# CBSE Class 10 Mathematics Basic Solution 2024 (Set 2 - 430/1/2)

---

**Ques 1. LCM (850, 500) is:**
**(a) 850 * 50**
**(b) 17 * 500**
**(c) 17 * $5^2$ * $2^2$**
**(d) 17 * $5^3$ * 2**

**Solu.** (d) I'd be glad to help you find the least common multiple (LCM) of 850 and 500.
LCM of 850 and 500 is 17 * 5^3 * 2 (option d).
Here's how we can find it:

1. Prime Factorization:
    - Break down 850 and 500 into their prime factors:
        - 850 = 2 * 5 * 5 * 17
        - 500 = 2 * 2 * 5 * 5
2. Identify Highest Powers:
    - Find the highest power of each prime factor present in either number:
        - 2: Appears twice in both numbers (use the highest occurrence, which is 2).
        - 5: Appears to the power of 3 in 500 (use the highest power).
        - 17: Appears only in 850 (include it).
3. LCM:
    - The LCM is the product of the highest powers of each prime factor involved:
        - LCM = 2 * 5^3 * 17

Explanation of incorrect options:

- (a) 850 * 50: This is simply the product of the two numbers, not their LCM.
- (b) 17 * 500: This only considers the prime factor 17 from 850 and the highest power of 5 from 500, but it misses the factor of 2 present in both numbers.

- (c) 17 * 5^2 * 2^2: This considers the factor of 17 and the highest powers of 2 and 5 from each number, but it misses the additional power of 5 present in 500's prime factorization.

In conclusion, the least common multiple of 850 and 500 is 17 * 5^3 * 2.

**Ques 2. If the roots of quadratic equation 4x ^ 2 - 5x + k = 0 are real and equal, then value of k is:**
**(a) 5/4**
**(b) 25/16**
**(c) - 5/4**
**(d) - 25/16**

**Solu.** When the roots of a quadratic equation are real and equal, it signifies that the discriminant (b^2 - 4ac) is equal to zero. Let's solve for k based on this condition.

1. Discriminant for equal roots:
   In a quadratic equation ax^2 + bx + c = 0, the discriminant is given by b^2 - 4ac. For real and equal roots, this value becomes zero.
   In the given equation (4x^2 - 5x + k = 0),
   - a = 4
   - b = -5
   - c = k
2. Set discriminant to zero:
   b^2 - 4ac = 0 (-5)^2 - 4 * 4 * k = 0
3. Solve for k:
   25 - 16k = 0 16k = 25 k = 25 / 16

Therefore, the value of k for real and equal roots is 25/16, which corresponds to option (b).

**Ques 3. The mean and median of a statistical data are 21 and 23 respectively. The mode of the data is:**
**(a) 27**
**(b) 22**
**(c) 17**
**(d) 23**

**Solu.** To determine the mode of the data given the mean and median, we can use the empirical relationship between the mean, median, and mode in a moderately skewed distribution:

Mode ≈ 3 × Median - 2 × Mean

Given:

- Mean (μ) = 21
- Median (M) = 23

We can plug these values into the formula:

1. Calculate 3 × Median:
   3 × 23 = 69
2. Calculate 2 × Mean:
   2 × 21 = 42
3. Subtract the second result from the first:
   69 - 42 = 27

Therefore, the mode of the data is:

Mode = 27

Thus, the mode of the data is:

(a) 27

**Ques 4. The height and radius of a right circular cone are 24 cm and 7 cm respectively. The slant height of the cone is :**

**(a) 24 cm**

**(b) 31 cm**

**(c) 26 cm**

**(d) 25 cm**

**Solu.**The slant height of the cone is 25 cm (option d).

Here's how to find the slant height:

1. Pythagorean Theorem:
   In a right circular cone, the slant height forms the hypotenuse of a right triangle. The height of the cone (24 cm) and the radius of the base (7 cm) form the other two sides. We can use the Pythagorean theorem to find the slant height.
2. Formula:
   The Pythagorean theorem states: a^2 + b^2 = c^2
   - a (height) = 24 cm
   - b (radius) = 7 cm
   - c (slant height) = unknown
3. Solve for slant height:
   c^2 = a^2 + b^2 c^2 = (24 cm)^2 + (7 cm)^2 c^2 = 576 cm^2 + 49 cm^2 c^2 = 625 cm^2
   Taking the square root of both sides: c = √625 cm c = 25 cm

Therefore, the slant height of the cone is 25 cm.

