

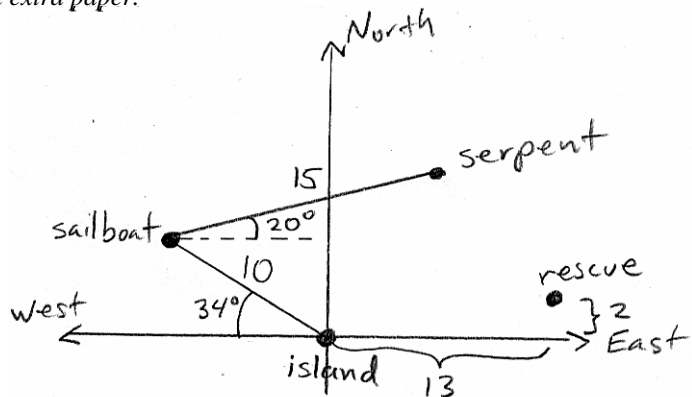
Directions: Work in groups of 2-3 people. You may need extra paper.

1 A sailboat went 10 miles from an island at an angle of 34° North of West (see diagram) and then the mast broke.

(a) The sailboat is _____ miles West of the island and _____ miles North of the island.

(b) A rescue boat is located 25 miles East and 2 miles North of the island.

How far is the sailboat from the rescue boat? _____



(c) A sea serpent is 15 miles away from the sailboat in a direction 20° North of East relative to the sailboat. How far is the serpent from the island?

2 Find the smallest three angles θ **in degrees** so that $\sec \theta = 1.7$

$\theta =$ _____ & _____ & _____ (exact answers)

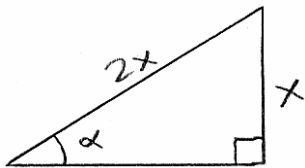
$\theta =$ _____ & _____ & _____ (approximate decimal answers)

3 Find ALL angles α **in radians** so that $3 \tan(\alpha) \cos(\alpha) = \tan(\alpha)$.

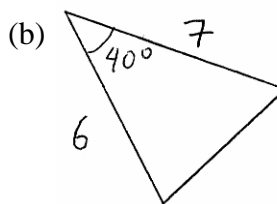
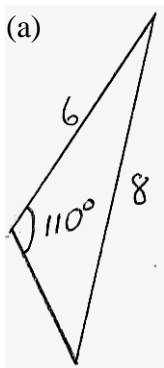
$\alpha =$ _____ (all exact answers)

4 A mass oscillates up and down on a spring. The height of the mass above the ground is a sinusoidal function of time. Suppose we take some measurements and find that it reached its minimum height of 2.6 feet when my stopwatch read 1.3 seconds, and then reached its next maximum position of 3.8 feet when the stopwatch read 2.7 seconds. Write a function $h(t)$ that gives the height of the mass at any time t .

5 For the right triangle shown, the cotangent of alpha is a function of x : $\cot(\alpha) = f(x)$. Find an algebraic formula for $f(x)$.

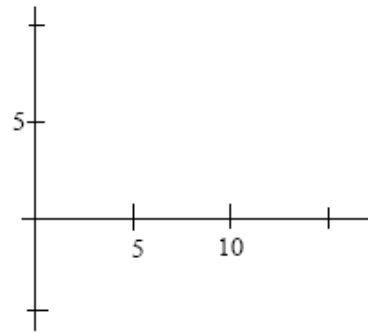


6 Find all of the missing sides and angles on the following triangles.

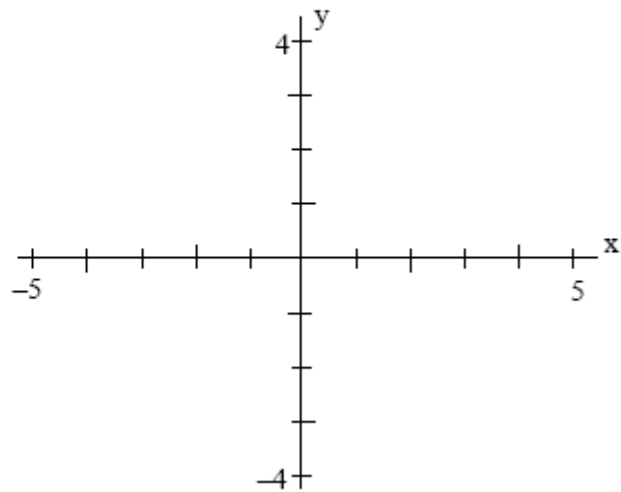


7. $P = \langle 5, 9 \rangle$ and $Q = \langle 15, 5 \rangle$

- (a) Sketch and label P and Q on the figure
 (b) $P \cdot Q =$ _____
 (c) angle between P and Q is _____
 (d) angle P makes with the y-axis is _____
 (e) $Proj_P Q$ is $\langle \quad , \quad \rangle$
 (f) Find a vector perpendicular to P: $\langle \quad , \quad \rangle$

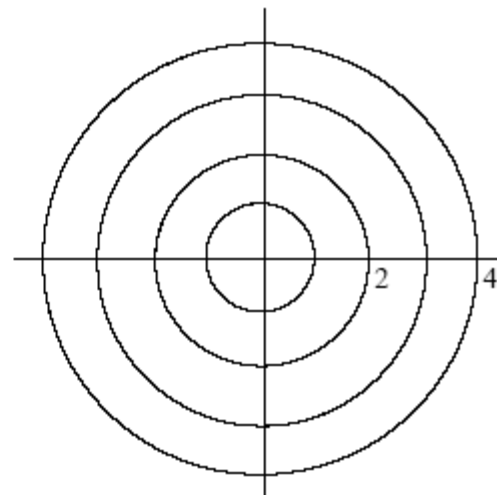


8. Sketch the graph of the parametric equations
 $x(t) = 2 + 3\sin(t)$, $y(t) = 1 + 2\cos(t)$



9. $A = (4, 80^\circ)$ $B = (3, 7\pi/6)$ $C = (-3, -60^\circ)$
 are points given in polar coordinates.

- (a) Plot and label A, B, and C
 (b) Convert A to rectangular coordinates
 $A = (\quad , \quad)$
 (Show your work)



10. Convert the rectangular coordinate points to polar coordinates (Show your work)

- (a) $P = (5, 12)$ rect. = (\quad , \quad) polar
 (b) $Q = (-4, 3)$ rect. = (\quad , \quad) polar