Cl
**(c)** I
**(d)** F

**Q18.** Which of the answer figures is formed from the shapes given the problem figure?

**Problem Figure:**



Answer Figures




**(a)** A
**(b)** C
**(c)** B
**(d)** D

**Q19.** _____ was the Finance Minister of the Mughal empire during Akbar's reign.

**(a)** Birbal
**(b)** Raja Man Singh 1
**(c)** Tansen
**(d)** Raja Todar Mal

**Q20.** You are given a question and two statements. Identify which of the statements is/are sufficient to answer the question.

Question:

Nayan has 4 caps of 3 different colours. How many blue caps does he have?

Statements:

1. Nayan has 2 white caps.

2. The number of blue caps he has is the same as that of white caps.

**(a)** Statement 1 alone is not sufficient.
**(b)** Statements 1 and 2 together are sufficient.
**(c)** Statements 1 or 2 alone are sufficient.
**(d)** Statement 2 alone is not sufficient.

**Q21.** Read the statement below along with two conclusions.

Statement:

Naina asks for pen from Mahi.

Conclusions:

I. Naina doesn't have a pen

II. Naina wants to write something

Which conclusion(s) follow(s) the given statement?

**(a)** Both the conclusions follow
**(b)** Conclusion I alone follows
**(c)** Neither I nor II follows

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**(d)** Conclusion II alone follows

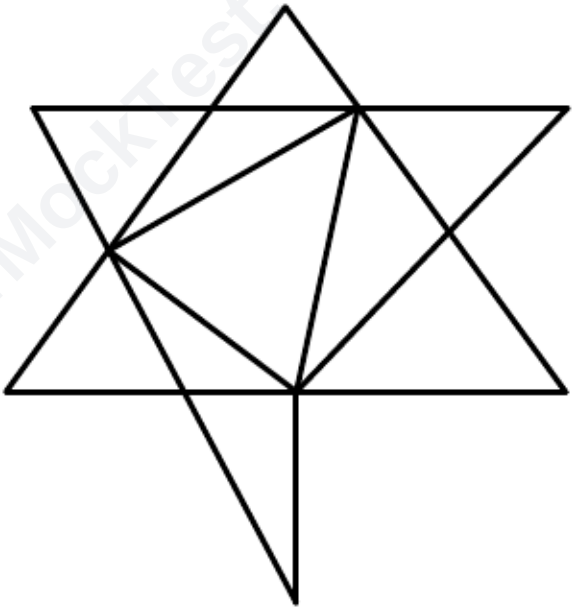
**Q22.** _____ is the mobile application launched by the Ministry of Commerce and Industry to aid exporters and importers in the country.

**(a)** Nikat Man
**(b)** Maitree Mitra
**(c)** Niryat Mitra
**(d)** Dikhat Mitra

**Q23.** A year ago, Akash's father's age was 9 times that of Akash. After 3 years his father's age will be 5 times that of his age. How old will Akash be next year?

**(a)** 4 years
**(b)** 5 years
**(c)** 8 years
**(d)** 6 years

**Q24.** How many triangles are there in the following figure?



**(a)** 8
**(b)** 12
**(c)** 11
**(d)** 17

**Q25.** _____ mutation is NOT hereditary.

**(a)** Deletion
**(b)** Insertion
**(c)** Somatic
**(d)** Duplication

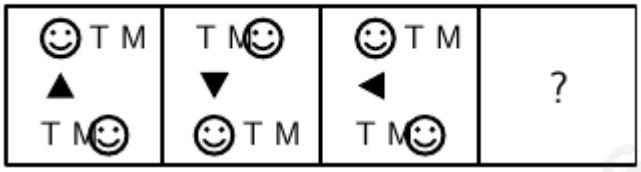
**Q26.** Which of the following is NOT a perfect square?

**(a)** 1250
**(b)** 16641
**(c)** 2025
**(d)** 9801

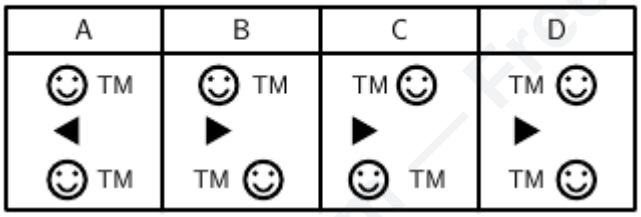
**Q27.** Select the option figure that will complete the series of question figures.

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Question figures:




Answer figures:




**(a)** D
**(b)** C
**(c)** A
**(d)** B

**Q28.** Which Indian has been crowned Miss Teen Universe 2017 at Managua, the capital of Nicaragua?
**(a)** Neeru Chadha
**(b)** Nisha Dutt
**(c)** Simran Khosla
**(d)** Srishti Kaur

**Q29.** Voluntary muscles are contained in the _____.
**(a)** Heart
**(b)** Hind limb
**(c)** Liver
**(d)** Lung

**Q30.** Choose the correct alternative to complete the pattern:
1224364860, 1122334455, 1020304050, _____.
**(a)** 918273642
**(b)** 918273644
**(c)** 918273645
**(d)** 918273643

**Q31.** Which state government launched the 'Gobar-dhan' scheme to support farmers?
**(a)** Uttar Pradesh
**(b)** Haryana
**(c)** Rajasthan
**(d)** Punjab

**Q32.** Consider the given statement(s) and decide which of the given assumption(s) is/are implicit in the statement.
Statement:
"Tomorrow morning the hockey team will report by 9:00 am instead of 8:00 am for practice," said the coach.
Assumptions:
I. That day coach had some other work at 8:00 am.
II. They usually assemble for practice.
**(a)** Only I is implicit.
**(b)** Only II is implicit.
**(c)** Both I and II are implicit.
**(d)** Neither I nor II is implicit.

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**Q33.** Which one of the following groups produces naked seeds?

**(a)** Angiosperms
**(b)** Bryophyta
**(c)** Thallophyte
**(d)** Gymnosperms

**Q34.** Find the next term in the following series:

31, 38, 44, 51, _____.

**(a)** 58
**(b)** 57
**(c)** 51
**(d)** 55

**Q35.** The ratio of the area of a square to the area of a regular hexagon, having the same perimeter is:

**(a)** 2 : 3
**(b)** √3 : 2
**(c)** 1 : √3
**(d)** 4 : 3√3

**Q36.** 3/12 of ((2/5 + 4/15))/((3/5 - 2/5)) = ?

**(a)** 5/7
**(b)** 5/6
**(c)** 6/5
**(d)** 2/6

**Q37.** What is the next term in this series?

L, D, O, E, R, F, ?

**(a)** K
**(b)** S
**(c)** U
**(d)** Q

**Q38.** The electoral college who elects the President of India is formed by _____.

**(a)** Head of the Parliament
**(b)** Governor
**(c)** Former President
**(d)** Elected members of the Parliament and the State Legislative Assemblies

**Q39.** An element of atomic number 16 will belong to the _____ period of the periodic table.

**(a)** 5^(th)
**(b)** 6^(th)
**(c)** 3^(rd)
**(d)** 4^(th)

**Q40.** An electric bulb of 100 W is used 8 hours per day. The energy consumed by the bulb in one day is _____ units.

**(a)** 800
**(b)** 80
**(c)** 8
**(d)** 0.80

**Q41.** As of February 2018, who was the spokesperson of the Indian Navy?

**(a)** Captain D.K. Sharma
**(b)** Admiral Suresh Bhatt
**(c)** Captain M.K. Sharma
**(d)** Pranab Mukherjee

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**Q42.** Pipe C and D alone can fill a tank in 4 and 5 hours, respectively. If pipe C is closed after 3 hours and at the same time pipe D is opened, in how many hours will the tank get filled?

**(a)** 0.8
**(b)** 1.25
**(c)** 1
**(d)** 1.5

**Q43.** $\{52 – (9 – 2)\} \div [3 \times \{1 + (-2) \times (-2)\}] = ?$

**(a)** 3
**(b)** -9
**(c)** 9
**(d)** -5

**Q44.** Nikhil meets a boy at the park. The boy identifies Nikhil as his father's younger brother. Nikhil is the boy's _____.

**(a)** Father
**(b)** Maternal uncle
**(c)** Cousin
**(d)** Paternal uncle

**Q45.** Football was officially included as a competitive game in Olympics in _____.

**(a)** 1908
**(b)** 1924
**(c)** 1916
**(d)** 1900

**Q46.** What is the area of the triangle whose vertices are A(-4, -2), B(-3, -5) and C(3, -2)?

**(a)** 12 sq. units
**(b)** 10 sq. units
**(c)** 7.5 sq. units
**(d)** 10.5 sq. units

**Q47.** A and B can do a piece of work together in 15 days while A alone can do it in 25 days. They start working together but B leaves 5 days before the completion of the work. For how many days did A and B work together?

**(a)** 10
**(b)** 13
**(c)** 9
**(d)** 12

**Q48.** The Second Equation of Motion gives the relationship between _____ and Time.

**(a)** Acceleration
**(b)** Position
**(c)** Momentum
**(d)** Velocity

**Q49.** If two charged bodies having equal potential are connected through a conducting wire, then:

**(a)** Magnetic induction flows
**(b)** Current flows from positive to negative
**(c)** Current will not flow
**(d)** Current will flow from negative to positive

**Q50.** Who among the following won the 'ITA Sterling Icon of Indian Entertainment' Award at the 17th edition of the Indian Television Academy Awards held in November 2017?

