Unit 7b Study Guide

Name: Key

Characteristics of a Parabola

Given the following equations find the axis of symmetry, vertex, y-intercept, domain and range.

1. $y = 2x^2 + 4x - 3$ $x = -\frac{b}{2a}$

$2(-1)^2 + 4(-1) - 3$

$2(1) - 4 - 3$

$2 - 4 - 3$

a) Axis of symmetry: $x = -\frac{(4)}{2(2)} = -1$
b) Vertex: $(-1, -5)$
c) Y-intercept: $(0, -3)$
d) Domain: $(-\infty, \infty)$
e) Range: $y \geq -5$

2. $y = -x^2 - x + 2$

$-(-\frac{1}{2})^2 - (-\frac{1}{2}) + 2$

$-(\frac{1}{4}) - (-\frac{1}{2}) + 2$

$-\frac{1}{4} + \frac{1}{2} + 2$

a) Axis of symmetry: $x = -\frac{(-1)}{2(-1)} = -\frac{1}{2}$
b) Vertex: $(-\frac{1}{2}, \frac{9}{4})$
c) Y-intercept: $(0, 2)$
d) Domain: $(-\infty, \infty)$
e) Range: $y \leq \frac{9}{4}$

3. A volcano eruption blasts a boulder upward with an initial velocity of 240 feet per second. This is modeled by the equation $h(t) = -16t^2 + 240t$.

$x = -\frac{(240)}{2(-16)} = \frac{240}{32}$

a) How long will it take the boulder to hit the ground?

15 seconds

b) What is the maximum height of the boulder?

$-16(7.5)^2 + 240(7.5)$

(7.5, 900)

$x = -\frac{(-4)}{2(-16)}$

4. A rock is thrown from the top of a tall building. The distance, in feet, between the rock and the ground t seconds after it is thrown is given by $d(t) = -16t^2 - 4t + 382$. How long after the rock is thrown does the rock reach his max height?

$x = -\frac{(-4)}{2(-16)}$

5. What is the parent function?

$y = x^2$ the original function before transformations

6. What is the axis of symmetry?

an invisible line that splits the graph in half.

Factoring

Factor the following using GCF

7. $30y^3, 20y^2$

$10y^2$

8. $24x^2 - 8x$

$8x(3x - 1)$

9. $2x^2 + 8x$

$2x(x + 4)$

10. $3x^3 - 12x^2 - 30x$

$3x(x^2 - 4x - 10)$

Factor the a = 1 trinomials

11. $x^2 + 7x + 12$

12	7
1, 12	
2, 6	
3, 4	

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

12. $x^2 - 7x - 8$

-8	-7
1, -8	
2, 4	

$(x+1)(x-8)$

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

5	-6
-1, -5	

$(x-1)(x-5)$

14. $x^2 + 4x - 32$

-32	4
1, 32	
2, 16	
-4, 8	

$(x-4)(x+8)$

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Factor the a > 1 trinomials

-6	-5
1, -6	
2, 3	

15. $2x^2 - 5x - 3$

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

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

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

-24	10
1, -24	
-2, 12	
3, 8	
4, 6	

16. $3x^2 + 10x - 8$

$(3x^2 + 12x - 2x - 8)$

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

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

24	15
1, 24	
2, 12	
3, 8	
4, 6	

17. $2x^2 + 15x + 7$

$(2x^2 + 1x + 14x + 7)$

$x(2x+1) + 7(2x+1)$

$(2x+1)(x+7)$

Factor by grouping

21. $(5x^2 + 35x + 7x + 49)$

$5x(x+7) + 7(x+7)$

$(x+7)(5x+7)$

22. $(3x^2 - 6x + 5x - 10)$

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

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

More Factoring (random)

25. $2x^2 - 8$

$2(x^2 - 4)$

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

26. $4x^2 + 16x + 16$

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

$4(x+2)(x+2)$

$4(x+2)^2$

4	4
1, 4	
2, 2	

-300	13
1, 300	
2, 150	
3, 100	
4, 75	
5, 60	
6, 50	
10, 30	
-12, 25	

28	-11
1, 28	
2, 14	
-4, -7	

18. $7x^2 - 11x + 4$

$(7x^2 - 7x - 4x + 4)$

$7x(x-1) - 4(x-1)$

$(x-1)(7x-4)$

19. $15x^2 - 28x - 32$

$(15x^2 - 40x + 12x - 32)$

$5x(3x-8) + 4(3x-8)$

$(3x-8)(5x+4)$

-480	-28
1, 480	
2, 240	
3, 160	
4, 120	
5, 96	
6, 80	
8, 60	
10, 48	
12, 40	

15	40
1, 15	1, 40
3, 5	2, 20
	4, 10
	5, 8

20. $10x^2 + 13x - 30$

$(10x^2 + 25x - 12x - 30)$

$5x(2x+5) - 6(2x+5)$

$(2x+5)(5x-6)$

12	32
1, 12	1, 32
2, 6	2, 16
3, 4	4, 8

23. $(x^2 + 9x + 2x + 18)$

$x(x+9) + 2(x+9)$

$(x+2)(x+9)$

24. $(4x^2 - x - 24x + 6)$

$x(4x-1) - 6(4x-1)$

$(x-6)(4x-1)$

-6	-1
1, 6	
2, 3	

27. $6x^2 - 26x - 20$

$2(3x^2 - 13x - 10)$

$(3x^2 - 6x + 5x - 10)$

-30	-13
1, -30	
2, -15	
3, -10	
5, -6	

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

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

28. $x^2 - x - 6$

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