Course: MFM2P Gr. 10 Applied   **Lesson: 9**

Unit: Right Triangle Trigonometry   **Topic: Ratio and Proportion in Right Triangles**

✻ *homework check:* **FM10 p. 50 # 2 – 8**

✻ *note:* **Ratio and Proportion in Right Triangles**

The angle in a right triangle designates the name of the sides. The hypotenuse is the only side that does not change even if the angle chang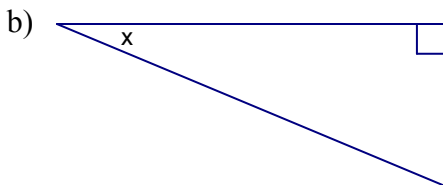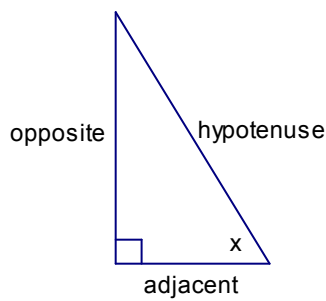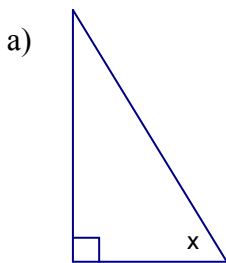es! The word *adjacent means beside and is located beside the angle*. The name of the *opposite side shows its location opposite the angle*. For example, for each triangle, label the hypotenuse, opposite and adjacent sides.

a)

opposite   hypotenuse

x   x

adjacent

b)

x

adjacent

x

hypotenuse   opposite

c)

opposite

hypotenuse

x   adjacent   x

d)

x   x

hypotenuse   adjacent
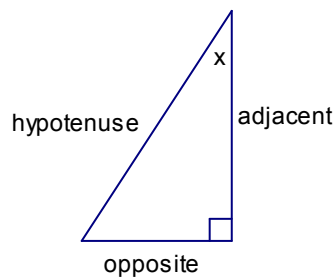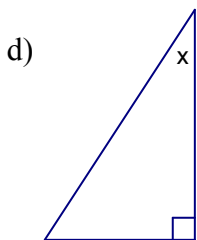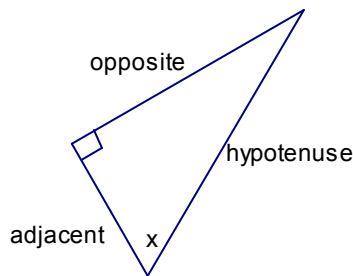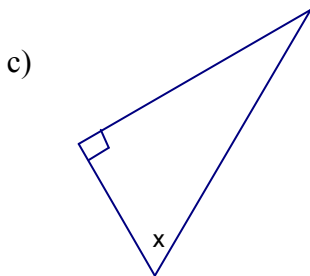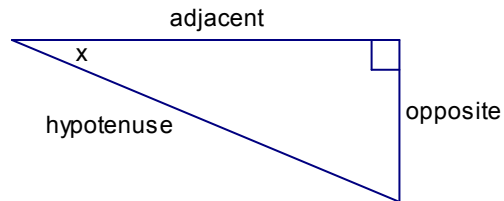
opposite

Writing the ratios of sides in a right angled triangle requires knowing not only the names of the sides, but also how to name the sides and angles given a specific triangle. For example, given triangle ABC , write the ratio of the opposite side to the adjacent side with respect to angle C.
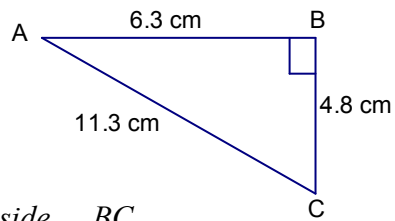
$$\frac{opposite\ side}{adjacent\ side} = \frac{BC}{AB}$$

$$= \frac{4.8}{6.3}$$

$$= 0.7619$$

Note: Use four decimals unless told otherwise! This will be helpful when we move onto trigonometry!

