

Today, a father is 2 years older than triple his son's age.

Five years ago, the product of their ages was 420. How old is the father now?

multiplication

* $x - 15 = 0$ or $x + 9 = 0$
 $x = 15$ $x = -9$ **reject**

	Today	Past
Father's age	$47 = 3x + 2$	$3x - 3$
Son's age	$x = 15$	$x - 5$

② $3x^2 - 18x - 405 = 0$
 $\frac{3x^2 - 18x - 405}{3} = 0$
 $x^2 - 6x - 135 = 0$

$(3x - 3)(x - 5) = 420$
 $3(3x - 3)(x - 5) - 420 = 0$
 $3x^2 - 15x - 3x + 15 - 420 = 0$
 $3x^2 - 18x - 405 = 0$

$3x^2 - 18x - 405 = 0$
 ① $3(x^2 - 6x - 135) = 0$
 $\therefore x^2 - 6x - 135 = 0$ -15 9
 * $(x - 15)(x + 9) = 0$

Today, a mother's age is two years more than double her son's age. In ten years, the product of their ages will be 2040. How old are they today ?

	Today	Future
Son's Age	x	$x+10$
Mother's Age	$2x+2$	$2x+12$

$$\begin{aligned} (x+10)(2x+12) &= 2040 \\ 2x^2 + 12x + 20x + 120 &= 2040 \\ 2x^2 + 32x + 120 &= 2040 \\ \underline{2x^2 + 32x - 1920} &= \underline{0} \\ 2 & \quad 2 \end{aligned}$$

$$\begin{aligned} \rightarrow x^2 + 16x - 960 &= 0 \\ (x+40)(x-24) &= 0 \\ x+40=0 \text{ or } x-24=0 \\ \underline{x=-40} \text{ or } \underline{x=24} \end{aligned}$$

Reject ✓

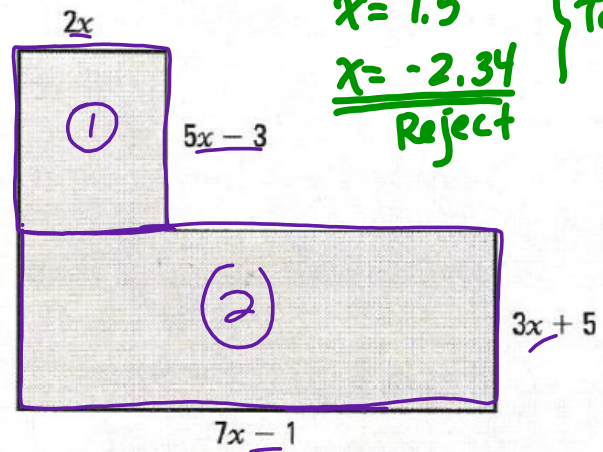
$$\left. \begin{array}{l} m \times n = -960 \\ m + n = 16 \end{array} \right\} 40, -24$$

Son is 24 yrs old
Mother is 50 yrs old.

The Quadratic Formula

The area of this figure is equal to 103.75cm^2 .

Determine the numerical length of each side.



$$\begin{array}{l} x = 1.5 \\ \underline{x = -2.34} \\ \text{Reject} \end{array} \left. \vphantom{\begin{array}{l} x = 1.5 \\ x = -2.34 \\ \text{Reject} \end{array}} \right\} \text{Tel}$$

$$\begin{aligned} & \overset{A_1}{\underbrace{2x(5x-3)}} + \overset{A_2}{\underbrace{(3x+5)(7x-1)}} = 103.75 \\ & 10x^2 - 6x + 21x^2 - 3x + 35x - 5 = 103.75 \\ & 31x^2 + 26x - 5 = 103.75 \\ & 31x^2 + 26x - 108.75 = 0 \end{aligned}$$

$$31x^2 + 26x - 108.75 = 0$$

$$m \times n = -3371.25$$
$$m + n = 26$$

The quadratic formula provides a solution to any quadratic (second-degree) equation.

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Example: $ax^2 + bx + c = 0$

$$\underset{a}{31}x^2 + \underset{b}{26}x - \underset{c}{108.75} = 0$$

$$x = \frac{-26 \pm \sqrt{26^2 - 4 \cdot (31) \cdot (-108.75)}}{2(31)}$$

$$x = \frac{-26 \pm \sqrt{14161}}{62} = \frac{-26 \pm 119}{62}$$

$$1 \quad x = \frac{-26 + 119}{62}$$

$$x = \frac{93}{62} = 1.5$$

OR

$$2 \quad x = \frac{-26 - 119}{62}$$

$$x = \frac{-145}{62} \approx -2.34$$

$$\therefore x = 1.5$$

