East Los Angeles College
Department of Mathematics
Math 241
Test 2

$$y = 4sin(2\pi x)$$

Determine:

1. The amplitude
2. The period.
3. The interval of one cycle.
4. The phase shift, if any.
5. Graph the function.
6. Graph the reciprocal function $y = 4\csc(2\pi x)$

Determine:

$$y = -\cos\left(x - \frac{\pi}{2}\right)$$

7. The amplitude
8. The period.
9. The interval of one cycle.
10. The phase shift, if any.
11. Graph the function.
12. Graph the reciprocal function $y = -\sec\left(3x - \frac{\pi}{2}\right)$

$$y = tan\left(\frac{\pi}{3}\right)$$

Determine:

13. The period.
14. The interval of one cycle.
15. Graph the function.

$$y = cot(4x - \pi)$$

Determine:

16. The period.
17. The interval of one cycle.
18. Graph the function.

19. Determine a function that describes simple harmonic motion with the following properties.
-Displacement is zero for t=0
-Amplitude is 3.5 cm
-Period is 12 cm

20. Determine a function that describes simple harmonic motion with the following properties.
-Displacement is at a maximum when t=0.
-Amplitude is 2.4 inch
-Frequency is 60 hz

21. Determine an angle between 0° and 360° that is coterminal to 1140^o

22. Find an angle between 0 and 2π that is coterminal to $\frac{25\pi}{6}$

23. Find the arc length that subtends a central angle of 30^o in a circle of radius 6 ft.

24. A circular arc of 3 ft. subtends a central angle of 1.5 radians, determine the radius of the circle.

25. Determine the area of a sector with central angle of 20^oin a circle of radius 6 meters.

26. City A lies at a latitude 28^oN and City B lies on the same meridian at a latitude of 6^oS. How far apart are the cities?

27. How many revolutions will a car wheel of 30-inch diameter make as the car travels 5 miles?

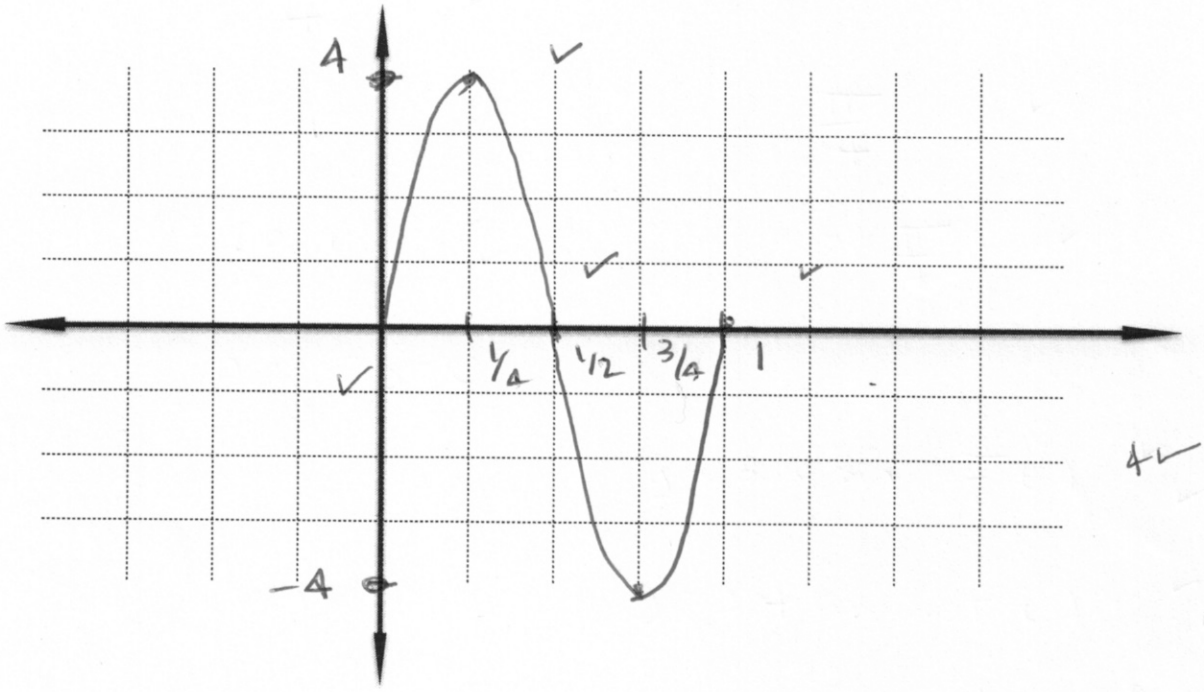
28. The wheels of car have a 26-inch diameter and are rotating at 800 rpm. Determine the linear speed of the car in miles per hour.

1	4	15	Use Graph Paper
2	1	16	$\frac{\pi}{4}$
3	$[0, 1]$	17	$(0, \frac{\pi}{4})$
4	none ; $b = 0$	18	Use Graph Paper
5	Use Graph Paper	19	$y = 3.5 \sin(\frac{\pi}{6} t)$
6	Use Graph Paper	20	$y = 2.4 \cos(120\pi t)$
7	1	21	60°
8	2π	22	$\frac{\pi}{6}$
9	$[\frac{\pi}{2}, \frac{5\pi}{2}]$	23	$S = \pi$ ft $\approx$ 3.14 ft
10	$\frac{\pi}{2}$	24	~~$S \approx 4.5$~~ ft $r = 2$ ft
11	Use Graph Paper	25	2π m^2
12	Use Graph Paper	26	2,349 miles
13	3	27	3363 rev
14	$(-\frac{3}{2}, \frac{3}{2})$	28	62 mph

~~28~~ 28 + 22 50

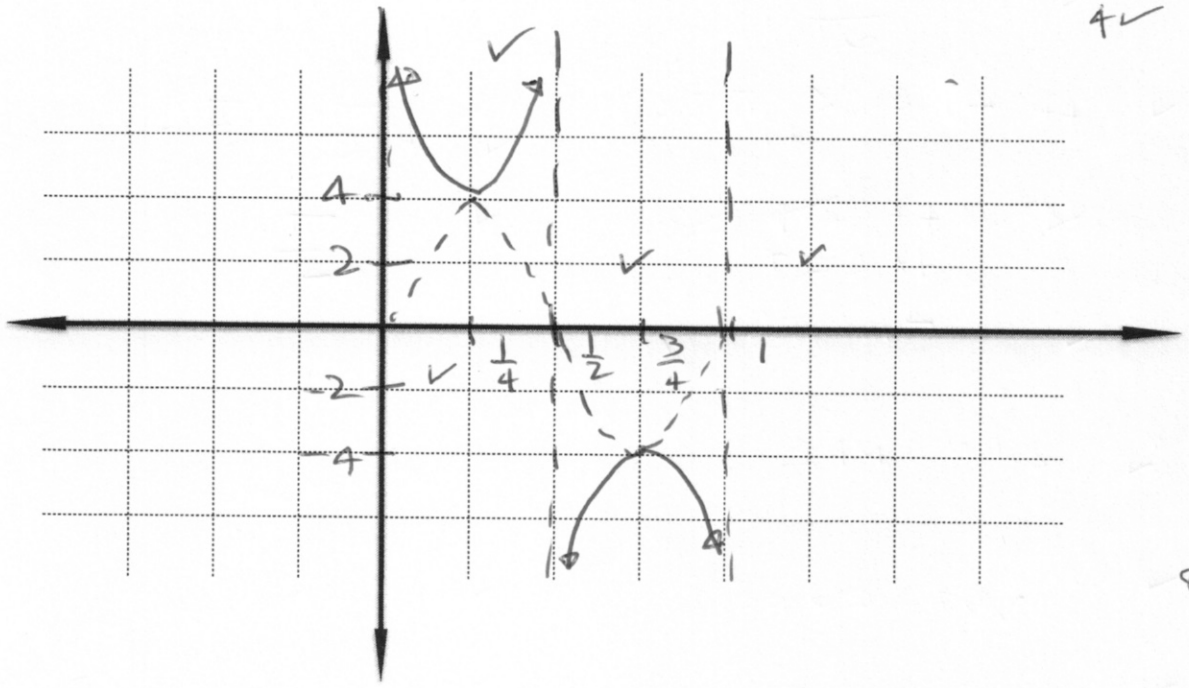
~~23~~

5.



