MATH 122 EXAM #2 KEY (SPRING 2024)

1 $\left(-\frac{7\pi}{20}\right)\left(\frac{180°}{\pi}\right) = -63°$.

2 Convert to decimal degree format first: $122°37' = 122° + (37/60)° = 122.6167°$. Now convert this to radians:

$$(122.6167°)\left(\frac{\pi}{180°}\right) = 2.140.$$

3 First get decimal degree format: $9.837(180°/\pi) = 563.619°$. Now convert to degree-minute format:

$$563.619° = 563° + (0.619°)\left(\frac{60'}{1°}\right) = 563°37'.$$

4 $\tan(5\pi/6) = -\frac{1}{\sqrt{3}}$ and $\csc(-13\pi/3) = \csc(-\pi/3) = -\frac{2}{\sqrt{3}}$.

5 Angle θ must be in radians: $\theta = (135°)(\pi/180°) = 3\pi/4$. We have

$$s = r\theta = (71.9 \text{ cm})\left(\frac{3\pi}{4}\right) = 169 \text{ cm}.$$

6 We first find the circumferential distance s_1 that the smaller gear with radius $r_1 = 4.80$ cm turns, with the angle of rotation θ_1 in radians:

$$s_1 = r_1\theta_1 = (4.80 \text{ cm})(438°)\left(\frac{\pi}{180°}\right) = 36.69 \text{ cm}.$$

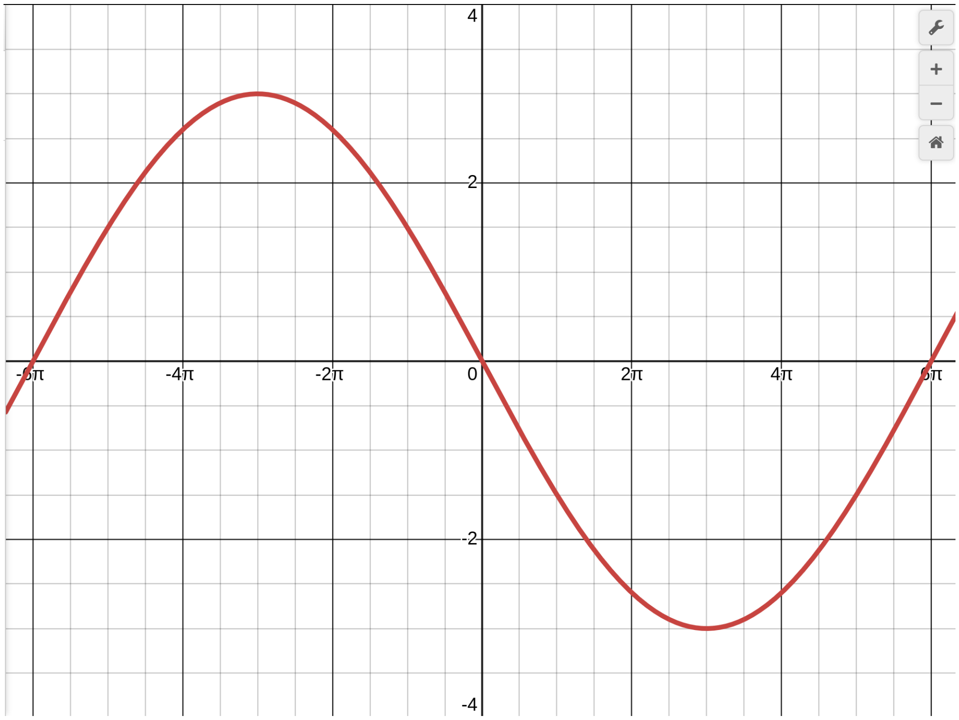
Next we find the angle of rotation θ_2 (in degrees) of the larger gear with radius $r_2 = 11.1$ cm, given it turns a circumferential distance of $s_2 = s_1 = 36.69$ cm.

$$\theta_2 = \left(\frac{s_2}{r_2}\right)\left(\frac{180°}{\pi}\right) = \left(\frac{36.69 \text{ cm}}{11.1 \text{ cm}}\right)\left(\frac{180°}{\pi}\right) = 189°$$

