Grade 8 Science

Efficiency of Machines Worksheet

Name: _____ Class: _____ Date:_____

Machines are great in that they change the direction of force or change the magnitude of the force that is applied. Friction is everywhere though on Earth and therefore there is a loss of energy to the rubbing of moving parts. This means that work in does not equal work out. The 'cost' of using a simple machine is the loss of some energy due to friction. We can calculate the efficiency of a machine by finding the percentage of the Actual Work done (Work Out) in relation to the amount of Work put into the Machine (Work in). So, Efficiency = Work Out ÷ Work In X 100%. Using this equation, calculate the efficiency of the following machines. Remember to use the decimal equivalent of your percentage (I.e., 87% = .87)

1. A lever does 315 J of work and needs 525 J of work to be put into the lever to make this happen. What is the efficiency of the Lever?

$$\text{Eff} = \frac{W_{out}}{W_{in}} \times 100\%$$

$$= \frac{315\ J}{525\ J} \times 100\%$$

$$= 0.6 \times 100\%$$

$$= 60\%$$

2. A machine requires 1820 J of work to do 1547 J of work. What is the efficiency of the machine?

3. If a machine is 93% efficient, how much work can it do if you put in 1500 J of work into it?

4. A pulley system raises a 1200N weight 3 metres. If it requires 4000 Joules of work to do this, what is the efficiency of the pulley system?

5. A 7 metre ramp is used to push a 400 N box up to a height of 2 metres. It requires a force of 180 N to do this. What is the efficiency of the ramp?

6. A machine with an efficiency of 92% needs 23800 J of work to operate. What is the Work output of the machine?

7. A machine does 2350 J of work and it is discovered that the efficiency is 65%. How much work has to be put into the machine to make it do that amount of work?

8. A squeaky gear system had an efficiency of 47%. After cleaning and oiling the gears, the work output was 1200 J with 1800 J input. How much was the efficiency increased?