

$$\begin{aligned}
 \textcircled{\#3} \quad & \pi^3 - \pi^2 - 42\pi \\
 & \pi(\pi^2 - \pi - 42) \\
 & (\pi^2 + 6\pi)(\pi - 7) \\
 & \pi(\pi + 6)(\pi - 7) \\
 & \pi(\pi - 7)(\pi + 6)
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{\#6} \quad & \frac{a^3 b^2 - a}{a} \\
 & a(a^2 b^2 - 1) \\
 & a(ab + 1)(ab - 1)
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{\#10} \quad & \frac{(x^3 - 3x^2 y)(-x + 3y)}{x^2 x^2 (-1 - 1)} \\
 & x^2(x - 3y)(-1)(x - 3y) \\
 & (x^2 - 1)(x - 3y)
 \end{aligned}$$

Application

Find the length and width.

1.

$$A = 10x^3y^4 + 30xy$$

$$A = \frac{10x^3y^4}{10xy} + \frac{30xy}{10xy}$$

$$A = 10xy(x^2y^3 + 3)$$

$$L = 10xy \quad W = x^2y^3 + 3$$

3.

$$A = x^2 - 7x - 8$$

$$a=1 \quad b=-7 \quad c=-8$$

$$ac = -8$$

$$\begin{array}{r|l} +1 & 8 \\ \hline & \end{array}$$

$$2 \quad | \quad 4$$

$$(x+1)(x-8)$$

$$\begin{array}{l} L = x+1 \\ W = x-8 \end{array}$$

2.

$$A = 25c^2 - 1$$

$$(5c+1) = L$$

$$(5c-1) = W$$

$$A = \frac{2x^2 - 6x}{2x} + \frac{7x - 21}{7}$$

$$2x(x-3) + 7(x-3)$$

$$(2x+7)(x-3)$$

$$L = 2x+7$$

$$W = x-3$$

The length of Morgan's room is three times the width of her room. After some remodeling the area of Morgan's room is given by the trinomial $3w^2 + 8w + 4$ sq.ft. Find the increase in the dimensions of the room. (Hint: Factor $3w^2 + 8w + 4$ and compare the dimensions with the original.)

The area of a rectangular plastic sheet is given by $b^3 + b^2 + 4b + 4$ square inches. Find an expression for the perimeter of the sheet. (Hint : Factor $b^3 + b^2 + 4b + 4$ to find the length and width of the sheet. Use the perimeter formula for a rectangle, $P = 2L + 2W$).

A square parking area has an area equal to $36x^2 - 36x + 9$ meters. Find the side of the parking lot.

The length of a rectangular courtyard is given by the expression $2x - 3$. If the area is given by $2x^2 + 5x - 12$, find the width of the room. (Hint: Factor the expression given for area.)

$$2x^2 + 5x - 12 \quad a=2 \quad b=5 \quad c=-12$$

$$ac = -24$$

-1	24
-2	12
-3	8
-4	6

$$\frac{2x^2 + 8x}{2x} - \frac{3x - 12}{-3}$$

$$2x(x+4) - 3(x+4)$$

$$(2x-3)(x+4)$$

↓
W

The volume of a rectangular prism is $15x^3 + 70x^2 + 40x$. What are the possible dimensions of the prism? $V = lwh$