**Ques 6. A card is drawn from a well shuffled deck of 52 playing cards. The probability that drawn card is a red queen**
**(a) 1/13**
**(b) 2/13**
**(c) 1/52**
**(d) - 1/26**

**Solu.** To determine the probability of drawing a red queen from a well-shuffled deck of 52 playing cards, we need to follow these steps:
1. Identify the total number of possible outcomes:
   - There are 52 cards in a deck.
2. Identify the number of favorable outcomes:
   - There are two red queens in a deck: the Queen of Hearts and the Queen of Diamonds.
3. Calculate the probability:
   The probability P of an event is given by: P = Number of favorable outcomes/Total number of possible outcomes
Using this formula, we can plug in the numbers:
P = 2/52= 1/26

Therefore, the probability that the drawn card is a red queen is 1/26.
Hence, the correct answer is: (d) 1/26

**Ques 7. If a certain variable x divides a statistical data arranged in order into two equal parts, then the value of x is called the :**
**(d) range**
**(b) median**
**(c) mode**
**(a) mean**
**of the data.**

**Solu.** The variable x that divides a statistical data arranged in order into two equal parts is called the (b) median of the data.
The median refers to the middle value when the data is ordered from least to greatest. It represents the point at which half of the data falls below and the other half falls above.

**Ques 8. Three coins are tossed together. The probability of getting exactly one tail**
**(a) 1/8**
**(b) 1/4**
**(c) 7/8**
**(d 3/8**

**Solu.** The probability of getting exactly one tail when tossing three coins together is 3/8, which corresponds to option (d).
Here's how to calculate it:
1. Total possible outcomes:
When tossing three coins, there are 2 possible outcomes for each coin (heads or tails). So, the total number of possible outcomes for three tosses is 2 x 2 x 2 = 8 (each toss can be heads or tails, independent of the others).
2. Favorable outcomes:
We only care about the outcomes where we get exactly one tail. There are three ways to achieve this:

- THH (Tails, Heads, Heads): One tail and two heads.

- HHT (Heads, Tails, Heads): One tail and two heads (order doesn't matter).
- HHB (Heads, Heads, Tails): One tail and two heads (order doesn't matter).

3. Probability:
The probability is the number of favorable outcomes divided by the total number of possible outcomes.
Probability (one tail) = Number of favorable outcomes / Total number of outcomes
Probability (one tail) = 3 (THH, HHT, HHB) / 8 (total outcomes)
Therefore, the probability of getting exactly one tail when tossing three coins together is 3/8.

**Ques 10. Outer surface area of a cylindrical juice glass with radius 7 cm and height 10 cm, is:**
**(a) 440 sq cm**
**(b) 594 sq cm**
**(e) 748 sq cm**
**(d) 1540 sq cm**

**Solu.** The outer surface area of the cylindrical juice glass consists of two parts: the lateral surface area and the area of the top and bottom circles. Here's how to calculate it:

1. Lateral surface area:
    - Formula: Lateral surface area = $2\pi r * h$
        - r (radius) = 7 cm
        - h (height) = 10 cm
        - π (pi) = approximately 22/7 (or you can use a calculator function)
    - Calculation: Lateral surface area = 2 * (22/7) * 7 * 10 ≈ 440 $cm^2$
2. Area of top and bottom circles:
    - Formula: Area of a circle = $\pi r^2$
    - r (radius) = 7 cm
    - Calculation (for one circle): Area of circle = π * $(7 \text{ cm})^2$ ≈ 154 $cm^2$

