

1. If a number is subtracted from its square, the result is 72. Find the number.
2. The difference between two integers is 5 and their product is 104. Find the integers.
3. Find two consecutive odd integers that have 514 as the sum of their squares.
4. Find three consecutive positive integers, such that the sum of their squares is 1085.
5. The length of a rectangle is 2 centimeters less than twice the width. If the area is 84 square centimeters, find the dimensions of the rectangle.
6. A rectangular playing field has an area of 1800 square yards and perimeter 180 yards. Find the dimensions of the field.
7. Two opposite sides of a square are increased by 8 inches and the other two sides decreased by 5 inches. The area of the new rectangle is 11 sq in more than the area of the original square. How long was one side of the square?

$$1. \quad x^2 - x = 72$$

$$x^2 - x - 72 = 0$$

$$(x - 9)(x + 8) = 0$$

$$x = 9, x = -8$$

$9 \text{ or } -8$

Check: $9^2 - 9 = 72$
 $81 - 9 = 72$
 $72 = 72 \checkmark$

$(-8)^2 - (-8) = 72$
 $64 + 8 = 72$
 $72 = 72 \checkmark$

$$x - y = 5$$

$$xy = 104$$

Solve for one: $x = 5 + y$

Sub: $(5 + y)y = 104$

Check to get x:

$$x - (-13) = 5$$

$$x + 13 = 5$$

$$x = -8$$

$$5y + y^2 - 104 = 0$$

Graph: $y^2 + 5y - 104 = 0$

$$y = -13, 8$$

$\text{Sol. 1: } x = -8, y = -13$

$$x - 8 = 5$$

$$x = 13$$

$\text{Sol. 2: } x = 13, y = 8$

$x, (x+2) \rightarrow$ odd integers

$$x^2 + (x+2)^2 = 514$$

$$x^2 + x^2 + 4x + 4 = 514$$

Graph: $2x^2 + 4x - 510 = 0$

$$x = 15, -17$$

$\text{Sol. 1: } 15 + 17$

$\text{Sol. 2: } -15 + -17$

$$15^2 + 17^2 = 514 \checkmark$$

$$(-15)^2 + (-17)^2 = 514 \checkmark$$

4. $x^2 + (x+1)^2 + (x+2)^2 = 1085$
 $x^2 + x^2 + 2x + 1 + x^2 + 4x + 4 = 1085$
 $3x^2 + 6x + 5 = 1085$

Graph: $3x^2 + 6x - 1080 = 0$
 $x = -20, 18$

Sol: 18, 19, 20

check: $18^2 + 19^2 + 20^2 = 1085$ ✓

$2x - 2$
 84 cm^2 x

$x(2x - 2) = 84$
 $2x^2 - 2x = 84$

Graph: $2x^2 - 2x - 84 = 0$
 $x = 7, -6$

↳ doesn't make sense

Dimensions: $2(7) - 2 = 12$
 $12 \times 7 \text{ cm}$

check: $12 \cdot 7 = 84$ ✓

x
 1800 yds^2 y

$xy = 1800$
 $2x + 2y = 180$

Solve: $\frac{1}{2}y = \frac{180 - 2x}{2}$
 $y = 90 - x$

Dimensions:
 $30 \times 60 \text{ yds}$

Sub: $x(90 - x) = 1800$
Graph: $90x - x^2 - 1800 = 0$
 $x = 30, 60$

Find y: $\frac{30}{30}y = \frac{1800}{30}$
 $y = 60$ ✓

or $\frac{60}{60}y = \frac{1800}{60}$
 $y = 30$ ✓