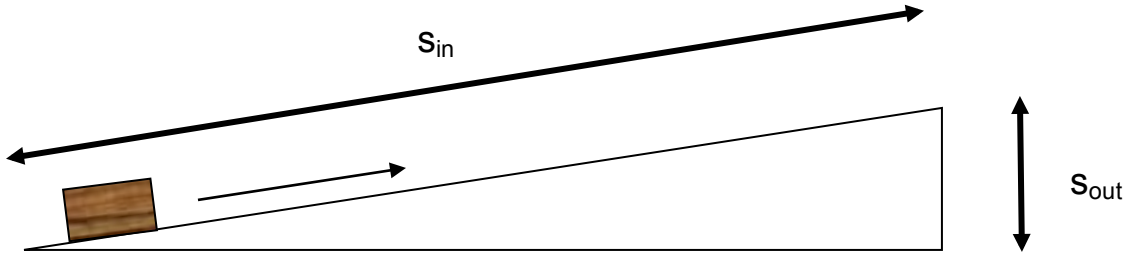


Name \_\_\_\_\_

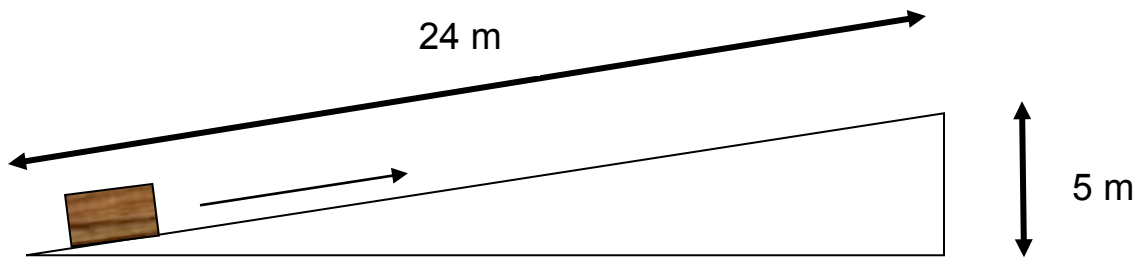
## Simple Machines, IMA, AMA, and Efficiency Worksheet

### Inclined Planes

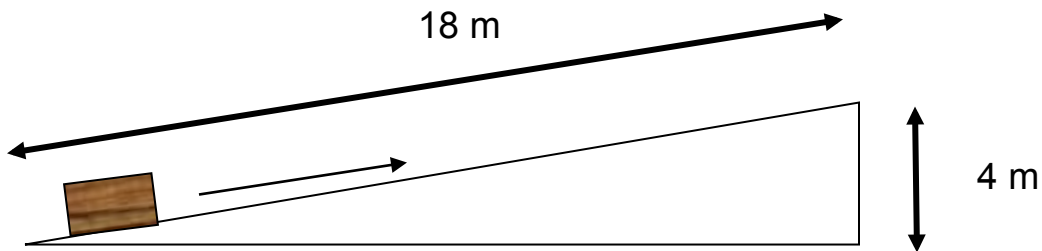
1. The following is how you tell the IMA of an inclined plane.



a. What is the IMA of this ramp? Show your work.



b. What is the IMA of this ramp? Show your work.

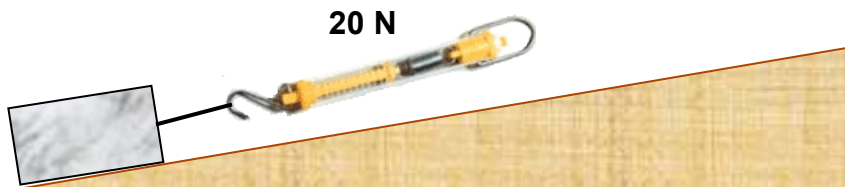


2. To determine the AMA of the inclined plane, you must use force. The effort force is what is measured with a spring scale in Newtons. The resistance force is weight of the box in Newtons.

a. Calculate the AMA of the ramp below. Show your work.

