

NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

Factor the following examples of the difference of perfect squares. Notice that these are not written as quadratic functions. They are simply expressions—we could not graph them or tell their key features.

1. $t^2 - 25$

$$(t+5)(t-5)$$

2. $4x^2 - 9$

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

3. $16h^2 - 36k^2$

$$(4h+6k)(4h-6k)$$

4. $4 - b^2$

$$(2-b)(2+b)$$

5. $x^4 - 4$

$$(x^2+2)(x^2-2)$$

6. $x^6 - 25$

$$(x^3+5)(x^3-5)$$

7. $9y^2 - 100z^2$

$$(3y+10z)(3y-10z)$$

8. $a^4 - b^6$

$$(a^2+b^3)(a^2-b^3)$$

9. **Challenge** $r^4 - 16s^4$ (Hint: This one factors twice.)

$$(r^2+4s^2)(r^2-4s^2)$$

$$(r^2+4s^2)(r+2s)(r-2s)$$

For each of the following, factor out the greatest common factor (GCF).

10. $6y^2 + 18$

$$6(y^2 + 3)$$

11. $27y^2 + 18y$

$$9y(3y + 2)$$

12. $21b - 15a$

$$3(7b - 5a)$$

13. $14c^2 + 2c$

$$2c(7c + 1)$$

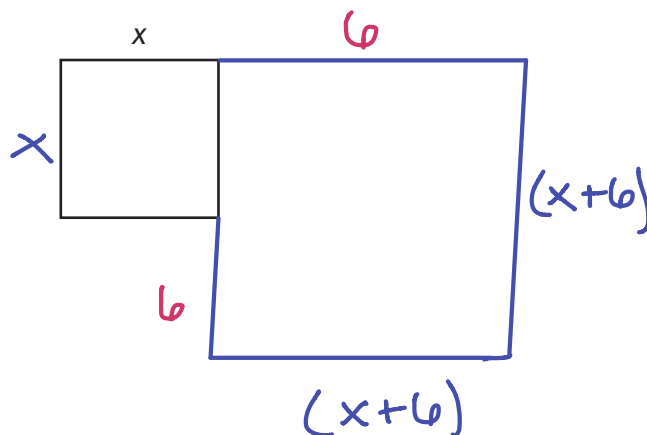
14. $3x^2 - 27$

$$3(x^2 - 9)$$

$$3(x + 3)(x - 3)$$

15. The measure of a side of a square is x units. A new square is formed with each side 6 units longer than the original square's side. Write an expression to represent the area of the new square. (Hint: Draw the new square and count the squares and rectangles.)

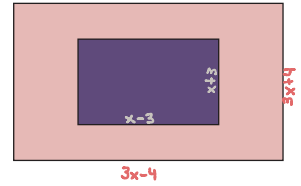
Original Square



$$A = (x + 6)(x + 6)$$

$$x^2 + 12x + 36$$

16. In the accompanying diagram, the width of the inner rectangle is represented by $x - 3$ and the length by $x + 3$. The width of the outer rectangle is represented by $3x - 4$ and the length by $3x + 4$.



- A. Write an expression to represent the area of the larger rectangle.

$$(3x-4)(3x+4) = 9x^2 - 16$$

- B. Write an expression to represent the area of the smaller rectangle.

$$(x-3)(x+3) = x^2 - 9$$

Mixed REVIEW

Factor completely.

** not difference of 2 squares*

17. $9x^2 - 25x$

$$x(9x-25)$$

18. $9x^2 - 25$

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

19. $9x^2 - 30x + 25$

$$(3x-5)(3x-5)$$

$$(3x-5)^2$$

20. $2x^2 + 7x + 6$

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

21. $6x^2 + 7x + 2$

	$3x + 2$		
$2x$	$6x^2$	$4x$	
1	$3x$	2	

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

22. $8x^2 + 20x + 8$

GCF: 4

$$4(2x^2 + 5x + 2)$$

	$2x + 1$		
x	$2x^2$	x	
2	$4x$	2	

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

23. $3x^2 + 10x + 7$

	21		
7	3	3	
	10		

$$\underline{3x^2 + 7x + 3x + 7}$$

$$\underline{x(3x+7) + 1(3x+7)}$$

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

24. $4x^2 + 4x + 1$

	4		
2	4	2	
	4		

$$\underline{4x^2 + 2x + 2x + 1}$$

$$\underline{2x(2x+1) + 1(2x+1)}$$

$$(2x+1)(2x+1) = (2x+1)^2$$

Challenge Problems

25. The area of the rectangle at the right is represented by the expression $18x^2 + 12x + 2$ square units. Write two expressions to represent the dimensions, if the length is known to be twice the width.

$$18x^2 + 12x + 2$$

$$2(9x^2 + 6x + 1)$$

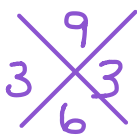
$$2(9x^2 + 3x + 3x + 1)$$

$$2(\underline{3x(3x+1)} + \underline{1(3x+1)})$$

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

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

Length width



26. Two mathematicians are neighbors. Each owns a separate rectangular plot of land that shares a boundary and has the same dimensions. They agree that each has an area of $2x^2 + 3x + 1$ square units. One mathematician sells his plot to the other. The other wants to put a fence around the perimeter of his new combined plot of land. How many linear units of fencing does he need? Write your answer as an expression in x .



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Note: This question has two correct approaches and two different correct solutions. Can you find them both?

$$2x^2 + 3x + 1$$

$$\underline{2x^2 + 2x + x + 1}$$

$$\underline{2x(x+1)} + \underline{1(x+1)}$$

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



	$x+1$	$x+1$	
	$2x+1$	$2x+1$	
$x+1$	$2x^2 + 3x + 1$	$2x^2 + 3x + 1$	$x+1$
$2x+1$	$2x+1$	$2x+1$	$2x+1$
	$x+1$	$x+1$	

$$= 10x + 6$$

OR

$$= 8x + 6$$

Spiral REVIEW—Factoring**Factor the following quadratic expressions.**

27. $2x^2 + 10x + 12$

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

28. $6x^2 + 5x - 6$

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

29. $x^2 - 12x + 20$

$$(x-10)(x-2)$$

30. $x^2 - 21x - 22$

$$(x-22)(x+1)$$

31. $2x^2 - x - 10$

$$(x+2)(2x-5)$$

32. $6x^2 + 7x - 20$

$$(3x-4)(2x+5)$$

33. $x^2 - 2x - 15$

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

34. $x^2 + 2x - 15$

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

35. $4x^2 + 12x + 9$

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

36. $49x^2 + 28x + 4$

$$(7x+2)^2$$