    - Since there are two circles (top and bottom), we multiply the area by 2: Total area of circles = 2 * 154 cm² ≈ 308 cm²
3. Total outer surface area:
    - Combine the lateral surface area and the total area of circles: Total surface area = Lateral surface area + Total area of circles Total surface area ≈ 440 cm² + 308 cm² Total surface area ≈ 748 cm²

Therefore, the outer surface area of the cylindrical juice glass is approximately 748 sq cm, which corresponds to option (c).

**Ques 11. On a throw of a die, if getting 6 is considered success then probability of losing the game is :**

- **(a) 0**
- **(b) 1**
- **(c)** ⅙
- **(d)** ⅚

**Solu.** The probability of losing the game (not getting a 6) is the opposite of the probability of winning (getting a 6).

1. Total possible outcomes:

When rolling a die, there are 6 possible outcomes (1, 2, 3, 4, 5, or 6).

2. Successful outcome:

There is only 1 successful outcome: getting a 6.

3. Probability of losing:

The probability of losing is the number of unsuccessful outcomes divided by the total number of possible outcomes.
Probability of losing = Number of unsuccessful outcomes / Total outcomes
Since there's only 1 successful outcome (getting a 6) and 5 remaining unsuccessful outcomes (any number but 6), we can calculate the probability of losing:
Probability of losing = 5 (unsuccessful) / 6 (total)
Therefore, the probability of losing the game (not getting a 6) is 5/6.

**Ques 12. The distance between the points (2,-3) and (-2, 3) is:**
**(a) 2sqrt(13) units (b) 5 units (c) 13sqrt(2) units (d) 10 units**

**Solu.** To determine the distance between the points (2, -3) and (-2, 3), we use the distance formula:

d = sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}

Here, (x_1, y_1) = (2, -3) and (x_2, y_2) = (-2, 3).

First, calculate the differences in the coordinates:

x_2 - x_1 = -2 - 2 = -4

y_2 - y_1 = 3 - (-3) = 3 + 3 = 6

Now, square these differences

(-4)^2 = 16

6^2 = 36

Add these squared differences:

16 + 36 = 52

Finally, take the square root to find the distance:

d = sqrt{52} = sqrt{4 cdot 13} = 2sqrt{13}

So, the distance between the points (2, -3) and (-2, 3) is 2sqrt{13} units.

Therefore, the correct answer is:

(a) 2sqrt{13} units

**Ques 13. For what value of θ, $\sin^2\theta+\sin\theta+\cos^2\theta$ is equal to 2?**

**Solu.** The expression $\sin^2\theta + \cos^2\theta$ is always equal to 1 for any value of θ. This is a fundamental trigonometric identity.

We can use this identity to simplify the given equation:

$\sin^2\theta + \sin\theta + \cos^2\theta = 2$

(based on the identity) 1 + sinθ = 2

Subtracting 1 from both sides:

sinθ = 1

However, sinθ can only be 1 when the angle θ is 90 degrees (π/2 radians) or some multiple of 360 degrees + 90 degrees (which is equivalent to adding multiples of 2π radians).

Therefore, for any value of θ that satisfies sinθ = 1, the equation $\sin^2\theta + \sin\theta + \cos^2\theta$ will be equal to 2. This includes angles like:

- θ = 90° (π/2 radians)
- θ = 450° (5π/2 radians)

- θ = -270° (-3π/2 radians)

and so on.
So, Correct option is C) $90^0$

**Ques 14. The diameter of a circle is of length 6 cm. If one end of the diameter is (-4, 0), the other end on x-axis is at:**
**(a) (0,2)**
**(b) (6,0)**
**(c) (2,0)**
**(d) (4,0)**

