

East Los Angeles College
Department of Mathematics
Math 241
Final Exam

An airplane flies at a speed of 500 mph in a heading N40E. The wind is traveling at a speed of 35 mph in a heading due West.

1. Determine the velocity vector of the airplane.
2. Determine the velocity vector of the wind.
3. Determine the resultant vector.
4. Determine the airplanes true speed with the wind.
5. Determine the airplanes true heading.

Forces on an object.

Let $\vec{F}_1 = 6i - 2j$ and $\vec{F}_2 = i + 2j$ and $\vec{F}_3 = i + j$

6. Determine the resultant force vector.
7. Determine the magnitude of the resultant force vector.
8. Determine the standard angle (direction) of the resultant force vector.

Let $r = 2 - 2\sin(\theta)$

9. Determine the Cartesian coordinate equation.
10. Graph $y = 2 - 2\sin(\theta)$ over $0 \leq \theta \leq 2\pi$
11. Graph the polar equation $r = 2 - 2\sin(\theta)$.

Let $r^2 = \sin(2\theta)$

12. Determine the Cartesian coordinate equation.
13. Graph $y = \sin(2\theta)$ over $0 \leq \theta \leq 2\pi$
14. Graph the polar equation $r^2 = \sin(2\theta)$

Solve the following trigonometric equations for θ over $0 \leq x \leq 2\pi$

15. $\tan(3x) = -1$

16. $\sqrt{2}\sin\left(\frac{x}{2}\right) - 1 = 0$

17. $(2\cos(x) + 1)(\cot(x) - 1) = 0$

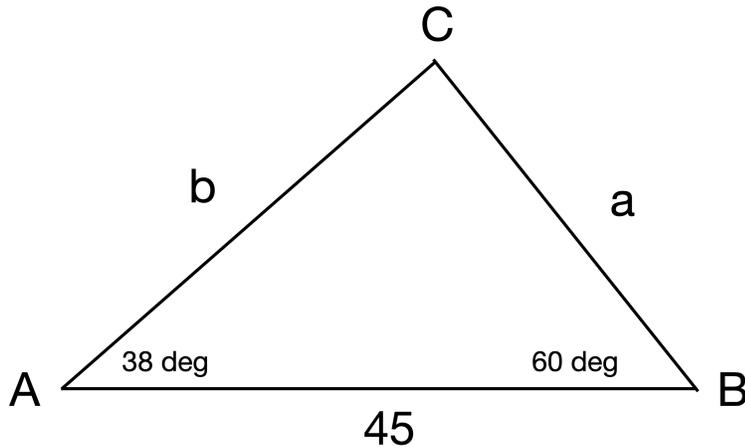
Give the sequence formula solution for the above trigonometric equations.

18. Problem 15
19. Problem 16
20. Problem 17

Navigation

21. Two boats leave the same port at the same time. One travels at a speed of 65 mph in the direction N20E and the other travels at the speed of 45 mph in a direction S75E. After 4 hours, how far apart are the boats?

Triangle



Determine the following values.

22. Angle C
23. b
24. a
25. Determine the area of the triangle.

Speed of a Car

26. The wheels of a car have a radius of 14 inches and are rotating at 600 rpm. Determine the speed of a car in mph.

Truck wheels

A truck with 42-inch diameter wheels is traveling at 70 mph.

27. Determine the angular speed of the wheels in radians per minute.
28. How many rpm's do the wheels make?

Answer Sheet

1		15	
2		16	
3		17	
4		18	
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