

August 23, 2010

1.2 #19

Class $\frac{1}{3}$ time

eating $\frac{1}{5}$ of the time

working out $\frac{1}{10}$

Studying 3 hrs

Other things $2\frac{1}{2}$ hours

Waking time

Sleeping time?

Waking time + Sleeping time = 24 hrs.

Let x be the waking time.

$$\frac{1}{3}x + \frac{1}{5}x + \frac{1}{10}x + 3 + 2.5 = 24$$

multiply both sides by 30

$$10x + 6x + 3x + 90 + 75 = 30x$$

$$19x + 165 = 30x$$

$$165 = 11x$$

$$\boxed{15 = x}$$

§1.3 Quadratic Equation

Examples

$$\textcircled{1} 2x^2 + 3x - 2 = 0 \quad \text{Yes}$$

$$\rightarrow a = 2, b = 3, c = -2$$

$$\textcircled{2} -0.1x^2 - x + 1000 = 0$$

Quadratic

$$a = -0.1, b = -1, c = 1000$$

$$\textcircled{3} x^2 = 2x + 3$$

Quadratic

$$a = 1, b = -2, c = -3$$

$$(4) \quad 3x^2 = 0$$

Quadratic

$$a = 3, b = 0, c = 0$$

$$(5) \quad 3x + 6 = 0 \text{ Not Quadratic}$$

$$\boxed{a = 0}$$

$$(6) \quad 3x(3) + x^2 + 3 = 0 \text{ Not Quadratic}$$

$$(7) \quad \begin{array}{r} x^2 + 3x - 1 = x^2 \\ -x^2 \end{array} \text{ Not quadratic}$$

$$3x - 1 = 0$$

Example 1

$$x^2 - 6x - 16 = 0$$

want two numbers such

that:

$$(x + \boxed{-8})(x + \boxed{2}) = 0$$

- Sum = -6
- product = -16

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

either

$$x-8 = 0$$

$$\vee x+2 = 0$$

$$\boxed{x = 8}$$

or

$$\boxed{x = -2}$$

Example 2

$$x^2 - 6x + 5 = -4$$

$$x^2 - 6x + 9 = 0 \quad \text{Quadratic}$$

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

either

$$x-3=0$$

$$\vee \quad x-3=0$$

$$\boxed{x=3}$$

\vee

$$\boxed{x=3}$$

Example 3

$$2x^2 = 3x$$

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

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

either

$$x = 0$$

or

$$2x - 3 = 0$$

$$2x = 3$$

$$x = \frac{3}{2}$$

Example

$$v^2 + 7v + 6 = 0$$

$$(v+6)(v+1) = 0$$

either

$$v+6 = 0$$

$$\vee v+1 = 0$$

$$\boxed{v = -6}$$

$$\boxed{v = -1}$$

Example

$$u^2 - 2u - 24 = 0$$

$$(u-6)(u+4) = 0$$

$$u-6 = 0$$

$$\vee u+4 = 0$$

$$\boxed{u = 6}$$

or

$$\boxed{u = -4}$$

Example

$$5y^2 - 45 = 0$$

$$5(y^2 - 9) = 0$$

Difference of Squares

$$5(y+3)(y-3) = 0$$
$$A^2 - B^2 = (A+B)(A-B)$$

$$y+3=0 \quad \text{or} \quad y-3=0$$

$$\boxed{y = -3}$$

or

$$\boxed{y = 3}$$

Square root method

Example 4

$$3x^2 - 27 = 0$$

$$3x^2 = 27$$

$$x^2 = 9 \quad \text{divide by 3}$$

So

$$x = \pm\sqrt{9}$$

$$\boxed{x = \pm 3}$$

Example

$$3x^2 + 27 = 0$$

$$3x^2 = -27$$

$$x^2 = -\frac{27}{3}$$

$$x^2 = -9$$

$$x = \pm \sqrt{-9}$$

$$= \pm 3i \text{ Complex.}$$

$$\sqrt{ab} = \sqrt{a} \sqrt{b}$$

$$\sqrt{-9} = (\sqrt{-1})(\sqrt{9})$$

$$= i \cdot 3$$

Imaginary or complex
(NOT REAL)

Example

$$(x-2)^2 = 16$$

$$x-2 = \pm\sqrt{16}$$

$$x-2 = \pm 4$$

either

$$x-2 = 4$$

$$\boxed{x = 6}$$

or

$$x-2 = -4$$

$$\boxed{x = -2}$$