

# ***Motion***

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**1. Motion**

**2. Types of  
motion**

**3. Speed**

**4. Vectors**

**5. Distance, Time**

*In physics, motion is a change in position of an object over time.*

*Motion is described in terms of displacement, distance, velocity, acceleration, time, and speed.*

# **Types of motion**

- 1. Uniform motion**
- 2. Linear motion**
- 3. non-uniform motion**
- 4. Circular motion**
- 4. Projectile motion**
- 5. Elliptic motion**
- 6. Accelerated and decelerated motion**
- 7. Motion with constant acceleration or deceleration**

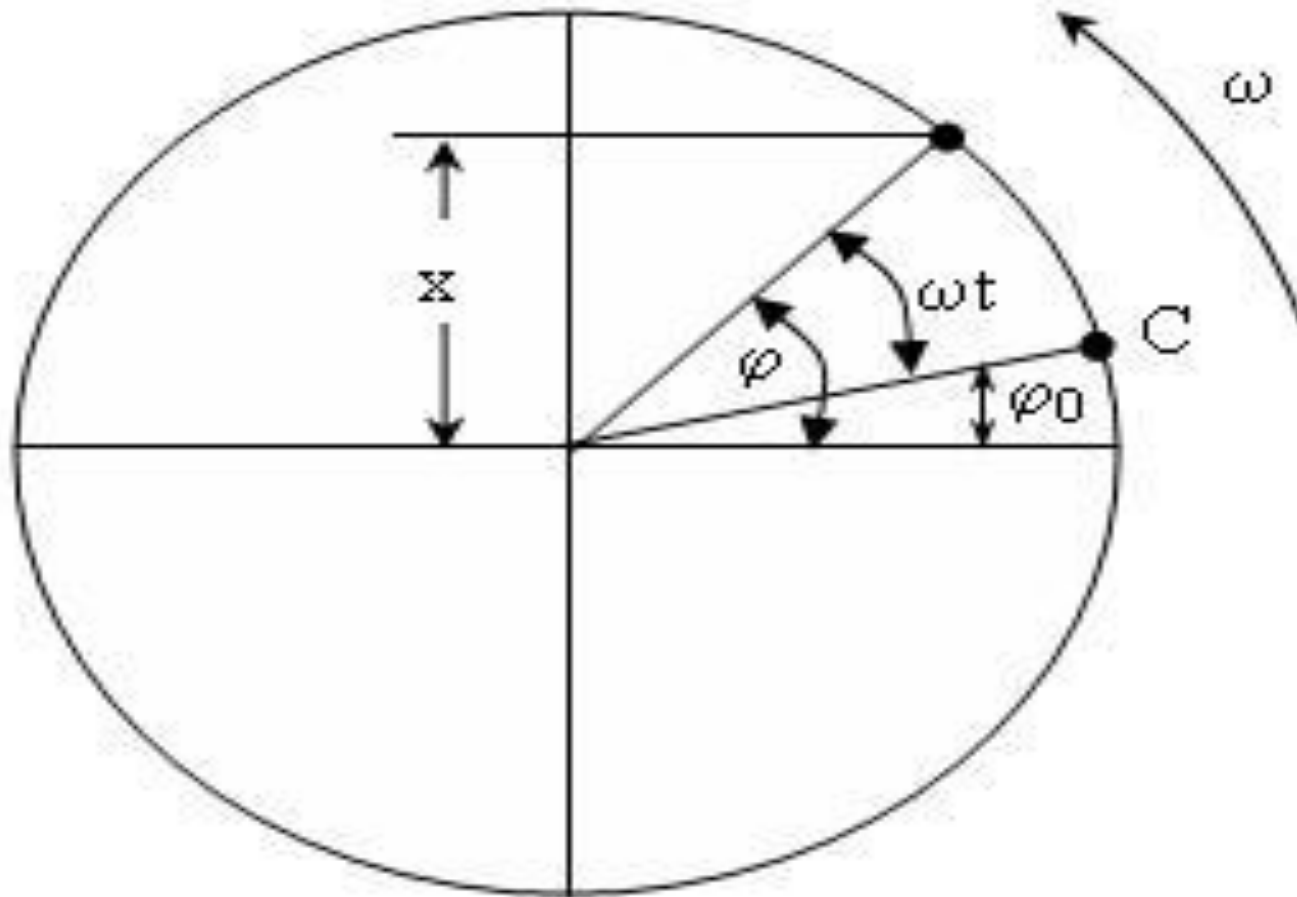
**If the body moves equally along  
the same length, the motion is  
called a uniform motion.**



If the body moves in an equally distinct time, it is called **non-uniform motion**.