**(a)** Jitendra
**(b)** Ekta Kapoor
**(c)** Siddarth Roy Kapur

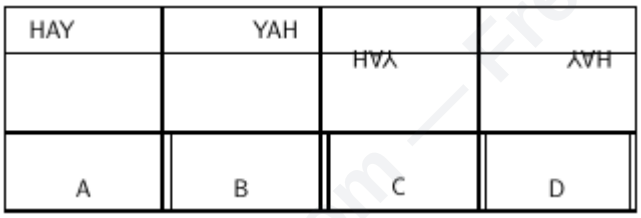
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**(d)** Shobha Kapoor

**Q51.** V is the daughter of MX and N is the daughter of NX. MX and NX have the same father. V and N are:

**(a)** Sister-in-law
**(b)** Cousins
**(c)** Paternal Aunt
**(d)** Maternal Aunt

**Q52.** What is the horizontal mirror image of HAY?

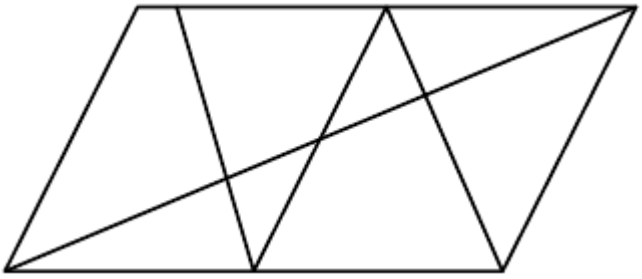



**(a)** A
**(b)** B
**(c)** D
**(d)** C

**Q53.** The Rajiv Gandhi Khel Ratna Awardee receives a cash price of rupees _____.(before 2020)

**(a)** 7.5 lakh
**(b)** 7 lakh
**(c)** 25 lakh
**(d)** 10 lakh

**Q54.** How many triangles are there in the below figure?



**(a)** 6
**(b)** 13
**(c)** 10
**(d)** 8

**Q55.** " A table, a chair, a bowl of fruit and a violin: what else does a man need to be happy ?" was said by

**(a)** Albert Einstien
**(b)** Alexander Graham bell
**(c)** Sir Isac Newton
**(d)** Alan Turing

**Q56.** Compressions and rarefactions are due to variability of _____

**(a)** Magnetic difference
**(b)** Ray refraction
**(c)** Air pressure
**(d)** Temperature difference

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**Q57.** Tarun and Tapan started a partnership with investments of Rs. 13,000 and Rs. 19,500 respectively, however, due to a financial emergency, Tapan had to withdraw his investment after 8 months. In what ratio should the profit of the first 12 months be shared among the duo?

**(a)** 1 : 2
**(b)** 1 : 1
**(c)** 3 : 2
**(d)** 2 : 3

**Q58.** India is the _____ most populated country in the world.(Till September 2018)

**(a)** Fourth
**(b)** First
**(c)** Third
**(d)** Second

**Q59.** What is the formula of average velocity?

**(a)** $V_{(av)} = (u – v)/ 2$
**(b)** $V_{(av)} = (u + v)/ 2$
**(c)** $V_{(av)}= u + v$
**(d)** $V = S \times t$

**Q60.** The volume of sales in a store is recorded for four different quarters. The following is the data.

| Quarters | Volume of sales |
|---|---|
| Quarter 1 | 200 |
| Quarter 2 | 100 |
| Quarter 3 | 350 |
| Quarter 4 | 550 |

What are the average sales per quarter?

**(a)** 250
**(b)** 300
**(c)** 350
**(d)** 500

**Q61.** Which of the following does NOT belong to the given group?

A. Tunnel
B. Bunker
C. Well
D. Building

**(a)** B
**(b)** D
**(c)** A
**(d)** C

**Q62.** Jayant introduces a man to his friend as his wife's father's son. The man is Jayant's _____.

**(a)** Brother-in-law
**(b)** Sister-in-law
**(c)** Father-in-law
**(d)** Daughter-in-law

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**Q63.** The filtration units in the human kidney are known as _____.

**(a)** Nephrons
**(b)** Protons
**(c)** Neutrons
**(d)** Neurons

**Q64.** Two trains, one 153 m long and the other 127 m long, coming from opposite directions crossed each other in 7.2 seconds. The combined speed of the two trains every hour would then be:

**(a)** 140 km/h
**(b)** 105 km/h
**(c)** 70 km/h
**(d)** 280 km/h

**Q65.** If the chromosome number is 46 in a human being, how many chromosomes are present in somatic cells of the human being?

**(a)** 24
**(b)** 46
**(c)** 23
**(d)** 48

**Q66.** A fraction when added to 7/8 gives 4. The said fraction is:

**(a)** 31/8
**(b)** -1/2
**(c)** 2/3
**(d)** 11/2

**Q67.** 4 + 3 × 4 + 3 × 4² + 3 × 4³ + 3 × 4^4 + 3 × 4^5 = ?

**(a)** 5 × 4^5
**(b)** 9 × 4^4
**(c)** 4^6
**(d)** 10 × 4^4

**Q68.** Who is the current (as of July 2018) Governor of Reserve Bank of India (RBI)?

**(a)** Arvind Subramanian
**(b)** Urjit Patel
**(c)** Amitabh Kant
**(d)** Raghuram Rajan

**Q69.** Study the following questions and statement, and decide which of statements is/are sufficient to answer the question.

Question:

J, K, L, M, N and O are standing in a row. If we arrange them according to their height from tallest to shortest, who is standing in the third place?

Statements:

1. L is the tallest
2. J is taller than K
3. N is the shortest of all
4. K is taller than O

**(a)** All the statements are insufficient
**(b)** Statements 1, 2 and 3 sufficient
**(c)** Statements 1, 2, 3 and 4 together are sufficient
**(d)** Statements 1 and 3 are sufficient

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**Q70.** Which of the numbers given below is NOT rational?

**(a)** ?32
**(b)** cbrt64
**(c)** 5√32
**(d)** cbrt27

**Q71.** _____ is semiconductor.

**(a)** Ga
**(b)** Pb
**(c)** Ge
**(d)** Sn

**Q72.** If $3x^2 + ax + 4$ is perfectly divisible by $x - 8$, then the value of a is:

**(a)** 24.5
**(b)** -25.5
**(c)** -24.5
**(d)** 25.5

**Q73.** Study the following question and decide which of the statements is/are sufficient to answer the question.

Questions:
What is the total age of Nakul and Dwij?
Statements:
1. Nakul is 12 years old today.
2. Dwij is younger to Nakul by 3 years.

**(a)** Statement 1 and 2 together are insufficient
**(b)** Statements 1 and 2 together are sufficient
**(c)** Statement 1 alone is sufficient
**(d)** Statement 2 alone is sufficient

**Q74.** Which of the following does NOT belong to this group?

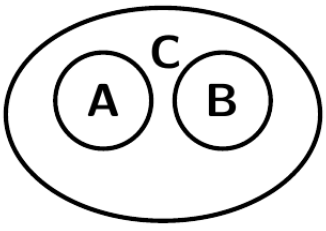
A. Poetry
B. Sonnet
C. Rhyme
D. Diagram

**(a)** B
**(b)** A
**(c)** C
**(d)** D

**Q75.** Which of the following correctly reparents the relationship between the given classes?

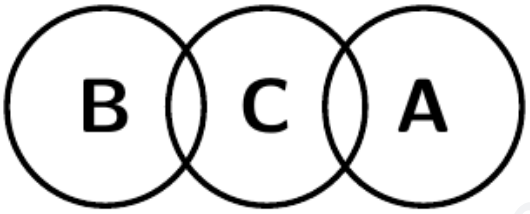
A. Spades
B. Hearts
C. Deck or cards

**(a)**




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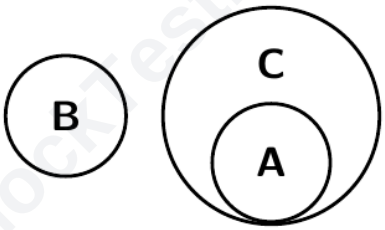
**(b)**




**(c)**




**(d)**




**Q76.** The electric configuration of four elements is given below. Which one among the following will be more electronegative?

**(a)** Al(2, 8, 3)
**(b)** P(2,8,5)
**(c)** Cl(2,8,7)
**(d)** S(2,8,6)

**Q77.** To dispose of the old stocks, a person sold a tea-set for Rs. 3,540, which was 41% below the cost price. In order to make a profit of 11% the seller should have sold the set for ____ more.

**(a)** 2664.42
**(b)** 2460
**(c)** 1812.60
**(d)** 3120

**Q78.** Which of the following is the official currency of the European Union?

**(a)** Yen
**(b)** Dollar
**(c)** Euro
**(d)** Pound

**Q79.** How many factors of 512 are perfect squares?

**(a)** 3
**(b)** 5
**(c)** 6
**(d)** 4

**Q80.** India celebrates its Constitution Day on _____.

**(a)** 15th December
**(b)** 26th November
**(c)** 21st August

**(d)** 26th January

**Q81.** An object has a potential energy of 400 J with a mass of 20 kg and gravity of 10 N kg-1. The height of the object is

**(a)** 0.5 m
**(b)** 4 m
**(c)** 1 m
**(d)** 2 m

**Q82.** With which sport is B Sai Praneeth associated?

**(a)** Cricket
**(b)** Kho-Kho
**(c)** Taekwondo
**(d)** Badminton

**Q83.** In which of the following field Udipi Ramachandra Rao has been awarded 'Padma Vibhushan' by the Government of India in 2017?

**(a)** Sports
**(b)** Science
**(c)** Literature
**(d)** Music

**Q84.** Which of the below is NOT a city/village/town of Rajasthan?

**(a)** Tonk
**(b)** Nagaur
**(c)** Sikar
**(d)** Navsari

**Q85.** _____ is not acidic.

**(a)** SbCl4
**(b)** CCl4
**(c)** PCl4
**(d)** PCl3

**Q86.** A shopkeeper sold two items, one at 25% profit and another at 15% loss and got a profit of Rs. 35. If the cost price of the item sold at 25% profit is twice than that of the item sold at 15% loss, find the sum of the cost price of both items.

**(a)** Rs. 300
**(b)** Rs. 200
**(c)** Rs. 100
**(d)** Rs. 400

**Q87.** What is the next term in the given series?

22A, 42E, 62I, ? _____.

**(a)** 82 M
**(b)** 82 N
**(c)** 82 K
**(d)** 82 S

**Q88.** An object travels 15 m in 4 s and then another 16 m in 3 s. What is the average speed of the object?

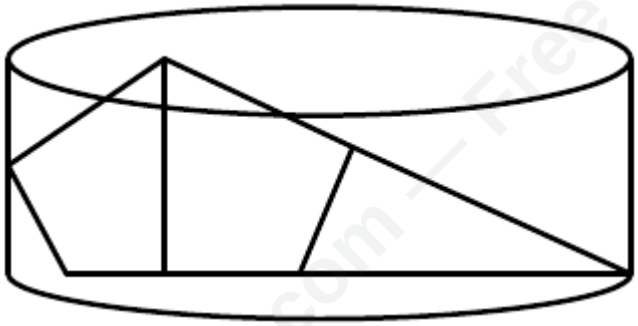
**(a)** 5.17 ms^(-1)
**(b)** 4.43 ms^(-1)
**(c)** 5.00 s^(-1)
**(d)** 6.17 m^(s-1)

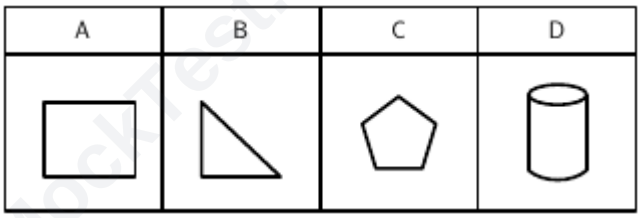
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**Q89.** The law of definite proportions was stated by _____.

