

post answer key June 4th

Physics

Final Review Packet

Part I (Units 1-5)

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Please note that the following chapters are meant to direct your studying.
We did not cover every topic in each of the listed sections of the Physics Classroom.

Unit 1-2 - Motion in 1D

Physics Classroom: 1D Kinematics

Key Vocab Words:

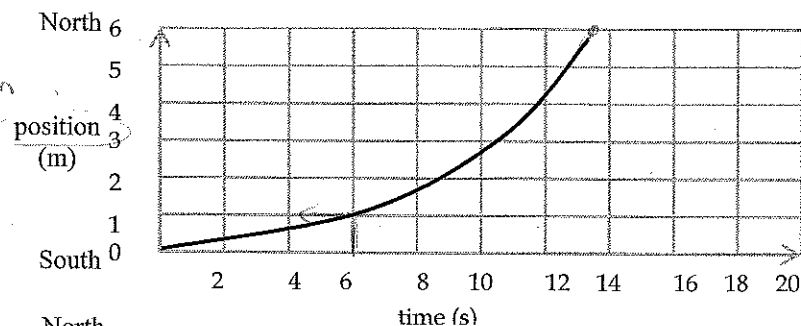
motion diagram, scalar, vector, displacement, distance, average velocity, average speed, instantaneous velocity, average acceleration, acceleration due to gravity (free fall)

Problems:

1. Looking at the graph to the right... a) 1m

- a) Identify the position at 6 seconds.
b) Describe the motion of the object.

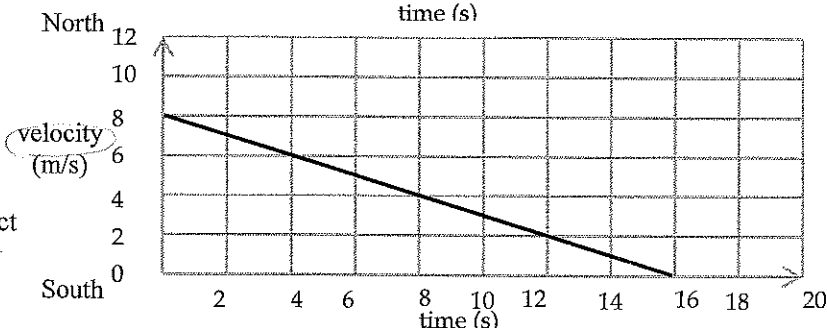
b) Begins at origin, at rest, increases in velocity for 13 seconds. (Accelerates at constant rate)



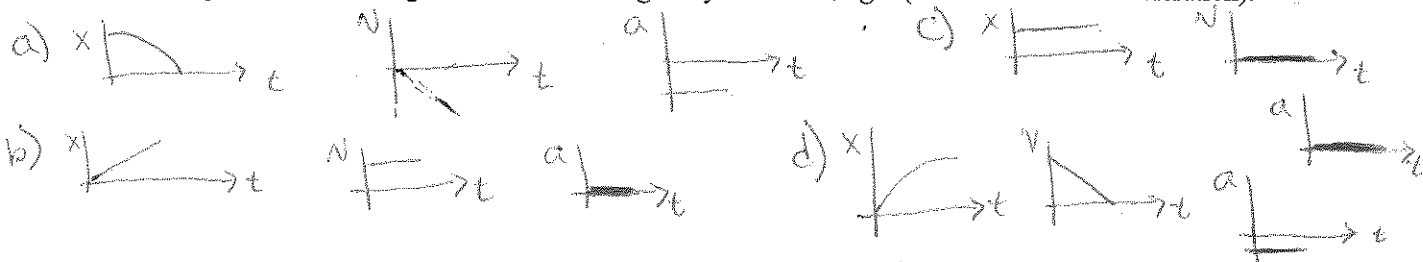
2. Looking at the graph to the right...
a) Describe the motion of the object.
b) Describe the acceleration of the object

a) Begins with a velocity of 8 m/s and slows to a rest.

b) Constant, negative acceleration.



3. Draw a position vs. time, a velocity vs. time and an acceleration vs. time graph for the following scenarios:
a) An object that is speeding up while moving toward the origin (assume constant acceleration).
b) An object moving at a constant velocity.
c) An object standing still.
d) An object that is slowing down while moving away from the origin (assume constant acceleration).



4. An airplane flying at a velocity of 165 m/s accelerates at a rate of 7.0 m/s² for 5.0 seconds. What is the final velocity of the plane?

$$v_f = v_0 + at$$

$$v_f = 165 + 7(5)$$

$$v_f = 200 \text{ m/s}$$

5. A motorcycle starts from rest and accelerates uniformly for 5.0 seconds. During this time, it travels a distance of 140 meters. At what rate was it accelerating?

$$v_0 = 0 \text{ m/s} \quad \Delta x = 140 \text{ m}$$

$$t = 5 \text{ s}$$

$$\Delta x = v_0 t + \frac{1}{2} at^2$$

$$140 = \frac{1}{2} a (5)^2$$

$$a = 11.2 \text{ m/s}^2$$

6. A wrecking ball is hanging at rest from a crane when suddenly the cable breaks. The time that it takes to fall to the ground is 2.4 s. How far has the ball traveled during this time?

