

WORK and MACHINES NOTES

1. Work is done when a force that is applied to an object **moves** that object.

2. According to that definition, put an **X** in the blank where work is done.

_____ If you are sitting and looking at a computer screen, has work been done on the computer?

X If you are typing on a computer's keyboard, has work been done?

_____ If you are sitting in the car on the way to school, has work been done on the car?

X If you are driving the car, has work been done on the car?



3. You have to exert a **force** and **move** something in the **same** direction as the force to qualify as doing **work**.

4. Work is calculated by using the formula: **work = force x distance**

4a. The unit for work is the **Joule (J)**

5. To lift one tree that has a weight of 100 Newtons, you would have to exert a force over **100 Newtons**. If you were to raise the tree **1 meter**, you would do:

Formula: **W = F x D**

Equation: **W = 100N x 1 m**

Answer : **W = 100 joules of work**

6. To lift a tree that has twice as much weight, you would have to exert a force over **200 Newtons**. If you were to raise the tree **1 meter**, you would do:

Formula: **W = F x D**

Equation: **W = 200N x 1 m**

Answer : **W = 200 joules of work**

5. The **heavier** the object, the more work needed to move the object the same distance.

6. If you try to move the same object a longer distance, more **work** is needed.

7. A **simple machine** is a device that has one or two parts which you can use to make work **easier** or more effective.



8. A machine does **NOT decrease** the amount of work that is done, but makes the work **easier** by:



-Increasing the amount of **force** exerted to move the object, OR



-Increasing the **distance** over which you exert the force, OR



- **changing** the **direction** in which you exert your force.

9. The force you apply to the simple machine is called the **input** force.

10. The machine does work by exerting a force on the object over a distance. The force exerted by the machine on the object to be moved is the **output** force. 

11. A machine's **mechanical advantage** is a ratio of the output force to the input force. It indicates how much the simple machine changes the input force (the force you apply to it.)

$$\text{Mechanical Advantage} = \frac{\text{Output Force}}{\text{Input Force}}$$

15. Some machines allow you to

- use **more** force over a **shorter** distance (can opener),
- **Less** force over a **longer** distance (piano up ramp) or
- the **same** force in a **different** direction (raising a sail).



16. In the end, you do the **same** amount of **work** with the machine as you do without the machine, but the work is **easier**.

17. There are **six** types of machines that make work easier. They are called

Simple Machines. The six simple machines are:

Wedge Wheel and Axle Screw Lever

*Inclined plane

*Pulley

*Note: These two simple machines are our focus this year.

_____ 18. Read pages 194 – 198 in your textbook and complete blue #4 & #5. Fill in the graphic organizer on page 198.