**(a)** Democritus
**(b)** Lavoisier
**(c)** Proust
**(d)** John Dalton

**Q90.** Which of the shapes in the options are combined to form the given shape?






**(a)** A, B and D
**(b)** B, C and D
**(c)** D and A
**(d)** C and D

**Q91.** The Human Development Index was developed by _____ in 1990.

**(a)** Mahbub Khan
**(b)** Apara Sen
**(c)** Syed-ul-Haq
**(d)** Mahbub-ul-Haq and Amartya Sen

**Q92.** If PIG is coded as 1697, then what will be the code for GOAT?

**(a)** 715122
**(b)** 715120
**(c)** 715123
**(d)** 715121

**Q93.** By what number should 62/9 be multiplied to get 40?

**(a)** 53/7
**(b)** 6
**(c)** 2/9
**(d)** 63/7

**Q94.** Leela introduces two girls to her friend as the daughters of the only sister of her father. Leela and the girls are _____.

**(a)** Cousins
**(b)** Friends
**(c)** Nieces
**(d)** Twins

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**Q95.** Murali takes his dog for a walk. He turns left at a crossroad and faces South. Towards which direction was he walking before turning left?

**(a)** East
**(b)** North
**(c)** West
**(d)** South

**Q96.** A solution turns blue litmus to red, its pH is likely to be _____.

**(a)** 9
**(b)** 8
**(c)** 6
**(d)** 7

**Q97.** If the standard deviation of 0, 1, 2, 3 ____ 9 is K, then the standard deviation of 10, 11, 12, 13 ___ 19 will be:

**(a)** K + 1
**(b)** K
**(c)** K + 4
**(d)** K + 8

**Q98.** Who was appointed as the new Director General of Military Operations of the Indian Army in 2018?

**(a)** Sarath Chand
**(b)** Anil Chauhan
**(c)** Ranbir Singh
**(d)** A.K. Bhatt

**Q99.** Given is a statement followed by two arguments. Decide which of the arguments is/are strong with respect to the statement.

Statement:

There is an increase in mobile usage and cell phone towers.

Arguments:

I. It shows global development and fast and easy way to get connected with the wider world.

II. In the long run, there will be more signals that will affect the normal functioning of the ecological systems.

**(a)** Neither argument I nor II is strong.
**(b)** Both arguments I and II are strong.
**(c)** Only arguments I is strong.
**(d)** Only argument II is strong.

**Q100.** How many balls, each of radius 1 cm, can be made from a steel sphere whose radius is 6 cm?

**(a)** 126
**(b)** 27
**(c)** 64
**(d)** 216

## ANSWER KEY

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | d | 2 | a | 3 | c | 4 | d | 5 | c | 6 | d | 7 | a | 8 | d | 9 | d | 10 | d |
| 11 | a | 12 | d | 13 | c | 14 | b | 15 | a | 16 | a | 17 | b | 18 | c | 19 | d | 20 | c |
| 21 | a | 22 | c | 23 | d | 24 | d | 25 | c | 26 | a | 27 | b | 28 | d | 29 | b | 30 | c |
| 31 | b | 32 | b | 33 | d | 34 | b | 35 | b | 36 | b | 37 | c | 38 | d | 39 | c | 40 | d |
| 41 | a | 42 | b | 43 | a | 44 | d | 45 | a | 46 | d | 47 | d | 48 | b | 49 | c | 50 | b |
| 51 | b | 52 | d | 53 | a | 54 | b | 55 | a | 56 | c | 57 | b | 58 | d | 59 | b | 60 | b |
| 61 | b | 62 | a | 63 | a | 64 | a | 65 | b | 66 | a | 67 | c | 68 | b | 69 | a | 70 | a |

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| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 71 | c | 72 | c | 73 | b | 74 | d | 75 | a | 76 | c | 77 | d | 78 | c | 79 | b | 80 | b |
| 81 | d | 82 | d | 83 | b | 84 | d | 85 | b | 86 | a | 87 | a | 88 | b | 89 | c | 90 | b |
| 91 | d | 92 | b | 93 | d | 94 | a | 95 | c | 96 | c | 97 | b | 98 | b | 99 | c | 100 | d |

## SOLUTIONS

**Q1. Answer: (d) 4 ms^(-1)**

Shortcut Trick

Average Speed = Total Distance ÷ Total Time

Total Distance = 10 m + 14 m = 24 m

Total Time = 4 s + 2 s = 6 s

Average Speed = 24 / 6 = 4 ms^(−1)

Therefore The correct answer is 4 ms^(−1).

Alternate Method

Given:

Distance 1 (d1) = 10 m, Time 1 (t1) = 4 s

Distance 2 (d2) = 14 m, Time 2 (t2) = 2 s

Formula Used:

Average Speed = (Total Distance) ÷ (Total Time)

Calculations:

=> Total distance = d1 + d2 = 10 + 14 = 24 m

=> Total time taken = t1 + t2 = 4 + 2 = 6 s

=> Average Speed = 24 ÷ 6

=> Average Speed = 4 ms^(−1)

Therefore The correct answer is 4 ms^(−1).

Additional Information

Uniform Speed

When an object covers equal distances in equal intervals of time, it is said to be moving with Uniform Speed.

Relative Speed

If two objects move in the same direction, relative speed = S1 − S2. In opposite directions, relative speed = S1 + S2.

Unit Conversion

To convert kmph to m/s, multiply by 5/18. To convert m/s to kmph, multiply by 18/5.

**Q2. Answer: (a) Magma**

The correct answer is magma.

Key Points

• Magma is hot liquid rock that is found just below the surface of the earth.

• It is formed from the melting of rocks in the earth's lithosphere, the outermost shell of Earth's surface.

• Lava is hot molten rocks that gets erupted outside from the volcano.

**Q3. Answer: (c) 18 groups and 7 periods**

• Periodic table is the tabular arrangement of chemical elements.

• The Modern Periodic table consists of 18 groups and 7 periods.

**Q4. Answer: (d) 5**

Shortcut Trick

For any polynomial, the sum of the reciprocals of its zeroes is given by the formula: Sum = −(coefficient of x) ÷ (constant term).

Given polynomial: $6x^2 + 3x^2 - 5x + 1 = 9x^2 - 5x + 1$.

Here, coefficient of x = −5 and constant term = 1.

Sum of reciprocals = −(−5) ÷ 1 = 5.

Therefore The correct answer is 5.

Alternate Method

Given:

Polynomial $P(x) = 6x^2 + 3x^2 - 5x + 1$

=> $P(x) = 9x^2 - 5x + 1$

Comparing with the general quadratic form $ax^2 + bx + c$:

=> $a = 9, b = -5, c = 1$

Formula Used:

Let the zeroes of the polynomial be $\alpha$ and $\beta$.

=> Sum of zeroes $(\alpha + \beta) = -b/a$

=> Product of zeroes $(\alpha\beta) = c/a$

=> Sum of reciprocals $= 1/\alpha + 1/\beta = (\alpha + \beta) \div (\alpha\beta)$

Calculations:

=> $\alpha + \beta = -(-5) \div 9 = 5/9$

=> $\alpha\beta = 1 \div 9 = 1/9$

=> Sum of reciprocals $= (5/9) \div (1/9)$

=> Sum of reciprocals $= (5/9) \times (9/1) = 5$

Therefore The correct answer is 5.

Additional Information

Vieta's Formulas for Quadratic Equations

For a quadratic $ax^2 + bx + c = 0$, the sum of roots is $-b/a$ and the product of roots is $c/a$.

Vieta's Formulas for Cubic Equations

For $ax^3 + bx^2 + cx + d = 0$, the sum of roots is $-b/a$, sum of products taken two at a time is $c/a$, and product of roots is $-d/a$.

General Sum of Reciprocals

For any polynomial $a_nx^n + ... + a1x + a0 = 0$, the sum of the reciprocals of the roots is always $-a1/a0$.

**Q5. Answer: (c) D**

The pattern followed here is:

The positional value of O is 15.

The positional value of C is 3.

The positional value of G is 7.

The positional value of N is $14 \neq 15$.

Hence, D is the correct answer.

**Q6. Answer: (d) 1**

- The Valency of an element is defined as the capability to gain or lose its valence electrons in order to complete its valence shell.
- Cuprous oxide or Cu2O is one of the principle oxides of copper.
- Its valency is 1.

**Q7. Answer: (a) 84**

Shortcut Trick

Total ratio units = 7 + 3 + 5 = 15 units.

Given total marbles = 315.

Difference between Aman and Ashok in units = 7 − 3 = 4 units.

Number of extra marbles = (315 ÷ 15) × 4 = 21 × 4 = 84.

Therefore The correct answer is 84 marbles.

Alternate Method

Given:

Ratio of marbles (Aman : Ashok : Alok) = 7 : 3 : 5

Total marbles = 315

Calculations:

=> Let the marbles be 7x, 3x, and 5x.

=> 7x + 3x + 5x = 315

=> 15x = 315

=> x = 315 ÷ 15 = 21

=> Marbles with Aman = 7x = 7 × 21 = 147

=> Marbles with Ashok = 3x = 3 × 21 = 63

=> Difference = 147 − 63 = 84

Therefore The correct answer is 84 marbles.

Additional Information

Ratio and Proportion

If a quantity A is divided into parts in ratio a:b:c, then the first part is [a / (a+b+c)] × Total.

Difference in Ratio

To find the difference between two parts, use the difference in their ratio units directly: [(a−b) / (a+b+c)] × Total.

**Q8. Answer: (d) Ethanol**

• Carbonyl group is an organic functional group composed of a carbon double atom double bonded to an oxygen atom.

• Aldehyde, Carboxyl Acid and Ketone contain Carbonyl group.

• Ethanol belongs to the Alcohol group.

**Q9. Answer: (d) 18**

Shortcut Trick

Let efficiency of Inlet Pipe 2 (less efficient) = 1 unit/hr.

Efficiency of Inlet Pipe 1 (more efficient) = 2 units/hr.

Combined efficiency = 1 + 2 = 3 units/hr.

Total Capacity = Combined Efficiency × Time = 3 × 12 = 36 units.

