Multiplication Principle of Counting: If a procedure is composed of two steps, and the first step can be done in *m* ways and the second can be done in *n* ways, then the number of ways the procedure can be performed is $m \cdot n$.

Example: When Dr. Condie went to his closet to select his clothes for school, he had four shirts and three pairs of pants to choose from. How many ways could he dress? We will assume he is not concerned about his clothes matching.

Solution: He has 4 ways to choose his shirt and 3 ways his pants, so

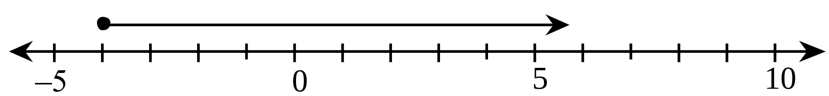
$4 \cdot 3 = 12$ ways

1) a) In the finals of the Olympic 100 m dash, seven runners compete for medals of gold, silver, and bronze. How many different ways can the medals be awarded?

b) In how many different ways can a group of 5 people arrange themselves in a straight line to have their portrait taken together?

A ray on a number line may be represented by:

- a graph:



- an inequality: $x \ge -4$
- a set: {x: $x \ge -4$}
- an interval: [–4, ∞). The "∞" means **infinity** and indicates that the ray continues forever in a positive direction. A curved bracket is always used with ± ∞.

2) Graph the following on the number line:

a) [-3, ∞) b) (5, ∞) c) (–∞, -4]

d) x < –2 or $x \ge 5$ e) $x : x \ge 3$ f) (–∞, 5) ∩ (–2, ∞)

When performing calculations with approximate values follow these rules:

i) a product or quotient should contain the same number of significant figures as the measurement with the least number of significant figures.

ii) The least significant digit in a sum or difference should be in the same position as the least significant digit of the measurement whose least significant digit is the furthest to the left.

3) Simplify. Label your answers using appropriate units.

a) 150.2 m/sec $*$ .045 sec = ? b) 125.3 cm – 61.59 cm = ?

The **mean** and the **median** are both *measures of central tendency* or *middle* for a set of data.

In statistics a measure of central tendency is a single value which is used to "represent" the entire data set. The mean is the arithmetic average of the numbers. The median is the middle measurement when the numbers are arranged in order. If there is not a middle one, then the median is the average of the two middle terms.

4) Find the mean and the median for each of the following data sets:

a) The peak wind gusts (mi/hr) at Chicago O'Hare airport for February 1995. (Days follow each other down the columns):

15	21	34
15	26	24
30	24	24
30	25	25
26	12	26
18	17	13
23	26	34
21	22	32
27	33	18
33		

b) The 2004 salaries (in hundred thousands of dollars) for members of the Chicago Cubs are listed below:

Sosa	169.00	Borowski	20	Zambrano	4.5
Garciaparra	115.00	Walker	17.5	Randolph	3.23
Wood	80.00	Barrett	15.5	Wellemeyer	3.1
Lee	61.67	Farnsworth	14	Mitre	3.05
Ramirez	60.00	Fox	12	Ransom	3.03
Maddux	60.00	Hollandsworth	10	Dempster	3
Remlinger	39.83	Blanco	7.5	Bergeron	3
Williamson	31.75	Macias	7.5	Wuertz	3
Prior	31.50	Grieve	7	Szuminski	3
Perez	27.50	Goodwin	6.5	Reyes	3
Hawkins	26.67	Patterson	4.8		

c) For each of the data sets above determine whether the mean or the median would serve as the better representative of the entire data set. Explain your reasoning.

5) A bag contains 16 red marbles, 11 blue marbles and 14 yellow marbles.
If you reach in and pull out a marble without looking, what is the probability that:

(a) It will be blue? (b) It will not be yellow?

(c) It will be red or yellow? (d) It will be green?

6) **NC** Simplify: a) $3\begin{bmatrix} 6 & 4 & -3 \\ -7 & 5 & 9 \end{bmatrix} + 2\begin{bmatrix} 2 & 6 \\ 5 & -1 \\ -4 & 7 \end{bmatrix}^T$ b) $\left(\begin{bmatrix} 6 & -3 \\ 5 & 7 \end{bmatrix} + \begin{bmatrix} 6 & 5 \\ 3 & -3 \end{bmatrix}^T\right)^T$

7) On the same grid, sketch the graph of each of the following, noting significant points. Label each graph.

a) $y = |x|$, $y = |x| - 2$, and $y = |x| + 4$

b) Generalize how you use the graph of $y = |x|$ to graph $y = |x| + k$.

8) A point is located on a number line. Its position, x is determined by:

$x = 2t^2 - 9$ for $-2 \le t \le +3$

a) Make a table of integer values for t and x, using t = -2, -1.5, -1, -.5, …, 3

b) Graph each of the points on a number line, labeling each x.

c) Give the range of values of x. $? \le x \le ?$

d) Estimate the total distance traveled by the point as t went from –2 to + 3?
Explain your estimate.

9) **NC** The vertex matrix of ΔABC is $\begin{bmatrix} -3 & 7 & 9 \\ 5 & -3 & -6 \end{bmatrix}$.

Using the transformation for the reflection of ΔABC over the y-axis, compute the matrix of $\Delta A'B'C'$. Show your matrix calculations.

10) PEA The population of for Vermont is given in the table below.

a) Find the average annual growth rate of this population during the time interval from 1960 to 2010. Note: Average rate of change is $\frac{\text{total change dependent variable}}{\text{total change independent variable}} = \frac{\Delta y}{\Delta x}$

b) Write an equation for a line in point slope form, using the ordered pair (1960, 389881) and the slope you found in part (a).

c) Evaluate you equation for the year 1970 and notice these *interpolated* values do not agree with the actual table values. Find the size of the error (sometimes called a *residual*) , expressed as a percent of the actual population value.

d) Use your point-slope equation to extrapolate a population prediction for 2020.

e) Predict when the population will be 1,000,000.

Year	Pop
1960	389881
1970	448327
1980	511456
1990	564964
2000	609890
2010	625741

11) a) Graph the region defined by the simultaneous inequalities $y \geq x-3$, $y \geq -2x+4$, and $x+y \leq 5$.

b)Calculate the area of the region defined by the simultaneous inequalities $y \geq x-3$, $y \geq -2x+4$, and $x+y \leq 5$ using the shoelace method. State values you entered into your calc.

12) In problem set #1 you looked at $y = |x-h|$ and above you considered $y = |x| + k$. Now we would like you to consider $y = |x-h| + k$.

a) Explore this problem by experimenting with different values of *h* and *k*. On your answer sheet, give three examples you used, stating both the formula and showing its sketch.

b) Write a generalization about the graph of $y = |x-h| + k$ and its relation to $y = |x|$. Explain your reasoning.