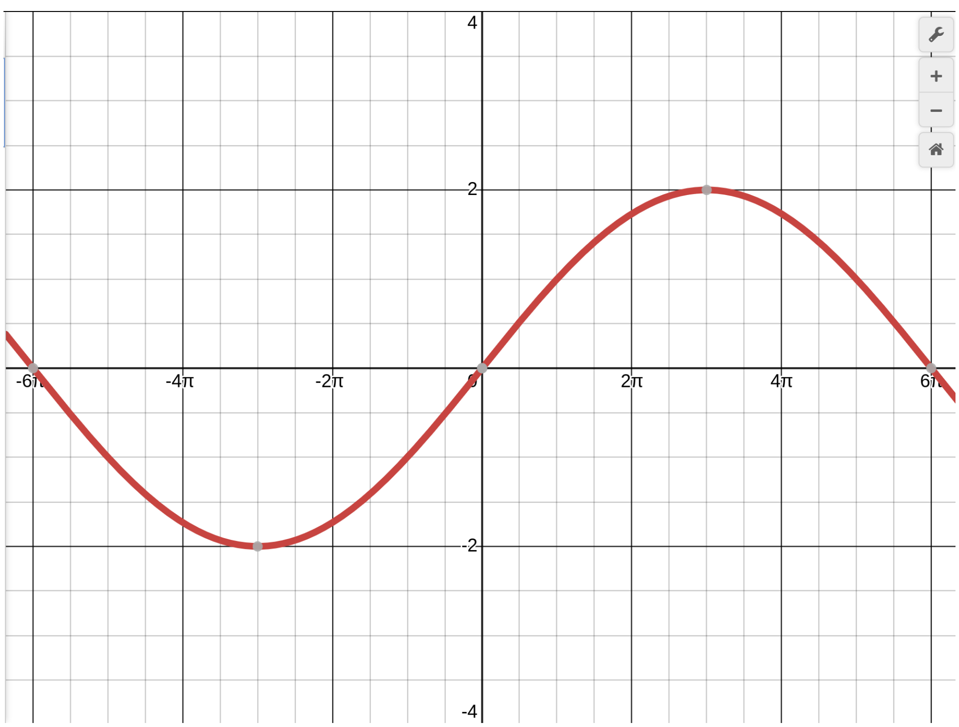
7 From $A = \frac{1}{2}r^2\theta$ we get

$$\theta = \frac{2A}{r^2} = \frac{2(24 \text{ cm}^2)}{(10 \text{ cm})^2} = 0.48.$$

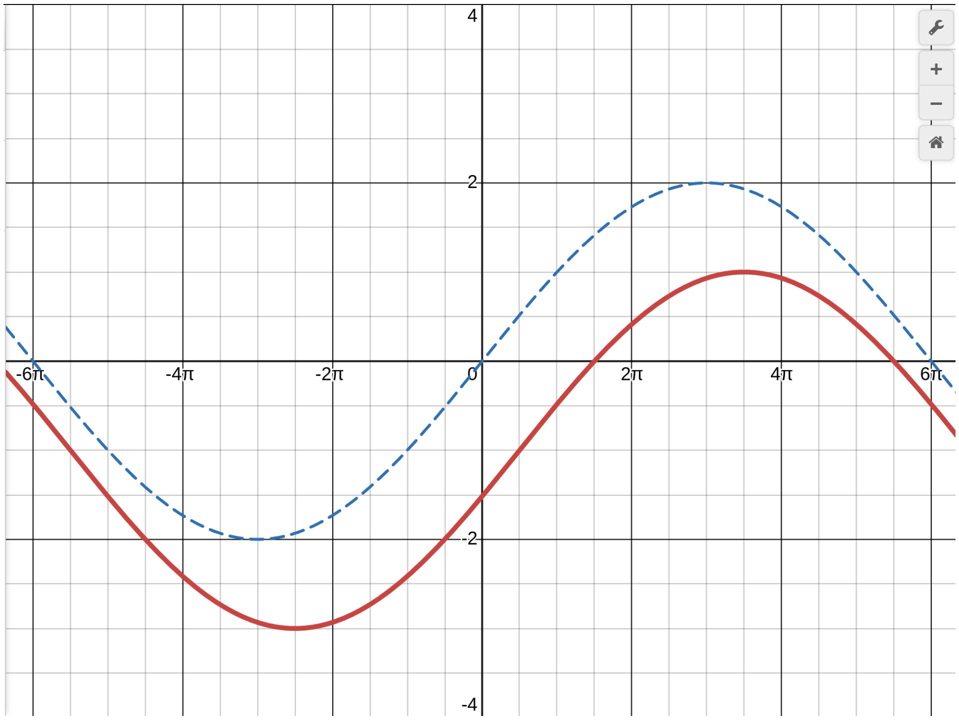
8 Amplitude is 3, period is 12π.



9 Amplitude is 2, period is 12π.



10 The dashed graph is that of $y = 2\sin(x/6)$.



11 Vertical translation: 7. Amplitude: $\frac{3}{4}$. Period: 16π. Phase shift: -8π.