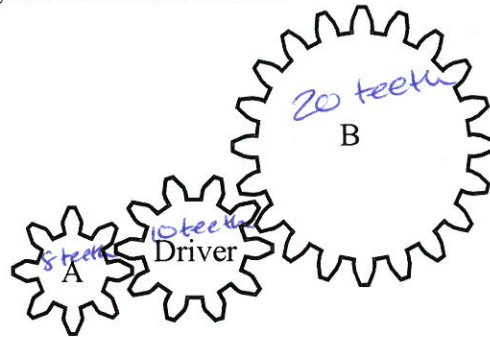


Quiz: Motion Transmission

1. Consider the gears illustrated below.



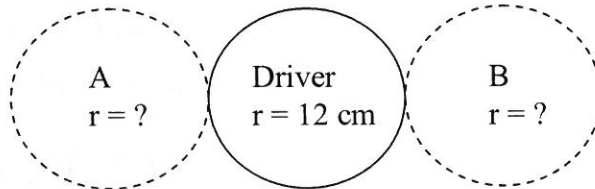
$$S.R. A = \frac{t_{driver}}{t_{driven}} = \frac{10}{8} = 1.25$$

$$S.R. B = \frac{t_{driver}}{t_{driven}} = \frac{10}{20} = 0.5$$

Which of the following correctly describes the speed ratios of the gears?

- a. The speed ratio of gear A is 0.8 and the speed ratio of gear B is 2.
 - b. The speed ratio of gear A is 0.8 and the speed ratio of gear B is 0.5.
 - c. The speed ratio of gear A is 1.25 and the speed ratio of gear B is 2.
 - d.** The speed ratio of gear A is 1.25 and the speed ratio of gear B is 0.5.
2. A friction gear has a radius of 12 cm. Two other gears (gears A and B) are added to the system. The gears must be chosen such that:

- Gear A will rotate 4 times faster than the 12 cm gear. $S.R. = 4$
- Gear B will rotate at one third (1/3) the speed of the 12 cm gear. $S.R. = 1/3$



What must be the radius of gear A and of gear B?

- a. Gear A must have a radius of 48 cm and gear B must have a radius of 4 cm.
- b. Gear A must have a radius of 48 cm and gear B must have a radius of 36 cm.
- c. Gear A must have a radius of 3 cm and gear B must have a radius of 4 cm.
- d.** Gear A must have a radius of 3 cm and gear B must have a radius of 36 cm.

(A)

$$S.R. = \frac{r_{driver}}{r_{driven}}$$

$$r_{driven} = \frac{r_{driver}}{S.R.}$$

$$= \frac{12cm}{4}$$

$$= 3cm$$

(B)

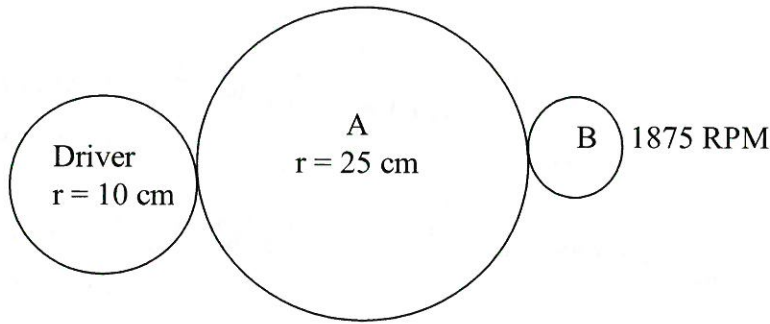
$$S.R. = \frac{r_{driver}}{r_{driven}}$$

$$r_{driven} = \frac{r_{driver}}{S.R.}$$

$$= \frac{12cm}{1/3}$$

$$= 36cm$$

3. In the gear train illustrated below, the driver gear rotates at a speed of 750 RPM. Gear B rotates at a speed of 1875 RPM.



- a. What is the rotation speed of gear A? (Show all your work.)

$$\frac{Sp A}{Sp dr} = \frac{r dr}{r A} \rightarrow Sp A = \frac{(Sp dr)(r dr)}{r A}$$

$$= \frac{(750 \text{ RPM})(10 \text{ cm})}{25 \text{ cm}}$$

$$= \underline{\underline{300 \text{ RPM}}}$$

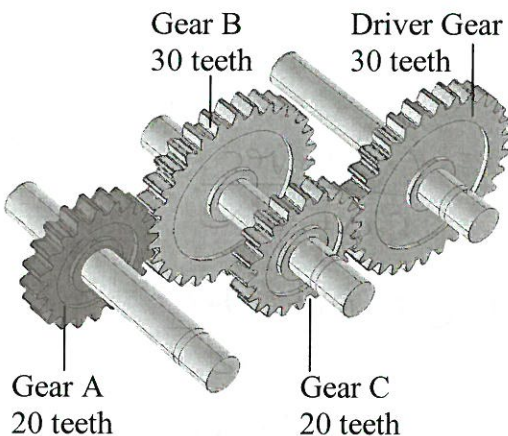
- b. What is the radius of gear B? (Show all your work.)

$$\frac{Sp B}{Sp Dr} = \frac{r dr}{r B} \rightarrow r B = \frac{(Sp Dr)(r dr)}{Sp B}$$

$$= \frac{(750 \text{ RPM})(10 \text{ cm})}{1875 \text{ RPM}}$$

$$= \underline{\underline{4 \text{ cm}}}$$

4. Consider the gears below. The driver gear rotates at a speed of 900 RPM. What is the rotational speed of gear A?



$$\textcircled{1} \frac{Sp C}{Sp dr} = \frac{t dr}{t c}$$

$$Sp C = \frac{(Sp dr)(t dr)}{t c}$$

$$= \frac{(900 \text{ RPM})(30 t)}{20 t}$$

$$= 1350 \text{ RPM}$$

$$\textcircled{3} \frac{Sp A}{Sp B} = \frac{t B}{t A}$$

$$Sp A = \frac{(Sp B)(t B)}{t A}$$

$$= \frac{(1350 \text{ RPM})(30 t)}{20 t}$$

$$= \underline{\underline{2025 \text{ RPM}}}$$

$$\textcircled{2} Sp B = 1350 \text{ RPM}$$

(same axle as C)