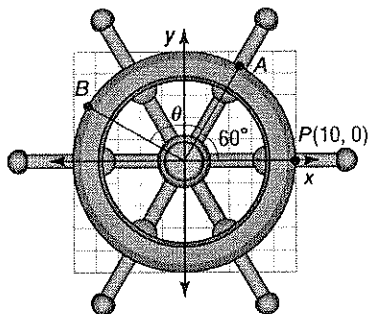


5-4 Word Problem Practice

Sum and Difference Identities

1. ENGINEERING Two highways branch off each other at an angle of 75° . An engineer uses $\tan 75^\circ$ to determine the height of an exit ramp at a particular point. Find the exact value of $\tan 75^\circ$.

2. SHIPS The wheel of a ship is connected to a mechanical or hydraulic system so that turning the wheel adjusts the angle of the rudder, which changes the direction of the ship. The wheel in the diagram shows a counterclockwise rotation of the wheel from A to B . The coordinates of B are $(10 \cos (\theta + 60^\circ), 10 \sin (\theta + 60^\circ))$.



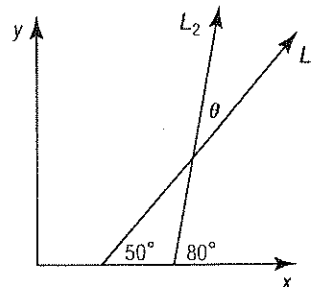
- Rewrite the x -coordinate in terms of one or more functions of θ .
- Rewrite the y -coordinate in terms of one or more functions of θ .

3. ELECTRICITY The current I in amperes in an alternating current at time t in seconds can be found with the formula

$I = 30 \sin \left(50\pi t - \frac{7\pi}{3} \right)$. Rewrite the formula in terms of one or more functions of $50\pi t$.

4. AIRPLANE ROUTES The lines L_1 and L_2 represent the flight paths of two airplanes. The tangent of the angle θ where the flight paths cross can be described by the expression

$$\frac{\tan 80^\circ - \tan 50^\circ}{1 + \tan 80^\circ \tan 50^\circ}$$



- Rewrite the expression as the sum or difference of two angle measures.
- Find the exact value of the expression in part a.

5. SKATEBOARD RAMP The cosine of the angle of elevation of a skateboard ramp can be described by the expression $\cos 55^\circ \cos 35^\circ + \sin 55^\circ \sin 35^\circ$. Simplify this expression.

6. TEMPERATURE A city's average daily high temperature can be modeled by $y = 14.33 \sin (0.56x - 2.44) + 60.79$, where $x = 1$ corresponds to January. Rewrite the formula using the Sine Difference Identity.