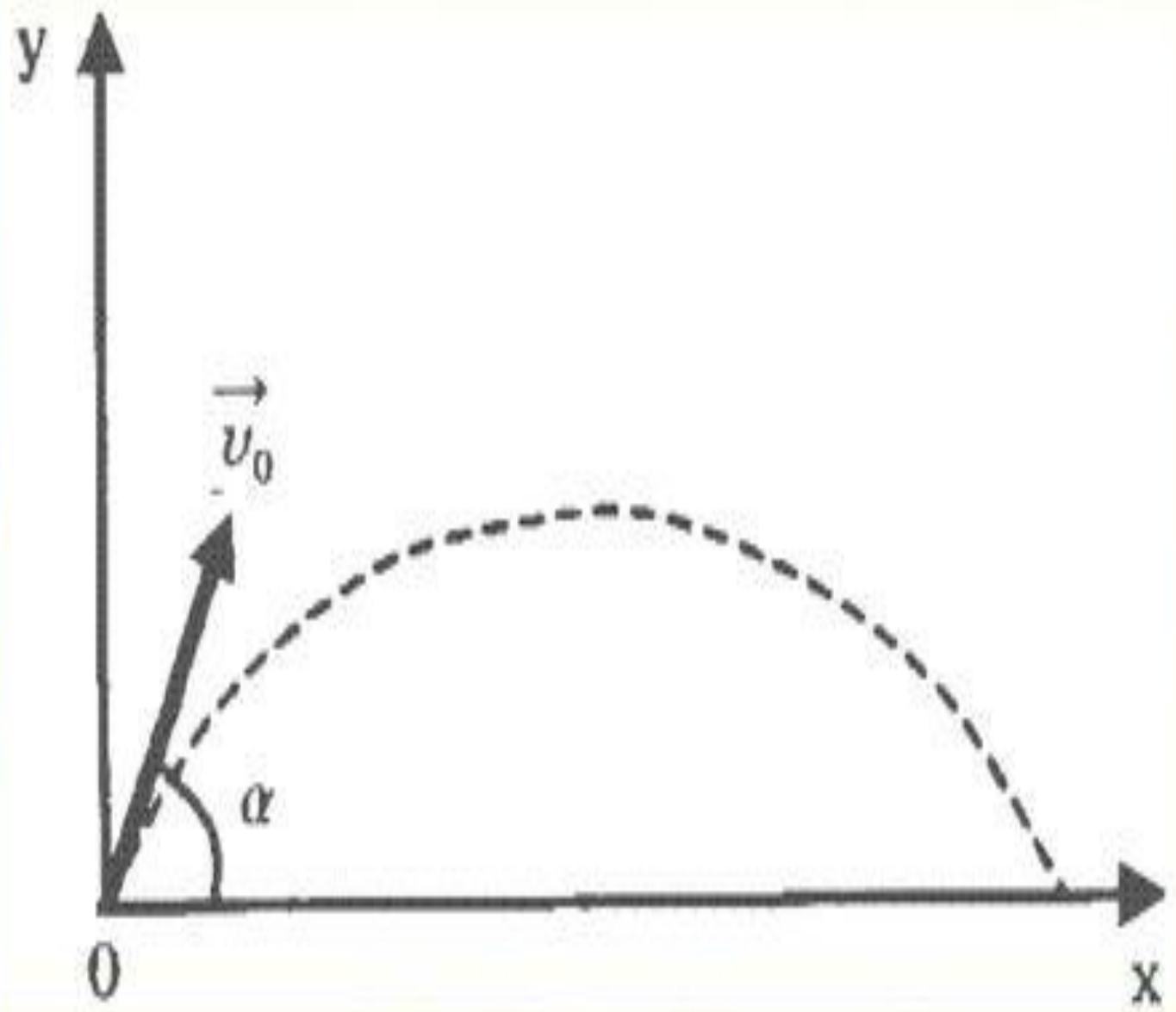


**What kind of motions do these photos refer to?**



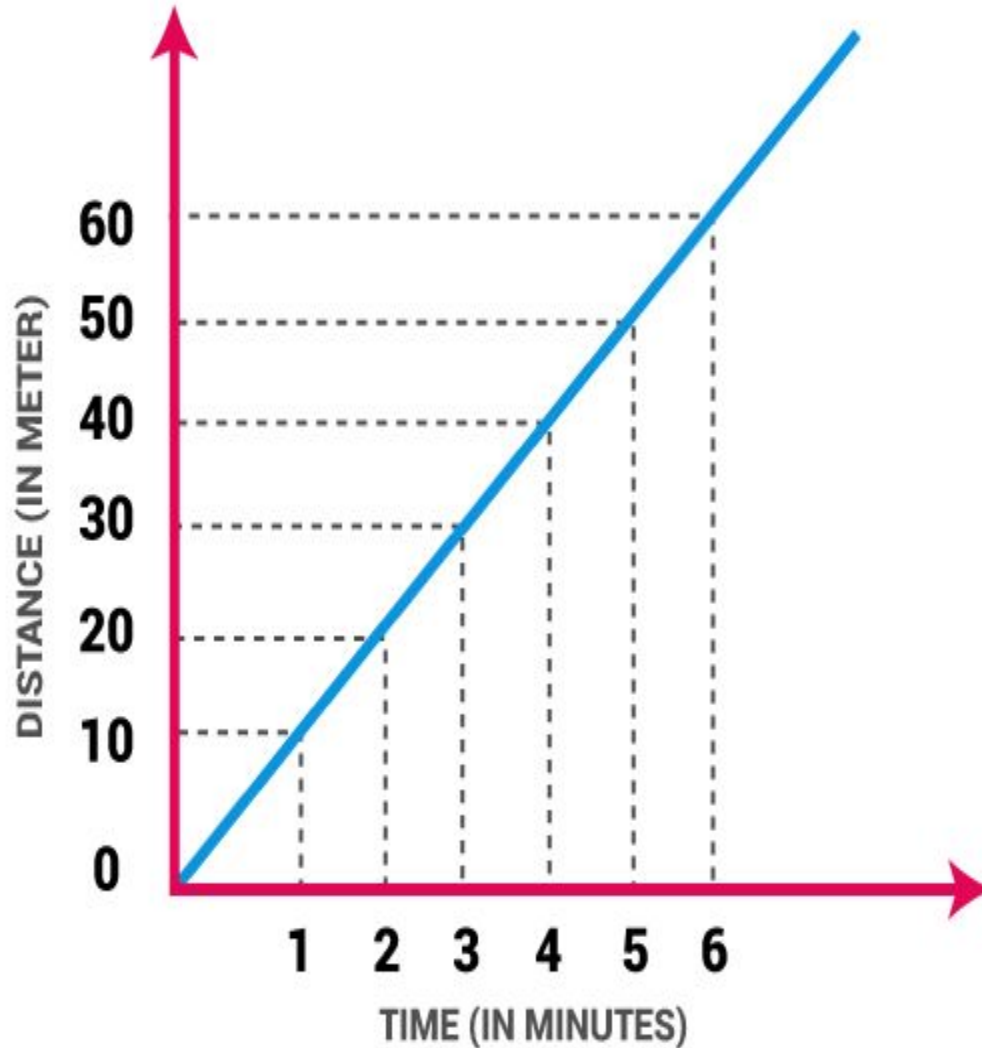
# Circular Motion



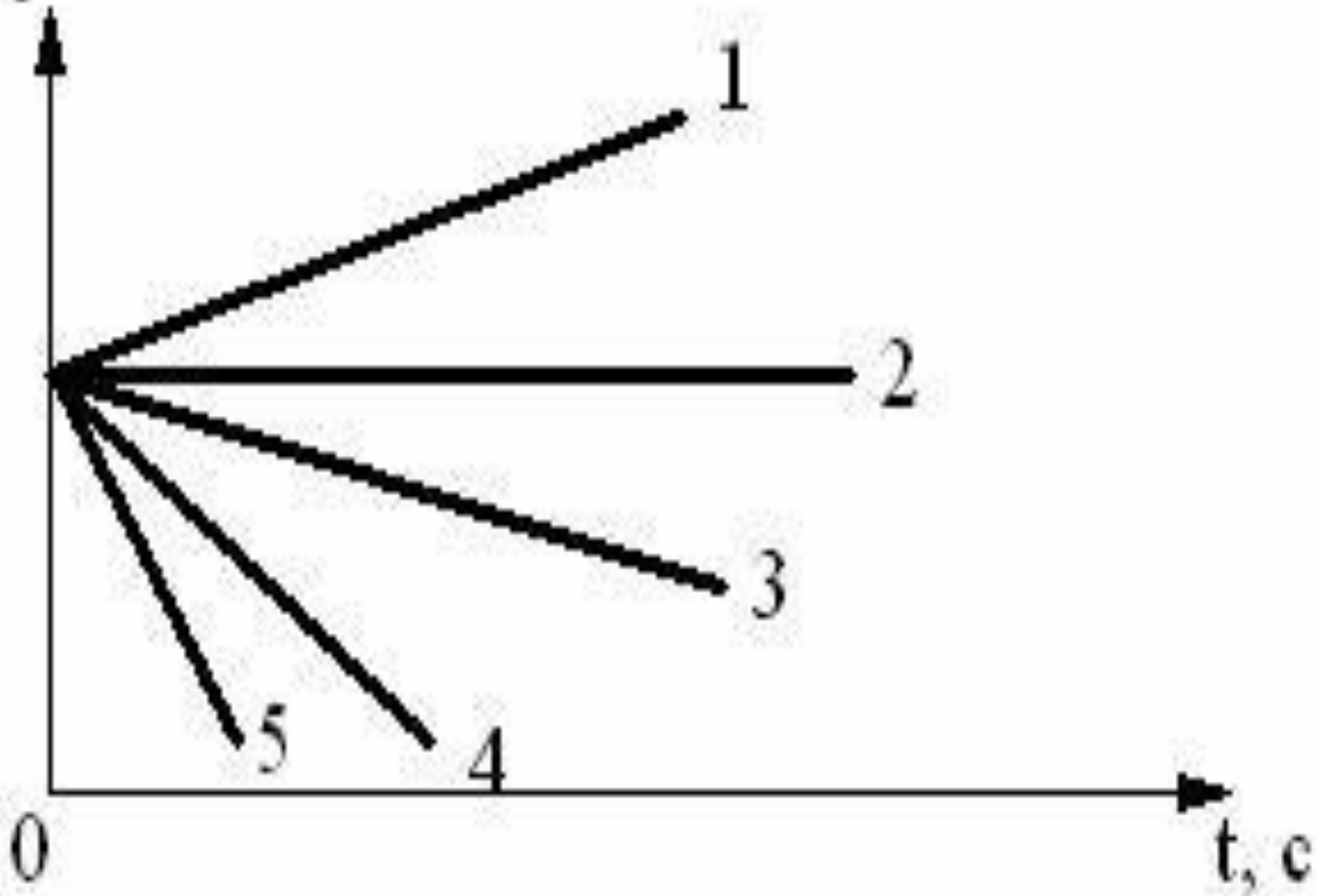




# UNIFORM MOTION GRAPH



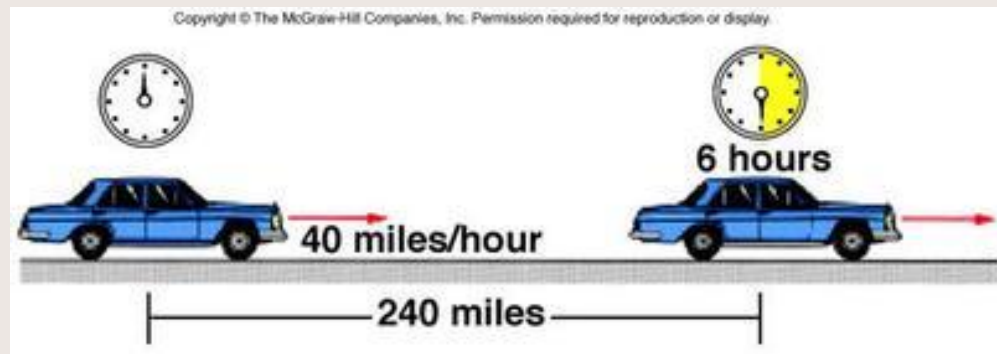
$\varphi, \text{M/c}$



