8-4: MULTIPLYING SPECIAL CASES

$(3x-7)^2$ $(3x-7)(3x-7)$ $9x^2-21x-21x+49$ $9x^2-42x+49$

$(a-b)^2$ $(a-b)(a-b)$ $a^2-ab-ab+b^2$ $a^2-2ab+b^2$

Lesson Objectives:

- *Finding the square of a binomial*
- *Finding the difference of two squares*

1 Finding the Square of a Binomial

$(a+b)(a+b)$ $(a-b)(a-b)$

The expressions $(a+b)^2$ and $(a-b)^2$ are squares of binomials. To square a binomial, you can use FOIL or the following shortcut.

RULE: THE SQUARE OF A BINOMIAL

$(a+b)^2$ $a^2+2ab+b^2$ and $(a-b)^2$ $a^2-2ab+b^2$

$(a\pm b)^2$ $a^2\pm 2ab+b^2$

The square of a binomial is the square of the first term, plus twice the product of the two terms, plus the square of the last term.

EXAMPLE 1: SQUARRING A BINOMIAL
Simplify.

Don't Do $9w^2-25$ X $9w^2-15w+25$ X

1. $(x+4)^2$ $a^2+2ab+b^2$ $x^2+8x+16$
2. $(y-3)^2$ $a^2-2ab+b^2$ y^2-6y+9
3. $(y+11)^2$ $y^2+22y+121$
4. $(3w-5)^2$ $9w^2-30w+25$
5. $(t+6)^2$ $t^2+12t+36$
6. $(x-7)^2$ $x^2-14x+49$
7. $(9c-8)^2$ $81c^2-144c+64$
8. $(3m+2n)^2$ $9m^2+12mn+4n^2$
9. $(x^2+y^2)^2$ $x^4+2x^2y^2+y^4$
10. $(2x^2+y^2)^2$ $4x^4+4x^2y^2+y^4$
11. $(y^2-4w^2)^2$ $y^4-8y^2w^2+16w^4$
12. $(5x^4-3x^2)^2$ $25x^8-30x^6+9x^4$

EXAMPLE 2: MENTAL MATH
Simplify in your mind.

13. 81^2 $(80+1)^2$ $6400+160+1$ 6561
14. 59^2 $(60-1)^2$ $3600-120+1$ 3481
15. 31^2 $(30+1)^2$ $900+60+1$ 961

16. 29^2

$(30-1)^2$

$900-60+1$

841

17. 98^2

$(100-2)^2$

$10000-400+4$

9604

18. 203^2

$(200+3)^2$

$40000+1200+9$

41209

2 Difference of Squares

The product of the sum and difference of the same two terms also produces a pattern.

$(2x-7)(2x+7)$

$4x^2+14x-14x-49$

$4x^2-49$

RULE: THE DIFFERENCE OF TWO SQUARES

$(a+b)(a-b) = a^2-b^2$

The product of the sum and difference of the same two terms is the difference of their squares.

EXAMPLE 3: FINDING THE DIFFERENCE OF TWO SQUARES
Simplify.

$(p^4)^2$

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

x^2-16

20. $(3x-5)(3x+5)$

$9x^2-25$

21. $(p^4-8)(p^4+8)$

p^8-64

22. $(d+11)(d-11)$

d^2-121

23. $(c^2+8)(c^2-8)$

c^4-64

24. $(9v^3+w^4)(9v^3-w^4)$

$81v^6-w^8$

25. $(x^2-2y)(x^2+2y)$

x^4-4y^2

26. $(3x+4)(3x+4)$

$(3x+4)^2$

$a^2+2ab+b^2$

$9x^2+24x+16$

EXAMPLE 4: MENTAL MATH
Simplify in your brains.

