

Name \_\_\_\_\_

### 47 Lesson Master

Questions on SPUR Objectives  
See Student Edition pages 288-291 for objectives.

#### PROPERTIES Objective E

In 1 and 2, an equation for a function is given. a. State the period of the function. b. State the amplitude of the function.

- $y = \sin(\frac{1}{2}t)$  a.  $4\pi$  b.  $\frac{1}{2}$
- $y = \frac{5\pi}{6} \cos(x)$  a.  $2\pi$  b.  $\frac{5\pi}{6}$
- $y = 5 \cos(60\pi x)$  a.  $2$  b.  $5$

4. Consider the image of the graph of  $y = \cos x$  under the transformation  $S(x, y) = (4x, \frac{1}{4}y)$ .

- Find the amplitude of the image.  $\frac{1}{4}$
- Find the period of the image.  $10\pi$
- Find an equation for the image.  $y = \frac{1}{4} \cos(\frac{x}{5})$

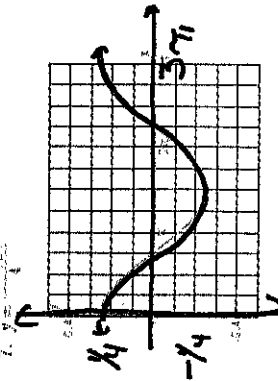
#### USES Objective F

- Suppose a tuning fork vibrates with a frequency of approximately 370 cycles per second. If the vibration displaces air molecules by a maximum of 0.22 mm, give a possible equation for the sound wave that is produced.  $y = 0.22 \sin(740\pi t)$
- A certain sound wave has equation  $y = 17 \cos(120\pi t)$ . Write an equation of a sound wave with pitch one octave lower and three times as loud as this one.  $y = 51 \cos(60\pi t)$

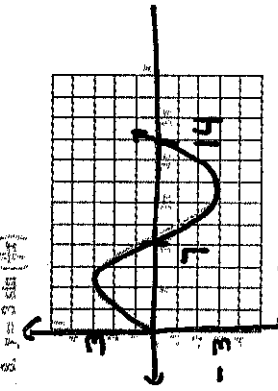
#### REPRESENTATIONS Objective J

In 7 and 8, sketch one cycle of the graph without a graphing utility.

- $y = \cos(\frac{2\pi}{3}x)$
- $y = 3 \sin(\frac{\pi}{2}x)$



amp  $\frac{1}{4}$   
 period  $2\pi \cdot \frac{3}{2} = 3\pi$   
 $\frac{2\pi}{3}x \rightarrow \frac{x}{3/2}$



amp 3  
 period  $2\pi \cdot \frac{1}{2} = \pi$   
 $\frac{\pi}{2}x \rightarrow \frac{x}{2}$

194 Functions, Statistics, and Trigonometry

Name \_\_\_\_\_

### 48 Lesson Master

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#### PROPERTIES Objective E

1. Consider the function  $f(x) = \cos(x - \frac{2\pi}{3}) - 2$ . Find each of the following for  $f$ .

- the phase shift from the cosine function  $\frac{2\pi}{3}$
- the period  $2\pi$
- the amplitude  $1$
- the maximum and minimum values  $-1, -3$

#### USES Objective F

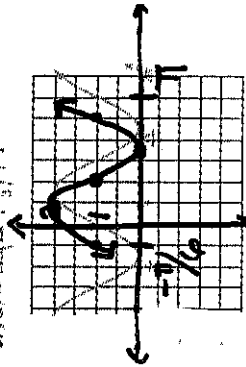
2. For an electrical-power supply, the output potential (in volts) and the current (in amps) as a function of time (in seconds) are given by  $v = 30 \cos t + 20$  and  $i = 0.25 \cos(t - \frac{\pi}{4})$ .

- What are the maximum and minimum output voltages?  $50V, -10V$
- What are the maximum and minimum outputs of the currents?  $0.25 A, -0.25 A$
- What is the phase shift between output current and output voltage?  $\frac{\pi}{4}$
- By how many seconds does the maximum current lag behind the maximum voltage?  $\frac{3}{4}\pi \approx 3.93$  seconds

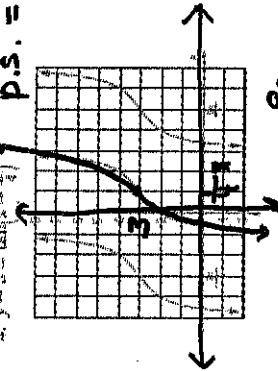
#### REPRESENTATIONS Objective J

In 4 and 5, sketch a graph of the function.

- $f(x) = \sin(2x + \frac{\pi}{3}) + 1$
- $y = 3 = \tan(x - \frac{\pi}{4})$



amp = 1 vs. = 1  
 $y - 1 = \sin(2x + \frac{\pi}{3})$



asymptotes  
 $\dots \frac{\pi}{4}, \frac{5\pi}{4}$

$2x + \frac{\pi}{3} \rightarrow 2(x + \frac{\pi}{6})$   
 $\rightarrow \frac{x + \frac{\pi}{6}}{1/2}$   
 P.S. =  $-\frac{\pi}{6}$   
 Period =  $2\pi \cdot \frac{1}{2} = \pi$

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