FIRST UNIT TEST
CLASS-X
MATHEMATICS

Time: 2 Hrs

MARKS: 50

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1. Express y in terms of x, given that $3x + 7y = 14$. Check whether $(3, -2)$ is a point on the given line.
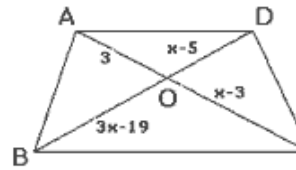
2. Reduce the following to the lowest terms $\dfrac{x^4 + x^2 + 1}{x^2 + x + 1}$

3. Using factorisation, solve $\dfrac{x + 1}{x - 1} + \dfrac{x - 2}{x + 2} = 3$ $(x \neq 1, -2)$

4. In the fig. AD || BC. Find the value of x

5. If $2x + y = 35$ and $3x + 4y = 65$, find the value of x/y.

6. Write a rational expression whose numerator is a quadratic polynomial with zeros 2 and 3 and the denominator is a polynomial with zeros -2, 1, and 4.

7. Find the set of values of p for which the given equation has real roots $2x^2 + px + 3 = 0$

8. Solve: $\dfrac{x}{a} + \dfrac{y}{b} = a + b$ and $\dfrac{x}{a^2} + \dfrac{y}{b^2} = 2$

9. Simplify: $\dfrac{1 + x}{1 - x} - \dfrac{1 - x}{1 + x} + \dfrac{4x}{1 + x^2} + \dfrac{8x^3}{1 - x^4}$.
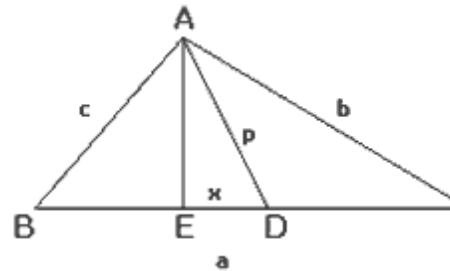
10. Using the quadratic formula, solve the following equation for x:
$$abx^2 + (b^2 - ac) x - bc = 0$$

11. From a point 20 m away from the foot of a tower, the angle of elevation of the top of a tower is 30°. Find the height of the tower. (Correct to 2 places of decimal)

12. A man rowing at the rate of 5 Km/hr in still water takes thrice as much time in going 40 Km up the river as in going 40 km down. Find the rate flows.

13. In fig. AD is a median triangle ABC, AE $\perp$ BC, if BC = a,

    CA = b, AD = p, AE = h and DE = x.
    Prove that $b^2 + c^2 = 2p^2 + 1/2\, a^2$.

14. The hypotenuse of right triangle is $3\sqrt{10}$ cm. If the smaller leg is tripled and the longer leg doubled, nev will be $9\sqrt{5}$ cm. How long are the legs of the triangle?

15. The shadow of a tower, standing on level ground is found to be 45 m longer when the Sun's altitude is 30° than when it was at 60°. Find the height of the tower. (Correct to 2 places of decimal)

16. Draw the graph of $x - y = -1$ and $2y + 3x - 12 = 0$. Calculate the area bounded by these lines and x-axis.

17. The angle of elevation of an aeroplane from a point P on the ground is 60°. After a flight of 15 seconds. The angle of elevation changes to 30°. If the aeroplane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of aeroplane.
18. Prove that if a line is drawn parallel to one side of any triangle intersecting the other two sides, the other two sides are divided in same ratio.Use the above result to prove that the diagonals of a trapezium cut each other in the same ratio.