Time for more efficient pipe = Total Capacity ÷ 2 = 36 ÷ 2 = 18 hours.

Therefore The correct answer is 18 hours.

Alternate Method

Given: Two inlet pipes fill the cistern in 12 hours. One is twice as efficient as the other. A drain pipe (not used for this specific calculation) empties it in 12 hours.

Formula Used: Total Work = Efficiency × Time

| Pipe | Efficiency | Combined Time | Total Capacity |
|---|---|---|---|
| Inlet A (More Efficient) | 2x | 12 hours | 36x |
| Inlet B (Less Efficient) | x | | |

=> Combined Efficiency of A and B = 2x + x = 3x

=> Total Capacity = 3x × 12 = 36x units

=> Time taken by Inlet A alone = Total Capacity ÷ Efficiency of A

=> Time = 36x ÷ 2x = 18 hours

Therefore The correct answer is 18 hours.

Additional Information

Efficiency and Time Relationship

Efficiency is inversely proportional to the time taken. If Efficiency ratio is a:b, then Time ratio is b:a.

Pipes and Cisterns Basics

Inlet pipes have positive efficiency (+), and outlet (drain) pipes have negative efficiency (−). Net work = Σ Efficiency × Time.

Combined Rate Formula

If two pipes take X and Y hours respectively, combined time T = (X × Y) ÷ (X + Y).

**Q10. Answer: (d) 23^(rd) June 1757**

• The Battle of Plassey was fought on 23rd June 1757.

• The battle was fought between East India Company and the Nawab of Bengal.

• The English won the battle and proved to be the decisive battle for the English in India.

**Q11. Answer: (a) Only assumption II is implicit**

An ecologist studies the relationship between the biotic and abiotic components of environment and its impact (both positive and negative) on the ecological balance.

Now, the ecologist says that the impact of plastic will be visible in 10 years.

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Therefore, it is safe to assume that he is talking about the impact of plastic on the environment.
Hence, assumption II is implicit.
There is nothing mentioned or hinted in the statement about the degradability of plastic.
Hence, assumption I is not implicit.
Thus, only assumption II is implicit.

**Q12. Answer: (d) Focus**

• The Point at which all the rays converge is termed as Focus.
• The straight line that goes through the center of the lens at right angles to the lens surface is called principle axis.
• Pole is the mid point of the Lens.

**Q13. Answer: (c) Brother-in-law**

Using the above symbols, we get the following family tree:
Hence, V is the brother-in-law of E.

**Q14. Answer: (b) D**

The symbols in each square move to the next square in clockwise direction.
The triangle is rotating in anticlockwise direction.
The slash symbols alternately turn forward or backward.
The number of (+) symbols alternately increases or decreases by one.
The symbol (Ω) alternately flips horizontally.
Hence, the figure in option D is the correct answer.

**Q15. Answer: (a) 4x + 5**

Shortcut Trick
In a quadratic expression $ax^2 + bx + c$, the product of the constant terms of its factors must equal c.
Here, the constant term of the expression is 5 and the constant term of the known factor (x + 1) is 1.
The constant term of the other factor must be 5 ÷ 1 = +5.
Similarly, the leading coefficient 4 divided by the coefficient of x in the known factor (1) gives 4.
Thus, the other factor is 4x + 5.
Therefore The correct answer is 4x + 5.
Alternate Method
Given: The polynomial $f(x) = 4x^2 + kx + 5$ is divisible by (x + 1).
Formula Used: Factor Theorem states that if f(x) is divisible by (x + a), then f(−a) = 0.
=> For the divisor x + 1, set $x + 1 = 0 \rightarrow x = -1$.
=> $f(-1) = 4(-1)^2 + k(-1) + 5 = 0$
=> $4(1) - k + 5 = 0$
=> $9 - k = 0$
=> $k = 9$
=> The complete expression is $4x^2 + 9x + 5$.
=> Factorizing by splitting the middle term: $4x^2 + 4x + 5x + 5$
=> $4x(x + 1) + 5(x + 1)$
=> $(x + 1)(4x + 5)$
=> The other factor is 4x + 5.
Therefore The correct answer is 4x + 5.
Additional Information
Factor Theorem
If a polynomial f(x) has a root x = a (i.e., f(a) = 0), then (x − a) is a factor of that polynomial.
Remainder Theorem
When a polynomial f(x) is divided by a linear divisor (ax − b), the remainder is equal to f(b/a).
Relationship of Coefficients
For a quadratic equation $ax^2 + bx + c = 0$, the sum of roots is −b/a and the product of roots is c/a.

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**Q16. Answer: (a) 49**

Shortcut Trick

Total Work (LCM of 45, 81) = 405 units.

Combined Efficiency (G + S) = 405 ÷ 45 = 9 units/day. Garima (G) Efficiency = 405 ÷ 81 = 5 units/day.

Sister (S) Efficiency = 9 − 5 = 4 units/day.

Work for last 9 days (only G works) = 9 × 5 = 45 units. Remaining = 405 − 45 = 360 units.

Time taken together = 360 ÷ 9 = 40 days. Total days = 40 + 9 = 49 days.

Therefore The correct answer is 49 days.

Alternate Method

Given: Time taken by Garima and Sister = 45 days. Time taken by Garima alone = 81 days.

Formula Used: Total Work = Time × Efficiency

| Person | Days | Total Work | Efficiency |
|---|---|---|---|
| Garima + Sister | 45 | 405 | 9 |
| Garima | 81 | 5 | |

=> Efficiency of Sister = Efficiency of (Garima + Sister) − Efficiency of Garima

=> Efficiency of Sister = 9 − 5 = 4 units/day.

=> Let the total time be 'x' days. Sister worked for (x − 9) days and Garima worked for 'x' days.

=> Work done: 5 × x + 4 × (x − 9) = 405

=> 5x + 4x − 36 = 405

=> 9x = 441

=> x = 49 days.

Therefore The correct answer is 49 days.

Additional Information

Combined Work Efficiency

When two people work together, their combined efficiency is the sum of their individual efficiencies. Efficiency = Total Work ÷ Time.

Work Completion Logic

If a person leaves 'n' days before completion, we can assume they stayed and add the work they would have done to the Total Work, then divide by combined efficiency.

**Q17. Answer: (b) Cl**

• Chlorine has the highest electron affinity from the elements listed above and also from all the elements in the periodic table

• The electron affinity of an element is defined as the ease with which it can accept an electron

• The correct order is Chlorine > Fluorine > Sodium > Helium

• Electron affinity is defined as the change in energy (in kJ/mole) :

• Fluorine (F) -328 kJ mol-1

• Chlorine (Cl) -349 kJ mol-1

• Bromine (Br) -324 kJ mol-1

• Iodine (I) -295 kJ mol-1

Additional Information

| Name | Symbol | Atomic Number |
|---|---|---|
| Sodium | Na | 11 |
| Helium | He | 2 |
| Chlorine | Cl | 17 |
| Fluorine | F | 9 |

**Q18. Answer: (c) B**

The shapes from the problem figure can be used to create the below figure:

Hence, the figure in option B is the correct answer.

**Q19. Answer: (d) Raja Todar Mal**

• Raja Todar Mal was the Finance Minister of the Mughal empire during Akbar's reign.
• Birbal was the advisor and the supreme commander of the army in the reign of Akbar.
• Raja man Singh was the general of the army.
• Tansen was a musician of in the Akbar's court.

**Q20. Answer: (c) Statements 1 or 2 alone are sufficient.**

The two colours mentioned in this question are blue and white. Let us assume the third colour to be black.
• Statement 1: Nayan has 2 white caps
Given: Nayan has 4 caps of 3 “different” colours.
Thus, we have the following combination:
• Case 1) 2 white caps and 1 blue cap
• Case 2) 2 white caps and 2 blue caps.
This is not possible as 4 caps should have 3 different colours.
• Case 3) 2 white caps and 2 black caps
• This is not possible as 4 caps should have 3 different colours.
• Thus, we can eliminate cases 2 and 3.
• Therefore, Nayan has 1 blue cap.
• Hence, statement 1 alone is sufficient to answer the question.
• Statement 2: The number of blue caps he has is the same as that of white caps.
• Case 1) 1 white cap and 1 blue cap
This will imply that the remaining 2 caps are black
• Case 2) 2 white caps and 2 blue caps.
• This case is not possible because there should be 3 different colours.
• Therefore, Nayan has 1 blue cap. Hence, statement 1 alone is sufficient to answer the question.
Hence, statement 1 or 2 alone is sufficient to answer the question.

**Q21. Answer: (a) Both the conclusions follow**

The most likely situation in which Naina would ask for a pen from Mahi or anyone else would be when it is not available with him/her. Hence, conclusion I follows.
The sole purpose of borrowing a pen would be to write and hence, conclusion II follows.
Thus, both the conclusions follow.

**Q22. Answer: (c) Niryat Mitra**

• Niryat Mitra is the mobile application launched by the Ministry of Commerce and Industry to aid exporters and importers in the country.
• This application was developed by the federation of Indian export organisation (FIEO).
• It provides wide range of information required to undertake international trade.

**Q23. Answer: (d) 6 years**

Shortcut Trick
Age ratio (Father : Akash) 1 year ago = 9 : 1 (Difference = 8 units)
Age ratio 3 years later = 5 : 1 (Difference = 4 units)
Equalize difference: 1 year ago = 9 : 1 | 3 years later = 10 : 2 (Difference = 8 units)
Growth of 1 unit (2 − 1) = 4 years (Total time gap)
Akash's age 1 year ago = 1 × 4 = 4 years
Akash's age next year = 4 + 1 (Present) + 1 (Next year) = 6 years
Therefore The correct answer is 6 years.
Alternate Method
Given: Ratio 1 year ago was 9 : 1. Ratio 3 years hence will be 5 : 1.
Let Akash's age 1 year ago be x and Father's age be 9x.
=> Present ages: Akash = x + 1, Father = 9x + 1
=> Ages after 3 years: Akash = x + 1 + 3 = x + 4, Father = 9x + 1 + 3 = 9x + 4

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=> According to question: 9x + 4 = 5 × (x + 4)

=> 9x + 4 = 5x + 20

=> 4x = 16 => x = 4

=> Akash's present age = 4 + 1 = 5 years

=> Akash's age next year = 5 + 1 = 6 years

Therefore The correct answer is 6 years.

Additional Information

Concept of Age Difference

The difference between the ages of two people remains constant regardless of the number of years passed or gone by.

Ratio Balancing Method

To solve age problems quickly, multiply ratio terms to make the numerical difference between the ratio parts equal to the actual time difference.