**Solu.** We can find the other endpoint on the x-axis using the following steps:

1. Center of the circle: The center of the circle is the midpoint of the diameter. Since one endpoint is (-4, 0), and the diameter has a length of 6 cm, the center coordinates will be:
   Center coordinates = (-4 + (diameter/2), 0) Center coordinates = (-4 + (6/2), 0) Center coordinates = (-1, 0)
2. Movement along x-axis: Since the other endpoint lies on the x-axis and has the same y-coordinate (0) as the center, we only need to find its x-coordinate.
3. Endpoint on x-axis: The diameter goes from left (-4) to right. Since the center is at -1, the other endpoint must be the same distance to the right (diameter/2). Therefore:
   Endpoint x-coordinate = Center x-coordinate + (diameter/2) Endpoint x-coordinate = -1 + (6/2) Endpoint x-coordinate = 1

Therefore, the other endpoint on the x-axis is at: (1, 0)

**Ques 16. For what value of k, the product of zeroes of the polynomial $kx^2$ - 4x - 7 is 2**
**(a) - 1/14**
**(b) - 7/2**
**(c) 7/2**
**(d) - 2/7**

**Solu.** We are given the quadratic equation: kx^2 - 4x - 7 = 0 (notice the coefficient of x^2 is k)
We want to find k such that the product of the roots (x1 and x2) is 2.
Step 1: Relate Product of Roots and Coefficients
We know from the quadratic formula that the roots of the equation are:
x1, x2 = (-b ± √(b^2 - 4ac)) / (2a)
In our case, a = k, b = -4, and c = -7. The product of the roots (x1 * x2) is given by:
x1 * x2 = c / a = -7 / k
Step 2: Set Up the Equation
Since we want the product of the roots to be 2, we can write the equation:
-7 / k = 2
Step 3: Solve for k
To isolate k, multiply both sides by k:
k * (-7 / k) = 2 * k
Simplify:
-7 = 2k
Divide both sides by 2:
-7 / 2 = k
Therefore, the value of k that satisfies the condition is k = -7/2.

**Ques 21. (B) Show that 11 * 19 * 23 + 3 * 11 is not a prime number**

**Solu.** We can demonstrate that 11 * 19 * 23 + 3 * 11 is not a prime number by factoring out a common factor of 11. Here's how:

1. Identify the common factor: Notice that both 11 * 19 * 23 and 3 * 11 share a common factor of 11.
2. Factor out the common factor:
   We can rewrite the expression as:
   11 * 19 * 23 + 3 * 11 = (11 * 19 * 23) + (3 * 11)
   = 11 * (19 * 23 + 3)
3. Analyze the remaining factors:
   - 11 is a prime number by definition (it has exactly two factors: 1 and 11).

- (19 * 23 + 3) is greater than 1 (since 19 x 23 is a large positive number, adding 3 will still result in a positive number greater than 1).

Since the expression can be factored into a prime number (11) multiplied by another number greater than 1 (19 * 23 + 3), it satisfies the definition of a composite number.
Therefore, 11 * 19 * 23 + 3 * 11 is not a prime number.

**Ques 25 (A) Solve the following pair of linear equations for x and y algebraically: x + 2y = 9 and y - 2x = 2**

**Solu.** the following pair of linear equations for x and y algebraically using the substitution method:
x + 2y = 9 (equation 1)y - 2x = 2 (equation 2)

1. Solve equation 1 for y:
   Isolate y in equation 1: y = (9 - x) / 2
2. Substitute this expression for y in equation 2:
   Replace y in equation 2 with the expression we just obtained:
   ((9 - x) / 2) - 2x = 2
3. Solve the resulting equation for x:
   - Simplify the equation: (9 - x) - 4x = 4 (multiply both sides by 2 to get rid of the fraction) -5x = -5 x = 1
4. Substitute the value of x back into equation 1 to solve for y:
   Now that we know x = 1, plug it back into the equation we solved for y (equation 1):
   y = (9 - 1) / 2 y = 8 / 2 y = 4

Therefore, the solution for the system of equations is:
x = 1 and y = 4
This method allows us to solve for x and y algebraically.

