Physics 512 Name KEY

# Final Review: STRAIGHT LINE MOTION REVIEW

1. A skater goes backward for 20 meters and then forward for 8 meters. The distance covered is 28m while the displacement of the skater is 12m backward

2. If a person drives 120 miles North to Albany and turns around and drives back home. The entire trip takes 4 hours. The person's average speed for the trip is 60 .miles per hour. For the same trip the AVERAGE VELOCITY is 0 miles per hour.

3. A runner accelerates from rest to a velocity of 12 m/sec in 2 seconds time. His ACCELERATION rate is 6 m/sec2

4. A car has three accelerators. They can all change the velocity of the car.

a) The gas pedal because it can change the speed, and

b) The brake pedal because it can change the speed, and

c) The steering wheel because it can change the direction .

5. A ball is thrown straight up in the air. It rises, reaches its peak, and begins to fall

a) As it rises the speed of the ball Dec (INC/DEC/REMAINS THE SAME)

b) As it FALLS the speed of the ball Inc (INC/DEC/REMAINS THE SAME)

c) At its peak, the magnitude of the ball's velocity is 0m/s .

d) At its peak the magnitude of the ball's acceleration is $10\ m/s^2$ & the direction of the acceleration is down .

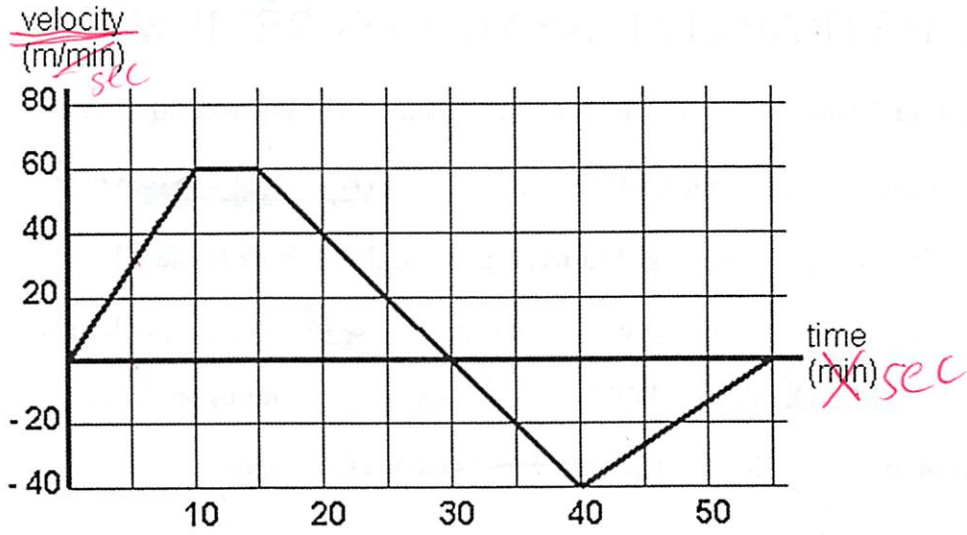
6. Write the equation for average velocity and then write the equation in words.

$\bar{V} = \frac{\Delta x}{t}$ or $\frac{d}{t}$ velocity is equal to displacement per unit time

7 Write the equation for acceleration and then write the equation in words.

$a = \frac{\Delta V}{t}$ acceleration is change in velocity per unit time

Questions 8-12 refer to this graph of a person's motion as they stroll on the Post Road.




8) Determine the person's velocity at t = 5 seconds.

A) 0 m/sec B) 15 m/sec C) 20 m/sec D) 30 m/sec

9) At what time is the person at rest? V=0 so graph = 0

A) 5 sec B) 12 sec C) 40 sec D) 55 sec

10) At what time did the person reverse their direction of travel on the Post Road? when velocity changes sign

A) 5 sec B) 10 sec C) 30 sec D) 45 sec

11) During which interval is the velocity constant?