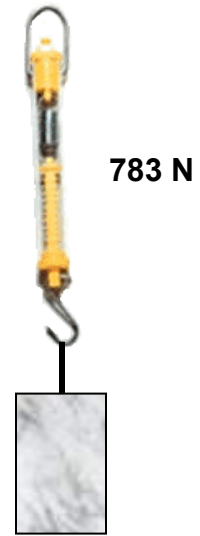
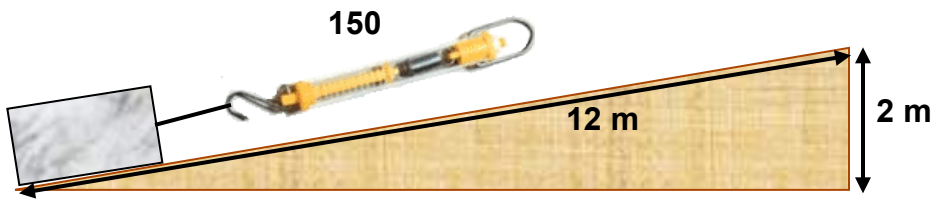


b. Calculate the AMA of the ramp below. Show your work.

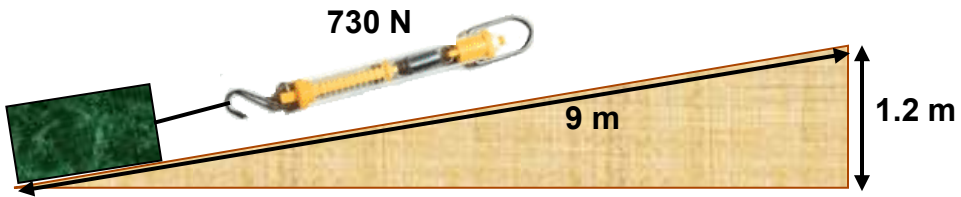


3.

a. Determine the efficiency based on the diagram below. Show work.

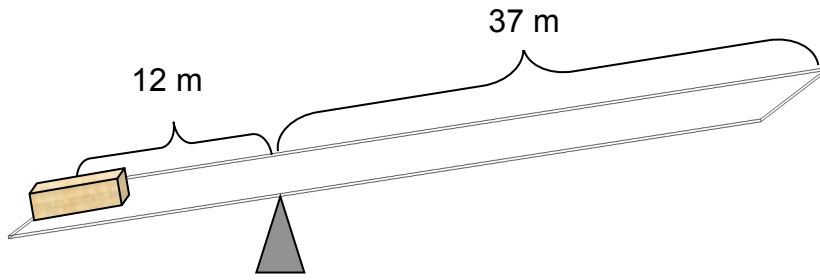


b. Determine the efficiency based on the following diagram. Show your work.

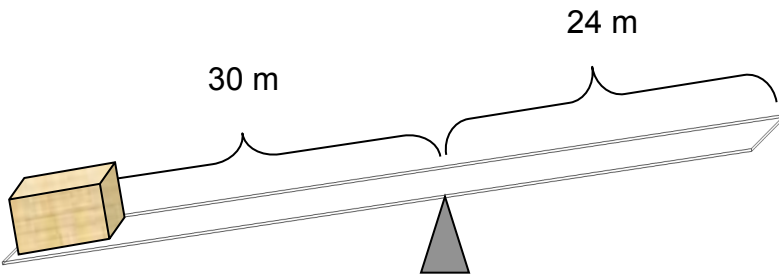


**Levers**

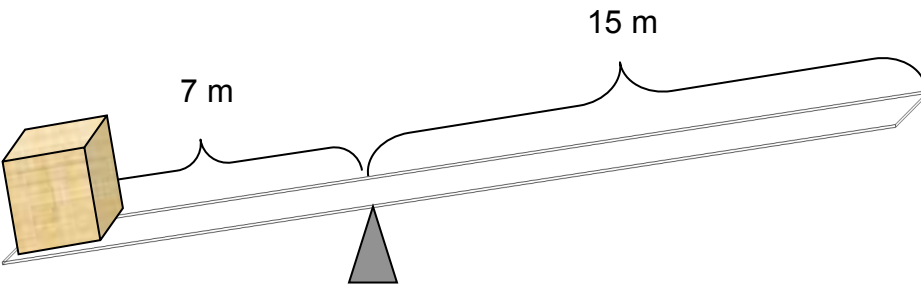
4.



