Solving Quadratic Equations   Nov. 23/2011

Recall:

To <u>solve</u> an equation, find value(s)
that <u>satisfy</u> the equation (i.e., make it <u>true</u>).

This value is called the <u>solution</u> or <u>root</u> of the equation.

Ex.1 Solve $x^2 - 12x + 32 = 0$

→ the <u>solutions</u> are the <u>zeroes</u>.

$$x^2 - 12x + 32 = 0$$
$$x^2 - 8x - 4x + 32 = 0$$
$$x(x-8) - 4(x-8) = 0$$
$$\quad\quad a \quad\quad\quad a$$
$$xa - 4a = 0$$
$$a(x-4) = 0$$
$$(x-8)(x-4) = 0$$

S -12
P 32
I -8, -4

$$x - 8 = 0 \quad \text{or} \quad x - 4 = 0$$
$$\boxed{x = 8} \quad\quad\quad \boxed{x = 4}$$

Apr 19-7:41 PM

We have most often solved for the <u>zeroes</u> of the
quadratic equation, but we can solve for any value.

Ex.2 Solve $y = 2x^2 + 5x - 12$ for   (a) $y = 0$
                                                            (b) $y = -12$

(a) $0 = 2x^2 + 5x - 12$

$$0 = 2x^2 + 8x - 3x - 12$$
$$0 = 2x(x+4) - 3(x+4)$$
$$0 = (x+4)(2x-3)$$

S 5
P -24
I 8, -3

$$x + 4 = 0 \quad \text{or} \quad 2x - 3 = 0$$
$$\boxed{x = -4} \quad\quad\quad 2x = 3$$
$$\quad\quad\quad\quad\quad\quad\quad \boxed{x = 1.5}$$

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1

We have most often solved for the <u>zeroes</u> of the quadratic equation, but we can solve for any value.

Ex.2 Solve $y = 2x^2 + 5x - 12$ for   (a) $y = 0$
                                          (b) $y = -12$

(b) $-12 = 2x^2 + 5x - 12$

→ finding matching point for y-int
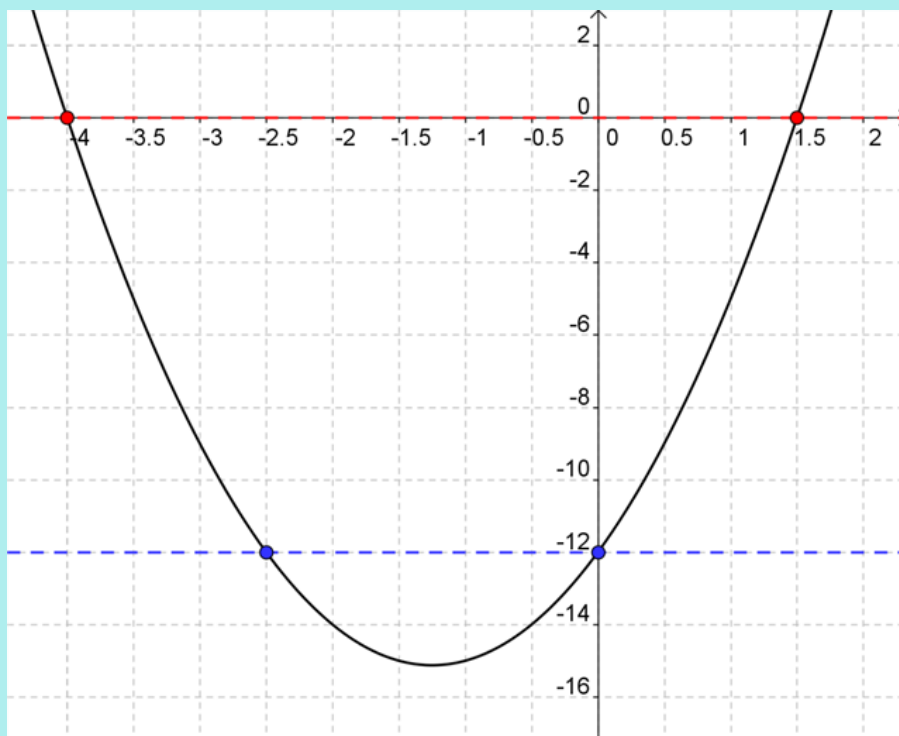
$0 = 2x^2 + 5x$

$0 = x(2x + 5)$

$\boxed{x = 0}$ or $2x + 5 = 0$

$2x = -5$

$\boxed{x = -2.5}$

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Ex.2 Solve $y = 2x^2 + 5x - 12$ for   (a) $y = 0$
                                        (b) $y = -12$

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2

To solve using factored form:

