Trigonometric Identity Formulas

Pythagorean Identities

$$\sin^2\theta + \cos^2\theta = 1$$

$$1 + \cot^2\theta = \csc^2\theta$$

$$\tan^2\theta + 1 = \sec^2\theta$$

Reciprocal Identities

$$sin\theta = \frac{1}{csc\theta} \qquad csc\theta = \frac{1}{sin\theta}$$

$$cos\theta = \frac{1}{sec\theta} \qquad sec\theta = \frac{1}{cos\theta}$$

$$tan\theta = \frac{1}{cot\theta} \qquad cot\theta = \frac{1}{tan\theta}$$

Quotient Identities

$$tan\theta = \frac{sin\theta}{cos\theta} \qquad cot\theta = \frac{cos\theta}{sin\theta}$$

Sum and Difference Identities

$$\sin(\alpha \pm \beta) = sin\alpha cos\beta \pm cos\alpha sin\beta$$

$$\cos(\alpha \pm \beta) = cos\alpha cos\beta \mp sin\alpha sin\beta$$

$$tan(\alpha \pm \beta) = \frac{tan\alpha \pm tan\beta}{1 \mp tan\alpha tan\beta}$$

Double and Half Angle Formulas

$$sin2\theta = 2sin\theta cos\theta$$

$$cos2\theta = \cos^2\theta - \sin^2\theta$$

$$cos2\theta = 2\cos^2\theta - 1$$

$$cos2\theta = 1 - 2\sin^2\theta$$

$$tan2\theta = \frac{2tan\theta}{1 - \tan^2\theta}$$

$$sin\frac{\theta}{2} = \pm\sqrt{\frac{1 - cos\theta}{2}}$$

$$cos\frac{\theta}{2} = \pm\sqrt{\frac{1 + cos\theta}{2}}$$

$$tan\frac{\theta}{2} = \pm\sqrt{\frac{1 - cos\theta}{1 + cos\theta}}$$

Trigonometric Ratios

$$sin\theta = \frac{opposite}{hypotenuse} \qquad csc\theta = \frac{hypotenuse}{opposite}$$

$$cos\theta = \frac{adjacent}{hypotenuse} \qquad sec\theta = \frac{hypotenuse}{adjacent}$$

$$tan\theta = \frac{opposite}{adjacent} \qquad cot\theta = \frac{adjacent}{opposite}$$

Law of Cosines

$$a^2 = b^2 + c^2 - 2bc \cdot cosA$$

$$A = \cos^{-1}\left(\frac{a^2 - b^2 - c^2}{-2bc}\right)$$

Law of Sines

$$\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC}$$

Area of a scalene Triangle

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

Where $s = \frac{a+b+c}{2}$

Degrees to Radians

$$degrees = radians\frac{\pi}{180^o}$$

Radians to Degrees

$$radians = degrees\frac{180^o}{\pi}$$

Magnitude

$$magnitude = \sqrt{x^2 + y^2}$$

Direction

$$\theta = \tan^{-1}\frac{y}{x}$$

Precalculus Final Review Name: _____ Block: ___

1. $\begin{bmatrix}-2\\5\end{bmatrix}+\begin{bmatrix}-4\\-5\end{bmatrix}=$

2. $\begin{bmatrix}2 & 1\\0 & 4\end{bmatrix}.\begin{bmatrix}1 & -2\\2 & 4\end{bmatrix}=$

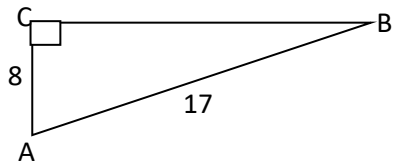
3. Find $\begin{vmatrix}3 & 2\\-4 & 1\end{vmatrix}$

4. $\begin{bmatrix}2 & 1\\3 & 0\end{bmatrix}^{-1}=$

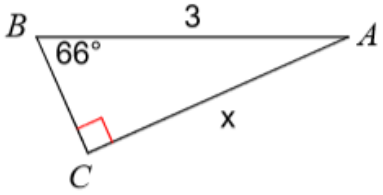
5. Solve the system of equations using matrices.

$$x-3y-2z=0$$
$$2x+3y+2z=3$$
$$-x+y-z=6$$

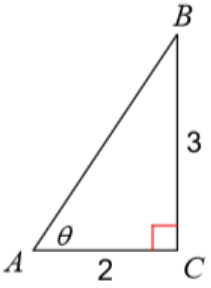
6. Find the value of the 6 trigonometric ratios for triangle ABC.



