LESSON **14.4**

NAME ______________________ DATE __________

Challenge: Skills and Applications

For use with pages 855–861

In Exercises 1–9, solve each equation for $0° \le x < 360°$.

1. $1 + \sec x = 2\cos x$

2. $\tan x - 2 - 3\cot x = 0$

3. $\cos^4 x - \sin^4 x = \sin x$

4. $\sec x - \cos x = \sec x \sin x$

5. $(\tan x + 1)^2 = \sec^2 x - 3$

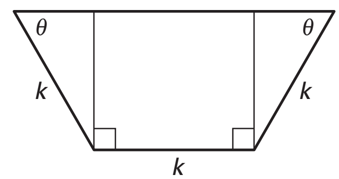
6. $2\tan^2 x + \sec^2 x = 2$

7. $2\sin x\cos x = 1$ (*Hint:* Start by squaring both sides.)

8. $\sec x \tan x = \frac{2}{3}$ (*Hint:* Start by squaring both sides.)

9. $\frac{\tan x}{\cos x} = 2$ (*Hint*: Convert to sine and cosine.)

10. A trough whose cross section is a trapezoid is to be fabricated from sheet metal by bending up the sides to make them have the same width as k at the bottom.



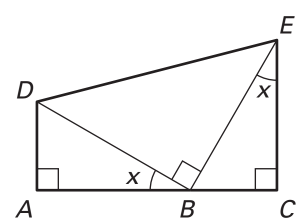
a. Write an expression that gives the area of the trapezoid in terms of k and θ.

b. It can be shown that, for a fixed k, the value of θ that maximizes the area of the cross section (and therefore the volume) of the trough is a solution of the equation

$$\cos^2\theta - \sin^2\theta + \cos\theta = 0.$$

Solve this equation for $0° \le \theta < 90°$, and find the maximum area of the trapezoid, in terms of k.

11. In the trapezoid shown, triangles ABD and CEB are congruent, with one acute angle of measure x.



a. Suppose $DB = EB = 1$. Write an expression for the area of the trapezoid in terms of x.

b. Find x, $0° \le x < 90°$, so that the area of the trapezoid is 1.

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