K - PS Physics: Chapter 5 Review Questions **Test Date: _____**

Unscramble the following vocabulary words and match each word with the correct definition.

j 1. Luylpe pulley

m 2. rvlee lever

l 3. twta watt

i 4. maiclehnca dvtaangea MA

e 5. Oprwe power

h 6. Cfurmlu fulcrum

g 7. cilendin nelpa inclined plane

k 8. Gwdee wedge

o 9. leewh adn xlae wheel and axle

n 10. Cwsre screw

b 11. Chinmae machine

a12. Krow work

f 13. Leuoj joule

c 14. feftro crofe effort force

d 15. siscnatree fcore resistance force

c. force applie

a. force acting over a distance to move an object

b. an instrument that makes work easier

c. force applied to machine

d. force that opposes the effort force

e. amount of work done per unit time

f. 1 newton-meter

g. simple machine with a sloped surface

h. the fixed point on a lever

i. number of times a machine multiplies the effort force

j. rope wrapped around a grooved wheel

k. simple machine made up of two inclined planes

l. 1 joule per second

m. straight bar that moves about a fixed point

n. inclined plane wrapped to make a spiral

o. simple machine made up of two circular objects

For the questions 16-30 decide which simple machine(s) that best fits the clue. Simple machine types can (and will) be used more than once.

Lever 16. Two simple machines found in a pair of scissors
wedge

inclined plane 17. A screw is actually one of these wrapped around a post

pulley 18. This simple machine makes raising a flag up a flagpole much easier

inclined plane 19. A ramp is an example of this type of simple machine

wheel and axle 20. This simple machine rolls and is found on cars, bikes and wheelbarrows.

pulley 21. A rope, a wheel with a groove in it and a weight make up this simple machine.

Lever 22. This simple machine has a fulcrum, or pivot point, which can be located in the center, near the end or at the end.

wedge 23. This simple machine can be used to split things apart or hold a door open.

screw 24. This simple machine secures things together and is made up of an inclined plane wrapped around a cylinder.

inclined plane 25. A heavy object could be rolled up this machine, instead of lifting it straight up.

wedge 26. A knife is an example of this type of simple machine.

screw 27. The bottom of a light bulb would be considered this type of simple machine

wedge 28. This machine is made up of two inclined planes that meet forming a sharp edge.

pulley 29. The rope is attached to a load and can move the load up, down, or sideways with this simple machine.

Lever 30. Two simple machines found in a wheelbarrow.
wheel and axle

True/False. If false, change the statement to make it true.

T 31. Simple machines are tools that make work easier.

F 32. Simple machines have many complex parts. only one part

F 33. Simple machines require no energy to do work. require energy

T 34. Simple machines do work with one movement.

T 35. Simple machines give us an advantage by changing the amount, speed or direction of forces.

F 36. Simple machines require a much greater force to overcome a smaller force. smaller force to overcome

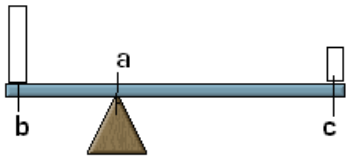
F 37. The amount of effort saved when using a simple machine is called the simple equilibrification equation. mechanical advantage

F38. Reducing friction increases the ideal mechanical advantage of a machine. friction doesn't affect IMA

F 39.When a machine is used to do work, the force applied by the machine is called the effort force. resistance

F 40. A device made up of more than one simple machine is called a complex machine. compound machine

Multiple Choice.



D 41. The diagram above is an example of a(n)
A) Inclined Plane B) Pulley C) Screw D) Lever

D 42. Which of the following statement is true for the diagram above?
A) b is the fulcrum, c is the resistance, a is the effort
B) b is the resistance, c is the fulcrum, a is the effort
C) b is the fulcrum, a is the effort, c is the resistance
D) b is the resistance, a is the fulcrum, c is the effort

B 43. Given that the mass at ***b*** is 1 kilogram. What mass would the block at ***c*** have to be to lift block ***b***?
Note: Use the distance values given in question 44.
A) 1000 grams B) 250 grams C) 80 grams D) 400 grams

C 44. In the diagram above, if the distance from ***a*** to ***b*** is 20cm, and the distance from ***a*** to ***c*** is 80 cm, then the mechanical advantage of the system is.
A) 20 B) 80 C) 4 D) 1/4

A 45. If the mechanical advantage of a simple machine is 4, then the
A) output force is 4 times the effort
B) effort is 4 times the output force
C) efficiency is 4%
D) the work output is 4 times the input

B 46. A simple machine that is actually a kind on inclined plane is a
A) pulley B) wedge C) gear D) lever

C 47. A pulley system has 3 sections of ropes that lift the load. The mechanical advantage of the system is
A) 1 B) 2 C) 3 D) 6

A 48. The efficiency of a simple machine
A) always less than 100%
B) is equal to 100%
C) is always 50%
D) is always more than 100%

B 49. Decreasing the slant of an inclined plane increases its
A) effort force B) Mechanical Advantage C) power D) work output

C 50. An example of work being done is
A) pushing against a stationary wall
B) a person pushing against a closed door that remains closed
C) a person pushing a lawn mower and cutting grass
D) a person carrying a bag of groceries to your car

Which class of lever best describes each of the following devices?