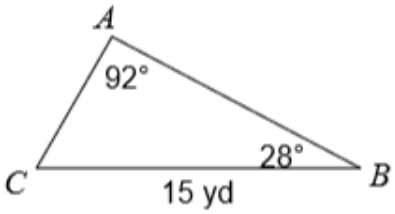
7. Find the value of x.



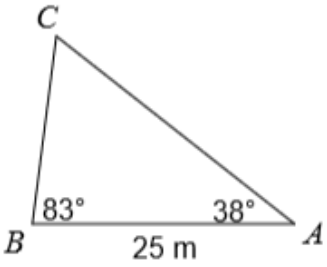
8. Find the value of θ.



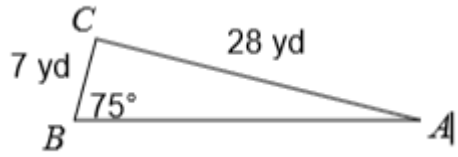
9. Find the length of $\overline{AC}$.



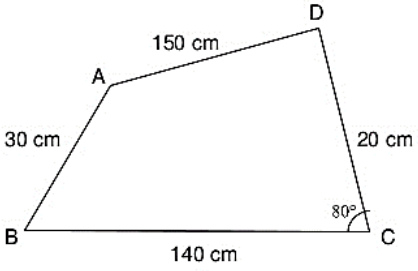
10. Find $m\angle C$.



11. Find $m\angle A$.



12. Find the area of quadrilateral ABCD.



13. Find the function value, rounded to the tenths. $cos\ 177^o$

14. Find θ, rounded to the nearest tenths. $sin\,\theta = .602$

15. State the reference angle and the quadrant the given angle terminates. $-\frac{4\pi}{3}$

16. State the reference angle and the quadrant the given angle terminates. $\frac{7\pi}{12}$

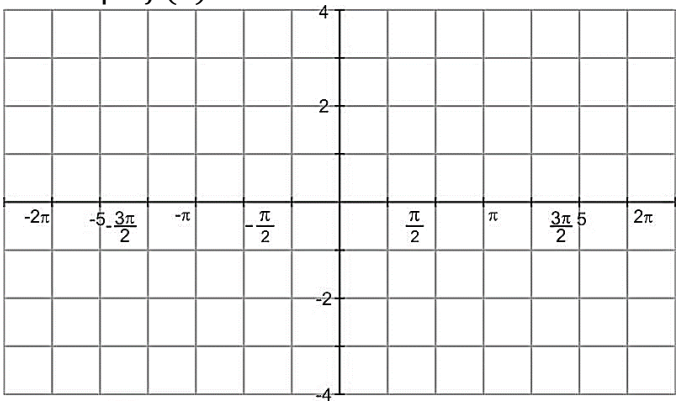
17. Convert $\frac{2\pi}{5}$ radians to degrees.

18. Convert 50^o to radians.

19. Write one positive and negative coterminal angle to $-\frac{\pi}{4}$

20. Write one positive and negative coterminal angle to 390^o.

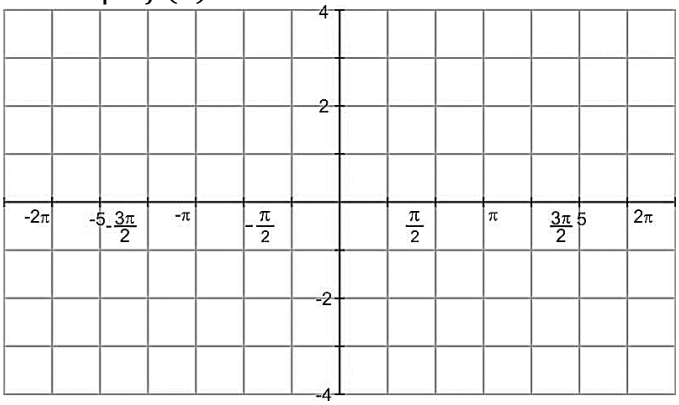
21. Graph $f(x) = sin$



Amplitude: Period:

Vertical Shift: Phase Shift:

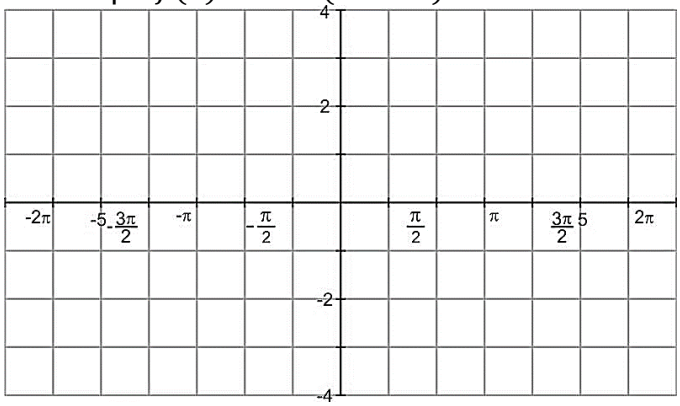
22 Graph $f(x) = -sinx + 1$



Amplitude: Period:

