

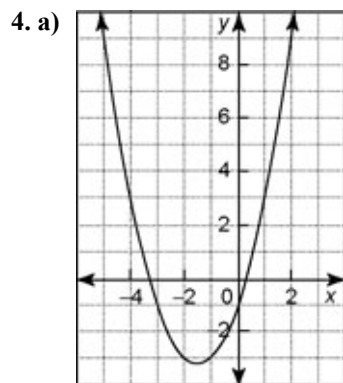
Chapter 1 BLM Answers

Prerequisite Skills

1. a) 10 b) -1
2. a) -7 b) 10

3.

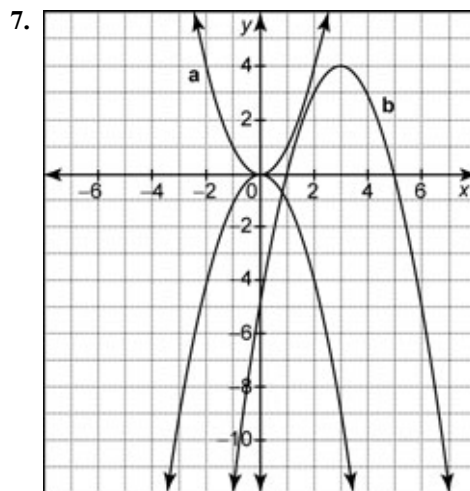
x	y
-2	-3
-1	-3
0	-1
1	3
2	9



5.

x	y	First Differences	Second Differences
-3	6		
-2	0	-6	
-1	-2	-2	4
0	0	2	4
1	6	6	4
2	16	10	4
3	30	14	

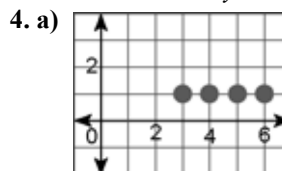
6. a) (0, 4) b) (3, -2) c) (3, -4)



8. a) 500 cm^2 b) 1000 cm^3

Section 1.1 Identify Functions

1. a) It is not a function, because there is more than one value of y for the x -value of -1.
b) It is a function.
2. a) It is a function.
b) It is not a function, because there is more than one value of y for each x -value.
3. a) It is a function, because there is a different y -value for each x -value.
b) It is not a function, because there is more than one value of y for each x -value.
c) It is a function, because no x -value is associated with more than one y -value.



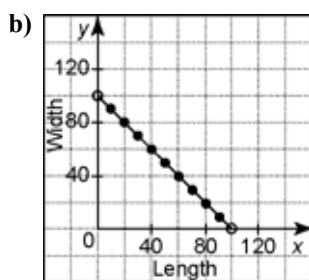
- b) When the points are plotted, it is easy to see whether the graph passes the vertical line test.
5. It is a function because there is one, and only one, y -value for each x -value.
6. a) 3 b) 9 c) 10
7. a) -2 b) -10 c) -2.44
8. a) -1 b) 0 c) 1

Section 1.2 Domain and Range

1. a) domain: $\{-1, -2, -3, -4\}$; range: $\{1, 4, 9, 16\}$
b) domain: $\{x \in \mathbf{R}\}$; range: $\{f(x) \in \mathbf{R} \mid f(x) \geq -3\}$
c) domain: $\{x \in \mathbf{R}\}$; range: $\{y \in \mathbf{R}\}$
d) domain: $\{x \in \mathbf{R} \mid x > 0\}$; range: $\{y \in \mathbf{R} \mid y < 0\}$

2. a) Answers may vary. For example:

Length (m)	Width (m)
10	90
20	80
30	70
40	60
50	50
60	40
70	30
80	20
90	10



- c) I plotted a series of points, but then I joined them, because the length could be any value between 0 and 100, so the graph is a line segment.
- d) The domain is the real numbers greater than 0 and less than 100. The range is the real numbers greater than 0 and less than 100.
- e) No, because you cannot have a length or width of 0 m.
- f) The domain becomes the real numbers greater than 15 and less than 25. The range becomes the real numbers greater than 75 and less than 85.

