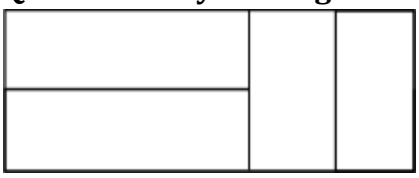
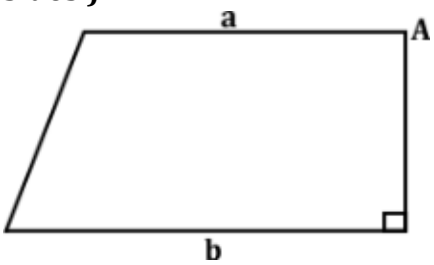
CSIR NET General Aptitude Questions Answers With Solutions

Q1. How many rectangles are there in the given figure?



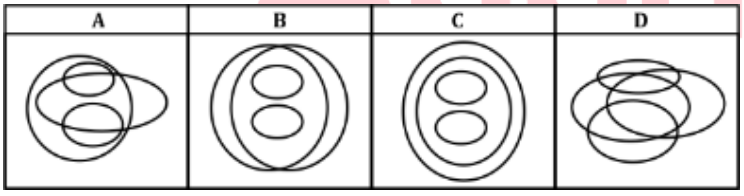
(a) 6
(b) 7
(c) 8
(d) 9

Q2. At what horizontal distance from A should a vertical line be drawn so as to divide the area of the trapezium shown in the figure into two equal parts ? (a and b are lengths of the parallel sides.)



(a) (a + b)/4
(b) (a + b)/3
(c) (a + b)/2
(d) (2a + b)/2

Q3. The correct pictorial representation of the relations among the categories PLAYERS, FEMALE CRICKETERS, MALE FOOTBALLERS and GRADUATES is



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

Q4. A liar always lies and a non-liar, never. If in a group of n persons seated around a round-table everyone calls his/her left neighbor a liar, then
(a) all are liars.
(b) n must be even and every alternate person is a liar
(c) n must be odd and every alternate person is a liar
(d) n must be a prime

Q5. In a four-digit PIN, the third digit is the product of the first two digits and the fourth digit is zero. The number of such PINs is
(a) 42
(b) 41
(c) 40
(d) 39

Q6. A walker takes steps, each of length L, randomly in the directions along east, west, north and south. After four steps its distance from the starting point is d. The probability that d≤3L is
(a) 63/64
(b) 59/64
(c) 57/64
(d) 55/64

Q7. Sections A, B, C and D of a class have 24, 27, 30 and 36 students, respectively. One section has boys and girls who are seated alternately in three rows, such that the first and the last positions in each row are occupied by boys. Which section could this be?
(a) A
(b) B
(c) C
(d) D

Q8. A boy has kites of which all but 9 are red, all but 9 are yellow, all but 9 are green, and all but 9 are blue. How many kites does he have?
(a) 12
(b) 15
(c) 9
(d) 18

Q9. In a round-robin tournament, after each team has played exactly four matches, the number of wins/ losses of 6 participating teams are as follows

Team	Win	Loss
A	4	0
B	0	4
C	3	1
D	2	2
E	0	4
F	3	1

Which of the two teams have certainly NOT played with each other?
(a) A and B
(b) C and F
(c) E and D
(d) B and E

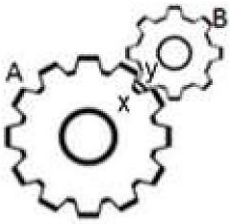
Q10. After 12:00:00 the hour hand and minute hand of a clock will be perpendicular to each other for the first time at

(a) 12:16:21
(b) 12:15:00
(c) 13:22:21
(d) 12:48:08

Q11. On a track of 200 m length, S runs from the starting point and R starts 20 m ahead of S at the same time. Both reach the end of the track at the same time. S runs at a uniform speed of 10 m/s. If R also runs at a uniform speed, what is R's speed (in m/s)?

