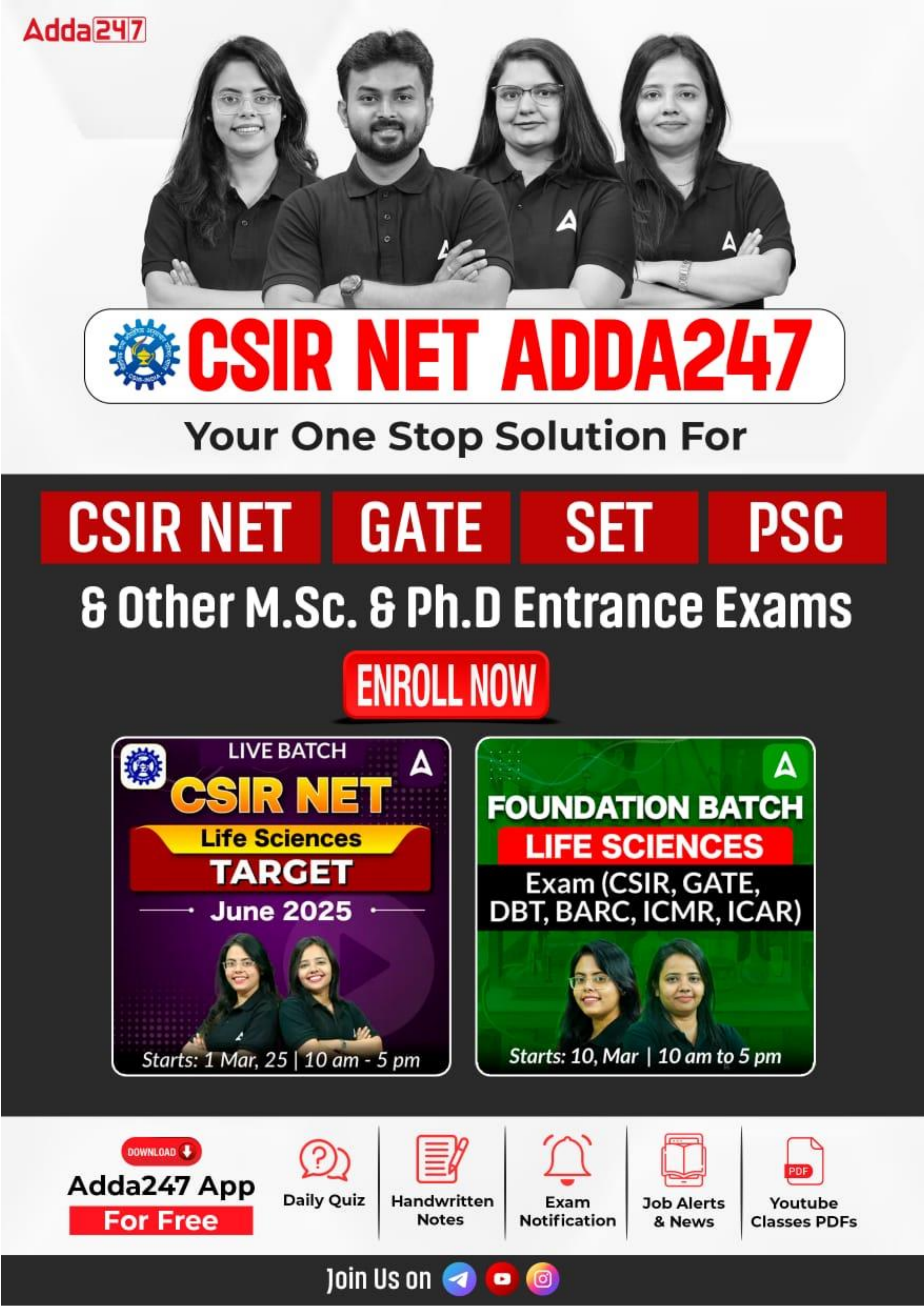
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CSIR NET General Aptitude Questions Answers With Solutions

