

Answer on Question #44463 – Math – Algebra

The cost of a piece of cloth is rs 35 .if the piece were 4m longer and each meter costs rs 1 less the cost would remains unchanged . How long is the piece.

Solution:

Let the length of piece of cloth be x

Let the rate per metre be y

$$\begin{aligned}x \cdot y &= 35 \\ x &= \frac{35}{y} \quad (1)\end{aligned}$$

4 mtr longer and Re 1 less

$$(x + 4)(y - 1) = 35$$

both are equal to 35, thus we can equate the two:

$$\begin{aligned}(x + 4)(y - 1) &= xy \\ xy - x + 4y - 4 &= xy \\ -x + 4y &= 4 \quad (2)\end{aligned}$$

Now we can make substitution of x in the equation

$$\begin{aligned}(1)in(2): \\ -\frac{35}{y} + 4y &= 4\end{aligned}$$

Let's multiply equation by y

$$\begin{aligned}-\frac{35y}{y} + 4y \cdot y &= 4y \\ -35 + 4y^2 &= 4y \\ 4y^2 - 4y - 35 &= 0\end{aligned}$$

Find the roots of the equation by quadratic formula

$$\begin{aligned}a &= 4, \quad b = -4, \quad c = -35 \\ b^2 - 4ac &= 16 + 560 = 576 \\ \sqrt{b^2 - 4ac} &= \sqrt{576} = 24 \\ x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ x_1 &= \frac{-b + \sqrt{b^2 - 4ac}}{2a} = \frac{4 + 24}{8} = 3.5 \\ x_2 &= \frac{-b - \sqrt{b^2 - 4ac}}{2a} = \frac{4 - 24}{8} = -2.5\end{aligned}$$

We can ignore negative value

$$\text{Rate per metre} = \text{Rs. } 3.50$$

Price of cloth is Rs.35

$$\frac{35}{3.5} = 10 \text{ metres}$$

Length of cloth = 10 metres

Answer: Length of cloth is equal to 10 metres.