Learning Objectives:
1. Graph linear functions
2. Use average rate of change to identify linear functions
3. Determine whether a linear function is increasing, decreasing, or constant
4. Build linear models from verbal description

Examples:
1. For each function, (i) determine the slope and $y$-intercept; (ii) graph the function using slope and $y$-intercept; (iii) determine the average rate of change; and (iv) determine whether the function is increasing, decreasing, or constant.
   
   \[(a)\ f(x) = 3x + 5. \quad (b)\ f(x) = -4x + 2. \quad (c)\ f(x) = 5.\]

2. Suppose $f(x) = 3x + 6$ and $g(x) = -x + 4$.
   
   (a) Solve $f(x) = 0$.  
   (b) Solve $f(x) \geq 0$.
   (c) Solve $f(x) = g(x)$.  
   (d) Solve $f(x) \leq g(x)$.

3. The cost, $C$, in dollars of a cellular phone plan is given by the function $C(x) = 0.30x + 7$, where $x$ is the number of minutes used.
   
   (a) What is the cost of the plan if you talk for 150 minutes? 
   (b) If the bill is $220, how many minutes were used? 
   (c) What is the maximum number of minutes that can be used for $120? 

Teaching Notes:
- The delta notation may take them a bit to understand.
- The applications are not difficult and should be interesting. Emphasize these.

Answers:  (Graphs are below.)

1. (a) (i) Slope = 3, $y$-intercept = 5; (iii) 3; (iv) increasing.  
   (b) (i) Slope = -4, $y$-intercept = 2; (iii) -4; (iv) decreasing.  
   (c) (i) Slope = 0, $y$-intercept = 5; (iii) 0; (iv) constant.

2. (a) $x = -2$  
   (b) $(-2, \infty)$  
   (c) $x = -\frac{1}{2}$  
   (d) $\left(-\infty, -\frac{1}{2}\right]$  

3. (a) $52$  
   (b) $710$  
   (c) $376$  

1.