Using Trigonometry to Solve Right Triangles

by – Paul Alves

Activity overview

This activity was designed for the Grade 11 College Math course in the Ontario curriculum. Students are expected to solve problems, including those that arise from real-world applications, by determining the measures of the sides and angles of right triangles using the primary trigonometric ratios. This activity focuses on solving for sides in right triangles.

Concepts

Primary Trigonometric Ratios

Teacher preparation

The Nspire file (Solving Sides in a Right Triangle) will need to be loaded onto the student handhelds. This lesson is a review of content covered in Grade 10 and may be used as an assessment. Students need to know how to measure a side a triangle in a Graphs & Geometry page.

Classroom management tips

The activity can be done in pairs. Students can compare solutions and discuss answers to questions posed in the activity.

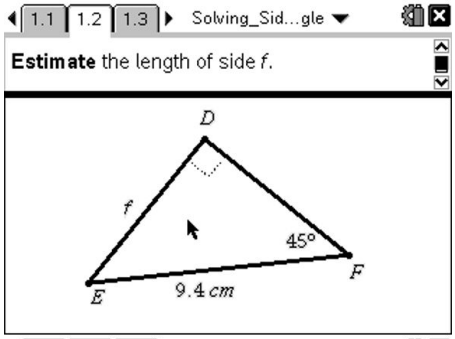
TI-Nspire Applications

Notes; Calculator; Graphs & