Skill Drill 11

This drill provides practice using triangles of a general shape and angles in various quadrants. As in the previous drill, a calculator may be used when appropriate.

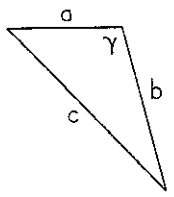
1. Review of major points:

(a) What is the quadrant and equivalent negative angle of 255°? Label the quadrant and the angles in a diagram showing a line pointing in the appropriate direction.

(b) What acute angle has the same magnitude (absolute size) trig functions as 255°? Show this angle in your drawing.

(c) What are the *signs* of the sine, cosine, and tangent of 255°? (Do not use a calculator.)

(d) A triangle is formed using side lengths (in arbitrary units) a = 2, b = 3, and c = 4. Use the law of cosines to determine the angle γ formed by the two shorter sides.



(e) Use the law of sines to find the remaining two angles of this triangle.

2. In the space beneath each of the following angles, sketch a pair of x-y axes and a line pointing approximately in the indicated direction. Also label and give the value of an equivalent angle having an opposite sign. (Use the usual convention for angle measurement, i.e., positive angles are measured counterclockwise from the +x axis.)

(a) −67° (b) −170° (c) 340° (d) −200°

3. Determine the sine, cosine, and tangent of three of the angles listed in the previous question by finding the trig functions of an appropriate positive acute angle and assigning the proper sign.

(a) −67° (b) −170° (c) 340°

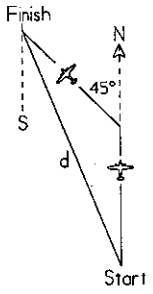
4. Use the law of cosines, the law of sines, or a combination of these laws to find the remaining angles and sides (in arbitrary units) of the triangles with the following measures. You may also use the geometrical fact $\alpha + \beta + \gamma = 180°$. Follow the usual convention for naming sides and angles (α opposite a, etc.)

(a) $a = 5.0$, $c = 4.0$, $\beta = 50°$

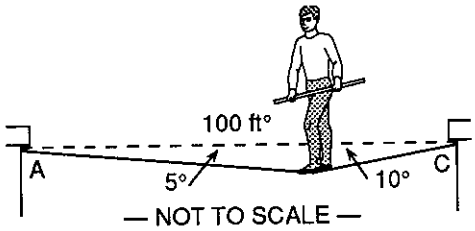
(b) $a = 7.0$, $b = 15.0$, $c = 18.0$

(c) $c = 600$, $\alpha = 65°$, $\beta = 70°$

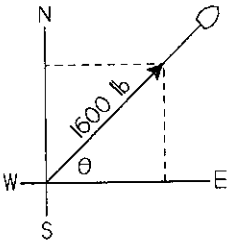
5. An airplane flies due north for 100 miles. It then makes a left turn directly to the northwest and flies another 100 miles. (a) What is the direct line distance to the starting point? (b) At what angle with respect to south does the starting point lie?



6. A tightrope walker is balanced on a wire strung between two buildings 100 feet apart. The wire dips at angles of 5° and 10° at the support points, as shown. What are the lengths of the segments of wire between where he is standing and each building? (Hint: Use law of sines.)



7. A tugboat is moving a raft of logs by pulling on a tow rope with a force of 1600 lb at an angle of θ with respect to east. This force has a component along the N-S direction and a component along the E-W direction. Determine the size (in pounds) of each component and state whether its direction is N, S, E, or W, for the following values of θ.



(a) $\theta = 60°$

(b) $\theta = 120°$.