Unit I Review

Name: _____ Period: _____ Date: _____

Identify the following characteristics as either QUALITATIVE or QUANTITATIVE.

_____ 1. Amount of water in a pool

_____ 2. Length of hair on a person's head

_____ 3. Color of hair

_____ 4. The time an astronaut spends in space

_____ 5. The type of fabric used to reupholster a couch

_____ 6. The softness of a tissue

A. Qualitative
B. Quantitative

For each of the scenarios identify the variables as either INDEPENDENT or DEPENDENT.

Karen constantly talked on the phone and texted way more than the average person. It seemed she was constantly grounded at the end of the month because her father was upset with the wireless bill.

_____ 7. Her father's mood

_____ 8. The time she spent on the phone

_____ 9. The size of the bill

A. Independent
B. Dependent

Greg was having a difficult time getting his drives to go more than 80 yards. His friends would give him several tips to improve the length of his drive, but nothing seemed to work. He changed the spacing of his feet, the speed of his swing, and type of ball. He finally broke down and started to take lessons where his instructor showed him how to properly set up his backswing. Finally he started to see results.

_____ 10. Type of ball

_____ 11. Spacing of his feet

_____ 12. Distance of his drive

_____ 13. His backswing

A. Independent
B. Dependent

Read the following scenario and answer questions 14 - 20.

a. Charles was walking by a construction zone and noticed a cinder block (a big brick) and an empty lunch pail fall
b. from the second story. He thought it was strange that they fell side by side the entire way to the ground. He
c. thought that since the block had more mass it would fall faster. This made him wonder if mass had
d. anything to do with how fast something fell. He thought about it for a while and figured out a way to get an
e. answer. He went home and got an empty container, metal pellets, a stop watch, a letter scale, and a tape
f. measure. He marked a distance of two meters on the wall and added a few pellets to the container. After he
g. determined the mass of the container and recorded it using the postage scale, he held the container up to the
h. mark and dropped it at the same time that he started the stop watch. When the container hit the ground he
i. stopped the timer and recorded the time in a table. He felt that he needed additional trials because his
j. measurement wasn't extremely precise so he repeated the same test two more times. Then he added several
k. more pellets, recorded its mass and repeated the test three more times for the new mass. He changed the mass
l. and repeated the test a total of 10 times. Looking at the numbers he still had a difficult time determining if
m. there was a relationship. He decided to graph the data he collected. After he graphed the data he felt confident
n. he knew the answer and he went and shared his ideas with his physics teacher because PHYSICS ROCKS! He
o. explained what he was thinking and how he acquired the data. He also shared the graphs he was able to make
p. using the data. His physics teacher looked over his results and explained that his answer was correct. Charles
q. then exclaimed, "This is the most rewarding experience ever! This even beats the time I ran 90 yards to return a
r. kickoff for the touchdown in the state championship."

_____ 14. Which of the sections best showed Charles stated his conclusion?

_____ 15. Which of the sections best showed Charles formulated and objectively tested a hypothesis?

_____ 16. Which of the sections best showed Charles interpreted his results?

_____ 17. Which of the sections best showed Charles made observations that lead to a question?

A. Lines a-d
B. Lines e-l
C. Lines l-n
D. Lines n-p
E. Lines p-r

Use the passage above to answer the following questions

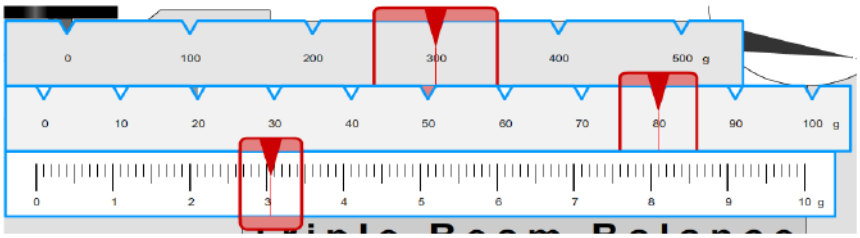
18. Which of the following variables was Charles' independent variable?
    a. Time
    b. Height
    c. Mass
    d. Type of pellets

19. Which of the following variables was Charles' dependent variable?
    a. Time
    b. Height
    c. Mass
    d. Type of pellets

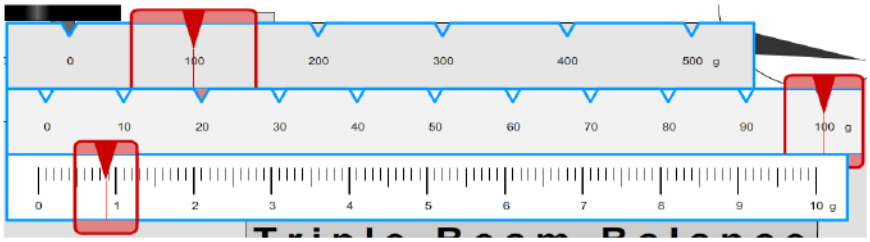
20. Which of the following is NOT a quantitative variable?
    a. Time
    b. Height
    c. Mass
    d. Type of pellets

Determine the measurement represented in each diagram with proper significant figures.

21. _____

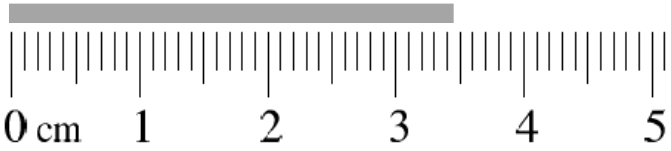


22. _____



23. _____

24. _____



In each of the following groups of numbers circle the number that is the most precise.

25. Group 1

32456
2134.2
123.21
5294
0.001

26. Group 2

3.04
23.45
19.320
1001.1
22.4

27. Determine the accuracy of 23.14 when compared to the accepted value of 21.92 by finding the percent error.

SHOW ALL WORK!!

Write the following numbers in scientific notation. Record each value with <u>THREE SIGNIFICANT FIGURES</u>.

28. 0.00000344 kg = _____

29. 32539.01 m = _____

Take the following numbers out of scientific notation.

30. 2.31×10^{-4} g = _____

31. 1.456×10^{6} nm = _____

Complete the following math problems using proper significant figures. Explain the reasoning behind your answer.

