Assignment - 2

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CHAPTER III, MISCELLANEOUS EXAMPLES VI

Question.13:-Two sides of a parallelogram are formed by the straight lines (i)3x-4y=4, (ii)y=mx and the other two sides are formed by two right lines through the point (5,-1) which are parallel to the lines (i) and (ii). Find the two values of m for which the area of parallelogram is 12

SOLUTION

First of all equation are given:-

$3\vec{x} - 4\vec{y} = 4$ ...(i)
$\vec{y} = m\vec{x}$ ...(ii)

Slope of Equation (i) and (ii) can be given by m_1 and m_2 respectively,

$$\mathbf{m_1} = \frac{3}{4}$$

and

$$\mathbf{m_2} = m$$

Now it's saying two line which is passing through the point (5,-1), which is parallel to the the lines (i) and (ii), so these lines will also have slope of equation (i) and (ii), which is m_1 and m_2 respectively
Now the equation can be given as:-

$3\vec{x} - 4\vec{y} = 19$ ...(iii)
$m\vec{x} - \vec{y} = 5m + 1$ ...(iv)
So we have total 4 equation.
Constant of equation (i) and (ii) are given as c_1 and c_2,

c_1=-1

and

c_2=0

Constant of equation (iii) and (iv) are given as d_1 and d_2,

$$d_1 = \frac{-19}{4}$$

and

$$d_2 = -(5m + 1)$$

Area of parallelogram can be given as $||\frac{(c_1-d_1)(c_2-d_2)}{(m_1-m_2)}||$, which is equal to 12
Now it can be written as:-

$$|\frac{(c_1 - d_1)(c_2 - d_2)}{(m_1 - m_2)}| = 12$$

By putting the values of c_1, c_2, d_1, d_2, m_1 and m_2 in above equation and solving for positive sign of modulus, we get:-

$$\frac{(-1 - \frac{-19}{4})(o + (5m + 1))}{(\frac{3}{4} - m)} = 12$$

after solving this, value of m we get:

$$\mathbf{m} = \frac{21}{123}$$

Similarly by taking the negative sign of modulus, then after solving for m , we get the value of m:-

$$\mathbf{m} = \frac{-17}{9}$$

So these are the two values of m for which the area of parallelogram is 12.

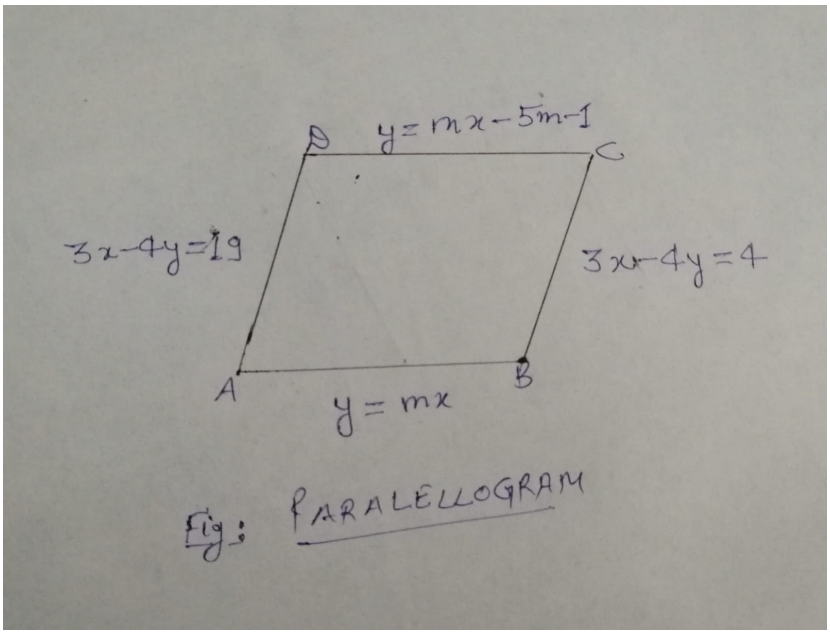

Fig. 1. Paralellogram