**Chapter 1 Describing Motion**

*Assessing existence while failing to embrace the insights of modern physics would be like wrestling in the dark with an unknown opponent. –Brian Greene*

**EQ: Use diagrams to describe the motion of an object on a Cartesian Coordinate System (position/time graphs).  
EQ: Demonstrate the ability to determine an object’s Path Length.**

**Chapter 1: Description of Motion**

To measure (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) motion requires the ability to measure the position of a moving object at different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

<https://www.bing.com/videos/search?q=Eadweard+Muybridge&&view=detail&mid=84D246557800399CCF1C84D246557800399CCF1C&&FORM=VRDGAR>

The motion of an object can be followed using a Cartesian Coordinate system (**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ graph**).

**Path length** (s) can be defined as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ traveled over a period of time (t). Path length is a scaler unit (total distance) and always positive.

**EQ: Be able to explain the concepts of speed, average speed, and displacement.**

**EQ: Solve problems involving speed, average speed, and displacement.**

**1-2 SPEED**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ motion** occurs when an object moves equal distances during equal amounts of time. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (v) is defined as the change in path length over the change in time.

**Non-uniform** motion is typically more common. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ speed** () represents the change in position (Δs) over a particular time period (Δt).

**1-3 DISPLACEMENT**

The change in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of an object from one place to another is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. It is typically represented by an arrow connecting two points. Displacement **does not** show the path the object takes during this motion.

**EQ: How are scalar and vector quantities different?**

**EQ: How are resultant vectors drawn?**

**1-4 VECTOR ALGEBRA**

Vectors and Scalers: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** have both magnitude and direction. Quantities that have only magnitude are called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. Vectors are usually represented with **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ FACE** letters. The direction is indicated with an arrow, the magnitude with the length of the arrow.

<https://www.bing.com/videos/search?q=vector+and+scaler+quantities&&view=detail&mid=7BF14A442E4A624CEB4D7BF14A442E4A624CEB4D&&FORM=VRDGAR>

Vector addition occurs when 2 or more vectors (**A, B, C**, etc.) are combined (tail to head) into a “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ vector” (**R**).

B

A + =

R

**POLYGON RULE**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ vectors are added the same way two vectors are added (head to tail). The resultant vector is found by connecting \_\_\_\_\_\_\_\_\_ of the first vector to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the last arrow.

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ vector is a vector when the same magnitude pointing in the opposite direction.

**A** Negative vector of **A**

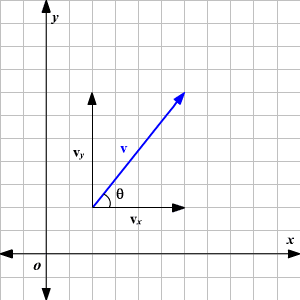
Subtraction of Vectors occurs when the negative of a vector is added to another vector.

When multiplying a vector quantity by a scalar one simply “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” the length of the vector quantity by the scalar factor.

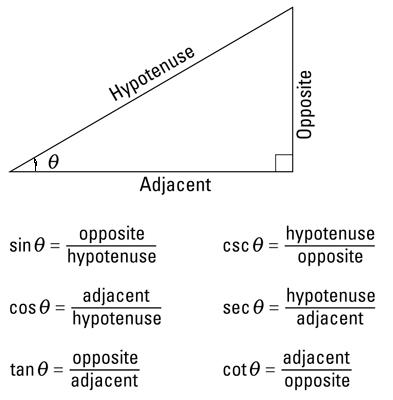
**1-5 Components of Vectors**

**EQ: Be able to use trig functions to solve problems involving moving objects.**

AlthoughVectors are typically represented by an arrow showing its magnitude and direction they can be designated by their components along the X and Y axis.



Trigonometric functions can be used to relate the two methods (See Appendix A on page 905).



**Practice with trig functions**

**1-6 Velocity**

**Speed** is a scalar quantity measuring the rate of motion (magnitude only) while **velocity** is a vector because in addition to the rate a direction is indicated.

Average velocity is calculated using**:**  = **D**

Δ t