4✓

6.

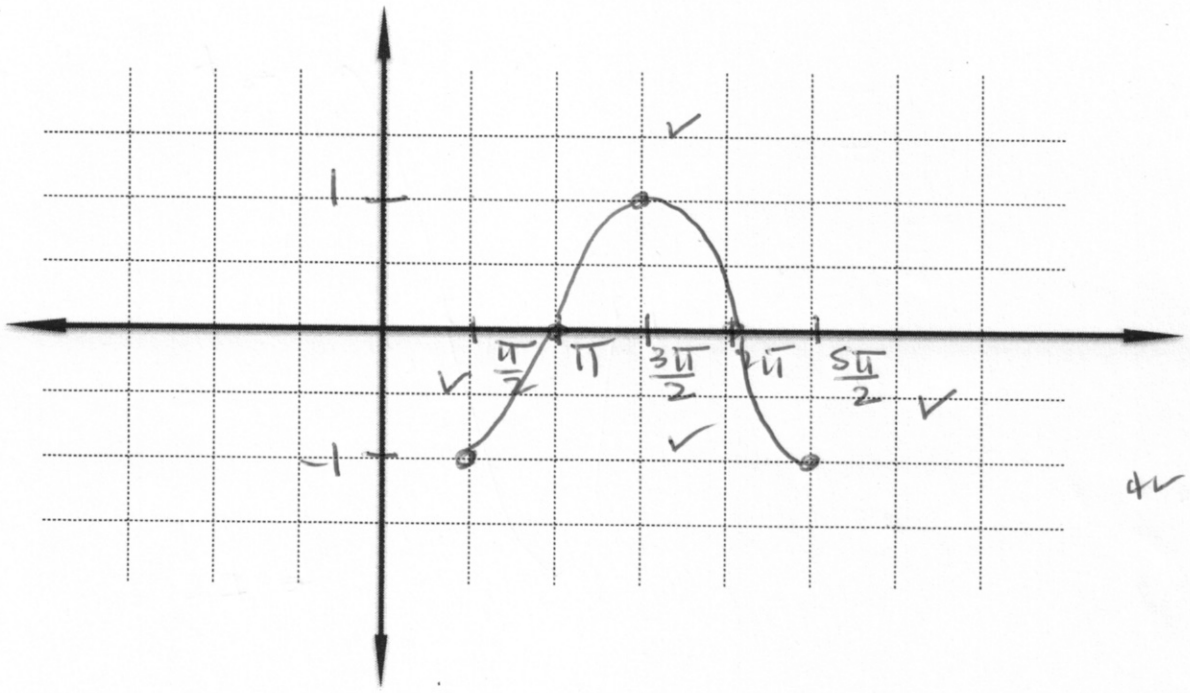


✓

4✓

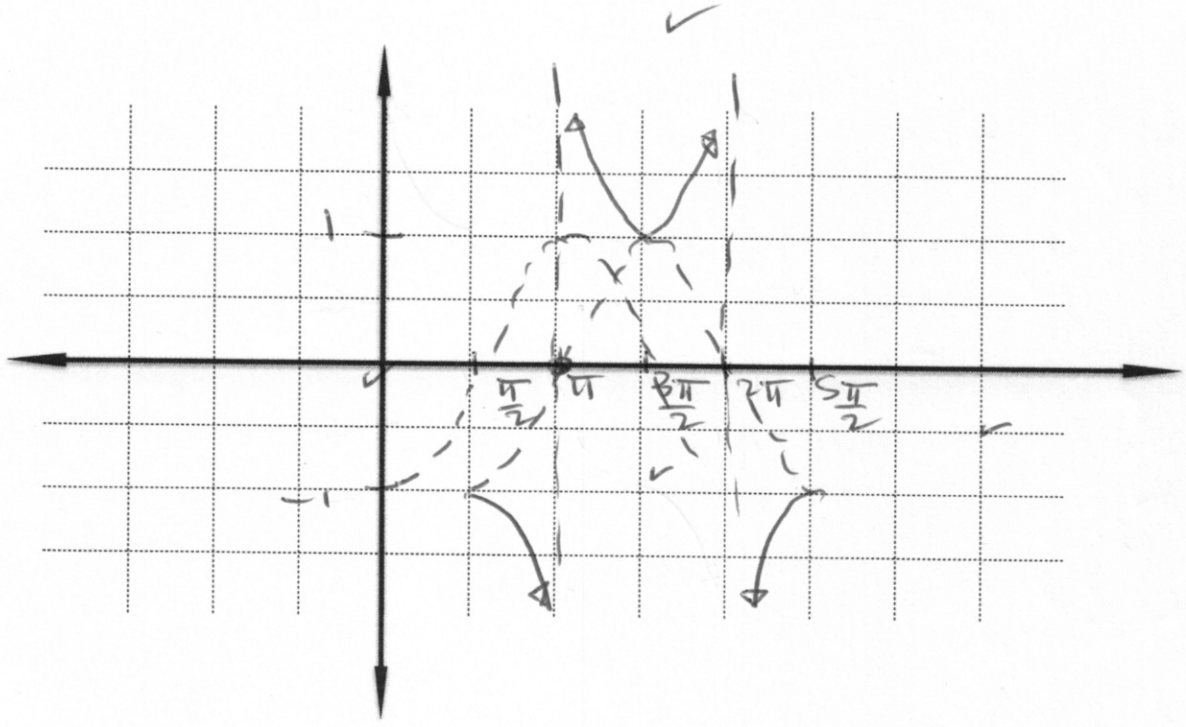
8✓

11.


1