Vertical Shift: Phase Shift:

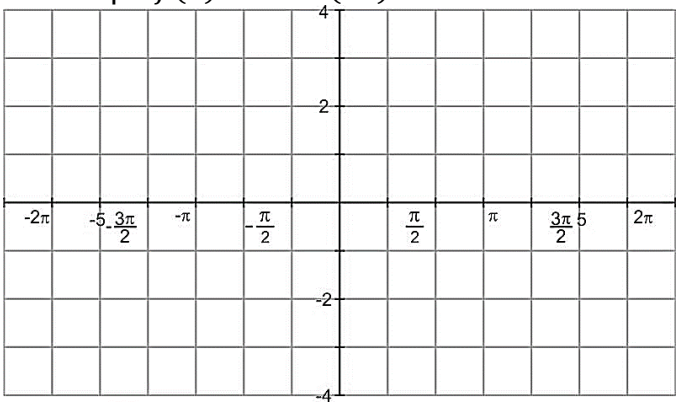
23. Graph $f(x) = 2sin(x + \pi)$



Amplitude: Period:

Vertical Shift: Phase Shift:

24. Graph $f(x) = 3sin(2x)$



Amplitude: Period:

Vertical Shift: Phase Shift:

25. Find the exact value of $\sin\theta$ if the terminal side of θ in standard position contains the point (4, -3).	26. Solve the equation for $0 \leq \theta < 2\pi$. Write your answer as a multiple of π. $$cos\,\theta = -\frac{1}{2}$$
27. Solve for θ. $$2sin\theta cos\theta + cos\theta = 0$$	28. Simplify the expression $$\frac{\sin^2\theta}{1 - cos\theta}$$
29. Rewrite the identity. $\sin^2 x + \cos^2 x = 1$	30. In which quadrants is the statement true, $sin\,\theta < 0$? $\cos\theta < 0$? $\tan\theta < 0$?
31. Find the exact value of $cos\left(\frac{\pi}{4}\right)$	32. Find the exact value of $sin\left(-\frac{\pi}{6}\right)$
33. Find the exact value of $tan\left(\frac{\pi}{2}\right)$	34. Find the exact value of $cot\left(\frac{\pi}{3}\right)$
35. Find the exact value of $cos\left(\frac{-\pi}{6}\right)$.	36. Find the exact value of $tan(4\pi)$.
37. Find the exact value of $sec\left(\frac{\pi}{4}\right)$.	38. Evaluate $Cos^{-1}\left(\frac{1}{2}\right)$
39. Evaluate $\sin\left(Tan^{-1}\left(\frac{\sqrt{3}}{3}\right)\right)$	40. Evaluate $Sin^{-1}\left(-\frac{1}{2}\right)$

41. Evaluate $\cos\left(Sec^{-1}(2)\right)$

42. An airplane travels at 445 mph at a $N25^{\circ}E$ and the wind blows at 40 mph at a bearing of $\mathrm{N}10^{\circ}E$. Find the magnitude of the true flight path of the plane.

43. Given that P = (5, 4), Q = (7, 3), R = (3, 6), and S = (-2, 1), find the component form and magnitude of the vector $PQ + 3RS$.

