

NAME:

PERIOD:

DATE:

MEASURING MOTION NOTES

MOTION – when an object changes position

To observe motion, we need to understand its original position and its new position. This requires us to have a frame of reference.

FRAME OF REFERENCE – objects in the background (usually large and immobile) which are used to make observations



In the pictures above, the car's position has changed relative to the building. Since buildings normally don't move, it serves as a frame of reference to tell us that the car has changed position.

An object can change its position slowly or quickly:

SPEED – is the rate at which an object changes its position. The formula is:

$$\text{SPEED} = \frac{\text{DISTANCE}}{\text{TIME}}$$

Other ways to look at the formula:

$$\text{SPEED} = \text{DISTANCE} \div \text{TIME}$$

$$\text{TIME} \overline{) \text{SPEED}} \quad \text{DISTANCE}$$

UNITS FOR SPEED will always have a distance being divided by a time.

Ex. $55 \frac{\text{MILES}}{\text{HOUR}}$ or $12.5 \frac{\text{METERS}}{\text{SECOND}}$



Velocity is a more scientific way to measure motion. It tells the direction the motion is in.

VELOCITY – a speed measurement with a specific direction

UNITS FOR VELOCITY are a distance being divided by a time with a direction attached.

Ex. $55 \frac{\text{MILES}}{\text{HOUR}}$ north or $12.5 \frac{\text{METERS}}{\text{SECOND}}$ up

Velocity can change when:

- An object speeds up or slows down
- An object changes direction

The rate at which an object's velocity changes is called...

ACCELERATION – the rate at which an object's velocity is changing.

The formula for acceleration is:

$$\text{ACCELERATION} = \frac{\text{VELOCITY (FINAL)} - \text{VELOCITY (INITIAL)}}{\text{TIME}}$$

UNITS FOR ACCELERATION are a distance being divided by a time divided by another time.

Ex. $55 \frac{\frac{\text{MILES}}{\text{HOUR}}}{\text{SECOND}}$ north or $12.5 \frac{\frac{\text{METERS}}{\text{SECOND}}}{\text{SECOND}}$ up