Successive Age Changes

If present age is P, then age 'n' years ago is P − n and age 'n' years hence is P + n.

**Q24. Answer: (d) 17**

Hence, there are 17 triangles in the figure.

**Q25. Answer: (c) Somatic**

• Somatic Mutation is not hereditary.

• Somatic Mutation is defined as the alteration in DNA that occurs after conception.

• It can occur in any of the cell body except the germ cells and therefore is not hereditary.

**Q26. Answer: (a) 1250**

Shortcut Trick

Check the unit digit and properties of perfect squares.

A perfect square never ends in 2, 3, 7, or 8, and if it ends in 0, it must have an even number of zeros.

Option (1) 1250 ends in a single zero (odd number of zeros).

All other options (2), (3), and (4) satisfy perfect square criteria (unit digits 1 and 5).

Therefore The correct answer is 1250.

Alternate Method

Given: Numbers 1250, 16641, 2025, 9801.

Let us find the square root or factorize each number:

=> Option (2): 16641 → √16641 = 129 (Perfect Square)

=> Option (3): 2025 → √2025 = 45 (Perfect Square)

=> Option (4): 9801 → √9801 = 99 (Perfect Square)

=> Option (1): 1250 → 1250 = 625 × 2 = $25^2$ × 2

=> Since 2 is not a perfect square, 1250 is not a perfect square.

Therefore The correct answer is 1250.

Additional Information

Unit Digit Rule

The unit digit of a perfect square must be 0, 1, 4, 5, 6, or 9. It can never be 2, 3, 7, or 8.

Zeros Property

A perfect square always ends with an even number of zeros (e.g., 100, 400, 10000).

Digital Sum Rule

The digital sum (sum of digits reduced to a single digit) of a perfect square is always 1, 4, 7, or 9.

**Q27. Answer: (b) C**

If the triangle in the first figure is rotated 90° in the anticlockwise direction, we obtain the third figure.

Similarly, if the triangle in the second figure is rotated 90° in the anticlockwise direction, we obtain the fourth figure.

Hence, the figure in option C is the correct answer.

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**Q28. Answer: (d) Srishti Kaur**

• Srishti Kaur had been crowned Miss Teen Universe 2017.
• The Event was held at Managua, the capital of Nicaragua.

**Q29. Answer: (b) Hind limb**

• Voluntary muscles are those muscles which can be controlled by the mind.
• Hind limb contains voluntary muscles.
• Heart, Lungs and Liver contain Involuntary muscles hence the functions of these organs can not be controlled by the Mind.

**Q30. Answer: (c) 918273645**

The pattern followed here is:
1224364860: 12 24 36 48 60 → First five multiples of 12
1122334455: 11 22 33 44 55 → First five multiples of 11
1020304050: 10 20 30 40 50 → First five multiples of 10
Similarly,
918273645: 9 18 27 36 45 → First five multiples of 9
Hence, 918273645 is the correct answer.

**Q31. Answer: (b) Haryana**

• Gobar-Dhan Yojana', is the central scheme for managing and converting cattle dung into manure and biogas.
• The scheme WAS launched at the national level from Karnal in Haryana on April 30.
• Under this scheme, one village in every district of the country would be selected for its implementation.

**Q32. Answer: (b) Only II is implicit.**

The statement by the coach requires the hockey team to report for practice by 9:00 am in instead of 8: 00 which is pointing towards a change in the usual schedule of the team.
Therefore, it is safe to assume that they usually assemble for practice.
Hence, assumption II is implicit.
However, the information in the coach’s statement is not sufficient to determine the reasons behind the change in schedule.
Hence, assumption I is not implicit.
Thus, only assumption II is implicit.

**Q33. Answer: (d) Gymnosperms**

The correct answer is Option 4 i.e. Gymnosperms
• The word "gymnosperm" means "naked seed" and the seeds are not enclosed inside the fruit but are instead exposed or on the scales of cones, like a pine cone.
• Gymnosperms belong to the kingdom ‘Plantae‘.
• The gymnosperms consist of conifers, tcycads, gnetophytes, and the species of Gynkgophyta division and Ginkgo biloba.
• The characteristics of Gymnosperms:
• They do not produce flowers.
• Seeds are not formed inside a fruit.
• They are not differentiated into an ovary, style, and stigma.
• Since stigma is not present, they are pollinated directly by the wind.
• Examples of Gymnosperms:
• Cycas
• Pinus
• Cedrus
• Picea
• Juniperus

**Q34. Answer: (b) 57**

The pattern followed here is:
31 + 7 = 38
38 + 6 = 44

44 + 7 = 51

51 + 6 = 57

Hence, 57 is the correct answer.

**Q35. Answer: (b) √3 : 2**

Shortcut Trick

If Perimeter is constant, let total length be 12 units.

Square side = 12 ÷ 4 = 3 => Area = $3^2$ = 9.

Hexagon side = 12 ÷ 6 = 2 => Area = 6 × (√3/4) × $2^2$ = 6√3.

Ratio = 9 : 6√3 = 3 : 2√3 = √3 : 2.

Therefore The correct answer is √3 : 2.

Alternate Method

Given: Perimeter of Square = Perimeter of Regular Hexagon.

Let side of square be 'a' and side of hexagon be 'h'.

=> 4a = 6h

=> a/h = 6/4 = 3/2

=> Area of Square (A1) = $a^2$

=> Area of Regular Hexagon (A2) = 3√3$h^2$ / 2

=> Ratio A1/A2 = $a^2$ / (3√3$h^2$ / 2)

=> Ratio = $(a/h)^2$ × (2 / 3√3)

=> Ratio = $(3/2)^2$ × (2 / 3√3) = (9/4) × (2 / 3√3)

=> Ratio = 3 / 2√3 = √3 / 2

Therefore The correct answer is √3 : 2.

Additional Information

Area of Regular Hexagon

A regular hexagon consists of 6 equilateral triangles. Area = 6 × (√3/4) × $side^2$ = 3√3/2 × $side^2$.

Constant Perimeter Comparison

For a fixed perimeter, as the number of sides of a regular polygon increases, the area increases. Circle has the maximum area.

Ratio Properties

To simplify 3 : 2√3, divide both sides by √3 to get √3 : 2.

**Q36. Answer: (b) 5/6**

Follow BODMAS rule to solve this question, as per the order given below:

Step-1: Parts of an equation enclosed in 'Brackets' must be solved first, and in the bracket,

Step-2: Any mathematical 'Of' or 'Exponent' must be solved next,

Step-3: Next, the parts of the equation that contain 'Division' and 'Multiplication' are calculated,

Step-4: Last but not least, the parts of the equation that contain 'Addition' and 'Subtraction' should be calculated.

=> 3/12of((2/5 + 4/15))/((3/5 - 2/5)) = 3/12of(10/15)/(1/5)

=> 3/12 × 10/15 × 5/1 = 5/6

Therefore The required answer is 5/6

**Q37. Answer: (c) U**

Hence, U is the correct answer.

**Q38. Answer: (d) Elected members of the Parliament and the State Legislative Assemblies**

• The electoral college who elects the President of India is formed by the Elected members of the Parliament and the State Legislative Assemblies.

• The Constitution provides for the election of the President by the system of proportional representation by means of the single transferable vote.

**Q39. Answer: (c) 3^(rd)**

• An element of atomic number 16 will belong to the 3^(rd) period of the periodic table.

• Periods are the horizontal rows across the periodic table.

• Groups are the vertical columns across the periodic table.

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**Q40. Answer: (d) 0.80**

CONCEPT:

• Heating effect of electric current: When a current is flowing in a circuit having resistance there is heat dissipation due to the resistance. This is called the heating effect of electric current.

The heat dissipated is given by:

Heat (H) = I2 R t

Work done (W) = Heat (H) = Energy consumed (E) = Power (P) × Time taken (t)

Where I = the current flowing in the circuit, R = the resistance of the circuit, and t = the time taken

CALCULATION:

Given,

Power = 100 W, Time = 8 hours per day

We know that,

Power (P) = Energy (E)/Time (t)

Power = 100 W = 0.1 KW

0.1 = E/8

Energy (E) = 0.8 KWh = 0.8 Unit in one day

Additional Information

• 1 unit of electric energy: When a one-kilowatt load works for 1 hour then the energy consumed is called 1 unit of electricity.

1 Unit of electricity = 1 KWh = 1000 Watt-hour = 3.6 × 106 J

1 Kilo-watt = 1000 Watt

1 Hp = 1 horsepower = 746 Watt (W)

**Q41. Answer: (a) Captain D.K. Sharma**

• Captain D.K. Sharma was the spokesperson of the Indian Navy in February 2018.

• The Current Navy Chief is Karambir Singh.

• INS Viraat was Indian Navy's first aircraft carrier.

• INS Vikrant is the first aircraft carrier to have been manufactured in India.

**Q42. Answer: (b) 1.25**

Shortcut Trick

Work done by Pipe C in 3 hours = 3/4 of total work.

Remaining work to be filled by Pipe D = 1 − 3/4 = 1/4.

Time taken by Pipe D = (Remaining Work) × (Total time for D) = 1/4 × 5 = 1.25 hours.

Therefore The correct answer is 1.25 hours.

Alternate Method

Given: Time for Pipe C = 4 hours, Time for Pipe D = 5 hours.

Formula Used: Total Work = LCM of time; Efficiency = Total Work ÷ Time.

| Person | Days | Total Work | Efficiency |
|---|---|---|---|
| Pipe C | 4 | 20 | 5 |
| Pipe D | 5 | 4 | |

=> Work done by Pipe C in 3 hours = 3 × 5 = 15 units.

=> Remaining Work = 20 − 15 = 5 units.

=> Time taken by Pipe D to fill remaining part = 5 ÷ 4 = 1.25 hours.

Therefore The correct answer is 1.25 hours.

Additional Information

Pipes & Cisterns Efficiency

Efficiency is inversely proportional to time. If a pipe fills a tank in 'x' hours, its 1-hour work is 1/x.

Inlet and Outlet Pipes

Inlet pipes (filling) have positive efficiency, while outlet pipes (emptying/leakage) have negative efficiency.

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**Q43. Answer: (a) 3**

Follow BODMAS rule to solve this question, as per the order is given below:

Step-1: Parts of an equation enclosed in 'Brackets' must be solved first and in the bracket,

Step-2: Any mathematical 'Of' or 'Exponent' must be solved next,

Step-3: Next, the parts of the equation that contain 'Division' and 'Multiplication' are calculated,

Step-4: Last but not least, the parts of the equation that contain 'Addition' and 'Subtraction' should be calculated.