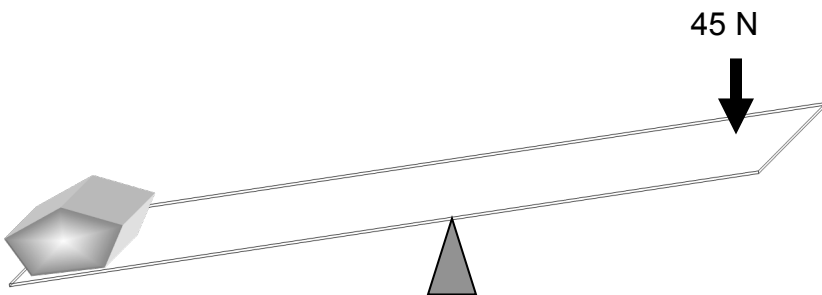
b. Determine the IMA for the following. Show your work.



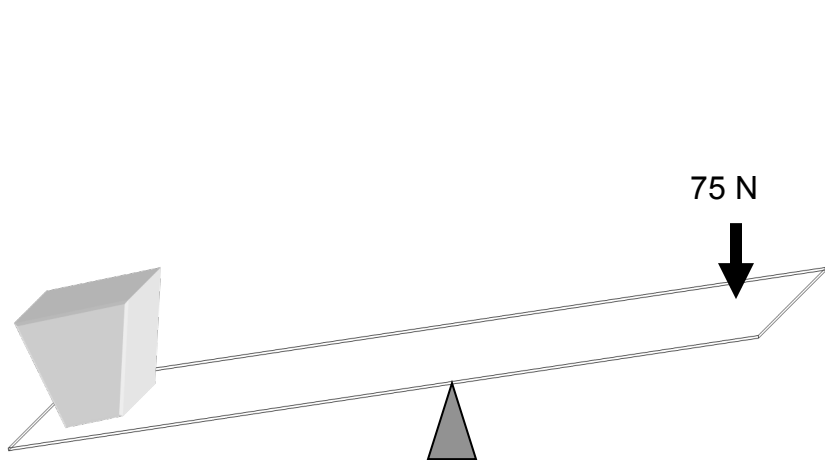
c. Determine the IMA for the following. Show your work.



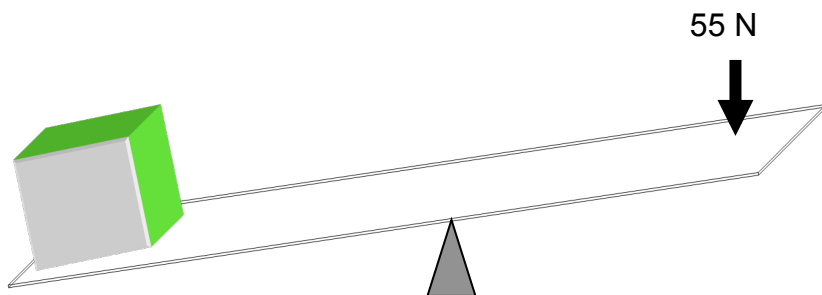
5.



a. Find the AMA of the following. Show your work.

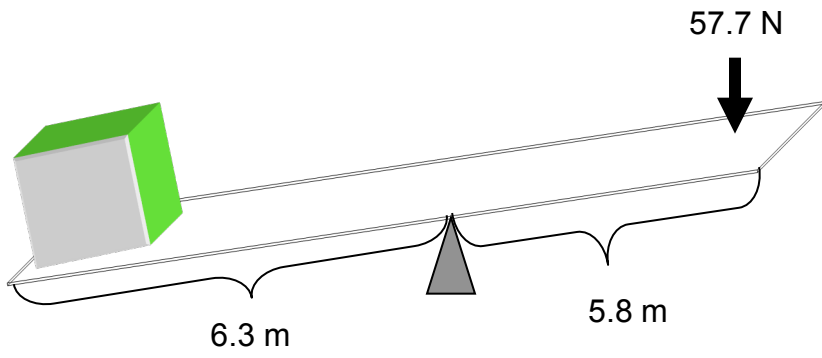


b. Find the AMA of the following. Show your work.

