Name: _____ Class: _____ Date: _____ ID: A

PS-B Final Review Packet

Key

Completion
Complete each statement.

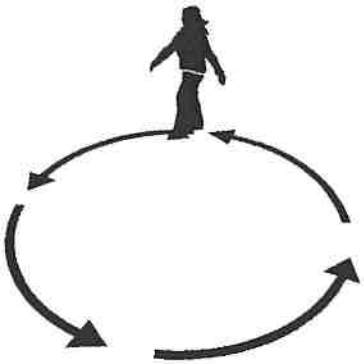
1. The speed you have at a specific point in your journey is best called instantaneous speed.
2. If a small change in one variable causes a large change in another, the relationship between the two variables is said to be strong.
3. The rate of change in the velocity of an object is called acceleration.
4. The SI unit of force required for a 1-kg object to accelerate at 1 m/s^2 is the Newton.
5. A force that resists the motion of objects or surfaces as they move over one another is called friction.
6. The force exerted by a surface on an object that is pressing on it is the normal force.
7. If the net force on an object is zero, the forces acting on it are balanced.
8. The property of an object that resists a change in its motion is called inertia.
9. Every force creates a reaction force that is equal in strength and opposite in direction.
10. The time required for a pendulum to make one swing over and back is called its period.
11. In one complete cycle, a wave moves forward one wavelength.

Name: _____ ID: A

Short Answer

Clearly write your responses in the space provided on this test. If you need more room, you may attach another sheet of paper & explicitly identify the location of each response.

The skater shown below is skating at a constant speed in a circle.



magnitude of $\vec{v}$
but direction of $\vec{v}$ is changing

$$\vec{a} = \frac{\Delta \vec{v}}{t}$$

Figure 4-2

12. Is the skater shown in **Figure 4-2** accelerating? Explain your answer.

yes, because direction is changing

13. A tennis ball is dropped off a cliff, and is in free fall until it hits the ocean below. Describe the speed and acceleration of the tennis ball as it falls.

speed increases by 9.8 m/s each second $\vec{a}$ is constant at $9.8 \frac{m}{s^2}$

An airboat is moving through the Florida Everglades. Four forces act upon the boat as shown in the illustration below. Force F_A is 5500 newtons, Force F_B is 1,000 newtons and Force F_C is 6,000 newtons. Using the illustration and the information above, answer the following:

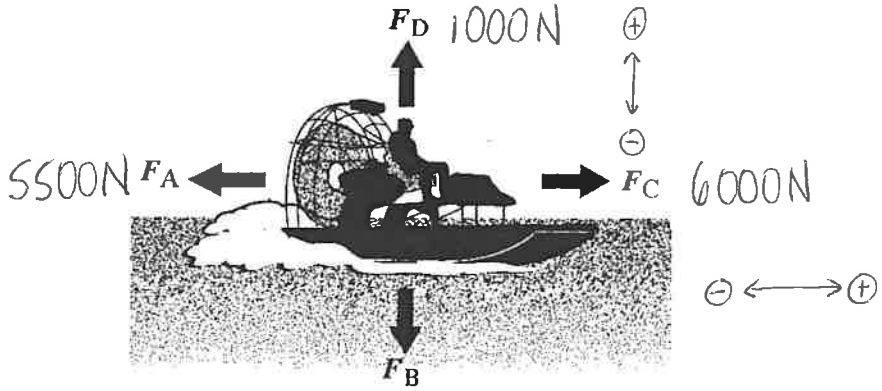


Figure 6-1 1000N

14. What is value of force F_D in **Figure 6-1**? $F_D = 1000N$

15. Is the speed of the airboat in **Figure 6-1** increasing, decreasing or constant?

speed is increasing to the right

$F_{NET} = 500N$

Name: _____ ID: A

16. Why will a golf ball accelerate faster than a bowling ball when struck with an equal amount of force by a golf club? golf ball = less mass so higher $\vec{a}$

17. A speeding truck makes contact with a bug on its windshield. Compare the force that the bug exerts on the truck to the force the truck exerts on the bug. equal + opposite

