IBSAT Quantitative Aptitude

Sample Paper – 4

Duration: 26 Minutes **Maximum Marks: 30**

Instructions

- This paper contains **30** Multiple Choice Questions (Single Correct Answer), modelled on the Quantitative Aptitude section of **IBSAT** (ICFAI Business School Aptitude Test).
- Each correct answer carries **+1 mark**. There is **no negative marking** for incorrect or unattempted answers, so attempt every question.
- Only **one** option is correct. Choose the most appropriate answer.
- IBSAT is a computer-based test with no sectional time limit; attempt this practice paper in one timed sitting of about **26 minutes**.
- Use of mobile phones, calculators, log tables, or electronic gadgets is strictly prohibited.

Part A: Arithmetic

Q1. In an election between two candidates, the winner secured 55% of the total valid votes and won by a margin of 800 votes. How many valid votes were cast in total?

(A) 7000

(B) 6000

(C) 8000

(D) 9000

Q2. An article is bought for Rs. 250 and sold for Rs. 300. What is the profit percent?

(A) 20%

(B) 25%

(C) 16%

(D) 15%

Q3. A bag contains one-rupee, two-rupee and five-rupee coins in the ratio $3:2:1$. If the total value of the coins is Rs. 108, how many one-rupee coins are there?

(A) 9

(B) 18

(C) 36

(D) 27

Q4. What is the average of the first 50 natural numbers?

(A) 25

(B) 25.5

(C) 26

(D) 50.5

Q5. The simple interest on a certain sum at 6% per annum for 4 years is Rs. 960. Find the principal.

(A) Rs. 4000

(B) Rs. 3600

(C) Rs. 4800

(D) Rs. 4400

Q6. Find the amount on Rs. 8000 at 10% per annum for 3 years, compounded annually.

(A) Rs. 10800

(B) Rs. 10600

(C) Rs. 10648

(D) Rs. 11000

Q7. In what ratio must rice costing Rs. 30 per kg be mixed with rice costing Rs. 45 per kg so that the mixture is worth Rs. 35 per kg?

(A) 1 : 2

(B) 2 : 1

(C) 3 : 2

(D) 1 : 1

Q8. A and B start a business investing money for the same period. A invests Rs. 5000, and at the end of the year the profit is divided between A and B in the ratio 5 : 2. How much did B invest?

(A) Rs. 2500

(B) Rs. 1000

(C) Rs. 5000

(D) Rs. 2000

Q9. A number is first decreased by 10% and then increased by 20%. What is the net change in the number?

(A) 8% increase

(B) 10% increase

(C) 8% decrease

(D) 2% decrease

Q10. A car is worth Rs. 500000 and depreciates at 10% per annum. What will its value be after 2 years?

(A) Rs. 450000

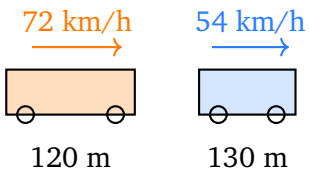
(B) Rs. 400000

(C) Rs. 405000

(D) Rs. 410000

Part B: Speed, Time and Work

Q11. Two trains, 120 m and 130 m long, are running in the same direction at 72 km/h and 54 km/h respectively. How long does the faster train take to completely overtake the slower one?



(A) 45 s

(B) 50 s

(C) 25 s

(D) 60 s

Q12. A boat travels downstream at 15 km/h and upstream at 9 km/h. What is the speed of the boat in still water?

(A) 3 km/h

(B) 9 km/h

(C) 6 km/h

(D) 12 km/h

Q13. A can complete a work in 10 days and B in 15 days. They begin together, but A leaves after 2 days. In how many more days will B finish the remaining work?

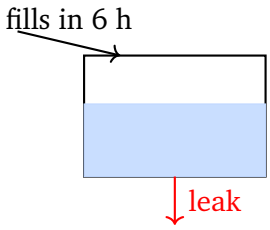
(A) 10

(B) 8

(C) 12

(D) 15

Q14. A pipe can fill a tank in 6 hours. Because of a leak at the bottom, it now takes 8 hours to fill the tank. How long will the leak alone take to empty a full tank?



(A) 12 hours

(B) 16 hours

(C) 24 hours

(D) 48 hours

Part C: Number System

Q15. What is the remainder when $2^{10} + 3^{10}$ is divided by 5?