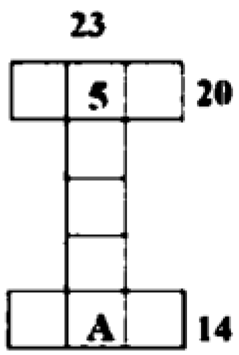
Q1. In a class of 70 students, 20% of girls have spectacles and 40% of boys have spectacles. If the total number of students having spectacle is 23, the number of boys in the class is
(a) 45
(b) 14
(c) 18
(d) 25

Q2. A rectangular tray of 30 cm × 60 cm size is used for baking circular biscuits. The diameter of each biscuit is 3 cm before baking, which increases by 10% on baking. What is the maximum number of biscuits that can be baked in the tray such that the base of each biscuit is in contact with the tray?
(a) 171
(b) 162
(c) 180
(d) 200

Q3. A random walker takes a step of unit length towards right or left at any discrete time step. Starting from x = 0 at time t = 0, it goes right to reach x = 1 at t = 1. Hereafter if it repeats the direction taken in the previous step with probability p, the probability that it is again at x = 1 at t = 3 is
(a) $1 - p$
(b) $(1 - p)^2$
(c) $2p(1 - p)$
(d) $4p^2(1 - p)$

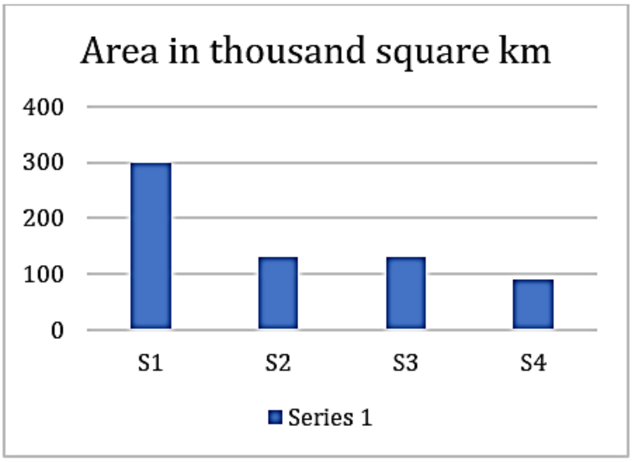
Q4. A large number of birds, half of which belong to specie A and the other half to specie B, rest on a tree where they are distributed randomly across the branches. In a random sample of 5 birds from the tree, what is the probability that at least one is from specie A?
(a) 0.03125
(b) 0.15625
(c) 0.84375
(d) 0.96875

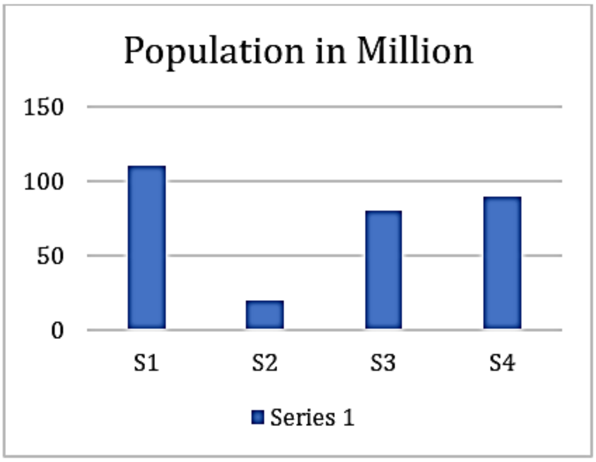
Q5. The squares in the following grid are filled with numbers 1 to 9, without repetition, such that the numbers in the squares forming the top and bottom rows add to 20 and 14 respectively and those forming the column to 23. What is the value of A?



