

Quiz 2 Review Questions

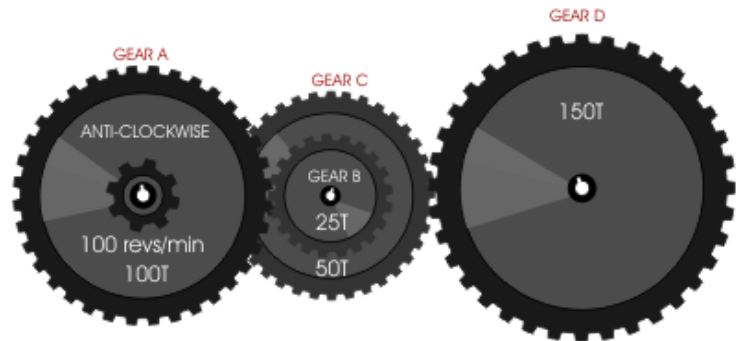
Gear Train #1

Santiago and Ellery want to design a robot with the best gear ratio possible in order to climb the greatest possible slope. They have 40, 24, 14, 12 and 8 tooth gears available.

- What two gears should they use for the driver gear and driven gear to maximize torque and what is the resulting gear ratio?
- If the robot's motor spins at 25 rotations per minute, how fast will the output gear spin?

Gear Train #2

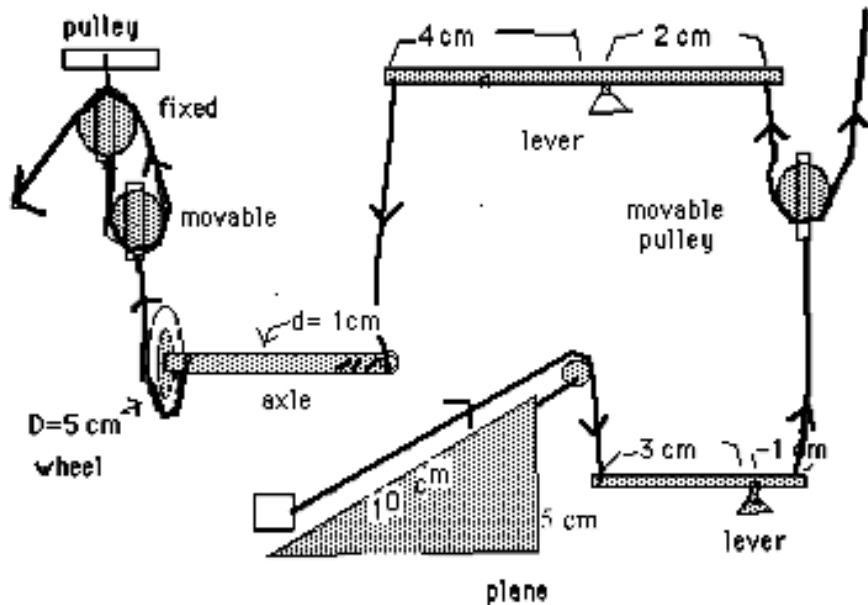
In the gear train shown to the right, Gear A is the driving gear and rotates at 100 rotations/minute in a counter clockwise direction.



- What is the gear ratio?
- What are Gear D's speed and direction of rotation?
- How much torque must be applied to gear A if Gear D has 100 ftlbs of torque?

Compound Machine

Calculate the ideal mechanical advantage for the compound machine diagramed below that pulls the rope to lift the weight up the ramp.



Answers:
 GT#1: (A) Driver = 40, Driven = 8; GR = 5 (B) $\omega_{out} = 5 \text{ rpm}$
 GT#2: (A) GR = 0.75 or $\frac{3}{4}$ (B) $\omega_{out} = 133 \text{ rpm}$ (C) $T_{in} = 133 \text{ ftlbs}$
 Compound Machine: $IMA_{TOTAL} = 26.6$