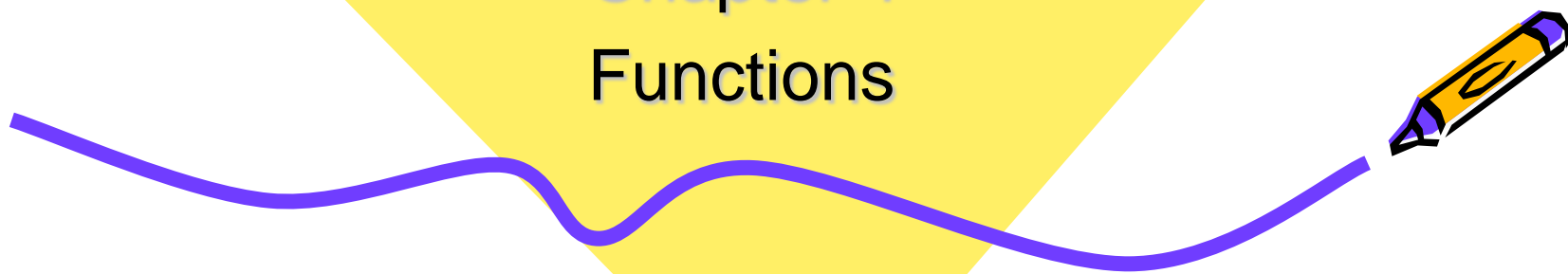


Algebra II

Chapter 4 Functions



Refresh Your Skills

1a) Add 7 to each side

1c) Subtract 2 from each side

1e) Subtract 6 from each side

2a) $x = 33$

2c) $x = 5$ or $x = -3$

2e) *no solution*

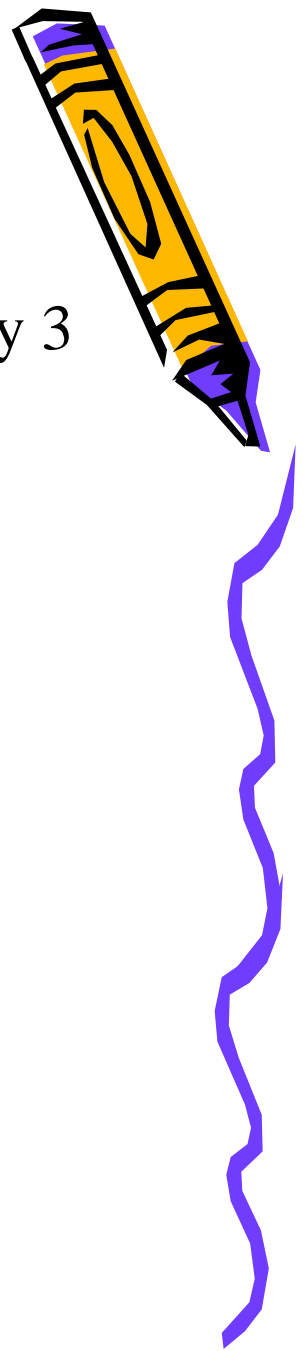
3) Answers will vary

1b) Divide each side by 3

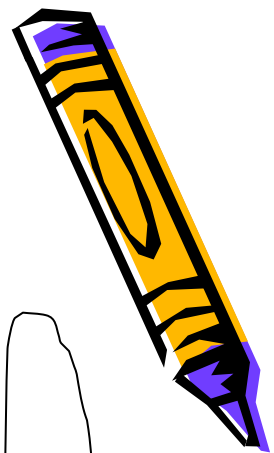
1d) Square each side

2b) $x = -1$ or $x = -15$

2d) $y = 57$



4.1a Interpreting Graphs

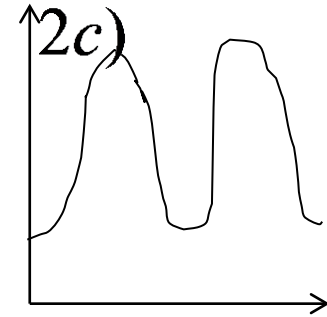
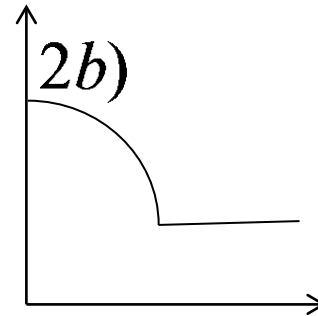
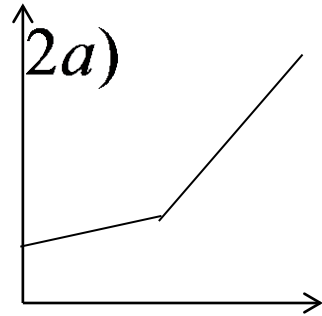


1a) *A*

1b) *C*

1c) *D*

1d) *B*

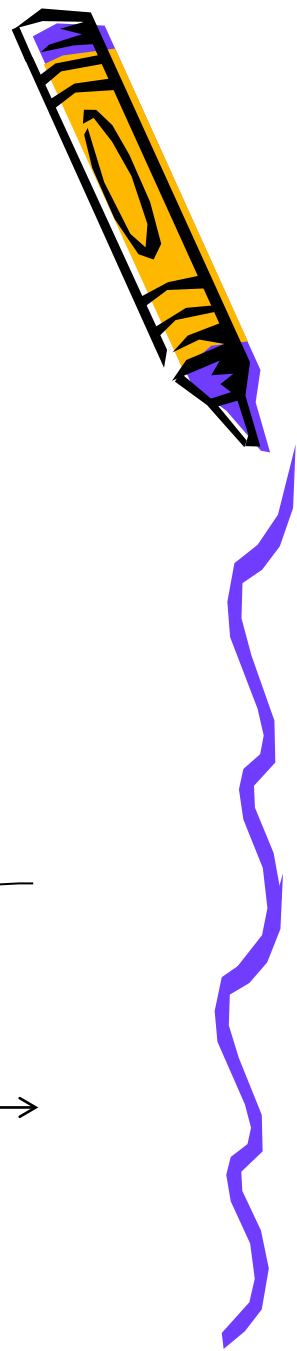


3a) Decreasing at a steady rate, suddenly becoming constant, then suddenly increasing at the same rate it was decreasing.

3b) First decreasing, then increasing back to the same level, without any sudden changes in rate.

3c) Rapidly increasing from 0; suddenly changing to rapidly decreasing until half the value is reached; constant, then suddenly rapidly decreasing at a constant rate until reaching 0.

4.1b Interpreting Graphs



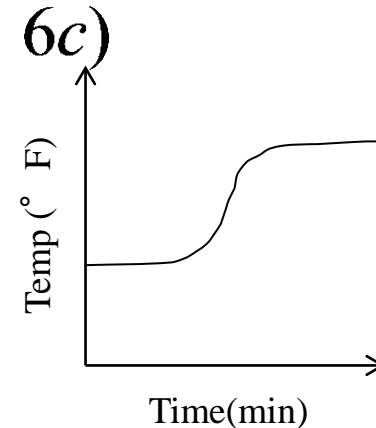
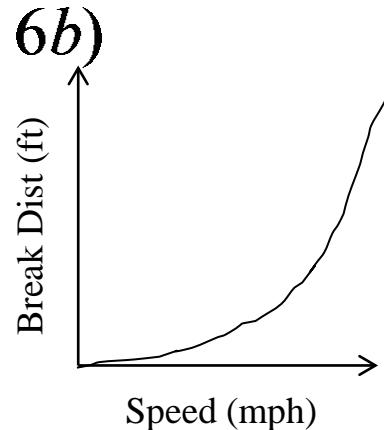
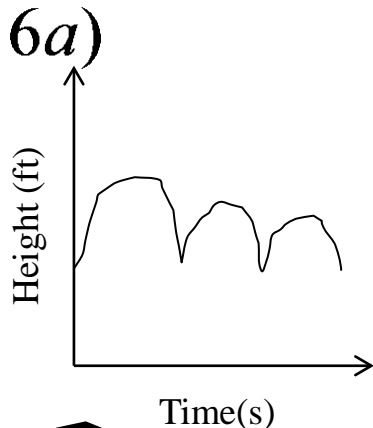
4a) Showing the height of the ball as time goes by.

4b) Possible answer: Seconds and Yards

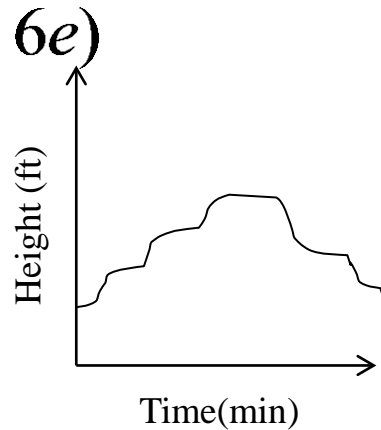
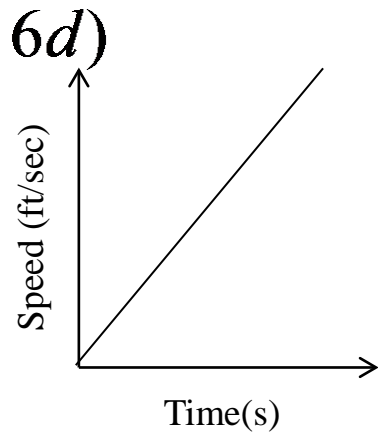
4c) Possible Answer: $0 \leq t \leq 10s$, $0 \leq h \leq 70$ yds

4d) No, the horizontal distance is not measured.

5) Answers will vary

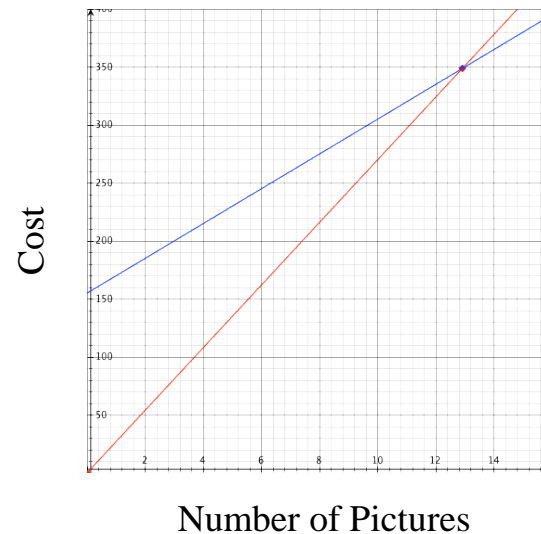


4.1c Interpreting Graphs



$$11a) y = 155 + 15x$$

$$11b) y = 27x$$



$$10a) l = 1.70 - 0.12k$$

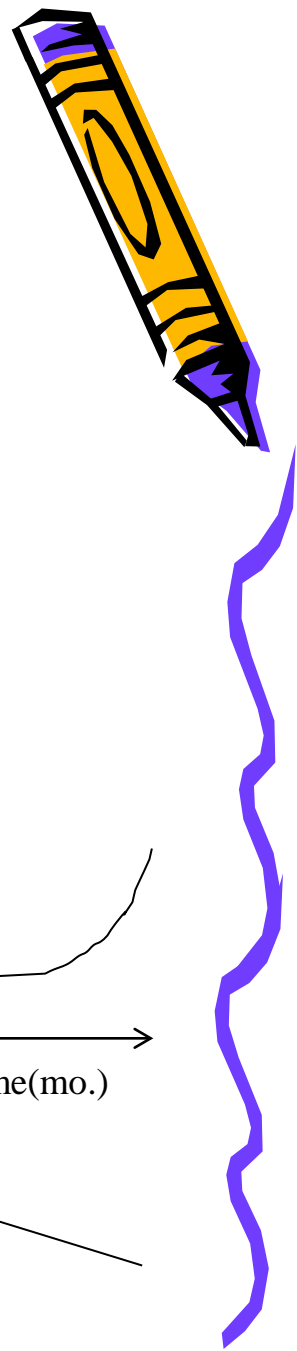
$$10b) b = 7.00 + 9.50(c - 8)$$

11c) 13 *pictures*

11d) The income, \$216, is less than the cost, \$375



4.2a Function Notation



1a) Function; each x-value has only one y-value

1b) Not a function; there is an x-value that has two y-values

1c) Function; each x-value has only one y-value

2a) $f(7) = 17$ 2b) $g(5) = 27$ 2c) $f(-5) = -19$

2d) $g(-3) = 11$ 2e) $x = \frac{11}{3}$ 3) B

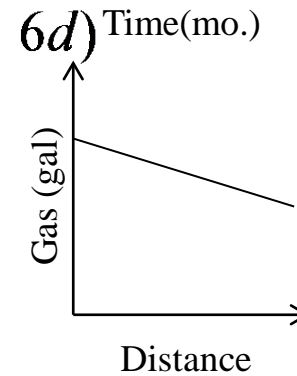
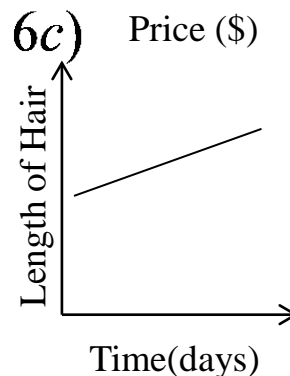
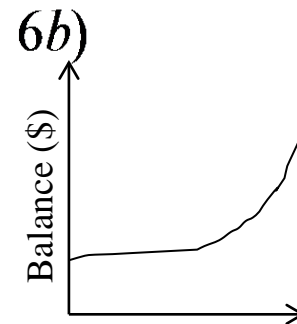
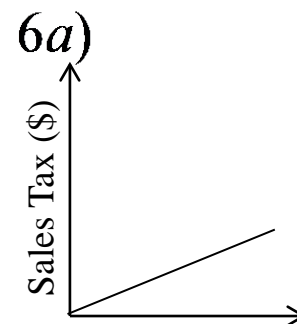
4) Warm-up activity

5a) Price of calculator; function

5b) Time money in bank; function

5c) Time since haircut; function

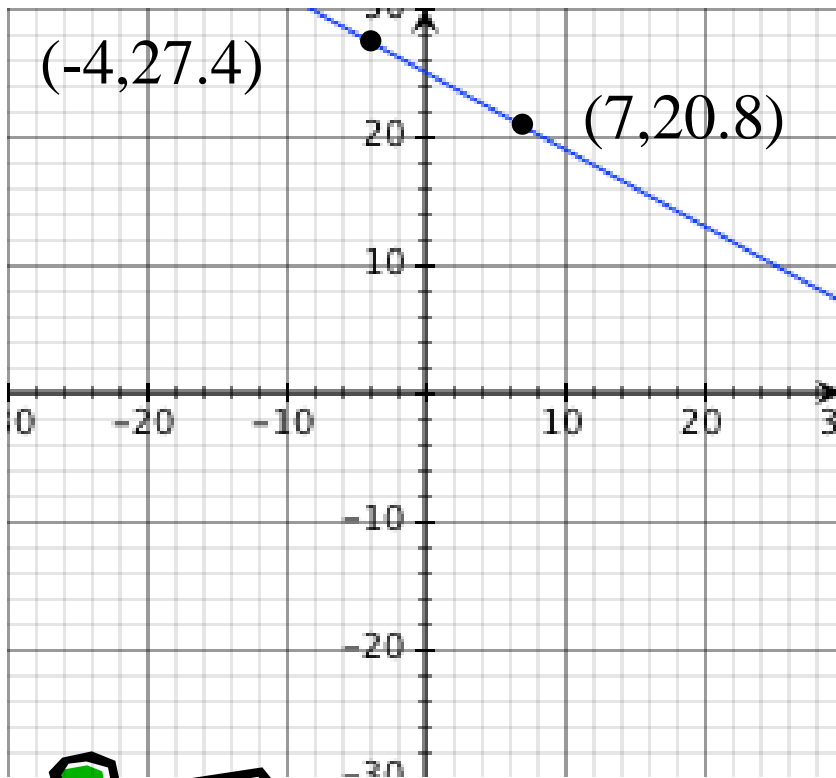
5d) Distance driven; function



4.2b Function Notation

7a,c,d)

$$7b) f(7) = 20.8$$



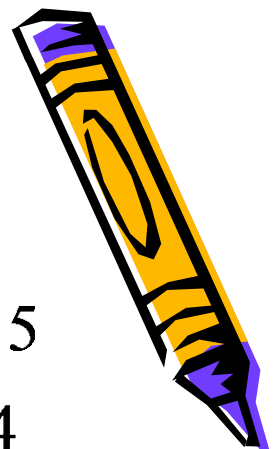
8) *Domain*: $-6 \leq x \leq 5$

Range: $-2 \leq y \leq 4$

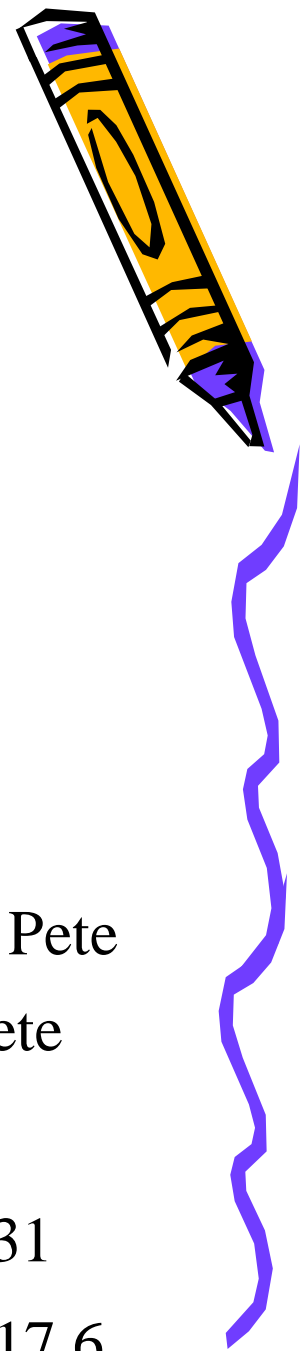
13a) 54 *diagonals*

13b) 20 *sides*

16) $(7, 25.5)$



4.3 Lines in Motion



$$1) y = -3 + \frac{2}{3}(x - 5)$$

2) Translated right 3 units

$$3a) -2x - 6$$

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

$$3c) -2x + 3$$

$$4a) y = -4.4 - 1.1\overline{48}(x - 1.4)$$

$$\text{or } y = 3.18 - 1.1\overline{48}(x + 5.2)$$

$$4b) y = -2.4 - 1.1\overline{48}(x - 1.4)$$

$$\text{or } y = 5.18 - 1.1\overline{48}(x + 5.2)$$

$$5a) y = -3 + 4.7x$$

$$5b) y = -2.8(x - 2)$$

$$5c) y = 4 - (x + 1.5)$$

$$\text{or } y = 2.5 - x$$

$$6a) y = -2 + f(x)$$

$$6b) y = 2 + f(x - 1)$$

$$6c) y = -5 + f(x + 2)$$

$$6d) y = -2 + f(x - 1)$$

8a) Brian - 1.5 m behind Pete

Started 2 sec. after Pete

$$8b) y = 1.5 + f(x + 2)$$

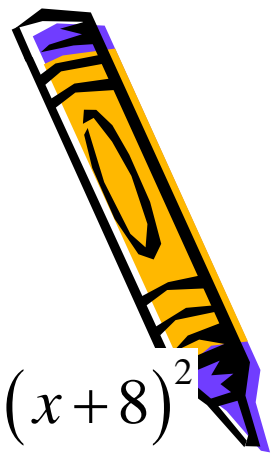
$$13a) x = 15$$

$$13b) x = 31$$

$$13c) x = -21$$

$$13d) x = 17.6$$

4.4a Translations and the Quadratic Family



1a) $y = x^2 + 2$

1b) $y = x^2 - 6$

1c) $y = (x - 4)^2$

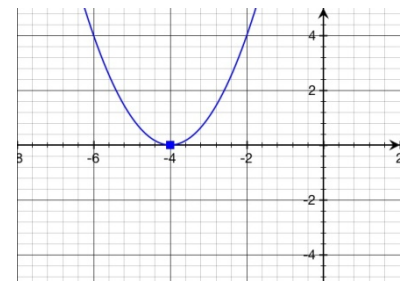
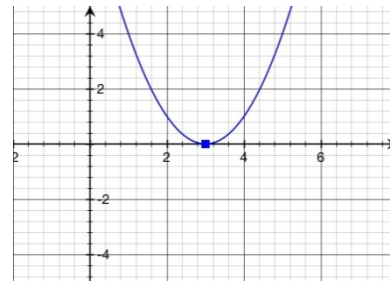
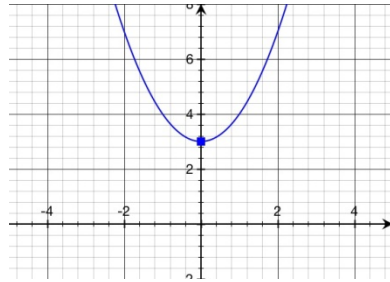
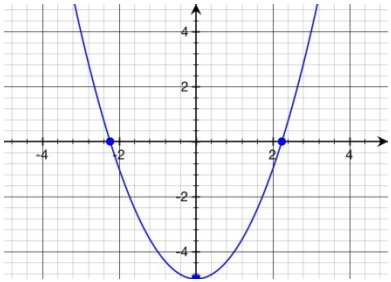
1d) $y = (x + 8)^2$

2a) $y = x^2 - 5$

2b) $y = x^2 + 3$

2c) $y = (x - 3)^2$

2d) $y = (x + 4)^2$



3a) vert -3 units

3b) vert 4 units

3c) hor 2 units

3d) hor -4 units

4a) hor 3 units

4b) hor -3 units

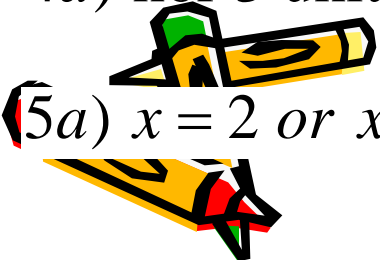
4c) vert 2 units

4d) vert -2 units

5a) $x = 2$ or $x = -2$

5b) $x = 4$ or $x = -4$

5c) $x = 7$ or $x = -3$



4.4b Translations and the Quadratic Family

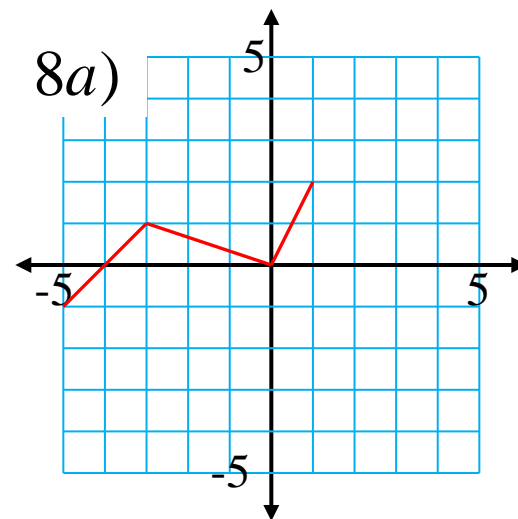
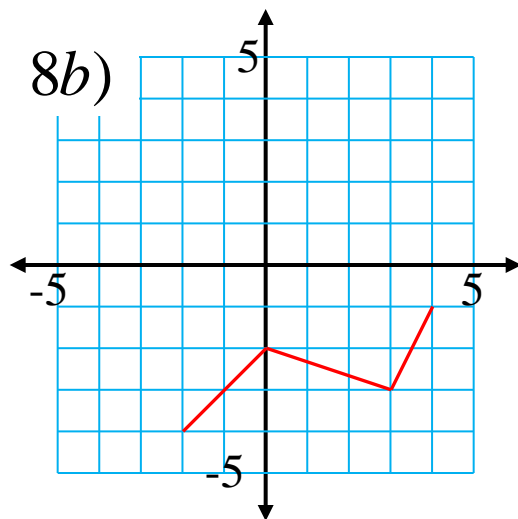


$$6a) y = (x - 2)^2$$

$$6b) y = (x - 2)^2 - 5$$

$$6c) y = (x + 6)^2$$

$$6d) y = (x + 6)^2 + 4$$

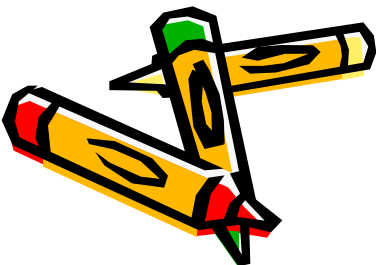


$$10a) x = 9 \text{ or } x = 1$$

$$10b) x = 4 \text{ or } x = -10$$

$$10c) x = 1 \pm \sqrt{27}$$

$$10d) x = -6 \pm \sqrt{8}$$



4.5a Reflections and the Square Root Family



1a) $y = \sqrt{x} + 3$

1b) $y = \sqrt{x+5}$

1c) $y = \sqrt{x+5} + 2$

1d) $y = \sqrt{x-3} + 1$

1e) $y = \sqrt{x-1} - 4$

2a) hor shift 3 units

2b) hor shift -3 units

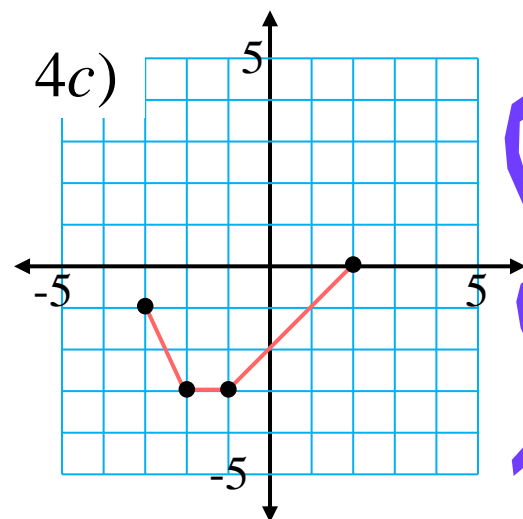
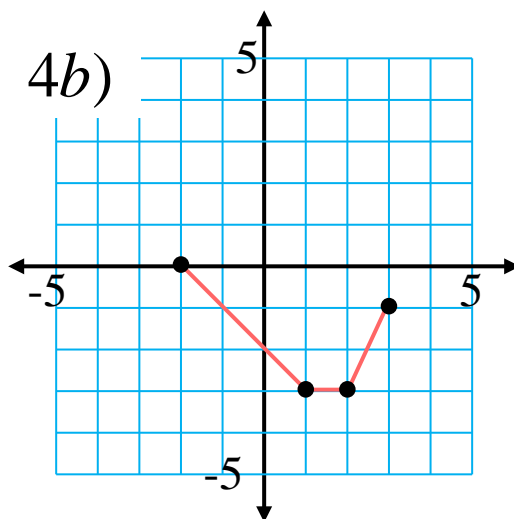
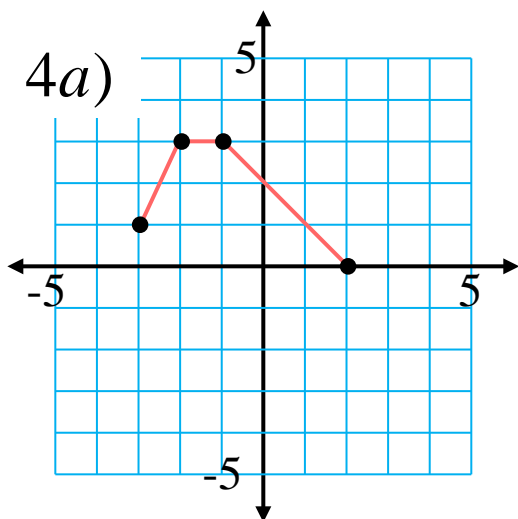
2c) vert shift 2 units

2d) vert shift -2 units

3a) *iii*

3b) *i*

3c) *ii*



4.5b Reflections and the Square Root Family



$$5a) y = -\sqrt{x}$$

$$5b) y = -\sqrt{x} - 3$$

$$1c) y = -\sqrt{x+6} + 5$$

$$5d) y = \sqrt{-x}$$

$$5e) y = \sqrt{-x+2} - 3$$

$$7a) y = \sqrt{x} \text{ and } y = -\sqrt{x}$$

$$7b) y = \pm\sqrt{x} ; y^2 = x$$

8a) Neither passes the vertical line test

$$8b) i. y = \pm\sqrt{x+4}$$

$$8c) i. y^2 = x + 4$$

$$ii. y = \pm\sqrt{x} + 2$$

$$ii. (y-2)^2 = x$$

$$12a) 2$$

$$12b) -2$$

$$12c) -1, 3$$

$$12d) 3$$

$$12e) 3$$

$$12f) 3$$

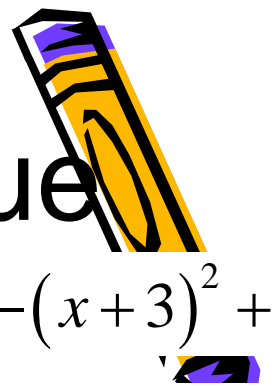
$$12g) 1$$

$$15a) x = 293$$

15b) *no solution*

$$15c) x = 7 \text{ or } x = -3$$

$$15d) x = -13$$

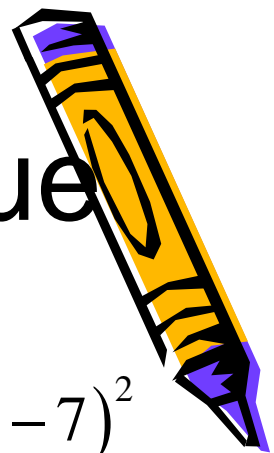


Section 4.6a - Absolute Value

- 1a) $y = |x| + 2$ 1e) $y = |x| - 1$ 1i) $y = -\frac{1}{4}|x|$ 1m) $y = -(x+3)^2 + 5$
- 1b) $y = |x| - 5$ 1f) $y = |x-4| + 1$ 1j) $y = (x-5)^2$ 1n) $y = \pm\sqrt{x-4} + 3$
- 1c) $y = |x+4|$ 1g) $y = |x+5| - 3$ 1k) $y = -\frac{1}{2}|x+4|$ 1p) $y = -\frac{2}{3}|x-3|$
- 1d) $y = |x-3|$ 1h) $y = 3|x-6|$ 1l) $y = -|x+4| + 3$
- 2a) Horizontal dilation by a factor of 3 3a) $y = 2(x-5)^2 - 3$
- 2b) Reflection across the y-axis
- 2c) Horizontal dilation by a factor of 1/3 3b) $y = 2\left|\frac{x+1}{3}\right| - 5$
- 2d) Vertical dilation by a factor of 2
- 2e) Reflection across the x-axis 3c) $y = -2\sqrt{\frac{x-6}{-3}} - 7$
- 2f) Vertical dilation by a factor of 1/2



Section 4.6b - Absolute Value



4) If $b > 0$ the graphs are the same, if $b < 0$ they are reflected across the x-axis

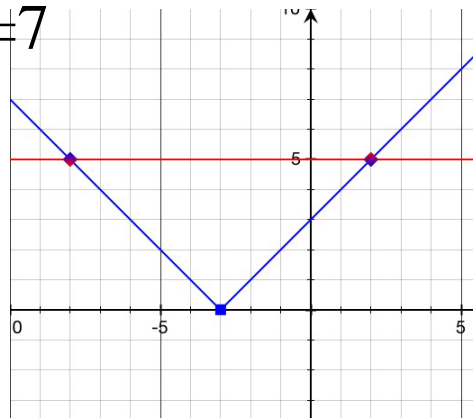
5a) 1 and 7; $x=1$ and $x=7$

5b) $x=-8$ and $x=2$

7a) $(6, -2)$

7b) $(2, -3)$ and $(8, -3)$

7c) *example* $(2, -2)$ and $(8, -2)$



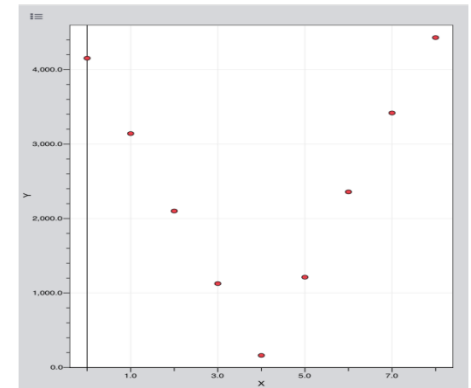
9a) $h = y, k = 3$

9b) $11 = 3 + a(11 - 7)^2$

9c) $a = \frac{1}{2}; y = 3 + \frac{1}{2}(x - 7)^2$

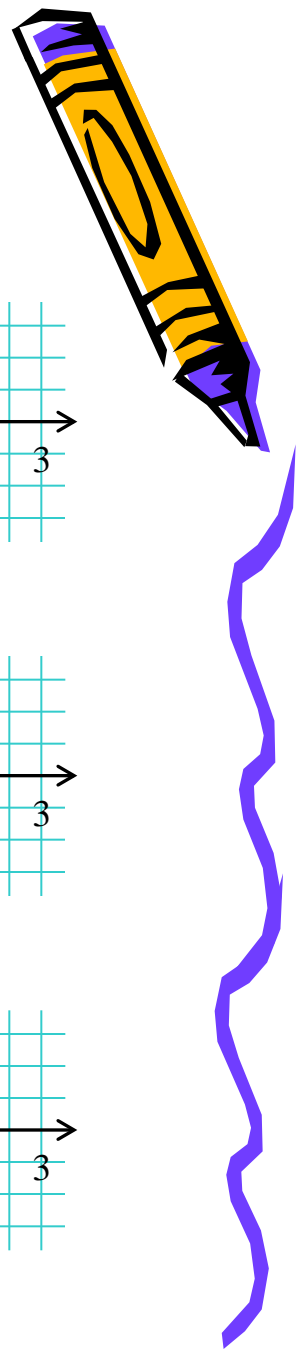
9d) $\frac{y - 3}{8} = \left(\frac{x - 7}{4}\right)^2$

9e) *Show Work*



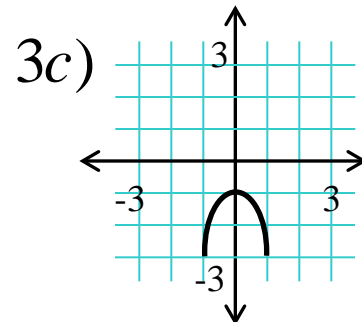
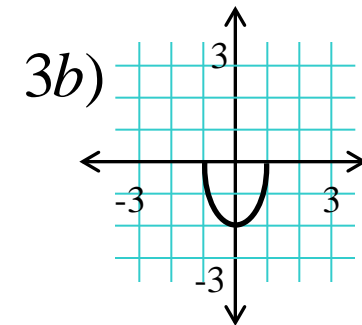
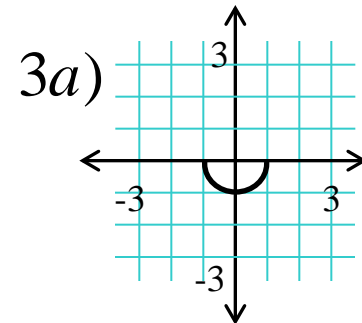
12) *possible answer* $y = 1050|x - 4| + 162$

Section 4.7a - Circles



1

Equation	Transformation	Direction	Scale Factor
$y + 3 = x^2$	Translation	Vertical	-3
$-y = x $	Reflection	Across x-axis	N/A
$y = \sqrt{\frac{x}{4}}$	Dilation	Horizontal	4
$\frac{y}{0.4} = x^2$	Dilation	Vertical	0.4
$y = x - 2 $	Translation	Horizontal	2
$y = \sqrt{-x}$	Reflection	Across y-axis	N/A