$$v_0 = 0 \text{ m/s} \quad a = -9.8 \text{ m/s}^2$$

$$t = 2.4 \text{ s}$$

$$\Delta x = v_0 t + \frac{1}{2} at^2$$

$$\Delta x = 0 + -4.9(2.4)^2$$

$$\Delta x = -28.2 \text{ m}$$

7. A ball is thrown upward with an initial velocity of 12.0 m/s.
- Draw a motion map for the ball's movement from the initial throw to the moment it hits the ground. Include both velocity and acceleration arrows.
 - How much time does it take to reach its maximum height? $v_f = 0 \text{ m/s}$

$$v_0 = 12 \text{ m/s}$$

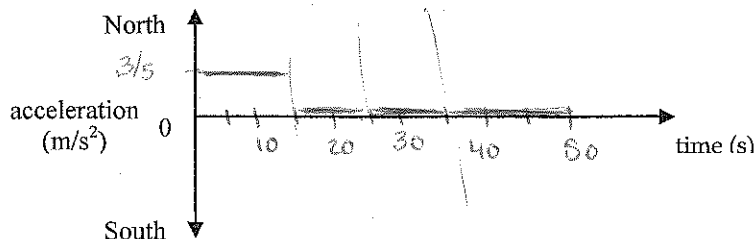
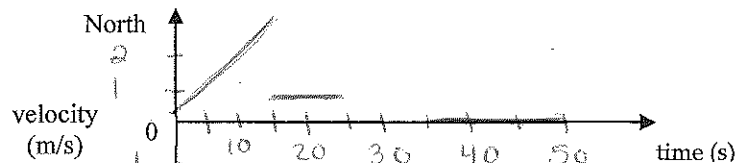
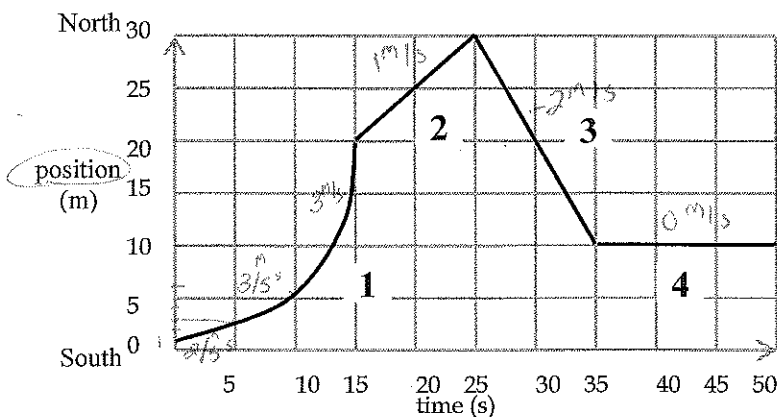
$$a = -9.8 \text{ m/s}^2$$

$$v_f = v_0 + at$$

$$0 = 12 + -9.8(t)$$

$$t = 1.22 \text{ s}$$

8. Using the position vs. time graph, answer the following questions and construct a velocity vs. time and an acceleration vs. time graph.

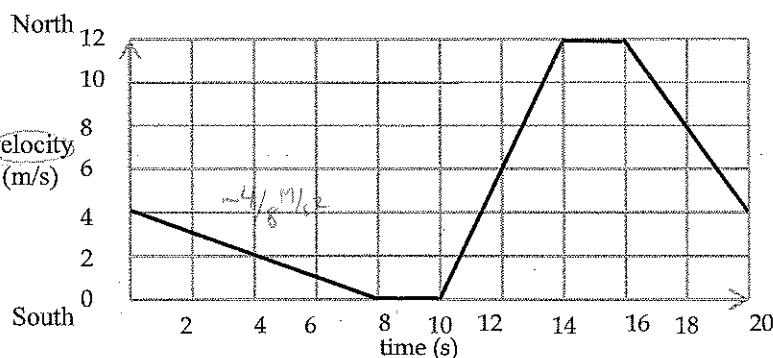


- Describe motion for each section (1, 2, 3, and 4).
- What is the object's average velocity from 15-25 s? 1 m/s
- What is the object's average velocity from 25-35 s? -2 m/s
- What is the object's average velocity from 35-50 s? 0 m/s
- Draw the corresponding velocity vs. time graph.
- Draw the corresponding acceleration vs. time graph.

a) Section 1: object @ rest
increases in velocity
Section 2: constant + velocity
Section 3: constant - velocity
Section 4: object @ rest

9. Use the velocity vs. time graph below to answer the questions that follow.

- What is the object's acceleration from 0-8 seconds? -0.5 m/s^2
- What is the object's acceleration from 8-10 seconds? 0 m/s^2



Unit 3 – Newton's Laws

Physics Classroom: Newton's Laws

Key Vocab Words:

force, free-body diagram, net force, Newton's first law, Newton's second law, inertia, Newton's third law

Problems:

1. If the forces acting upon an object are balanced, then the object...

- must not be moving.
- must be moving with a constant velocity.
- must not be accelerating.
- none of these

$$F = ma$$