{52 – (9 – 2)} ÷ [3 × {1 + (-2) × (-2)}]

=> {52 – 7} ÷ [3 × {1 + 4}]

=> 45 ÷ [3 × 5]

=> 45 ÷ 15

=> 3

**Q44. Answer: (d) Paternal uncle**

Using the above symbols, we get the following family tree:

Hence, Nikhil is the boy's paternal uncle.

**Q45. Answer: (a) 1908**

• Football was officially included as a competitive game in Olympics in 1908 Games.

• The 1908 Olympics games were held in London, United Kingdom.

**Q46. Answer: (d) 10.5 sq. units**

Shortcut Trick

Identify vertices with the same coordinate: A(−4, −2) and C(3, −2) have the same y-coordinate.

This means the side AC is horizontal, serving as the base.

Base length (AC) = |3 − (−4)| = 7 units.

Height (perpendicular from B to AC) = |−2 − (−5)| = 3 units.

Area = 1/2 × base × height = 1/2 × 7 × 3 = 10.5 sq. units.

Therefore The correct answer is 10.5 sq. units.

Alternate Method

Given: Vertices of the triangle are A(−4, −2), B(−3, −5), and C(3, −2).

Formula Used: Area of a triangle with vertices (x1, y1), (x2, y2), and (x3, y3) is:

Area = 1/2 |x1(y2 − y3) + x2(y3 − y1) + x3(y1 − y2)|

Calculations:

=> x1 = −4, y1 = −2

=> x2 = −3, y2 = −5

=> x3 = 3, y3 = −2

=> Area = 1/2 |(−4)(−5 − (−2)) + (−3)(−2 − (−2)) + 3(−2 −

**Q47. Answer: (d) 12**

Shortcut Trick

Efficiency ratio of A+B to A is 25 : 15 => 5 : 3.

Efficiency of B = 5 − 3 = 2 units/day.

Total work = 15 × 5 = 75 units.

If B leaves 5 days early, A works alone for the last 5 days: 3 × 5 = 15 units.

Remaining work done together = 75 − 15 = 60 units.

Days worked together = 60 ÷ 5 = 12 days.

Therefore The correct answer is 12 days.

Alternate Method

Given: Time taken by (A+B) = 15 days, Time taken by A = 25 days.

Formula Used: Total Work = LCM of days; Efficiency = Work ÷ Time.

| Person | Days | Total Work | Efficiency |
|---|---|---|---|
| A + B | 15 | 75 | 5 |

| | | | |
|---|---|---|---|
| A | 25 | 3 | |

=> Efficiency of B = (Efficiency of A+B) − (Efficiency of A) = 5 − 3 = 2 units/day.

=> Let they work together for x days. Total time to complete work = (x + 5) days.

=> Work done by A in (x + 5) days + Work done by B in x days = 75

=> 3(x + 5) + 2x = 75

=> 3x + 15 + 2x = 75

=> 5x = 60

=> x = 12 days.

Therefore The correct answer is 12 days.

Additional Information

Leaving Before Completion

When a person leaves 'n' days before completion, add their 'n' days of work to the total work and divide by total efficiency to find total time.

Work and Efficiency Relation

Efficiency is inversely proportional to the time taken to complete a specific task. If time ratio is x:y, efficiency ratio is y:x.

**Q48. Answer: (b) Position**

• The Second Equation of Motion gives the relationship between Position and Time.

=> It is given by $S = ut + 1/2\ at^2$

=> S = Displacement, u = Initial Velocity, t = Time, a = Acceleration

**Q49. Answer: (c) Current will not flow**

The correct answer is Current will not flow.

Key Points

• If two charged bodies having equal potential are connected through a conducting wire, then the Current will not flow.

• The flow of current is defined as the rate of flow of electric charge.

• When the electric charge flows in one direction, the current flows in the opposite direction.

• The current only flows when there is a potential difference between two bodies.

**Q50. Answer: (b) Ekta Kapoor**

• Ekta Kapoor had won the ITA Sterling Icon of Indian Entertainment' Award at the 17th edition of the Indian Television Academy Awards held on November 2017.

• ITA Awards is an annual event organised by the Indian Television Academy to honour the excellence of Indian Television.

**Q51. Answer: (b) Cousins**

Using the above symbols, we get the following family tree:

Hence, V and N are cousins.

**Q52. Answer: (d) C**

Hence, the figure in option C is the correct answer.

**Q53. Answer: (a) 7.5 lakh**

• Before 2020, Rajiv Gandhi Khel Ratna awardee got a medal, a citation and a cash prize of Rs 7.5 lakhs.

Important Points

• Prime Minister Narendra Modi has announced that the Rajiv Gandhi Khel Ratna Award will now be known as the Major Dhyan Chand Khel Ratna Award.

• Dhyan Chand himself has been conferred with several honours, including India's third highest civilian honour of Padma Bhushan in 1956.

• In addition to this, the Government of India also celebrates his birthday on August 29 as National Sports Day.

• The Khel Ratna award is the highest sporting honour in the nation.

• In the year 2020, The prestigious award carries prize money revised to Rs. 25 lakh.

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**Q54. Answer: (b) 13**

Hence, there are 13 triangles in the figure.

**Q55. Answer: (a) Albert Einstien**

• " A table, a chair, a bowl of fruit and a violin: what else does a man need to be happy ?" was quoted by Albert Einstien.

A few other quotes are:

• I have no special talents. I am only passionately curious.

• Anyone who has never made a mistake has never tried anything new.

• Logic will get you from A to B. Imagination will take you everywhere.

**Q56. Answer: (c) Air pressure**

• Compressions and rarefactions are due to variability of Air Pressure.

• A Compression is a region in a longitudinal wave where the particles are closest together.

• A Rarefaction is a region in a longitudinal wave where the particles are furthest apart.

**Q57. Answer: (b) 1 : 1**

Shortcut Trick

Ratio of Profit = (Investment1 × Time1) : (Investment2 × Time2)

Investment Ratio (Tarun : Tapan) = 13,000 : 19,500 = 2 : 3

Time Ratio (Tarun : Tapan) = 12 : 8 = 3 : 2

Profit Ratio = (2 × 3) : (3 × 2) = 6 : 6 = 1 : 1

Therefore The correct answer is 1 : 1.

Alternate Method

Given: Tarun investment = Rs. 13,000, Tapan investment = Rs. 19,500. Tarun time = 12 months, Tapan time = 8 months.

Formula: Profit = Investment × Time

=> Tarun total investment units = 13,000 × 12 = 156,000

=> Tapan total investment units = 19,500 × 8 = 156,000

=> Ratio of Profit = 156,000 : 156,000

=> Ratio of Profit = 1 : 1

Therefore The correct answer is 1 : 1.

Additional Information

Partnership Rule

When investments are for different time periods, the profit is distributed in the ratio of the product of Capital and Time.

Simplified Ratio

Always simplify the investment amounts first to make calculations easier; here 130 and 195 simplify to 2 and 3 by dividing by 65.

**Q58. Answer: (d) Second**

• India is the Second most populated country in the world.

• China is the most populated country in the world.

• The current population of India is 1.3 Billion.

Important Points

• The current population of India is 1,442,195,981 as of Monday, July 15, 2024, based on the latest United Nations data.

• India surpasses China to become World's Most populous Country.

• India 2023 population is estimated at 1,428,627,663 people at mid year.

**Q59. Answer: (b) V_(av) = (u + v)/ 2**

CONCEPT:

• Average velocity: The ratio of net displacement to total time taken is called average velocity.

Average velocity (V_(av)) = (Net displacement (S))/(time taken (t))

The average velocity is also given by:

V_(av) = (u + v) / 2

Where u is initial velocity and v is the final velocity of the object.

EXPLANATION:

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If final Velocity v and Initial velocity u are known, then the formula for the average velocity is given by:

$V_{(av)} = (u + v)/2$.

So option 2 is correct.

**Q60. Answer: (b) 300**

Shortcut Trick

Total sales across all quarters = 200 + 100 + 350 + 550 = 1200.

Number of quarters = 4.

Average = Total sales ÷ Number of quarters = 1200 ÷ 4 = 300.

Therefore The correct answer is 300.

Alternate Method

Given:

Sales in Quarter 1 = 200

Sales in Quarter 2 = 100

Sales in Quarter 3 = 350

Sales in Quarter 4 = 550

Formula Used:

Average = (Sum of all observations) ÷ (Total number of observations)

=> Sum of sales = 200 + 100 + 350 + 550

=> Sum of sales = 1200

=> Total Quarters = 4

=> Average Sales = 1200 ÷ 4

=> Average Sales = 300

Therefore The correct answer is 300.

Additional Information

Arithmetic Mean

The arithmetic mean is the most common type of average and is calculated by dividing the sum of a set of numbers by the count of those numbers.

Sum Formula

Sum = Average × Number of Items. This is useful when the average and count are known and the total is required.

Deviation Method

Average can also be calculated by assuming a mean and balancing the positive and negative deviations of all observations from that assumed mean.

**Q61. Answer: (b) D**

Tunnel, bunker and well are structures mostly built underground whereas building is a structure built about the ground.

Hence, building is the odd one among the given options.

**Q62. Answer: (a) Brother-in-law**

Using the above symbols, we get the following family tree:

Hence, the man is Jayant's brother-in-law.

**Q63. Answer: (a) Nephrons**

• Each kidney consists of a large number of filteration units called Nephrons.

• Each Nephron filters a small amount of blood.

NOTE:

• Nephrons are also called the functional units of the kidney.

• Nephrons produce urine in the process of removing waste and excess substances from the blood.

**Q64. Answer: (a) 140 km/h**

Shortcut Trick

Total distance = Sum of lengths of trains = 153 + 127 = 280 m.

Relative speed (m/s) = Total distance ÷ Time = 280 ÷ 7.2.

Convert to km/h by multiplying by 18/5: (280 × 18) ÷ (7.2 × 5).

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Combined speed = 5040 ÷ 36 = 140 km/h.

Therefore The correct answer is 140 km/h.

Alternate Method

Given: Length of Train 1 (L1) = 153 m, Length of Train 2 (L2) = 127 m, Time (t) = 7.2 s.

