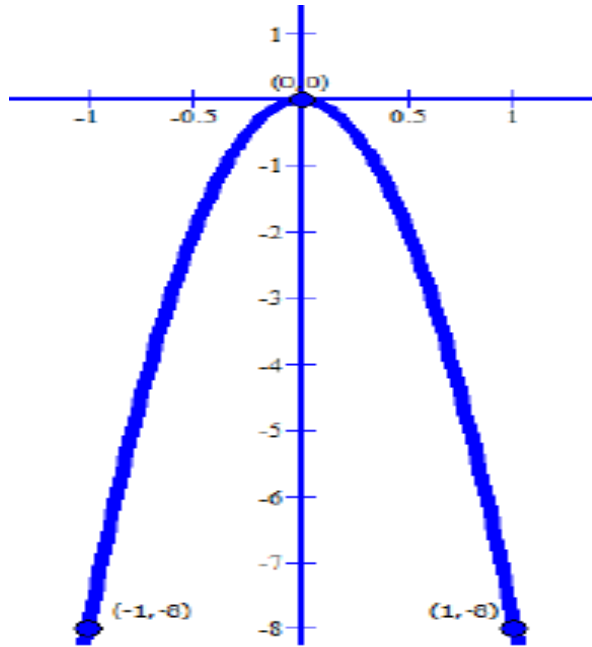## Exercise 1

1. Page 84 of your textbook Exercise 1 - number 2
2. Page 86 of your textbook Exercise 3 – number 2 to 4

Exercise 1 Answers
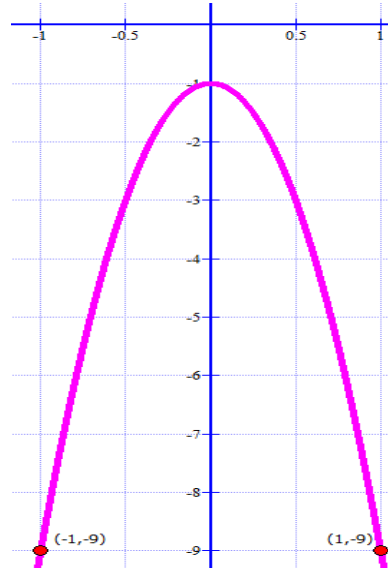**EXERCISE 1 FROM TEXTBOOK NUMBER 2.**
2.1

Exercise 1 Answers
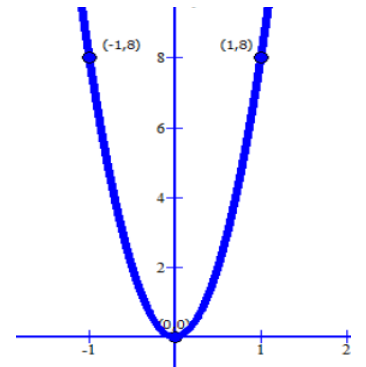**EXERCISE 1 FROM TEXTBOOK NUMBER 2.**
2.2

Exercise 1 Answers
EXERCISE 1 FROM TEXTBOOK NUMBER 2.
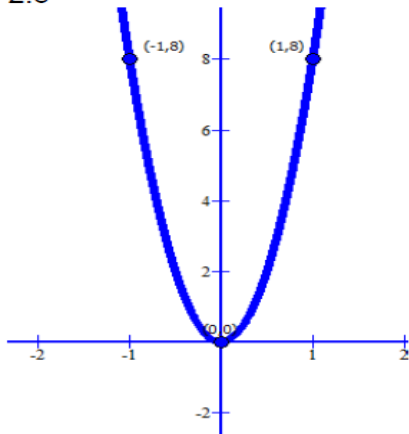2.3

$g(x) = -8x^2 - 1$

2.4

Exercise 1 Answers
EXERCISE 1 FROM TEXTBOOK NUMBER 2.

2.5 $h(x) = 8x^2$

2.6

2.7 $k(x) = 8x^2 + 1$

Exercise 1 Answers
EXERCISE 3 FROM TEXTBOOK

2. $y = 4(x+2)^2 - 1$
   $y = 4x^2 + 16x + 15$
   $y = (2x+3)(2x+5)$

   SHIFT FROM ORIGIN
   $y = 4(x+2)^2 - 1$
   2 units left and 1 unit down

   TURNING POINT
   $(-2;-1)$

3. $y = -(x+5)^2 + 16$
   $y = -x^2 - 10x - 9$
   $y = -(x^2 + 10x + 9)$
   $y = -(x+9)(x+1)$

