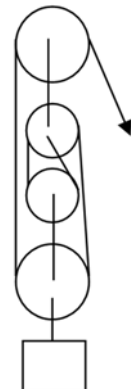
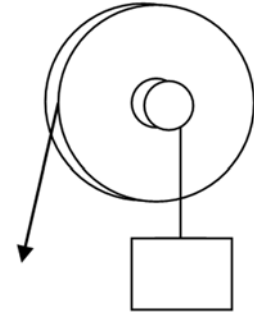


Worksheet - Simple Machines

- 1.) You apply a force of 18 N on to the end of a lever to open a paint can lid. The resistance of the lid is 9.0 N . Calculate the MA.
- 2.) You apply a force on a crowbar to open a stuck door. The effort length of the crowbar is 26 cm long and the resistance length is 4.0 cm . Find the MA of the crowbar.
- 3.) A worker uses a board that is 4.0 m long to pry up a boulder. A small rock is used for a fulcrum and is placed 0.50 m from the resistance end of the lever. Calculate the MA of the board.
- 4.) a.) Three of your friends are all sitting on one end of a seesaw. The combined weight is 275 N . The length from the fulcrum to your friends is 2.5 m . The rest of the seesaw (from the fulcrum to you) is 4.5 m . What is the MA? What effort force is needed to lift your friends?
b.) You want to see if you can lift your three friends when each side of the seesaw is equal in length (3.5 m). What is the MA? What effort force is needed to lift them?
- 5.) A person weighing $800.\text{ N}$ moves an object with a simple machine using all his weight. The mechanical advantage of the machine is $MA = 5.0$. Determine the mass of the object.
- 6.) The force arm of a lever is 4.0 m long and the length of the load arm is 1.0 m . Calculate the force F needed to lift a $1000.\text{ N}$ load and find out the mechanical advantage of the lever.
- 7.) The force arm of a lever is 2.0 m long and the length of the load arm is $80.\text{ cm}$. Work out the weight we can lift making a $200.\text{ N}$ force and calculate the mechanical advantage of the lever.
- 8.) The force arm of a lever is 1.5 m long. We want to lift a $2500.\text{ N}$ weight applying a $1200.\text{ N}$ force. Find out the length of the load arm needed and work out the mechanical advantage of the lever.
- 9.) We want to lift a $8200.\text{ N}$ weight applying a $+820.\text{ N}$ force. Find out the mechanical advantage needed. How many movable pulleys will we need?
- 10.) A block and tackle has three movable pulleys. Find out the load we can lift applying a $+600.\text{ N}$ force and work out the mechanical advantage of the machine.
- 11.) What is the mechanical advantage of the system pictured on the right?
- 12.) If the load is $100.\text{ kg}$, how much effort is required to pick up the load for the pulley in the previous question?



13.) What is the mechanical advantage of the system pictured below if the diameter of the wheel is 3.0 m and the diameter of the axle is 1.0 m ?

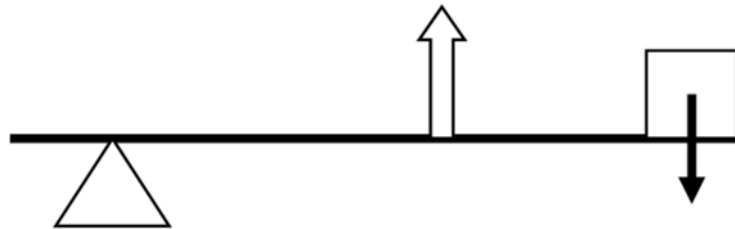


14.) If Mr. Wilkison can only pull with $+25\text{ N}$ of force, how much weight can he lift using the wheel and axle system from question 13?

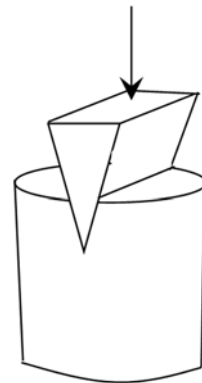
15.) If we build a ramp that is 2.0 m high and the length of the ramp is $30.\text{ m}$, what is the mechanical advantage?

16.) How much effort force would someone need to push a 45 kg box up the ramp from question 15?

17.) Jose and Suzette construct an arm where the effort is located $10.\text{ cm}$ from the fulcrum and the load is 25 cm from the fulcrum, what is the mechanical advantage of the arm?



18.) Find the mechanical advantage and the maximum separation load for a wedge used to split the object shown. The wedge has an incline length of 8.0 cm , an overall height of 2.0 cm . The effort load applied is $60.\text{ N}$.



19.) A wheel and axle is used to raise a weight of $+720\text{ N}$ with an effort of 200 N . If the radii of the wheel and axle are $40.\text{ cm}$ and $10.\text{ cm}$ respectively; What is the efficiency of the machine?