18. When you push on a door, it opens. The force you exert generates an equal and opposite reaction force. Why don't the two forces cancel out, leaving zero net force (and not moving the door)?
more forces coming into play, resulting in a net force

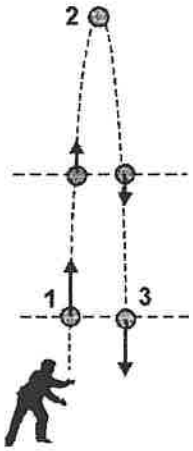
19. When you walk, you push against the ground with your feet. What pushes **you** and allows you to move forward? Use Newton's third law to explain walking.
ground pushes back on your feet

20. Name the three basic parts of a lever.
input arm, output arm, fulcrum

21. What is the basic source for most of the energy on Earth? The Sun solar radiation

22. How are work and energy related?
energy is the ability to do work; work is a Force applied over a distance

23. A ball is thrown from position (1) to a height of 3 meters (position 2) to give it potential energy. The ball then falls to position (3). Assuming there is no energy loss due to friction **compare:**

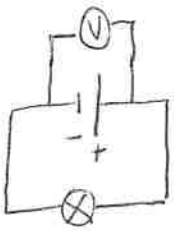


a. kinetic energy at position (1) with kinetic energy at position (3) same
b. potential energy at position (2) with kinetic energy at (3) same

24. On Monday, Bik runs quickly upstairs carrying a heavy book. The next day, she walks slowly upstairs carrying the same book. Compare Bik's work and power on Monday and Tuesday.
work is same but power or Energy/Time is more on Monday

25. Why does a voltmeter read "0" when both the positive and negative leads are connected to the negative terminal of a 1.5 volt battery? no voltage of battery = battery is dead if connected across battery
0V

26. You install two batteries in a flashlight so that their positive ends are connected together. Will the flashlight work? Why or why not?
No potential difference = no voltage across circuit.
Flashlight will not work.



Name: _____ ID: A

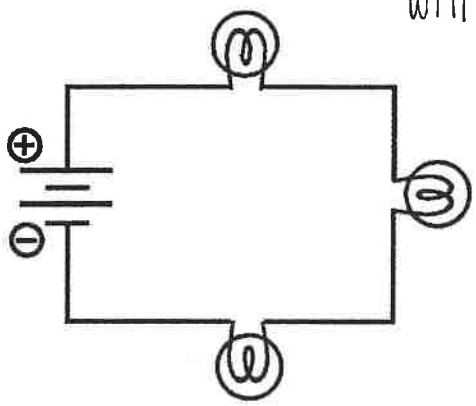
copper, gold

27. Give two examples for each of the following: a conductor, an insulator and a semiconductor.

wood, glass silicon, germanium

28. The circuit shown below has 3 identical bulbs connected in series to a battery. If 1 bulb is unscrewed, what will happen to the 2 remaining bulbs?

will go out



The circuit pictured contains 3 identical light bulbs. They are connected to a voltage source which causes 2 amperes of current to flow through each of the bulbs.

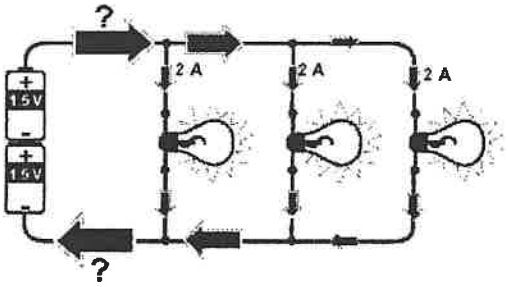


Figure 16-1

29. Identify the type of circuit in **Figure 16-1**. parallel

30. Determine the current produced by the source in **Figure 16-1**. 6 A

31. If a permanent magnet is cut in half, describe the polarity of the two halves of the magnet.

= two mini magnets both with N + S poles

32. What is the main difference between a motor and a generator?

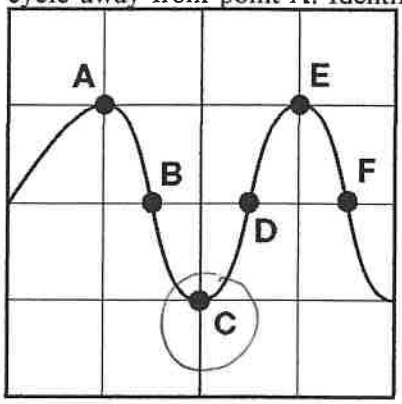
motor = electrical energy → mechanical energy generator = ME → EE