(a) 4
(b) 6
(c) 7
(d) 8

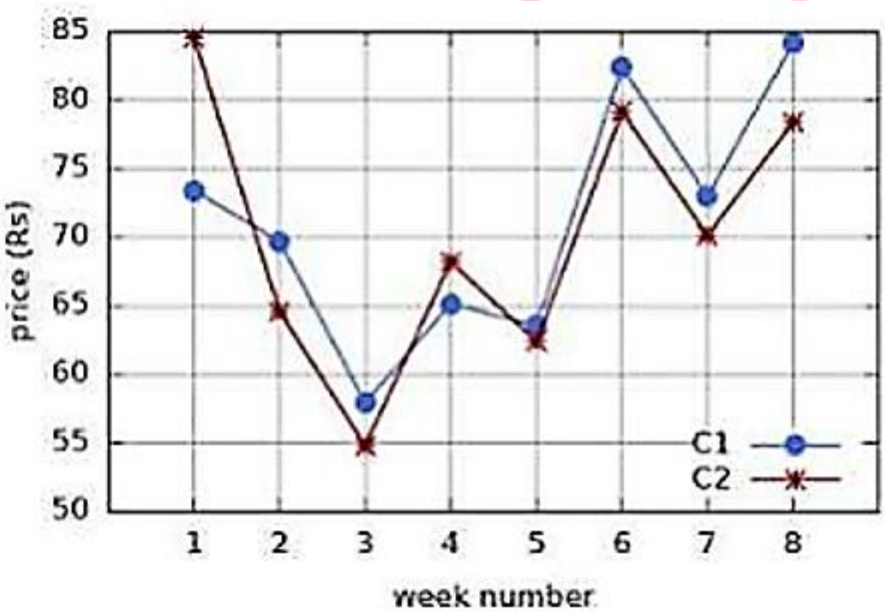
Q6. Areas and populations of four states S1, S2, S3 and S4 are shown.





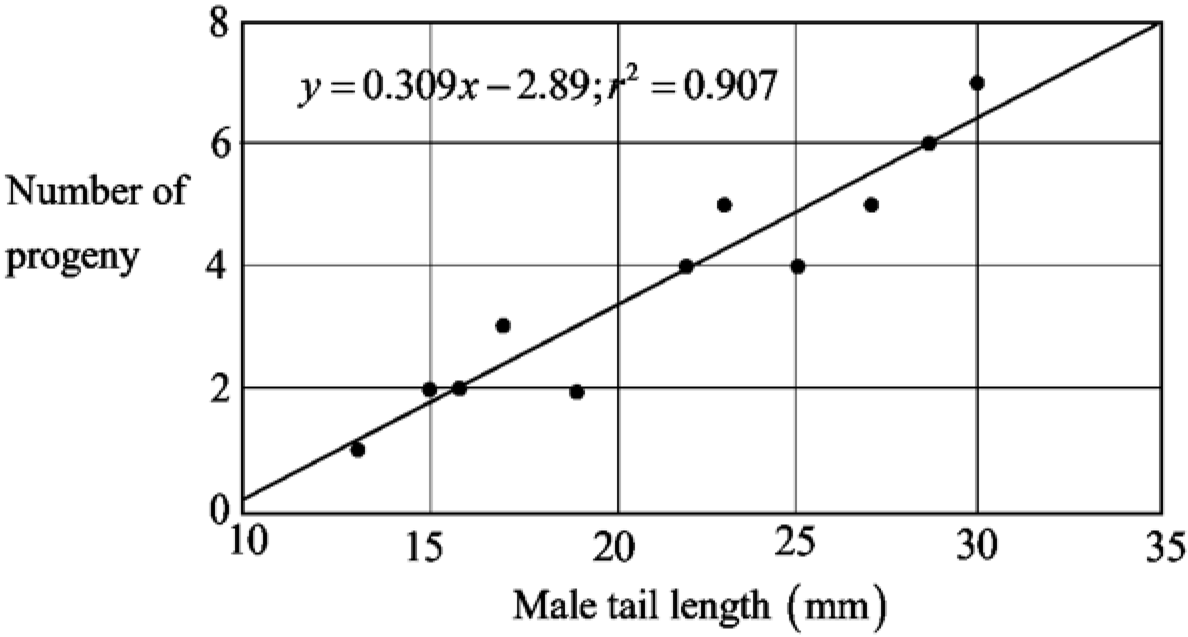
Their arrangement in decreasing order of population density would be
(a) S4, S3, S1, S2
(b) S1, S2, S3, S4
(c) S4, S1, S3, S2
(d) S2, S1, S3, S4

Q7. The two graphs show the change in price of two commodities C1 and C2 over 8 weeks.