3rd 51. hockey stick

2nd 52. nutcracker

2nd 53. wheelbarrow

1st 54. scissors

1st 55. screwdriver prying off a paint lid

2nd 56. bottle cap opener

3rd 57. baseball bat

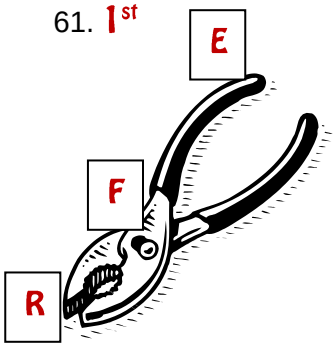
X 58. winding mountain road

3rd 59. fishing pole

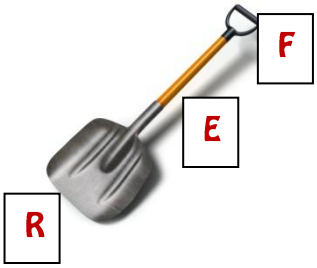
1st 60. hammer head removing a nail

Below are three devices, each a different class lever. First, identify the class of each lever. Then label (fill in the box) the fulcrum, resistance and effort by using the letters F, R, and E.

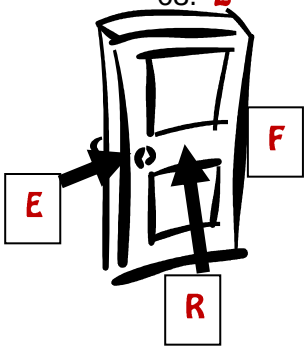
61. 1st



62. 3rd



63. 2nd



64. A crow bar (lever) is often used to lift a large object. If the crowbar is 100 cm long and the object is 20 cm from the fulcrum, what is the mechanical advantage of the crowbar?

$IMA = D_e/D_r$ $IMA = 80\ cm/20\ cm$ $IMA = 4$

65. The wheel of a small dirt bike has a radius of 30 cm. The axle has a radius of 20 cm. What is the mechanical advantage of the wheel and axle?

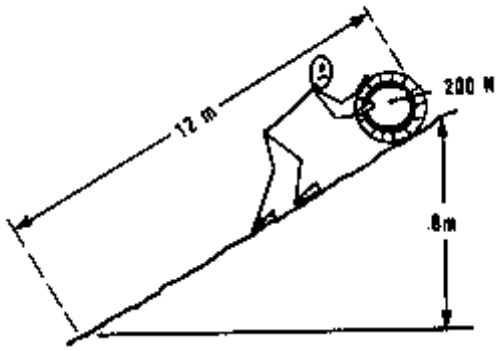
$IMA = R_w/R_a$ $IMA = 30\ cm/20\ cm$ $IMA = 1.5$

66. You are using a ramp to move a heavy box into a moving truck. If the mechanical advantage of the ramp is 2 and the ramp is 2.5 meters long, how high is the slope of the ramp?

$IMA = D_e/D_r$ $2 = 2.5\ meters/D_r$ $D_r = 1.25\ meters$

67. The mechanical advantage of a steering wheel is 15. If the radius of the steering column (axle) is 5 cm, what is the radius of the steering wheel?

$IMA = R_w/R_a$ $15 = R_w/5\ cm$ $R_w = 75\ cm$



68. You need to lift a barrel that weighs 200 N up 6 meters in height. Instead of lifting it straight up, you decide to roll the barrel up a ramp 12 meters long.
A) Calculate Mechanical Advantage.

IMA = D_e/D_r IMA = 12 meters/6 meters IMA = 2

B) Is the Mechanical Advantage you calculated ideal or actual?

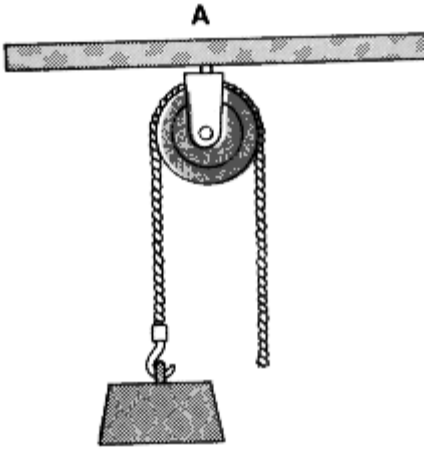
Ideal

C) If it takes 125 N of force to roll the barrel up the 12 meter ramp, what is the efficiency of the ramp?

W_o = $(F_r)(D_r)$ W_o = (200 N)(6 meters) = 1200 J Efficiency = (W_o / W_i) x 100

W_i = $(F_e)(D_e)$ W_i = (125 N)(12 meters) = 1500 J Efficiency = 80%

69. What is the mechanical advantage of the pulley seen below? Is this ideal MA or actual MA? A fixed pulley has no mechanical advantage. A mechanical advantage of 1 doesn't provide any advantage. Your forces are equal. (If it did have MA, it would be ideal.)



70. If the above pulley system can lift a 50 kg mass with 400N of force, what is the MA?

AMA = F_r/F_e AMA = (50 kg)(9.8)/400 N AMA = 1.225

(please note...a fixed pulley should have no MA, your effort force should equal the resistance force)