

Worksheet 7-1: Multiplying Binomials**Binomials:**

Binomials are algebraic expressions with two terms.

Examine the following algebraic expressions. Circle all the binomials.

$x^2 + 2x - 3$

$3xy$

$4xy + 2$

$8a$

$x^2 + y$

$5b + 7$

Recall: Distributive Property

When expanding brackets, we distribute the property of the number or math operation outside the brackets to every term inside the brackets.

e.g., $3(x + 4) = 3x + 12$ and $-(x + 1) = -x - 1$

How do we expand $(x + 1)(x + 2)$?

$$(x + 1)(x + 2)$$

$$= (x)(x) + (x)(2) + (1)(x) + (2)(1) \rightarrow \text{Multiply the terms on the left to every single term on the right.}$$

$$= x^2 + 2x + x + 2$$

$$= x^2 + 3x + 2 \rightarrow \text{Collect like terms.}$$

Example 1:

(a) $(x + 4)(x + 5)$

(b) $(y + 6)(y + 3)$

(c) $(a + 7)(a - 1)$

(d) $(2m - 4)(m + 3)$

(e) $(n - 10)(3n - 9)$

(f) $(2w - 3)(5w - 7)$

To multiply monomials: **1st multiply the signs; 2nd multiply the numbers; 3rd multiply the variables**

Simplify.

2. $(x+7)(x+2)$

3. $(y-9)(y+5)$

4. $(x+5)(x-1)$

5. $(y-6)(y-7)$

6. $(2x+1)(x+3)$

7. $(x+5)(3x+1)$

8. $(4x-1)(2x+3)$

9. $(5x+3)(2x-7)$

10. $(6x-5)(2x-4)$

11. $(3x-2)(6x-5)$

Answers: 1. (a) $x^2 + 9x + 20$, (b) $y^2 + 9y + 18$, (c) $a^2 + 6a - 7$, (d) $2m^2 + 2m - 12$, (e) $3n^2 - 39n + 90$,
(f) $10w^2 - 29w + 21$; 2. $x^2 + 9x + 14$; 3. $y^2 - 4y - 45$; 4. $x^2 + 4x - 5$; 5. $y^2 - 13y + 42$;
6. $2x^2 + 7x + 3$; 7. $3x^2 + 16x + 5$; 8. $8x^2 + 10x - 3$, 9. $10x^2 - 29x - 21$, 10. $12x^2 - 34x + 20$,
11. $18x^2 - 27x + 10$

Worksheet 7-2: Perfect Square of a Binomial**Perfect Square of a Binomial:**

$$\text{If } 4^2 = 4 \times 4, \text{ and } y^2 = y \times y$$

$$\text{then } (x + 1)^2 = (x + 1)(x + 1),$$

$$\text{and } (x - 1)^2 = (x - 1)(x - 1)$$

Example 1:

(a) Simplify $(x + 2)^2$.

$$= (x + 2)(x + 2)$$

$$= (x)(x) + (x)(2) + (2)(x) + (2)(2)$$

$$= x^2 + 2x + 2x + 4$$

$$= x^2 + 4x + 4$$

→ It's called a "Perfect Square Trinomial" because its first term is a perfect square and its last term is also a perfect square.

(b) Simplify $(x - 2)^2$.

$$= (x - 2)(x - 2)$$

$$= (x)(x) - (x)(2) - (2)(x) + (2)(2)$$

$$= x^2 - 2x - 2x + 4$$

$$= x^2 - 4x + 4$$

(c) Simplify $(3x + 2)^2$.

$$= (3x + 2)(3x + 2)$$

$$= (3x)(3x) + (3x)(2) + (2)(3x) + (2)(2)$$

$$= 9x^2 + 6x + 6x + 4$$

$$= 9x^2 + 12x + 4$$

(d) Simplify $(3x - 2)^2$.

$$= (3x - 2)(3x - 2)$$

$$= (3x)(3x) - (3x)(2) - (2)(3x) + (2)(2)$$

$$= 9x^2 - 6x - 6x + 4$$

$$= 9x^2 - 12x + 4$$

Simplify.

1. $(x+7)^2$

2. $(y+5)^2$

3. $(x-6)^2$

4. $(y-4)^2$

5. $(2x+3)^2$

6. $(3x+1)^2$

7. $(4x-5)^2$

8. $(6x-7)^2$

9. $(x+4)(x-4)$

10. $(2x-6)(2x+6)$

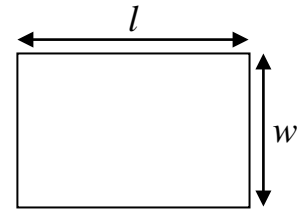
Answers: 1. $x^2+14x+49$; 2. $y^2+10y+25$; 3. $x^2-12x+36$; 4. $y^2-8y+16$; 5. $4x^2+12x+9$;
6. $9x^2+6x+1$; 7. $16x^2-40x+25$; 8. $36x^2-84x+49$; 9. x^2-16 ; 10. $4x^2-36$

Worksheet 7-3: Algebraic Modelling of Areas

The area of any rectangle can be found using the formula:

$$A = lw$$

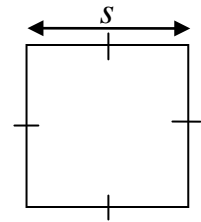
where A is the area of the rectangle,
 l is the length of the rectangle, and
 w is the width of the rectangle.



The area of any square can be found using the formula:

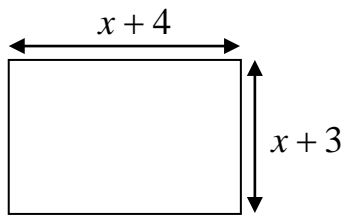
$$A = s^2$$

where A is the area of the square, and
 s is the side length of the square,

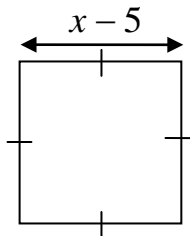


1. Write a simplified algebraic expression to represent the area of each figure.

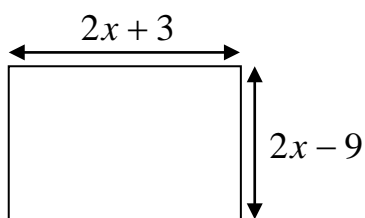
(a)



(b)



(c)



2. There is a rectangular parking lot near George Harvey C. I. If $x + 7$ represents the length of the parking lot and $x - 2$ represents the width of the parking lot, write a simplified algebraic expression for the area of the parking lot.
3. A flower garden has a shape of a square. If $2x + 3$ represents the side length of the garden, write a simplified algebraic expression for the area of the flower garden.
4. Ms. Chor's bedroom is rectangular in shape. The length of her room can be represented as $3x - 2$, and the width of her room can be represented as $2x + 5$. Write a simplified algebraic expression to represent the area of her room.
5. Ms. Chor saw a table in a furniture store as shown on the right. She wants to make the table on her own and tries to cut out a piece of wood as the table top. If the side length of the table top can be represented as $3x - 7$, write a simplified algebraic expression for the area of table top.



Answers: 1. (a) $x^2 + 7x + 12$, (b) $x^2 - 10x + 25$, (c) $4x^2 - 12x - 27$; 2. $x^2 + 5x - 14$; 3. $4x^2 + 12x + 9$;
4. $6x^2 + 11x - 10$; 5. $9x^2 - 42x + 49$