Formula Used: Relative Speed = (L1 + L2) ÷ Time

=> Total Distance = 153 + 127 = 280 m

=> Relative Speed in m/s = 280 ÷ 7.2

=> Relative Speed in km/h = (280 ÷ 7.2) × (18 ÷ 5)

=> Relative Speed = (280 × 18) ÷ (7.2 × 5) = 5040 ÷ 36

=> Relative Speed = 140 km/h

Therefore The correct answer is 140 km/h.

Additional Information

Relative Speed Concept

When two objects move in opposite directions, their relative speed is the sum of their individual speeds (S1 + S2). If moving in the same direction, it is the difference |S1 − S2|.

Unit Conversion

To convert speed from m/s to km/h, multiply by 18/5. To convert from km/h to m/s, multiply by 5/18.

Train Crossing Objects

Total distance covered while crossing another train or platform is the sum of their lengths. While crossing a pole or a man, distance is equal to the length of the train itself.

**Q65. Answer: (b) 46**

• There are 23 pairs of Chromosomes i.e 46 present in somatic cells of Human beings.

• A Somatic cell is any cell of the body except sperm and egg cells.

• These cells are diploid, and each set of the chromosome is inherited from each parent.

**Q66. Answer: (a) 31/8**

Let the fraction x be added to 7/8.

According to the question

=> x + 7/8 = 4

=> x = 4 – (7/8)

=> x = 25/8 = 31/8

**Q67. Answer: (c) 4^6**

4 + 3 × 4 + 3 × $4^2$ + 3 × $4^3$ + 3 × 4^4 + 3 × 4^5

=> 4 + 3 (4 + $4^2$ + $4^3$ + 4^4 + 4^5)

=> 4 + 3 × 1364

=> 4 + 4092

=> 4096

=> 4 × 4 × 4 × 4 × 4 × 4 = 4^6

Alternate method:

4 + 3 × 4 + 3 × $4^2$ + 3 × $4^3$ + 3 × 4^4 + 3 × 4^5

=> 4(1 + 3) + 3 × $4^2$ + 3 × $4^3$ + 3 × 4^4 + 3 × 4^5

=> $4^2$ + 3 × $4^2$ + 3 × $4^3$ + 3 × 4^4 + 3 × 4^5

=> $4^2$(1 + 3) + 3 × $4^3$ + 3 × 4^4 + 3 × 4^5

=> $4^3$ + 3 × $4^3$ + 3 × 4^4 + 3 × 4^5

=> $4^3$(1 + 3) + 3 × 4^4 + 3 × 4^5

=> 4^4 + 3 × 4^4 + 3 × 4^5

=> 4^4(1 + 3) + 3 × 4^5

=> 4^5 + 3 × 4^5

=> 4^5(1 + 3)

=> 4^6

**Q68. Answer: (b) Urjit Patel**

• Urjit Patel served as the 24^(th) Governor of the Reserve Bank of India.

• The RBI governor performs the task of administering the government's Policy.

• Raghu Ram Rajan was the 23^(rd) Governor of the Reserve Bank of India.

**Q69. Answer: (a) All the statements are insufficient**

Statements 1 and 3 together:

L > > > > > N

Here, the data is insufficient to answer the question.

Statements 1, 2 and 3 together:

L > > > > > N

J > K

Here, the data is insufficient to answer the question.

Statements 1, 2, 3 and 4 together:

J > K > O

Case 1:

L >_J_ >_K_ > _O_ > _M_ > N

Case 2:

L >_M_ >_J_ > _K_ > _O_ > N

Now, this data is also insufficient as we are unable to determine the position of M.

Hence, all the statements are insufficient to answer the question.

**Q70. Answer: (a) ?32**

Shortcut Trick

Check if the number inside the radical is a perfect n^(th) power.

Option 2: 64 = $4^3$ → Rational

Option 3: 32 = 2^5 → Rational

Option 4: 27 = $3^3$ → Rational

Option 1: 32 is not a perfect 4^(th) power (2^4 = 16, 3^4 = 81).

Therefore The correct answer is ?32.

Alternate Method

Given: Four radical expressions to identify the irrational number.

Evaluating each option:

=> Option 2: cbrt64 = cbrt(4 × 4 × 4) = 4 (Rational)

=> Option 3: ^5√32 = ^5√(2 × 2 × 2 × 2 × 2) = 2 (Rational)

=> Option 4: cbrt27 = cbrt(3 × 3 × 3) = 3 (Rational)

=> Option 1: ?32 = ?(2^5) = 2 × ?2 (Irrational)

Therefore The correct answer is ?32.

Additional Information

Rational Number

A number that can be expressed in the form p/q where p and q are integers and q ≠ 0. Their decimals are terminating or repeating.

Irrational Number

A number that cannot be expressed as a simple fraction. Their decimals are non-terminating and non-repeating (e.g., √2, π).

Surds Property

If 'a' is not a perfect n^(th) power of a rational number, then $\sqrt[n]{a}$ is an irrational number.

**Q71. Answer: (c) Ge**

• Germanium (Ge) is a semiconductor.

• Semiconductors are those elements which have their electrical conductivity lying between the range of Conductors and Insulators.

• Gallium, Lead and Tin are all metals.

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**Q72. Answer: (c) -24.5**

Shortcut Trick

According to the Remainder Theorem, if a polynomial is divisible by (x − k), then substituting x = k makes the polynomial zero.

Substitute x = 8 directly into the expression:

$3(8)^2 + 8a + 4 = 0$

$192 + 4 + 8a = 0 \Rightarrow 8a = -196$

$a = -196 \div 8 = -24.5$

Therefore The correct answer is −24.5.

Alternate Method

Given:

Polynomial $P(x) = 3x^2 + ax + 4$

Divisor = x − 8

Formula Used:

Factor Theorem: A polynomial f(x) is perfectly divisible by (x − c) if and only if f(c) = 0.

Calculations:

=> For perfect divisibility by (x − 8), we set x − 8 = 0, which gives x = 8.

=> Substituting x = 8 in P(x) to satisfy the condition P(8) = 0:

=> $3(8)^2 + a(8) + 4 = 0$

=> $3(64) + 8a + 4 = 0$

=> $192 + 8a + 4 = 0$

=> $196 + 8a = 0$

=> $8a = -196$

=> $a = -196 \div 8$

=> $a = -24.5$

Therefore The correct answer is −24.5.

Additional Information

Remainder Theorem

When a polynomial f(x) is divided by (x − a), the remainder is always equal to f(a).

Factor Theorem

(x − a) is a factor of polynomial f(x) if and only if f(a) = 0.

Synthetic Division

A shortcut method to divide a polynomial by a linear factor of the form (x − c) using only coefficients.

**Q73. Answer: (b) Statements 1 and 2 together are sufficient**

Shortcut Trick

To calculate the total age, we need the numerical age of both Nakul and Dwij.

Statement 1 provides Nakul's age = 12 years.

Statement 2 gives the relation: Dwij = Nakul − 3.

Combining both: Nakul (12) + Dwij (12 − 3) = 12 + 9 = 21 years.

Therefore The correct answer is Statements 1 and 2 together are sufficient.

Alternate Method

Given:

Age of Nakul (from Statement 1) = 12 years

Age difference (from Statement 2) = 3 years (Dwij is younger)

Formula Used:

Total Age = Age of Nakul + Age of Dwij

=> From Statement 1: Age of Nakul = 12 years.

=> From Statement 2: Dwij is 3 years younger than Nakul.

=> Age of Dwij = 12 − 3 = 9 years.

=> Total Age = 12 + 9 = 21 years.

=> Since we used both statements to find a unique value, they are together sufficient.

Therefore The correct answer is Statements 1 and 2 together are sufficient.

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Additional Information

Data Sufficiency Logic

A set of statements is sufficient if they lead to a single unique answer. If multiple answers are possible or information is missing, they are insufficient.

Age Relationships

If the age of one person is x and another is y years younger, the sum is x + (x − y). Knowledge of both the base age and the difference is required to solve for the sum.

Constant Difference

The difference between the ages of two individuals always remains constant, regardless of how many years pass or how many years ago the comparison was made.

**Q74. Answer: (d) D**

Poetry, sonnet and rhyme are words related to poem whereas diagram is a drawing.

Hence, diagram does not belong to this group.

**Q75. Answer: (a) [figure]**

Spades and Hearts are 2 types of playing cards.

The least possible Venn diagram is:

Hence, the figure in option 1 is the correct answer.

**Q76. Answer: (c) Cl(2,8,7)**

• Chlorine is the most electro negative element of all the available elements.

• Electro negativity is chemical property that describes the tendency of an atom to attract a shared pair of electrons toward it self.

• Chlorine has 7 Electrons in its outer most shell, hence its valency is 1.

• This tends to make it one of the most electro negative elements in the periodic table.

• Aluminium and Phosphorus are metals and hence not electro negetive in nature.

• Sulphur is a Non metal but less electro negative than Chlorine.

• Fluorine is the most electro negative element in the Modern periodic table.

**Q77. Answer: (d) 3120**

Shortcut Trick

Loss of 41% means SP1 = 59% of CP.

Profit of 11% means SP2 = 111% of CP.

Given: 59% units = 3,540 => 1 unit = 3,540 ÷ 59 = 60.

Difference in Selling Price = 111% − 59% = 52% units.

Required extra amount = 52 × 60 = 3,120.

Therefore The correct answer is Rs. 3,120.

Alternate Method

Given: Old Selling Price (SP1) = Rs. 3,540, Loss% = 41%, Desired Profit% = 11%.

Formulas: CP = SP × 100 ÷ (100 − Loss%), New SP = CP × (100 + Profit%) ÷ 100.

=> Step 1: Calculate Cost Price (CP) = 3,540 × 100 ÷ (100 − 41) = 3,540 × 100 ÷ 59 = 6,000.

=> Step 2: Calculate New Selling Price (SP2) = 6,000 × (100 + 11) ÷ 100 = 6,000 × 1.11 = 6,660.

=> Step 3: Calculate Additional Amount = New SP − Old SP = 6,660 − 3,540 = 3,120.

Therefore The correct answer is Rs. 3,120.

Additional Information

Base for Profit/Loss

Profit and Loss are always calculated on the Cost Price unless otherwise specified in the question.

Unitary Method Application

When the CP is constant (100%), the ratio of two Selling Prices is directly proportional to (100 ± Change%): SP1/SP2 = (100 − L1%)/(100 + P2%).

**Q78. Answer: (c) Euro**

• The Official currency of Europe is Euro.

• Yen is the official currency of Japan.

• Dollar is the official currency of USA.
• Pound is the official currency of United Kingdom.