32. $\frac{9.34}{0.25}$ =

33. 14.25 + 132.2 =

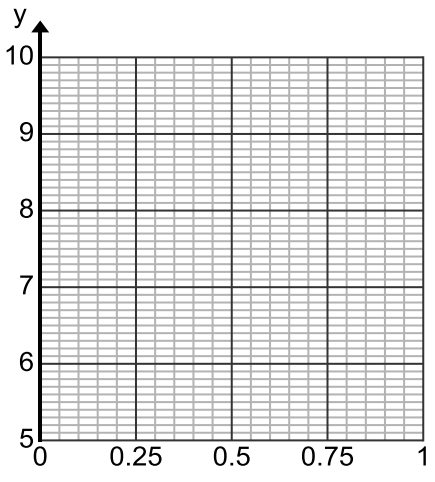
Perform the following conversions and SHOW ALL WORK including the KHDBDCM work if used. Leave all answers in <u>THREE SIGNIFICANT FIGURES</u>

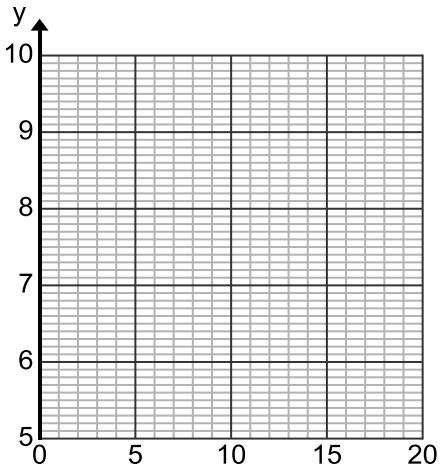
34. 24.5 cm = _____miles

35. 7.25×10^{17} nm = _____km

Title and label the graph below. Plot the following data and determine the equation. Answer the remaining questions based on the data.

Time (s)	Position (m)
0.05	9.25
0.07	8.11
0.10	7.25
0.15	6.58
0.20	6.25
0.25	6.05
0.35	5.82
0.50	5.65
0.75	5.52
1.00	5.45





36. Slope: _____

37. Y-Intercept: _____

38. Mathematical Expression: _____

39. At what time would the object be at 15 m?

40. Where would the object be at 2 seconds?

41. Complete the following table

Time (s)	Position (m)
0.06	
0.17	
	6.10
	20.21

Review Unit II: One Dimensional Motion

Name: _____Period: _____ Date: _____

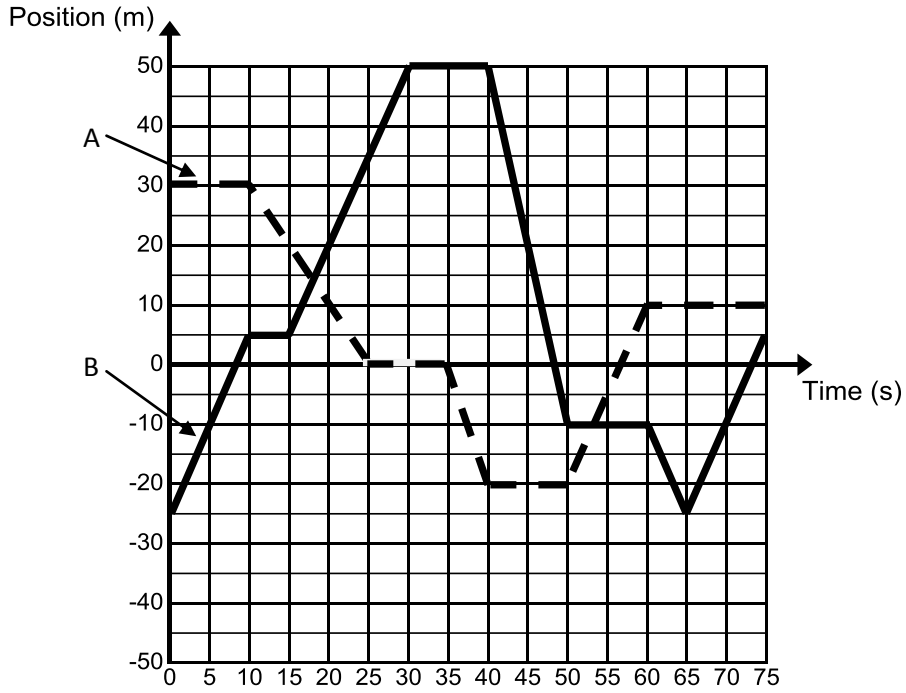
Define the following terms.

1. Distance

2. Displacement

3. Speed

4. Velocity



Use the graph above to answer questions 5-15. Pay attention to the scale of the x and y axis. Show all work! Leave all calculated answers in 3 significant figures.

5. What is the initial position of object A and B?

   A: _____

   B: _____

6. What is the total distance traveled by object A between 0 and 75 seconds?

7. What is the total distance traveled by object B between 0 and 75 seconds?

8. What is the displacement of object B between 0 and 50 seconds?

9. What is the displacement of object A between 10 and 60 seconds?

10. What is the average velocity of object A between 10 and 50 seconds?

11. What is the average velocity of object B between 10 and 75 seconds?

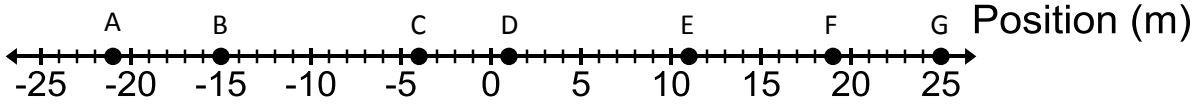
12. What is the average speed of object B between 0 and 50 seconds?

13. What is the average speed of object A between 35 and 60 seconds?

14. What is the instantaneous velocity of object B at 45 seconds?

15. What is the instantaneous velocity of object A at 55 seconds?

Use the number line below to answer questions 16-21. Show all work! Leave all calculated values in 3 sig. figures.



16. What is the total displacement on an object that travels from G to B to E to D?

17. What is the total distance of an object that travels from B to F to E?

18. What is the average velocity of an object if it travels from C to G to A in 15 seconds?

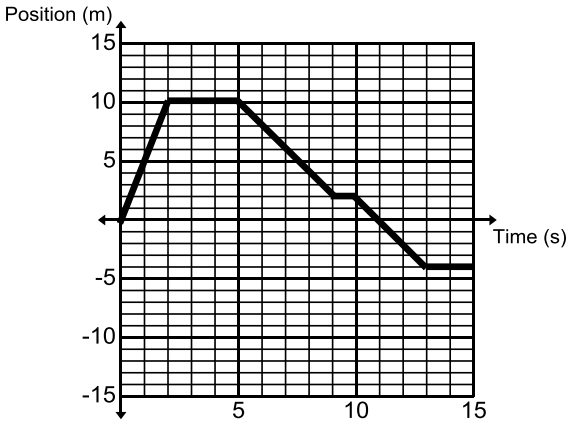
19. What is the average velocity of an object if it travels from D to C to E in 5 seconds?

