Chapter 7 Review

5. Over the course of five weekdays, one mining stock on the Toronto Stock Exchange (TSX) closed at \$4.28 on Monday, closed higher at \$5.17 on Tuesday, finished Wednesday at \$4.79, and shot up to close at \$7.15 on Thursday, only to finish the week at \$6.40.
   a) What is the net change in the value of this stock for the week?
   b) Determine the total change in the value of the stock.

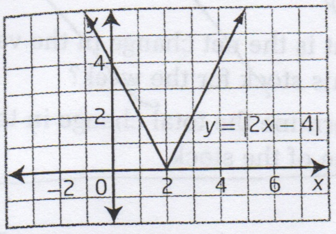
7.2 Absolute Value Functions, pages 368–379

6. Consider the functions $f(x) = 5x + 2$ and $g(x) = |5x + 2|$.
   a) Create a table of values for each function, using values of $-2, -1, 0, 1,$ and 2 for x.
   b) Plot the points and sketch the graphs of the functions on the same coordinate grid.
   c) Determine the domain and range for both $f(x)$ and $g(x)$.
   d) List the similarities and the differences between the two functions and their corresponding graphs.

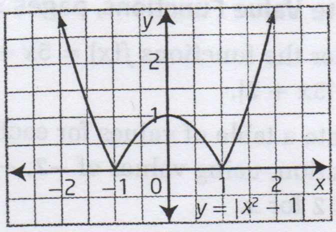
7. Consider the functions $f(x) = 8 - x^2$ and $g(x) = |8 - x^2|$.
   a) Create a table of values for each function, using values of $-2, -1, 0, 1,$ and 2 for x.
   b) Plot the points and sketch the graphs of the functions on the same coordinate grid.
   c) Determine the domain and range for both $f(x)$ and $g(x)$.
   d) List the similarities and the differences between the two functions and their corresponding graphs.

8. Write the piecewise function that represents each graph.

a)



b)



9. a) Explain why the functions $f(x) = 3x^2 + 7x + 2$ and $g(x) = |3x^2 + 7x + 2|$ have different graphs.

b) Explain why the functions $f(x) = 3x^2 + 4x + 2$ and $g(x) = |3x^2 + 4x + 2|$ have identical graphs.

10. An absolute value function has the form $f(x) = |ax + b|$, where $a \neq 0$, $b \neq 0$, and $a, b \in \mathrm{R}$. If the function $f(x)$ has a domain of $\{x \mid x \in \mathrm{R}\}$, a range of $\{y \mid y \geq 0, y \in \mathrm{R}\}$, an x-intercept occurring at $\left(-\frac{2}{3}, 0\right)$, and a y-intercept occurring at (0, 10), what are the values of a and b?

7.3 Absolute Value Equations, pages 380–391

11. Solve each absolute value equation graphically. Express answers to the nearest tenth, when necessary.

a) $|2x - 2| = 9$

b) $|7 + 3x| = x - 1$

c) $|x^2 - 6| = 3$

d) $|m^2 - 4m| = 5$

12. Solve each equation algebraically.

a) $|q + 9| = 2$

b) $|7x - 3| = x + 1$

c) $|x^2 - 6x| = x$

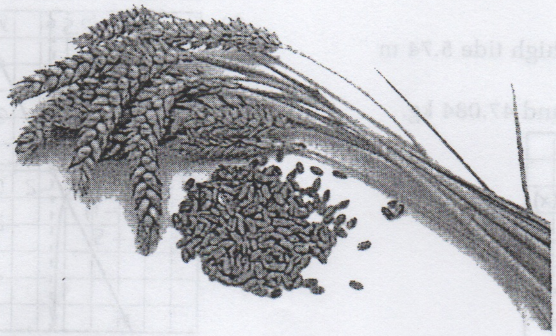
d) $3x - 1 = |4x^2 - x - 4|$

13. In coastal communities, the depth, d, in metres, of water in the harbour varies during the day according to the tides. The maximum depth of the water occurs at high tide and the minimum occurs at low tide. Two low tides and two high tides will generally occur over a 24-h period. On one particular day in Prince Rupert, British Columbia, the depth of the first high tide and the first low tide can be determined using the equation $|d - 4.075| = 1.665$.

a) Find the depth of the water, in metres, at high tide and low tide in Prince Rupert on this day.

b) Suppose the low tide and high tide depths for Prince Rupert on the next day are 2.94 m, 5.71 m, 2.28 m, and 4.58 m. Determine the total change in water depth that day.

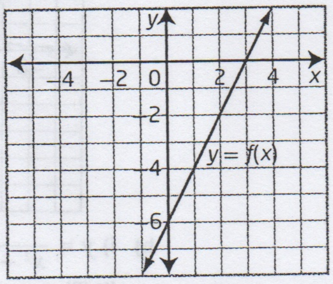
14. The mass, m, in kilograms, of a bushel of wheat depends on its moisture content. Dry wheat has moisture content as low as 5% and wet wheat has moisture content as high as 50%. The equation $|m - 35.932| = 11.152$ can be used to find the extreme masses for both a dry and a wet bushel of wheat. What are these two masses?