▉ *homework assignment:* __FM10__ p. 59 #1 – 8, 10 – 12

- The opposite side and the adjacent side of a right triangle are named relative to the angle being considered.
- In a right triangle, the hypotenuse is always the side opposite the right angle.
- Ratios comparing the side lengths of right triangles can be expressed as fractions or as decimals.

Discuss the Concepts

D1. Explain how to tell which side in a right triangle is the hypotenuse.

D2. Your friend missed class and wants to know an easy way to decide which side is opposite and which is adjacent to an angle in a right triangle. What would you say to your friend to help?
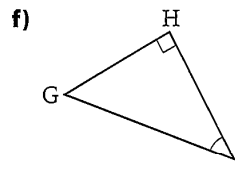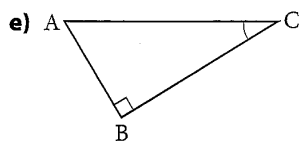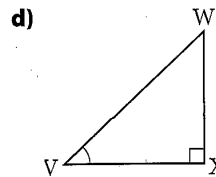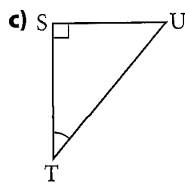
For help with questions 1 and 2, refer to Example 1.

1. Copy each triangle. Label the hypotenuse, the opposite, and the adjacent sides relative to the marked acute angle.

a)

b)

c)

d)

e)

f)
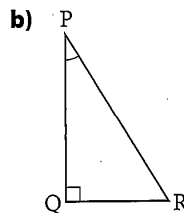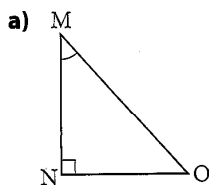
2. Copy each right triangle. Label the hypotenuse, the opposite side, and the adjacent side relative to the marked angle.

a)

A ⌐——————C
|
|
B

b)

D
|
|
E⌐————△F

c)

G
|
|
H◿————□I

d)

J
|
|
K⌐————△L
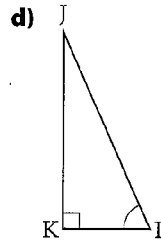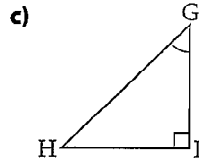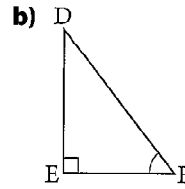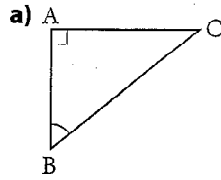
For help with questions 3, 4, and 5, refer to Example 2.

3. Write the ratio comparing the length of the side opposite the marked angle to the length of the hypotenuse. Then, express the ratio as a decimal, rounded to three decimal places.

S
8.6 cm — 10.4 cm
K⌐——————Y
5.8 cm
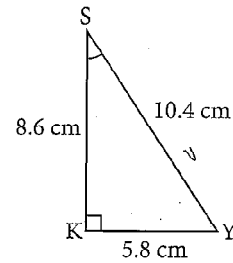
4. Write the ratio comparing the length of the adjacent side to the length of the hypotenuse for the marked angle. Then, express the ratio as a decimal, rounded to three decimal places. Compare answers with a classmate.

H
12 m — 13 m
I⌐————△S
5 m
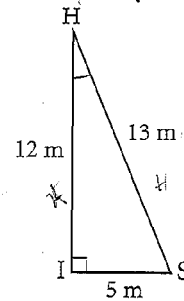
5. Write the ratio comparing the length of the opposite side to the length of the adjacent side for the marked angle. Then, express the ratio as a decimal, rounded to three decimal places.