Which of the statements is correct?
(a) C1 has higher fluctuation than C2
(b) Average price of C1 is lower than that of C2
(c) The largest change in a week is shown by C2
(d) C1 shows a tendency of reduction

Q8. The graph shows observations and a regression line of the number of progeny on the tail length of male birds.



Which of the following can be inferred from the graph?
(a) Producing less progeny decreases the tail length of the males.
(b) Males cannot have a tail length lesser than 10 mm.
(c) Males with longer tails tend to father more progeny.
(d) For a male with a 25 mm tail, the expected number of progeny is 4.

Q9. The population of a town is increasing at a uniform rate. If its population was 90,000 and 96,000 in 2022 and 2023 respectively, what would be its population in 2024?
(a) 102, 000
(b) 102, 400
(c) 102, 720
(d) 102, 960

Q10. In how many distinct ways can 128 identical marbles be arranged in a complete rectangular grid (disregarding the orientation of the grid)?
(a) 7
(b) 6
(c) 5
(d) 4

Q11. How many three-digit numbers exist whose first and last digits add up to 9?
(a) 90
(b) 81
(c) 80
(d) 72

Q12. If 32XY6 is divisible by 9, X and Y being even decimal digits, then X =
(a) 2
(b) 4
(c) 6
(d) 8

Q13. A record player stylus moves along a spiral groove cut on an annular portion of a disc with inner radius 4 cm and outer radius 10 cm. If the record turns 100 times when playing, the stylus travels approximately
(a) 2.2 m
(b) 4.4 m
(c) 22 m
(d) 44 m

Q14. An egg tray has 30 cavities to hold eggs in 5 rows and 6 columns. Each cavity is surrounded by 4 raised corners shared by adjacent cavities. How many raised corners does the egg tray have?
(a) 30
(b) 35
(c) 36
(d) 42

Q15. A patient requires administration of 500 ml of an intravenous fluid in 1 hour. What is the approximate drip rate (number of drops per minute) at which the fluid should be administered, if the volume of a drop is 0.05 ml?
(a) 76
(b) 152
(c) 167
(d) 332

Q16. A referendum on a proposal involved 7000 participants. Among the participants 3600 were women and the rest were men. 2900 participants, of whom 1300 were women, voted against while 3000 participants voted in favour. 400 women abstained. The ratio of the number of men that did not vote to the total number of participants is
(a) 11:70
(b) 17:35
(c) 1:10
(d) 8:70

Q17. Among A, B, C, D, E and F, D is taller than B but shorter than F. E is taller than B, but shorter than C. B is not the shortest of all. Then A is
(a) the shortest of all.
(b) the tallest of all.
(c) taller than E, but shorter than C.
(d) taller than C, but shorter than F.

Q18. Canals A and B join to form canal C, all having semi-circular cross-sections of radii which are in the ratio 3:4:5, respectively. Assume smooth merger of A and B, and ignore the possibility of flooding. If the speed s of water is the same and uniform in both A and B then the speed of water flowing in C is
(a) S
(b) 7S/5
(c) 2S
(d) 5S/7

Q19. On a one-way road, broken lines consisting of 2.5 m length segments separated by 2.5 m gaps are painted along the length of the road to demarcate 3 lanes, and continuous lines are painted along both the borders. What is the total length of the painted lines (in m) over a 250 m stretch of the road?
(a) 500
(b) 625
(c) 750
(d) 1000

