Review for chapters 1 – 5, Summer 2009

1. When referring to the "mks" system what does the "m", the "k", and the "s" stand for ?

2. Give examples of four quantities which are vectors.

3. When multiplying several quantities, the number of significant digits in the result must always be

   A. equal to the number of significant digits in the least accurate of the quantities.
   B. equal to the number of significant digits in the most accurate of the quantities.
   C. larger than the number of significant digits in the most accurate of the quantities.
   D. smaller than the number of significant digits in the least accurate of the quantities.
   E. equal to the average number of significant digits in the most and least accurate of the quantities.

4. What is the conversion factor between cm^2 and m^2? How do you change $second^2$ to $hour^2$?

5. A stone is thrown straight up. What is its acceleration on the way up?

6. It is possible to have a zero acceleration, and still be moving. (True or false)

7. The slope of a line connecting two points on a position versus time graph gives ?

8. The slope of a tangent line at a given time value on a velocity versus time graph gives?

9. A stone is thrown straight up. When it reaches its highest point,

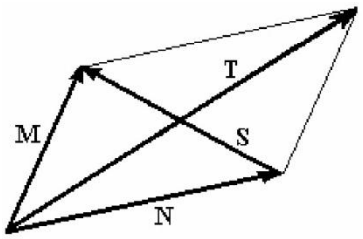
   A. both its velocity and its acceleration are zero.
   B. its velocity is zero and its acceleration is not zero.
   C. neither its velocity nor its acceleration is zero.
   D. its velocity is not zero and its acceleration is zero.

10. If $\mathbf{A} + \mathbf{B} = 0$, then the vectors **A** and **B** have equal magnitudes and are directed in the same direction. (True or false?)

11. It is possible for the resultant of three vectors to equal zero. (true or false).

12. The sum of two vectors has the greatest magnitude when the angle between these two vectors is:

    a) 90°. B) 270°. C) 180°. D) 0°. E) 60°.



13. Refer to Figure. Vector **S** as expressed in terms of vectors **M** and **N** is given by

a) **N**, b) **M** - **N**, C) **M** + **N**, D) **M**.

14. The horizontal component of the velocity of a projectile remains constant during the entire trajectory of the projectile. (True or false)

15. The vertical component of the acceleration of a projectile remains constant during the entire trajectory of the projectile. (true or false)

16. A projectile is launched with an initial velocity of 80 m/s at an angle of 30° above the horizontal. Neglecting air resistance, what is horizontal component of the projectile's acceleration?

17. Mass is a measure of how difficult it is to change the velocity of an object. (true or false).

18. A force is required for an object to move. (true or false).

19 The mass of an object is fixed, but its weight varies from location to location. (true or false).

20. A block of mass M slides down a frictionless plane inclined at an angle θ with the horizontal. The normal reaction force exerted by the plane on the block is:

a) Mg sin θ. B) Mg tan θ. C) Mg cos θ. D) Mg. E) zero, since the plane is frictionless.

Quantitative problems.

1. A car with initial velocity of 15.0 m/s moves with constant acceleration. At the end of 10.0 s, it is moving at a velocity of 55.0 m/s. Find the car's acceleration and its displacement during this 10.0s.

2. A tennis ball is released at rest from the top of a building in A&M University. It hits the ground after falling 2.50 s. Neglecting air resistance, what was the height from which the ball was dropped?

3. A stone is thrown with an initial velocity of 35 m/s at an angle of 37^o above the horizontal. Find: (a) its horizontal and vertical displacement after 0.55 s; (b) its velocity after 0.55 s (both magnitude and direction). (c) its maximum height and range.

4. An astronaut applies a force of 500 N to an asteroid and it accelerates at 5.0 m/s^2 (far far away from the Earth and other planets). What is the asteroids mass?

