The axis (or axes) of a graph must be marked with equal-sized spaces called intervals. Marking the uniform intervals on the axes is called scaling the axes. The difference between consecutive markings tells the size (scale) of each interval. Note that each axis of a two-dimensional graph may use a different scale.

Sometimes the axis or set of axes is not provided. A student must count the number of usable spaces on the graph paper. How many spaces are usable depends in part on how large the graph will be and how much space will be needed for labeling beside each axis.

Follow these steps to scale each axis of a graph.

1. Find the difference between the smallest and largest numbers (the range) you need to put on an axis.
2. Count the number of intervals (spaces) you have on your axis.
3. Divide the range by the number of intervals to find the interval size.
4. Label the marks on the axis using the interval size.

Sometimes dividing the range by the number of intervals produces an interval size that makes it difficult to interpret the location of points on the graph. The student may then exercise judgment and round the interval size up (always up, if rounded at all) to a number that is convenient to use. Interval sizes like 1, 2, 5, 10, 20, 25, 50, 100, etc., work well. For more information, see the Math Notes box in Lesson 1.2.2 of the Core Connections, Course 2 text.

**Example 1**

1. The difference between 0 and 60 is 60.
2. The number line is divided into 5 equal intervals.
3. 60 divided by 5 is 12.
4. The marks are labeled with multiples of the interval size 12.

**Example 2**

1. The difference between 300 and 0 is 300.
2. There are 4 intervals.
3. 300 ÷ 4 = 75
4. The axis is labeled with multiples of 75.
Example 3

1. The difference on the vertical axis is $750 - 0 = 750$. (The origin is $(0, 0)$. ) On the horizontal axis the range is $6 - 0 = 6$. 
2. There are 5 spaces vertically and 3 spaces horizontally. 
3. The vertical interval size is $750 ÷ 5 = 150$. The horizontal interval is $6 ÷ 3 = 2$. 
4. The axes are labeled appropriately.

Example 4

Sometimes the axes extend in the negative direction.

1. The range is $20 - (-15) = 35$. 
2. There are 7 intervals along the line. 
3. $35 ÷ 7 = 5$ 
4. Label the axes with multiples of five.

Problems

Scale each axis:

1. 

2. 

3. 

4. 

5. 

6.
Answers

1. $2, 4, 6, 8, 10, 12$
2. $-9, -6, -3, 0, 3, 6$
3. $86, 102, 118, 134$
4. $-2, 8, 18, 28, 38$
5. $-12, -11, -10, -9$
6. $-18, -14, -12, -10, -8$
7. $x: 2, 4, 6, 8, 12$
   $y: 4, 8, 12, 16, 24$
8. $x: 3, 6, 9, 15, 18$
   $y: 4, 8, 12, 20, 24$
9. $x: 60, 120, 180, 240, 360$
   $y: 40, 80, 120, 160, 240$
10. $x: \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1\frac{1}{4}, 1\frac{1}{2}$
    $y: \frac{1}{2}, 1\frac{1}{2}, 2, 2\frac{1}{2}, 3$