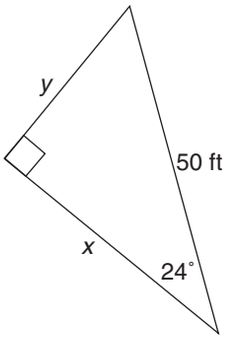
Lesson 3.2: The Sine and Cosine Ratios

Complete the *Practice* below. When you have completed all the questions for *Lesson 3.2 Practice – III* with your best work, mark your work by first comparing your answers to the solutions provided in the *Appendix*. Then, apply the rubric found at the beginning of the *Workbook*.

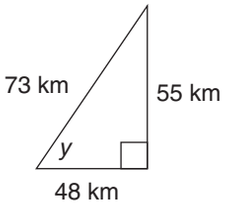
Practice – III

1. Although six different ratios can be produced for any triangle, this course only uses three of the ratios: the sine ratio, the cosine ratio, and the tangent ratio. Explain why only these three ratios are required to relate any pair of sides.

2. Determine the unknown side lengths, to the nearest tenth, in the diagram.



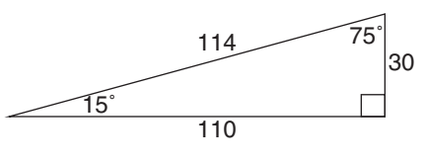
3. Show that the sine ratio, cosine ratio, and tangent ratio can each be used to determine the measure of angle y, to the nearest tenth of a degree, in the following triangle.



4. Look at the table in *Lesson 3.2* that shows the tangent, sine, and cosine ratio values for various angles. Notice that $\sin 5^\circ = \cos 85^\circ$, $\sin 10^\circ = \cos 80^\circ$, $\sin 15^\circ = \cos 75^\circ$, etc.

   a. What do the angles in each of the equalities add to?

   b. Use the following triangle to explain the equalities. (Hint: What fraction represents both $\sin 15^\circ$ and $\cos 75^\circ$ in the diagram?)



5. A boat is anchored in a river. There is 15 m of rope between the boat and the bottom of the river and the rope makes an angle of 66° with the surface of the water. How deep is the river to the nearest tenth of a metre?

6. Chad cycled up a long straight hill. The odometer on his bike showed that the hill was 1984 m long, while a digital map showed that he was 1976 m from the base of the hill.

   a. Assuming Chad rode in a straight line and that both the odometer and the digital map are accurate, why did the two instruments show different distances?

   b. What is the average angle of elevation of the hill? Express your answer to the nearest degree.

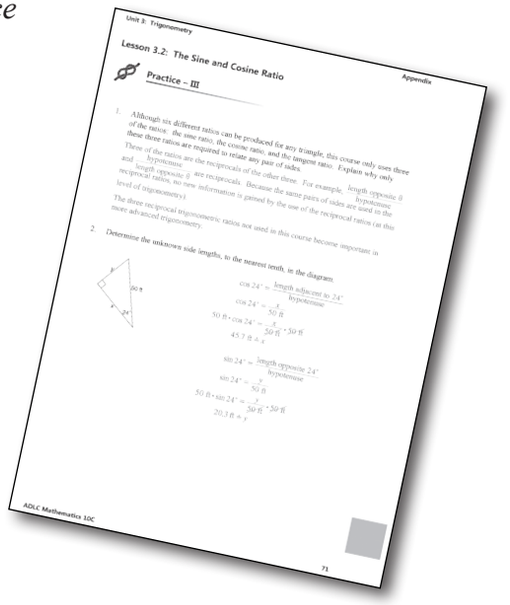
c. How much higher is Chad when he is at the top of the hill compared to when he is at the bottom? Express your answer to the nearest metre.

Mark your work for *Lesson 3.2 Practice – III* using the solutions provided in the *Appendix*. Then, apply the rubric found at the beginning of the *Workbook*.

Transfer your self-assessed mark to the front cover of the *Workbook*.

My self-assessed mark on *Lesson 3.2 Practice – III* is _____.

Reflect on your understanding of the concepts addressed in the *Practice* exercises in the table provided.


Unit 3: Trigonometry

Lesson 3.2: The Sine and Cosine Ratio

Appendix

Practice – III

1. Although six different ratios can be produced for any triangle, this course only uses three of the ratios: the sine ratio, the cosine ratio, and the tangent ratio. Explain why only these three ratios are required to relate any pair of sides.