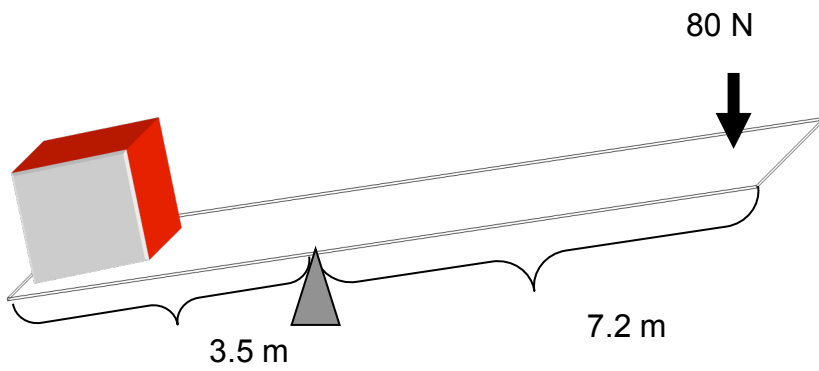


7. Determine the efficiencies of the lever examples below. Show your work.

a.

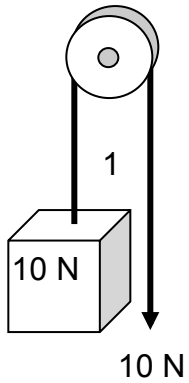


b.

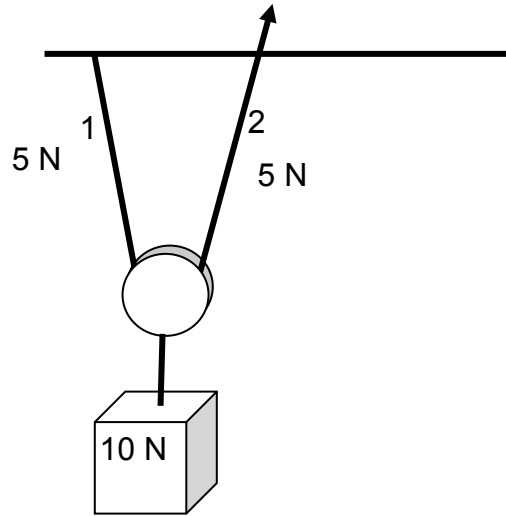


**Pulleys**

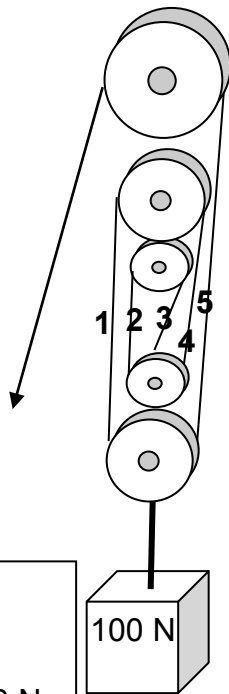
8. The ideal mechanical advantage of a pulley is determined by counting the number of supporting ropes. Look at the following examples.



IMA = 1



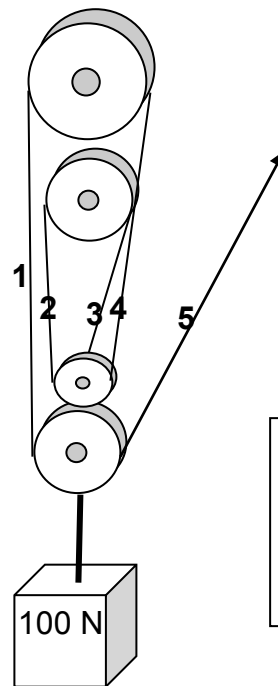
IMA = 2



Each rope supports 20 N.  