   SHIFT FROM ORIGIN
   $y = -(x+5)^2 + 16$
   5 units left and 16 units up

   TURNING POINT
   $(-5;16)$

4. $y = -(x-3)^2 + 4$
   $y = -x^2 + 6x - 5$
   $y = -(x^2 - 6x + 5)$
   $y = -(x-5)(x-1)$
   SHIFT FROM ORIGIN
   $y = -(x-3)^2 + 4$
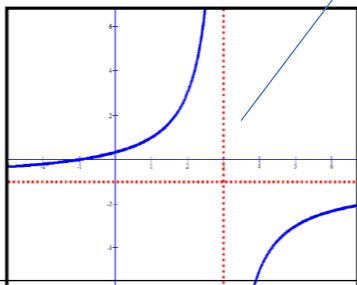   3 units right and 4 units up

   TURNING POINT
   $(3;4)$

Exercise 2

1. Consider $f(x) = \frac{4}{x-2} + 4$
   a. Describe the shift from the origin
   b. Write down the asymptotes of the function.

2. Consider $f(x) = -\frac{4}{x-3} - 1$
   a. Describe the shift from the origin
   b. Write down the asymptotes of the function.

3. Consider $f(x) = \frac{1}{x+2} - 3$
   a. Describe the shift from the origin
   b. Write down the asymptotes of the function.

4. Consider $f(x) = -\frac{3}{x-1} + 2$
   a. Describe the shift from the origin
   b. Write down the asymptotes of the function.
   c. Write down h(x) if h(x) is the reflection of f(x) about the x-axis
   d. Write down k(x) if k(x) is the reflection of f(x) about the y-axis

Exercise 3

For the following Functions determine the following
   A. SHIFT FROM THE ORIGINAL FUNCTION $f(x) = a^x$
   B. ASYMPTOTE
   C. Y-INTERCEPT
      1. $f(x) = 5.2^{x-2} + 3$
      2. $f(x) = -4.3^{x+2} - 1$
      3. $f(x) = 2.5^{x+1} - 2$
      4. $f(x) = 3.\frac{1}{2}^x + 1$

Answer for Exercise 3

1.
   A. Shift - 2 units right and 3 units up
   B. Asymptote- y =3
   C. Y-Intercept - (When x=0) (0;4 ¼)
2.
   A. Shift - 2 units left and 1 unit down
   B. Asymptote - y = -1
   C. Y-Intercept - (0;37)
3.
   A. Shift - 1 unit left and 2 units down
   B. Asymptote - y = -2
   C. Y-Intercept - (0;8)
4.
   A. Shift - 0 units left and 1 unit up
   B. Asymptote - y = 1
   C. Y-Intercept - (0;4)

Exercise 2 Answers

1.
   a. 2 units right and 4 units up
   b. x = 2 (Vertical Asymptote) and y = 4 (Horizontal Asymptote)
2.
   a. Rewrite as $f(x) = \frac{-4}{x-3} - 1$. The shift is 3 units right and 1 unit down. The -4 the top indicates the quadrants the graph will be in. In other words, it influences the shape.

REMEMBER THE FOLLOWING

Function change	Shift
f(x) + c	Shift the graph of f(x) up c units
f(x) - c	Shift the graph of f(x) down c units
f(x + c)	Shift the graph of f(x) left c units
f(x - c)	Shift the graph of f(x) right c units
-f (x)	Reflect the graph of f(x) about the x-axis
f (-x)	Reflect the graph of f(x) about the y-axis
f(c.x)	Compress the graph of f(x) horizontally by a factor of c.
c.f(x)	Stretch the graph of f(x) vertically by a factor of c.

Exercise 2 Answers

   b. x = 3 and y = -1
3.
   a. 2 units left and 3 units down
   b. x=-2 and y = -3
4.
   a. 1 unit right and 2 units up
   b. x = 1 and y = 2
   c. $f(x) = -\frac{3}{x-1} + 2$

The Reflection about x-axis leaves x as is but changes the sign of the entire function. -f(x)

$g(x) = -f(x) = -\left(-\frac{3}{x-1} + 2\right)$

The asymptotes are now x=1 and y= -2

$g(x) = \frac{3}{x-1} - 2$

   d. The Reflection about y-axis leaves y as is but changes the sign of the x-value. f(-x)

$k(x) = f(-x) = -\frac{3}{(-x)-1} + 2$

$k(x) = f(-x) = -\frac{3}{-(x+1)} + 2$

The asymptotes are now x=-1 and y= 2

$k(x) = f(-x) = \frac{3}{x+1} + 2$