# 2-1. Speed

- Definitions:
  - Speed
    - The rate at which something moves a given distance.
    - Faster speeds = greater distances
  - General formula for speed:
    - Speed = distance / time
    - Abbreviations commonly used:  
 $d = \text{distance}$     $t = \text{time}$     $v = \text{speed}$

$$v = d/t$$



# 2-1. Speed

## Velocity

$$v = \left( \frac{d}{t} \right) = \left( \frac{100 \text{ miles}}{2.5 \text{ hours}} \right) = 40 \frac{\text{miles}}{\text{hour}} = 40 \text{ mph}$$

## Distance

$$d = v \cdot t = 30 \left( \frac{\text{miles}}{\text{hour}} \right) \cdot 6 \text{ hours} = 180 \text{ miles}$$

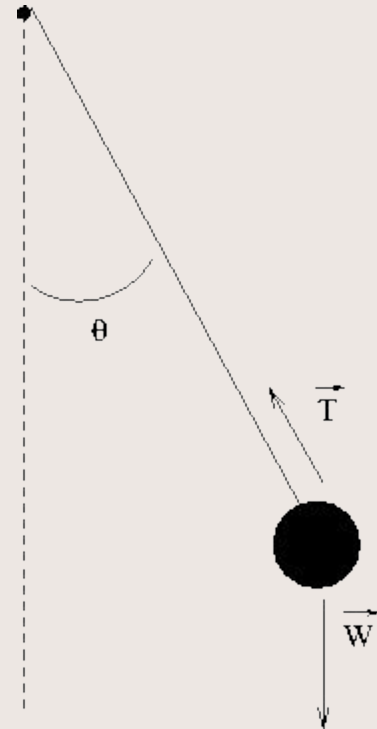
## Time

$$t = \left( \frac{d}{v} \right) = \left( \frac{100 \text{ miles}}{40 \text{ miles / hour}} \right) = 2.5 \frac{\text{miles}}{\text{miles / hour}} = 2.5 \text{ hours}$$