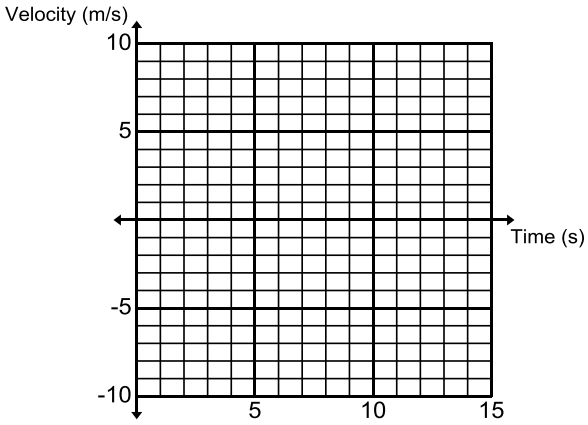
20. What is the average speed of an object if it travels from A to C to B in 4 seconds?

21. What is the average speed of an object if it travels from F to D to G in 10 seconds?

Change the following graphs from one form into the other. (i.e. Position vs. Time to Velocity vs. Time and vice versa.)

22.





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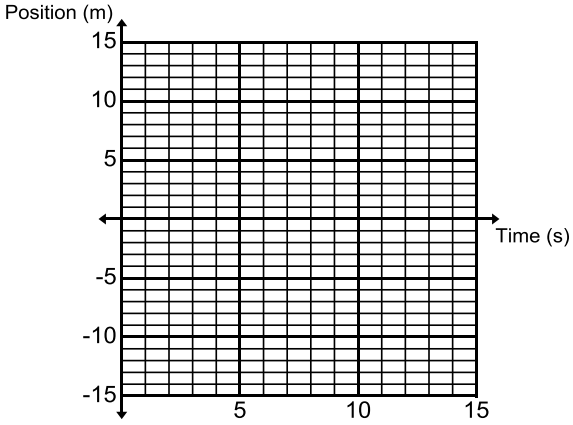

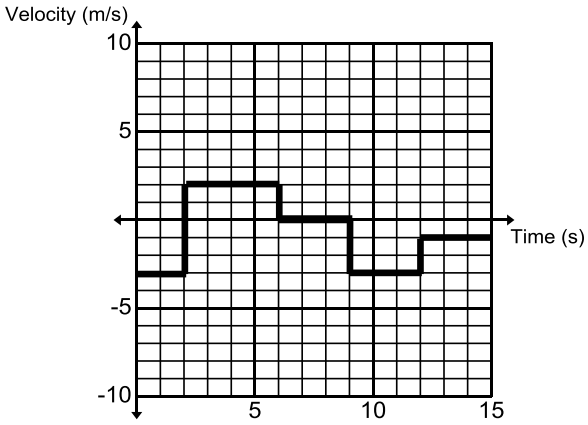

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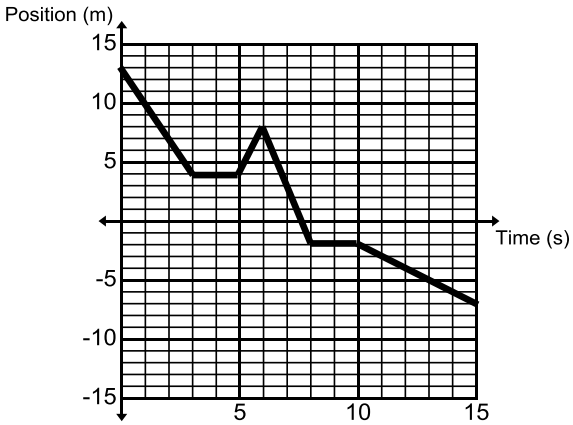

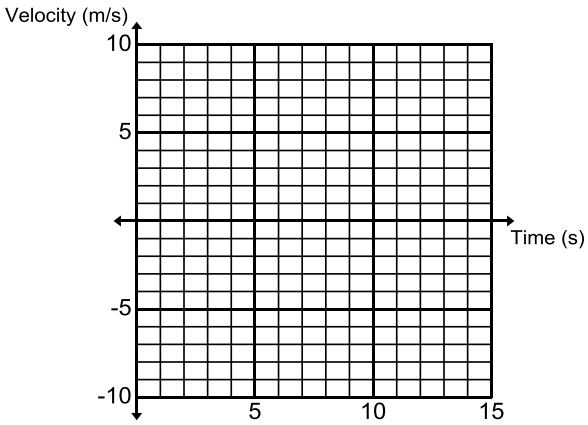

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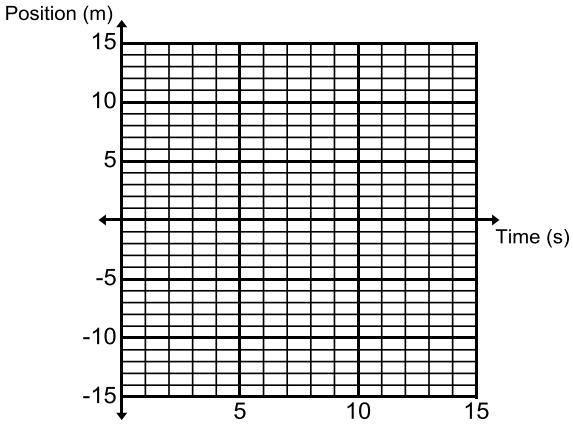
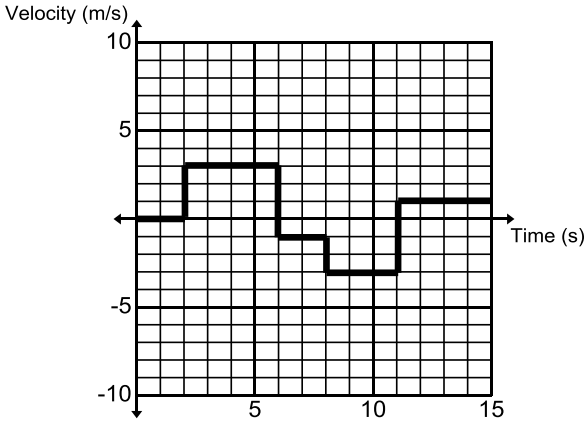