    1) Expand all terms

    2) Move all terms to one side of the equal sign so that
       the equation equals zero

    3) Factor your expression (if possible)

    4) Set each factor equal to zero and solve

Ex.3 Solve: $x^2 - 10 = -x(2x + 13)$

① $\quad x^2 - 10 = -2x^2 - 13x$
$\qquad +2x^2 \ +13x \quad +2x^2 \ +13x$

② $\quad 3x^2 + 13x - 10 = 0$

$\qquad 3x^2 + 15x - 2x - 10 = 0$

$\qquad 3x(x+5) - 2(x+5) = 0$

$\qquad (x+5)(3x-2) = 0$

$\qquad x + 5 = 0 \quad \text{or} \quad 3x - 2 = 0$
$\qquad\qquad x = -5 \qquad\qquad 3x = 2$
$\qquad\qquad\qquad\qquad\qquad\qquad x = \frac{2}{3}$

$S \quad 13$
$P \ -30$
$\mp \ 15, -2$

Mar 29-11:52 AM

$y = x^2 - 10$
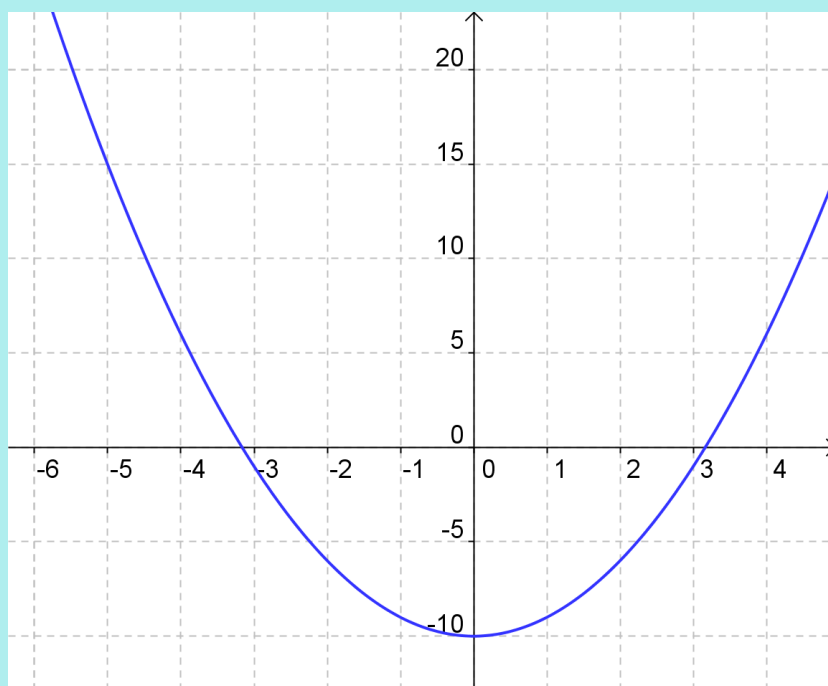
Nov 22-7:51 PM

$y = -x(2x + 13)$
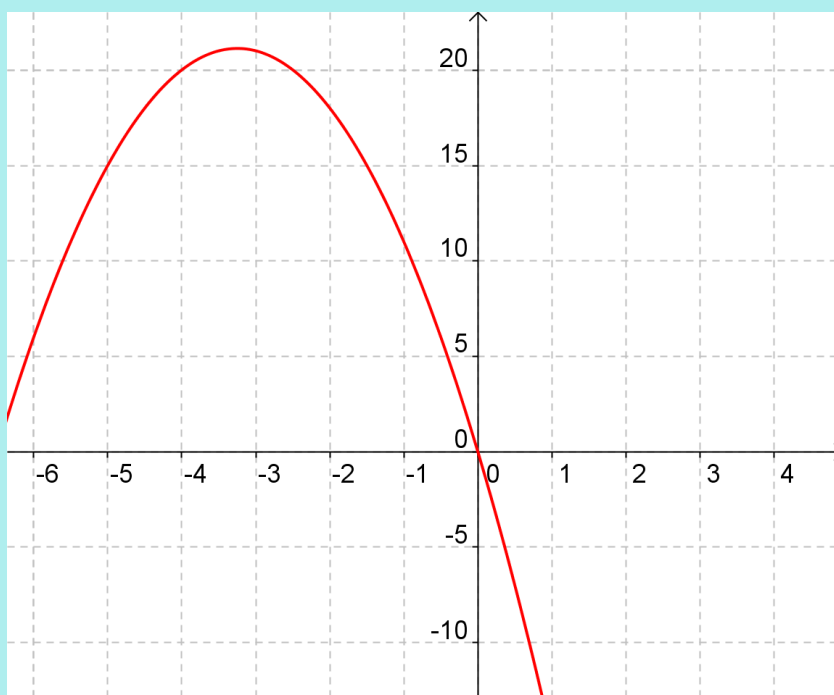
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$x^2 - 10 = -x(2x + 13)$

