AFM
Unit 3 Test Review

Name Key

I. Convert each degree measure to radian measure.

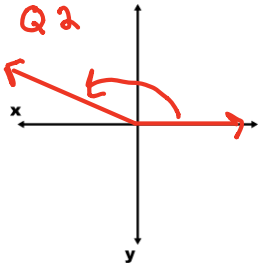
1. 150° $\frac{5\pi}{6}$
2. 210° $\frac{7\pi}{6}$
3. 45° $\frac{\pi}{4}$
4. 240° $\frac{4\pi}{3}$

II. Convert each radian measure to degree measure.

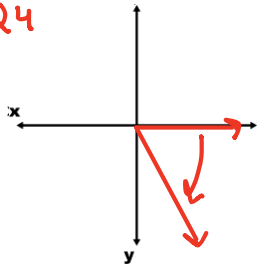
5. $\frac{\pi}{6}$ 30°
6. $\frac{\pi}{4}$ 45°
7. $\frac{5\pi}{6}$ 150°
8. $\frac{7\pi}{6}$ 210°

III. In which quadrant, or on which axis, does the terminal side of the each angle lie? Draw the angle in standard position.

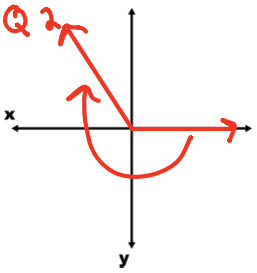
9. 150° Q 2



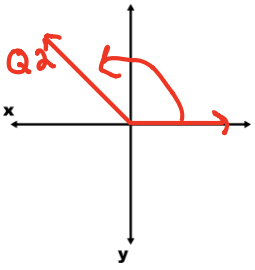
10. -60° Q4



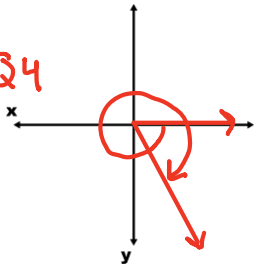
11. -240° Q 2



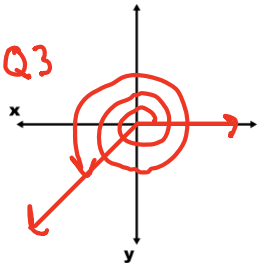
12. $\frac{3\pi}{4}$ Q2



13. $-\frac{7\pi}{3}$ Q4



14. $\frac{21\pi}{4}$ Q3



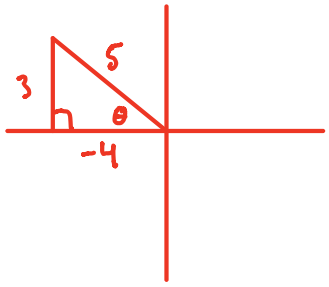
IV. Find the coterminal angle between 0° and 360° or 0 and 2π for the following measures. What quadrant does the terminal side lie in? Give the reference angle for the given angle.

	15. -24°	16. -330°	17. 750°	18. $\frac{7\pi}{3}$	19. $-\frac{17\pi}{3}$
coterminal ∠	336°	30°	30°	$\frac{\pi}{3}$	$\frac{\pi}{3}$
Ref. ∠	24°	30°	30°	$\frac{\pi}{3}$	$\frac{\pi}{3}$

	20. $\frac{11\pi}{3}$	21. -280°	22. 940°	23. $\frac{36\pi}{13}$	24. -624°
	$\frac{5\pi}{3}$	80°	220°	$\frac{10\pi}{6}$	96°
	$\frac{\pi}{3}$	80°	40°	$\frac{4\pi}{6}$	84°

V. A point on the terminal side of angle θ is given. Find the exact value of each of the six trig functions of θ

25. (-4, 3)

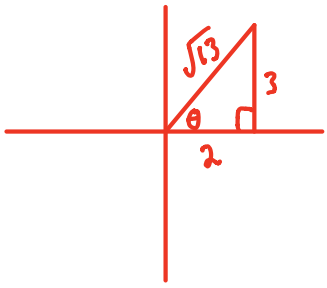


$\sin\theta = \frac{3}{5}$ $\quad \csc\theta = \frac{5}{3}$

$\cos\theta = \frac{-4}{5}$ $\quad \sec\theta = \frac{-5}{4}$

$\tan\theta = \frac{-3}{4}$ $\quad \cot\theta = \frac{-4}{3}$

26. (2, 3)