(a) 9
(b) 10
(c) 12
(d) 8

Q12. A vehicle has tyres of diameter 1 m connected by a shaft directly to gearwheel A which meshes with gearwheel B as shown in the diagram. A has 12 teeth and B has 8. If points x on A and y on B are initially in contact, they will again be in contact after the vehicle has travelled a distance (in meters)



(a) 2π
(b) 3π
(c) 4π
(d) 12π

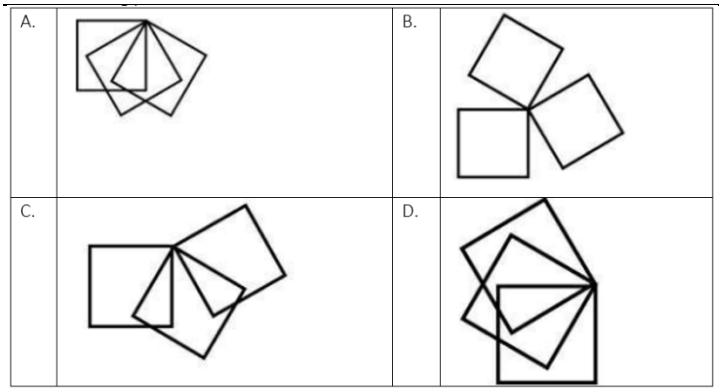
Q13. Starting from the top of a page and pointing downward, an ant moves according to the following commands

Start

↓

{Repeat actions in curly brackets 3 times
Repeat actions in the box 4 times
[Move forward 100 units
↓
Turn right by 90 degrees]
Turn left by 30 degrees}

Of the following paths



Which is the correct path of the ant?

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

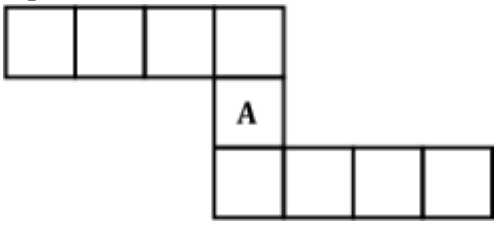
Q14. I have a brother who is 4 years elder to me, and a sister who was 5 years old when my brother was born. When my sister was born, my father was 24 years old. My mother was 27 years old when I was born. How old (in years) were my father and mother, respectively, when my brother was born?

(a) 29 and 23
(b) 27 and 25
(c) 27 and 23
(d) 29 and 25

Q15. A plant grows by 10% of its height every three months. If the plant's height today is 1 m, its height after one year is the closest to

(a) 1.10 m
(b) 1.21 m
(c) 1.33 m
(d) 1.46 m

Q16. The squares in the following sketch are filled with digits 1 to 9, without any repetition, such that the numbers in the two horizontal rows add up to 20 each. What number appears in the square labelled A in the vertical column?



(a) It cannot be ascertained in the absence of the sum of the numbers in the column
(b) 3
(c) 5
(d) 7

Q17. A beam of square cross-section is to be cut out of a wooden log. Assuming that the log is cylindrical, what approximately is the largest fraction of the wood by volume that can be fruitfully utilised as the beam?
(a) 49%
(b) 64%
(c) 71%
(d) 81%

Q18. Tokens numbered from 1 to 25 are mixed and one token is drawn randomly. What is the probability that the number on the token drawn is divisible either by 4 or by 6?
(a) 8/25
(b) 10/25
(c) 9/25
(d) 12/25

Q19. What is the product of the number of capital letters and the number of small letters of the English alphabet in the following text?
A4;={c8%$56((+B/;,.H&r]]](u];#~K@>83<??/STvx%^(d)L:/<N347)))2;:$+}E$###[w]"..;/89
(a) 17
(b) 37
(c) 53
(d) 63

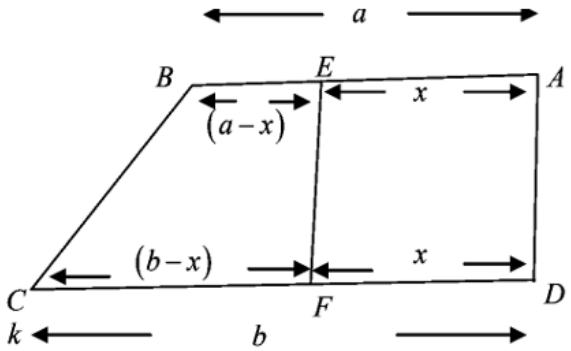
Q20. If one letter each is drawn at random from the words CAUSE and EFFECT, the chance that they are the same is
(a) 1/30
(b) 1/11
(c) 1/10
(d) 2/11

Solutions

S1. Ans.(c)
Sol. The large outer rectangle itself counts as 1 rectangle.
Smaller rectangles are formed by the internal divisions:
The grid inside the larger rectangle has horizontal and vertical lines that intersect.
There are 3 vertical lines and 2 horizontal lines, creating several combinations of rectangles.
Counting rectangles of different sizes:
Smallest rectangles: Each 1x1 section inside the figure counts as a rectangle. There are **4 small rectangles**.
Larger rectangles: We can count other rectangles formed by combining the smaller ones:
2 rectangles formed by combining two adjacent small rectangles horizontally.
2 rectangles formed by combining two small rectangles vertically.
1 large rectangle: The entire figure itself counts as 1 large rectangle.