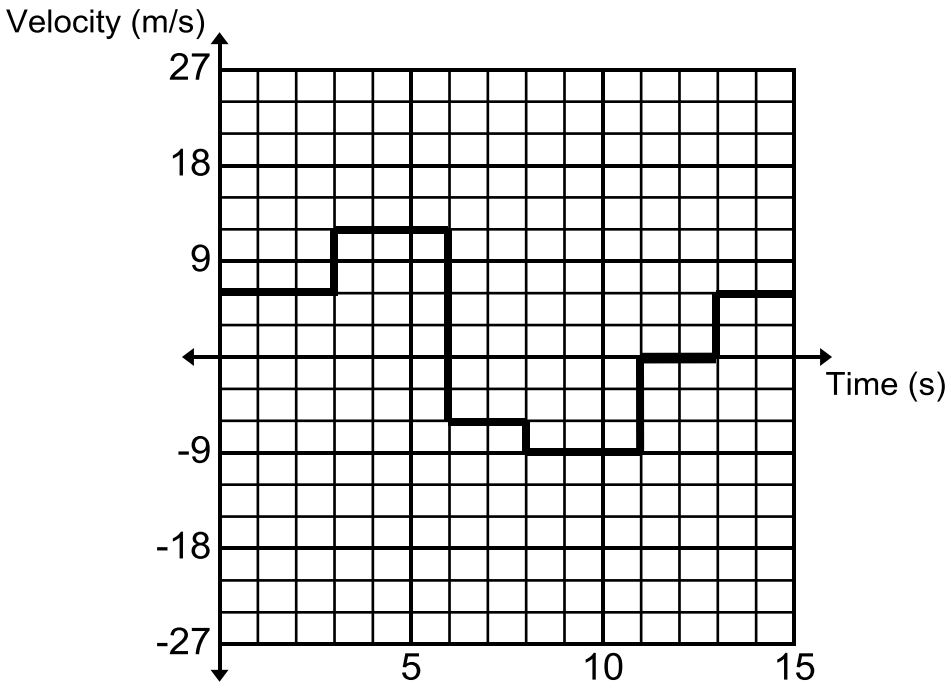


Use the velocity equation to solve the following questions. Leave all answers in 3 significant figures.

26. The late bell is about to ring in 5 seconds and Stanley needs to get to homeroom on time or he will end up with TOC. He travels at a velocity of 2.34 m/s to the LEFT and makes it to his homeroom right as the bell rings. If the homeroom is considered the origin, what was Stanley's initial position?

27. How much time would it take for an object to go from a position of -5.13 m to a position of 14.2 m if it is traveling at a velocity of 3.12 m/s?

28. What is the displacement of the object below between 0 and 15 seconds? Pay attention to the scale of the axis.



Unit III Review

Name: _____Period: _____ Date: _____

1. Define acceleration.

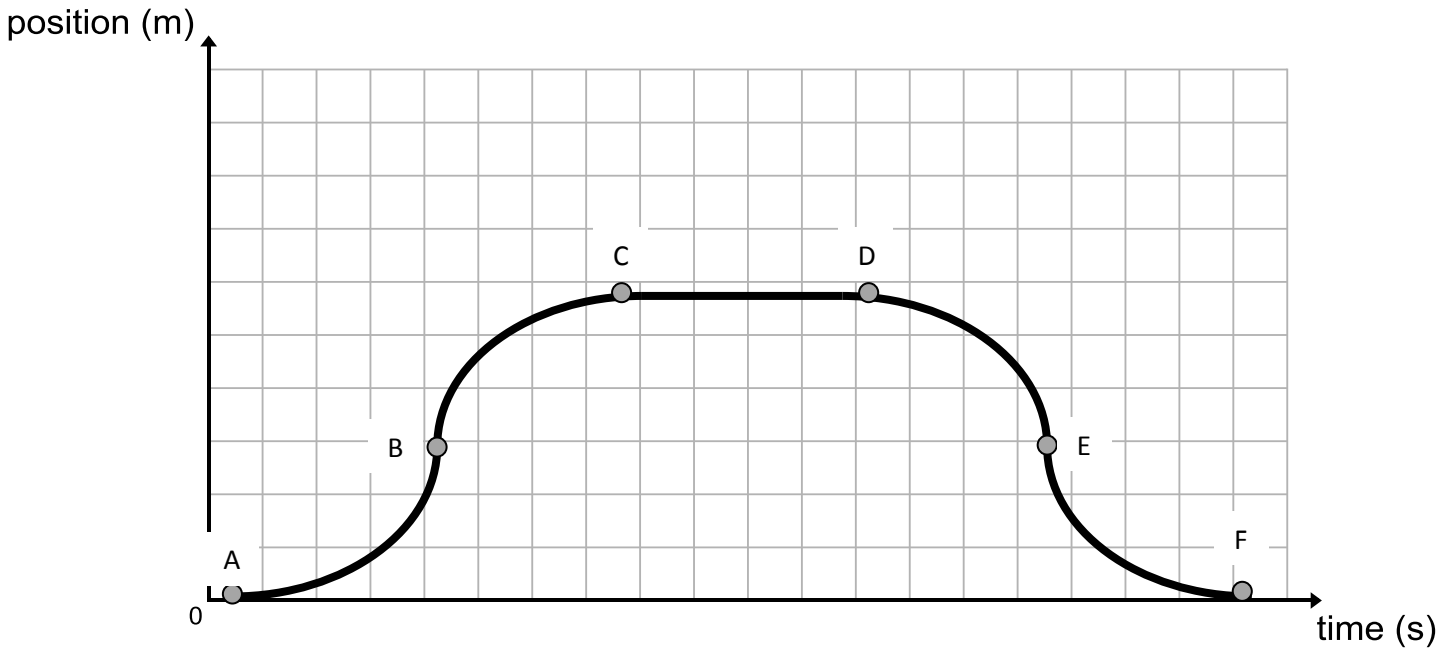
2. A small sandbag is dropped from rest from a hovering hot-air balloon. After 2.0 s, how far below the balloon is the sand bag?

3. A gumdrop is released from rest at the top of the Empire State Building, which is 381 m tall. Disregarding air resistance, calculate the displacement of the gumdrop after 1.00, 2.00, and 3.00 s.

4. The flight speed of a small bottle rocket can vary greatly, depending on how well its powder burns. Suppose a rocket is launched from rest so that it travels 12.4 m upward in 2.0 s. What is the rocket's net acceleration?

5. A ship with an initial speed of 6.23 m/s approaches a dock that is 255 m away. If the ship accelerates uniformly and comes to rest in 82 s, what is its acceleration?

Use the graph below to answer questions 6 to 10.



