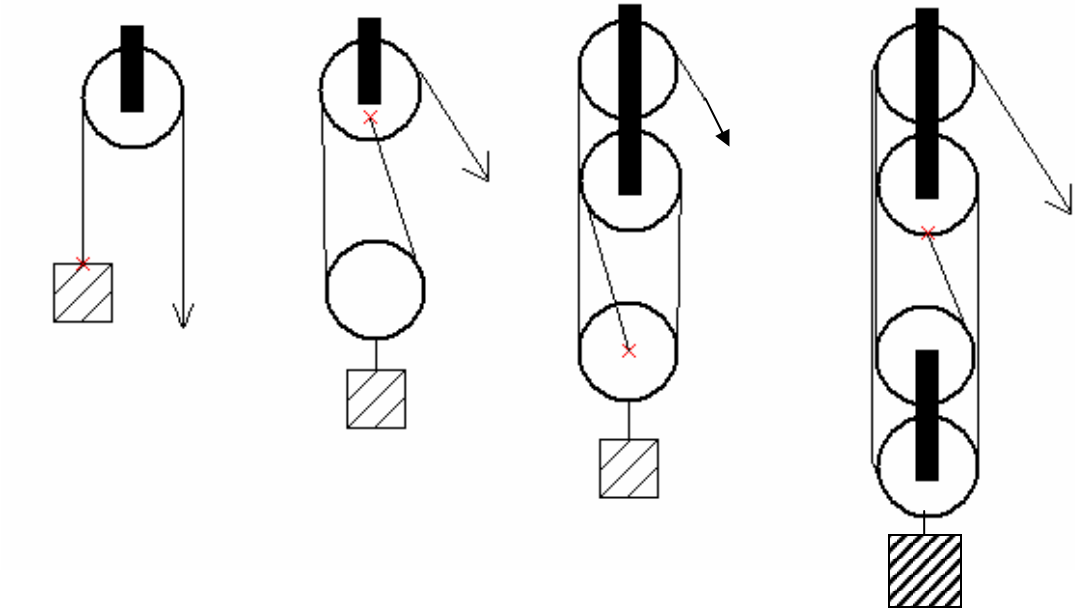
Title: Pulleys

Introduction: Pulleys are simple machines that can be used to change the direction of a force, the size of a force, or the speed at which the load (resistance force) moves. As the size of the effort force reduces, the distance through which the resistance force moves decreases proportionally.

Equipment: Several pulleys, string, hooked masses, meter stick, spring scale.

Objective: In this investigation the mechanical advantage and efficiency of several pulley systems will be determined.

(a) (b) (c) (d)



Procedure: Set up system according to diagram (a).

In each case a 1 kg mass (9.8N) will serve as the resistance force.

Apply the minimum effort force to the system that just causes the load to move at the slowest constant velocity.

Record this effort force. (N)

Measure and record as well the distances through which both the effort and resistance moves. (m)

Repeat procedure for systems (b), (c), and (d).

Data and Results:

System	F_r (N)	F_e (N)	D_r (m)	D_e (m)	W_{in} (J)	W_{out} (J)	MA	IMA	Eff (%)
A	9.8								
B	9.8								
C	9.8								
D	9.8								

Interpretation:

1) What is the primary reason that efficiency is not 100% for a system?

2) Would increasing the load increase the IMA? What other variable would also increase if the load were increased?

3) Compare the number of lifting strings to the IMA for each system. Comment on any similarity.

a) strings=_____ IMA=_____

b) strings=_____ IMA=_____

c) strings=_____ IMA=_____

d) strings=_____ IMA=_____

4) It is common to hear people say that machines save you work. Explain why this statement is FALSE and tell what a machine actually does.