Name: Key

9.4 Completing the Square

Find the value of c that makes each trinomial a perfect square.

1. $x^2 - 24x + c$

144

2. $x^2 - 9x + c$

20.25

3. $x^2 - x + c$

1

Solve each equation by completing the square. Reduce your radical if necessary.

4. $x^2 - 14x - 24 = 0$

$(x-7)^2 = 49 + 24$

$x - 7 = \pm\sqrt{73}$

$x = 7 \pm \sqrt{73}$

5. $b^2 + 12b = 13$

$(b+6)^2 = 36 + 13$

$b + 6 = \pm\sqrt{49}$

$b = +1, -13$

6. $x^2 - 30x - 56 = -25$

$(x-15)^2 = 225 + 56 - 25$

$x - 15 = \pm\sqrt{256}$

$x = -31 + 1$

7. $n^2 - 10n - 8 = -7$

$(n-5)^2 = 10 + 1$

$n - 5 = \pm\sqrt{11}$

$n = 5 \pm \sqrt{11}$

8. $x^2 + 18x - 50 = 9$

$(x+9)^2 = 81 + 59$

$x + 9 = \pm\sqrt{140}$

$x = -9 \pm 2\sqrt{35}$

9. $3g^2 + 15g - 3 = 0$

$3[g^2 + 5g - 1] = 0$

$g^2 + 5g = 1$

$(g+2.5)^2 = 6.25 + 1$

$g + 2.5 = \pm\sqrt{7.25}$

$g = -2.5 \pm \sqrt{7.25}$

10. Jaime owns a business making decorative boxes to store jewelry, mementos, and other valuables. The function $y = x^2 + 50x + 1800$ models the profit y that Jaime has made in month x for the first two years of his business.

a. Write an equation representing the month in which Jaime's profit is \$2400.

$2400 = x^2 + 50x + 1800$

b. Use completing the square to find out in which month Jaime's profit is \$2400.

$x^2 + 50x = 600$

$(x+25)^2 = 1225$

$x + 25 = \pm 35$

$x = -60 + 10$ October

11. From a height of 256 feet above a lake on a cliff, Mikaela throws a rock out over the lake. The height H of the rock t seconds after Mikaela throws it is represented by the equation $H = -16t^2 + 32t + 256$. To the nearest tenth of a second, how long does it take the rock to reach the lake below? (*Hint:* Replace H with 0.)

$0 = -16t^2 + 32t + 256$

$0 = -16(t^2 - 2t - 16)$

$1 + 16 = (t-1)^2$

$\pm\sqrt{17} = t - 1$

$t = 1 \pm \sqrt{17}$

no -, since application (time)

$1 + \sqrt{17}$