33. List three examples of renewable resources for electrical generation and three examples of non-renewable resources.

↓
solar
wind
hydroelectric

↓
coal
oil
natural gas

34. Point A is shown on the harmonic motion graph of a vibrating string. Another point is located 1/2 of a cycle away from point A. Identify by letter that point.



The diagram represents four transverse waves traveling in the same medium.

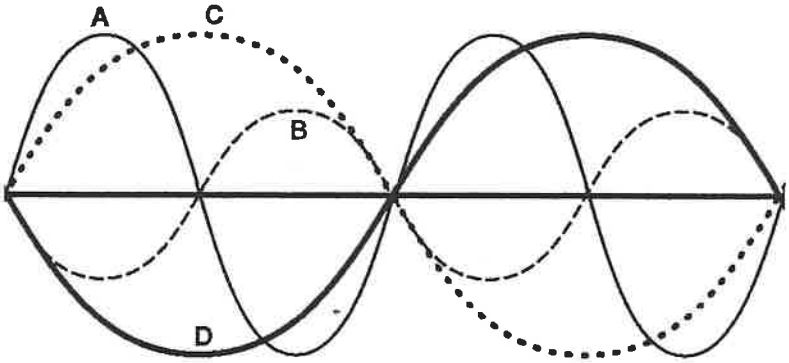


Figure 24-1

35. Which of the four waves shown in **Figure 24-1** have the same amplitude? A, C, D

36. Which waves shown in **Figure 24-1** have the same wavelength? A + B C + D

37. List four things that may happen to a wave as it meets a boundary.
reflection, refraction, diffraction, absorption

38. Arrange the following list of media in order by the speed of sound through it, fastest to slowest.
a. Water at 20°C
b. Air at 20°C
c. Helium at 20°C
d. Steel at 20°C
e. Air at 0°C

D, A, C, B, E

39. How are electromagnetic waves created?
oscillation of electrical + magnetic fields

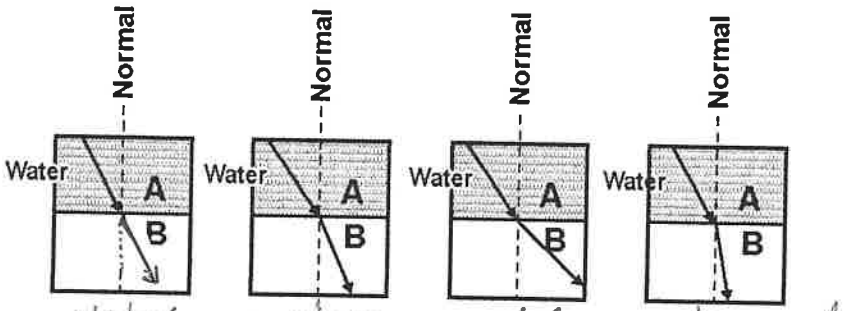
40. Indicate the color the apple appears for each of the following lights:
    a. A pure red apple illuminated by white light. red
    b. A pure red apple illuminated by red light. red
    c. A pure red apple illuminated by blue light. black

41. Overlapping circles of red, blue, and green light are projected at a white screen. All lights are of equal intensity. Describe the color an observer would see:
    a. At the point where red, blue, and green overlap. white
    b. At the point where red and green overlap. yellow
    c. At the point where blue and green overlap. cyan
    d. At the point where red and blue overlap. magenta

42.

Material	Index of Refraction
Vacuum	1.0
Air	1.0001
Water	1.33
Ice	1.31
Glass	1.5
Diamond	2.42

The diagrams below represent light traveling from water (A) into another material (B). Using the chart above, label material B for each diagram as air, water, glass or diamond.



