Balanced vs. Unbalanced Forces

Read from **Lesson 1** of the **Newton's Laws** chapter at **The Physics Classroom**:

http://www.physicsclassroom.com/Class/newtlaws/u2l1c.html
http://www.physicsclassroom.com/Class/newtlaws/u2l1d.html

MOP Connection: Newton's Laws: sublevels 2 and 3

Review: An object at rest ... _____;

An object in motion .... _____;

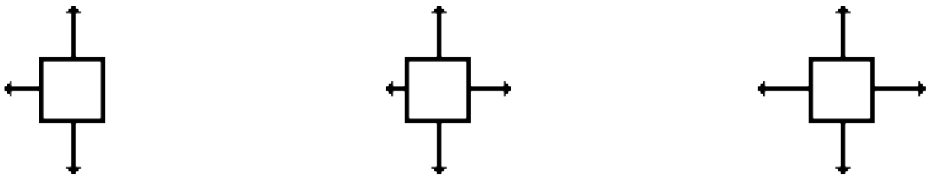
unless ..._____.

1. The amount of force required to keep a 6-kg object moving with a constant velocity of 2 m/s is __ N.
   a. 0.333 b. 2 c. 3 d. 6 e. 12
   f. ... nonsense! A force is NOT required to keep an object in motion.

2. Renatta Oyle is having car troubles. She is notorious for the trail of oil drops that she leaves on the streets of Glenview. Observe the following oil traces and indicate whether Renatta's car is being acted upon by an unbalanced force. Give a reason for your answers.

	Unbalanced Force?
a.  **Reason:** _____	**Yes or No**
b.  **Reason:** _____	**Yes or No**
c.  **Reason:** _____	**Yes or No**

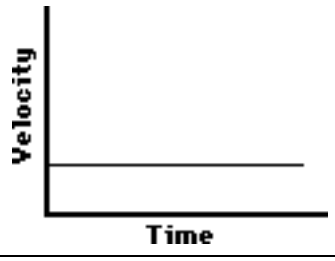
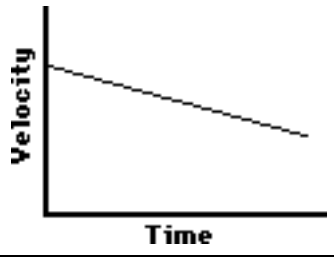
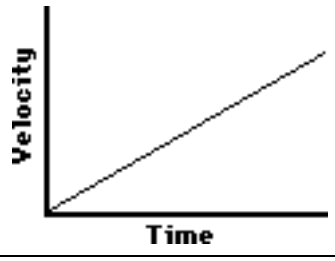
3. Each one of the dot diagrams in question #2 can be matched to a force diagram below. The force diagrams depict the individual forces acting upon the car by a vector arrow. The arrow direction represents the direction of the force. The arrow length represents the strength of the force. Match the dot diagrams from #2 to a force diagram; not every force diagram needs to be matched.



Dot Diagram(s): _____ **Dot Diagram(s): _____** **Dot Diagram(s): _____**

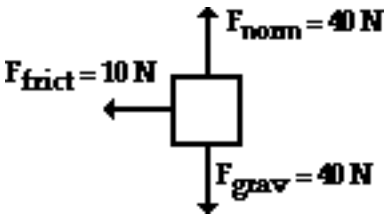
4. If the net force acting upon an object is 0 N, then the object MUST ____. Circle one answer.
   a. be moving b. be accelerating c. be at rest
   d. be moving with a constant speed in the same direction e. either c or d.

5. These graphs describe the motion of Carson Busses at various times during his trip to school. Indicate whether Carson's vehicle is being acted upon by an unbalanced force. Give a reason in terms of a description of what the car is doing (speeding up, slowing down, or constant velocity).

		
Unbalanced Force? Yes or No? **Reason/Description:** _____	**Unbalanced Force? Yes or No?** **Reason/Description:** _____	**Unbalanced Force? Yes or No?** **Reason/Description:** _____

6. A free-body diagrams show all the individual forces acting upon an object. The net force is the *vector sum* of all these forces (∑F). Determine the net force and state if there is an acceleration.

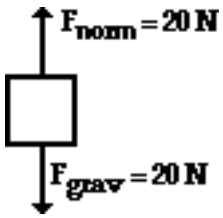
a.



∑F = _____

Accel'n? Yes or No

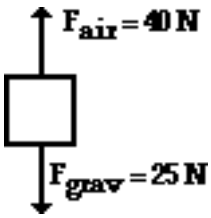
b.



∑F = _____

Accel'n? Yes or No

c.



∑F = _____

Accel'n? Yes or No

7. During an in-class discussion, Anna Litical suggests to her lab partner that the dot diagram for the motion of the object in #6b *could be*

. . . . . .

Anna's partner objects, arguing that the object in #6b could not have any horizontal motion if there are only vertical forces acting upon it. Who is right? _____ Explain.

8. During an in-class discussion, Aaron Agin asserts that the object in #6a **must** be moving to the left since the only horizontal force acting upon it is a "left-ward" force. Is he right? _____ Explain.

9. The diagrams below depict the magnitude and direction of the individual forces acting upon an object. Which objects **could be** moving to the right? Circle all that apply.