6.6 Solving Polynomial Equations

Study 6.6 # 1-7, 11, 15, 19, 27, 33, 47, 57, 63-67, 97, 101

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6.6 Solving Polynomial Equations

Solve: $x^2 - 9 = 0$

Need to find the values of x
that make the statement true.

Multiplication Property of Zero:
If a product = 0, then
at least one of the factors = 0

If   a b = 0
then either   a = 0
   or   b = 0
   or both

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<div style="text-align:center">

6.6 Solving Polynomial Equations

</div>

If $a\,b = 0$

then either $a = 0$

or $b = 0$

or both

Solve: $x^2 - 9 = 0$

Need a product. So, factor.

$(x + 3)(x - 3) = 0$ $a\,b = 0$

$x + 3 = 0$ | $x - 3 = 0$ $a = 0$ $b = 0$

$x = -3$ | $x = 3$

∴ x = -3 and x = 3 are both solutions.

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6.6 Solving Polynomial Equations

If $ab = 0$
then either $a = 0$
or $b = 0$
or both

Solve: $x^2 - 6x + 9 = 0$

Need a product. So, factor.

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

_____ = 0 | _____ = 0 $a = 0$ $b = 0$

$x =$ ___ | $x =$ ___

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6.6 Solving Polynomial Equations

If　　　$ab = 0$
then either　　$a = 0$
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or both

Solve:　$x^2 - 6x + 9 = 0$

Need a product. So, factor.

$(x - 3)(x - 3) = 0$　　　　　　$ab = 0$

$x - 3 = 0$	$x - 3 = 0$
$x = 3$	$x = 3$

$a = 0$　$b = 0$

∴ $x = 3$ is the solution

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6.6 Solving Polynomial Equations
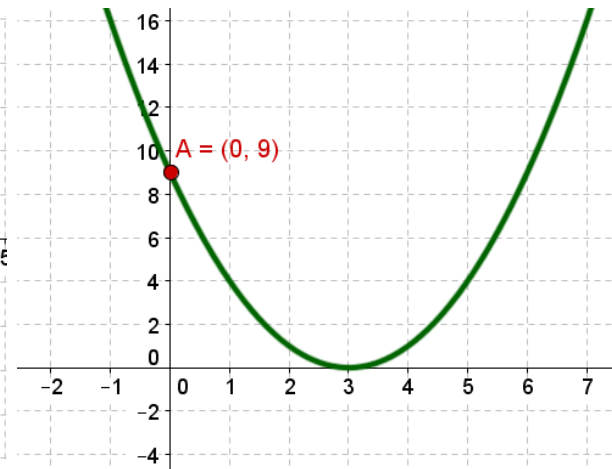
$x^2 - 9 = 0$

∴ solution: x = -3 and x = 3
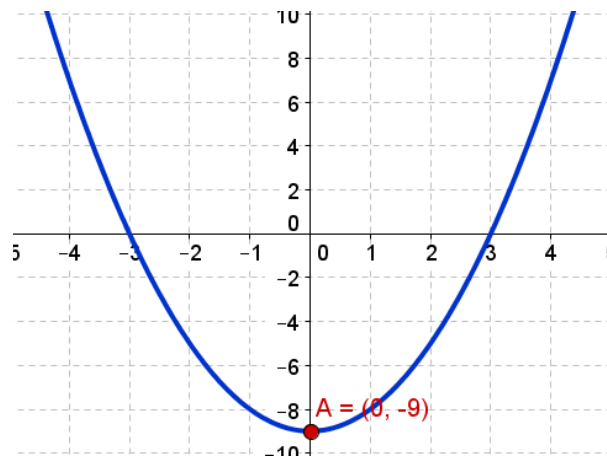
$x^2 - 6x + 9 = 0$

∴ x = -3 is the solution

$f(x) = x^2 - 9$

$f(x) = x^2 - 6x + 9$

How do our solutions relate to the graphs
of the corresponding functions?

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6.6 Solving Polynomial Equations

Solve: $x^2 - 9 = 7$

$f(x) = x^2 - 9$
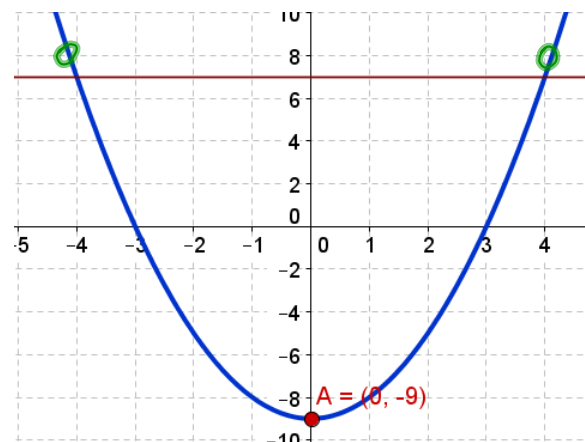
Not equal to 0. Need to use the APE so = 0 on right.