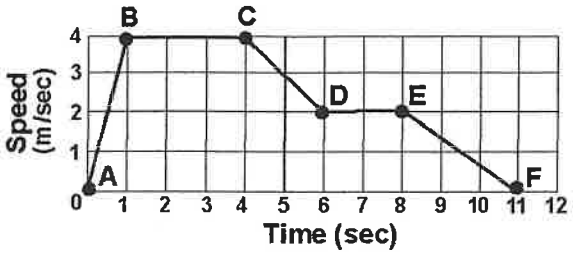
a. water b. glass c. air d. diamond

Problem

43. Jordan takes his bicycle out for 5 hours. For the first 3 hours, he rides his bicycle at 10 miles per hour. He stops to rest for 1 hour and then continues his ride. For the last hour he rides at a speed of 20 miles per hour. What was Jordan's average speed for the entire 5 hour period?

$\frac{10 \text{ miles}}{\text{hr}}$

44. The speed vs. time graph below shows the motion of a cart traveling along a track.



How far does the cart move from time = 0 seconds to time = 6 seconds? 20 m

45. Maria rolls a ball down her driveway. The ball leaves her hand traveling at 2 m/s and is traveling at 10 m/s after 4 seconds. What is the acceleration of the ball? Show your work. $2\ m/s^2$

46. Two body builders are involved in a weight lifting contest to determine who is the stronger. Ivan lifts 500 pounds. Vladimir lifts 2000 newtons. Who is stronger? Ivan
500 pounds = 2240 N

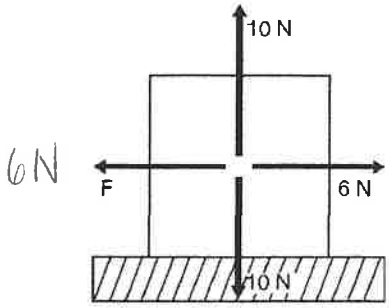
The table below gives the gravitational force for different planets in our solar system.

Planet	Gravitational Force (N/kg)
Mercury	3.7
Venus	8.9
Earth	9.8
Neptune	11.0
Jupiter	23.1

47. Sophie has a mass of 50.0 kg. Using the table above, what would her weight be on Jupiter? 1155 N

48. A 400-kg space probe has a weight of 3,560 N on one of the above planets. According to the table above, on which planet is the space probe? Show your work. 8.9 N/Kg = Venus

49. The diagram below represents an object moving to the right with a constant velocity.



What is the value of force *F*?

Name: _____ ID: A

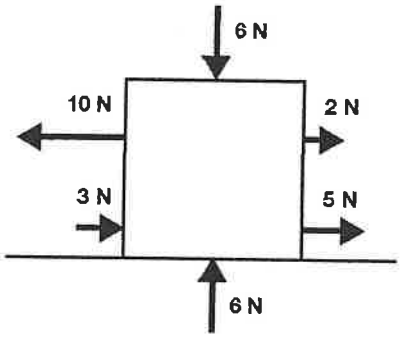


Figure 5-1

This box is being acted upon by forces in the up, down, left, and right directions. Use this diagram to answer the following questions.

50. Calculate the net force on the box shown in **Figure 5-1**. $\Sigma F = 0N$

51. Is the box **Figure 5-1** accelerating? If not, what type of motion does it have? no $\Sigma F = 0N$ at rest or constant velocity

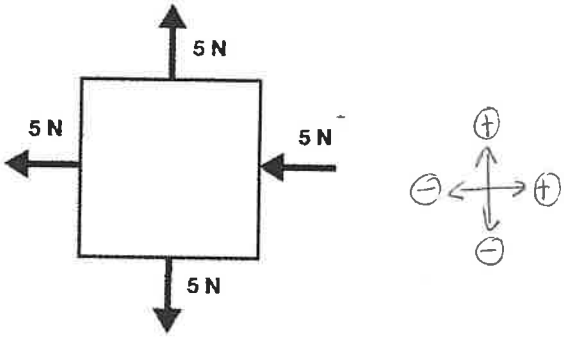


Figure 5-3

This box is being acted upon by forces in the up, down, left, and right directions. Use this diagram to answer the following questions.