H
24 cm — 38 cm
E⌐——————△R
29 cm
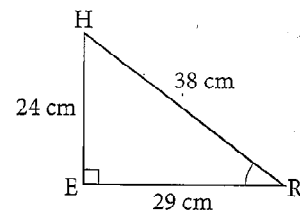
6. Write the ratio comparing the length of the opposite side to the length of the hypotenuse for the marked angle. Then, express the ratio to two decimal places.

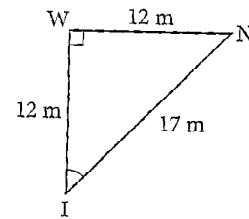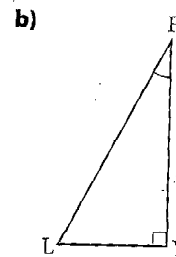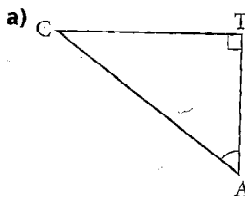**7.** Write the ratio comparing the length of the adjacent side to the length of the hypotenuse for the marked angle. Measure the side lengths to the nearest tenth of a centimetre. Then, express the ratio to two decimal places.

a)

b)

8. a) Draw triangle XYZ with a right angle at Y and side lengths XY = 3 m, YZ = 4 m, and XZ = 5 m.

b) Write the ratio comparing the length of the adjacent side to the length of the hypotenuse with respect to angle X.

Literacy Connect

9. a) Make up your own example to find the ratio comparing the length of the opposite side to the length of the hypotenuse.

b) Build a model of your example.

c) Trade your example and model with a classmate.

Reasoning and Proving

Representing | Selecting Tools

Problem Solving

Connecting | Reflecting

Communicating

10. a) Draw a rectangle 3 cm by 3 cm. Label the vertices A, B, C, and D.

b) Draw diagonal AC.

c) For each of the right triangles formed, identify the side opposite ∠A, the side adjacent to ∠A, the side opposite ∠C, and the side adjacent to ∠C.

d) For each triangle, write the ratios comparing the lengths of the sides opposite and adjacent to ∠A and of the sides opposite and adjacent to ∠C. What do you notice?

e) Will the result you found in part d) be the same for rectangles of any size? Explain your answer.

11. Jeff has now built the elevator cage that he began in Section 1.1. The floor of the cage is 2.1 m square with a diagonal brace piece. The sides of the cage are 2.1 m by 2.5 m, also with diagonal braces.
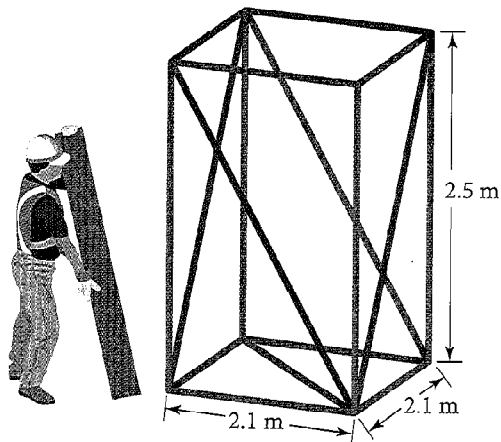
a) For the base, find the ratio of the length of the horizontal piece to the length of the brace.

b) For the side, find the ratio of the length of the vertical piece to the length of the brace.

c) For the side, find the ratio of the horizontal piece to the length of the brace piece.

Extend the Concepts **C**

12. Draw △ABC with a right angle at B and legs each of length 17 units.

a) Find the length of the third side. Round your answer to the nearest tenth.

b) Write the ratio comparing the length of the opposite side to the length of the adjacent side with respect to angle A.

13. Draw triangle XYZ with a right angle at Y and legs each of length 1 unit.

a) Find the length of the third side. Round your answer to the nearest tenth.

b) Find the ratio comparing the length of the opposite side to the length of the hypotenuse with respect to angle X.

c) Find the ratio comparing the length of the opposite side to the length of the hypotenuse with respect to angle Z.