10-5

NAME _____ DATE _____

Perfect Squares and Factoring

(Pages 587–593)

Products of the form $(a + b)^2$ and $(a - b)^2$ are called perfect squares, and their expressions are called **perfect square trinomials**.

Perfect Square Trinomials	$(a + b)^2 = a^2 + 2ab + b^2$ $(a - b)^2 = a^2 - 2ab + b^2$
Factoring a Perfect Square Trinomial	You can check whether a trinomial is a perfect square trinomial by checking that the following conditions are satisfied. • The first term is a perfect square. • The third term is a perfect square. • The middle term is either 2 or -2 times the product of the square root of the first term and the square root of the third term.

EXAMPLE

Determine whether $4x^2 + 4xy + y^2$ is a perfect square trinomial. If so, factor it.

Check each of the following.

- *Is the first term a perfect square?* $4x^2 \stackrel{?}{=} (2x)^2$ *yes*
- *Is the last term a perfect square?* $y^2 \stackrel{?}{=} (y)^2$ *yes*
- *Is the middle term twice the product of 2x and y?* $4xy = 2(2x)(y)$ *yes*

So, $4x^2 + 4xy + y^2$ *is a perfect square trinomial.*

$$4x^2 + 4xy + y^2 = (2x)^2 + 2(2x)(y) + (y)^2$$
$$= (2x + y)^2$$

PRACTICE

***Determine whether each trinomial is a perfect square trinomial. If so, factor it. If the polynomial cannot be factored write* prime.**

1. $m^2 - 6m + 9$ **2.** $x^2 + 10x + 25$ **3.** $t^2 - 14t + 49$

4. $x^2 + 3x + 4$ **5.** $y^2 - 12y + 36$ **6.** $k^2 - 22k + 121$

***Factor each polynomial. If the polynomial cannot be factored write* prime.**

7. $x^2 + 16x + 64$ **8.** $2q^2 + 30q - 8$ **9.** $x^2 + 3x + 9$

10. $4m^2 + 20m + 25$ **11.** $100h^2 - 9$ **12.** $4z^3 - 16z^2 + 16z$

13. $3x^2 + 24x + 48$ **14.** $n^2 + 1.8n + 0.81$ **15.** $7x^2 - 5.6x + 1.12$

16. Factor $\frac{1}{9}y^2 + 4y + 36$. (Hint: Check to see if the trinomial is a perfect square trinomial.)

17. **Standardized Test Practice** Factor the trinomial $5a^2 + 30a + 45$.

A $(5a + 3)^2$ **B** $5(a + 3)$ **C** $(a + 3)^2$ **D** $5(a + 3)^2$

Answers: **1.** $(m - 3)^2$ **2.** $(x + 5)^2$ **3.** $(t - 7)^2$ **4.** prime **5.** prime **6.** $(y - 6)^2$ **7.** $(k - 11)^2$ **8.** $(x + 8)^2$ **9.** $2(q^2 + 15q - 4)$ **10.** prime **11.** $(2m + 5)^2$ **12.** $(10h - 3)(10h + 3)$ **13.** $4z(z - 2)^2$ **14.** $3(x + 4)^2$ **15.** $(n + 0.9)^2$ **16.** $7(x - 0.4)^2$ **17.** $\left(\frac{1}{3}y^2 + 6\right)^2$ **17.** D