52. Calculate the net force on the box shown in **Figure 5-3**. 10N to the left or -10N

53. Is the box in **Figure 5-3** accelerating? If not, what type of motion does it have? yes

Answer the questions based on the following statement. Jackie has a mass of 50 kilograms and her baby sister has a mass of 10 kilograms.

54. How does Jackie's inertia compare to her sister's inertia?

5x greater

Name: _____ ID: A

55. Is Jackie's mass directly proportional to her inertia, or is her mass inversely proportional to her inertia? Explain your answer.

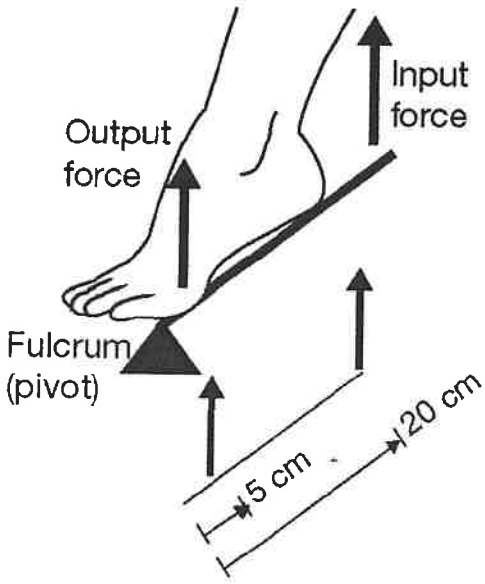
as mass ↑ so does inertia

56. Tom accelerates a box at a rate of 0.5 m/s² using a force of 25 N. Assuming the surface on which the box moves is frictionless, what is the mass of the box?

50kg

57. What force does it take to accelerate a 10-kg bike at a rate of 2 m/s²? 20N

58. The picture shows the foot acting as a second class lever. Using the distances shown in the picture, calculate the foot's mechanical advantage.



$\frac{20}{5} = 4$

59. How much kinetic energy does a 1,000-kg car have when it is traveling at 30 m/s? 450,000J

60. How much potential energy is held by a 2.0-kg can of paint on top of a 2.0-meter ladder? 39J

61. How much gravitational potential energy is contained by a 1,000-kg car traveling at 20 m/s? Ø

62. An automobile uses 75,000 joules of chemical energy from gasoline to produce 10,000 joules of useful output energy. How much energy is "lost" to the system? Where does the extra energy go?

65,000J → thermal energy

63. A father warns his son against speeding in the family automobile by saying "Having an accident at 80 miles per hour is four times as dangerous as an accident at 20 miles per hour." Do you agree with the father or not? Give support for your answer based upon principles of energy conversion and conservation.

16x as dangerous

4x velocity

$= \frac{1}{2}m(4v)^2 = 16x\ KE$

A rubber ball with a mass of 0.1 kilogram is thrown straight up with a speed of 20 m/s.

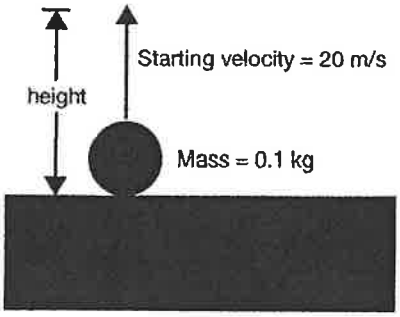


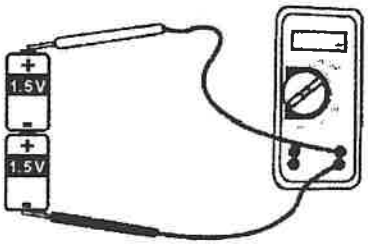
Figure 7-2

64. Calculate the height to which the ball in **Figure 7-2** travels. 20m

65. The rubber ball in **Figure 7-2** is replaced with a steel ball with a mass of 2 kg. If the steel ball is still thrown straight up with a velocity of 20 m/s, how high will it travel? 20m

66. What is the efficiency of a machine that requires work input of 15 joules to lift a 4-newton object 3 meters? $\frac{4N \times 3m}{15J} \times 100 = 80\%$

