Science 10 Honours Review for Physics Test #2 Name:

1. Add the following vectors:
   a. 3.0 m [south] and 4.0 m [south]

   b. 3.0 m [south] and 4.0 m [north]

   c. 8.0 m [west] and 5.0 m [north]

2. Find the x and y components of the following vectors:
   a. 16.0 m [27° E of N]

   b. 10.0 m [52° W of N]

3. Carolyn is walking up an escalator with a velocity of 1.10 m/s with respect to the escalator. The escalator is at an angle of 35° to the horizontal and is moving at a velocity of 0.90 m/s.
   a. What is the horizontal component of Carolyn's velocity?

   b. What is the vertical component of Carolyn's velocity?

4. Lindsay heads her plane with a velocity of 255 km/h north. If there is a strong wind of 112 km/h blowing east, what is the velocity of the plane in reference to the ground?

5. A boat whose speed in still water is 2.5 m/s is in a river whose velocity is 1.0 m/s south. What is the velocity of the boat relative to the shore when:
   a. the boat is headed south?

   b. the boat is headed north?

   c. the boat is headed west?

6. A boat that can travel on still water at a speed of 3.0 m/s wants to travel north perpendicular to the river current. If the river current is 1.2 m/s east, in what direction must the boat head?

7. A pilot wants to fly west. If the plane has an airspeed of 95 m/s, and there is a 25 m/s wind blowing north, in what direction must the plane head?

8. An object is thrown horizontally from the top of a building at a velocity of 15.0 m/s. If the object takes 5.50 s to reach the ground, how high is the building?

9. An object is thrown horizontally from the top of a cliff at a velocity of 20.0 m/s. If the object takes 4.20 s to reach the ground, how far from the base of the cliff did the object hit the ground?

10. An object is thrown from the ground into the air at an angle of 40° from the horizontal at a velocity of 18.0 m/s. How far will the object travel horizontally?

11. An object is projected from the top of a building at an angle of 28° at a velocity of 15 m/s. If the object hits the ground 32 m from the base of the building, how high is the building?

12. A force of 2.0 N east and a force of 3.0 N 25° north of east act on an object. What is the net force on the object?

13. Forces of 2.0 N 38° north of west and 3.0 N 61° south of west act on an object. What is the net force on the object?

14. A 12.0 kg object is accelerated by a net force of 10.2 N east. What is the acceleration of the object?

15. A 5.2 kg object is accelerating at a rate of 6.0 m/s^2. What is the magnitude of the net force acting on the object?

16. What is the mass of an object if it has a weight of 80.0 N near the earth's surface?

17. What is the weight of a 72.0 kg object hear the surface of the earth?

18. What is the acceleration due to gravity near the surface of the moon if an object that has a mass of 22.0 kg has a weight of 36.0 N near the moon's surface?

19. A 9.6 kg object is pulled along a horizontal surface. If the coefficient of friction between the surfaces is 0.11, what is the force of friction?

20. Kevin, with a mass of 60 kg, is sitting 2 m from his car which has a mass of 2000 kg. What is the force of attraction between Kevin and his car?

1. a. *7.0 m [S]* b. *1.0 m [N] or –1.0 m [S]* c. *9.4 m [32° N or W]* 2. a. *x = 7.26 m [E], y = 14.3 m [N]*
b. *x = 7.88 m [W], y = 6.16 m [N]* 3. a. *1.64 m/s* b. *1.15 m/s* 4. *279 km/h [23.7° E of N]* 5. a. *3.5 m/s [south]*
b. *1.5 m/s [north]* c. *2.7 m/s [22° S of W]* 6. *[24° W of N]* 7. *[75° W of S]* 8. *148 m* 9. *84.0 m* 10. *32.5 m* 11. *12 m*
12. *4.9 N [15° N of E]* 13. *3.3 N [25° S of W]* 14. 0.850 m/s^2 east 15. *31 N* 16. *8.15 kg* 17. *706 N* 18. *1.64 m/s^2*
19. *10 N* 20. *2.0 x 10^{-6} N*