7.4 Reciprocal Functions, pages 392–409

15. Copy each graph of $y = f(x)$ and sketch the graph of the corresponding reciprocal function, $y = \frac{1}{f(x)}$. Label the asymptotes, the invariant points, and the intercepts.

a)



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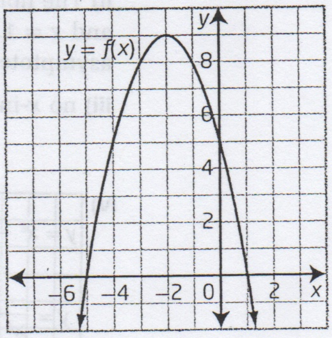


16. Sketch the graphs of $y = f(x)$ and $y = \frac{1}{f(x)}$ on the same set of axes. Label the asymptotes, the invariant points, and the intercepts.

a) $f(x) = 4x - 9$ **b)** $f(x) = 2x + 5$

17. For each function,

i) determine the corresponding reciprocal function, $y = \frac{1}{f(x)}$

ii) state the non-permissible values of x and the equation(s) of the vertical asymptote(s) of the reciprocal function

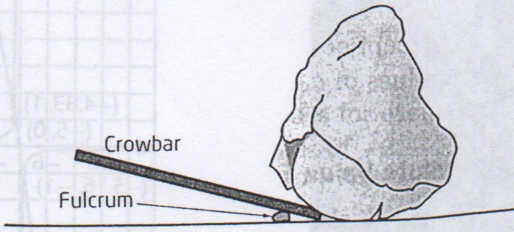
iii) determine the x-intercepts and the y-intercept of the reciprocal function

iv) sketch the graphs of $y = f(x)$ and $y = \frac{1}{f(x)}$ on the same set of axes

a) $f(x) = x^2 - 25$

b) $f(x) = x^2 - 6x + 5$

18. The force, F, in newtons (N), required to lift an object with a lever is proportional t the reciprocal of the distance, d, in metres of the force from the fulcrum of a lever. The fulcrum is the point on which a lever pivots. Suppose this relationship can be modelled by the function $F = \frac{600}{d}$.



a) Determine the force required to lift an object if the force is applied 2.5 m fron the fulcrum.

b) Determine the distance from the fulcrum of a 450-N force applied to lift an object.

c) How does the force needed to lift an object change if the distance from the fulcrum is doubled? tripled?

9. a) The functions have different graphs because the initial graph goes below the x-axis. The absolute value brackets reflect anything below the x-axis above the x-axis.

   b) The functions have the same graphs because the initial function is always positive.

10. $a = 15$, $b = 10$

11. a) $x = -3.5$, $x = 5.5$

    b) no solution

    c) $x = -3$, $x = 3$, $x = -\sqrt{3}$, $x = \sqrt{3}$

    d) $m = -1$, $m = 5$

12. a) $q = -11$, $q = 7$ b) $x = \frac{1}{4}$, $x = \frac{2}{3}$

    c) $x = 0$, $x = 5$, $x = 7$

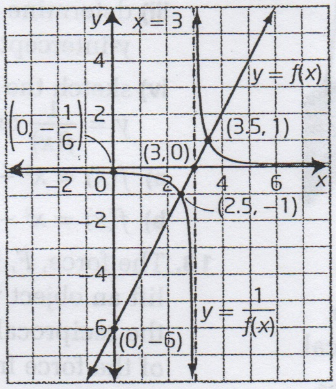
    d) $x = \frac{3}{2}$, $x = \frac{-1 + \sqrt{21}}{4}$

13. a) first low tide 2.41 m; first high tide 5.74 m

    b) The total change is 8.5 m.

14. The two masses are 24.78 kg and 47.084 kg.

15. a)



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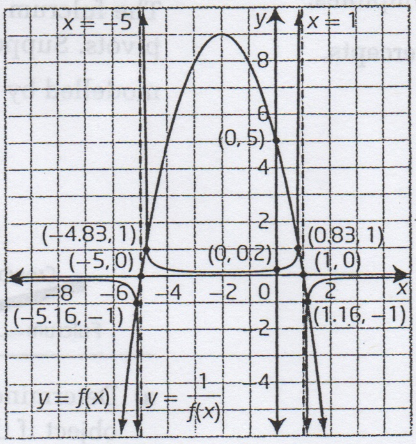
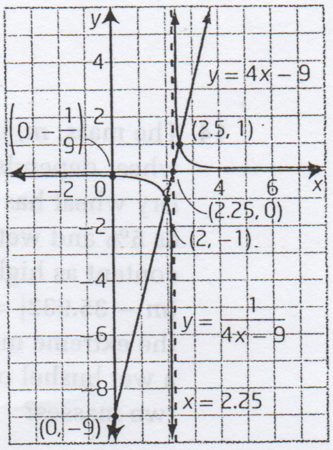


16. a)



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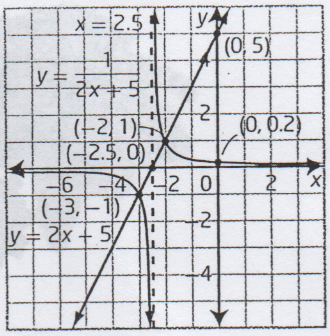
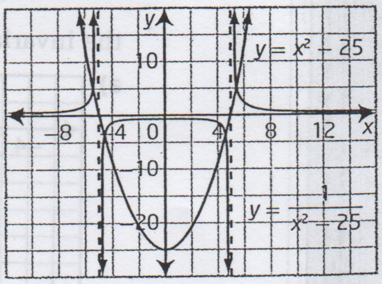


17. a) i) $y = \frac{1}{x^2 - 25}$

    ii) The non-permissable values are $x = -5$ and $x = 5$. The equations of the vertical asymptotes are $x = -5$ and $x = 5$.

    iii) no x-intercepts; y-intercept: $-\frac{1}{25}$

    iv)



b) i) $y = \frac{1}{x^2 - 6x + 5}$

   ii) The non-permissable values are $x = 5$ and $x = 1$. The equations of the vertical asymptotes are $x = 5$ and $x = 1$.

   iii) no x-intercept; y-intercept $\frac{1}{5}$

   iv)