6. What is the object doing between points A and B?

7. What is the object doing between points B and C?

8. What is the object doing between points C and D?

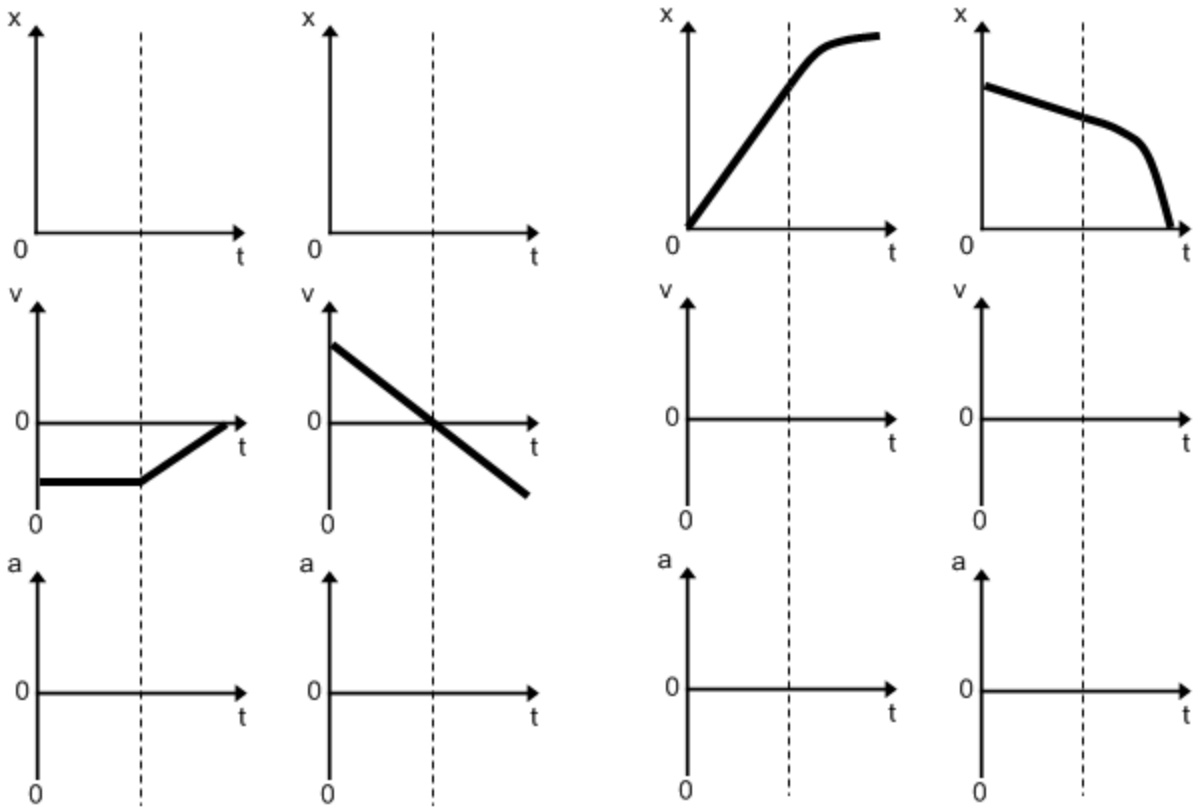
9. What is the object doing between points D and E?

10. What is the object doing between points E and F?

11. Fill in the chart below.

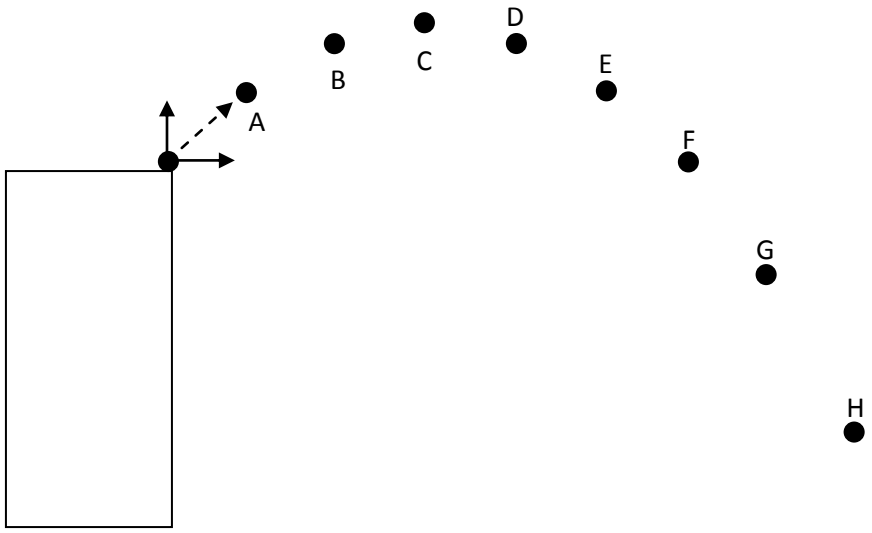
Velocity	Acceleration	Description
	+	Speeds up to the right
-		Speeds up to the left
+	-	
-	+	
0		Speeds up to the left
	+	Speeds up to the right
	0	Moves left at constant speed
+		Moves right at constant speed
0	0	

12. Fill in the blank graphs



Unit IV Review

Name: _____ Period: _____ Date: _____



1. Draw the x and y component of velocity on each point in the diagram above. In addition draw the resultant on each point as well. The first point is done for you as an example.

2. Based on the completed diagram, where is the ball's vertical velocity the smallest?

a. A	c. C	e. E	g. G
b. B	d. D	f. F	h. H

3. Based on the completed diagram, where is the ball's resultant velocity the greatest?

a. A	c. C	e. E	g. G
b. B	d. D	f. F	h. H

4. Based on the completed diagram, where is the ball's resultant velocity the smallest?

a. A	c. C	e. E	g. G
b. B	d. D	f. F	h. H

5. What happens to the horizontal velocity as time elapses?
   a. It increases
   b. It decreases
   c. It remains constant

Use vectors A, B and C to perform the following functions.

6. A + B using the Head to tail method.

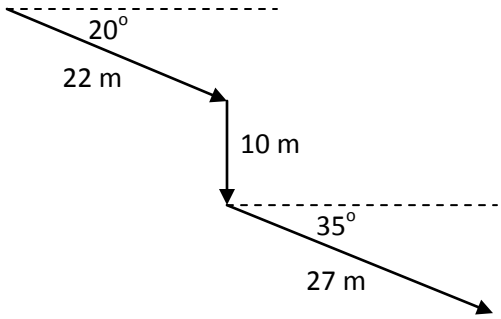
7. A + C using the parallelogram method.

