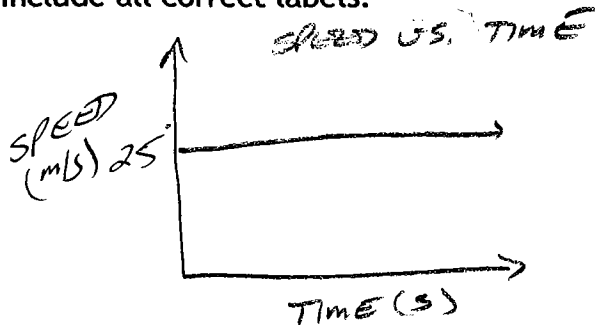


**Study Tips**

- A. Review the targets of what you should be able to do each lesson.
- B. Look through your text book and review vocabulary and look at pictures, graphs and diagrams to be sure you understand them.
- C. Look over lab reports. Be sure you can do the calculations and answer the questions.

**Motion:**

1. A kayak floats 12 km down a river. What is this distance in cm?  $12 \text{ km} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{100 \text{ cm}}{1 \text{ m}} =$
2. What are two examples of SI units used to measure volume? Mass?   
 mL, L      g, kg
3. Draw a graph of speed vs. time for an object moving at a constant speed of 25 m/s. Include all correct labels.



4. The slope of a distance vs. time graph equals what? **VELOCITY / SPEED.**
5. The slope of a velocity vs. time graph equals what? **ACCELERATION**
6. Does a horizontal line on a velocity vs. time graph mean an object has stopped? **NO**
7. Does a horizontal line on a distance vs. time graph mean an object has stopped? **YES**
8. If a velocity vs. time graph has a straight line, what does this tell you about acceleration? **ACCEL IS CONSTANT.**
9. What is the definition of velocity? Of acceleration?  

$$VEL = \frac{\text{CHANGE IN POSITION}}{\text{CHANGE IN TIME}} \quad a = \frac{\Delta V}{\Delta t}$$
10. If a car is constantly getting faster, is its acceleration increasing? Explain.  
**YES, BECAUSE THE SPEED IS CHANGING IN A POSITIVE (INCREASING) WAY.**
11. What is the equation to find velocity?  $VEL = \frac{\Delta d}{\Delta t}$
12. A river flows 400 meters in 50 seconds, what is its velocity?  $V = \frac{400 \text{ m}}{50 \text{ s}} = 8 \text{ m/s}$
13. If the river flows around a bend at a constant speed, is the acceleration zero? Why?  
**NO, SINCE THE DIRECTION IS CHANGING, THE VELOCITY IS CHANGING.**  
**VELOCITY INCLUDES SPEED AND DIRECTION.**

14. What is the equation for finding acceleration?  $a = \frac{\Delta v}{\Delta t} = \frac{v_3 - v_2}{\Delta t}$

15. If the river hits the cutbank at 15 meters/sec and friction causes the water to slow down to 3 meters/sec in 4 seconds, what is the acceleration of the river?

$$a = \frac{3 \text{ m/s} - 15 \text{ m/s}}{4 \text{ s}} = -\frac{12 \text{ m/s}}{4 \text{ s}} = -3 \text{ m/s}^2$$

16. Give an example of acceleration. Of deceleration.

- CAR LEAVING A STOP SIGN.
- = CAR APPROACHING A STOP SIGN.

17. If a tectonic plate moves 82 millimeters/ year for 20,000 years, how many centimeters does it move?

$$v = \frac{d}{\Delta t}, \quad d = v \cdot t = 82 \frac{\text{mm}}{\text{yr}}, 20,000 \text{ yrs} = 1,640,000 \text{ mm}$$

Forces

18. What are three types of friction? Give an example of each one.

- AIR FRICTION - TERMINAL VELOCITY
- SLIDING FRICTION - BOX SLIDING
- STATIC FRICTION - BOX DOESN'T SLIDE

$$\times \frac{1 \text{ cm}}{10 \text{ mm}} = 164,000 \text{ cm}$$

19. What are Newton's Laws?

1. LAW OF INERTIA
2.  $F = m \cdot a$
3. ACTION / REACTION PAIRS.

20. A 20 kg object accelerates at half the speed of a 10 kg object when an equal force is applied. This is an example of which law?

