

Quiz #2

Name: Mr. Solutions

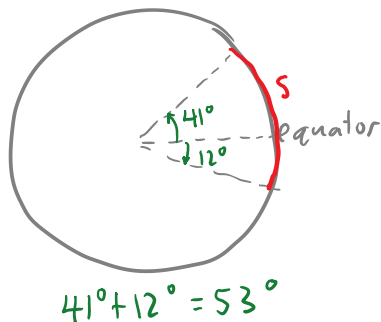
Math 150, Prof. Beydler

Thursday, April 6, 2017

Directions: Show all work. No books or notes. A **scientific calculator** is allowed. Your desk and lap must be clear (no phones, notebooks, etc.). Write your answers in the indicated places, or box your answers. Good luck!

1. (2 points) Given the following latitudes, find the distance in kilometers between each pair of cities, assuming they lie on the same north-south line. Use $r = 6400$ km for the radius of Earth.
New York City, New York, 41° N, and Lima, Peru, 12° S.

Answer: 5920 km

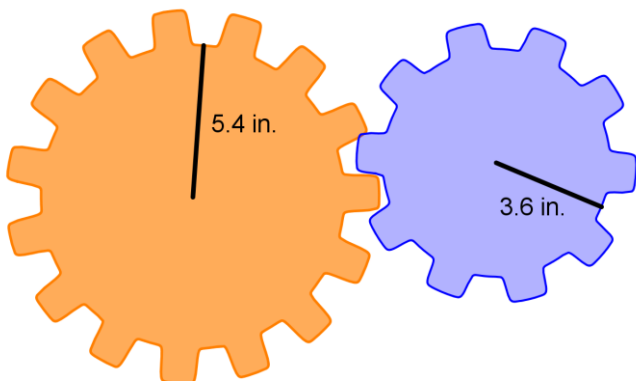


$$s = \theta r$$

$$= \left(\frac{53^\circ}{1} \times \frac{\pi}{180^\circ} \right) (6400)$$

2. (3 points) Two gears are aligned so that the smaller gear drives the larger one (see below). If the smaller gear rotates 150° , how many degrees will the larger gear rotate?

Answer: 100°



Small: $s = \theta r$

$$= \left(\frac{150^\circ}{1} \times \frac{\pi}{180^\circ} \right) (3.6)$$

$$= 3\pi \leftarrow \text{arc length moved by smaller gear}$$

Large: $s = \theta r$

$$\theta = \frac{s}{r} = \frac{3\pi}{5.4} \rightarrow \frac{3\pi}{5.4} \times \frac{180^\circ}{\pi} = 100^\circ$$

3. (1 point) Find the area of a sector of a circle having radius 15.2 cm and central angle $\frac{2\pi}{3}$ radians. Write your answer to the nearest tenths, and be sure to write units for your answer. (The formula is $A = \frac{1}{2}r^2\theta$.)

$$A = \frac{1}{2} (15.2)^2 \left(\frac{2\pi}{3} \right)$$

Answer: 241.9 cm²

4. (1 point) Use $v = \omega r$ to find the value of the missing variable. Be sure to write the units for your answer.
 $v = 12$ m per sec, $\omega = \frac{3\pi}{2}$ radians per sec

$$12 = \frac{3\pi}{2} r$$

$$r = \frac{12}{\frac{3\pi}{2}} = \frac{8}{\pi}$$

Answer: $\frac{8}{\pi}$ m
 (≈ 2.5 m)

5. (2 points) Find the linear speed of the tip of the minute hand of a clock, if the hand is 5 cm long. Be sure to write units for your answer.

$$v = \omega r$$

$$= \left(\frac{2\pi \text{ rad}}{60 \text{ min}} \right) (5 \text{ cm})$$

Answer: $\frac{\pi}{6}$ cm/min
 (≈ 0.5 cm/min)

6. (2 points) The tires of a bike have a radius of 14.0 inches and are turning at a rate of 240 revolutions per minute. How fast is the bike traveling in miles per hour? (Note: 1 mile = 5280 feet)

$$v = \omega r$$

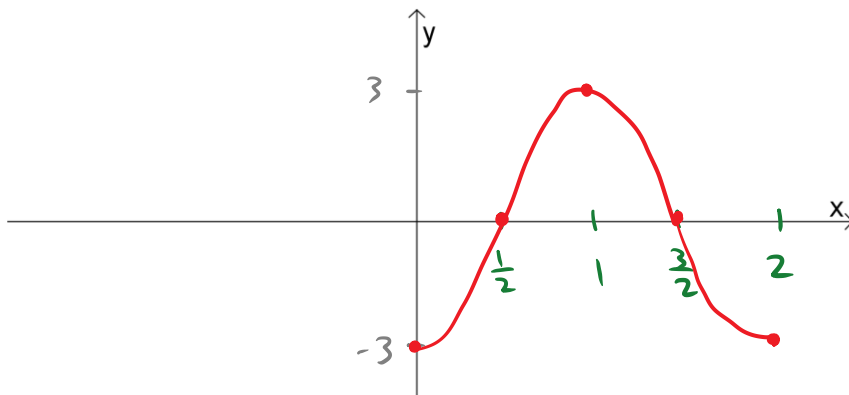
$$= \left(\frac{240 \text{ rev}}{1 \text{ min}} \times \frac{2\pi \text{ rad}}{1 \text{ rev}} \times \frac{60 \text{ min}}{1 \text{ hr}} \right) \left(\frac{14.0 \text{ in}}{1} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{1 \text{ mile}}{5280 \text{ ft}} \right)$$

Answer: 20 mph

7. (4 points) Graph $y = -3 \cos \pi x$. Give the period and the amplitude.

Period: 2

Amplitude: 3



$$0 \leq \pi x \leq 2\pi$$

$$0 \leq x \leq 2$$

Period: $\frac{2\pi}{\pi} = 2$

QP: $\frac{2}{4} = \frac{1}{2}$

$$0 \quad \frac{1}{2} \quad 1 \quad \frac{3}{2} \quad 2$$