8. A - B

9. A - B - C

Complete the following questions and SHOW ALL WORK.

10. What is the magnitude and direction (angle and description) of the resultant?



11. A bird flies 45 m directly east and then 23 m directly south. What is the magnitude and direction (angle and description) of the resultant?

12. A person standing at the edge of a seaside cliff kicks a stone horizontally over the edge with a speed of 18 m/s. The cliff is 52 m above the water's surface. How long does it take for the stone to fall to the water? What is the horizontal displacement of the stone?

13. A human cannonball is shot out of a cannon at 45.0^{o} to the horizontal with an initial speed of 25.0 m/s. A net is positioned at a horizontal distance of 50.0 m from the cannon. At what height above the cannon should the net be placed in order to catch the human cannonball? Show all work.

Unit V Review

Name: _____ Period: _____ Date: _____

1. What is the definition of mass?

2. What is the standard unit for mass?

3. What is the difference between mass and weight?

4. What is the difference between weight and force of gravity?

5. What is the equation for the force of gravity?

6. Name three types of non-contact forces.
   a.
   b.
   c.

7. What is inertia?

8. How do you measure inertia?

9. If an object is in equilibrium, what does that mean?

10. What are Newton's three laws?
    a.
    b.
    c.

11. What is the equation associated with Newton's second law?

12. What are the action-reaction pairs of forces in the following situations?
    a. A person jumping off the ground.
    b. A person closing a door by pushing on the door handle.
    c. A person falling to the ground.

13. What is the normal force and in which direction does it point?

14. What is the force of friction and which way does it point?

15. What are the two types of friction and define them.
    a.

    b.

16. Which of the following are examples of acceleration? (Circle all that apply)
    a. An object speeds up.
    b. An object slows down.
    c. An object changes direction.

17. Is the coefficient of friction a scalar or vector quantity?

18. Do free-body diagrams include the forces acting on an object or forces caused by the object?

19. When does an object accelerate?
    a. When it has a zero net force acting on it.
    b. When it has a non-zero net force acting on it.

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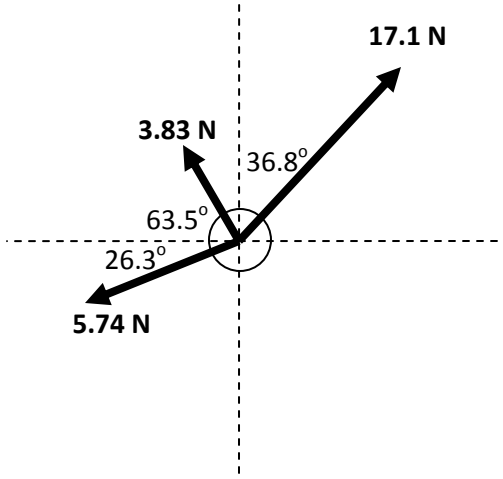
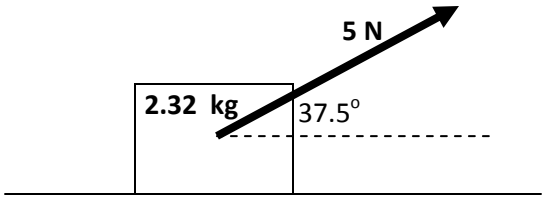
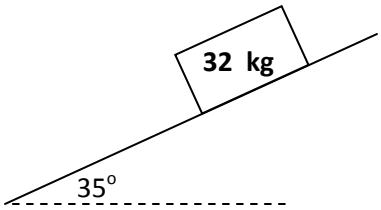
20. What is the net force acting on the object below? What is its acceleration if its mass is 35 kg?



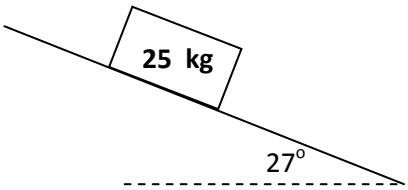
21. Draw the remainder of the forces acting on the object. What is the normal force and force of friction acting on the object below if the coefficient of kinetic friction is 0.023?



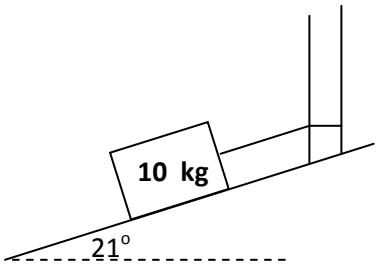
22. What is the acceleration and normal force acting on the object below? (Ignore friction)



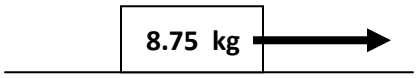
23. What is the force of friction acting on the object below if the acceleration is 3.21 m/s^2?



24. If the object below is in equilibrium, what is the tension in the string? (Ignore Friction)



25. What is the coefficient of static friction if it requires 23 N to move the object below?



Unit 6 Review

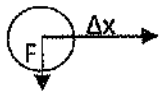
Name: _____ Period: _____ Date: _____

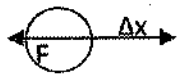
Answer the following questions and show all work whenever work is needed.

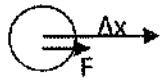
1. Give an example of a situation where the everyday meaning of work is being used.

2. Give an example of a situation where the scientific meaning of work is being used.

3. Is the work in the following situations positive, negative, or zero?

   a. 

   b. 

   c. 

4. Is work done in the following scenarios? Explain why.
   a. Greg holds a box of stones above his head for 2 minutes.

   b. A person reads a sign.

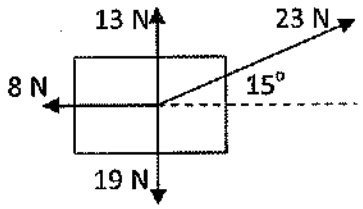
   c. Charles pushes on a car but it never moves.

   d. James pulls on a wagon as he pulls it down the road.

5. Define kinetic energy.

6. Define potential energy.

7. What is the net work done on the object below if it is pulled directly east for 2.5 m?



8. List 5 different types of potential energy.

   a.

   b.

   c.

   d.

   e.

9. If object A is 9 kg and object B is 27 kg, what is the ratio of their kinetic energy?

10. If object A is moving with a velocity of 9 m/s and object B is moving at 3 m/s, what is the ratio of their kinetic energy?

11. What is the gravitational potential energy of a 34.3 kg object that is 2.13 cm above the ground?

12. What is mechanical energy?

13. Why is mechanical energy not conserved when friction is present?

14. When catching a baseball, a catcher's glove moves by 10 cm along the line of motion of the ball. If the baseball exerts a force of 475 N on the glove, how much work is done **by the ball**?

