Name: Key Period: _____

Chapter 4 study guide Date: _____

WARNING

This guide is not the only thing you should use to study. It does not provide you with everything you need. You should also rely on your textbook, homework, and classroom notes. Use everything you can for the best results.

Topic 1: Work – Textbook pg. 108 – 111; Binder Page 35-36

1. ***True/False:*** The only thing necessary for doing work is force.
2. Motion does not necessarily mean you are doing work. The direction of the object's motion must be in the same direction as your force.
3. Imagine you are unloading a heavy entertainment center from a moving truck, when the piece of furniture starts to slide down the ramp. You try to stop it by pushing on it with all your strength, but the piece of furniture continues to slide down.
   - Is this an example of ***work*** or ***non-work***?
   - Why? You push up the ramp but the furniture moves down
4. You push on a refrigerator with a force of 500N. The refrigerator experiences a friction force of 800N with the floor.
   - Will the fridge ***move*** or ***stay still***?
   - Why? You are not pushing hard enough to overcome friction.
   - Is this an example of ***work*** or ***non-work***?
   - Why? You are pushing but the fridge is not moving
5. Which requires more work?
   a. Lifting a 50N potted plant onto a .5 meter tall table
   b. Lifting a 100N potted plant onto a .5 meter tall table
6. Write out the formula for work: Work = Force × Distance
7. Calculate the work required to lift the plants from problem 5:
   a. Lifting a 50N potted plant onto a .5 meter tall table

   50N × .5m = 25J

   b. Lifting a 100N potted plant onto a .5 meter tall table

   100N × .5m = 50J

Topic 2: Power – Textbook pg. 111 - 113 Binder Page 37-38

8. Josh and Tim both use 300N of force to push wheelbarrows a distance of 100 yards. However, It took Josh 3 minutes to complete this distance, while it only took Tim 1.5 minutes.
   - Who performed more work: ***Josh*** ***Tim*** ***Both performed the same amount***
   - Who used more power: ***Josh*** ***Tim*** ***Both used the same amount***
9. Work depends on Force and distance only, while power depends on Time.
10. ***True/False:*** To perform work faster, you need more power.
11. Write out the short and the long version of the formula for power:

    POWER = $\frac{W}{T}$ = $\frac{\text{Force} \times \text{Distance}}{\text{Time}}$

12. The unit for power is the: ***Newton*** ***Pascal*** ***Watt*** ***Liter***

13. A tow truck uses 11,000N to pull a car out of a ditch. It moves the car a distance of 5m in 30 seconds.
    - List all the variables that the problem gives you:

      Force = 11,000N Time = 30s

      Distance = 5m

    - Calculate the work the truck performed:

      $11{,}000\,N \times 5m = 55{,}000\,J$

    - Calculate the power the truck used:

      $P = \frac{W}{T} = \frac{55{,}000\,J}{30s} = 1{,}833\,W$

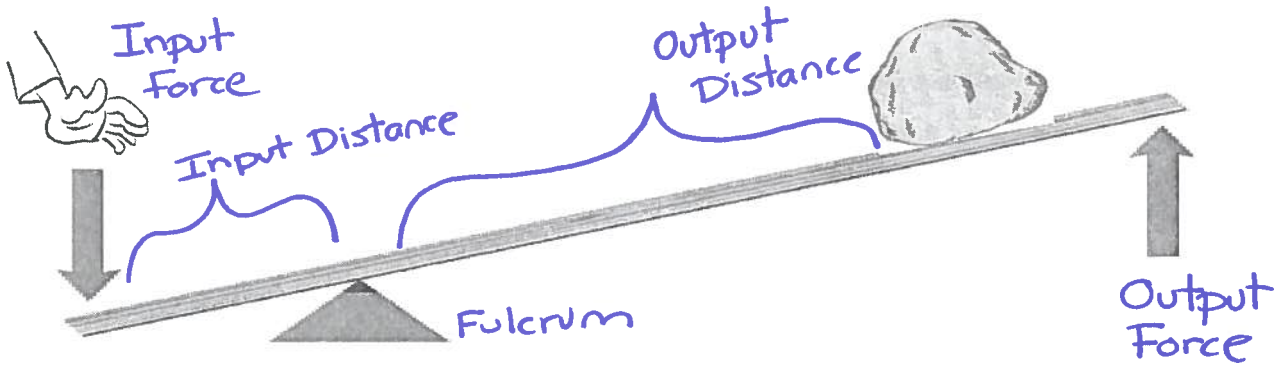
14. Imagine if the same truck used 11,000N of force to move the same car 5m but did it in only 10 seconds. How much power would the truck's engine have to produce then?