Total Rectangles:
4 small rectangles (1x1).
2 larger rectangles formed by combining two small rectangles horizontally.
2 larger rectangles formed by combining two small rectangles vertically.
1 large rectangle (the entire figure).
Thus, the total number of rectangles is **8**.
Final Answer: 8.

S2. Ans.(a)
Sol. Solution:
Let the vertical line be drawn at a distance x from A.
EA = x = FDE
BE = a−x
CF = b−x



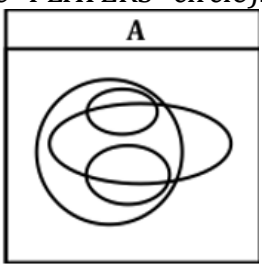
The area of trapezium EBCF equals the area of trapezium AEFD:
Area formula: (1/2) × EF × ((a - x) + (b - x)) = EF × x
Simplify the equation: (1/2) × EF × (a + b - 2x) = EF × x
a + b - 2x = 2x
4x = a + b
Solve for x: x = (a + b) / 4
Final Answer: The vertical line should be drawn at a distance **(a + b) / 4** from A.

S3. Ans.(a)
Sol. Concept:
A **Venn diagram** is a type of chart with **overlapping circles that indicates how much different groups have in common.** A way to visualize relationships between different groups, known as sets.
Here's a basic way how a Venn Diagram works:

- Each **set of elements or event is represented as a circle or other shape.**
- **If elements belong to more than one set, the shapes are overlapped.** For example, if you have two sets A and B, then the intersection of these sets (those elements that belong to both A and B) are represented by the area where the circles overlap.
- Sometimes, a **rectangle is drawn around the whole diagram to represent the universal set,** which includes all the elements under consideration.
- The **areas where circles interact or overlap represent all the possible logical relations between the sets.**

Solution:

- Draw a large circle and label it as "PLAYERS." This circle contains all individuals who fall into the category of playing any type of sport.
- Within the "PLAYERS" circle, draw two smaller circles that don't intersect and label one as "FEMALE CRICKETERS" and the other as "MALE FOOTBALLERS". The fact that these two circles are mutually exclusive represents the fact that a person cannot be both a female cricketer and a male footballer.
- Finally, draw a separate large circle intersecting with the "PLAYERS" circle and label it as "GRADUATES". This circle will also overlap the "FEMALE CRICKETERS" and "MALE FOOTBALLERS" circles (because they are subsets of the "PLAYERS" circle).



S4. Ans.(b)
Sol. Solution:
Given the information that a liar always lies and a non-liar never lies, let's analyze the options:
"All are liars": This statement contradicts the information given because **if all are liars, they would call their left neighbor a liar, but that would mean the person on their left is telling the truth,** which is inconsistent.
"n must be even, and every alternate person is a liar": **This option is correct**. If n is even and every alternate person is a liar, then it can work without logical contradictions. For example:
Person 1 (on the far left) is a truth-teller. Person 2 (to the right of Person 1) is a liar. Person 3 (to the right of Person 2) is a truth-teller. Person 4 (to the right of Person 3) is a liar.
This pattern continues around the table. In this setup, every alternate person is a liar, which means they will always lie and call their left neighbor a liar, while the truth-tellers will always tell the truth and call their left neighbor a liar. There are no logical contradictions in this arrangement.
"n must be odd, and every alternate person is a liar": This option does not work because if n is odd, then there will be an even number of people between any two liars, which means there will be a truth-teller in between. This breaks the condition that every alternate person is a liar.
"n must be a prime": This option does not necessarily hold true. For example, you can have a group of 6 people where every alternate person is a liar, and this satisfies the conditions without n being a prime number.
Conclusion:-
So, **the correct answer is option b: "n must be even, and every alternate person is a liar."**

