HW SOL 4.6

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Name:_____   Date:_____

Math 9 Enriched HW 4.6 Solving Equations by CTS

1. Indicate what value should be added to the trinomial so that the equation could be a perfect trinomial:

a) $x^2 + (?) + 9$	b) $x^2 + 8x + (?)$
c) $(?) - 2x + 1$	d) $x^2 - (?) + 81$
e) $x^2 - 15x + (?)$	f) $x^2 + 17x + (?)$
g) $4x^2 + 4x + (?)$	h) $9x^2 - (?) + 1$

2. Solve each of the following equations algebraically:

a) $(x-3)^2 - 12 = 0$	b) $(2x+4)^2 - 16 = 0$	c) $-4(x+7)^2 + 14 = 0$
d) $0.5(x+11)^2 - 11 = 0$	e) $(x+5)^2 + 12 = 0$	f) $\dfrac{(2x+1)^2}{3} - 15 = 0$

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

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

1

c) $4x^2 = 2 - 13x$

$4x^2 + 13x - 2 = 0 \leftarrow$ $\frac{13}{8}$

$4(x^2 + \frac{13}{4}x) - 2 = 0. \leftarrow$

$4(x^2 + \frac{13x}{4} + \frac{169}{64} - \frac{169}{64}) - 2 = 0$

$4(x^2 + \frac{13x}{4} + \frac{169}{64}) - \frac{169}{16} - \frac{32}{16} = 0.$

$4(x + \frac{13}{8})^2 = \frac{201}{16}$

$x + \frac{13}{8} = \pm\frac{\sqrt{201}}{8}$

$x = \frac{-13}{8} \pm \frac{\sqrt{201}}{8}$

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d) $0 = -\frac{2}{3}x^2 + 12x + 3$

$0 = -\frac{2}{3}(x^2 - 18x) + 3$ $= \frac{3}{2} = 18$

$0 = -\frac{2}{3}(x^2 - 18x + 81 - 81) + 3$

$0 = -\frac{2}{3}(x^2 - 18x + 81) + 54 + 3.$

$-57 = -\frac{2}{3}(x - 9)^2$

$\pm\sqrt{\frac{171}{2}} = x - 9$

$\boxed{9 \pm \sqrt{\frac{171}{2}} = x} \leftarrow$

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d) $0 = -\frac{4}{3}x^2 + 11x + 9$

$0 = -\frac{4}{3}(x^2 - \frac{33}{4}x) + 9$

$0 = -\frac{4}{3}(x^2 - \frac{33}{4}x + \frac{1089}{64} - \frac{1089}{64}) + 9$

$0 = -\frac{4}{3}(x^2 - \frac{33}{4}x + \frac{1089}{64}) + \frac{363}{16} + 9$

$0 = -\frac{4}{3}(x - \frac{33}{8})^2 + \frac{507}{16}$

$\frac{-507}{16} = \frac{-4}{3}(x - \frac{33}{8})^2$

$\pm\sqrt{\frac{1521}{64}} = x - \frac{33}{8}$

$\boxed{\frac{33 \pm \sqrt{1521}}{8} = x}$

$\frac{33 \pm 39}{8} = x = \frac{-3}{4} \cdot \cdot 9$

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d) $0 = -\frac{4}{5}x^2 + 13x + 11$

$0 = -\frac{4}{5}(x^2 - \frac{65x}{4}) + 11$ $(\frac{65}{8})^2 = \frac{4225}{64}$

$0 = -\frac{4}{5}(x^2 - \frac{65x}{4} + \frac{4225}{64} - \frac{4225}{64}) + 11$

$0 = -\frac{4}{5}(x - \frac{65}{8})^2 + \frac{845}{16} + \frac{176}{16}.$

$\frac{1021}{16} = \frac{4}{5}(x - \frac{65}{8})^2$

$\pm\sqrt{\frac{5105}{64}} = x - \frac{65}{8}$

$\frac{65}{8} \pm \frac{\sqrt{5105}}{8} = x$

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4. The sum of an arithmetic series is given by the equation: $S = \frac{n}{2}(2 \times a + [n-1]d)$, 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 1144, find the number of terms "n" in the series.

$a = 10$

$d = 4$

$S = 1144$

$n = ?$

$1144 = \frac{n}{2}[2(10) + (n-1)(4)]$

$2288 = n(20 + 4n - 4)$

$2288 = n(16 + 4n)$

$2288 = 4n(4 + n)$

$572 = n(4 + n)$

$572 = 4n + n^2$

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

$n^2 + 4n + 4 = 576$

$(n + 2)^2 = 576$

$n + 2 = \pm 24$

$n = 24 - 2$

$\boxed{n = 22}$

2

5. 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":
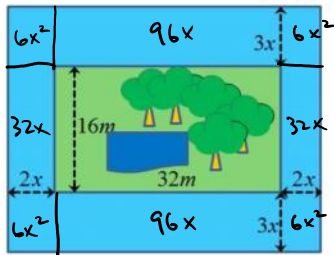
$24x^2 + 96x + 96x + 64x = 16(32)$

$6x^2 + 24x + 24x + 16x = 16(8)$

$3x^2 + 12x + 12x + 8x = 64$

$3x^2 + 26x = 64$

$3\left(x^2 + \frac{26}{3}x + \frac{28^2}{9} - \frac{28^2}{9}\right) = 64$

$3\left(x + \frac{14}{3}\right)^2 = 64 + \frac{28^2}{3}$

49×16

$x =$

6. 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?

$16x + 4"$

$9x + 4"$

7. A number is 4 more than its reciprocal. Find the number

8. The sum of a number and its reciprocal is 3. What is the number?

9. Find a positive number whose square is 3 more than the number itself

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10. Find a negative number whose square is 29 more than the number itself

11. The length of a rectangle is 10cm more than the twice the width. The area is 120cm2. What are the dimensions of the rectangle to the nearest tenth?

12. A picture frame has an area of 340cm2 and a perimeter of 80cm. What are the dimensions of the picture frame?

13. Find the sides of a rectangle whose perimeter is 56 and diagonal is 22

14. Complete the square and isolate the variable "x": $mx^2 + nx + p = 0$