

Linear.

When 5 is added to twice a number the result is 19.
Find number.

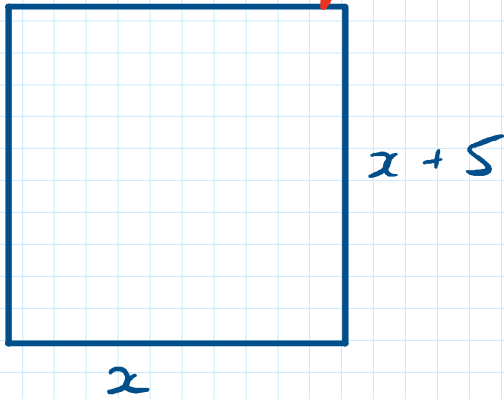
$$\begin{aligned} \text{Number} &= x \\ 2x + 5 &= 19 \\ 2x &= 14 \\ x &= 7 \end{aligned}$$

Ann is 5 times John's age.
In 6 years she will be 3 times his age. What age is Ann now?

	Ann	John
Today	$5x$	x
6 yrs	$5x + 6$	$x + 6$
	$5x + 6 = 3(x + 6)$	
	$5x + 6 = 3x + 18$	
	$2x = 12$	
	$x = 6$	
Ans	30.	

Quadratics.

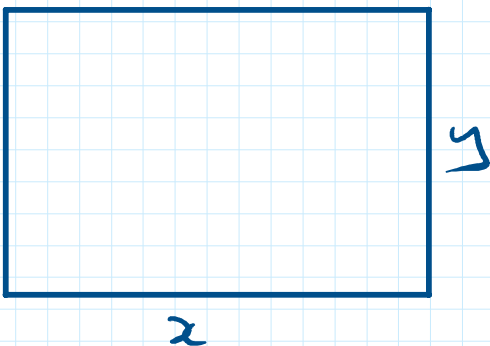
A rectangle has a length 5m longer than width. It has an area of 66m^2 . Find dimensions of rectangle.



$$\begin{aligned} A &= l \times b \\ x(x+5) &= 66 \\ x^2 + 5x - 66 &= 0 \\ (x+11)(x-6) &= 0 \\ \cancel{x = -11} \quad x &= 6 \end{aligned}$$

6m x 11m.

A rectangle has perimeter of 20m and area of 16m^2 . Find dimensions.



$$\begin{aligned} P &= 20 & A &= 16 \\ 2x + 2y &= 20 \\ x + y &= 10 \\ y &= 10 - x \\ xy &= 16 \\ x(10 - x) &= 16 \\ 10x - x^2 - 16 &= 0 \end{aligned}$$

$$x^2 - 10x + 16 = 0$$

$$(x - 2)(x - 8) = 0$$

$$x = 2 \quad x = 8.$$

Find 2 consecutive odd numbers which multiply to 63.

One x Other $x + 2$.

$$x(x + 2) = 63$$

$$x^2 + 2x - 63 = 0$$

$$(x + 9)(x - 7) = 0$$

$$x = -9 \quad x = 7$$

Ans 7, 9

or -9, -7

€120 is divide between x people. If there were 5 more people each would get €4 less.

Find x .

Money	People	Each
120	x	$\frac{120}{x}$
120	$x + 5$	$\frac{120}{x + 5}$

$$\frac{120}{x} - \frac{120}{x+5} = \frac{4}{1}$$

$$\frac{120(x+5) - 120x = 4x(x+5)}{x(x+5)}$$

$$\cancel{120x} + 600 - \cancel{120x} = 4x^2 + 20x$$

$$+4x^2 + 20x - 600 = 0$$

$$x^2 + 5x - 150 = 0 \quad \text{LN-150}$$

$$x^2 + 15x - 10x - 150 = 0 \quad \text{Sub 5}$$

$$x(x+15) - 10(x+15) = 0$$

$$(x+15)(x-10) = 0$$

$$\cancel{x = -15} \quad x = 10$$

One tap fills a bath in 4 minutes.

Another tap takes x minutes.

Both take 3 minutes together

Find x .

Time	Full Pool	Per minute
4	1	$\frac{1}{4}$
x	1	$\frac{1}{x}$
-

$$\text{Together} \quad \frac{1}{4} + \frac{1}{x} =$$

$$\frac{1}{\frac{1}{4} + \frac{1}{x}} = 3$$

$$\frac{1}{1} = 3 \left(\frac{1}{4} + \frac{1}{x} \right)$$

$$4x = 3(x + 4)$$

$$4x = 3x + 12$$

$$x = 12.$$

A boat has a speed of x km/h. It travels 12 km up river and 12 km back again. The river runs at 1 km/h. The total journey takes 9 hrs. Find x .

Speed : boat = x River = 1.

	Distance	Speed	Time
Up	12	$x - 1$	$\frac{12}{x - 1}$
Down	12	$x + 1$	$\frac{12}{x + 1}$

$$\frac{12}{x - 1} + \frac{12}{x + 1} = \frac{9}{1}$$

$$\frac{12(x + 1) + 12(x - 1) = 9(x - 1)(x + 1)}{(x - 1)(x + 1)}$$

$$12x + \cancel{12} + 12x - \cancel{12} = 9x^2 - 9$$

$$9x^2 - 24x - 9 = 0$$

$$3x^2 - 8x - 3 = 0$$

$$3x^2 - 9x + 1x - 3 = 0$$

$$3x(x-3) + 1(x-3) = 0$$

$$(x-3)(3x+1) = 0$$

$$x = 3$$

$$~~x = -\frac{1}{3}~~$$