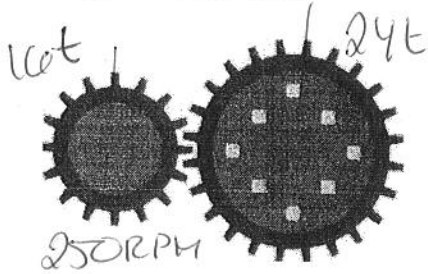


Practice with Gears

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



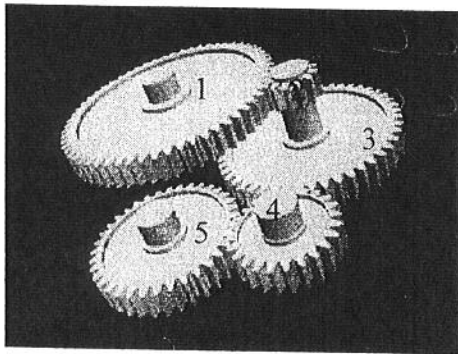
$$\frac{Sp_{dn}}{Sp_{dr}} = \frac{t_{dr}}{t_{dn}}$$

$$Sp_{dn} = \frac{(t_{dr})(Sp_{dr})}{t_{dn}}$$

$$= \frac{(16t)(250t)}{24t} = 167 \text{ RPM}$$

counterclockwise

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



2 - counter clockwise

3 - counter clockwise

4 - clockwise

5 - counter clockwise

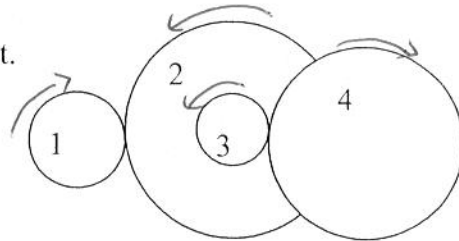
- 3) Consider the system of friction gears on the right.

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.

① 1 → 2

$$Sp_{dn} = \frac{(r_{dr})(Sp_{dr})}{(r_{dn})}$$

$$= \frac{(2.0 \text{ cm})(400 \text{ RPM})}{5.0 \text{ cm}}$$

$$= 160 \text{ RPM}$$

③ 3 → 4

$$\frac{Sp_4}{Sp_3} = \frac{r_3}{r_4}$$

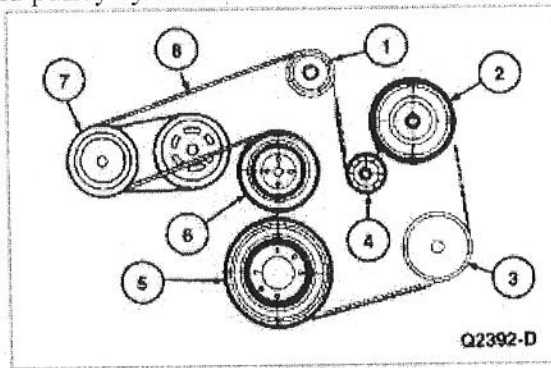
$$Sp_4 = \frac{(r_3)(Sp_3)}{r_4}$$

$$= \frac{(1.0 \text{ cm})(160 \text{ RPM})}{4.0 \text{ cm}}$$

$$= 40 \text{ RPM clockwise}$$

② Speed 3 = 160 RPM

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



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

1 - CCL  
 2 - CCL  
 3 - CCL  
 4 - CL  
 5 - CCL  
 6 - CL  
 7 - CCL  
 8 - CCL

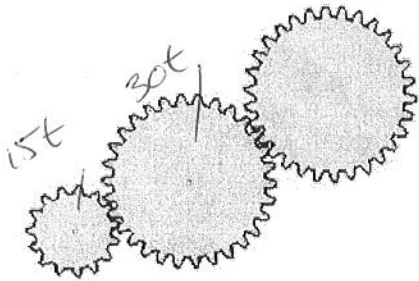
b) Which pulley will rotate the fastest?

#4

c) Which pulley will rotate the slowest?

#5

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

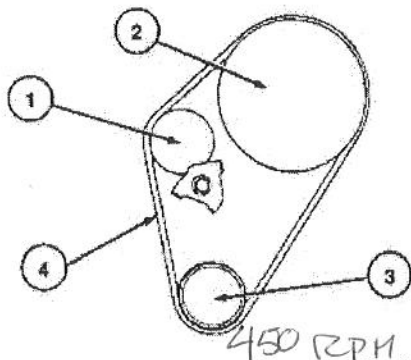


left → 15t = 2x as fast as center gear  
 → 1000 RPM (opposite direction as center gear)

Right → 30t = same speed as center gear  
 → 500 RPM (opposite direction as center gear)

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



① Speed 1 = 450 RPM (same size as 3)

$$\begin{aligned} \text{② } Sp_2 &= \frac{(Sp_3)(d_3)}{d_2} \\ &= \frac{(450 \text{ RPM})(50 \text{ mm})}{85 \text{ mm}} \\ &= 265 \text{ RPM} \end{aligned}$$

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