Name:______________________________ Date:____________________________

SOLUTION For: Pre-Calculus 11 HW 4.3 Solving Quadratic Equations by CTS

1. Solve each of the following equations algebraically:

a) $(x-3)^2-12=0$ $(x-3)^2=12$ $x-3=\pm\sqrt{12}$ $x=3\pm\sqrt{12}$	b) $(2x+4)^2-16=0$ $(2x+4)^2=16$ $2x+4=\pm4$ $2x=4\pm4$ $x=4,0$	c) $-4(x+7)^2+14=0$ $-4(x+7)^2=-14$ $(x+7)^2=3.5$ $x=-7\pm\sqrt{3.5}$
d) $0.5(x+11)^2-11=0$ $0.5(x+11)^2=11$` $x+11=\pm\sqrt{22}$ $x=-11\pm\sqrt{22}$	e) $(x+5)^2+12=0$ $(x+5)^2=-12$ $x+5=\pm\sqrt{-12}$ $x=-5\pm\sqrt{-12}$ *No Real Sol.*	f) $\frac{(2x+1)^2}{3}-15=0$ $(2x+1)^2=45$ $2x+1=\pm\sqrt{45}$ $2x=-1\pm3\sqrt{5}$ $x=\frac{-1\pm3\sqrt{5}}{2}$

2. Solve each of the following quadratic equations by Completing the Square. Please show all your steps:

a) $0=3x^2+8x-5$ $0=(3x^2+8x)-5$ $0=3\left(x^2+\frac{8}{3}x+\frac{16}{9}-\frac{16}{9}\right)-5$ $0=3\left(x^2+\frac{8}{3}x+\frac{16}{9}\right)-\frac{16}{3}-5$ $0=3\left(x+\frac{4}{3}\right)^2-\frac{31}{3}$ x=0.522588 OR -3.189 $\frac{31}{3}=3\left(x+\frac{4}{3}\right)^2$ $\frac{31}{9}=\left(x+\frac{4}{3}\right)^2$ $-\frac{4}{3}\pm\sqrt{\frac{31}{9}}=x$	b) $0=5x^2+12x-3$ $0=(5x^2+12x)-3$ $0=5\left(x^2+\frac{12}{5}x\right)-3$ $0=5\left(x^2+\frac{12}{5}x+\frac{36}{25}-\frac{36}{25}\right)-3$ $0=5\left(x^2+\frac{12}{5}x+\frac{36}{25}\right)-\frac{36}{5}-3$ $0=5\left(x+\frac{6}{5}\right)^2-\frac{51}{5}$ x=-2.628286 OR 0.22828 $\frac{51}{5}=5\left(x+\frac{6}{5}\right)^2$ $\pm\sqrt{\frac{51}{25}}=\left(x+\frac{6}{5}\right)$ $\frac{-6}{5}\pm\sqrt{\frac{51}{25}}=x$

c) $4x^2 = 2 - 13x$ Move everything to one side and then complete the square. The process is the same.	d) $0 = 5x^2 + 12x - 3$

3. The equation of a parabola is given by the equation: $y = 3x^2 + 5x - 10$. Find the roots [aka: coordinates of the x-intercepts] by completing the square:

$$y = \left(3x^2 + 5x\right) - 10$$

$$y = 3\left(x^2 + \frac{5}{3}x\right) - 10$$

$$y = 3\left(x^2 + \frac{5}{3}x + \frac{25}{36} - \frac{25}{36}\right) - 10$$

$$y = 3\left(x^2 + \frac{5}{3}x + \frac{25}{36}\right) - \frac{25}{12} - 10$$

$$y = 3\left(x + \frac{5}{6}\right)^2 - \frac{145}{12}$$

Make the Y – Coordinate equal to zero

$$\frac{145}{12} = 3\left(x + \frac{5}{6}\right)^2$$

$$\pm\sqrt{\frac{145}{36}} = x + \frac{5}{6}$$

$$-\frac{5}{6} \pm \sqrt{\frac{145}{36}} = x$$

The roots will be:

$x = -.2840266, \quad x = 1.173599$

The sum of an arithmetic series is given by the equation: $S = \frac{n}{2}\left(2 \times a + [n-1]d\right)$, where "n" is the number of terms, "a" is the first term, and "d" is the common difference. If the first term *"a"* is 10, common difference *"d"* is 4, and the sum *"S"* is 1192, find the number of terms *"n"* in the series.

$$S = \frac{n}{2}\left(2 \times a + [n-1]d\right)$$

$$1144 = \frac{n}{2}\left(20 + [n-1]4\right)$$

$$2288 = n[16 + 4n]$$

$$2288 = 4n^2 + 16n$$

$$572 = n^2 + 4n$$

$$572 + 4 = n^2 + 4n + 4$$

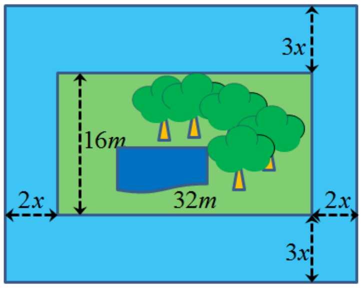
$$576 = (n+2)^2$$

$$24 = n + 2$$

$$22 = n$$

There are 22 terms in the series

4. A rectangular playground (16m by 32m) has a walkway around it as shown below. If adding the walkway doubles the area of the playground, find the value of "x":



Here's the equation that you need to solve:

$A=(16+6x)(32+4x)$

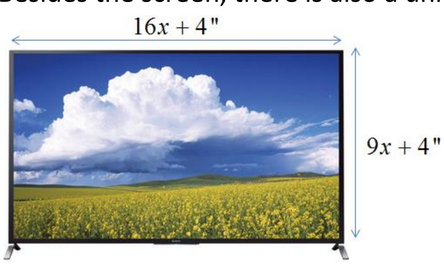
$16\times32\times2=(16+6x)(32+4x)$

$16\times32\times2=2(8+3x)4(8+x)$

$2\times32\times2=(8+3x)(8+x)$

$128=64+32x+x^2$

5. Jason bought a 75" television at Costco. He knows that the screen aspect ratio is 16:9 [width to height]. Besides the screen, there is also a uniform border of 2" around. What is the width of the TV?



The diagonal is 75", so you need to use the Pythagorean formula:

$(16+4x)^2+(9x+4)^2=75^2$