(A) 2

(B) 3

(C) 4

(D) 1

Q16. Find the greatest number that divides 285 and 1249, leaving remainders 9 and 7 respectively.

(A) 69

(B) 46

(C) 23

(D) 138

Q17. What is the unit digit of $3^{17} \times 7^{12}$?

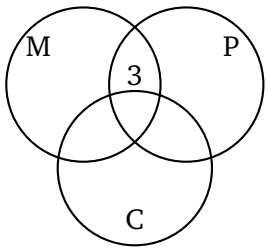
(A) 3

(B) 1

(C) 9

(D) 7

Q18. In a survey, 25 students like Maths, 20 like Physics and 18 like Chemistry. Also, 8 like both Maths and Physics, 6 like both Physics and Chemistry, 5 like both Maths and Chemistry, and 3 like all three. How many students like exactly one subject?



(A) 30

(B) 37

(C) 34

(D) 40

Part D: Algebra

Q19. 3 pens and 4 pencils together cost Rs. 62, while 5 pens and 2 pencils cost Rs. 80. What is the cost of one pen?

(A) Rs. 12

(B) Rs. 14

(C) Rs. 10

(D) Rs. 8

Q20. What is the nature of the roots of the quadratic equation $x^2 - 6x + 9 = 0$?

(A) Real and distinct

(B) Imaginary

(C) No real roots

(D) Real and equal

Q21. How many integer values of x satisfy the inequality $x^2 < 25$?

(A) 9

(B) 10

(C) 11

(D) 8

Q22. In an arithmetic progression, the 4th term is 14 and the 9th term is 34. What is the common difference?

(A) 2

(B) 5

(C) 4

(D) 3

Q23. Find the sum to infinity of the geometric progression $16,\ 8,\ 4,\ 2,\ \ldots$

(A) 30

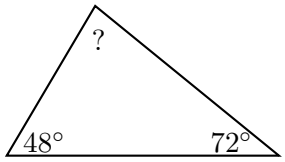
(B) 32

(C) 24

(D) 64

Part E: Geometry and Mensuration

Q24. In the triangle shown, two of the angles measure 48° and 72°. What is the measure of the third angle?



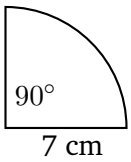
(A) 72°

(B) 48°

(C) 65°

(D) 60°

Q25. Find the area of a sector of a circle of radius 7 cm with a central angle of 90°. (Take $\pi = \frac{22}{7}$.)



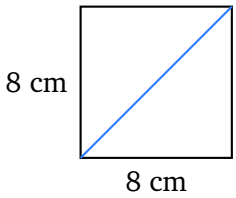
(A) 38.5 cm^2

(B) 77 cm^2

(C) 19.25 cm^2

(D) 49 cm^2

Q26. What is the length of the diagonal of a square whose side is 8 cm?



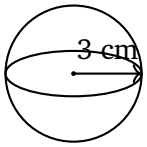
(A) 16 cm

(B) 8 cm

(C) $8\sqrt{2}$ cm

(D) $4\sqrt{2}$ cm

Q27. Find the volume of a sphere of radius 3 cm. (Take $\pi = \frac{22}{7}$.)



(A) 108 cm^3

(B) 113.14 cm^3

(C) 84.86 cm^3

(D) 150 cm^3

Part F: Permutation, Combination and Probability

Q28. In how many different ways can 5 people be seated in a row?

(A) 60

(B) 24

(C) 720

(D) 120

Q29. At a party, every person shakes hands with every other person exactly once. If there are 10 people present, how many handshakes take place in all?

(A) 45

(B) 90

(C) 50

(D) 55

Q30. A bag contains 4 red balls and 6 blue balls. One ball is drawn at random. What is the probability that it is red?

(A) $\frac{3}{5}$

(B) $\frac{1}{2}$

(C) $\frac{2}{5}$

(D) $\frac{4}{6}$

Detailed Solutions

Q1.

Solution

Concept — Election Percentages: With two candidates, the winner's share and the loser's share add to 100%, and the margin equals the difference of the two shares.

Step 1 — Loser's share of the votes:

$$100\% - 55\% = 45\%.$$

Step 2 — Margin as a percentage:

$$55\% - 45\% = 10\%.$$

Step 3 — This 10% equals 800 votes:

$$10\% \text{ of total} = 800.$$

Step 4 — Solve for the total votes:

$$\text{Total} = \frac{800 \times 100}{10} = 8000.$$

Why other options are wrong:

- Option A: 7000 treats the margin as more than 10%.
- Option B: 6000 uses a wrong margin percentage.
- Option D: 9000 overstates the total for an 800-vote margin.

