

## PAL Problem Set 2 for Phys 5A (Math Review 2)

---

**Always explain your answers and show your work.**

1. Algebra: Solve the following expression for  $T$ . That is, get  $T$  on its own on one side of the equation:

$$ma = (mg) \cos(\theta) - T \sin(\theta)$$

2. Algebra: Solve the following set of simultaneous linear equations. That is, find the value of  $x$  and the value of  $y$  that make both equations true.

$$2y - 10x = 6 \quad y + x = 15$$

3. Algebra: Find both values of  $x$  that satisfy the following quadratic equation:

$$x^2 - x - 12 = 0$$

4. Trigonometry: In the figure to the right, find:

a. the missing side of the triangle

b.  $\sin(\theta)$

c.  $\cos(\theta)$

d.  $\tan(\theta)$

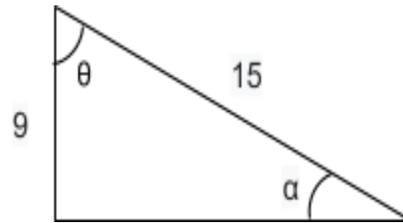
e.  $\theta$

f.  $\sin(\alpha)$

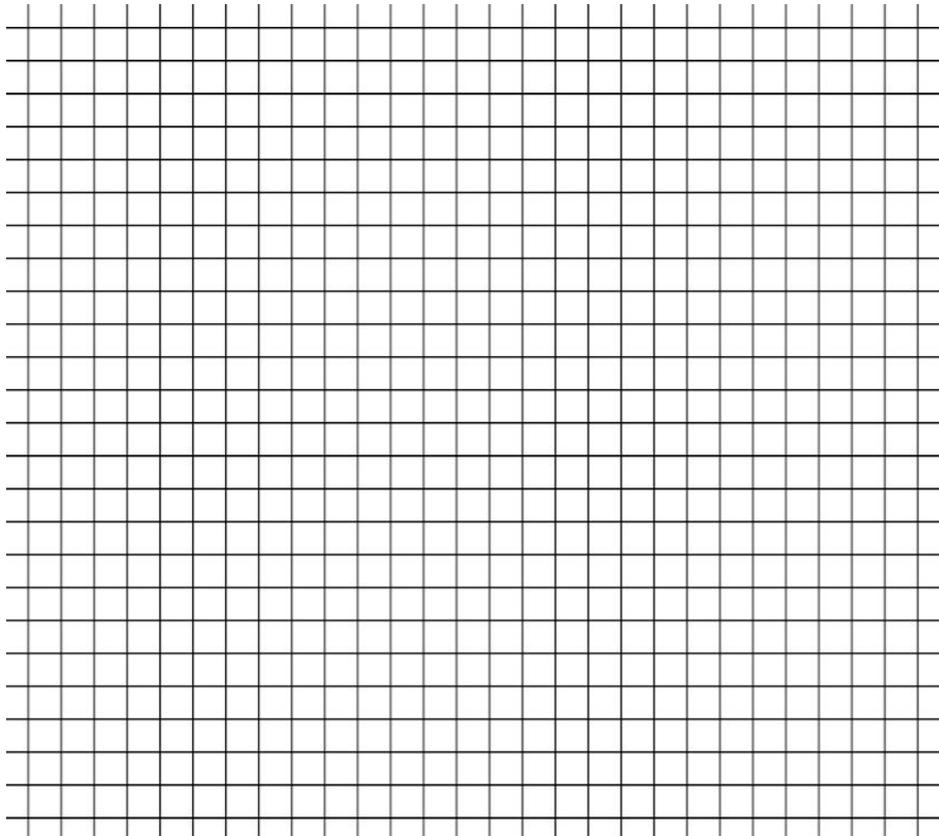
g.  $\cos(\alpha)$

h.  $\tan(\alpha)$

i.  $\alpha$



5. Vectors: Is it possible for the magnitude of a vector (a) to be smaller than the magnitude of any of its components? Why or why not? (b) to be equal to the magnitude of one of its components? How?
6. In each of the cases that follow, the magnitude of a vector is given along with the counter-clockwise angle it makes with the +x axis. Use trigonometry to find the x and y components of the vector. Also sketch each vector approximately to scale to see if your calculated answers seem reasonable. (a) 50.0 N at  $60^\circ$ , (b) 75 m/s at  $5/6$  radians.



7. Vectors: Vector  $\vec{A}$  has magnitude 60 lb and direction  $25^\circ$  east of north. Vector  $\vec{B}$  has magnitude 40 lb and direction  $\pi/3$  south of west. On a single diagram, carefully sketch each force vector to scale.