-1
$\frac{\pi}{2}$
π
$\frac{3\pi}{2}$
2π
$\frac{5\pi}{2}$

4✓

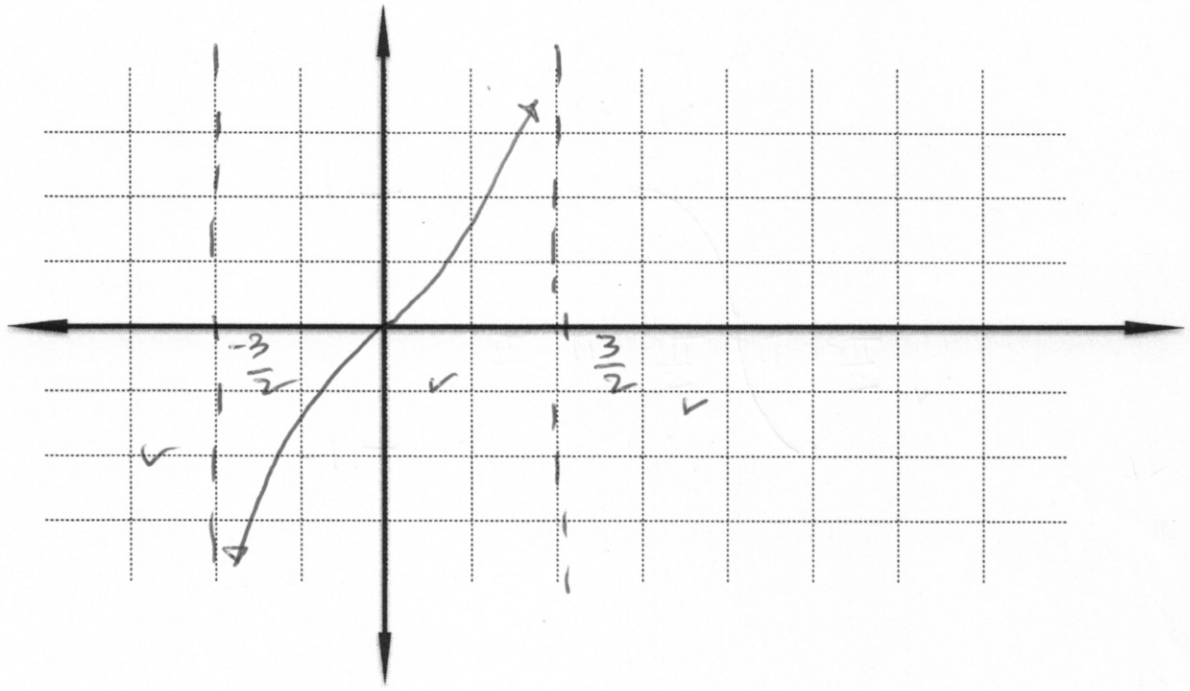
12.


