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LESSON 2.01 - MANIPULATING EQUATIONS

1. Solve the following equation for a: $d = (1/2)at^2$ Answer:

2. Solve the following equation for L: $T = 2\pi\sqrt{\frac{L}{g}}$ Answer:

LESSON 2.02 - ACCELERATION

1. Define acceleration:

2. _____ motion is when the motion of an object is not speeding up, slowing down, or changing direction.

3. _____ motion is when the motion of an object is speeding up, slowing down, and/or changing direction.

4. State whether each of the following is an example of accelerated or non-accelerated motion.

    a. A cup is at rest on a table.

    b. A bug is flying straight toward you at a constant speed of 2.5 cm/s.

    c. A speed skater is rounding the curve in the track at a constant speed.

    d. A race car is slowing down after crossing the finish line in a race.

5. List the 3 ways that the velocity of an object changes, thus indicating acceleration has occurred.

    a.
    b.
    c.

5. Give the three equations listed in this lesson that contains initial velocity, v_o.

    a.

    b.

    c.

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6. Rewrite the equations assuming the initial velocity, v_o is 0.

   a.

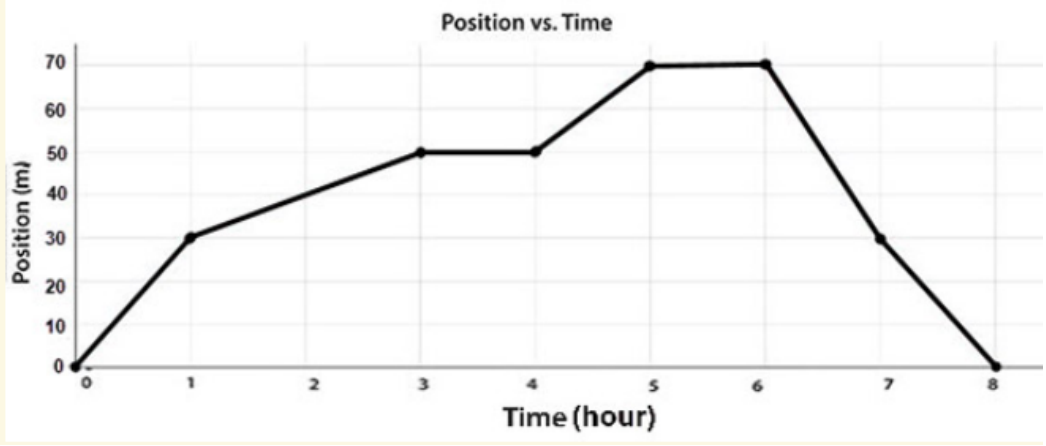
   b.

   c.

6. A truck starts from rest at a stop light and accelerates at 5.2 m/s^2 for 3.5 s. How far did the truck travel from the stop light?

7. Allyson is riding a bike and starts slowing down with an average acceleration of -1.5 m/s^2. If her initial velocity was 6.5 m/s, how far does she travel in 2.5 seconds?

LESSON 2.04 MOTION GRAPHS II



Use the above position-time graph to answer the following questions.

1. What is the change in position during the fourth hour of the trip?

2. What is the change in position during the seventh hour of the trip?

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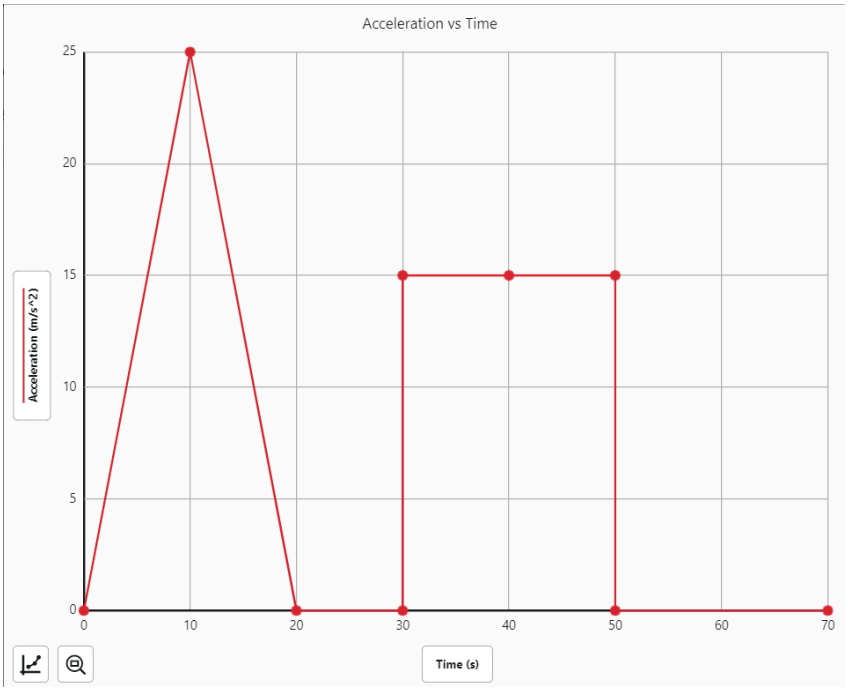