5. A 5.60 kg sled is pulled across a smooth ice surface (see figure below). The force acting on the sled is of magnitude 25.3 N and points in a direction 35.0° above the horizontal. If the sled starts at rest, how fast is it going after being pulled 2.50 s?

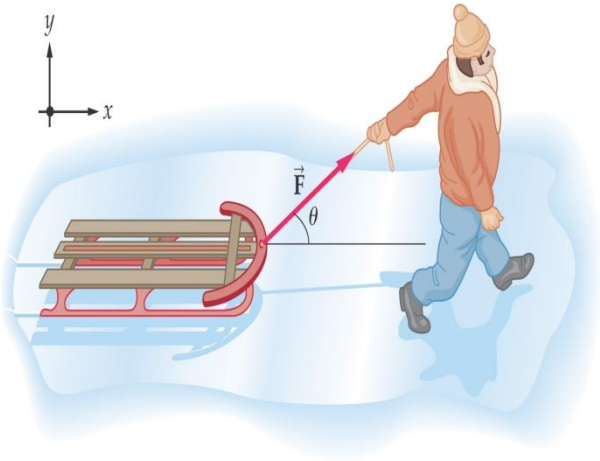


Figure for problem 5.

6. An instructor asks students to weigh a 6.0 kg salmon by hanging it from a fish scale attached to the ceiling of an elevator. What is the apparent weight of the salmon, if the elevator (a) is at rest, (b) moves with an upward acceleration of 35 m/s^2, or (c) moves with a downward acceleration of 58 m/s^2? Do you have any comments on your results?

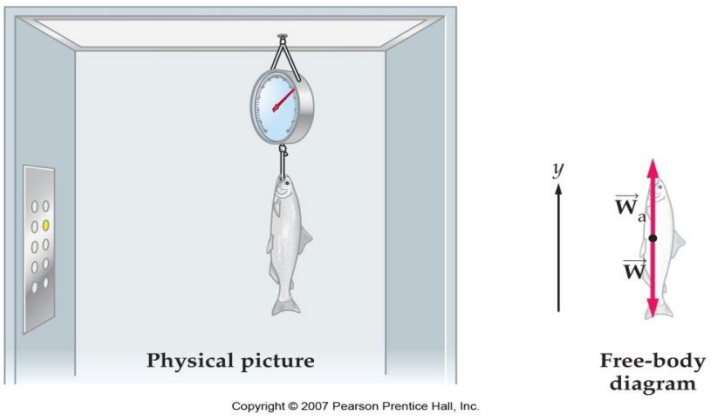
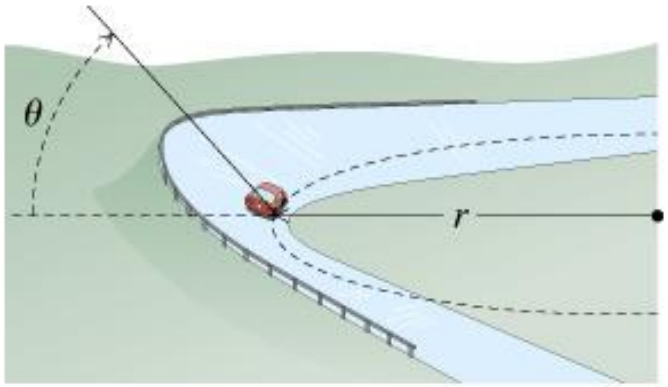


Figure for problem 6.

7. A truck tows a 500 kg car with a rope having a tensile strength of 350 N. If the driver wishes to attain a final speed of 20 m/s, what is the shortest interval of time to achieve this speed without breaking the rope?

8. A car of mass M= 1500 kg traveling at 55.0 km/h enters a banked turn covered with ice. The road is banked at an angle θ, and there is no friction between the road and the car's tires.



What is the radius r of the turn if θ = 20.0° (assuming the car continues in uniform circular motion around the turn)? In the case that θ = 0° (flat road), at least what the coefficient of static friction should be to avoid any sliding of the car?