Final Answer: Total votes $= \frac{800 \times 100}{10} = 8000 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Profit Percent: Profit percent $= \dfrac{\text{profit}}{\text{cost price}} \times 100$, where profit $=$ SP $-$ CP.

Step 1 — Find the profit:

$$300 - 250 = 50.$$

Step 2 — Divide by the cost price:

$$\frac{50}{250}.$$

Step 3 — Convert to a percentage:

$$\frac{50}{250} \times 100 = 20\%.$$

Why other options are wrong:

- Option B: 25% divides the profit by the selling price instead of the cost.
- Option C: 16% has no valid basis here.
- Option D: 15% understates the profit.

Final Answer: Profit percent $= \frac{50}{250} \times 100 = 20\% \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q2

Q3.

Solution

Concept — Ratio of Coins: Let the numbers of coins be $3x$, $2x$ and x; multiply each count by its denomination to get the value, then add.

Step 1 — Value contributed by each denomination:

$$1\text{-rupee} : 3x \times 1 = 3x, \quad 2\text{-rupee} : 2x \times 2 = 4x, \quad 5\text{-rupee} : x \times 5 = 5x.$$

Step 2 — Total value in terms of x:

$$3x + 4x + 5x = 12x.$$

Step 3 — Equate to Rs. 108 and solve:

$$12x = 108 \Rightarrow x = 9.$$

Step 4 — Number of one-rupee coins is $3x$:

$$3 \times 9 = 27.$$

Why other options are wrong:

- Option A: 9 is the value of x, not the count of one-rupee coins.
- Option B: 18 is the number of two-rupee coins ($2x$).
- Option C: 36 doubles the correct count.

Final Answer: One-rupee coins $= 3x = 27 \Rightarrow$ D

Answer: (D) Go Back to Q3

Q4.

Solution

Concept — Average of First n Natural Numbers: The average of the first n natural numbers is $\frac{n+1}{2}$.

Step 1 — Write the sum of the first 50 numbers:

$$\frac{n(n+1)}{2} = \frac{50 \times 51}{2} = 1275.$$

Step 2 — Divide the sum by the count:

$$\frac{1275}{50} = 25.5.$$

Step 3 — Check with the direct formula:

$$\frac{n+1}{2} = \frac{50+1}{2} = \frac{51}{2} = 25.5.$$

Why other options are wrong:

- Option A: 25 rounds the true average down.
- Option C: 26 rounds it up.

- Option D: 50.5 uses $\frac{2n+1}{2}$ instead of $\frac{n+1}{2}$.

Final Answer: Average $= \frac{51}{2} = 25.5 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q4

Q5.

Solution

Concept — Simple Interest (find principal): From $\text{SI} = \dfrac{P \times R \times T}{100}$, the principal $P = \dfrac{\text{SI} \times 100}{R \times T}$.

Step 1 — Multiply the rate and the time:

$$R \times T = 6 \times 4 = 24.$$

Step 2 — Substitute in the rearranged formula:

$$P = \frac{960 \times 100}{24}.$$

Step 3 — Simplify the numerator:

$$960 \times 100 = 96000.$$

Step 4 — Divide:

$$\frac{96000}{24} = 4000.$$

Why other options are wrong:

- Option B: Rs. 3600 uses a wrong rate-time product.
- Option C: Rs. 4800 divides by 20 instead of 24.
- Option D: Rs. 4400 has no valid basis here.

Final Answer: Principal $= \frac{960 \times 100}{24} = \text{Rs. } 4000 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q5

Q6.

Solution

Concept — Compound Amount: Amount $= P\left(1+\dfrac{R}{100}\right)^{T}$.

Step 1 — Write the growth factor:

$$1+\frac{10}{100}=1.1.$$

Step 2 — Raise it to the power of 3 years:

$$(1.1)^3=1.331.$$

Step 3 — Multiply by the principal:

$$8000\times 1.331=10648.$$

Why other options are wrong:

- Option A: Rs. 10800 adds a flat 10% each year with no compounding on interest.
- Option B: Rs. 10600 understates the growth.
- Option D: Rs. 11000 overstates the compound growth.