1
-1
$\frac{\pi}{2}$
π
$\frac{3\pi}{2}$
2π
$\frac{5\pi}{2}$

4✓

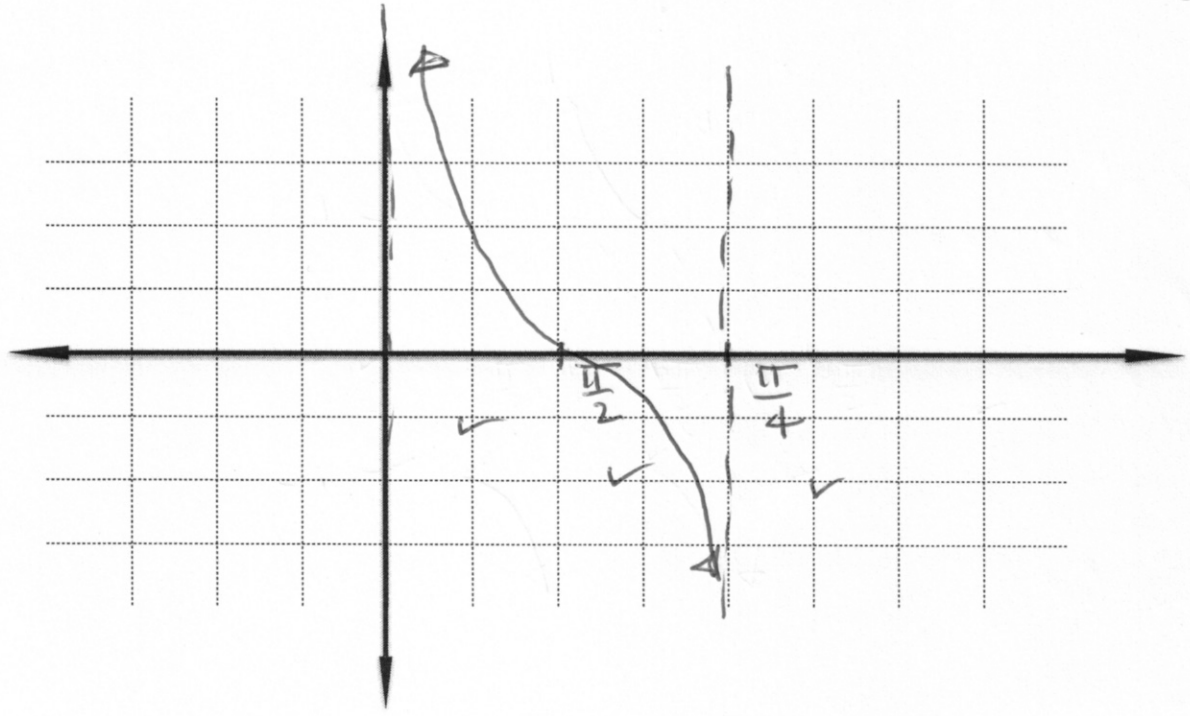
8✓

15.



18.

