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Unit 2: Force and Motion Study Guide

1. What are the similarities and differences between speed and velocity?
   Speed is the distance traveled over time. Velocity is speed (distance over time) with a direction.
2. How do you know if an object is in motion? How can reference points be used to show motion and no motion?
   You can tell an object has motion if it changes position in reference to another object. An object is in motion if it is changing position based on a reference point that appears to be still. If the reference point is moving with the object that is in motion, then the object in motion appears to not be in motion.
3. What factors affect acceleration? How do you know if an object has a positive acceleration or negative acceleration?
   Acceleration is affected by speed/velocity and/or direction. If an object is going a shorter distance in a given time, it is a negative acceleration. If an object is traveling a larger distance in the same time, it will be a positive acceleration. Acceleration can change is speed changes, direction changes or both speed and direction change.
4. What affects the amount of gravitational pull on an object?
   The mass of the objects and the distance between the objects. The larger the mass of the object, the greater the gravitational pull. The shorter the distance between objects, the greater the gravitational pull.
5. Explain the different types of frictional forces?
   Static Friction- friction between two surfaces that are not in motion.
   Sliding friction-friction between surfaces that are sliding across each other.
   Rolling friction- friction between two surfaces in which one or more are rolling over the other.
   Fluid Friction- friction between two surfaces, one of which is a fluid (liquid or gas)
6. How are weight and mass similar?
   They are not really similar. Weight is a measurement of force (mass multiplied by a gravitational pull/force), and mass is the amount of matter the object has.
7. How are weight and mass different? Mass is the amount of matter in an object. It cannot change. Weight is a measurement of gravity times mass. Weight can change depending on the amount of gravitational force acting on an object.
8. What ways can friction be reduced? Lubrication, ball bearings, sanding a surface to make it smoother, etc.
9. Give 3 examples of projectile motion and explain why you chose them as an example?
   A baseball going over home plate, casting a fishing line, gymnast doing a back handspring
10. Explain inertia. Inertia is the tendency of an object to resist change in motion, or if in motion, to resist stopping.

Motion Graphs: Look at the graphs below and answer the following questions. *Pay attention to what is on the y-axis!*

Each graph depicts the motion of a car. For each graph, **or** each part of a graph determine if the car is:

- not moving (at rest)
- moving at a constant velocity
- speeding up
- slowing down

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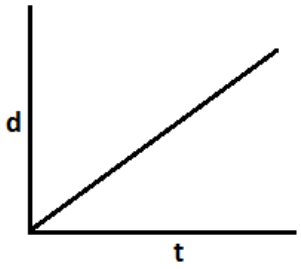
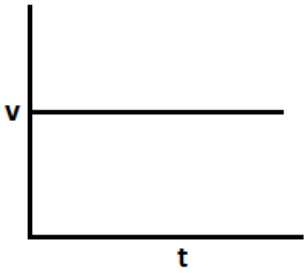
11a.



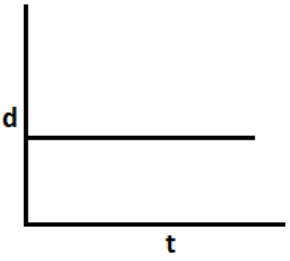
Constant speed

11b.



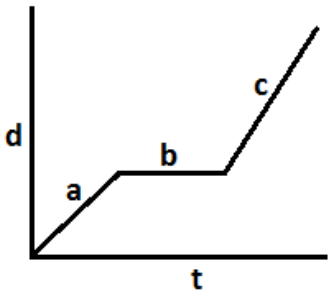
constant speed/ no acceleration

11c.



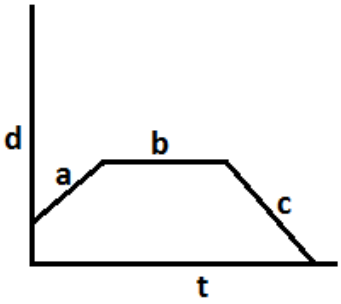
no motion

11d.



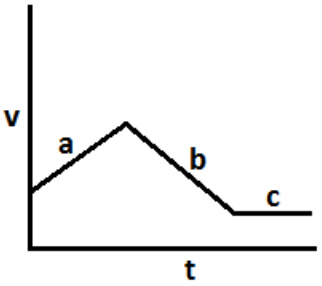
a. constant speed
b. no motion
c. constant speed

11e.



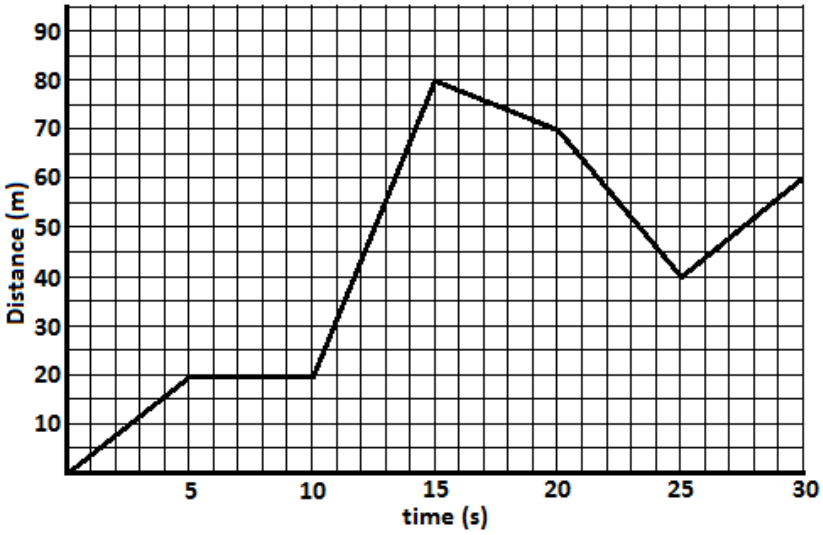
a. constant speed
b. no motion
c. constant speed back toward initial location

