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ELECTRONIC TOLL PASS AHEAD
TOLL VIOLATIONS $ 100 MINIMUM FINE
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ELECTRONIC TOLL PASS AHEAD

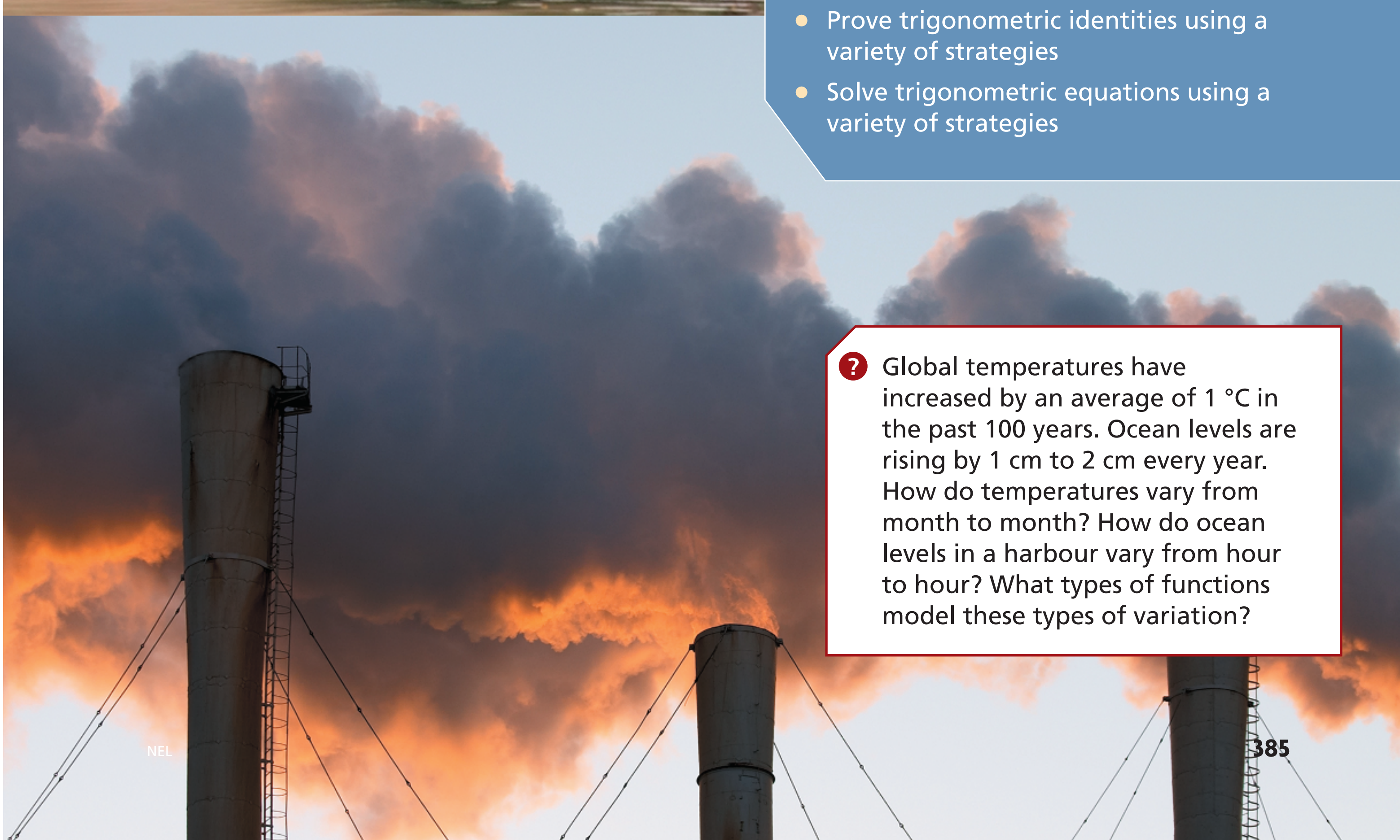
Chapter 7

Trigonometric Identities and Equations

GOALS

You will be able to

- Recognize equivalent trigonometric relationships
- Use compound angle formulas to determine the exact values of trigonometric ratios that involve sums, differences, and products of special angles
- Prove trigonometric identities using a variety of strategies
- Solve trigonometric equations using a variety of strategies



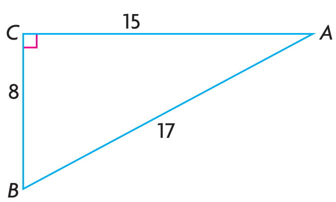
? Global temperatures have increased by an average of 1 °C in the past 100 years. Ocean levels are rising by 1 cm to 2 cm every year. How do temperatures vary from month to month? How do ocean levels in a harbour vary from hour to hour? What types of functions model these types of variation?