6 ✓



Math 241 Test 2

$y = 4 \sin(\underset{k}{2}\pi x)$

(1) amp $= |4| = \boxed{4}$

(2) $p = \frac{2\pi}{k} = \frac{2\pi}{2\pi} = (1)$

(3) $[0, p] = \boxed{[0, 1]}$

(4) no phase shift ; $b = 0$

(5) See Graph

(6) See graph $y = -\cos(x - \frac{\pi}{2})$

(7) amp $= |-1| = (1)$ $k = 1$

(8) period $= \frac{2\pi}{k} = \frac{2\pi}{1} = \boxed{2\pi}$

(10)

(9) Phase Shift : $\boxed{b = \frac{\pi}{2}}$

(9) $[b, b+p] = [\frac{\pi}{2}, \frac{\pi}{2} + 2\pi]$

$\boxed{[\frac{\pi}{2}, \frac{5\pi}{2}]}$

(11) (12) See Graph

$$y = \tan\left(\frac{\pi}{3}x\right), \quad k$$

(13) $p = \frac{\pi}{k} = \frac{\pi}{\frac{\pi}{3}} = \pi \cdot \frac{3}{\pi}$

$= \pi \cdot \frac{3}{\pi} = \boxed{3}$

(14) $\left(-\frac{\pi}{2k}, \frac{\pi}{2k}\right)$

$\left(-\frac{\pi}{2\cdot\frac{\pi}{3}}, \frac{\pi}{2\cdot\pi/3}\right)$

$\left(-\pi \cdot \frac{3}{2\pi}, \pi \cdot \frac{3}{2\pi}\right)$

$\boxed{\left(-\frac{3}{2}, \frac{3}{2}\right)}$

(15) See Graph

$y = \cot(4x - \pi)$

$4 \quad \left(x - \frac{\pi}{4}\right)$

k

(16) $p = \frac{\pi}{k} \quad \therefore \boxed{p = \frac{\pi}{4}}$

(17)

(17) $(0, \frac{\pi}{k}) = \boxed{(0, \frac{\pi}{4})}$

(18) See Graph

(19) $A = 3.5$ cm ; Sine curve

$p = 12$ cm

$p = \frac{2\pi}{\omega}$; $\frac{2\pi}{\omega} = 12$

$\omega = \frac{2\pi}{12}$; $\omega = \frac{\pi}{6}$

$f(x) = A \sin(\omega t)$

$f(x) = 3.5 \sin(\frac{\pi}{6} t)$

$\boxed{y = 3.5 \sin(\frac{\pi}{6} t)}$

(20) $A = 2.4$; $f = 60$ Hz

cosine

$p = \frac{1}{60}$; $p = \frac{2\pi}{\omega}$

$\frac{2\pi}{\omega} = \frac{1}{60}$; $\omega = 120\pi$

$$y = A\cos(\omega t)$$

$$\boxed{y = 2.4\cos(120\pi t)}$$

(21) 1140°

-360°

780°

-360°

420°

-360°

$\boxed{60^\circ}$

(22) $\frac{25\pi}{6}$

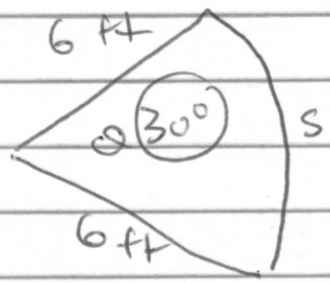
$-\frac{2\pi \cdot 6}{6}$

$\frac{13\pi}{6}$

$-\frac{2\pi \cdot 6}{6}$

$\frac{\pi}{6}$

(23) $s = r\theta$



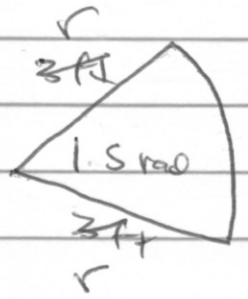
$s = 6\text{ ft} \cdot 30^\circ \cdot \frac{\pi}{180^\circ}$

$s = \frac{6 \cdot \pi \text{ ft } 30^\circ}{180^\circ 6}$

$\boxed{s = \pi \text{ ft}}$

$s \approx 3.14 \text{ ft}$

(24)