Final Answer: Amount $= 8000\times(1.1)^3 =$ Rs. 10648 $\Rightarrow$ C

Answer: (C) Go Back to Q6

Q7.

Solution

Concept — Alligation: The ratio of the two ingredients is the inverse ratio of the distances of their prices from the mean price.

Step 1 — List the prices:

$$\text{Cheaper}=30,\quad \text{Dearer}=45,\quad \text{Mean}=35.$$

Step 2 — Distance of each price from the mean:

$$\text{Dearer side}=45-35=10,\qquad \text{Cheaper side}=35-30=5.$$

Step 3 — Ratio of cheaper to dearer equals the two distances:

$$10 : 5 = 2 : 1.$$

Why other options are wrong:

- Option A: $1 : 2$ reverses the ratio and gives a mean of Rs. 40.
- Option C: $3 : 2$ gives a mean of Rs. 36.
- Option D: $1 : 1$ gives a mean of Rs. 37.5.

Final Answer: Cheaper : dearer $= 2 : 1 \Rightarrow$ B

Answer: (B) Go Back to Q7

Q8.

Solution

Concept — Partnership: When investments run for the same time, profit is shared in the ratio of the capitals, so the capitals are in the same ratio as the profits.

Step 1 — Profit ratio equals capital ratio:

$$A : B = 5 : 2.$$

Step 2 — A's capital corresponds to 5 parts:

$$5 \text{ parts} = 5000 \;\Rightarrow\; 1 \text{ part} = 1000.$$

Step 3 — B's capital is 2 parts:

$$2 \times 1000 = 2000.$$

Why other options are wrong:

- Option A: Rs. 2500 uses a $2 : 1$ ratio.
- Option B: Rs. 1000 is the value of a single part, not B's capital.
- Option C: Rs. 5000 equals A's investment, not B's.

Final Answer: B invests $2 \times 1000 =$ Rs. 2000 $\Rightarrow$ D

Answer: (D) Go Back to Q8

Q9.

Solution

Concept — Successive Percentage Change: Apply each change as a multiplying factor to the running value one after the other.

Step 1 — Take the original number as 100.

Step 2 — Apply the 10% decrease:

$$100 \times 0.90 = 90.$$

Step 3 — Apply the 20% increase on the new value:

$$90 \times 1.20 = 108.$$

Step 4 — Compare with the original:

$$100 \to 108 \;\Rightarrow\; \text{an increase of } 8\%.$$

Why other options are wrong:

- Option B: 10% increase ignores that the increase acts on the reduced value 90.
- Option C: 8% decrease has the direction wrong; the final value exceeds 100.
- Option D: 2% decrease subtracts the percentages directly, which is invalid.

Final Answer: The number rises from 100 to 108, an 8% increase $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q9

Q10.

Solution

Concept — Depreciation: A value falling at a fixed rate each year follows $V\left(1-\frac{R}{100}\right)^{T}$.

Step 1 — Write the yearly depreciation factor:

$$1-\frac{10}{100}=0.9.$$

Step 2 — Square it for 2 years:

$$(0.9)^2 = 0.81.$$

Step 3 — Multiply by the original value:

$$500000 \times 0.81 = 405000.$$

Why other options are wrong:

- Option A: Rs. 450000 removes only one year's 10%.
- Option B: Rs. 400000 subtracts a flat 20% instead of compounding.
- Option D: Rs. 410000 understates the depreciation.

Final Answer: Value after 2 years $= 500000 \times 0.81 =$ Rs. 405000 $\Rightarrow$ C

Answer: (C) Go Back to Q10

Q11.

Solution

Concept — Relative Speed (same direction): When one train overtakes another moving the same way, the relative speed is the difference of the speeds, and the distance to cover is the sum of the two lengths.

Step 1 — Relative speed in km/h:

$$72 - 54 = 18 \text{ km/h}.$$

Step 2 — Convert to metres per second:

$$18 \times \frac{5}{18} = 5 \text{ m/s}.$$

Step 3 — Total distance to overtake:

$$120 + 130 = 250 \text{ m}.$$

Step 4 — Time $= \dfrac{\text{distance}}{\text{relative speed}}$:

$$\frac{250}{5} = 50 \text{ s}.$$

Why other options are wrong:

- Option A: 45 s uses a wrong total length.
- Option C: 25 s adds the speeds instead of subtracting.
- Option D: 60 s uses a slower relative speed.