S5. Ans.(a)
Sol. Given: In a four-digit PIN, the third digit is the product of the first two digits and the fourth digit is zero.
Solution:
Let the four digit number is abcd.
Now according to the question, we have -
d = 0 and c = ab
Now we **choose the values for a and b** and make sure that the product of the **numbers is one digit number.**

Now make cases-
when a = 0 then choices for b = 0,1,2,.....9
this case gives you total 10 numbers
when a = 1 then choices for b = 0,1,2,.....9
this case gives you total 10 numbers
when a = 2 then choices for b = 0,1,2,.....4
this case gives you total 5 numbers
when a = 3 then choices for b = 0,1,2,.....3
this case gives you total 4 numbers
when a = 4 then choices for b = 0,1,2
this case gives you total 3 numbers
when a = 5 then choices for b = 0,1,
this case gives you total 2 numbers
when a = 6 then choices for b = 0,1
this case gives you total 2 numbers
when a = 7 then choices for b = 0,1
this case gives you total 2 numbers
when a = 8 then choices for b = 0,1
this case gives you total 2 numbers
when a = 9 then choices for b = 0,1
this case gives you total 2 numbers
total numbers - 42
Hence option (a) is correct.

S6. Ans.(d)
Sol. Solution:
Let's proceed by understanding what could be the possible outcomes after N steps.
If one-step is taken, the person could end up anywhere (East, West, South, North) so **d = L.**
If two-steps are taken, the person could move two steps back to the origin (move East then West, or move North then South), move a step East or West and then a step North or South, or move two steps in the same direction.
Therefore, the possible distances are **0L, $\sqrt{2}$L, or 2L**.
If three-steps are taken, the person could return to the origin (e.g., East, West, North), or make several other moves producing distances of **$\sqrt{2}$L, $\sqrt{3}$L, $\sqrt{5}$L**.
If four-steps are taken, there are more possibilities. In this problem, we are only interested in the possibilities where the total displacement vector's magnitude d ≤ 3L.
Considering all possible combinations of moves in four steps, we get four situations: Four moves in the same direction (e.g., North, North, North, North).
This leads to a distance of 4L.
Three moves in the same direction and one move in a different plane (e.g., North, North, North, East).
This can lead to distances of **$\sqrt{10}$L, $\sqrt{2}$L**.
Two pairs move in the same direction but in different planes (e.g., North, North, East, East). This leads to a distance of **2$\sqrt{2}$L**.
Two moves in one direction and the other two moves in two different directions (e.g., North, North, East, South). This can give **$\sqrt{5}$L, 1L, $\sqrt{2}$L**.

Four moves in four different directions (e.g., North, South, East, West). This leads to a distance of 0L.
From the above, we can notice that distances greater than **3L** (i.e., **$\sqrt{5}$L, $\sqrt{10}$L and 4L**) can only occur in situations 1 and 2.
So, let's calculate the probabilities.
The total number of outcomes in this situation is 4 (one for each direction). There are 4×4 ways of choosing which direction to go three times, and 3 ways of choosing the direction for the fourth step. This gives a total of 48 outcomes.
But only 16 of these result in a distance of $\sqrt{2}$L (8 of the form NNNE and 8 of the form NNNW), while the remaining 32 results in a distance greater than 3L.
This situation always results in a distance less than or equal to 3L. This situation always results in a distance less than or equal to 3L. This situation always results in a distance less than or equal to 3L.
Finally, the total number of outcomes is 44 = 256, and the number of undesired outcomes (where d > 3L) is **4 + 32 = 36**.
This gives us a probability
$P(d \leq 3L) = 1 - P(d > 3L) = 1 - \frac{36}{256} = \frac{220}{256} = \frac{55}{64}$.

S7. Ans.(b)
Sol. Given:
1. Sections A, B, C, and D have 24, 27, 30, and 36 students, respectively.
2. In the section we're looking for:
- Boys and girls are seated alternately in three rows.
- The first and last positions in each row are occupied by boys.

Analysis:
1. Since boys and girls are seated alternately, each row must start and end with boys, meaning each row must contain an **odd number of seats** (so that boys occupy the first and last positions).
2. Let's assume each row has an odd number of seats, say x, where x is odd.
3. Since there are three rows, the total number of seats in that section would be 3×x
4. We need to check which section has a total number of students that is a multiple of 3 and can be arranged with an odd number of seats in each row.