    $P = \frac{W}{T} = \frac{11{,}000\,N \times 5m}{10s} = 5{,}500\,W$

Topic 3: Machines – Textbook pg. 114 - 117 Binder Page 39-44

15. Machines make work feel ___easier___, but they do not ___change___ the amount of work you do.
16. ***True/False:*** When using a machine, your input work is <u>equal</u> to the machine's output work.
17. Use the word bank to label the machine below:

Output force *Input distance* *Output distance* *Input force*



18. If a machine makes work easier by <u>increasing your input distance</u>, then what does it do to the rest of the variables?

↓	x	↑	=	↑	x	↓
Input force		*Input distance*		*Output force*		*Output distance*

19. If a machine makes work easier by <u>decreasing your input distance</u>, then what does it do to the rest of the variables?

↑	x	↓	=	↓	x	↑
Input force		*Input distance*		*Output force*		*Output distance*

20. Imagine you use a machine that requires an input force of 300N over an input distance of .4m.
    - What would be your input work? ___W = F×D = 300N × .4m = 120J___
    - What would be the machine's output work? ___120 J___

    * Input Work = Output Work

21. What is mechanical advantage? The number of times a machine increases a force exerted on it.

22. What is the formula for calculating the efficiency of a machine? $\frac{\text{Output Work}}{\text{Input Work}} \times 100\%$

23. If friction in a machine increases, what happens to the machine's efficiency? It decreases

Topic 4: Simple machines – Textbook pg. 124 - 135 Binder Page 45-51

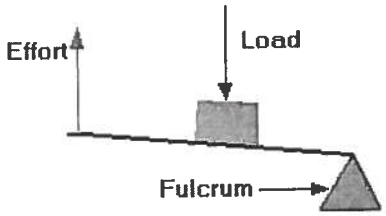
24. List the 6 types of simple machines: ***Study the Simple Machine Summary Table!**

- Lever
- Incline Plane
- Wheel & Axle
- Pulley
- Screw
- Wedge

25. The inclined plane makes work easier by:
   a. Increasing input force and decreasing input distance
   b. Decreasing input force and increasing input distance
   c. Changing the direction of your input force

26. The wedge makes work easier by:
   a. Increasing input force and decreasing input distance
   b. Decreasing input force and increasing input distance
   c. Changing the direction of your input force

27. The screw makes work easier by:
   a. Increasing input force and decreasing input distance
   b. Decreasing input force and increasing input distance
   c. Changing the direction of your input force



28. Which type of lever is shown to the right?
   a. First class b. Second class c. Third class

29. The third class lever makes work easier by:
   a. Increasing input force and decreasing input distance
   b. Decreasing input force and increasing input distance
   c. Changing the direction of your input force

30. Which type of pulley is shown to the right?
   a. Fixed pulley b. Moveable pulley c. Block and tackle pulley

31. The block and tackle pulley makes work easier by:
   a. Increasing input force and decreasing input distance
   b. Decreasing input force and increasing input distance
   c. Changing the direction of your input force
   d. Both B and C

32. The wheel makes work easier by:
   a. Increasing input force and decreasing input distance
   b. Decreasing input force and increasing input distance
   c. Changing the direction of your input force

33. The axle makes work easier by:
   a. Increasing input force and decreasing input distance
   b. Decreasing input force and increasing input distance
   c. Changing the direction of your input force