Week 1 Wednesday

January 9, 2019 7:29 AM

Quiz Tues 15th
1.2 Quadratic Equations
Bring your calculator

1.2 Cont'd

Ex: Solve $5 + \frac{2}{x} - \frac{7}{x^2} = 0$

Mult by x^2:

$$5x^2 + 2x - 7 = 0$$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{-2 \pm \sqrt{144}}{10}$$

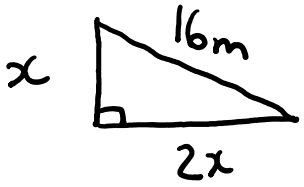
$$x = \frac{-2 \pm 12}{10}$$

$$x = \frac{-14}{10}, \frac{10}{10}$$

$$x = -\frac{7}{5}, 1$$

Ex: A right triangle has a hypotenuse

of length 16m. Find the lengths of the shorter sides if one is twice the length of the other.



$$a^2 + b^2 = c^2$$

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

$$x^2 + 4x^2 = 256$$

$$5x^2 = 256$$

Square Root Method

$$x^2 = \frac{256}{5}$$

$$x = \pm\sqrt{\frac{256}{5}}$$

$$x = \pm\frac{\sqrt{256}}{\sqrt{5}}$$

$$x = \pm\frac{16}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

$$x = \pm\frac{16\sqrt{5}}{5}$$

Length >0 therefore $x = \frac{16\sqrt{5}}{5}$

The lengths are $x = \frac{16\sqrt{5}}{5}$ m

and $2x = \frac{32\sqrt{5}}{5}$ m

1.4 Radical Equations

Ex: Solve $\sqrt[3]{4x+3} - 3 = 0$

Isolate the root

$$\sqrt[3]{4x+3} = 3$$

Cube both sides

$$4x+3 = 27$$
$$4x = 24$$
$$x = 6$$

Check $x=6$: $LS = \sqrt[3]{27} - 3 = 0$ ✓
$RS = 0$

Answer $= \{6\}$

Ex: Solve $\sqrt{x+4} + x = 8$

$$\sqrt{x+4} = 8-x$$

Square both sides:

$$x+4 = (8-x)^2$$
$$x+4 = 64 - 16x + x^2$$
$$0 = 60 - 17x + x^2$$
$$x^2 - 17x + 60 = 0$$

$$(x-12)(x-5)=0$$

$x-12=0$ $\quad$ $x=5$

$x=12$

Check $x=5$: $\quad \sqrt{x+4}+x=8$

$LS=\sqrt{9}+5=8$

$RS=8$ ✓

Check $x=12$: $\quad LS=\sqrt{16}+12$

$RS=8$ $\quad$ ✗

$x=12$ is "extraneous"

Answer = $\{5\}$

Squaring both sides can produce extraneous solutions.

Be sure to check our answer when raising both sides to an <u>even</u> power.

<u>Ex</u>: Solve $\sqrt{x}=\sqrt{x+16}-2$

Isolate the more complicated root

$$\sqrt{x}+2=\sqrt{x+16}$$

Square both sides $\longrightarrow$ CHECK

$$(\sqrt{x}+2)^2=\sqrt{x+16}^2$$

$$x + 4\sqrt{x} + 4 = x + 16$$

Isolate the root

$$4\sqrt{x} = 12$$

$$\sqrt{x} = 3$$

Square

$$x = 9$$

Check: $\sqrt{x} = \sqrt{x+16} - 2$

$x = 9$: LS $= 3$ RS $= \sqrt{25} - 2 = 3$ ✓

Answer $= \{9\}$

Equations in Quadratic form

Ex: Solve $(x^2-9)^2 + 6(x^2-9) + 8 = 0$

Let $y = x^2 - 9$

$$y^2 + 6y + 8 = 0$$

$$(y+4)(y+2) = 0$$

x^2-9

$$(x^2-5)(x^2-7) = 0$$

$x^2 - 5 = 0$ $\quad$ $x^2 - 7 = 0$

$x^2 = 5$ $\quad$ $x^2 = 7$

$x = \pm\sqrt{5}$ $\quad$ $x = \pm\sqrt{7}$

Answer: $\{\pm\sqrt{5}, \pm\sqrt{7}\}$