Checking Each Section:
- **Section A** has 24 students.
- If divided into 3 rows, each row would have 24 ÷ 3 = 8 seats (even number). So, Section A does not meet the condition.
- **Section B** has 27 students.
- If divided into 3 rows, each row would have 27 ÷ 3 = 9 seats (odd number). This satisfies the condition of an odd number of seats per row, where boys can sit at the first and last positions.
- **Section C** has 30 students.
- If divided into 3 rows, each row would have 30 ÷ 3 = 10 seats (even number). So, Section C does not meet the condition.
- **Section D** has 36 students.
- If divided into 3 rows, each row would have 36 ÷ 3 = 12 seats (even number). So, Section D does not meet the condition.

Conclusion:
The only section that meets the criteria is **Section B**, with 27 students, where each row can have 9 seats, allowing boys to occupy the first and last positions in each row.
Answer:
The correct answer is **Section B**.

S8. Ans.(a)
Sol. Given:
1. The boy has kites of different colors: red, yellow, green, and blue.
2. All but 9 of the kites are red.
3. All but 9 of the kites are yellow.
4. All but 9 of the kites are green.
5. All but 9 of the kites are blue.

This means that the total number of kites minus the number of kites of each color is 9.
Let the total number of kites be "N."

- The number of red kites is "N - 9."
- The number of yellow kites is "N - 9."
- The number of green kites is "N - 9."
- The number of blue kites is "N - 9."

Approach:
Each color (red, yellow, green, and blue) has "N - 9" kites, but there are only "N" kites in total, so there is exactly one kite of each color that is not included in the count for each color.
Thus, the total number of kites is 9 plus one kite for each color (one red, one yellow, one green, and one blue). Therefore, the total number of kites is:
N = 9 + 3 = 12.
Final Answer:
The boy has **12 kites**.
Correct Option: (a) 12.

S9. Ans.(d)
Sol. Given:
1. It's a round-robin tournament with each team playing exactly four matches.
2. There are 6 teams (A, B, C, D, E, F) with the following win/loss records:

- Team A: 4 wins, 0 losses
- Team B: 0 wins, 4 losses
- Team C: 3 wins, 1 loss
- Team D: 2 wins, 2 losses
- Team E: 0 wins, 4 losses
- Team F: 3 wins, 1 loss

Observations:
1. **Team A** has 4 wins and 0 losses, which means Team A won all of its matches.
2. **Team B** and **Team E** both have 0 wins and 4 losses, which means they lost all of their matches.
3. Since each team plays exactly four matches, any team with 0 wins could not have played against any other team with 0 wins (because they would each need to lose that match, which is impossible in a single game).

Conclusion:
Since **Team B** and **Team E** both lost all of their matches, it's certain that **B and E did not play against each other**. If they had, one of them would have at least one win.
Answer:
The correct answer is: **(d) B and E**

S10. Ans.(a)
Sol. Given:
After 12:00:00 the hour hand and minute hand of a clock will be perpendicular to each other for the first time
Solution:
After 12:00, the first time the hour and minute hands of a clock are perpendicular, or form a 90-degree angle, is at approximately 1:05.
Let me explain why that is:
Both the hour and the minute hand start off at 12:00 (with "0" degrees between them).
Every minute, the minute hand moves 6 degrees (as 360 (full circle) divided by 60 (minutes) equals 6 (degrees every minute)), and the hour hand moves 0.5 degrees (as 360 (full circle) divided by 12 (hours) divided by 60 (minutes) yields 0.5 (degrees every minute)).
So, for the angle between both hands to be 90 degrees, the difference in their positions must be 90 degrees. If "M" stands for the number of minutes passed, the equation is:
6M - 0.5M = 90
Solving for M (the number of minutes after 12:00), we get:
5.5M = 90 --> M = 90/5.5 ≈ 16.36 minutes,
which is close to 16 minutes and 21 seconds.