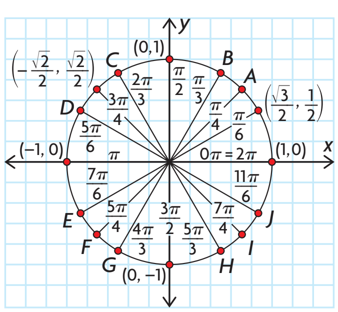
7 Getting Started

Study Aid

- For help, see the Review of Essential Skills found at the Nelson Advanced Functions website.

Question	Appendix/ Lesson
1	R-6
3	R-10
4, 5, 6	6.2
7	R-14
8	R-12





SKILLS AND CONCEPTS *You Need*

1. Solve each equation to two decimal places where necessary.

a) $3x - 7 = 5 - 9x$

b) $2(x + 3) - \frac{x}{4} = \frac{1}{2}$

c) $x^2 - 5x - 24 = 0$

d) $6x^2 + 11x = 10$

e) $x^2 + 2x - 1 = 0$

f) $3x^2 = 3x + 1$

2. Show that the line segment from $A(1, 0)$ to $B\left(2, \frac{1}{2}\right)$ is the same length as the line segment from $C\left(-\frac{1}{2}, 5\right)$ to $D(0, 6)$.

3. Given $\triangle ABC$ shown,

a) state the six trigonometric ratios for $\angle A$

b) determine the measure of $\angle A$ in **radians**, to one decimal place

c) determine the measure of $\angle B$ in **degrees**, to one decimal place

4. $P(-2, 2)$ lies on the terminal arm of an angle in **standard position**.

a) Sketch the **principal angle**, θ.

b) Determine the value of the **related acute angle** in radians.

c) Determine the value of θ in radians.

5. a) Determine the coordinates of each missing point on the unit circle shown.

b) Determine:

i) $\cos\left(\frac{3\pi}{4}\right)$ **ii)** $\sin\left(\frac{11\pi}{6}\right)$ **iii)** $\cos(\pi)$ **iv)** $\csc\left(\frac{\pi}{6}\right)$

6. Given $\tan x = -\frac{3}{4}$, where $0 \le x \le 2\pi$,

a) state the other five trigonometric ratios as fractions

b) determine the value(s) of x, to one decimal place

7. State whether each relationship is true or false.

a) $\tan\theta = \frac{\sin\theta}{\cos\theta}, \cos\theta \ne 0$

b) $\sin^2\theta + \cos^2\theta = 1$

c) $\sec\theta = \frac{1}{\sin\theta}, \sin\theta \ne 0$

d) $\cos^2\theta = \sin^2\theta - 1$

e) $1 + \tan^2\theta = \sec^2\theta$

f) $\cot\theta = \frac{\cos\theta}{\sin\theta}, \sin\theta \ne 0$

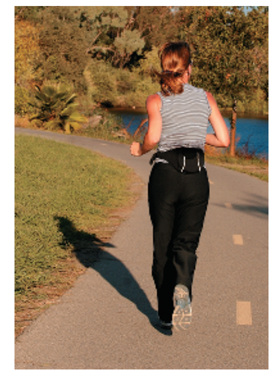
8. Create a flow chart that shows how transformations can be used to sketch the graph of a sinusoidal function in the form $y = a\sin(k(x - d)) + c$.

APPLYING What You Know

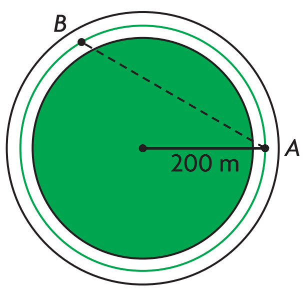
Going for a Run

YOU WILL NEED

- graph paper

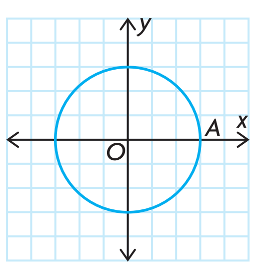


Julie goes for a daily run in her local park. She parks her bike at point A and runs five times around the playing field, in a counterclockwise direction. The radius of the path that she runs is 200 m. This morning, she ran one-third of the way around the field, to point B, before realizing that she had left her heart-rate monitor on her bike. She ran in a straight line across the field, back to her bike, to get her monitor.



? How far did Julie run when she went across the field, back to her bike?

A. Draw a circle (centred at the origin) on graph paper, as shown, to represent the path that Julie runs. Write the coordinates of point A.



B. Mark point B one-third of the way around the circle from point A. What is the radian measure of $\angle AOB$? Write the coordinates $(r \cos \theta, r \sin \theta)$ of point B in terms of this angle.

C. Use the distance formula, $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$, to calculate the distance from A to B.

D. What kind of triangle is $\triangle AOB$? What are the lengths of AO and BO?

E. Verify your answer in part C using the cosine law.

F. How far did Julie run when she went across the field, back to her bike, to get her heart-rate monitor?