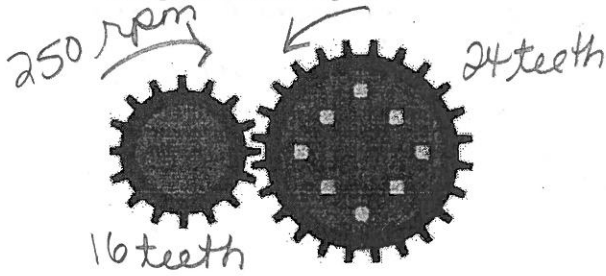


Practice with Gears

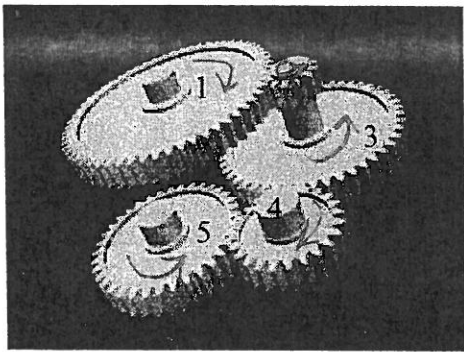
- 1) The gear on the left spins at 250 RPM clockwise. What is the speed and direction of the gear on the right?



$$D_N S = \frac{D_R}{D_N} \cdot D_R S$$

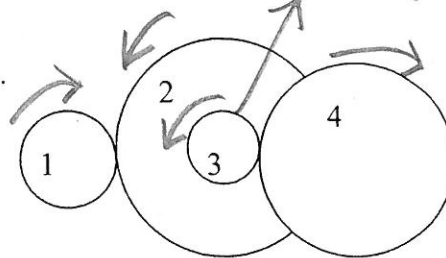
$$= \frac{16 \text{ teeth}}{24 \text{ teeth}} \cdot 250 \text{ RPM} = 167 \text{ RPM}$$

- 2) Consider the gear train below. Gear #1 rotates clockwise. Give the direction of rotation of the other gears. *counter CW*



- 1) CW
- 2) CCW
- 3) attached to 2 ∴ CCW
- 4) CW
- 5) CCW

- 3) Consider the system of friction gears on the right.
 Radius of gear #1 = 2.0 cm
 Radius of gear #2 = 5.0 cm
 Radius of gear #3 = 1.0 cm
 Radius of gear #4 = 4.0 cm



Gear #1 rotates clockwise at a speed of 400 RPM. Find the speed and direction of gears 2, 3 and 4.

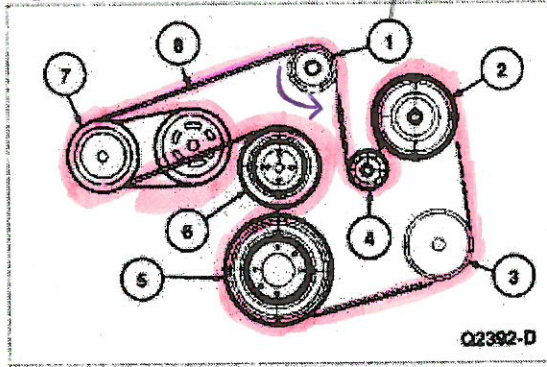
$$\text{Speed } 2 = \frac{D_R}{D_N} \times \text{Speed } 1$$

$$= \frac{2.0 \text{ cm}}{5.0 \text{ cm}} \times 400 \text{ RPM} = 160 \text{ RPM} = \text{speed } 3!$$

$$\text{Speed } 4 = \frac{D_R}{D_N} \times \text{speed } 3$$

$$= \frac{1.0 \text{ cm}}{4.0 \text{ cm}} \times 160 \text{ RPM} = 40 \text{ RPM}$$

4) Consider the belt and pulley system below. Gear #1 rotates counterclockwise.

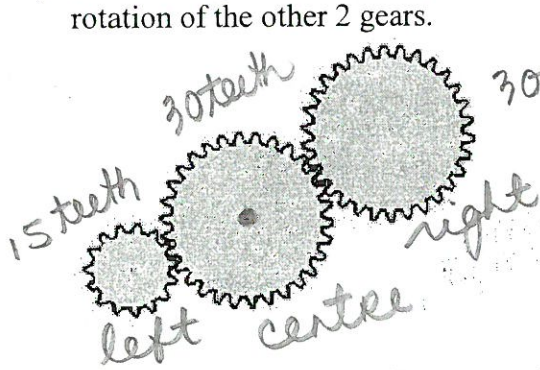


- 1) inside = CCW
- 2) inside = CCW
- 3) inside = CCW
- 4) outside = CW
- 5) inside = CCW
- 6) outside = CW
- 7) inside = CCW
- 8) inside = CCW

a) Give the direction of rotation of all the labeled parts.

- b) Which pulley will rotate the fastest? *the smallest = #4*
- c) Which pulley will rotate the slowest? *the largest = #5*

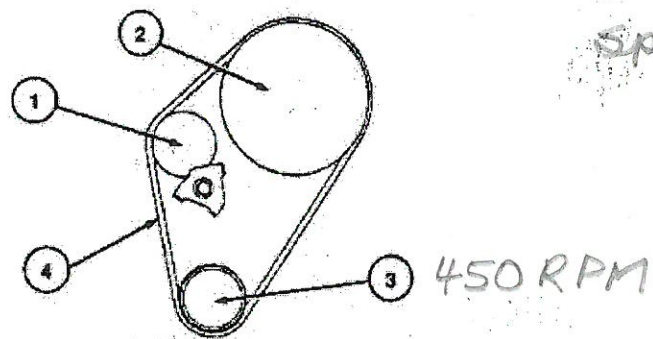
5) The center gear rotates at speed of 500 RPM. Determine the speed and direction of rotation of the other 2 gears.



① $\frac{D_R}{D_N} = \frac{30 \text{ teeth}}{15 \text{ teeth}} = 2 \times 500 \text{ RPM} = 1000 \text{ RPM}$
 left gear
 = opp dir of middle gear

② $\frac{D_R}{D_N} = \frac{30 \text{ teeth}}{30 \text{ teeth}} = 1$
 = same speed
 = opp dir

6) Consider the belt and pulley system below. Pulley #1 has a diameter of 50 mm, Pulley #2 has a diameter of 85 mm, Pulley #3 has a diameter of 50 mm



Speed 3 = $\frac{D_R}{D_N} \cdot \text{Speed 1}$
 $= \frac{50 \text{ mm}}{50 \text{ mm}} \times 450 \text{ RPM} = 450 \text{ RPM}$

If pulley #3 rotates at a speed of 450 RPM. What is the speed of rotation of pulleys 1 and 2?

speed 3 = $\frac{50 \text{ mm}}{85 \text{ mm}} \times 450 \text{ RPM} = 265 \text{ RPM} \rightarrow$ bigger slower