

GEAR RATIO PROBLEMS

1. A gear system consists of a driver gear with 40 teeth and a driven gear with 80 teeth.

- What is the gear ratio of this system?

Answer: The gear ratio is the number of teeth on the driven gear divided by the number of teeth on the driver gear:
Gear Ratio = $80 / 40 = 2:1$

- Is the output speed higher or lower than the input speed?

Answer: The output speed is **lower** because the driven gear is larger, resulting in a reduction in speed.

2. In a gear system, the driver gear has 20 teeth, and the gear ratio is 4:1. How many teeth does the driven gear have?

Answer: Using the gear ratio formula:
Teeth on Driven Gear = Teeth on Driver Gear \times Gear Ratio
 $= 20 \times 4 = 80$ teeth

3. In a gear train, if the driver gear is larger than the driven gear:

- How will the angular speed of the driven gear compare to that of the driver gear?

Answer: The angular speed of the driven gear will be higher than that of the driver gear.

- What happens to the torque transmitted to the driven gear?

Answer: The torque transmitted to the driven gear is **reduced** because speed increases as torque decreases.

4. The driver gear in a system has a diameter of 6 cm, and the driven gear has a diameter of 12 cm.

- What is the gear ratio?

Answer: The gear ratio is the diameter of the driven gear divided by the diameter of the driver gear: Gear Ratio = $12 / 6 = 2:1$

- How does this affect the rotational speed of the driven gear compared to the driver gear?

Answer: The rotational speed of the driven gear is **lower** than that of the driver gear.

5. In a gear train, the driver gear provides high torque but rotates slowly. The driven gear rotates faster.

- Which gear likely has more teeth, the driver or the driven gear?

Answer: The driver gear likely has more teeth since it is slower and provides higher torque.

- Why is torque reduced in the driven gear when its speed increases?

Answer: Torque is reduced in the driven gear because speed and torque are inversely related in a gear system.