15. A flight attendant pulls her 70.0 N flight bag a distance of 253 m along a level airport floor at a constant velocity. The force she exerts is 40.0 N at an angle of 52.0° above the horizontal. How much work is the flight attendant doing on the bag?

16. What speed would a fly with a mass of 0.55 g need in order to have 7.6×10^4 J of kinetic energy?

17. A 25 kg child on a 2.0 m long swing is released from rest when the swing makes an angle of 30.0° with the vertical.
    a. What is the maximum potential energy associated with the child?

    b. Ignoring friction, find the child's speed at the lowest position. (Conservation of Energy)

18. Starting at rest, John pulls on a 32.1 kg crate with a force of 30.0 N at an angle of 23.7° above the horizontal. If friction is ignored, how fast is the crate going after he pulls the cart directly east for 3.12 m? (Work-Kinetic Energy theorem)

Unit 7 Review

Name: _____ Period: _____ Date: _____

Momentum

1. What two factors impact an object's momentum?

    a.

    b.

2. Object A is travelling 3 times faster than object B, but they have the same momentum. How can this be true?

3. In 1987,Marisa Canofoglia, of Italy, roller-skated at a record-setting speed of 40.3 km/h. If the magnitude of Canofoglia's momentum was 6.60×10^2 kgm/s, what was her mass?

4. The first human-made satellite, *Sputnik I,* had a mass of 83.6 kg and a momentum with a magnitude of 6.63×10^5 kgm/s. What was the satellite's **speed**?

Impulse

5. What is the definition of impulse?

6. How can a small force have a large impulse?

7. How can a large force have a small impulse?

8. What are the three equations associated with impulse?

    a.

    b.

    c.

9. In 1992, Dan Bozich of the United States drove a gasoline-powered go-cart at a speed of 34.9 m/s. Suppose Bozich applies the brakes upon reaching this speed. If the combined mass of the go-cart and driver is 200 kg, the decelerating force is 3.60×10^2 N opposite the cart's motion, and the time during which the deceleration takes place is 10.0 s. What is the final speed of Bozich and the go-cart?

10. With upward speeds of 12.5 m/s, the elevators in the Yokohama Landmark Tower in Yokohama, Japan, are among the fastest elevators in the world. Suppose a passenger with a mass of 70.0 kg enters one of these elevators. The elevator then goes up, reaching full speed in 4.00 s. Calculate the net force that is applied to the passenger during the elevator's acceleration.

Conservation of Momentum

11. Two skaters initially at rest push off of each other and both move in opposite directions. Skater A has two times more mass than skater B. (Ignore Friction)

    a. What is the total momentum of the system before they push off of each other?

    b. Do the individual skaters have momentum after they push off of each other? How do you know?

    c. Based on your answers from parts A and B, how is momentum conserved?

    d. When comparing the **magnitude** (ignore direction) of the two skater's momentum after they push off of each other, which of the following statements is true?

        i. Skater A has more momentum than skater B.

        ii. Skater B has more momentum than skater A.

        iii. They have the same momentum.

    WHY?

12. A student stumbles backward off a dock and lands in a small boat. The student isn't hurt, but the boat drifts away from the dock with a velocity of 0.85 m/s to the west. If the boat and student each have a mass of 68 kg, what is the student's initial horizontal velocity?

13. A 50.0 g shell fired from a 3.00 kg rifle has a speed of 400.0 m/s. With what speed does the rifle recoil in the opposite direction?

Kinetic Energy and Conservation of Momentum

14. What are the tree different types of collisions and explain what happens for each one.

    a.

    b.

    c.

15. In which of the collisions is momentum conserved?

16. In which of the collisions is kinetic energy conserved?

17. Suppose a cat is sitting on a skateboard that is not moving. Together they have a mass of 21.3 kg. A 1.80×10^{-1} kg treat is thrown to the cat. When the cat catches the treat, the cat and skateboard move with a speed of 6.00×10^{-2} m/s. What was the initial speed of the treat? How much kinetic energy is lost in the process?

Unit 8 Review Part A

Name: _____ Period: _____ Date: _____

1. A 985 kg car is driving on a circular track with a constant speed of 25.0 m/s. The circumference of the track is 2.75 km.

   a. Why does a passenger in the car feel pulled toward the outside of the circular path?

   _____

   _____

   b. Describe the force that keeps the car moving in a circle, identify what causes the force and explain which direction it points.

   _____

   _____

   c. Find the centripetal acceleration of the car. Which way does this acceleration point?

   _____

   _____

   d. Find the centripetal force on the car.

   _____

   e. Why does the front passenger get pushed into the door?

   _____

2. Determine the change in gravitational force under the following changes.

   a. If one of the masses is doubled the force is _____

   b. If both masses are doubled the force is _____

   c. If the distance between masses is doubled the force is_____

   d. If the distance between masses is halved the force is_____

   e. If the distance between masses is tripled the force is_____

3. Manipulate the following equation for mass.

$$T = 2\pi\sqrt{\frac{r^3}{Gm}}$$

4. Manipulate the following equation for radius.

$$T = 2\pi\sqrt{\frac{r^3}{Gm}}$$

5. Manipulate the following equation for mass.

$$v_t = \sqrt{G\frac{m}{r}}$$

6. Manipulate the following equation for radius.

$$v_t = \sqrt{G\frac{m}{r}}$$

7. As an elevator begins to descend, you feel momentarily lighter. As the elevator begins to stop, you feel momentarily heavier. Explain the sensations you feel.

8. A 45.0 kg satellite is in a circular orbit around Earth with an orbital radius of 4.23×10^7 m. Earth's mass is 5.97×10^{24} kg. Calculate the following:

   a. the magnitude of the gravitational force on the satellite _____

   b. the period of the satellite's orbit _____

   c. the orbital speed of the satellite _____

   d. When measuring the radius what points do you use? _____

9. What does the mass represent in the previous manipulations? _____

10. Pluto's moon, Charon, has an orbital period of 153 hours. How far is Charon from Pluto? ($m_{pluto} = 1.30 \times 10^{22}$ kg)

11. What are Kepler's three laws?

    a.

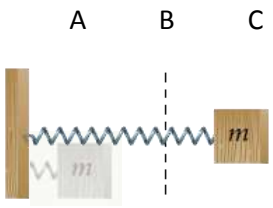
    b.

    c.