Final Answer: Time $= \frac{250}{5} = 50$ s $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q11

Q12.

Solution

Concept — Boats and Streams: Speed in still water $= \dfrac{\text{downstream speed} + \text{upstream speed}}{2}$.

Step 1 — Add the two speeds:

$$15 + 9 = 24.$$

Step 2 — Halve the sum:

$$\frac{24}{2} = 12 \text{ km/h}.$$

Why other options are wrong:

- Option A: 3 km/h is the speed of the stream, not the boat.
- Option B: 9 km/h is the upstream speed.
- Option C: 6 km/h halves the difference of the speeds.

Final Answer: Still-water speed $= \frac{15+9}{2} = 12$ km/h $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q12

Q13.

Solution

Concept — Time and Work (one worker leaves): Find the work done together before one leaves, then let the remaining worker finish the rest at their own rate.

Step 1 — One-day work of each:

$$A = \frac{1}{10}, \qquad B = \frac{1}{15}.$$

Step 2 — Combined one-day work:

$$\frac{1}{10}+\frac{1}{15}=\frac{3}{30}+\frac{2}{30}=\frac{5}{30}=\frac{1}{6}.$$

Step 3 — Work done together in 2 days:

$$2\times\frac{1}{6}=\frac{1}{3}.$$

Step 4 — Remaining work:

$$1-\frac{1}{3}=\frac{2}{3}.$$

Step 5 — Time for B alone to finish it:

$$\frac{2}{3}\div\frac{1}{15}=\frac{2}{3}\times 15=10 \text{ days}.$$

Why other options are wrong:

- Option B: 8 days understates the leftover work.
- Option C: 12 days ignores the 2 days worked together.
- Option D: 15 days is B's time for the whole job, not the remainder.

Final Answer: B needs $\frac{2}{3}\times 15=10$ more days $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q13

Q14.

Solution

Concept — Pipes and Leaks: The leak works against the filling pipe, so the leak's rate = filling rate − net filling rate.

Step 1 — Filling rate of the pipe:

$$\frac{1}{6} \text{ tank per hour}.$$

Step 2 — Net filling rate with the leak:

$$\frac{1}{8} \text{ tank per hour}.$$

Step 3 — Leak's emptying rate:

$$\frac{1}{6} - \frac{1}{8} = \frac{4}{24} - \frac{3}{24} = \frac{1}{24}.$$

Step 4 — Time for the leak to empty a full tank:

$$\frac{1}{1/24} = 24 \text{ hours}.$$

Why other options are wrong:

- Option A: 12 hours doubles the leak's rate.
- Option B: 16 hours has no valid basis here.
- Option D: 48 hours halves the leak's rate.

Final Answer: The leak empties the tank in 24 hours $\Rightarrow$ C

Answer: (C) Go Back to Q14

Q15.

Solution

Concept — Remainder of a Sum: Find the remainder of each power separately using cyclicity, then add the remainders and reduce modulo the divisor.

Step 1 — Cycle of $2^n \bmod 5$:

$$2,\ 4,\ 3,\ 1 \text{ (length 4)}; \quad 10 \equiv 2 \pmod 4 \ \Rightarrow\ 2^{10} \equiv 4.$$

Step 2 — Cycle of $3^n \bmod 5$:

$$3,\ 4,\ 2,\ 1 \text{ (length 4)}; \quad 10 \equiv 2 \pmod 4 \ \Rightarrow\ 3^{10} \equiv 4.$$

Step 3 — Add the two remainders:

$$4 + 4 = 8.$$

Step 4 — Reduce modulo 5:

$$8 \equiv 3 \pmod 5.$$

Why other options are wrong:

- Option A: 2 uses a wrong position in one cycle.
- Option C: 4 is the remainder of a single term, not the sum.
- Option D: 1 forgets to reduce 8 modulo 5 correctly.

Final Answer: $2^{10} + 3^{10} \equiv 3 \pmod 5 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q15

Q16.

Solution

Concept — Greatest Number with Given Remainders: Subtract each remainder from its number, then take the HCF of the results.

Step 1 — Subtract the remainders:

$$285 - 9 = 276, \qquad 1249 - 7 = 1242.$$

Step 2 — Factorise both:

$$276 = 2^2 \times 3 \times 23, \qquad 1242 = 2 \times 3^3 \times 23.$$

Step 3 — Take the common factors:

$$\text{HCF} = 2 \times 3 \times 23 = 138.$$

Why other options are wrong:

- Option A: 69 is 3×23, missing the factor 2.
- Option B: 46 is 2×23, missing the factor 3.
- Option C: 23 keeps only one common prime.