$$x^2 - \underline{\quad} = 0$$
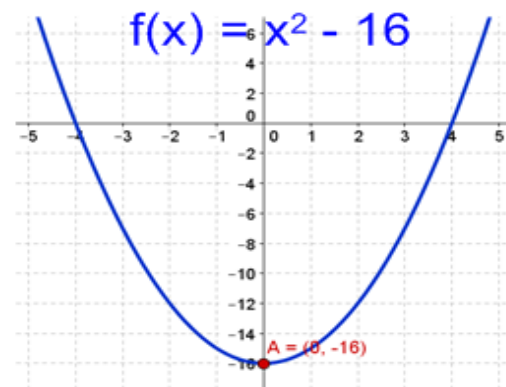
$$(x + \underline{\quad})(x - \underline{\quad}) = 0$$

$$x + \underline{\quad} = 0 \quad\Big|\quad x - \underline{\quad} = 0$$

$$x = \underline{\quad} \quad\Big|\quad x = \underline{\quad}$$

A = (0, -9)

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

A = (0, -16)

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6.6 Solving Polynomial Equations

Solve: $x^2 - 9 = 7$

Not equal to 0. Need to
use the APE so = 0 on right.
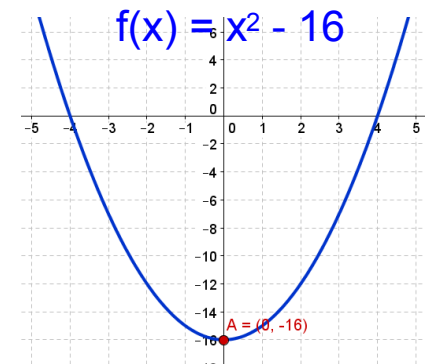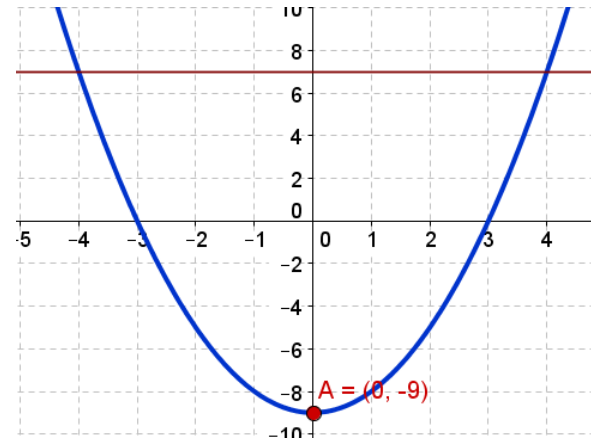
$$x^2 - 16 = 0$$

$$(x + 4)(x - 4) = 0$$

$x + 4 = 0$ | $x - 4 = 0$

$x = -4$ | $x = 4$

∴ solution: x = -4 and x = 4

$f(x) = x^2 - 9$

A = (0, -9)

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

A = (0, -16)

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6.6 Solving Polynomial Equations

$$x^2 - 9 = 8$$

$$x^2 - 17 = 0 \longrightarrow x^2 = 17$$

$$\left(x + \sqrt{17}\right)\left(x - \sqrt{17}\right) = 0 \qquad x = \pm\sqrt{17}$$

$$x + \sqrt{17} = 0 \ \bigg| \ x - \sqrt{17} = 0$$

$$x = -\sqrt{17} \ \bigg| \ x = \sqrt{17}$$

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6.6 Solving Polynomial Equations

Solve:

$$16 + x^2 + 8x = 0$$

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6.6 Solving Polynomial Equations

Solve:

$$16 + x^2 + 8x = 0$$

$$x^2 + 8x + 16 = 0$$

$$(x + 4)^2 = 0$$

$$x + 4 = 0$$

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

$(x)^2 = x^2$
$(4)^2 = 16$
  and
$2(x)(4) = 8x$
$\therefore$ Perfect
Sq. Trinomial

Check:

$$16 + (-4)^2 + 8(-4) \overset{?}{=} 0$$

$$16 + 16 - 32 = 0$$

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6.6 Solving Polynomial Equations

Solve:

$$(x + 3)(x - 2) = 24$$

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6.6 Solving Polynomial Equations

Solve:

$$(x + 3)(x - 2) = 24$$

Check:

$$-3(-8) = +24 \checkmark$$
$$8(3) = 24 \checkmark$$

Need: $ax^2 + bx + c = 0$

$$x^2 - 2x + 3x - 6 = 24$$
$$x^2 + x - 30 = 0$$

$$(x + 6)(x - 5) = 0$$

$$x + 6 = 0 \qquad x - 5 = 0$$
$$x = -6 \qquad x = 5$$

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6.6 Solving Polynomial Equations

Solve:

$$y^3 + 3y^2 - 4y - 12 = 0$$

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6.6 Solving Polynomial Equations

$$y^3 + 3y^2 - 4y - 12 = 0$$

$$y^2(y+3) - 4(y+3) = 0$$

$$(y^2 - 4)(y+3) = 0$$

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

$y+2=0$	$y-2=0$	$y+3=0$
$y=-2$	$y=2$	$y=-3$

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