3. a) Answers may vary. For example:

Time, t (s)	Height, h (m)
0	0
1.0	13.3
2.0	16.8
2.5	14.9
3.0	10.5
3.5	3.7
4.0	-5.6

- b) about 16.8 m c) about 3.7 s
- d) domain: $\{x \in \mathbf{R} \mid 0 \leq x \leq 3.7\}$; range: $\{y \in \mathbf{R} \mid 0 \leq y \leq 16.8\}$
4. a) \$2 b) \$6
- c) It is a function because it passes the vertical line test.
- d) domain: $\{x \in \mathbf{R} \mid 0 \leq x < 9\}$; range: $\{2, 4, 6\}$

5. a) Answers may vary. For example:

Side Length (cm)	Volume (cm ³)
1	1444
5	4500
10	4000
15	1500
19	76

- b) 19 cm, because if the side length were 20 cm, none of the box would be left.
- c) $\{x \in \mathbf{I} \mid 1 \leq x \leq 19\}$

Section 1.3 Analyse Quadratic Functions

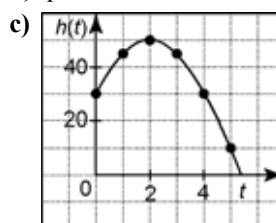
1. a), d), e), g) linear b), c), f), h) quadratic

2. a) quadratic b) linear c) neither

3. a)

t (s)	h (m)
0	30.4
1	45.1
2	50.0
3	45.1
4	30.4
5	5.9

b) quadratic



- d) axis of symmetry: $t = 2$, direction of opening: downward, vertex: (2, 50), domain: $\{t \in \mathbf{R} \mid 0 \leq t \leq 5.2\}$, range: $\{h \in \mathbf{R} \mid 0 \leq h \leq 50\}$

4. a) The possible values of x are the integers from 1 to 29. x cannot be greater than 29, because then no material would be left for the box.

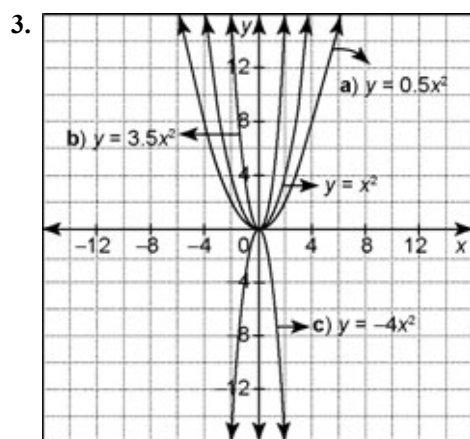
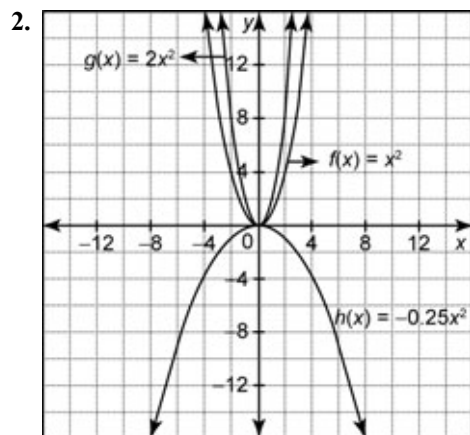
b) Answers may vary. For example:

x (cm)	Area of Four Sides (cm ²)
1	252
5	1100
10	1800
15	2100
16	2112
20	2000
25	1500
29	812

- c) quadratic
d) A side length of 16 cm will produce an area of 2112 cm^2 .

Section 1.4 Stretches of Functions

1. a) B b) C c) A



4. a) $f(x) = 6x^2$ b) $r(x) = 0.5x^2$ c) $t(x) = -2x^2$

5. $\frac{3}{5}$

6. 4

7. 50

8. a) 19.6 m b) about 4.5 s

9. a) 15.2 m b) about 3.6 s

- c) a vertical stretch of $4.9 \div 3.8$ or about 1.29

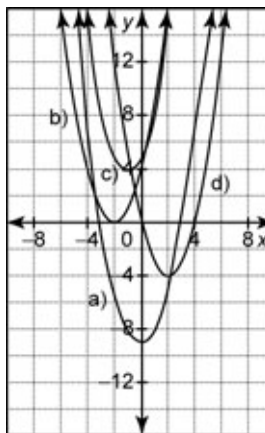
Section 1.5 Translations of Functions

1. a) D b) A c) B d) C

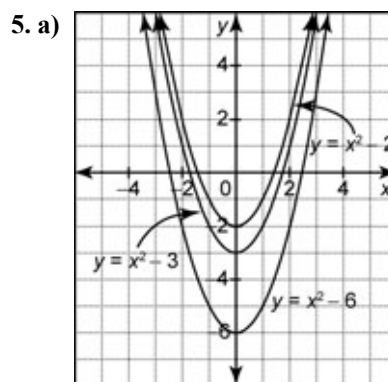
2. a) $f(x) = (x-2)^2$ b) $g(x) = x^2 + 2$

c) $p(x) = (x+3)^2$ d) $q(x) = x^2 - 3$

3. a) (0, -9) b) (-2, 0) c) (-1, 4) d) (2, -4)



4. a) (0, -16) b) (-1, 0) c) (-2, 3) d) (4, -1)



b) $y = (x+2)^2 - 2$, $y = (x+2)^2 - 3$, $y = (x+2)^2 - 6$

c) $y = (x-2)^2 - 2$, $y = (x-2)^2 - 3$, $y = (x-2)^2 - 6$

6. a) -3 b) $p(x) = (x+3) - 1$

7. a) 4 b) $p(x) = (x-4) - 4$

8. a) -5 b) $p(x) = (x+5) - 4$

9. Alike: They will both curve upward, like the right half of a parabola. Different: The vertex of the dragster with the head start will be (0, 0) and the vertex of the other will be (3, 0), as if it were transformed.