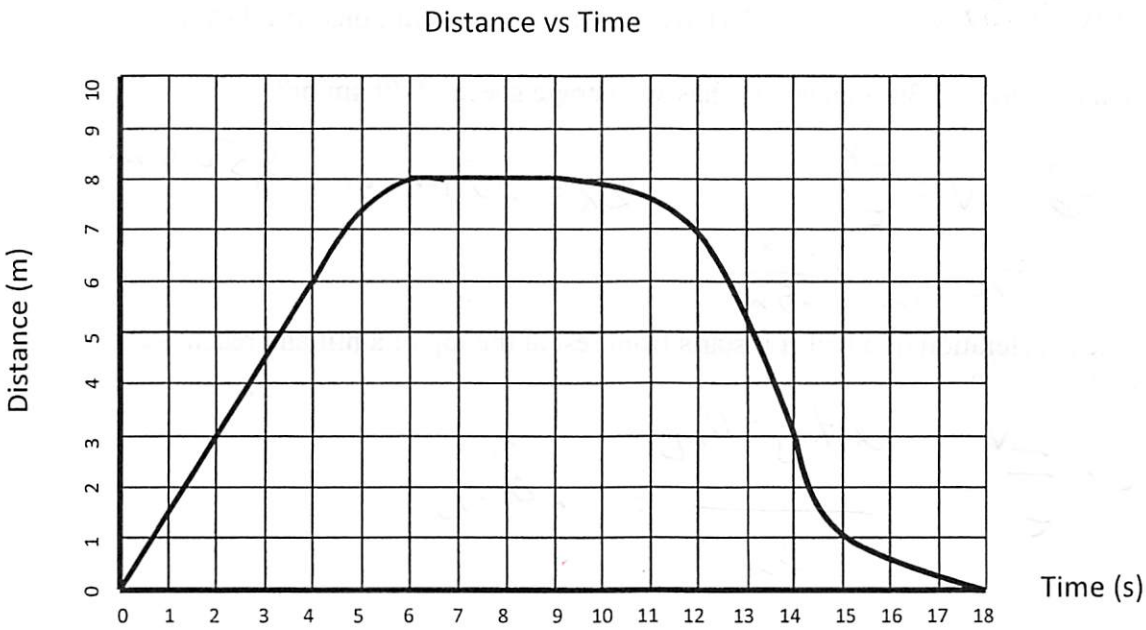
A) 5-10 sec B) 10-15 sec C) 30-35 sec D) 45-50 sec

12) Describe the motion between

a) 0 – 10 seconds moving forward speeding up

b) 30 – 40 seconds moving backward speeding up

c) 40 – 50 seconds moving backward slowing down




Questions 13-21 refer the displacement vs. time graph above.

13) Determine the velocity at t = 3 sec.

slope of 1st interval so $\frac{6-0}{4-0} = 1.5 m/s$

14) Determine the velocity at t = 9 sec.

0 m/s

15) Name a time interval(s) when the object experienced POSITIVE velocity.

0-6s

16) Name a time interval(s) when the object experienced NEGATIVE velocity.

9-18s

17) Name a time interval(s) when the object is not moving.

6-9s

18) Name a time interval(s) when the object experienced ZERO acceleration.

0-4s, 6-9s,

19) Name a time interval(s) when the object is speeding up

9-14s

20) Name a time interval(s) when the object is slowing down

4-6s, 14-18s

21) Name a time interval(s) when the object is moving backward while slowing.

14-18s

SHOW YOUR WORK. WRITE the EQUATION. INCLUDE substitutions with UNITS.

1. How far can a car travel in 30 minutes if it has an average speed of 70 km/hr?

$V = \frac{\Delta x}{t}$ $\quad \Delta x = 35\ km$ or $3{,}500\ m$

$70\ km/hr = \frac{\Delta x}{.5\ hr}$

2. a) What is the acceleration of a ball if it starts from rest at the top of a hill and reaches 2.4 m/sec in 3 sec. ?

$a = \frac{\Delta V}{t} = \frac{2.4\ m/s - 0\ m/s}{3\ s} = .8\ m/s^2$

b) What is the average speed of the ball during the 3 seconds?

$\bar{V} = \frac{V_1 + V_2}{2} = \frac{0\ m/s + 2.4\ m/s}{2} = 1.2\ m/s$

c) How far has the ball rolled during the 3 seconds?

$\bar{V} = \frac{\Delta x}{t}$ $\quad 1.2\ m/s = \frac{\Delta x}{3\ s}$ $\quad \Delta x = 3.6\ m$

3. A rock falls off a cliff and hits the ground 2.5 seconds later.
a) How fast will it be going as it hits the ground?

$\downarrow +$ $\quad g \rightarrow a = \frac{\Delta V}{t}$ $\quad 10\ m/s^2 = \frac{V_f - 0\ m/s}{2.5}$ $\quad V_f = 25\ m/s$

b) How high is the cliff?

$d = \cancel{V_i t}^{\,0} + \frac{1}{2} g t^2 = \frac{1}{2}(10\ m/s^2)(2.5\ s)^2 = 31.25\ m$