

Name: _____

Date: _____ Block: _____

Physics Midterm Review

Please answer the following questions on a separate sheet of paper. This review will be collected the day of the exam.

- Rewrite the following in scientific notation:
 - 365,298 kg
 - .0046259 mL
- Convert the following:
 - 8.76×10^7 MW to GW
 - 28 m/s to miles per hour
 - 1000mm to km
- Express the following in standard form:
 - 5.2×10^3
 - 3.6×10^1
 - 6.4×10^{-3}
- I start to travel and I move west 3 m, south 5 meters, north 7 meters, east three meters and finally north 1 meter. What is my distance? What is my displacement?
- What is the average speed of a car that travels 600 km in 10 hours? Convert to m/s.
- A car travels for 6 hours at an average speed of 70 km/hr. How far did the car travel?
- How much time does it take for a horse to run 1.5 miles at an average speed of 15 mi/hr?
- A car is traveling at 45 m/s and 2 seconds later has sped up to 55 m/s, what is the car's acceleration?
- An object is accelerated from rest at a constant rate of 5 m/s^2 . What will its speed be after 8 seconds?
- A toy car is given an initial velocity of 5 m/s and experiences a constant acceleration of 2 m/s^2 .
What is the final velocity after 6 s?
- A skier starts from rest and slides 9 m down a slope in 3 s. In what time after starting will the skier acquire a velocity of 24 m/s. Assume constant acceleration.

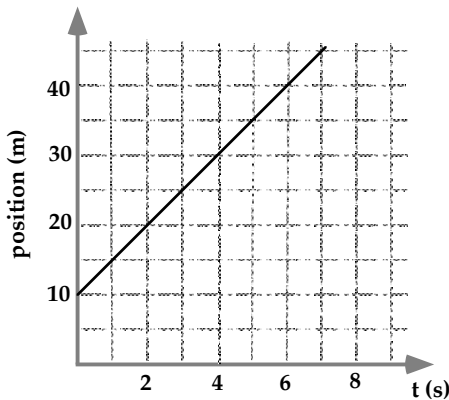
12. A cat runs and jumps from one roof top to another which is 5 meters away and 3 meters below. Calculate the minimum horizontal speed with which the cat must jump off the first roof in order to make it to the other.
13. An object is thrown off of a cliff with a horizontal speed of 10 m/s. After three seconds the object hits the ground. Find the height of the cliff and the total horizontal distance traveled by the object.
14. If a marble is released from a height of 10 m, how long would it take for it to hit the ground?
15. A ski jumper wants to jump a horizontal distance of 135m. The takeoff point of the ski jump is at a height of 25 m. With what horizontal speed must she leave the jump?
16. An apple is at rest on a table; draw a free body diagram.
17. An apple is free-falling from a tree; draw a free body diagram. Neglect air resistance.
18. A rightward force is applied to the apple in order to move it across the desk. Draw a force diagram.
19. You drop an apple. Draw a force diagram and consider air resistance.
20. Which of Newton's three laws applies:
- A person is pushed forward into their seatbelt when a car stops.
 - A larger car takes more force to move.
 - A person leans on the wall, and the wall pushes back.
21. What is the net force acting on an object if it has a mass of 101.5 kg and experiences an acceleration of 5 m/s^2 ?
22. If a force of 200 N applied to an object is opposed by a force of 150 N, what is the net force? What acceleration will this object experience if it has a mass of 25 kg?
23. What is the mass of a falling rock if it produces a force of 147 N?
24. What is Sally's acceleration if her car weighs 2100 N and it has 10,000 N of force?
25. A 20 kg box is pulled at a constant speed horizontally across the floor by a 75 N force. Calculate μ .

MIDTERM REVIEW PROBLEMS

1. If a car is traveling at a speed of 28.0 m/s, is it exceeding the speed limit of 55.0 mi/hr?

2. The speed of light is about 3.00×10^8 m/s. Convert this figure to miles per hour.

3. Use the graph below to answer the following:



- Describe the motion of the object modeled in the graph.
- Determine the object's average velocity.
- Write the mathematical equation that describes the object's motion.
- Determine the object's position at $t = 12$ s.

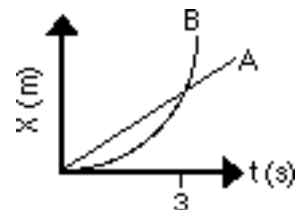
4. Using the graph to the right, compare the kinematic behavior of the two objects.

Comparison:

is **A > B**, **A < B**, or **A = B**,

How do you know?

- Displacement at 3 s
- Average** velocity from 0 - 3 s
- Instantaneous** velocity at 3 s



5. A bus moving at 20 m/s ($t = 0$) slows at a rate of 4 m/s each second.

a) How long does it take the bus to stop?

b) How far does it travel while braking?

6. A car accelerates from rest at a rate of 5 m/s/s for a period of 4.2 seconds and then moves at a constant speed for 8 seconds more. How far did it travel?

7. Suppose that an airplane flying 260 m/s, at a height of 720m, dropped a sack of flour. How far from the point of release would the sack have traveled when it struck the ground? (range)

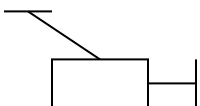
8. Draw a free-body diagram for the following situations. Assume all objects are within earth's gravitational field and neglect air-resistance.

a) A rock traveling upward through the air

c) A box moving at constant velocity across a horizontal surface

b) A sign hanging from two strings

d) an object on an incline (ramp)



PHYSICS MIDTERM REVIEW

Tips for Success:

1. Go back through all of the old assignments—especially the graphs!
2. Check out www.physicsclassroom.com. There are very good (and accurate!) explanations of conceptual topics as well as problems to practice. These can be found in the “physics tutorial” section of the site.
3. **Review** the following topics (*You do not need to write out the answers to these questions*):
 1. What is the difference between displacement and distance?
 2. How do you convert units? (ex. from miles/hour to meters/second)
 3. What is a vector? What is a scalar? What quantities are vectors and what quantities are scalars?
 4. What is the difference between velocity and speed?
 5. What is the *real-life* meaning of velocity?
 6. How do you find velocity from a position-time graph?
 7. How do you find displacement from a velocity-time graph? position-time graph?
 8. How do you find acceleration from a velocity-time graph?
 9. What is the *real-life* meaning of acceleration?
 10. What is instantaneous velocity? How do you find it from a position-time graph?
 11. What is the equation for average velocity?
 12. What are the kinematics equations? Under what conditions do these equations apply?
 13. How to translate graphs. (Describe motion from a graph, draw a v-t graph from an x-t graph)
 14. What is the direction of acceleration when an object is speeding up and moving in the negative direction? slowing down moving in the negative direction?
 15. What is acceleration due to gravity? (the actual value)
 16. How to add vectors graphically and mathematically.
 17. What is a force? Is it a vector?
 18. What is the mathematical relationship between force, mass and acceleration? What law is this? Know how to solve problems using this equation.
 19. What is inertia? (define it) What is the law of inertia? How does inertia relate to mass?
 20. What is the difference between mass and weight?
 21. Know how to draw a free-body diagram (aka force diagram).
 22. What is net force?
 23. What is normal force?
 24. How to solve projectile problems (launched horizontally).
 25. Describe the horizontal part of motion of a projectile and compare to the vertical part of the motion of the projectile.