**Ques 31. The greater of two supplementary angles exceeds the smaller by 18°. Find measures of these two angles.**
**Solu.** We can find the measures of the two supplementary angles using the following steps:

1. Relationship between supplementary angles:
   Supplementary angles add up to 180 degrees. We can represent this mathematically as:
   x + larger angle = 180° (where x is the measure of the smaller angle)
2. Larger angle based on smaller angle:
   We are given that the larger angle exceeds the smaller angle by 18 degrees. This can be written as:
   larger angle = x + 18°
3. Substitute and solve for x:
   Now, we can substitute the expression for the larger angle in the equation for supplementary angles:
   x + (x + 18°) = 180°
   Combine like terms:
   2x + 18° = 180°
   Subtract 18° from both sides to isolate x:
   2x = 162°
   Divide both sides by 2 to find x:
   x = 81°
4. Find the larger angle:
   Since x represents the smaller angle, we can find the larger angle using the equation we derived earlier:
   larger angle = x + 18°
   Substitute the value of x (81°):
   larger angle = 81° + 18°
   larger angle = 99°

Therefore, the measures of the two supplementary angles are:

- Smaller angle: 81 degrees
- Larger angle: 99 degrees

**Ques 34 (A) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that other two sides are divided in the same ratio.**

**Solu.** when a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, it divides those two sides in the same ratio:

1. Given:
   - Triangle ABC
   - Line DE parallel to side BC
   - Line DE intersects lines AB and AC at points P and Q respectively

2. Similar Triangles:

Since DE is parallel to BC, we have two pairs of corresponding angles:

- Angle BDE and Angle ABC (alternate interior angles)
- Angle CDE and Angle ACB (alternate interior angles)

Assuming triangles:

- ΔBDE and ΔABC share Angle B
- ΔCDE and ΔABC share Angle C

Based on these shared angles and the fact that DE || BC, we can conclude that:

- ΔBDE ~ ΔABC (by Angle-Angle Similarity)
- ΔCDE ~ ΔABC (by Angle-Angle Similarity)

3. Ratios of Corresponding Sides:

Since triangles ΔBDE and ΔABC are similar, the ratios of their corresponding sides are equal. Let x represent the length of BP and y represent the length of AP. We can write:

- BD / BA = DE / AC (corresponding sides of similar triangles)
- Substitute x and y: (BC - x) / y = DE / AC (since BP = BC - x)

Similarly, from the similarity of ΔCDE and ΔABC:

- CE / CA = DE / AB
- Substitute y and (AC - y): (AC - y) / x = DE / AB

4. Combining Ratios:

Now we have two equations with the same term (DE) on both sides. We can set them equal to each other:

- (BC - x) / y = (AC - y) / x

5. Cross-multiplication and Simplification:

Cross-multiplying both sides:

- x * (AC - y) = y * (BC - x)

Expanding the product on both sides:

- x * AC - x * y = y * BC - y * x

Combining like terms:

- x * AC - y * x = y * BC - x * y
- x (AC - y) = y (BC - x)

6. Solve for Ratio:

Factoring out x and y:

- x(AC - y) = y(BC - x)
- x * y (AC/y - 1) = y * x (BC/x - 1)

Since x and y are not zero (they represent lengths of line segments), we can cancel them out:

- AC/y - 1 = BC/x - 1

7. Conclusion:

Adding 1 to both sides:

- AC/y = BC/x

This equation shows that the ratio of AC to y (length of AC divided by the length segmented by the parallel line on AC) is equal to the ratio of BC to x (length of BC divided by the length segmented by the parallel line on BC). Therefore, the line parallel to one side of a triangle divides the other two sides in the same ratio.

---