(-5, 15)

$x = -5$

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

(0.67, -9.56)

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4
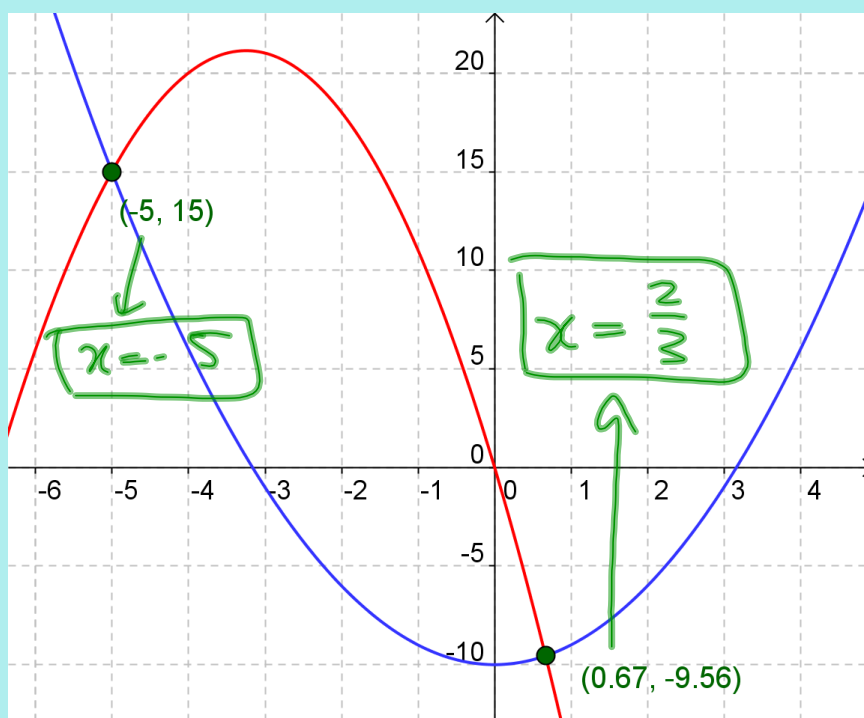
Assigned Work:

p.320 # 4ac, 6ace, 7ace, 9ace, 11, 14

tech.

4(c) $x = -\frac{1}{2}$

$2x^2 + 11x + 5 = 0$

$LS = 2x^2 + 11x + 5$

$= 2\left(-\frac{1}{2}\right)^2 + 11\left(-\frac{1}{2}\right) + 5$

$= 2\left(\frac{1}{4}\right) - \frac{11}{2} + 5$

$= \frac{2}{4} - \frac{11}{2} + 5$

$= 0.5 - 5.5 + 5$ $RS = 0$

$= 0$ $LS = RS$ ✓

$\therefore x = -\frac{1}{2}$ is a solution

Nov 24-10:31 AM

6(a)

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

$$3x^2 - 6x + x - 2 = 0$$

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

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

S -5
P -6
I $-6, 1$

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

$$\boxed{x = 2} \qquad 3x = -1$$

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

check $x = 2$

$$LS = 3x^2 - 5x - 2$$
$$= 3(2)^2 - 5(2) - 2$$
$$= 12 - 10 - 2$$
$$= 0 \qquad RS = 0$$
$$LS = RS \checkmark$$

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7(c)

$$(x+2)^2 + x = 2(3x+5)$$

$$(x+2)(x+2) + x = 6x + 10$$

$$x^2 + 2x + 2x + 4 + x = 6x + 10$$

$$x^2 + 5x + 4 = 6x + 10$$
$$ -6x - 10 \quad -6x - 10$$

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

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

S -1
P -6
I $-3, 2$

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

$$\boxed{x = 3} \qquad \boxed{x = -2}$$

Nov 24-10:37 AM

11. $A = 160x + 4x^2$

want $A = 900$

$900 = 160x + 4x^2$

$\dfrac{0}{4} = \dfrac{4x^2}{4} + \dfrac{160x}{4} - \dfrac{900}{4}$

$0 = x^2 + 40x - 225$ S 40
                            P -225
$0 = x^2 + 45x - 5x - 225$ I 45, -5

$0 = x(x+45) - 5(x+45)$

$0 = (x+45)(x-5)$

$x + 45 = 0$ $x - 5 = 0$

$\boxed{x = -45}$ $\boxed{x = 5}$

but x is width, $x > 0$

∴ width is 5m

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