$$\frac{100 \text{ N}}{5} = 20 \text{ N}$$

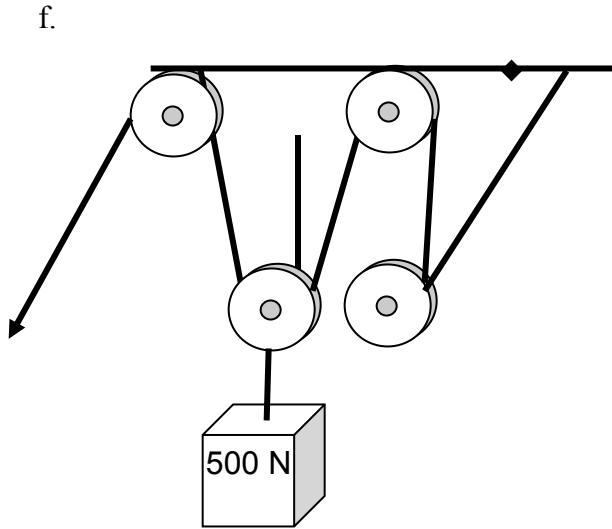
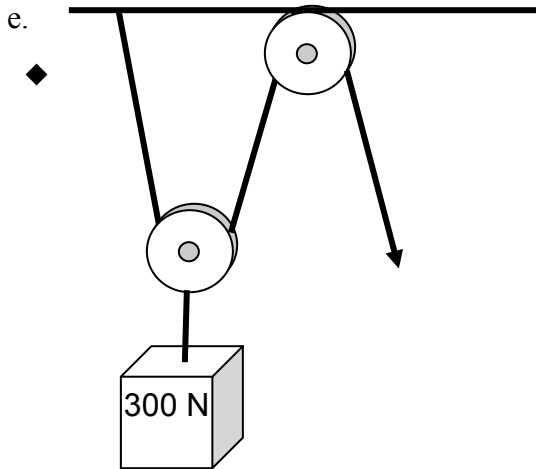
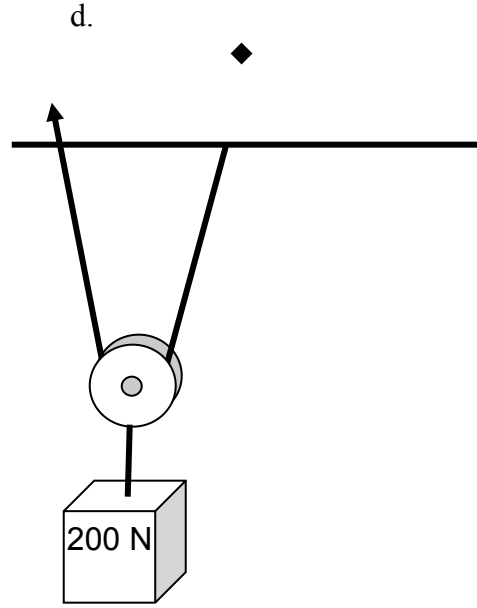
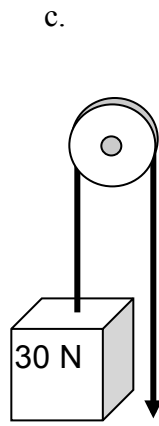
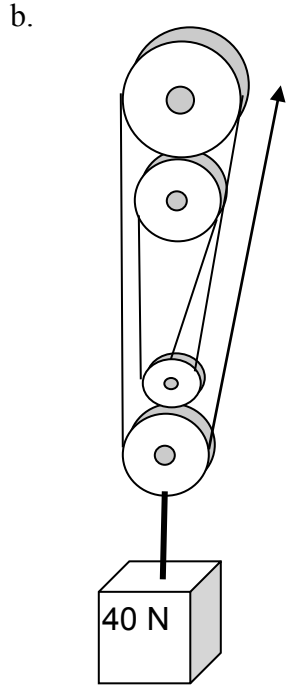
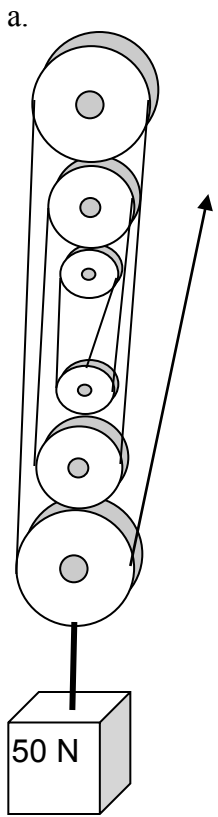
IMA = 5



Each rope supports 20 N.

IMA = 5

Determine the IMA of the following pulleys.