67. What should the voltmeter read (approximately)?

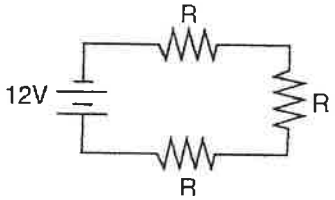


3.0V

68. If the current moving through the filament of a light bulb is 0.5 amps when the voltage across the bulb is 120 volts, what is the resistance of the bulb? 240Ω

69. Typically, household appliances operate at 120 volts. What is the current flowing in the circuit of a microwave when the resistance of the microwave oven is 30 ohms? 4A

70. The diagram represents three identical resistors in a circuit with a 12-volt source.The total current in the circuit is 2.0 amperes.



What is the resistance across any one of the three resistors? 2Ω

Name: _____ ID: A

A simple circuit is pictured below. A light bulb is connected to a 9-volt battery that causes 3 amps of current through the bulb:

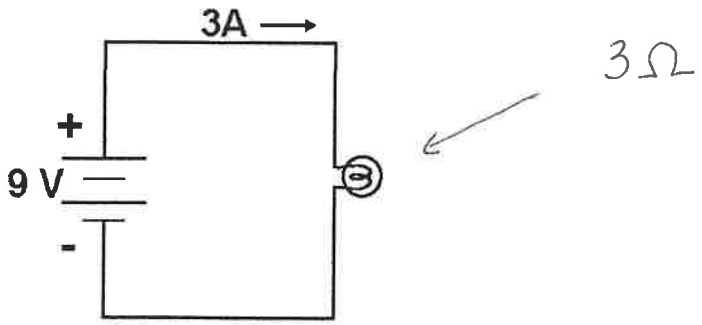


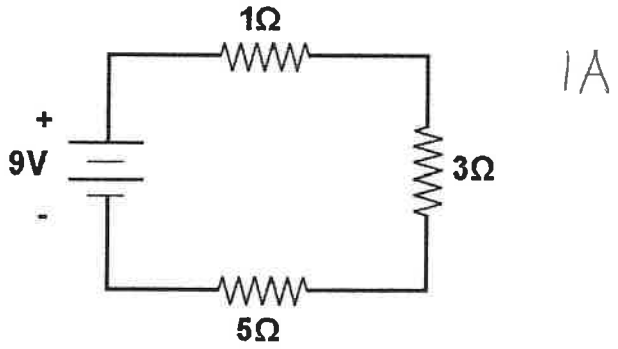
Figure 16-2

71. What is the resistance of the light bulb in the circuit shown in **Figure 16-2**?

72. If the light bulb in the circuit shown in **Figure 16-2** is replaced with a light bulb having a resistance of 9 ohms, what would the new current in the circuit be? 1A

73. If a second 9-volt battery is stacked with the battery shown in the circuit in **Figure 16-2**, what would the new current in the circuit be? 2A

74. A series circuit contains a 9-volt battery and three resistors of 1 ohm, 3 ohms, and 5 ohms. What is the current in the circuit?



1A

75. If a bumble bee moves its wings at a frequency of 130 "flaps" per second, what is the period of vibration of the bee's wings? 0.0077s

76. If your heart beats at a rate of 65 beats per minute, what is the frequency of your heart measured in hertz? 1.1 Hz

77. The distance between the highest and lowest position for an oscillator on a graph of harmonic motion is 40 centimeters. What is the amplitude of the oscillator? 20cm

78. Middle C on a piano has a frequency of about 264 hertz. If the wavelength in air of this note is 1.31 meters, what is the speed of sound in air? 346 m/s

79. A string 3.0 meters long is vibrating at 50 hertz at the 4th harmonic. Calculate the speed of the wave on the string. 2 complete cycles so $\lambda = 1.5$ m $v = 75$ m/s

80. The speed of light is 3×10^8 meters per second (300,000,000 m/s). This was determined by allowing light to travel 40 kilometers (40,000 m) and measuring the time it took to travel that distance. How much time was required for light to travel that distance?

1.3×10^{-4} s