

Date: _____

Acceleration Worksheet
Review #1

Name: _____

Equations:

$$\bar{a} = \frac{\Delta \bar{v}}{\Delta t} \qquad \Delta \bar{v} = \bar{a} \Delta t \qquad \Delta t = \frac{\Delta \bar{v}}{\bar{a}}$$
$$\Delta \bar{v} = v_f - v_i \qquad \bar{v}_{av} = \frac{\bar{d}}{\Delta t} \qquad \bar{v}_{av} = \frac{\bar{v}_i + \bar{v}_f}{2}$$

Problems: In order to receive credit for this worksheet you MUST show your work. You can use a calculator but you must show all of the steps in the spaces provided.

1. A roller coaster car rapidly picks up speed as it rolls down a slope. As it starts down the slope, its speed is 4 m/s. But 3 seconds later, at the bottom of the slope, its speed is 22 m/s. What is its average acceleration?

$$\Delta v = v_f - v_i = 22 \text{ m/s} - 4 \text{ m/s} = 18 \text{ m/s}$$

$$a = \frac{\Delta v}{\Delta t} = \frac{18 \text{ m/s}}{3 \text{ s}} = 6.0 \text{ m/s}^2 \text{ [forward]}$$

2. A cyclist accelerates from 0 m/s to 8 m/s in 3 seconds. What is his acceleration? Is this acceleration higher than that of a car which accelerates from 0 to 30 m/s in 8 seconds?

Car #1

$$a = \frac{\Delta v}{\Delta t} = \frac{8 \text{ m/s}}{3 \text{ s}} = 2.7 \text{ m/s}^2 \text{ [forward]}$$

Car #2

$$a = \frac{\Delta v}{\Delta t} = \frac{30 \text{ m/s}}{8 \text{ s}} = 3.75 \text{ m/s}^2 \text{ [forward]}$$

No car #2s acceleration is greater

3. A car advertisement states that a certain car can accelerate from rest to 70 km/h in 7 seconds. Find the car's average acceleration.

$$\frac{70 \text{ km}}{\text{h}} \times \frac{1 \text{ h}}{3600 \text{ s}} \times \frac{1000 \text{ m}}{1 \text{ km}} = 19.44 \text{ m/s}$$

$$a = \frac{\Delta v}{\Delta t} = \frac{19.44 \text{ m/s}}{7 \text{ s}} = 2.8 \text{ m/s}^2 \text{ [forward]}$$

4. A lizard accelerates from 2 m/s to 10 m/s in 4 seconds. What is the lizard's average acceleration?

$$\Delta v = v_f - v_i = 10 \text{ m/s} - 2 \text{ m/s} = 8 \text{ m/s}$$

$$a = \frac{\Delta v}{\Delta t} = \frac{8 \text{ m/s}}{4 \text{ s}} = 2.0 \text{ m/s}^2 \text{ [forward]}$$