

Calculating Mechanical advantage

To Calculate Mechanical advantage you need to:

This is a very simple question to work out, you simply divide the Output by the input and the answer should be a whole number.

measured in newtons (N).



MATHEMATICAL UNDERSTANDING

E15: Mechanical advantage calculation

Question:

What is the mechanical advantage of a linkage with an input force of 10 N and an output force of 30 N?

Solution:

$$MA = \frac{F_b}{F_a}$$

$$MA = \frac{30}{10}$$

$$MA = 3$$

Calculating Mechanical advantage

- 1, What is the mechanical advantage of a linkage with an input force (effort) of 10N and an output force (load) of 30N (show all working)
- 2, What is the mechanical advantage of a linkage with an input force (effort) of 5N and an output force (load) of 35N (show all working)
- 3, What is the mechanical advantage of a linkage with an input force (effort) of 20N and an output force (load) of 45N (show all working)
- 4, What is the mechanical advantage of a linkage with an input force (effort) of 7N and an output force (load) of 35N (show all working)
- 5, What is the mechanical advantage of a linkage with an input force (effort) of 9N and an output force (load) of 56N (show all working)

Calculating Gear ratio

To calculate Gear ratio you need to:

Divide the number of driven teeth by the number of Driver teeth.

The answer will come out as a whole number but needs to be put into a ratio 3:1.

Basically it is to do with how many turns the driven gear does compared to the Driver gear.

MATHEMATICAL UNDERSTANDING

E14: Ratio of simple gears

Question

If the number of teeth on the driver gear is 36 and the number of teeth on the driven gear is 108, what is the gear ratio of the system?

Solution

$$\begin{aligned}\text{Gear ratio} &= \frac{108}{36} \\ &= 3:1\end{aligned}$$

This means that the driver gear must revolve three times for the driven gear to revolve once. The output torque is therefore three times greater than the input torque.

Calculating Gear Ratio

- 1, If the number of teeth on the driver gear is 36 and the number of teeth on the driven gear is 108, what is the gear ratio of the system? (show your working)
- 2, If the number of teeth on the driver gear is 56 and the number of teeth on the driven gear is 224, what is the gear ratio of the system? (show your working)
- 3, If the number of teeth on the driver gear is 11 and the number of teeth on the driven gear is 22, what is the gear ratio of the system? (show your working)
- 4, If the number of teeth on the driver gear is 16 and the number of teeth on the driven gear is 96, what is the gear ratio of the system? (show your working)
- 5, If the number of teeth on the driver gear is 27 and the number of teeth on the driven gear is 108, what is the gear ratio of the system? (show your working)

Calculating Velocity ratio

To calculate Velocity ratio you need to:

Divide the diameter of driven teeth by the Diameter of Driver teeth.

The answer will come out as a whole number but needs to be put into a ratio 3:1.

Basically it is to do with how many turns the driven pulley does compared to the Driver pulley.



MATHEMATICAL UNDERSTANDING

Pulley system: velocity ratio

Question

A driver pulley has a diameter of 30 mm and the driven pulley has a diameter of 150 mm. What is the velocity ratio of the system?

Solution

$$\begin{aligned}\text{Velocity ratio} &= \frac{150}{30} \\ &= 5:1\end{aligned}$$

Calculating velocity ratio

- 1, A driver pulley has a diameter of 30mm and the driven pulley has a diameter of 150mm. What is the Velocity ratio of the system?
- 2, A driver pulley has a diameter of 50mm and the driven pulley has a diameter of 150mm. What is the Velocity ratio of the system?
- 3, A driver pulley has a diameter of 40mm and the driven pulley has a diameter of 160mm. What is the Velocity ratio of the system?
- 4, A driver pulley has a diameter of 60mm and the driven pulley has a diameter of 240mm. What is the Velocity ratio of the system?
- 5, A driver pulley has a diameter of 80mm and the driven pulley has a diameter of 320mm. What is the Velocity ratio of the system?