   There of the ratios are the reciprocals of the other three. For example, $\frac{\text{length opposite } \theta}{\text{hypotenuse}}$ and $\frac{\text{hypotenuse}}{\text{length opposite } \theta}$ are reciprocals. Because the same pairs of sides are used in the reciprocal ratios, no new information is gained by the use of the reciprocal ratios (at this level of trigonometry).

   The three reciprocal trigonometric ratios not used in this course become important in more advanced trigonometry.

2. Determine the unknown side lengths, to the nearest tenth, in the diagram.

$$\cos 24^\circ = \frac{\text{length adjacent to } 24^\circ}{\text{hypotenuse}}$$
$$\cos 24^\circ = \frac{x}{50 \text{ ft}}$$
$$50 \text{ ft} \cdot \cos 24^\circ = \frac{x}{50 \text{ ft}} \cdot 50 \text{ ft}$$
$$45.7 \text{ ft} \doteq x$$
$$\sin 24^\circ = \frac{\text{length opposite } 24^\circ}{\text{hypotenuse}}$$
$$\sin 24^\circ = \frac{y}{50 \text{ ft}}$$
$$50 \text{ ft} \cdot \sin 24^\circ = \frac{y}{50 \text{ ft}} \cdot 50 \text{ ft}$$
$$20.3 \text{ ft} \doteq y$$

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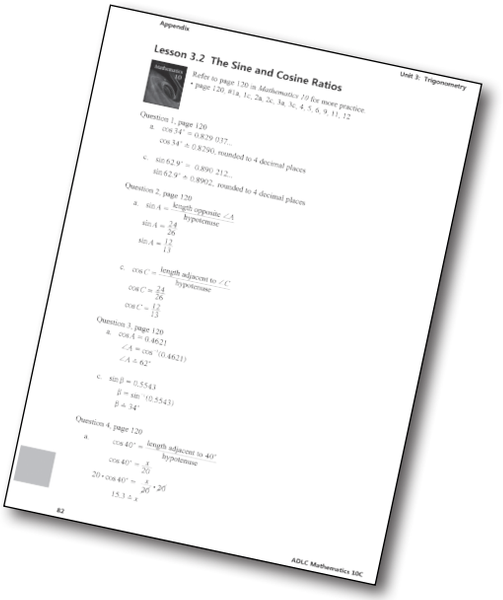
Question Number	Got it!	Almost there…	Need to retry or ask for help.
1			
2			
3			
4			
5			
6			

You may proceed to *Explore Your Understanding Assignment* on the next page of this *Workbook*.

Note: Before you complete *Explore Your Understanding*, you may review your skills and get more practice by completing the following problems in *Mathematics 10*.

- Page 120, #1a, 1c, 2a, 2c, 3a, 3c, 4, 5, 6, 9, 11, 12

Check your work in *Enhance Your Understanding*.


Appendix

Lesson 3.2 The Sine and Cosine Ratios

Unit 3: Trigonometry

Refer to page 120 in *Mathematics 10* for more practice.

Question 1, page 120

a. $\cos 34^\circ = 0.829\,037...$

$\cos 34^\circ \doteq 0.8290$, rounded to 4 decimal places

c. $\sin 62.9^\circ = 0.890\,212...$

$\sin 62.9^\circ \doteq 0.8902$, rounded to 4 decimal places

Question 2, page 120

a. $\sin A = \frac{\text{length opposite } \angle A}{\text{hypotenuse}}$

$\sin A = \frac{24}{26}$

$\sin A = \frac{12}{13}$

c. $\cos C = \frac{\text{length adjacent to } \angle C}{\text{hypotenuse}}$

$\cos C = \frac{24}{26}$

$\cos C = \frac{12}{13}$

Question 3, page 120

a. $\cos A = 0.4621$

$\angle A = \cos^{-1}(0.4621)$

$\angle A \doteq 62^\circ$

c. $\sin \beta = 0.5543$

$\beta = \sin^{-1}(0.5543)$

$\beta \doteq 34^\circ$

Question 4, page 120

a. $\cos 40^\circ = \frac{\text{length adjacent to } 40^\circ}{\text{hypotenuse}}$

$\cos 40^\circ = \frac{x}{20}$

$20 \cdot \cos 40^\circ = \frac{x}{20} \cdot 20$

$15.3 \doteq x$

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