27. $(18)(22)$

$(20-2)(20+2)$

$400-4$

396

28. $(19)(21)$

$(20-1)(20+1)$

$400-1$

399

29. $(59)(61)$

$(60-1)(60+1)$

$3600-1$

3599

30. $(87)(93)$

$(90-3)(90+3)$

$8100-9$

8091

31. $(96)(104)$

$(100-4)(100+4)$

$10000-16$

9984

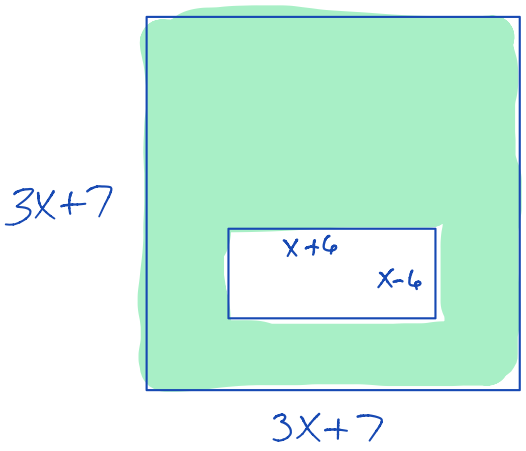
32. $(33)(47)$

$(40-7)(40+7)$

$1600-49$

1551

33. Find the area of the shaded region that is (eventually) drawn on the board.



$A_{large} - A_{small}$

$(3x+7)^2 - [(x+6)(x-6)]$

$9x^2 + 42x + 49 + [-x^2 + 36]$

$8x^2 + 42x + 85$

34. Simplify.

a) $(x+4)(x+3)$

$x^2 + 3x + 4x + 12$

$x^2 + 7x + 12$

b) $(x+4)(x-4)$

$x^2 - 16$

c) $(x-4)^2$

$x^2 - 8x + 16$

d) $(2x-7)(2x+7)$

$4x^2 - 49$

e) $(2x-1)(2x+3)$

$4x^2 + 6x - 2x - 3$

$4x^2 + 4x - 3$

f) $(2x+5)^2$

$4x^2 + 20x + 25$

Due Wed

Name _____ ***8-4 Practice Worksheet*** Period _____

Simplify each product.

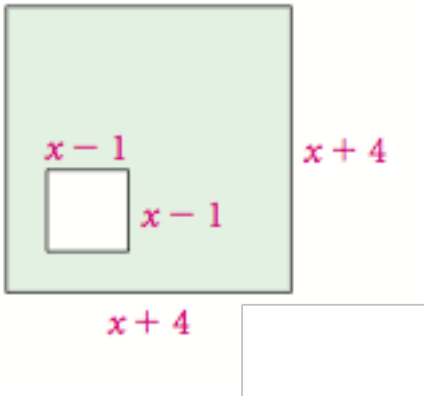
1. $(x+4)^2$
2. $(3m+7)^2$
3. $(b-5)^2$
4. $(9j-2)^2$
5. $(a+8)(a-8)$
6. $(h+15)(h-15)$
7. $(k+5)(k-5)$
8. $(x-7y)^2$
9. $(6a+11b)^2$
10. $(y^5-9x^4)^2$
11. $(2d+7g)(2d-7g)$
12. $(g^3-7h^2)(g^3+7h^2)$

Use mental math to find each product. Show the setup step.

13. 302^2
14. 499^2
15. $(197)(203)$
16. $(299)(301)$

Find an expression for the area of the shaded region.

17. A_{square} = (length of a side)^2



MIXED REVIEW

Evaluate each expression for *x=3, y=-1, and z=2*.

18. $-xyz$
19. $-z^3 - 2z + z$
20. y^2-$(-y)^2$

Prob. = $\frac{\#\text{ favorable}}{\#\text{ possible}}$ Odds in favor # favorable : # unfavorable odds against # unfavorable : # favorable

Suppose you have a bag containing 3 red, 4 blue, 5 white, and 2 black marbles. You select one marble at random. Find each probability or odds.

21. *P*(not white) $\frac{9}{14}$

22. *P*(red or blue)

23. *P*(orange)

24. *P*(not black)

25. odds in favor of red 3:11

26. odds against blue

27. odds against black or white

28. odds in favor of red, white, or blue

You have 8 red checkers and 8 black checkers in a bag. You choose two checkers. Find each probability.

29. *P*(red and red) with replacing

P(r) · P(r)

30. *P*(red then black) without replacing

P(r) · P(b after r)

31. *P*(black and red) with replacing