Precalculus - Unit 7 - Conics Name _____

~~Chapter 9~~ Intro: Complete the Square

Factor the following Perfect Square Trinomials:

a) $x^2 + 18x + 81$
$(x+9)(x+9)$
$(x+9)^2$

b) $x^2 - 16x + 64$
$(x-8)(x-8)$
$(x-8)^2$

c) $x^2 + \frac{3}{4}x + \frac{9}{64}$
$(x+\frac{3}{8})(x+\frac{3}{8})$
$(x+\frac{3}{8})^2$

Find the value of c that makes each expression a perfect square trinomial. Then, write the expression as a square of a binomial.

1. $x^2 + 14x + c$
$x^2+14x+49$
$(x+7)^2$

2. $a^2 + 12a + c$
$a^2+12a+36$
$(a+6)^2$

3. $m^2 + 11m + c$
$m^2+11m+\frac{121}{4}$
$(m+\frac{11}{2})^2$

Steps for solving by completing the square.
1. Make sure the coefficient on the quadratic term is 1. If it is not 1, then factor to make it so.
2. Move the constant term to the opposite side of the equal sign from the quadratic & linear terms
3. Take half of 'b', square it, & add that value to both sides of the equation.
4. Factor
5. Take the square root of both sides. *Remember--you will get 2 answers.*
6. Isolate the variable and simplify to get the final solutions.

Solve each of the following by completing the square.

4. $x^2 - 14x + 19 = 0$
$x^2-14x+49 = -19+49$
$\frac{-14}{2} = -7 \rightarrow (-7)^2 = 49$
Factor! $(x-7)^2 = 30$
now solve! $\sqrt{(x-7)^2} = \sqrt{30}$
$x-7 = \pm\sqrt{30}$
$x = 7 \pm \sqrt{30}$

5. $v^2 + 18 = 9v$
$v^2-9v+(\frac{-9}{2})^2 = -18+(\frac{-9}{2})^2$
$(v-\frac{9}{2})^2 = \frac{9}{4}$
$v = \frac{9}{2} \pm \frac{3}{2}$
$v=6$
$v=3$

6. $3a^2 + a - 2 = 0$
$\frac{3a^2}{3} + \frac{a}{3} = \frac{2}{3}$
$a^2 + \frac{1}{3}a + (\frac{1}{6})^2 = \frac{2}{3} + (\frac{1}{6})^2$
$\sqrt{(a+\frac{1}{6})^2} = \sqrt{\frac{25}{36}}$
$a + \frac{1}{6} = \pm\frac{5}{6}$
$a = -\frac{1}{6} \pm \frac{5}{6}$
$a = \frac{2}{3}, -1$

7. $2d^2 - 10d + 5 = 0$
$2d^2-10d = -5$
$d^2-5d+(\frac{-5}{2})^2 = -\frac{5}{2}+(\frac{-5}{2})^2$
$(d-\frac{5}{2})^2 = \frac{15}{4}$
$d = \frac{5}{2} \pm \sqrt{\frac{15}{4}} = \frac{5\pm\sqrt{15}}{2}$

Classwork :)
~~HOMEWORK~~

Solve the equation by completing the square.

1. $x^2+4x+1=0$
$x^2+4x+4 = -1+4$
$(x+2)^2 = 3$
$x = -2 \pm \sqrt{3}$

2. $2x^2 = 3x-1$
$2x^2-3x = -1$
$x^2-\frac{3}{2}x+(\frac{-3}{4})^2 = -\frac{1}{2}+(\frac{-3}{4})^2$
$(x-\frac{3}{4})^2 = \frac{1}{16}$
$x = \frac{3}{4} \pm \sqrt{\frac{1}{16}}$
$x = \frac{3}{4} \pm \frac{1}{4}$
$x=1$
$x=1/2$

3. $0 = x^2-4x-1$
$4+1 = x^2-4x+4$
$5 = (x-2)^2$
$x = 2 \pm \sqrt{5}$

4. $-x^2-5x-\frac{13}{4}=0$
$x^2+5x+(\frac{5}{2})^2 = -\frac{13}{4}+(\frac{5}{2})^2$
$(x+\frac{5}{2})^2 = \frac{12}{4}$
$x = \frac{-5\pm\sqrt{12}}{2} = \frac{-5\pm2\sqrt{3}}{2}$

5. $-25 = 2x^2+24x$
$-\frac{25}{2} = x^2+12x+36$
$\frac{47}{2} = (x+6)^2$
$x = -6 \pm \sqrt{\frac{47}{2}}$

72
-25
47

6. $-5x = -x^2+1$
$x^2-5x+(\frac{-5}{2})^2 = 1+(\frac{-5}{2})^2$
$(x-\frac{5}{2})^2 = \frac{29}{4}$
$x = \frac{5\pm\sqrt{29}}{2}$

$2x^2+24x = -25$
$x^2+12x+36 = -\frac{25}{2}+\frac{72}{2}$
$(x+6)^2 = \frac{47}{2}$