S11. Ans.(a)
Sol. Concept:
In a mathematical context, you can calculate uniform speed by dividing the total distance traveled by the total time it took to travel that distance. The formula is:
Speed = Distance / Time
Solution:
S starts on the starting line and runs the full length of the **200m track at a speed of 10m/s**.
Therefore, the time S takes to finish the race can be calculated by dividing distance over speed:
t = Distance / Speed
t = 200m / 10m/s
t = 20 seconds
During this time, **R runs from a point 20m** in front of the starting line to the finish line.
This means **R runs a distance of (200m - 20m) = 180m.**
Since **the time taken by R is the same as S,** we can use this to find R's speed:
Speed = Distance / Time Speed
180m / 20s Speed = **9 m/s**
Conclusion:
So, **R's speed is 9 m/s**

S12. Ans.(a)
Sol. Given:
1. Diameter of the tyre = 1 meter.
2. Gearwheel A has 12 teeth, and Gearwheel B has 8 teeth.
3. Gearwheel A meshes with Gearwheel B.
4. Points "x" on A and "y" on B are initially in contact.
We need to determine the distance traveled by the vehicle when "x" and "y" are in contact again.

Concept/Formula Used:

1. **Teeth Ratio for Contact Alignment:** To realign points "x" and "y", both gearwheels need to complete an integer number of revolutions simultaneously. This happens when the number of revolutions corresponds to the least common multiple (LCM) of their teeth.
2. **Circumference of the Tyre:** The tyre rotates as the vehicle moves forward. The distance traveled by the vehicle equals the circumference of the tyre multiplied by the number of tyre revolutions.
3. **Link Between Tyre and Gearwheel A:** The tyre's rotation is directly proportional to the rotation of Gearwheel A since they are connected by the same shaft.
4. **Distance Traveled = Circumference × Number of Tyre Revolutions.**

Solution:

LCM of Teeth Counts: Gearwheel A has 12 teeth, and Gearwheel B has 8 teeth. The least common multiple (LCM) of 12 and 8 is 24. This means Gearwheel A must complete 2 revolutions (24 ÷ 12), and Gearwheel B must complete 3 revolutions (24 ÷ 8) for "x" and "y" to realign.

Circumference of the Tyre: The circumference of the tyre = π × diameter = π × 1 = π meters.

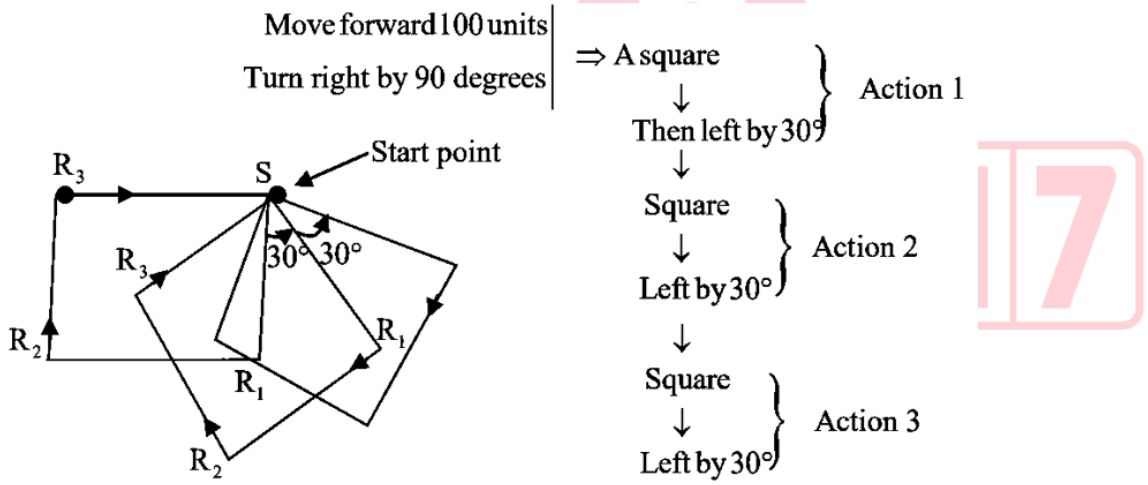
Tyre Revolutions Required: Gearwheel A completes 1 revolution for every tyre revolution. Since Gearwheel A completes 2 revolutions, the tyre also completes 2 revolutions.

Distance Traveled by the Vehicle: Distance traveled = Circumference of the tyre × Number of tyre revolutions. Distance traveled = π × 2 = 2π meters.

Final Answer: The vehicle will travel **2π meters**. **Correct option: (a) 2π.**

S13. Ans.(a)

Sol. Solution:



From the diagrams provided, the correct path that matches this description is **option (a)**.