Q20. Among 1000 squirrel babies, 200 have three stripes on their back, 500 have two stripes on their back and the rest have four stripes on their back. While 90% of the three-striped babies survive to adulthood, only 80% of the two-striped and 70% of the four-striped babies survive to adulthood. The fraction of four-striped squirrels among the adults is nearest to
(a) 0.21
(b) 0.3
(c) 0.266
(d) 0.228

Solutions

S1. Ans.(a)
Sol. Given:
- Total students = 70,
- 20% of girls have spectacles,
- 40% of boys have spectacles,
- Total students with spectacles = 23.

Solution:
Let the number of boys in the class be x.
Then, the number of girls in the class is 70 - x.
Calculate the number of boys with spectacles:
Since 40% of boys have spectacles, the number of boys with spectacles is:
0.4 × x.
Calculate the number of girls with spectacles:
Since 20% of girls have spectacles, the number of girls with spectacles is:
0.2 × (70 - x).

Total students with spectacles:
The sum of boys and girls with spectacles is given as 23. So:
0.4x + 0.2(70 - x) = 23.
Simplify the equation:
Expanding the terms:
0.4x + 14 - 0.2x = 23,
0.2x + 14 = 23,
0.2x = 9,
x = 45.
Thus, the number of boys in the class is **45**.

S2. Ans.(b)
Sol. **Given:**
- Dimensions of the tray: 30 cm × 60 cm.
- Diameter of each biscuit before baking: 3 cm.
- Diameter increases by 10% after baking.
- The biscuits need to fit into the tray without overlapping, with their bases in contact with the tray.

Solution:
1. **Calculate the diameter of each biscuit after baking:**
   - Increase in diameter = 10% of 3 cm = 0.3 cm.
   - Diameter after baking = 3 cm + 0.3 cm = 3.3 cm.
2. **Calculate the number of biscuits that can fit along the length and width of the tray:**
   - Along the **length (60 cm):** Each biscuit occupies a space of 3.3 cm.
     Number of biscuits along the length = Floor of (60 / 3.3) ≈ 18 biscuits.
   - Along the **width (30 cm):** Each biscuit occupies a space of 3.3 cm.
     Number of biscuits along the width = Floor of (30 / 3.3) ≈ 9 biscuits.
3. **Calculate the total number of biscuits that can fit in the tray:**
   - Total number of biscuits = Number along the length × Number along the width = 18 × 9 = 162 biscuits.

Conclusion:
The maximum number of biscuits that can fit in the tray is **(b) 162**.

S3. Ans.(a)
Sol. **Solution:**
To determine the probability that the random walker is again at x=1 at time t=3, we need to consider the possible sequences of steps it can take after the first step. The random walker starts at x=0 at time t=0 and moves to x=1at time t = 1. From x = 1at time t = 1, the random walker can take the following steps:
1. Right, Left, Right (R, L, R)
2. Right, Right, Left (R, R, L)
3. Left, Right, Right (L, R, R)
4. Left, Left, Right (L, L, R)

However, since the random walker repeats the direction taken in the previous step with probability p, and changes direction with probability 1−p, we need to consider the probabilities of each sequence.

Let's analyze each sequence:

1. **Sequence R, L, R:**
   - The probability of the first step being Right is 1 (since it is given).
   - The probability of the second step being Left is $1-p$ (since it changes direction).
   - The probability of the third step being Right is $1-p$ (since it changes direction).
   - Therefore, the total probability for this sequence is $1\times(1-p)\times(1-p)=(1-p)^2$.
2. **Sequence R, R, L:**
   - The probability of the first step being Right is 1.
   - The probability of the second step being Right is p (since it repeats direction).
   - The probability of the third step being Left is $1-p$ (since it changes direction).
   - Therefore, the total probability for this sequence is $1\times p\times(1-p)=p(1-p)$.
3. **Sequence L, R, R:**
   - The probability of the first step being Right is 1.
   - The probability of the second step being Left is $1-p$ (since it changes direction).
   - The probability of the third step being Right is p (since it repeats direction).
   - Therefore, the total probability for this sequence is $1\times(1-p)\times p = p(1-p)$.
4. **Sequence L, L, R:**
   - The probability of the first step being Right is 1.
   - The probability of the second step being Left is $1-p$ (since it changes direction).
   - The probability of the third step being Left is p (since it repeats direction).
   - The probability of the fourth step being Right is $1-p$ (since it changes direction).
   - Therefore, the total probability for this sequence is $1\times(1-p)\times p\times(1-p)=p(1-p)^2$.