$$a = \frac{F}{m} \Rightarrow 2^{\text{ND}} \text{ LAW}$$

21. If you throw a baseball into space, what would happen to it? CONTINUE IN DIRECTION THROWN (1<sup>ST</sup> LAW)

22. What is Newton's equation for determining acceleration?  $F = m \cdot a$

23. How much force is needed to accelerate a 5 kg rock at rate of 10 m/s<sup>2</sup>?

$$F = (5 \text{ kg})(10 \text{ m/s}^2) = 50 \text{ N}$$

24. How fast will a 1000 kg car accelerate if 20,000 N of force are applied?

$$a = \frac{F}{m} = \frac{20,000 \text{ N}}{1,000 \text{ kg}} = 20 \text{ m/s}^2$$

25. A 1 kg car will accelerate (faster, slower, the same) as a 2 kg car when rolling down a frictionless ramp.

SAME RAMP  $\Rightarrow$  SAME ACCEL REGARDLESS OF MASS.

26. What can be done to increase the acceleration of a car rolling down a ramp?

- RAISE RAMP

27. Why won't a propeller driven airplane move in space?

- NO AIR TO PUSH AGAINST
- 3<sup>RD</sup> LAW.

28. If you were in the middle of a frictionless ice patch, how could you get off? This is an example of which of Newton's laws?

- THROW SOMETHING
- 3<sup>RD</sup> LAW.

29. If you have a weight of 600 N and lean on a table, pressing with 30 N of force, how much force will the table exert on your hand? How do you know?

- TABLE WILL EXERT 30 N ON HAND  
- 3<sup>RD</sup> LAW

### Energy, Work & Power

30. What are some different types of energy?

PE, KE, THERMAL, CHEMICAL

31. An object at the top of a building will have (more) less) potential energy than the same object on the ground.

32. What is the law of conservation of energy? ENERGY IS NEITHER CREATED NOR DESTROYED. IT IS TRANSFORMED FROM ONE TYPE TO ANOTHER.

33. What is the equation to determine Potential Energy? Kinetic Energy?

$$E_p = m \cdot g \cdot h \quad E_k = \frac{1}{2} m \cdot v^2$$

34. If a ball is launched upwards with 300 J of KE, what will be the PE of the ball at the top of its path? What is the KE when it hits the ground again? (assume no friction)

$$E_p = 300 \text{ J, SAME AS KE AT BOTTOM.}$$
$$E_k = 300 \text{ J, SAME AS INITIAL KE.}$$

35. What is the potential energy of an 8 kg butterfly on a building 0.2 km high?

$$E_p = m \cdot g \cdot h = (8 \text{ kg})(9.8 \text{ m/s}^2)(200 \text{ m}) = 15,680 \text{ J}$$

36. What is the kinetic energy of a 0.02 kg golf ball hit at 130 m/s?

$$E_k = \frac{1}{2} (0.02 \text{ kg})(130 \text{ m/s})^2 = 169 \text{ J}$$

37. Explain how KE and PE change as you ride on a roller coaster. Would the roller coaster ever stop if you didn't apply the brakes? Why or why not?

AS COASTER DECREASES IN HEIGHT,  $E_p \downarrow$  AND  $E_k \uparrow$

38. What is work? THE ENERGY ASSOCIATED WITH APPLYING A FORCE FOR A CERTAIN DISPLACEMENT.

39. What is the formula for work? WORK = FORCE • DISPLACEMENT

40. If 100 J are used to push a rock 5 m, how much force was used to move the rock?

$$F = W/d = 100 \text{ J} / 5 \text{ m} = 20 \text{ N}$$

41. 2000 N of force are used to push a block 50 m, how much work was done?

