

Chapter 4 Review

Finite Differences

1. Use finite differences to determine whether each relationship is linear, quadratic, or neither. (3 marks each)

a)

x	y
1	-8
2	-5
3	-2
4	1
5	4

> 3
 > 3
 > 3
 > 3

Type of Relationship: LINEAR

b)

x	y
2	26
4	33
6	40
8	47
10	54

> 7
 > 7
 > 7
 > 7

Type of Relationship: LINEAR

c)

x	y
-2	51
-1	33
0	19
1	9
2	3

> -18
 > -14
 > -10
 > -6

> 4
 > 4
 > 4

Type of Relationship: QUADRATIC

Chapter 4 Review

ANSWERS

Vertex form

1. Complete the following charts:

a)

Property	$y = (x - 3)^2 + 2$
Vertex	(3, 2)
axis of symmetry	$x = 3$
stretch or compression (a value)	none
direction of opening	up
values that x may take	any real #
values that y may take	$y \geq 2$

c)

Property	$y = -2(x + 4)^2 + 3$
Vertex	(-4, 3)
axis of symmetry	$x = -4$
stretch or compression (a value)	stretch by 2
direction of opening	down
values that x may take	any real #
values that y may take	$y \leq 3$

b)

Property	$y = \frac{1}{3}(x + 1)^2 - 4$
Vertex	(-1, -4)
axis of symmetry	$x = -1$
stretch or compression (a value)	compression by $\frac{1}{3}$
direction of opening	up
values that x may take	any real #
values that y may take	$y \geq -4$

d)

Property	$y = 4x^2 - 2$
Vertex	(0, -2)
axis of symmetry	$x = 0$
stretch or compression (a value)	stretch by 4
direction of opening	up
values that x may take	any real #
values that y may take	$y \geq -2$

3. Describe the transformations from $y=x^2$ to $y = -\frac{1}{3}(x+5)^2 - 4$

- left 5, down 4
- reflection in x-axis
- compress by $\frac{1}{3}$

4. Describe the transformations from $y=x^2$ to $y = 3(x-1)^2 + 4$

- right 1, up 4
- stretch by 3

5. The graph of $y=x^2$ is compressed vertically by a factor of $1/2$, reflected in the x-axis, and then translated 3 units down and 1 units right.

a) Equation of the parabola: $y = -\frac{1}{2}(x-1)^2 - 3$

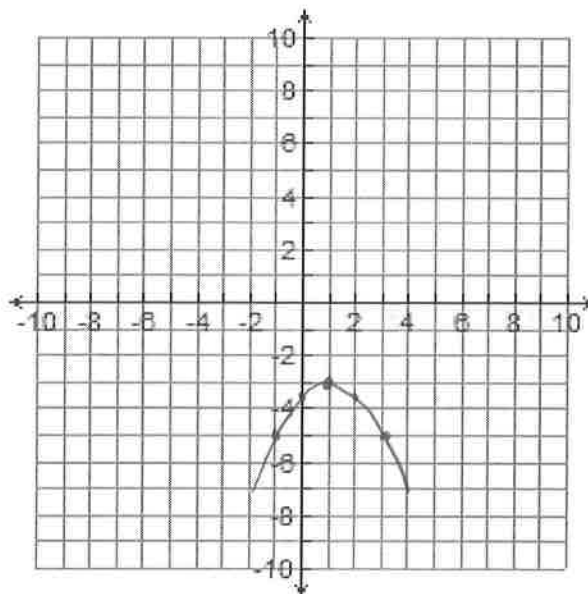
b) Vertex: $(1, -3)$

c) Axis of symmetry:

$$x=1$$

d) Graph the parabola using a table of values. LABEL THE VERTEX.

x	y
-1	-5
0	-3.5
1	-3
2	-3.5
3	-5



3. For the quadratic relation

$$y = -(x + 4)(x - 7):$$

a. What are the x-intercepts?

$$x = -3$$

$$x = 7$$

b. What is the vertex?