11f.



a. positive acceleration
b. negative acceleration
c. constant speed/ no acceleration

12. Use the graph to answer the questions below:



12a. During which time interval is the object moving the fastest? 10-15 sec. That section has the steepest slope (rise/run) or (change in y/change in x).

12b. What is the speed of the object from time 25 s to time 30 s?

4 m/s

13. Solve - Know how to solve speed, velocity and acceleration problems using FSAU.

a) A train travels 120 km in 2 hours and 30 minutes. What is the average speed?

S=d/t s= 120km/2.5hr s=48km/hr (make sure your units match hours vs minutes)

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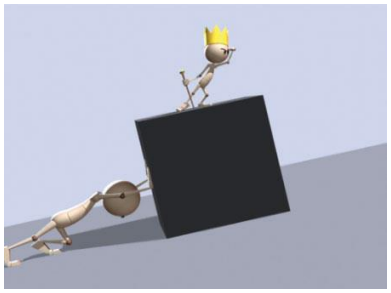
b) A plane's average speed between two cities is 600 km/hr. If the trip takes 2.5 hrs, how far does the plane fly? d=st d= 600km/hr x 2.5 hrs d=1500km

c) An ant can travel approximately 30 meters per minute. How many meters could an ant move in 45 minutes? d= st d= 30m/min x 45 min d=1350m

14. Label all of the forces acting in the following picture. Then draw an arrow showing the net force.

a) 

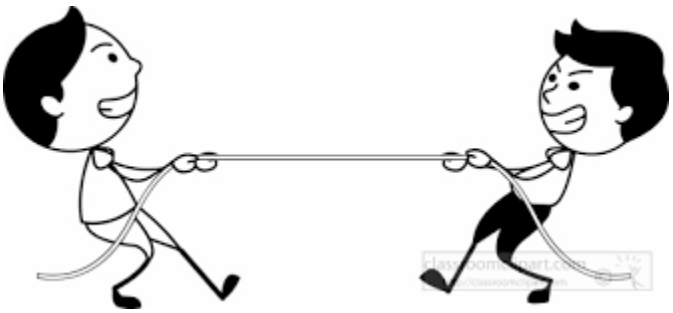
b) 

15. Give 1 reasonable solution for how friction could be reduced in figure b above.

A) ball bearings, lubricant

b) lubricant, putting the box on a wheeled cart

16. For the following questions, the arrows represent the size and direction of forces acting on an object. Next to each picture, write the net fore and whether that net force is a balanced or unbalanced.

a) 

Net Force___0 N_____

Balanced/Unbalanced__balanced

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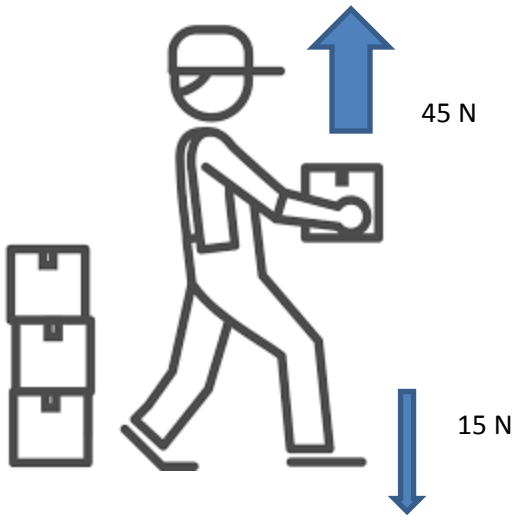
b)



Net Force__30 N ^_____

Balanced/Unbalanced__unbalanced

17. What is the formula for Velocity? For Acceleration?

V= d/t and a direction a= V_2-V_1/t

18. What units are used for distance, time, speed, velocity, acceleration? Examples include but are not limited to: Distance- meters, feet, yards, etc. Time- min, sec, hr, etc. Speed- km/min, etc. Acceleration- km/min^2

19. Review your notes from Unit 1 –Matter – yes, you may see questions on this topic on the test!

For real! Review your Unit 1 Matter notes ☺

20. Complete the chart on Newton's Laws.

	Newton's Law 1	Newton's Law 2	Newton's Law 3
Define the Law	An object in motion stays in motion: an object at rest stays at rest UNLESS acted on by an outside force	Force is related to mass and acceleration F=ma	Every action has an opposite and equal reaction Every force has an opposite and equal force
Give an Example of the Law	When you have to stop quickly in your car and your backpack gets thrown off the seat	A race car speeds up faster than a dump truck from a stop	rocket ship launching sitting in a chair