2) $y = 2\sqrt{1 - x^2}$

Section 4.7b - Circles

$$4a) y = 3\sqrt{1-x^2}$$

$$4b) y = 0.5\sqrt{1-x^2}$$

$$4c) y = 2\sqrt{1-x^2} + 1$$

$$4d) y = 2\sqrt{1-(x-3)^2} + 1$$

$$4e) y = -5\sqrt{1-\left(\frac{x+2}{2}\right)^2} + 3$$

$$4f) y = 4\sqrt{1-(x-3)^2} - 2$$

$$5a) y = \pm\sqrt{1-x^2} + 2$$

$$\text{or } x^2 + (y-2)^2 = 1$$

$$5b) y = \pm\sqrt{1-(x+3)^2}$$

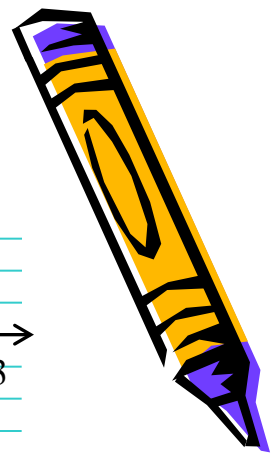
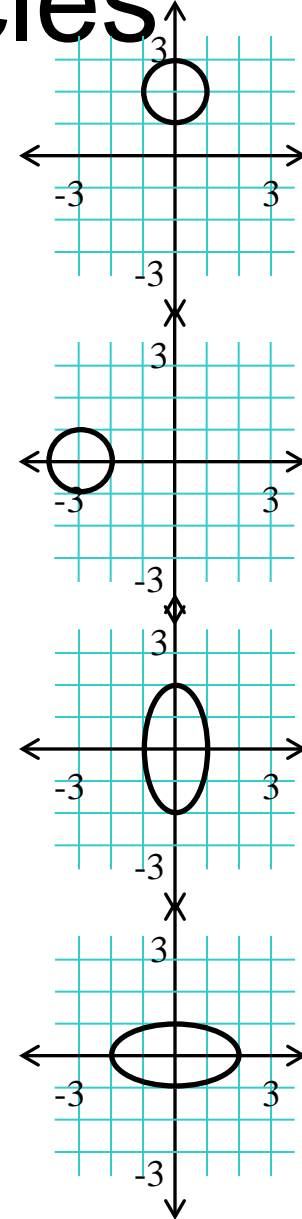
$$\text{or } (x+3)^2 + y^2 = 1$$

$$5c) y = \pm 2\sqrt{1-x^2}$$

$$\text{or } x^2 + \left(\frac{y}{2}\right)^2 = 1$$

$$5d) y = \pm\sqrt{1-\left(\frac{x}{2}\right)^2}$$

$$\text{or } \left(\frac{x}{2}\right)^2 + y^2 = 1$$



Section 4.8a - Composition of Functions

1a) 6

2a) 2

3a) approximately 1.5 m/s

1b) 7

2b) 1

3b) approximately 12 L/min

1c) 6

2c) 0

3c) approximately 15 L/min

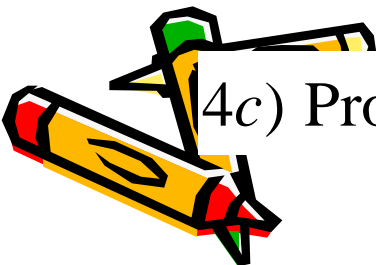
1d) 18

4a) Product $f(x) \cdot g(x)$; $f(x) = 5$ and $g(x) = \sqrt{3 + 2x}$

or Composition $f(g(x))$; $f(x) = 5\sqrt{x}$ and $g(x) = 3 + 2x$

4b) Composition $f(g(x))$; $f(x) = |x + 5|$ and $g(x) = 3 + (x - 3)^2$

4c) Product $f(x) \cdot g(x)$; $f(x) = (x - 5)^2$ and $g(x) = 2 - \sqrt{x}$



Section 4.8b – Composition of Functions

$$5a) y = |(x-3)^2 - 1|$$

$$5b) f(x) = |x| \text{ and } g(x) = (x-3)^2 - 1$$

$$6a) 2 \quad 6b) 6$$

6c) must show work and have a written explanation

$$9a) 2 \quad 9b) -1$$

9c & d) must show work

9e) must have a written explanation

$$10a) 4 \quad 10b) 3 \quad 10c) 3.0625 \quad 10d) 4$$

$$10e) -\left((x-2)^2\right)^2 + 2(x-2)^2 + 3$$

$$= -x^4 + 8x^3 - 22x^2 - 5$$

$$10f) (-x^2 + 2x + 1)^2$$

$$= x^4 - 4x^3 + 2x^2 + 4x + 1$$

$$12a) \text{ Jen: } \$4.49; \text{ Priya: } \$4.44$$

$$12b) C(x) = x - 0.50$$

$$12c) D(x) = 0.90x$$

$$12d) C(D(x)) = 0.90x - 0.50$$

12e) Priya's server

12f) No – must explain

$$13a) x = -5 \text{ or } x = 13$$

$$13b) x = -1 \text{ or } x = 23$$

$$13c) x = 64$$

$$13d) x = \pm\sqrt{1.5} \approx \pm 1.22$$

$$16a) g(x) = (x+3)^2 + 5$$

$$16b) (-3, 5)$$

$$16c) (-1, 9)$$