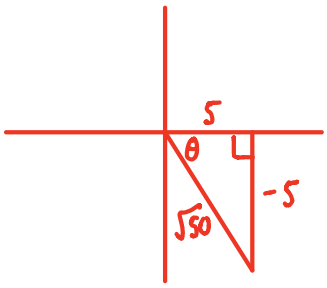


$\sin\theta = \frac{3\sqrt{13}}{13}$ $\quad \csc\theta = \frac{\sqrt{13}}{3}$

$\cos\theta = \frac{2\sqrt{13}}{13}$ $\quad \sec\theta = \frac{\sqrt{13}}{2}$

$\tan\theta = \frac{3}{2}$ $\quad \cot\theta = \frac{2}{3}$

27. (5, -5)

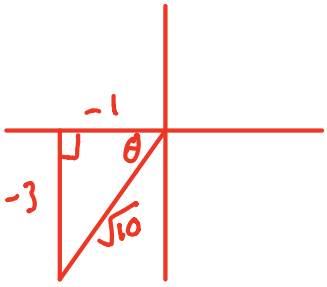


$\sin\theta = \frac{-\sqrt{50}}{10}$ $\quad \csc\theta = \frac{-\sqrt{50}}{5}$

$\cos\theta = \frac{\sqrt{50}}{10}$ $\quad \sec\theta = \frac{\sqrt{50}}{5}$

$\tan\theta = -1$ $\quad \cot\theta = -1$

28. (-1, -3)



$\sin\theta = \frac{-3\sqrt{10}}{10}$ $\quad \csc\theta = \frac{-\sqrt{10}}{3}$

$\cos\theta = \frac{-\sqrt{10}}{10}$ $\quad \sec\theta = -\sqrt{10}$

$\tan\theta = \frac{1}{3}$ $\quad \cot\theta = 3$

*VI. Arc Length and Area of a Sector ** Remember, angle must be in radian measure!*

29. Find the length of an arc of a circle of radius 8 m if the arc subtends a central angle of 1 radian.

$s = 8\text{ m}$

30. Find the measure of a central angle θ (in degrees) in a circle of radius 5 ft if the angle is subtended by an arc of length 7 ft.

$\theta = 80.22^\circ$

31. A circular arc of length 100 ft subtends a central angle of 70°. Find the radius of the circle.

$\frac{70}{180} \rightarrow \frac{7\pi}{18}$

$r = 81.85\text{ ft}$

32. Find the area of a sector with central angle 52° in a circle of radius 200 ft.

$\frac{52}{180} \rightarrow \frac{13\pi}{45}$

$\frac{52000\pi}{9}$ or $18{,}151.42\text{ ft}^2$

33. A sector in a circle of radius 25 ft has an area of 125 ft^2. Find the central angle of the sector in radians.

$\theta = \frac{2}{5}$ rad.

VII. Find the exact values of the following.

34. $\sin(315^\circ)$ $= -\frac{\sqrt{2}}{2}$

35. $\cot(-135^\circ)$ $= 1$

36. $\csc\left(\frac{5\pi}{6}\right)$ $= 2$

37. $\cos\left(-\frac{22\pi}{3}\right)$ $= -\frac{1}{2}$

38. $\cos 225^\circ$ $= -\frac{\sqrt{2}}{2}$

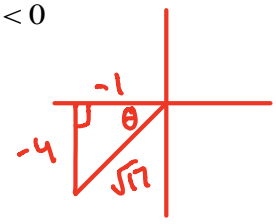
39. $\tan 210^\circ$ $= \frac{\sqrt{3}}{3}$

40. $\tan 420^\circ$ $= \sqrt{3}$

41. $\csc\frac{7\pi}{6}$ $= -2$

VIII. Find the value of the SIX trigonometric functions of θ from the information given.

42. $\tan\theta = \frac{4}{1}, \sin\theta < 0$



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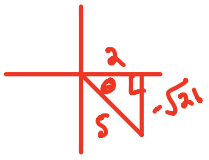
$\sin\theta = -\frac{4\sqrt{17}}{17}$ $\quad \csc\theta = -\frac{\sqrt{17}}{4}$

