Math Review

$a=\frac{\triangle v}{t}$

$d=vt$

1. Bob straps on his in-line skates and pushes down a hill. His velocity changes from 0 m/s at the start to 4.5 m/s exactly 15 s later. What is Bobs average acceleration? 0.30 m/s^2

2. A baseball is hit straight up at an initial velocity of 30 m/s. If the ball has a negative acceleration of about 10 m/s^2, how long does the ball take to reach the top of its path? 3 s

3. Heather and Matthew take 45 s to walk eastward along a straight road to a store 72 m away. What is their average velocity? 1.6m/s

4. Simpson drives his car with an average velocity of 85 km/h eastward. How long will it take him to drive 560 km on a perfectly straight highway? 6.6 h

5. A driver is traveling eastward on a dirt road when she spots a pothole ahead. She slows her car from 14.0 m/s to 5.5 m/s in 6.0 s. What is the car's acceleration? 1.4 m/s^2 west

6. How long will it take a cyclist with a forward acceleration of -0.50 m/s^2 to bring a bicycle with an initial forward velocity of 13.5 m/s to a complete stop? 27 s

F=ma
p=mv
(p=momentum)
(N=kg•m/s^2)

7. The net force acting on a 5kg discus is 50 N. What is the acceleration of the discus? 10 m/s^2

8. A block pushed with a force of 13.5 N accelerates at 6.5 m/s^2 to the left. What is the mass of this block? 2.1 kg

9. A student tests the second law of motion by accelerating a block of ice at a rate of 3.5 m/s^2. If the ice has a mass of 12.5 kg, what force must the student apply?44 N

10. A bag of sugar has a mass of 2.26 kg. What is the weight in newtons on the moon, where the acceleration due to gravity is one-sixth of that on earth? (hint: on earth, g= 9.8 m/s^2) 3.7 N

11. Calculate the momentum of the following objects:

a. A 65 kg skateboarder moving forward at the rate of 3.0 m/s 195 kg•m/s forward

b. A 20.0 kg toddler in a car traveling west at a rate of 22 m/s 440 kg•m/s west

c. A 16 kg penguin at rest 0 kg•m/s

12. What is the net force on a 2.0 kg weight hanging motionless on a string?

A. 0.0 N B. 2.0N C. 9.8N D. 19.6N

W=Fd
$P=\frac{W}{t}$
PE=mgh
(g=9.8 m/s^2)
KE=1/2mv²
J=kg•m^2/s^2

13. You and two friends apply a force of 425 N to push a piano up a 2.0 m long ramp.

A. How much work in joules has been done when you reach the top of the ramp? 850 J

B. If you make it to the top in 5.0 s, what is your power output in watts? 170 W

C. If lifting the piano straight up would require 1700 N of force, what is the mechanical advantage of the ramp? 4.0

14. A crane uses a block and tackle to lift a 2200 N flagstone to a height of 25 m.

A. How much work is done on the flagstone? 55 kJ

B. In the process, the crane's hydraulic motor does 110 kJ of work on the cable in the block and tackle. What is the efficiency of the block and tackle? 0.50 or 50%

C. What is the potential energy of the flagstone when it is 25 m above the ground? 55 kJ

D. Calculate the kinetic energy in joules of a 1500 kg car moving at 29 m/s. 6.3 X 10^f J