Final Answer: Greatest such number $= \text{HCF}(276, 1242) = 138 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q16

Q17.

Solution

Concept — Unit Digit of a Product: Find the unit digit of each factor using its cycle of length 4, then multiply the two unit digits and take the unit digit of the result.

Step 1 — Unit digit of 3^{17}:

$$3,\ 9,\ 7,\ 1 \text{ (cycle)}; \quad 17 \equiv 1 \pmod 4 \ \Rightarrow \text{ unit digit } 3.$$

Step 2 — Unit digit of 7^{12}:

$$7,\ 9,\ 3,\ 1 \text{ (cycle)}; \quad 12 \equiv 0 \pmod 4 \ \Rightarrow \text{ unit digit } 1.$$

Step 3 — Multiply the two unit digits:

$$3 \times 1 = 3.$$

Why other options are wrong:

- Option B: 1 ignores the unit digit 3 from 3^{17}.
- Option C: 9 uses the wrong position in the cycle of 3.
- Option D: 7 mixes up the two cycles.

Final Answer: Unit digit of $3^{17} \times 7^{12}$ is 3 $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q17

Q18.

Solution

Concept — Sets (exactly one region): For each subject, subtract the two pairwise overlaps and add back the triple overlap once, since it was removed twice.

Step 1 — Students liking only Maths:

$$25 - (8 - 3) - (5 - 3) - 3 = 25 - 5 - 2 - 3 = 15.$$

Step 2 — Students liking only Physics:

$$20 - (8 - 3) - (6 - 3) - 3 = 20 - 5 - 3 - 3 = 9.$$

Step 3 — Students liking only Chemistry:

$$18 - (5 - 3) - (6 - 3) - 3 = 18 - 2 - 3 - 3 = 10.$$

Step 4 — Add the three "only" counts:

$$15 + 9 + 10 = 34.$$

Why other options are wrong:

- Option A: 30 leaves out the triple-overlap correction.
- Option B: 37 double-counts a shared region.
- Option D: 40 counts students in more than one subject.

Final Answer: Exactly one subject $= 15 + 9 + 10 = 34 \Rightarrow$ C

Answer: (C) Go Back to Q18

Q19.

Solution

Concept — Linear Equations: Set up two equations from the two cost statements and eliminate one variable to find the other.

Step 1 — Let the pen cost p and the pencil cost q:

$$3p + 4q = 62, \qquad 5p + 2q = 80.$$

Step 2 — Double the second equation:

$$10p + 4q = 160.$$

Step 3 — Subtract the first equation:

$$(10p + 4q) - (3p + 4q) = 160 - 62 \;\Rightarrow\; 7p = 98.$$

Step 4 — Solve for the pen cost:

$$p = \frac{98}{7} = 14.$$

Why other options are wrong:

- Option A: Rs. 12 does not satisfy both equations.
- Option C: Rs. 10 is the pencil-related value, not the pen's.
- Option D: Rs. 8 fits neither equation.

Final Answer: Cost of one pen $= \frac{98}{7} =$ Rs. 14 $\Rightarrow$ B

Answer: (B) Go Back to Q19

Q20.

Solution

Concept — Nature of Roots: For $ax^2 + bx + c = 0$, the discriminant $D = b^2 - 4ac$ decides the roots: $D > 0$ real and distinct, $D = 0$ real and equal, $D < 0$ imaginary.

Step 1 — Identify the coefficients:

$$a = 1, \quad b = -6, \quad c = 9.$$

Step 2 — Compute the discriminant:

$$D = (-6)^2 - 4 \times 1 \times 9 = 36 - 36 = 0.$$

Step 3 — Interpret $D = 0$:

$$D = 0 \;\Rightarrow\; \text{roots are real and equal.}$$

Why other options are wrong:

- Option A: Real and distinct needs $D > 0$.
- Option B: Imaginary needs $D < 0$.
- Option C: "No real roots" also needs $D < 0$, but here $D = 0$.

Final Answer: $D = 0$, so the roots are real and equal $\Rightarrow$ D

Answer: (D) Go Back to Q20

Q21.