$\cos\theta = -\frac{\sqrt{17}}{17}$ $\quad \sec\theta = -\sqrt{17}$

$\tan\theta = 4$ $\quad \cot\theta = \frac{1}{4}$

43. If $\cos\theta = 2/5$, and $\sin\theta < 0$, find the remaining trig functions.



$\sin\theta = -\frac{\sqrt{21}}{5}$ $\quad \csc\theta = -\frac{5\sqrt{21}}{21}$

$\cos\theta = \frac{2}{5}$ $\quad \sec\theta = \frac{5}{2}$

$\tan\theta = -\frac{2\sqrt{21}}{21}$ $\quad \cot\theta = -\frac{\sqrt{21}}{2}$

IX. Linear and Angular Speed

44. A phonograph record has a radius of 3 inches and revolves at 45 rpm. Find the linear speed of the outside edge of the record in inches per second.

$\hookrightarrow 90\pi = \theta$

$v = \frac{9\pi}{2}$ in/sec or 14.14 in/sec

45. The propeller of an airplane has a radius of 3 ft. The propeller is rotating at 2250 revolutions per minute. Find the linear (in feet per second) and angular speed (in radians per second) of the tip of the propeller.

$\hookrightarrow 4500\pi$

$v = 225\pi$ ft/sec or 706.86 ft/sec

$w = 75\pi$ rad/sec or 235.62 rad/sec.

46. The fastest human on a bicycle was John Howard, who achieved an incredible speed of 152.3 mph in 1985. If the tires on John's bicycle have a diameter of 30 inches and turn at rate of 141 revolutions per minute in a warm-up, what is the bicycle's speed in mph

X. State the midline, amplitude, period, and phase shift.

47. $y=-\cos\left(\frac{1}{2}\left(x-\frac{\pi}{2}\right)\right)-2$

midline: $y=-2$

Amplitude: 1

Period: 4π

Phase shift: right $\frac{\pi}{2}$

48. $y=\cos(x+\pi)-2$

midline: $y=-2$

Amplitude: 1

Period: 2π

Phase shift: left π

49. $y=\frac{1}{2}\sin 2\left(x+\frac{\pi}{6}\right)-1$

midline: $y=-1$

Amplitude: $\frac{1}{2}$

Period: π

Phase shift: left $\frac{\pi}{6}$

50. y= –sin(2x)+4

midline: $y=4$

Amplitude: 1

Period: π

Phase shift: None

51. $y=\cos\frac{1}{2}x$

midline: $y=0$

Amplitude: 1

Period: 4π

Phase shift: None

52. $y=2\sin\left(\frac{1}{2}x\right)-1$

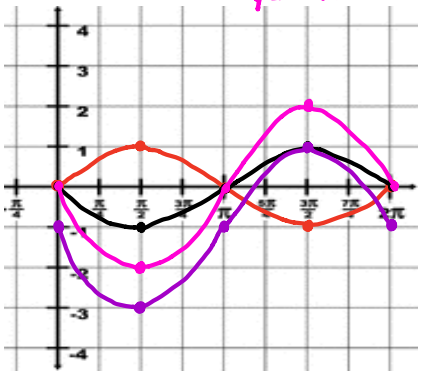
midline: $y=-1$

Amplitude: 2

Period: 4π

Phase shift: None

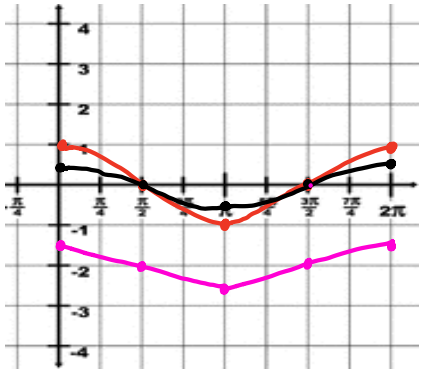
53. $y=-2\sin(x)-1$ $y=\sin x$ $y=-\sin x$ $y=-2\sin x$ $y=-2\sin(x)-1$



Midline: $y=-1$ Amplitude: 2

Period: 2π Phase shift: none

54. $y=\frac{1}{2}\cos(x)-2$ $y=\cos x$ $y=\frac{1}{2}\cos x$ $y=\frac{1}{2}\cos(x)-2$



Midline: $y=-2$ Amplitude: $\frac{1}{2}$

Period: 2π Phase shift: none