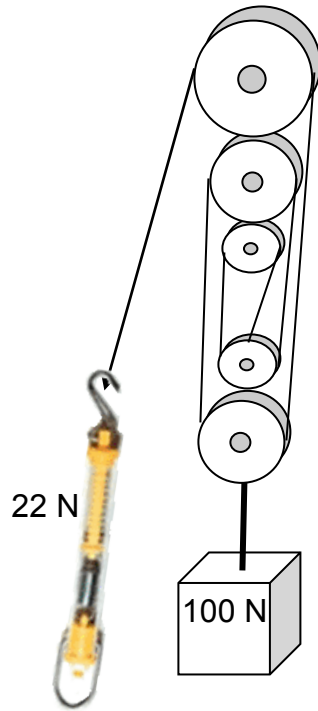


9. Tell how much force is on each rope.

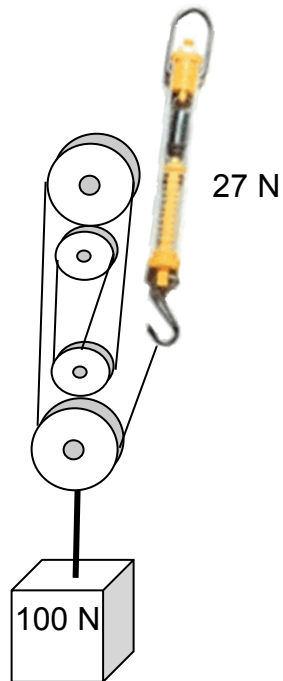
- a)
- b)
- c)
- d)
- e)
- f)



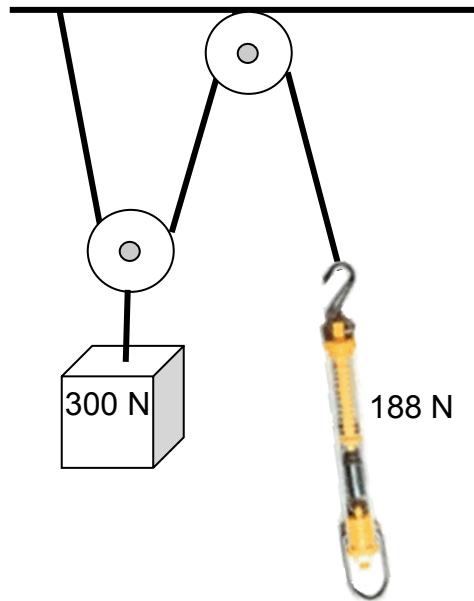
10. Determine the efficiency of the following pulley system.



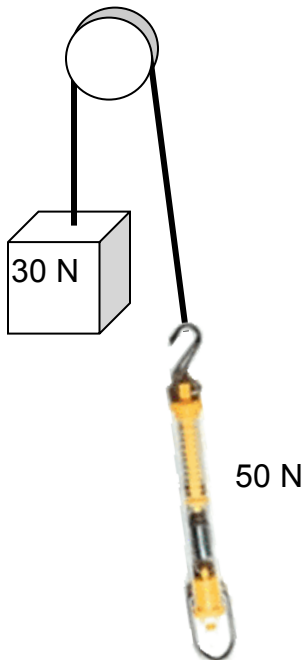
10. Determine the efficiency of the following pulley system.



11. Determine the efficiency of the following pulley.



12. Determine the efficiency of the following pulley.

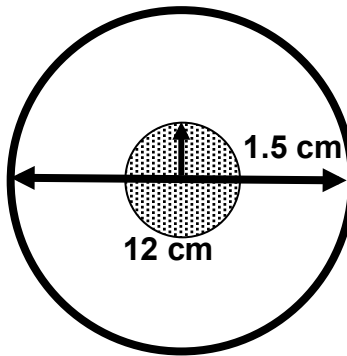


### 13. Wheel and Axles

- a. if effort is applied to the wheel, then force is increased, but speed and distance are decreased.
- b. If effort is applied to the axle, then force is decreased, but speed and distance are increased.
- c. If the wheel portion is not fixed to the axle, then it is not a wheel and axle.
- d. The wheel and axle is made up of two circles: the smaller one is the axle and the larger one is the wheel. Every time the wheel is turned, the axle turns, too. One rotation of the wheel causes one rotation of the axle.
- e. IMA of a wheel and axle

$$\text{IMA} = \frac{\text{radius of wheel}}{\text{radius of axle}} \quad \text{OR} \quad \text{IMA} = \frac{\text{diameter of wheel}}{\text{diameter of axle}}$$

- f. What is the IMA of the wheel and axle?



- g. What is the IMA of the wheel and axle?