Solution

Concept — Quadratic Inequality: $x^2 < k$ means $-\sqrt{k} < x < \sqrt{k}$; count the integers strictly inside.

Step 1 — Rewrite the inequality:

$$x^2 < 25 \;\Rightarrow\; -5 < x < 5.$$

Step 2 — List the integers strictly between -5 and 5:

$$-4,\ -3,\ -2,\ -1,\ 0,\ 1,\ 2,\ 3,\ 4.$$

Step 3 — Count them:

$$\text{Number of integers} = 9.$$

Why other options are wrong:

- Option B: 10 wrongly includes one endpoint.
- Option C: 11 includes both endpoints -5 and 5, where $x^2 = 25$, not < 25.
- Option D: 8 misses the value $x = 0$.

Final Answer: There are 9 integers from -4 to $4 \Rightarrow$ A

Answer: (A) Go Back to Q21

Q22.

Solution

Concept — Arithmetic Progression: The nth term is $a_n = a+(n-1)d$; subtracting two term equations eliminates a and gives d.

Step 1 — Write the two given terms:

$$a + 3d = 14, \qquad a + 8d = 34.$$

Step 2 — Subtract the first from the second:

$$(a + 8d) - (a + 3d) = 34 - 14 \;\Rightarrow\; 5d = 20.$$

Step 3 — Solve for the common difference:

$$d = \frac{20}{5} = 4.$$

Why other options are wrong:

- Option A: 2 divides the gap by 10 instead of 5.
- Option B: 5 uses the difference in term positions as d.
- Option D: 3 does not fit the given terms.

Final Answer: Common difference $= \frac{20}{5} = 4 \Rightarrow$ C

Answer: (C) Go Back to Q22

Q23.

Solution

Concept — Sum to Infinity of a GP: For $|r| < 1$, the sum to infinity is $S_\infty = \frac{a}{1-r}$, where a is the first term and r the common ratio.

Step 1 — Identify the first term and ratio:

$$a = 16, \qquad r = \frac{8}{16} = \frac{1}{2}.$$

Step 2 — Substitute in the formula:

$$S_\infty = \frac{16}{1 - \frac{1}{2}}.$$

Step 3 — Simplify the denominator and divide:

$$1 - \frac{1}{2} = \frac{1}{2}, \qquad S_\infty = \frac{16}{1/2} = 32.$$

Why other options are wrong:

- Option A: 30 rounds the true sum down.
- Option C: 24 sums only the first few terms.
- Option D: 64 uses $\frac{a}{1-r}$ with a wrong ratio.

Final Answer: Sum to infinity $= \frac{16}{1/2} = 32 \Rightarrow$ B

Answer: (B) Go Back to Q23

Q24.

Solution

Concept — Angle Sum of a Triangle: The three interior angles of any triangle add up to 180°.

Step 1 — Add the two known angles:

$$48^\circ + 72^\circ = 120^\circ.$$

Step 2 — Subtract from 180°:

$$180^\circ - 120^\circ = 60^\circ.$$

Why other options are wrong:

- Option A: 72° simply repeats a given angle.
- Option B: 48° repeats the other given angle.
- Option C: 65° does not make the angles total 180°.

Final Answer: Third angle $= 180^\circ - 120^\circ = 60^\circ \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q24

Q25.

Solution

Concept — Area of a Sector: Area $= \dfrac{\theta}{360^\circ} \times \pi r^2$, where θ is the central angle.

Step 1 — Fraction of the full circle:

$$\frac{90}{360} = \frac{1}{4}.$$

Step 2 — Area of the full circle:

$$\pi r^2 = \frac{22}{7} \times 7^2 = \frac{22}{7} \times 49 = 154 \text{ cm}^2.$$

Step 3 — Take one quarter of it:

$$\frac{1}{4} \times 154 = 38.5 \text{ cm}^2.$$

Why other options are wrong:

- Option B: 77 cm^2 takes half the circle instead of a quarter.
- Option C: 19.25 cm^2 takes one-eighth of the circle.
- Option D: 49 cm^2 is r^2, not the sector area.

Final Answer: Sector area $= \frac{1}{4} \times 154 = 38.5$ $\text{cm}^2 \Rightarrow$ A

Answer: (A) Go Back to Q25

Q26.

Solution

Concept — Diagonal of a Square: For a square of side s, the diagonal $= s\sqrt{2}$, from the Pythagoras theorem on two equal sides.