44. Determine whether the vectors u and v are parallel, orthogonal, or neither.

$$u =< -6, -5 >, v =< 3, 2 >$$

45. Determine if u and v are equal. R = (8, -2), S = (11, -6), O = (-3, -9), and P = (0, -13)

46. Find $|v|$ $v =< -2, -5 >$

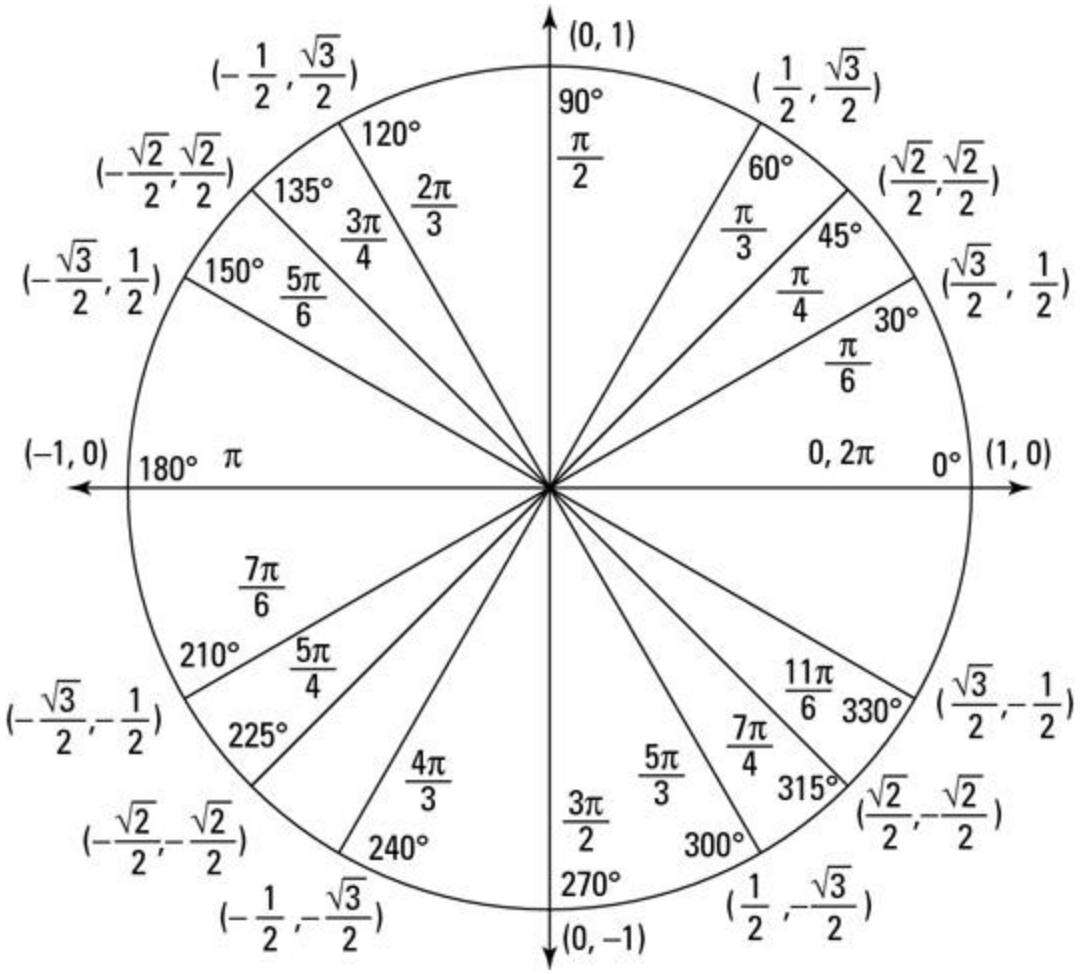
47. The numbers 1 – 10 are placed in a hat, and a number is selected. What is the probability that the number is 4 given that it is known to be an even number?

48. The payoff for a lottery game has the following probability distribution. What is the expected value of x?

Pay off (x)	P(x)
$ 0	0.95
$ 5	0.05

49. There are 20 people participating in a raffle. Three $50 gift cards, from the same store, are to be awarded. How many ways can the three gift cards be awarded?

50. A casino game costs $5 to play. You draw 1 card. If it is a heart, you win $10; If it is a Queen of hearts, you win $50. What is the expected value? Is this a fair game?


(0, 1)
90°
$\frac{\pi}{2}$
$(\frac{1}{2}, \frac{\sqrt{3}}{2})$
60°
$\frac{\pi}{3}$
$(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
45°
$\frac{\pi}{4}$
$(\frac{\sqrt{3}}{2}, \frac{1}{2})$
30°
$\frac{\pi}{6}$
(1, 0)
0°
0, 2π
(−1, 0)
180°
π
$(-\frac{1}{2}, \frac{\sqrt{3}}{2})$
120°
$\frac{2\pi}{3}$
$(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
135°
$\frac{3\pi}{4}$
$(-\frac{\sqrt{3}}{2}, \frac{1}{2})$
150°
$\frac{5\pi}{6}$
$\frac{7\pi}{6}$
210°
$\frac{5\pi}{4}$
$(-\frac{\sqrt{3}}{2}, -\frac{1}{2})$
225°
$\frac{4\pi}{3}$
$(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$
240°
$(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$
$\frac{3\pi}{2}$
270°
(0, −1)
$\frac{5\pi}{3}$
300°
$(\frac{1}{2}, -\frac{\sqrt{3}}{2})$
$\frac{7\pi}{4}$
315°
$(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$
$\frac{11\pi}{6}$
330°
$(\frac{\sqrt{3}}{2}, -\frac{1}{2})$