Chapter 11 Review

Name: _____ Period: _____ Date: _____

1. At what point does the spring mass system, shown at the right, have the following?



   a. Minimum Velocity
   b. Maximum Force
   c. Minimum Acceleration
   d. Maximum Velocity
   e. Maximum Acceleration
   f. Minimum Force

2. A pendulum with a mass of 0.100 kg was released. The bob of the pendulum returns to its lowest point every 0.10 s.
   a. What is its period?
   b. What is its frequency?

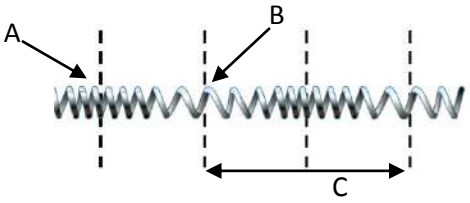
3. The frequency of a pressure wave is 1.00×10^2 Hz. Its wavelength is 3.00 m. What is the speed of the wave?

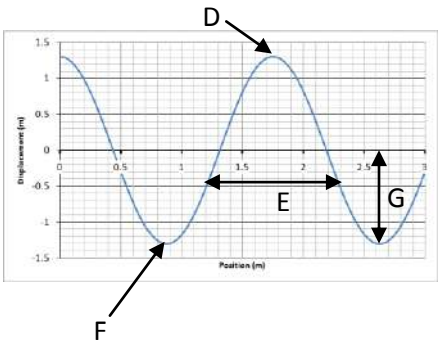
4. What is a transverse wave? Give an example.

5. What is a longitudinal wave? Give an example.

6. How is period related to frequency?

7. Identify the following parts of the diagrams on the right.





   a.

   b.

   c.

   d.

   e.

   f.

   g.

8. Define the following terms.
   a. Frequency

   b. Wavelength

   c. Period

   d. Amplitude.

9. What are three tests for simple harmonic motion?
   a.

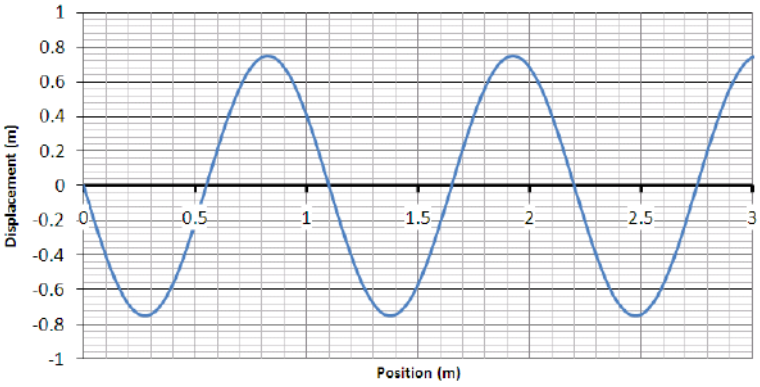
   b.

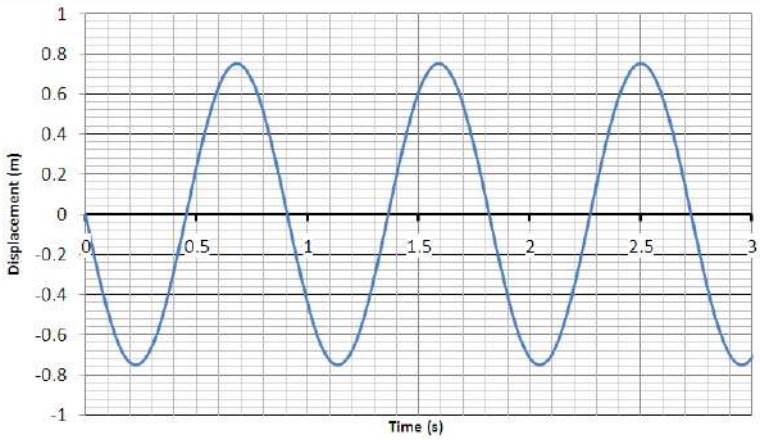
   c.

10. Find the length of a pendulum that oscillates with a frequency of 0.16 Hz.

11. What is the spring constant for a spring that stretches 0.25 m to the right with a 15 N force?

12. What is the wavelength of a wave travelling at 246 m/s with a frequency of 210 Hz?





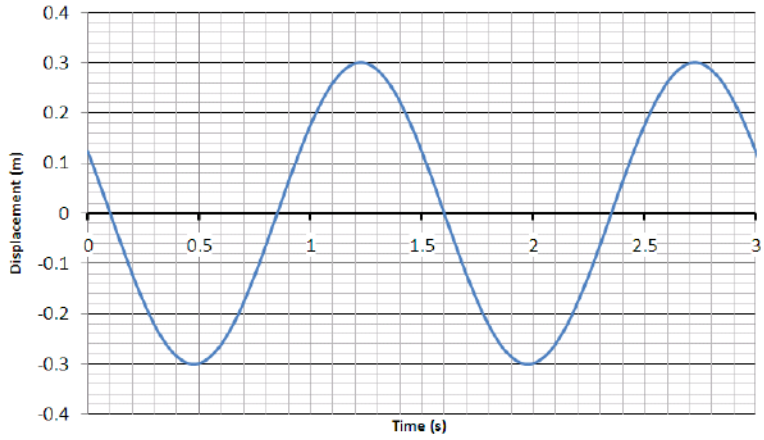
Use the waveforms on the left to identify the values for the following.

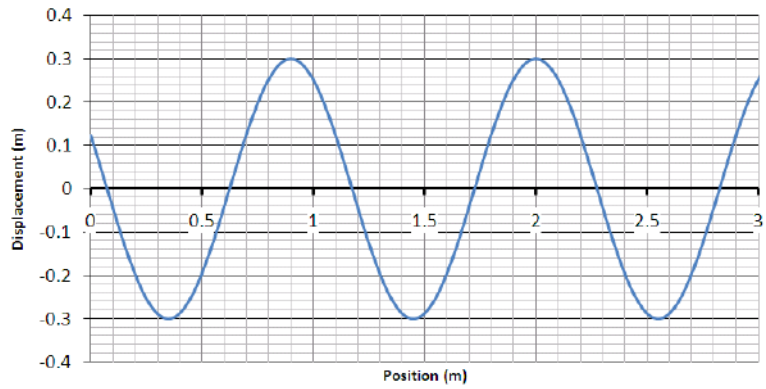
Period:

Wavelength:

Frequency:

Amplitude:





Use the waveforms on the left to identify the values for the following.

Period:

Wavelength:

Frequency:

Amplitude: