Complete The Square Worksheets

Solve the questions from 1-3 by completing the square.

1) $x^2 - x - 30 = 0$

2) $x^2 + 22x + 121 = 0$

3) $2q^2 + 16q - 32 = 0$

4) To solve $x^2 + x + 1 = 0$ by completing the square, which number should be added on both sides?

5) Fill in the following blanks as instructed to solve $5n^2 + 10n + 20 = 0$ by completing the square.
   Step 1: Divide both sides by 5 to make the coefficient of n^2 to be 1. Then we get _____
   Step 2: Subtract/add the constant term on both sides to eliminate it from the left side. Then we get _____
   Step 3: Find half of coefficient of n and square it. The resultant number is ____.
   Step 4: Add the number from the above step on both sides of the equation in Step 2. Then we get

   _____
   Step 5: Factorize the left side part of the above equation. Notice that you get the number from step 3 just after n when you factorize. Then the result is _____
   Step 6: Take the square root on both sides. Then we get

   _____
   Step 7: Solve for n. Then n = _____ (or) _____.

6) Solve $m^2 + 11m + 30 = 0$ by completing the square.

7) The length of a rectangular swimming pool is 7 ft more than twice its width. Find the dimensions of the pool if its area is 270 square feet.
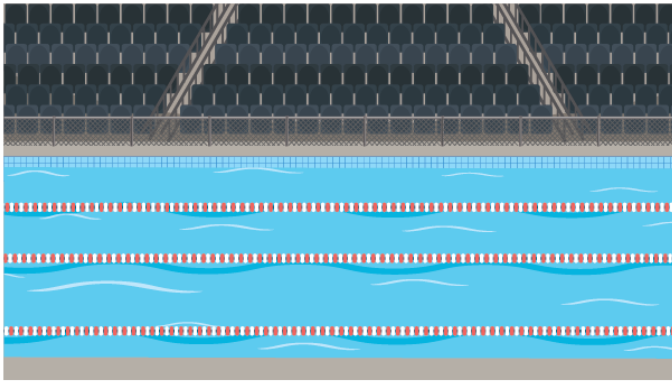
8) Factor and then solve for the values of x by completing the square assuming $y \neq 0$.

$$9x^3y + 29x^2y + 20xy = 0$$

9) Find the values of x in terms of y by solving
$$x^2 - 15xy + 36y^2 = 0.$$

10) Can we help Jonathan solve this problem?
"The sum of the squares of two consecutive numbers is 365. Find the numbers".

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1)	$x = 6; x = -5$
2)	$x = -11$
3)	$q = 4(\sqrt{2} - 1), q = -4(1 + \sqrt{2})$
4)	$\dfrac{1}{4}$
5)	Step 1: $n^2 + 2n + 4 = 0$ Step 2: $n^2 + 2n = -4$ Step 3: $\left(\dfrac{2}{2}\right)^2 = 1$ Step 4: $n^2 + 2n + 1 = -3$ Step 5: $(n + 1)^2 = -3$ Step 6: $n + 1 = \pm i\sqrt{3}$ Step 7: $-1 + i\sqrt{3}$; $-1 - i\sqrt{3}$
6)	$m = -5; m = -6$
7)	27 ft x 10 ft
8)	$x = 0; x = -1; x = \dfrac{-20}{9}$
9)	$x = 3y; x = 12y$
10)	13 and 14

FUN FACT

1. The square root of a negative number is a complex number. For example, $\sqrt{-4} = \pm 2i$.

2. To complete the square, the simplest way is writing $ax^2 + bx + c$ as $a(x-h)^2 + k$, where $h = \dfrac{-b}{2a}$, and k can be obtained by substituting $x = \dfrac{-b}{2a}$ in $ax^2 + bx + c$.

3. Setting $a(x-h)^2 + k$ to 0 and solving it for x gives the root(s) of the quadratic equation $ax^2 + bx + c = 0$.