Worksheet 6D

Name _____

1. A crate of bananas weighing 3000 N is shipped from South America to New York, where it is unloaded by a dock worker who lifts the crate by pulling with a force of 200 N on the rope of a pulley. What is the actual mechanical advantage of the system?

2. Two clowns are in a circus act performing a stunt with a trampoline and a seesaw. The smaller clown stands on the lower end of the seesaw (which is 1.5 m from the fulcrum) while the larger clown jumps from the trampoline onto the raised side of the seesaw (which is 3 m from the fulcrum), propelling his friend into the air. A) What is the mechanical advantage of the seesaw? B) If the larger clown exerts a force of 850 N on the seesaw as he jumps, how much force is exerted on the smaller clown?

3. A jackscrew with a handle 30.0 cm long is used to lift a car sitting on the jack. The car raised 2.0 cm <u>with every full turn</u> of the handle. What is the mechanical advantage of the jack? ($C = 2\pi r$).

4. Jack & Jill went up the hill to fetch a pail of water. At the well, Jill turned the crank wheel of radius 0.400 m to rotate the axle of radius 0.100 m, so she could raise the 60.0 N bucket of water. A) What is the mechanical advantage of the wheel? B) How much force did Jill need to apply to the crank wheel?

5. Clyde, a stubborn 3500 N mule, refuses to walk into the horse trailer, so Farmer Brown must drag him up a 5.0 m ramp, which stands 0.5 m above the ground. A) What is the ideal mechanical advantage of the ramp? B) How much force must Farmer Brown apply to move Clyde up the ramp?

6. Cathy, a 460 N actress playing Peter Pan, is hoisted above the stage in order to "fly" by a stagehand pulling on a pulley system with a force of 60N. What is the mechanical advantage of the pulley system?

7. A boy exerts a force of 225 N on a lever to raise a 1.25×10^3 N rock a distance of 13 cm. How far did the boy have to push his end of the lever?

8. A pulley system has a mechanical advantage of 10. A) If a mover used this pulley to lift a piano with a force of 1450 N a distance of 4 m, how much force must the mover use? B) How far will the mover pull the rope? C) How many ropes support the piano?

9.

1. The gear attached to the rear axle of a bicycle acts as the wheel in a wheel and axle simple machine. The radius of the gear and the wheel are the input and output distances respectively. If the gear and wheel combination are to have a MA of 6 and the wheel has a radius of 0.5 m, what is the radius of the gear necessary to produce the MA?

2. A 1 cm long screw that is 62.5% efficient in pulling a 500 N board to a wall when the carpenter used 80 N of force in turning it. What is the thread length of the screw?