S14. Ans.(a)

Sol. Given:

1. My brother is 4 years older than me. Let my age be "x" and my brother's age is "x + 4."
2. My sister was 5 years old when my brother was born. This means my sister is 5 years older than my brother. Therefore, my sister's age is "x + 4 + 5 = x + 9."
3. When my sister was born, my father was 24 years old. So, my father's age is "my sister's age + 24," which is "x + 9 + 24 = x + 33."
4. My mother was 27 years old when I was born. So, my mother's age is "my age + 27," which is "x + 27."

To Find:
The ages of my father and mother when my brother was born. When my brother was born, I was 4 years younger than him, i.e., "x - 4."
Solution:
1. **Father's Age When My Brother Was Born:** My father's age when I was "x" is "x + 33." When my brother was born (4 years earlier), my father's age was: "x + 33 - 4 = x + 29."
2. **Mother's Age When My Brother Was Born:** My mother's age when I was "x" is "x + 27." When my brother was born (4 years earlier), my mother's age was: "x + 27 - 4 = x + 23."

Final Answer:
The ages of my father and mother when my brother was born are **29 and 23**, respectively.
Correct Option: (a) 29 and 23.

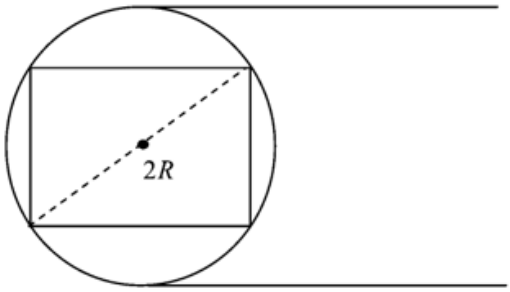
S15. Ans.(d)
Sol. Concept:
In the context of plant growth, **"successive increment"** typically refers to **the gradual and consecutive increases in various aspects of a plant's development over time.**
It's a form of compound growth, where the increase is applied to the original amount as well as any already accumulated increases
Solution:
If the **plant grows by 10%** of its height **every three months,** then it means the **plant's height after every three months will be 1.1 times** its height at the beginning of those three months. So, after one year (which consists of 4 quarters), the plant's height can be calculated as follows:
After the first quarter: 1 m * 1.1 = 1.1 m
After the second quarter: 1.1 m * 1.1 = 1.21 m
After the third quarter: 1.21 m * 1.1 = 1.331 m
After the fourth quarter: 1.331 m * 1.1 = **1.4641 m**
Conclusion:
So, approximately the plant's **height will be 1.464 m after one year.**

S16. Ans.(c)
Sol. Given:
The squares are filled with digits from 1 to 9, without any repetition.
The two horizontal rows each sum up to 20.
We need to determine the number that appears in the square labeled "A" in the vertical column.
Concept:
This problem involves using the properties of unique numbers from 1 to 9. The key points to consider:
The sum of numbers from 1 to 9 is 45.
If each row sums to 20, then the two horizontal rows together sum to 20 + 20 = 40.
This means the remaining number in the column (which is "A") must complete the total sum to 45.
Solution:
Calculate the total sum of numbers from 1 to 9:
1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45
Since the sum of the two horizontal rows is given as 20 each, the combined sum of both rows is: 20 + 20 = 40

To find the number in the square labeled "A," subtract the sum of the horizontal rows from the total sum of numbers 1 to 9:
45 - 40 = 5
Therefore, the number in the square labeled "A" must be 5.
Answer:
The correct answer is: (c) 5

S17. Ans.(b)
Sol. Given:
- A wooden log with a cylindrical shape.
- A beam with a square cross-section is to be cut from the cylindrical log.
- We need to determine the largest fraction of the wood by volume that can be fruitfully utilized as the beam.

Approach:
To maximize the volume of the square cross-section beam that can be cut from the cylindrical log, we need to ensure that the square fits perfectly within the circular cross-section of the cylinder.
Consider the geometry:
The log has a circular cross-section with radius "r."
The beam has a square cross-section with side length "s."
Square inscribed in a circle:



For the largest square that fits inside the circle, the diagonal of the square is equal to the diameter of the circle.
The diagonal of the square is given by: Diagonal =
$$d = \sqrt{s^2 + s^2} = \sqrt{2} \cdot s.$$
The diagonal of the square must be equal to the diameter of the circle, which is 2r. Therefore, $\sqrt{2} \times s = 2r$, and solving for "s" gives: $s = r\sqrt{2}$.
Volume of the cylindrical log:
The volume of the cylinder is: Volume of cylinder = $\pi \times r^2 \times h$, where "h" is the height of the cylinder.
Volume of the square beam:
The volume of the square beam is: Volume of beam =
$$V_{\text{beam}} = s^2 h = (r\sqrt{2})^2 h = 2r^2 h.$$
Fraction of the wood utilized:
The fraction of the wood used by the beam is the ratio of the volume of the beam to the volume of the cylinder: Fraction = (Volume of beam) / (Volume of cylinder)
$$\text{Fraction} = \frac{V_{\text{beam}}}{V_{\text{cylinder}}} = \frac{2r^2 h}{\pi r^2 h} = \frac{2}{\pi}.$$

Simplifying this gives: Fraction = 2 / π ≈ 0.6366, which is approximately 64%.
Final Answer:
The largest fraction of the wood by volume that can be fruitfully utilized as the beam is approximately **64%**.
Correct Option:(b) 64%.

S18. Ans.(a)
Sol. Given:
- Tokens numbered from 1 to 25 are mixed.
- We need to find the probability that the number on the token drawn is divisible by 4 or 6.

Step 1: Identify numbers divisible by 4 or 6.
Numbers divisible by 4: The numbers divisible by 4 in the range from 1 to 25 are:
4, 8, 12, 16, 20, 24.
So, there are 6 numbers divisible by 4.
Numbers divisible by 6: The numbers divisible by 6 in the range from 1 to 25 are:
6, 12, 18, 24.
So, there are **4 numbers** divisible by 6.
Numbers divisible by both 4 and 6 (i.e., divisible by 12): The numbers divisible by 12 in the range from 1 to 25 are:
12, 24.
So, there are **2 numbers** divisible by both 4 and 6.
Step 2: Apply the principle of inclusion and exclusion.
The number of tokens that are divisible by **either 4 or 6** can be calculated as:
Total = (Divisible by 4) + (Divisible by 6) - (Divisible by both 4 and 6)
Substituting the values:
Total = 6 + 4 - 2 = 8.
So, there are **8 favorable outcomes** (numbers divisible by 4 or 6).
Step 3: Calculate the probability.
The total number of possible outcomes is 25 (since the tokens are numbered from 1 to 25).
The probability is given by:
Probability = (Number of favorable outcomes) / (Total number of outcomes) = 8 / 25.
Final Answer:
The probability that the number on the token drawn is divisible either by 4 or by 6 is **8/25**.
Correct Option: (a) 8/25.

S19. Ans.(d)
Sol. Solution:
In the given text, we can identify the capital and lowercase letters:
The capital letters are: A, B, H, K, S, T, L, N, E.
So, we have **9 capital letters**. The lowercase letters are: c, r, u, v, x, d, w.
So, we have **7 lowercase letters.**
The product of the number of capital letters and the number of lowercase letters is 9 (capital letters) * 7 (lowercase letters) = 63
Conclusion:
So, the product of the number of capital letters and the number of small letters of the English alphabet in the given text is **63**

S20. Ans.(c)

Sol. Solution: To determine the probability of drawing the same letter from each word, let's break down the problem step-by-step.

Step 1: Total Possible Outcomes

- The word **CAUSE** has 5 unique letters: C, A, U, S, and E.
- The word **EFFECT** has 6 letters: E, F, F, E, C, and T, with the letters E and F appearing twice.

When we draw one letter from each word, the total possible combinations are: 5 letters from **CAUSE** multiplied by 6 letters from **EFFECT**, which equals 30 possible outcomes.

Step 2: Favorable Outcomes (Matching Letters)

To achieve a favorable outcome, the letters drawn from each word must match. Let's identify the common letters between **CAUSE** and **EFFECT**:

1. The letter **C** appears in both words.
2. The letter **E** also appears in both words.

Case 1: Drawing the Letter "C"

- There is 1 **C** in **CAUSE** and 1 **C** in **EFFECT**.
- This provides **1 favorable outcome** for drawing "C" from both words.

Case 2: Drawing the Letter "E"

- There is 1 **E** in **CAUSE** and 2 **E's** in **EFFECT**.
- This provides **2 favorable outcomes** for drawing "E" from both words.

Step 3: Total Favorable Outcomes

Adding up the favorable outcomes from both cases: 1 (for C) + 2 (for E) = 3 favorable outcomes.

Step 4: Calculate the Probability

The probability of drawing the same letter from both words is: Favorable Outcomes / Total Outcomes = 3 / 30 = 1/10.