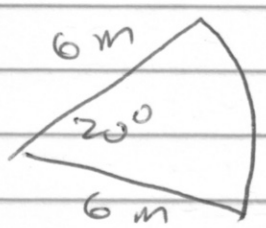
$r = \frac{3}{1.5}$ | $r = 2$ ft |

$S = r\theta$; $r = \frac{S}{\theta}$

$S = 3$ ft $\cdot$ 1.5 rad

$S = 4.5$ ft

(25) $A = \frac{1}{2} r^2 \theta$



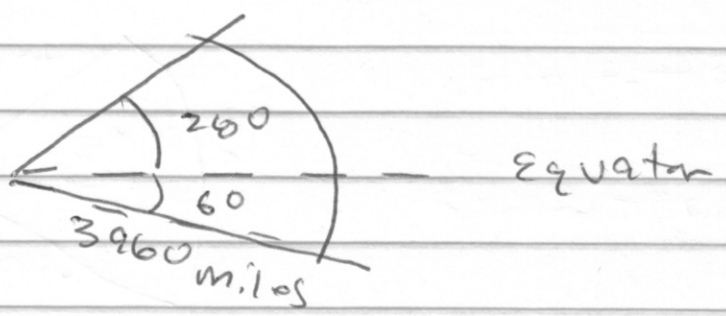
$A = \frac{1}{2} 6^2 \cdot 20^\circ \cdot \frac{\pi}{180^\circ}$

$A = \frac{1}{2} \cdot 36 \cdot \frac{2}{180} \cdot \pi$

$A = \frac{36 \cdot \pi}{2 \cdot 9}$

$A = 2\pi \text{ m}^2$

(26)



$S = r\theta$

$S = 3960 \text{ miles} \cdot 34^\circ \cdot \frac{\pi}{180^\circ}$

$$s = \frac{3960 \cdot 34 \cdot \pi}{180} \quad \text{miles}$$

$$s \approx \boxed{2,349 \text{ miles}}$$

(27) $s = r\theta$; $\theta = \frac{s}{r}$; $r = 15$ inch

$$\theta = \frac{5 \text{ miles}}{15 \text{ inch}} = \frac{1 \text{ mile}}{3 \text{ inch}}$$

$$\theta = \frac{1}{3} \frac{\text{mile}}{\text{in}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{12 \text{ inch}}{1 \text{ ft}}$$

$$\theta = \frac{5280 \cdot 12}{3} \text{ rad} \cdot \frac{1 \text{ rev}}{2\pi \text{ rad}}$$

$$\theta = \frac{5280 \cdot 12 \cdot 2}{6\pi} \text{ rev}$$

$$\theta = \frac{2 \cdot 5280}{\pi} \text{ rev} \qquad \pi \approx 3.14$$

$$\boxed{\theta \approx 3363 \text{ rev}}$$

(26) $r = 13 \text{ inch}$; $\omega = 800 \frac{\text{rev}}{\text{min}}$

$V = r\omega$

$V = 13 \text{ inch} \cdot 800 \frac{\text{rev}}{\text{min}}$

$V = 13 \cdot 800 \cdot \frac{\text{inch} \cdot \text{rev}}{\text{min}}$ $\left(\frac{\text{miles}}{\text{hour}}\right)$

$V = 13 \cdot 800 \frac{\text{inch} \cdot \text{rev}}{\text{min}} \cdot \frac{1 \text{ ft}}{12 \text{ inch}} \cdot \frac{1 \text{ mile}}{5280 \text{ ft}}$

$V = \frac{13 \cdot 800 \text{ rev} \cdot \text{mile}}{12 \cdot 5280 \cdot \text{min}} \cdot \frac{60 \text{ min}}{1 \text{ h}} \cdot \frac{2\pi \text{ rad}}{1 \text{ rev}}$

$V = \frac{13 \cdot 800 \cdot 60 \cdot 2\pi}{12 \cdot 5280} \frac{\text{mile}}{\text{hour}}$ ← 3.14

$V \approx 62 \text{ mph}$