# 2-1. Speed

**Average speed** is the total distance traveled by an object divided by the time taken to travel that distance.

**Instantaneous speed** is an object's speed at a given instant of time.

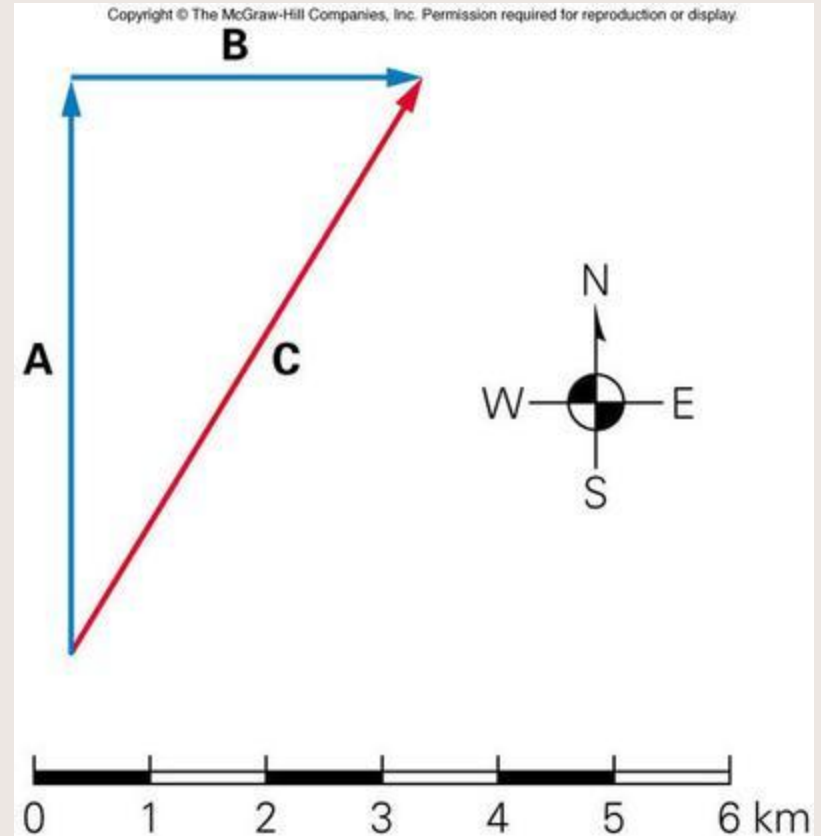


# 2-2. Vectors

**Magnitude** of a quantity tells how large the quantity is.

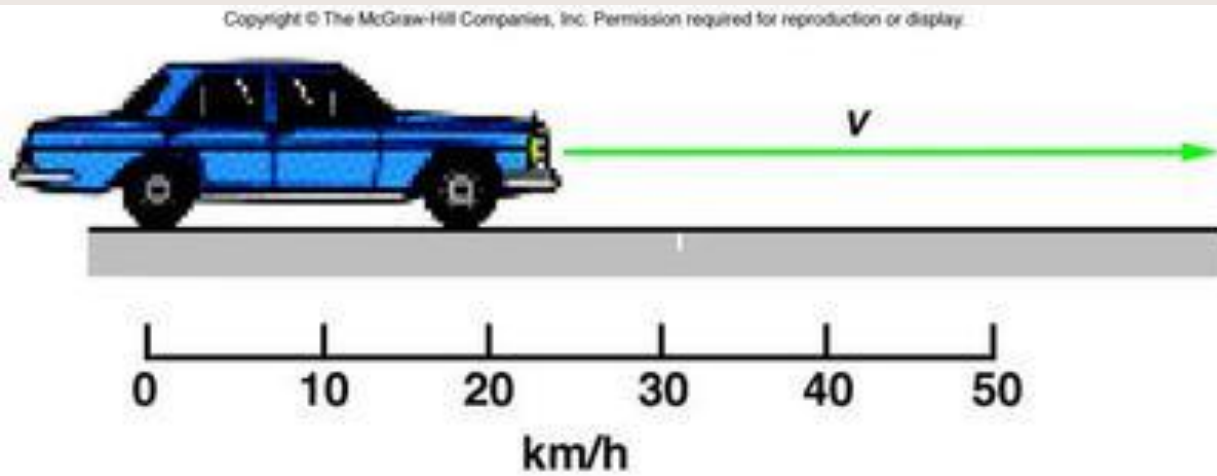
**Scalar** quantities have magnitude only.

**Vector** quantities have both magnitude and direction.



# 2-2. Vectors

**Velocity** is a vector quantity that includes both speed and direction.



## 2- 4. Distance, Time

$$v_{\text{avg}} = \frac{(v_1 + v_2)}{2} = \frac{(20_{\text{mph}} + 60_{\text{mph}})}{2} = 40_{\text{mph}}$$

$$d = v_{\text{avg}} t = 30_{\text{mph}} \cdot 2_{\text{hr}} = 60_{\text{miles}}$$



# Semantic card

	Uniform motion	Deceleration	Position	Санақ нүктесі	Орын ауыстыру	Равномерное движение	ускорение
<b>Орын</b>							
<b>Displacement</b>							
<b>Reference point</b>							
<b>Бірқалыпты қозғалыс</b>							
<b>Тежелу</b>							
<b>Uniform motion</b>							
<b>Үдеу</b>							