Key Words and Phrases

Distance

Position

Displacement

Speed

Velocity

Acceleration

Key Equation (4 Key Equations) Please define the variables in the equations.

Fill in the following table using the following equation

Distance / Time = Speed

Distance	Time	Speed
10 m	5 sec	
20 m	3 sec	
	5 sec	20 m/s
	10 sec	345 m/s
20 m		10 m/s

Fill in the following table using the following equation

Displacement / Time = Velocity

Displacement	Time	Velocity
10 m	5 sec	
-20 m	4 sec	
	8 sec	-10 m/s
	10 sec	345 m/s
- 100 m		-5 m/s
200 m	5 sec	

Fill in the following table using the following equation

Change in position / Time = Velocity

Initial Position	Final Position	Time	Velocity
40 m	20 m	5 sec	
-20 m	10 m	10 sec	
	100 m	5 sec	-10 m/s
-100 m		8 sec	5 m/s
10 m	80 m		10 m/s

Fill in the following table using the following equation

Change in velocity / Time = Acceleration

Initial velocity	Final velocity	Time	Acceleration
20 m/s	80 m/s	5 sec	
5 m/s	-10 m/s	3 sec	
	40 m/s	10 sec	5 ms^{-2}
30 m/s	80 m/s		2 ms^{-2}
10 m/s		8 sec	-10 ms^{-2}

For the following problems calculate the Relative velocity (both magnitude and direction) the boat has.

A boat is attempting to cross a very wide river. The motor on the will produce enough power for the boat to have a speed of 5 m/s in still water. When solving these problems note the direction of the boat and the speed of the river. Consider the down river to be the positive x direction and the directly across the positive y direction. All angles are measured from the positive x direction.

1) The boat traveling down stream with the river speed 2 m/s
2) The boat traveling upstream with the river speed of 2 m/s
3) The boats heading is straight across the river, the river speed is 3 m/s
4) The boat heading at 45 degrees with the river speed 5 m/s
5) If you wanted to head straight across river, and the river speed is 4 m/s at what heading have to be

Solve the following word problems.

1) In some explosive loaded trill ride by Jerry Bruckheimer, the star needs to jump out of a moving train car before it hits a pile of explosive sitting on the track. The train car is 20 meters in length, the train is moving at 10 m/s down the track. The explosive s are placed 50 meters down the track.

a) How time does our hero have before the train car hits the explosives?

b) From the point of view of the villain (who is trapped inside the train car) what is the minimum speed our hero is traveling in order to get out of the train car before it hits the explosives?

c) From the point of view of a passerby how much time does our hero have before the train hits the car?

d) From the point of view of the passerby how fast is our hero traveling?

2) A car travels in the positive x direction at a rate of 10 m/s for 2 minutes; then turns and travel in the positive y direction for 30 m/s for 3 minutes; finally turned to negative x direction at a rate of 20 m/s for 1 minute.

a) What is the average velocity of the car?

b) What is the average speed of the car?

3) A car travels in the negative x direction at a rate of 10 m/s for 4 minutes, then stops for 1 minute then the cars turns around and travels at a rate of 15 m/s for 6 minutes.

a) What is the average velocity of the car?

b) What is the average speed of the car?

4) A salesperson drives the 215 miles from New York City to Washington DC in 4.5 hours

a) What is the average speed of the salesperson in meters per seconds?

b) Do you know what the speed of the salesperson when she passes through Baltimore?

5) During a sneeze, the average person has their eyes closed for a third of a second. Calculate the displacement a car would travel during the sneeze (calculate in meters).

a) 20 mph

b) 45 mph

c) 70 mph

6) During texting, the average person has their eyes off the road for 3 or more seconds (some stats suggests that the time is closer to a minute). Calculate the displacement a car would travel when texting (calculate in meters).

a) 20 mph

b) 45 mph

c) 70 mph

7) A car starts from rest and travels for 10 seconds with a constant acceleration of 3.0 m/s/s The driver then applies the brakes causing a constant negative acceleration of -4.0 m/s/s. Assuming the brakes are applied for 2.0 seconds: How fast is the car going at the end of braking?

8) Automobile experts will oftentimes refer to a car's "0 to 60 time", the time it takes for a car to go from rest to 60 miles/hour, when talking about how powerful its engine is. For example, a Ferrari Daytona's "0 to 60 time" is about 6 seconds.

a) What is the acceleration of this car compared to that of gravity (the acceleration due to gravity is 9.8 m/s/s)?

b) If you had a car able to accelerate at 1 g, what would its "0 to 60 time" be?

9) A car accelerates at a rate of 0.6 m/s/s. How long does it take (time) for this car to go from a speed of 55 mi/h to 60 mi/h?

10) A jet acquires a lift-off speed of 112 m/s in 20.0 s, starting from rest and traveling due east. What are the magnitude and direction of its average acceleration?