Section 1.6 Sketch Graphs Using Transformations

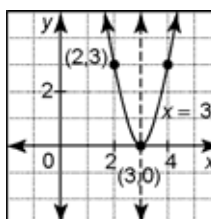
1. a) (0, 30), $x = 0$, downward, $\{y \in \mathbf{R} \mid y \leq 30\}$

- b) (4, 0), $x = 4$, downward, $\{y \in \mathbf{R} \mid y \leq 0\}$

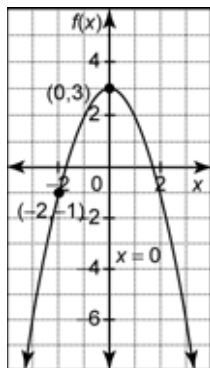
- c) (4, -18), $x = 4$, upward, $\{y \in \mathbf{R} \mid y \geq -18\}$

- d) (-3, 32), $x = -3$, downward, $\{y \in \mathbf{R} \mid y \leq 32\}$

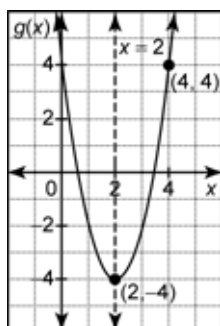
2. a) a vertical stretch by a factor of 3 and a translation of 3 units to the right



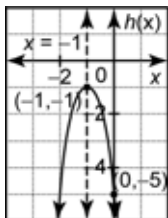
- b) a reflection in the x-axis and translation of 3 units up



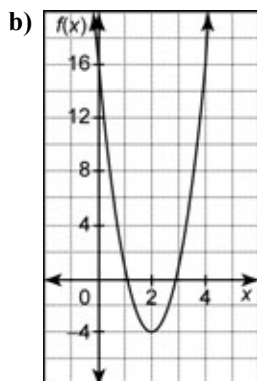
- c) a vertical stretch by a factor of 2 and a translation of 4 units down and 2 units to the right



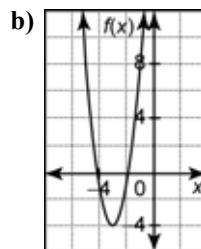
- d) a reflection in the x-axis, a vertical stretch by a factor of 4, a translation of 1 unit to the left and 1 unit down



3. a) $f(x) = 5(x - 2)^2 - 4$

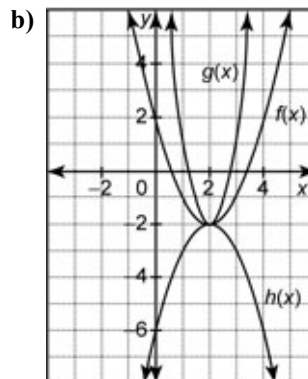


4. a) $f(x) = 3(x + 3)^2 - 4$



5. a) $f(x) = -2(x - 4)^2 - 2$ b) $f(x) = 2(x + 1)^2$

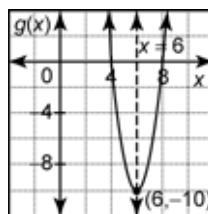
6. a) They have the same vertex, (2, -2).



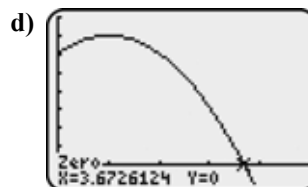
7. a) Answers may vary. For example, (-1, 3) and (1, 3).

- b) From the equation, each point on the graph of $f(x)$ will be translated 6 units to the right and 10 units down to form the graph of $g(x)$. So, (-1, 3) and (1, 3) will be translated to (5, -7) and (7, -7).