Step 1 — Apply Pythagoras to the two sides:

$$d = \sqrt{s^2 + s^2} = \sqrt{2s^2}.$$

Step 2 — Simplify:

$$\sqrt{2s^2} = s\sqrt{2}.$$

Step 3 — Substitute $s = 8$:

$$d = 8\sqrt{2} \text{ cm}.$$

Why other options are wrong:

- Option A: 16 cm doubles the side rather than multiplying by $\sqrt{2}$.
- Option B: 8 cm is just the side length.
- Option D: $4\sqrt{2}$ cm uses half the side.

Final Answer: Diagonal $= s\sqrt{2} = 8\sqrt{2}$ cm $\Rightarrow$ C

Answer: (C) Go Back to Q26

Q27.

Solution

Concept — Volume of a Sphere: Volume $= \frac{4}{3}\pi r^3$.

Step 1 — Cube the radius:

$$3^3 = 27.$$

Step 2 — Multiply by $\frac{4}{3}$:

$$\frac{4}{3} \times 27 = 36.$$

Step 3 — Multiply by $\pi = \frac{22}{7}$:

$$36 \times \frac{22}{7} = \frac{792}{7}.$$

Step 4 — Convert to a decimal:

$$\frac{792}{7} \approx 113.14 \text{ cm}^3.$$

Why other options are wrong:

- Option A: 108 cm^3 leaves out the factor π.
- Option C: 84.86 cm^3 uses πr^2 scaling incorrectly.
- Option D: 150 cm^3 has no valid basis for radius 3.

Final Answer: Volume $= \frac{792}{7} \approx 113.14$ cm^3 $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q27

Q28.

Solution

Concept — Permutations: The number of ways to arrange n distinct people in a row is $n!$.

Step 1 — Here $n = 5$, so we need $5!$:

$$5! = 5 \times 4 \times 3 \times 2 \times 1.$$

Step 2 — Multiply step by step:

$$5 \times 4 = 20, \quad 20 \times 3 = 60, \quad 60 \times 2 = 120, \quad 120 \times 1 = 120.$$

Why other options are wrong:

- Option A: 60 stops the factorial one step early.
- Option B: 24 is $4!$, for only four people.
- Option C: 720 is $6!$, for six people.

Final Answer: Number of ways $= 5! = 120 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q28

Q29.

Solution

Concept — Combinations (handshakes): Each handshake is a pair of people, so the number of handshakes among n people is $\binom{n}{2} = \dfrac{n(n-1)}{2}$.

Step 1 — Substitute $n = 10$:

$$\binom{10}{2} = \frac{10 \times 9}{2}.$$

Step 2 — Multiply the numerator:

$$10 \times 9 = 90.$$

Step 3 — Divide by 2:

$$\frac{90}{2} = 45.$$

Why other options are wrong:

- Option B: 90 counts each handshake twice (ordered pairs).
- Option C: 50 has no valid basis here.
- Option D: 55 is $\binom{11}{2}$, for 11 people.

Final Answer: Handshakes $= \binom{10}{2} = 45 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q29

Q30.

Solution

Concept — Probability: Probability $= \dfrac{\text{favourable outcomes}}{\text{total outcomes}}$ for equally likely draws.

Step 1 — Total number of balls:

$$4 + 6 = 10.$$

Step 2 — Favourable (red) outcomes:

$$4.$$

Step 3 — Form and simplify the ratio:

$$\frac{4}{10} = \frac{2}{5}.$$

Why other options are wrong:

- Option A: $\frac{3}{5}$ is the probability of drawing a blue ball.
- Option B: $\frac{1}{2}$ assumes equal numbers of each colour.
- Option D: $\frac{4}{6}$ divides red balls by blue balls, not by the total.

Final Answer: $P(\text{red}) = \frac{4}{10} = \frac{2}{5} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q30

Answer Key

IBSAT Quantitative Aptitude – Sample Paper 4									
Q	**Ans**	**Q**	**Ans**	**Q**	**Ans**	**Q**	**Ans**	**Q**	**Ans**
1	C	2	A	3	D	4	B	5	A
6	C	7	B	8	D	9	A	10	C
11	B	12	D	13	A	14	C	15	B
16	D	17	A	18	C	19	B	20	D
21	A	22	C	23	B	24	D	25	A
26	C	27	B	28	D	29	A	30	C