Did you know?

I have picked two numbers that multiply to make zero.

What can you say about my numbers?

At least one of them must be zero

This is useful when using factorising to solve equations.

If $a \times b = 0$, then either $a = 0$ or $b = 0$ (or both!)

Historically zero wasn't accepted as a number until relatively recently!

Solving with Quadratics 1

Solve the following

1. $x^2 = 16$

2. $x^2 - 16x = 0$

3. $(x + 1)(2x - 3) = 0$

4. $x^2 - 3x + 2 = 0$

5. $(2x - 5)(4x + 3) = 0$

6. $3x^2 + 14x - 5 = 0$

7. $(x + 3)^2 = 25$

8. $\dfrac{3}{x} + \dfrac{4}{x - 1} = 10$

Solving with Quadratics 1

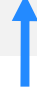Solutions on the next slide…..

Quadratics 1 Solutions

1. $x^2 = 16$
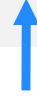
   $x = \pm\sqrt{16}$
   $x = \pm 4$

2. $x^2 - 16x = 0$

   $x(x - 16) = 0$
   $x = 0 \text{ or } x = 16$

3. $(x + 1)(2x - 3) = 0$

   $x + 1 = 0 \text{ or } 2x - 3 = 0$
   $x = -1 \text{ or } x = \dfrac{3}{2}$

4. $x^2 - 3x + 2 = 0$

   $(x - 2)(x - 1) = 0$
   $x = 2 \text{ or } x = 1$

Quadratics 1 Solutions

5. $(2x - 5)(4x + 3) = 0$

$2x - 5 = 0 \; or \; 4x + 3 = 0$

$2x = 5 \; or \; 4x = -3$

$x = \dfrac{5}{2} \; or \; x = -\dfrac{3}{4}$

6. $3x^2 + 14x - 5 = 0$

$(3x - 1)(x + 5) = 0$

$3x - 1 = 0 \; or \; x + 5 = 0$

$3x = 1 \; or \; x = -5$

$x = \dfrac{1}{3} \; or \; x = -5$

7. $(x + 3)^2 = 25$

$x + 3 = \pm\sqrt{25}$

$x + 3 = \pm 5$

$x = 2 \; or \; x = -8$

8. $\dfrac{3}{x} + \dfrac{4}{x - 1} = 10$

$\dfrac{3(x - 1) + 4x}{x(x - 1)} = 10$

$3x - 3 + 4x = 10x(x - 1)$

$7x - 3 = 10x^2 - 10x$

$10x^2 - 17x + 3 = 0$

$(2x - 3)(5x - 1) = 0$

$x = \dfrac{3}{2} \; or \; x = \dfrac{1}{5}$

Solving with Quadratics 2

Solve the following

1. $x^2 - 4x - 12 = 0$

2. $x^2 - x = 6$

3. $2x^2 - 11x + 12 = 0$

4. $6x^2 + x - 12 = 0$

5. $3 + 2x - x^2 = 0$

6. $x^2 - 4x - 1 = 0$

7. $\dfrac{8}{x+2} - \dfrac{14}{x-3} = 9$

8. The area of this rectangle is $30m^2$

$2x - 1$

$3x + 4$
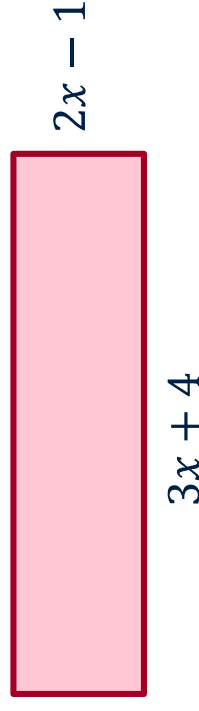
a) Show that $6x^2 + 5x - 34 = 0$
b) Find any possible values for x

Solving with Quadratics 2

Solutions on the next slide…..

Solutions Quadratics 2

1. $x^2 - 4x - 12 = 0$

$(x-2)^2 - 4 - 12 = 0$
$(x-2)^2 = 16$
$x - 2 = \pm 4$
$x = 6 \ or \ x = -2$

2. $x^2 - x = 6$

$x^2 - x - 6 = 0$
$(x-3)(x+2) = 0$
$x = 3 \ or \ x = -2$

3. $2x^2 - 11x + 12 = 0$

$(2x-3)(x-4) = 0$
$2x - 3 = 0 \ or \ x - 4 = 0$
$2x = 3 \ or \ x = 4$
$x = \dfrac{3}{2} \ or \ x = 4$

4. $6x^2 + x - 12 = 0$

$(2x+3)(3x-4) = 0$
$2x + 3 = 0 \ or \ 3x - 4 = 0$
$2x = -3 \ or \ 3x = 4$
$x = -\dfrac{3}{2} \ or \ x = \dfrac{4}{3}$

Solutions Quadratics 2

5. $3 + 2x - x^2 = 0$

$(3 - x)(1 + x) = 0$
$x = 3 \; or \; x = -1$

6. $x^2 - 4x - 1 = 0$

$(x - 2)^2 - 4 - 1 = 0$
$(x - 2)^2 = 5$
$x - 2 = \pm\sqrt{5}$
$x = 2 \pm \sqrt{5}$

> We have used completing the square. The quadratic formula can also be used

7. $\dfrac{8}{x + 2} - \dfrac{14}{x - 3} = 9$

$\dfrac{8(x - 3) - 14(x + 2)}{(x + 2)(x - 3)} = 9$
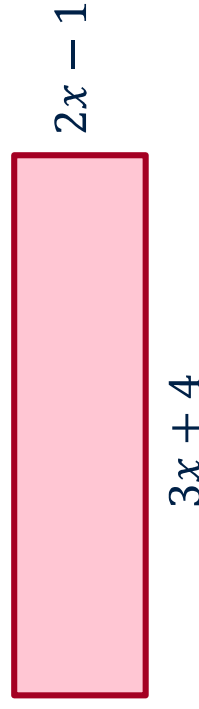
$8x - 24 - 14x - 28 = 9(x + 2)(x - 3)$
$-6x - 52 = 9x^2 - 9x - 54$
$9x^2 - 3x - 2 = 0$
$(3x + 1)(3x - 2) = 0$
$x = -\dfrac{1}{3} \; or \; x = \dfrac{2}{3}$

8. The area of this rectangle is $30m^2$

$2x - 1$

$3x + 4$

a) Show that $6x^2 + 5x - 34 = 0$

$(2x - 1)(3x + 4) = 30$
$6x^2 + 5x - 4 = 30$
$6x^2 + 5x - 34 = 0$
$(6x + 17)(x - 2) = 0$

b) Find any possible values for x

$x = 2$ Note $x \neq -\dfrac{17}{6}$

> Side lengths can't be negative