$$\text{axis of symm.} - x = \frac{-3 + 7}{2}$$

$$x = 2$$

$$y = -(2 + 4)(2 - 7)$$

$$y = -(6)(-5)$$

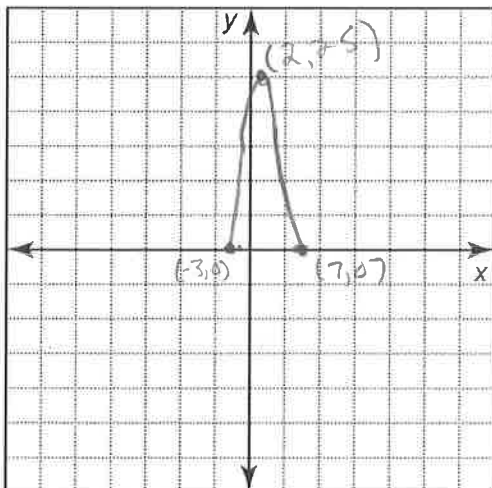
$$y = 30$$

$$(2, 30)$$

c. What is the axis of symmetry?

$$x = 2$$

d. Sketch the graph (label the vertex and x-intercepts)



4. For the quadratic relation

$$y = 2(x + 5)(x + 1):$$

a. What are the x-intercepts?

$$x = -5$$

$$x = -1$$

b. What is the vertex?

$$\text{axis of symm.} - x = \frac{-5 + (-1)}{2}$$
$$= -3$$

$$y = 2(-3 + 5)(-3 + 1)$$

$$y = 2(2)(-2)$$

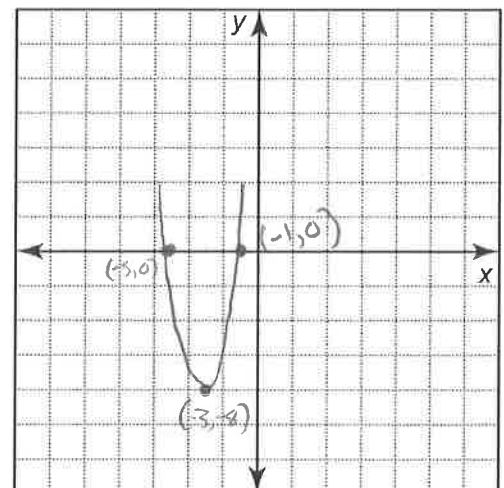
$$y = -8$$

$$(-3, -8)$$

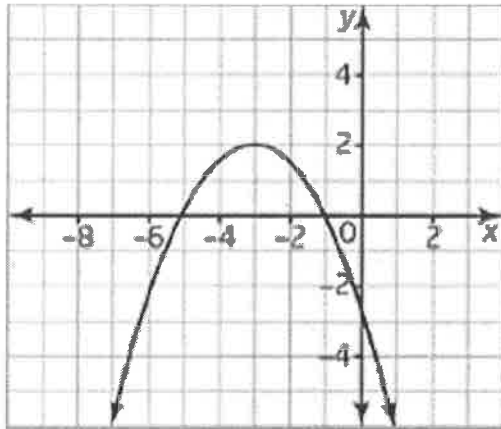
c. What is the axis of symmetry?

$$x = -3$$

d. Sketch the graph (label the vertex and x-intercepts)



8. Determine an equation in the form $y = a(x-r)(x-s)$ to represent the parabola. (Consider the x-intercepts and one other point (x,y) on the graph of the parabola)



- a) x-intercepts: $x = -1$
 $x = -5$
- b) another point on the graph: $(-3, 2)$
- c) 'a' value:

$$\begin{aligned} 2 &= a(-3+1)(-3+5) \\ 2 &= a(-2)(2) \\ 2 &= a(-4) \\ a &= -\frac{1}{2} \end{aligned}$$

- d) Equation of the parabola in the form $y = a(x-r)(x-s)$

$$y = -\frac{1}{2}(x+1)(x+5)$$