- c) domain: $x \in \mathbf{R}$, range: $\{g(x) \in \mathbf{R} \mid g(x) \geq -10\}$



8. a) 30.1 m b) 35 m, at 1 s c) $\{h \in \mathbf{R} \mid 0 \leq h \leq 35\}$



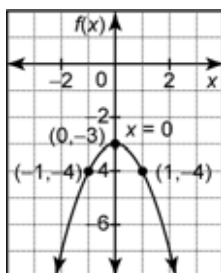
about 3.6 s

e) $\{t \in \mathbf{R} \mid 0 \leq t \leq 3.6\}$

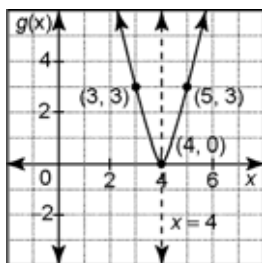
Chapter 1 Review

- It is a function, because no two points lie on the same vertical line.
- It is a function, because no two points lie on the same vertical line.
- It is a function, because no two points lie on the same vertical line.

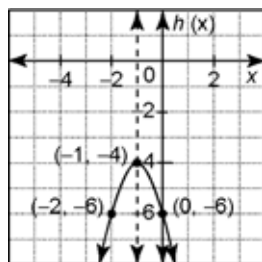
2. a) 9 b) -11 c) $-2\frac{1}{4}$
3. When you draw the graph, you can see that it is a straight line that goes forever. So, the domain is all the real numbers, because x can take any value. The range is all the real numbers, because y can take any value, depending on x .
4. domain: $x \in \mathbf{R}$, range: $\{y \in \mathbf{R} \mid y \geq 5\}$
5. a) yes
b) no, because the graph is a straight line, not a parabola
6. quadratic
7. a) a reflection in the x -axis and a translation of 3 units down



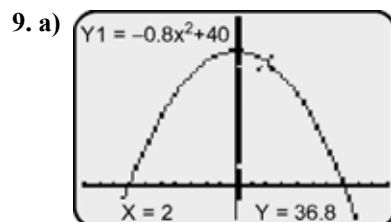
- b) a vertical stretch by a factor of 3 and a translation of 4 units to the right



- c) a vertical stretch by a factor of 2, a reflection in the x -axis, a translation 1 unit to the left and 4 units down



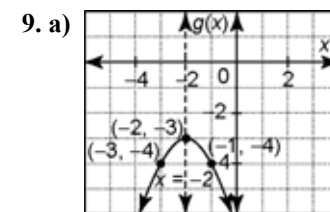
8. $f(x) = -2(x - 8)^2 - 2$



- b) 36.8 m c) about 7 s

Chapter 1 Practice Test

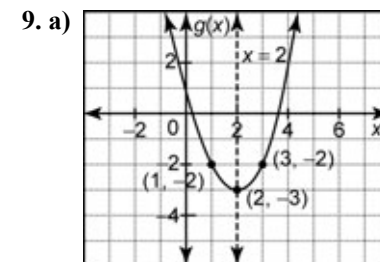
1. D 2. C 3. B
4. a) domain: $x \in \mathbf{R}$, range: $y \in \mathbf{R}$
b) domain: $x \in \mathbf{R}$, range: $\{y \in \mathbf{R} \mid y \geq -3\}$
5. a) $f(x) = (x - 2)^2$ b) $h(t) = t^2 - 3$
c) $A(r) = \pi(r + 2)^2$ d) $f(x) = 3x^2 + 1$
6. a) (0, -5) b) (-2, -10)
c) (1, 0) d) (-1, -10)
7. a) $y = -(x - 2)^2$ b) $y = -(x + 1)^2 - 1$
8. a) a translation 3 units down
b) a translation 3 units to the left and 4 units down
c) a vertical stretch by a factor of 6 and a translation 1 unit to the left
d) a translation 10 units to the right and 1 unit up



- b) domain: $x \in \mathbf{R}$, range: $\{g(x) \in \mathbf{R} \mid g(x) \leq -3\}$
10. $y = 2(x - 3)^2 + 5$

Chapter 1 Test

1. A 2. A 3. C
4. a) domain: $x \in \mathbf{R}$, range: $y \in \mathbf{R}$
b) domain: $x \in \mathbf{R}$, range: $\{y \in \mathbf{R} \mid y \geq 3\}$
5. a) $f(x) = (x + 2)^2$ b) $h(t) = t^2 + 3$
c) $A(r) = \pi(r + 1)^2$ d) $f(x) = 2x^2 - 1$
6. a) (0, -6) b) (2, 10)
c) (-1, 0) d) (-1, 10)
7. a) $y = (x - 2)^2 + 2$ b) $y = -(x + 2)^2 + 4$
8. a) a translation 4 units up
b) a translation 3 units to the right and 4 units down
c) a vertical stretch by a factor of 6, a translation 1 unit to the left and 2 units down
d) a translation 8 units to the left and 1 unit up



- b) domain: $x \in \mathbf{R}$, range: $\{g(x) \in \mathbf{R} \mid g(x) \geq -3\}$
10. $y = 3(x + 2)^2 - 4$