**Q79. Answer: (b) 5**

Shortcut Trick
Express 512 as a power of 2: 512 = 2^9.
Perfect square factors must have even exponents in their prime factorization.
Possible even exponents of 2 from 0 to 9 are: 0, 2, 4, 6, and 8.
Total count of such exponents = 5.
Therefore The correct answer is 5.
Alternate Method
Given: The number is 512.
Formula Used: If a number N = p^a × q^b..., a perfect square factor must be of the form p^(2x) × q^(2y)... where 2x ≤ a and 2y ≤ b.
=> Prime factorization of 512:
=> 512 = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 = 2^9.
=> The factors of 512 are: 2^0, $2^1$, $2^2$, $2^3$, 2^4, 2^5, 2^6, 2^7, 2^8, 2^9.
=> Selecting only the perfect squares (those with even powers):
=> 2^0 = 1
=> $2^2$ = 4
=> 2^4 = 16
=> 2^6 = 64
=> 2^8 = 256
=> Total number of perfect square factors = 5.
Therefore The correct answer is 5.
Additional Information
Total Number of Factors
For N = p^a, total factors = (a + 1). For 512 = 2^9, total factors = 9 + 1 = 10.
Perfect Cube Factors
Factors with exponents divisible by 3. For 2^9, exponents are 0, 3, 6, 9 (Total 4).
General Rule for Squares
If N = p^a, the number of perfect square factors is given by [a/2] + 1, where [] is the greatest integer function.

**Q80. Answer: (b) 26th November**

• India celebrates its constitutional day on 26^(th)November.
• This date is also remembered as the date of Poorna Swaraj resolution.
• The Poorna Swaraj resolution was passed by the INC as the Lahore Session 1929.

**Q81. Answer: (d) 2 m**

Potential Energy = M X g X H
400 J= 20 X 10 X H
H = 400/200
H = 2 Meters

**Q82. Answer: (d) Badminton**

• B Sai Praneeth is associated with Badminton.
• Other famous Badminton players are Saina Nehwal, PV Sindhu, K Shrikanth.
• Famous Cricket players are MS Dhoni, Virat Kohli.
• Famous Kho-Kho players are Satish Rai, Veena Narayan.
• Famous Taekwondo players are Anita Pal, Sagnik Sen.

**Q83. Answer: (b) Science**

• Udipi Ramachandra Rao was a space scientist who also served as Chairman of ISRO.
• The Government of India has awarded him Padma Vibhushan in 2017 for his achievements in the field of Science and Technology.

**Q84. Answer: (d) Navsari**

- Tonk, Nagaur and Sikar are districts in Rajasthan.
- Navsari district is in Gujarat.
- Other major cities in Gujarat are Ahmedabad, Gandhinagar, Surat.

**Q85. Answer: (b) CCl4**

- CCl4 or Tetracholoromethane is not acidic in nature.
- It is a clear, colorless, volatile and stable Chlorinated Hydrocarbon.
- It is used as a refrigerant and as a solvent for oils and fats.

**Q86. Answer: (a) Rs. 300**

Shortcut Trick

Let the Cost Price of the second item be 100 units. Then the Cost Price of the first item is 200 units.

Profit from first item = 200 × 25% = 50 units. Loss from second item = 100 × 15% = 15 units.

Net profit = 50 − 15 = 35 units. Given net profit = Rs. 35.

Therefore 35 units = Rs. 35 => 1 unit = Rs. 1.

Sum of Cost Price = 200 + 100 = 300 units = 300 × 1 = Rs. 300.

Therefore The correct answer is Rs. 300.

Alternate Method

Given: CP1 = 2 × CP2, Profit%1 = 25%, Loss%2 = 15%, Net Profit = Rs. 35.

Formulas: Profit = CP × Profit%, Loss = CP × Loss%, Total CP = CP1 + CP2.

=> Let Cost Price of item 2 be x. Then Cost Price of item 1 is 2x.

=> Profit from item 1 = 2x × (25/100) = 0.5x.

=> Loss from item 2 = x × (15/100) = 0.15x.

=> Net Profit = 0.5x − 0.15x = 0.35x.

=> 0.35x = 35 => x = 35 ÷ 0.35 = 100.

=> Sum of Cost Price = 2x + x = 3x = 3 × 100 = 300.

Therefore The correct answer is Rs. 300.

Additional Information

Net Profit and Loss

When multiple transactions occur, the overall profit or loss is the algebraic sum of individual profits (positive) and losses (negative).

Cost Price Calculation

Total Cost Price is the sum of the individual cost prices of all articles purchased: Total CP = CP1 + CP2 + ... + CP_n.

**Q87. Answer: (a) 82 M**

The pattern followed here is:

22 + 20 = 42; 42 + 20 = 62; 62 + 20 = 82

A + 4 → E; E + 4 → I; I + 4 → M

Hence, ‘82 M’ is the correct answer.

**Q88. Answer: (b) 4.43 ms^(-1)**

Shortcut Trick

Average Speed = Total Distance ÷ Total Time

Total Distance = 15 m + 16 m = 31 m

Total Time = 4 s + 3 s = 7 s

Average Speed = 31 ÷ 7 ≈ 4.43 ms^(−1)

Therefore The correct answer is 4.43 ms^(−1).

Alternate Method

Given:

Distance 1 (d1) = 15 m, Time 1 (t1) = 4 s

Distance 2 (d2) = 16 m, Time 2 (t2) = 3 s

Formula Used:

Average Speed = (Total distance traveled) / (Total time taken)

Calculations:

=> Total distance = d1 + d2 = 15 + 16 = 31 m

=> Total time = t1 + t2 = 4 + 3 = 7 s

=> Average Speed = 31 / 7

=> Average Speed = 4.4285...

=> Average Speed ≈ 4.43 ms^(−1)

Therefore The correct answer is 4.43 ms^(−1).

Additional Information

Average Speed for Equal Distances

If an object covers two equal distances with speeds u and v, the average speed is given by (2uv) / (u + v).

Units of Speed

The SI unit of speed is meters per second (m/s or ms^(−1)). To convert km/h to m/s, multiply by 5/18.

Instantaneous Speed

It is the speed of an object at a particular moment in time, measured by a speedometer in vehicles.

**Q89. Answer: (c) Proust**

- The Law of definite proportions states that a compound will always contain the same proportion of elements by mass.
- It was given by Proust.
- Lavoisier discovered the role of oxygen in combustion.
- Democritus was a Greek Mathematician.
- Dalton gave the atomic theory which states that the atom of different size varies in size and mass.

**Q90. Answer: (b) B, C and D**

Hence, 'B, C and D' is the correct answer.

**Q91. Answer: (d) Mahbub-ul-Haq and Amartya Sen**

- Human Development Index is a statistical tool used to measure a country's overall achievement in its social and economic dimensions.
- It was developed by Pakistani economist Mahbub-ul-Haq and Indian economist Amartya Sen.
- Every year United Nation Development Program (UNDP) ranks countries based on the HDI report.

**Q92. Answer: (b) 715120**

The pattern followed here is:

The positional value of P is 16.

The positional value of I is 9.

The positional value of G is 7.

Thus, PIG is coded as 1697.

Now,

The positional value of G is 7.

The positional value of O is 15.

The positional value of A is 1.

The positional value of T is 20.

Hence, GOAT is coded as 715120.

**Q93. Answer: (d) 63/7**

Let the number be x multiplied to 62/9 to get 40.

According to the question

=> x × 62/9 = 40

=> x × (56/9) = 40

=> x = 40 × (9/56)

=> x = 63/7

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**Q94. Answer: (a) Cousins**

Hence, Leela and the girls are cousins.

**Q95. Answer: (c) West**

To face south after turning left, Murali must walking towards the west direction.

Hence, west is the correct answer.

**Q96. Answer: (c) 6**

- pH value is defined as the measure of the concentration of hydrogen ion in a solution.
- The pH scale ranges from 0 to 14.
- If the pH value of a solution less than 7 then it is termed as Acidic.
- An acidic solution turns blue litmus red.
- If the pH value of a solution more than 7 then it is termed as Basic.
- An basic solution turns red litmus blue.

**Q97. Answer: (b) K**

Formula Used:

- $\sigma^2 = \sum(x_i - x)^2/n$
- Standard deviation is same when each element is increased by the same constant

Calculation:

Since each data increases by 10,

There will be no change in standard deviation because $(x_i - x)$ remains same.

Therefore The standard deviation of 10, 11, 12, 13 _____ 19 will be will be K.

Alternate Method

**Q98. Answer: (b) Anil Chauhan**

- Lt. General Anil Chauhan took charge as the new Director General of Military Operations (DGMO) of Indian Army in 2018.
- He observed various operations of the Indian Army including along the LoC in Jammu and Kashmir.
- Lt. General Paramjit Singh has taken charge as the new Director General of Military Operations in 2019.

**Q99. Answer: (c) Only arguments I is strong.**

Increase in mobile usage and cell phone towers indicates that many people can afford to purchase the device, thereby showing global development. Also, the purpose of using mobiles and cell phone towers is to facilitate fast and easy connectivity.

Hence, argument I is strong.

However, the information given in the statement is not sufficient to determine the impact of the usage of mobiles and cell phone towers on the functioning of the ecological systems.

Hence, argument II is not strong.

Thus, only argument I is strong.

**Q100. Answer: (d) 216**

Shortcut Trick

Number of small spheres = (Radius of larger sphere / Radius of smaller ball)$^3$

=> Number = $(6 / 1)^3$

=> Number = $6^3 = 216$

Therefore The correct answer is 216 balls.

Alternate Method

Given:

Radius of the steel sphere (R) = 6 cm

Radius of each small ball (r) = 1 cm

Formula Used:

Volume of a sphere = $(4/3) \times \pi \times \text{radius}^3$

Calculations:

=> Volume of large sphere = $(4/3) \times \pi \times 6^3$

=> Volume of one small ball = $(4/3) \times \pi \times 1^3$

=> Number of balls (n) = Volume of large sphere ÷ Volume of small ball

=> n = [(4/3) × π × 216] ÷ [(4/3) × π × 1]

=> n = 216 / 1

=> n = 216

Therefore The correct answer is 216 balls.

Additional Information

Volume Invariance

When a 3D solid is melted and recast into multiple smaller solids, the total volume remains constant. Total Volume = n × Volume of one small part.

Surface Area of Sphere

The total surface area of a sphere is given by $4 \times \pi \times r^2$.

Hemisphere

Volume of a hemisphere is $(2/3) \times \pi \times r^3$ and its total surface area is $3 \times \pi \times r^2$.

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