$$W = F \cdot d = 2000 \text{ N} \times 50 \text{ m} = 10,000 \text{ J}$$

42. What is the equation for power?

$$\text{POWER} = \frac{\text{WORK}}{\text{TIME}}$$

43. How can two people that do the same amount of work have different power?

IF THE LENGTHS OF TIME ARE DIFFERENT  $\Rightarrow$

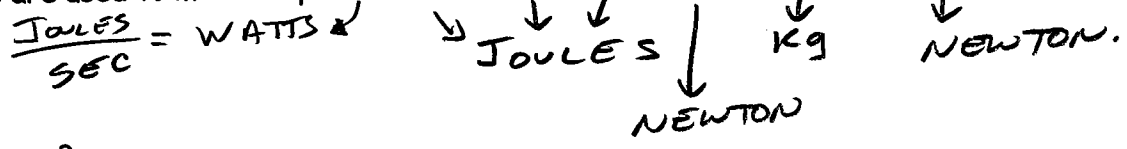
44. How can two people that have the same power do different amounts of work?

THE TIME FACTOR AGAIN

POWER DIFFERENT

45. If you did 700 J of work in 2 minutes, what is your power?  $P = \frac{W}{t} = \frac{700J}{2 \text{ min} \times \frac{60s}{\text{min}}} = 5.8W$

46. What units are used to measure power? Work? PE? KE? Force? Mass? Weight?



**Waves**

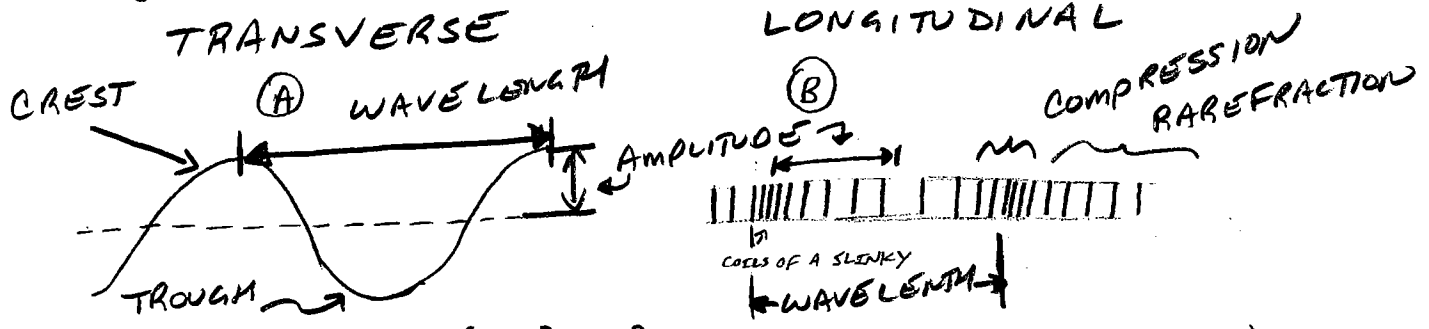
47. What is a wave?

WAVES TRANSFER ENERGY

48. How are waves created?

THROUGH VIBRATIONS

49. Identify the types of waves in the diagram below. Label the wave crest (compression), trough (rarefaction), wavelength, & amplitude for BOTH types of waves.



50. What are two other names for a P-wave?

PRIMARY WAVE, LONGITUDINAL, COMPRESSION

51. What are two other names for an S-wave?

SECONDARY WAVE, TRANSVERSE, SHEAR WAVE

52. What is frequency? What are the units of frequency?

# WAVES PER SECOND, UNITS ARE HERTZ

53. If a wave travels 1000 meters in 20 seconds, what is the speed?

$v = 1000m / 20s = 50m/s$

54. If the wave has a speed of 100 meters/sec, how far does it travel in one minute?

$v = d/t \Rightarrow d = v \cdot t = 100m/s \times 60s = 6000m$

55. If the wavelength of a wave increases, what will happen to the frequency?

AS WAVELENGTH INCREASES FREQUENCY DECREASES.

56. How do longitudinal and transverse waves differ? How are they similar?

LONGITUDINAL  
ENERGY IN SAME DIRECTION AS MOTION

TRANSVERSE  
ENERGY IS PERPENDICULAR TO MOTION

57. If an earthquake occurs in San Francisco, which type of waves will reach Las Vegas first? Which ones will arrive last?

→ BOTH TRANSFER ENERGY

- PRIMARY WAVES FIRST (P-WAVES)
- SURFACE WAVES LAST (L-WAVES)