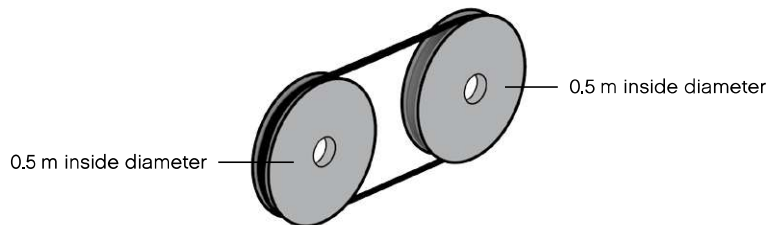


The Mechanical Advantage of a Pulley

The advantage of a pulley lies in the trade-off between force and distance. In general, what you gain in useful force, you have to make up by traveling extra distance. The most accurate way of calculating the mechanical advantage of a belt driven pulley is to divide the inside diameter of the driven pulley wheel by the inside diameter of the drive pulley wheel. You can also compare the number of rotations of the driven pulley wheel to one rotation of the drive pulley wheel. However slip may affect the accuracy of your comparison.

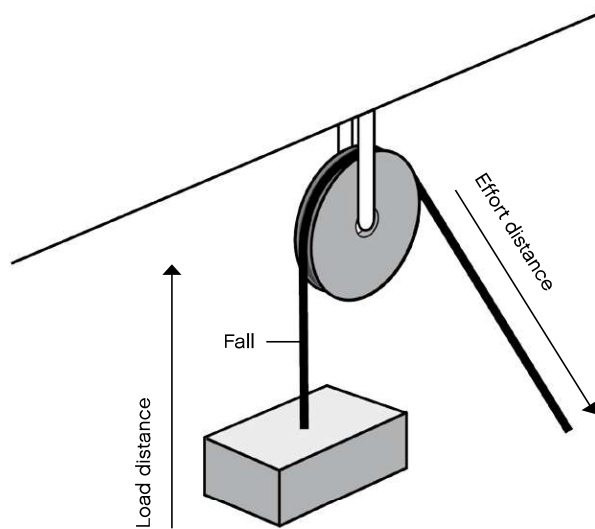
$$\text{Mechanical advantage} = \frac{\text{Driven pulley diameter}}{\text{Driver pulley diameter}}$$



$$\text{Mechanical advantage} = \frac{0.5 \text{ m}}{0.5 \text{ m}}$$

$$\text{Mechanical advantage} = 1$$

There are two ways of determining the mechanical advantage of a pulley system. The simplest way to determine the mechanical advantage is counting the number of falls (or active lifting ropes) that are actually attached to the load. Alternatively, you can divide the effort distance by the load distance.



$$\text{Mechanical advantage} = 1$$

Hint:



The inside diameter of a large pulley wheel is 22 mm (\approx 0.8 in).



The inside diameter of a small pulley wheel is 5.8 mm (\approx 0.22 in).

Did you know?

In theory, you should be able to lift any object regardless of its weight using a huge block and tackle system and huge lengths of rope. However, due to an increase in friction, the system will eventually become inefficient to the point where it gives no mechanical advantage.