However, we only need to consider the sequences that bring the random walker back tox=1at timet=3.
The only sequences that satisfy this condition are R, L, R and R, R, L.
Therefore, the total probability is the sum of the probabilities of these two sequences:
$(1-p)^2 + p(1-p) = (1-p)(1-p+p) = (1-p)\times1 = 1-p$
Thus, the probability that the random walker is again at $x = 1$ at time $t = 3$ is $\mathbf{1-p}$.

S4. Ans.(d)
Sol. <u>Given:</u>

- 50% of birds belong to species A, and 50% belong to species B,
- A random sample of 5 birds is taken,
- Find the probability that at least one bird is from species A.

<u>Solution:</u>

1. Probability of selecting a bird from species A = 0.5,
   Probability of selecting a bird from species B = 0.5.
2. Probability that all 5 birds are from species B:
   P (all 5 from B) = $(0.5)^5$ = 0.03125.
3. Probability that at least one bird is from species A:
   P (at least one from A) = 1 - P(all 5 from B),
   P (at least one from A) = 1 - 0.03125 = 0.96875.

Thus, the probability that at least one bird is from species A is **0.96875.**

S5. Ans.(c)

Sol. Givena) 3 × 3 grid with numbers 1 to 9 filled without repetition. The top row sums to 20, the bottom row sums to 14, and the column sums to 23. Find the value of A.

Solution:

	23		
6	5	9	20
	1		
	2		
	8		
3	7	4	14

1. Analyze the constraints:
   - The sum of numbers in the top row is 20.
   - The sum of numbers in the bottom row is 14.
   - The column sum is 23.
2. Deduce the placement of numbers:
   - Place numbers systematically, ensuring the given constraints are satisfied.
   - After assigning values, the grid configuration leads to the value of A being 7.

Thus, the value of A is **7**.

S6. Ans.(a)

Sol. Given:

Population and area of four states (S1, S2, S3, S4).

Solution:

1. Population density is defined as the number of people per unit area. It is calculated as:
   Population density = Population / Area.
2. Calculate the population density for each state:
   - S1: Population = P1, Area = A1, Density = P1/A1,
   - S2: Population = P2, Area = A2, Density = P2/A2,
   - S3: Population = P3, Area = A3, Density = P3/A3,
   - S4: Population = P4, Area = A4, Density = P4/A4.
3. Arrange the states in decreasing order of population density.
   From the calculations, the correct order is: S4 > S3 > S1 > S2.
   Thus, the correct arrangement is **S4, S3, S1, S2**.

S7. Ans.(c)

Sol. Given:

- Graphs showing the weekly price changes of two commodities, C1 and C2, over 8 weeks.
- Analyze the graphs to determine which statement is correct.

Solution:

1. **Fluctuation:**
   - The fluctuation refers to how much the prices vary over the 8 weeks.
   - From the graph, both commodities show fluctuations, but C2 has slightly smaller fluctuations than C1. Therefore, C1 does not have higher fluctuation than C2.

2. **Average Price Comparison:**
   - The average price is calculated as the sum of prices over 8 weeks divided by 8.
   - By visual inspection, the average price of C1 is not consistently lower than that of C2.
3. **Largest Weekly Change:**
   - The largest weekly change is identified by observing the steepest slope in the graph.
   - From the graph, the largest single-week change is for C2 (between week 4 and week 5).
4. **Tendency for Reduction:**
   - C1 does not show a consistent tendency for reduction, as the prices increase and decrease variably over the 8 weeks.