For the acceleration-time graph above, answer the following two questions.

1. What is the change in velocity during the first 10 seconds?
2. What is the change in velocity from 50 seconds to 70 seconds?

READING GRAPHS

1. What does the slope of a position-time graph represent?
2. What does the slope of a velocity-time graph represent?
3. What does the area under an acceleration-time graph represent?
4. What does the area under a velocity-time graph represent?

LESSON 2.05 - FREE-FALL MOTION

1. Define free-fall motion.
2. What is the value of acceleration due to gravity on Earth?

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3. Explain the difference between mass and weight. _____ is the amount of matter in an object while _____ is the measure of gravitational force acting on an object.

4. A feather and a brick are dropped from the same height at the same time in free-fall motion. Which one will reach the ground first?

5. Does air resistance affect objects that are in free-fall motion?

6. A ball is dropped from a height of 450 meters in free-fall motion. How long will it take the ball to first strike the ground?

7. A ball is dropped from an unknown height in free-fall motion. If it takes 8.9 seconds to strike the ground, what was the height of the building?

8. According to Newton, gravity depends on the _____ and the _____ between them.

9. The force of gravity follows an _____ relationship with distance, which means that the intensity of the force of gravity is _____ proportional to the square of the _____ between two objects.

10. Increasing the _____ of one or both objects will cause an _____ in the gravitational force between the two objects.

11. Increasing the distance between two objects will _____ the gravitational force between them and decreasing the distance between the two objects will _____ the gravitational force between them.

LESSON 2.06 - NEWTON'S FIRST AND THIRD LAWS

1. Define Newton's First Law.

2. _____ is the tendency of an object to resist a change in its state of rest or motion. The greater the _____ of an object the greater the _____ needed to change the object's motion.

3. Definite Net Force.

4. What is the magnitude of acceleration if the net force is equal to zero?

5. When the net force equals _____, we say that there are balanced forces, or _____. When the net force does not equal 0, we say there are _____ forces.

6. Is force a scalar or a vector quantity?

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7. What is the unit of force?

8. Define Newton's Third Law.

9. Explain why action and reaction forces do not cancel each other out.

10. Give both the action and reaction force (equal and opposite forces) for the following scenarios.

    a. You kick a soccer ball that is at rest on the ground.

    b. You set a glass down on a table.

LESSON 2.07 - NEWTON'S SECOND LAW

1. Newton's second law states that the _____ of an object is directly proportional to the _____ _____ acting on it and inversely proportional to the _____ of the object.

2. Give the equation for Newton's 2nd Law solved for acceleration, a, and force, F.

3. What are the units for each of the following physical quantities?

    a. acceleration:
    b. force:
    c. mass:

4. Layla is driving at 15 m/s when she decides to speed up to 29 m/s. If it takes her 3.2 seconds to reach her new speed, what was the magnitude of the acceleration?

5. Haley's new scooter, starting from rest, can reach a speed of 8.90 m/s in about 3.56 s. If the combined mass of Haley and her scooter is 225 kg, what is the magnitude of the unbalanced force required to accelerate her and the scooter at this rate?

6. Kally and her teammate are pushing a bobsled at the beginning of a race with a force of 620 N that causes an acceleration of 4.8 m/s^2. What is the mass of the bobsled?

Answer Key Link