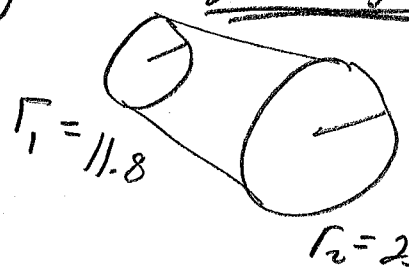
SOLUTIONS

(I) Find θ_2 in degrees



C_1: angle $= 137.2°$

$$\frac{180}{137.2} = \frac{\pi}{x}$$

$$\Rightarrow 180x = (137.2)(\pi)$$

$$\Rightarrow x = \frac{(137.2)(\pi)}{180}$$

$$= 2.394591\ldots$$

$$= 2.395$$

So $r_1 = 11.8$

$\theta_1 = 2.395$

$$\Rightarrow s_1 = r_1\theta_1 \Rightarrow s_1 = (11.8)(2.395)$$

$$= 28.5005$$

$$= 28.500$$

Since the gears have diff. rad. centers:

$$\Rightarrow s_2 = s_1$$

$$= 28.500$$

So $s_2 = r_2\theta_2 \Rightarrow 28.500 = (23.2)\theta_2$

$$\Rightarrow \theta_2 = \frac{28.500}{23.2}$$

$$= 1.22844\ldots$$

$$= 1.228$$

Convert to degrees:

So $\frac{180}{x} = \frac{\pi}{1.228}$

$$\Rightarrow \pi x = (1.228)(180)$$

cont.

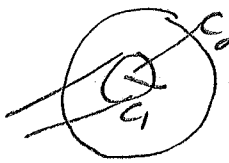
#1 ⇓ cont:

$\Rightarrow x = \frac{(1.228)(180)}{\pi}$

$= 70.359217\ldots$

$= \boxed{70.359°}$

#2.



$r_2 = 17.8$

given $S_1 = 52.5$

Find: S_2

$r_1 = 5.7$

we have circles with same center so $\theta_1 = \theta_2$ ←

IN C_1: $S_1 = r_1\theta_1$

$\Rightarrow 52.5 = (5.7)\theta_1$

$\Rightarrow \theta_1 = \frac{52.5}{5.7}$

$= 9.210526\ldots$

$= 9.211$

Thus $\theta_2 = \theta_1$

$= 9.211$

In C_2:

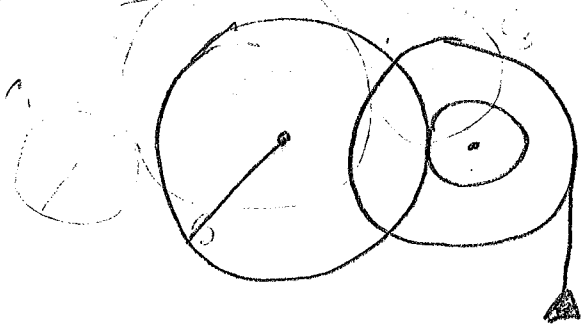
$S_2 = r_2\theta_2$

$= (17.8)(9.211)$

$= 163.9558$

$= \boxed{163.956\text{ cm}}$

#3



GIVEN:

$r_1 = 25.7$

$r_2 = 9.8$

$\theta_1 = \frac{1}{2}$ revolution

$= \pi$

$S_3 = 131$

Find

$\boxed{r_3 = \quad \text{cm}}$

In C_1

$S_1 = r_1\theta_1$

$= (25.7)(\pi)$

$= 80.738931\ldots$ cont.

$= 80.739$ ⇒

(#3) cont.

Since C_1 & C_2 have different centers, BY Three we have $s_1 = s_2$

so $s_2 = 80.739$

In C_2:

$s_2 = r_2 \theta_2$

$\Rightarrow 80.739 = 9.8\theta_2$

$\Rightarrow \theta_2 = \frac{80.739}{9.8}$

$= 8.238673...$

$= 8.239$

since C_2 & C_3 have the same centers, $\theta_2 = \theta_3$

so $\theta_3 = 8.239$

In C_3: given $s_3 = 131$

$s_3 = r_3 \theta_3$

$\Rightarrow 131 = r_3 (8.239)$

$\rightarrow r_3 = \frac{131}{8.239}$

$= 15.899987...$

$= \boxed{15.900}$

So $\boxed{r_3 = 15.900 \text{ cm}}$