Conclusion:
The correct statement is: **(c) The largest change in a week is shown by C2.**

S8. Ans.(c)
S9. Ans.(b)
S10. Ans.(d)

S11. Ans.(a)
Sol. Solution: A three-digit number can be represented as ABCABCABC, where AAA is the hundreds digit, BBB is the tens digit, and CCC is the units digit. The condition given is that the first digit (AAA) and the last digit (CCC) must sum up to 9.
1. Possible values for AAA (hundreds digit) are 1,2,3,...,91, 2, 3, ..., 91,2,3,...,9, as AAA must be a non-zero digit in a three-digit number.
2. For each AAA, the corresponding CCC is calculated as C=9−AC = 9 - AC=9−A. Hence, valid pairs of AAA and CCC are:
   - (1,8),(2,7),(3,6),(4,5),(5,4),(6,3),(7,2),(8,1),(9,0)(1, 8), (2, 7), (3, 6), (4, 5), (5, 4), (6, 3), (7, 2), (8, 1), (9, 0)(1,8),(2,7),(3,6),(4,5),(5,4),(6,3),(7,2),(8,1),(9,0).
   - This gives 9 pairs of (A,C)(A, C)(A,C).
3. The tens digit BBB can be any digit from 000 to 999 (10 choices for each pair (A,C)(A, C)(A,C)).

Thus, the total number of such three-digit numbers is:
$9\times10=90$
Final Answer: Thus the correct answer is option (A) 90

S12. Ans.(d)
S13. Ans.(d)
S14. Ans.(d)
S15. Ans.(c)
S16. Ans.(c)
S17. Ans.(a)

S18. Ans.(a)
Sol. Given:
- **semi-circular cross-sections**Canals A, B, and C have .
- Radii of A, B, and C are in the ratio 3:4:53:4:53:4:5.
- Speed of water in canals A and B is sss.

We need to find the speed of water in canal C.

Concept:
The flow rate (QQQ) of water is conserved and is given by:
Flow rate = Cross-sectional area × Speed of water
For a semi-circular cross-sectiona)**rea = (1/2) × π × r^2**
Step 1: Calculate the flow rates for canals A and B
1. **Canal A**:
   - Radius = 3k3k3k
   - Flow rate = (1/2) × π × $(3k)^2$ × sss
   - Flow rate = (1/2) × π × $9k^2$ × sss
1. **Canal B**:
   - Radius = 4k4k4k
   - Flow rate = (1/2) × π × $(4k)^2$ × sss
   - Flow rate = (1/2) × π × $16k^2$ × sss

Step 2: Total flow rate in canal C
The total flow rate in canal C is the sum of the flow rates in canals A and B:
Total flow rate = Flow rate of A + Flow rate of B
= (1/2) × π × $9k^2$ × sss + (1/2) × π × $16k^2$ × sss
Factor out common terms:
Total flow rate = (1/2) × π × k^2 × sss × (9 + 16)
Total flow rate = (1/2) × π × k^2 × sss × 25
Step 3: Flow rate in canal C
For canal C:
- Radius = 5k5k5k
- Flow rate = (1/2) × π × $(5k)^2$ × v_CvCv_C

where v_C vCv_C
is the speed of water in C.
Simplify:
Flow rate in C = (1/2) × π × $25k^2$ × v_CvCv_C
Step 4: Equate total flow rate and flow rate in canal C
Equating both expressions for the flow rate:
(1/2) × π × k^2 × sss × 25 = (1/2) × π × $25k^2$ × vCv_Cv_C
Cancel out common terms:
k2k^2k_2, πππ, and 252525:
s=vCs = v_Cs=v_C
Final Answer:
The speed of water in canal C is equal to sss.
Correct Option: (a) sss

S19. Ans.(c)

S20. Ans.(c)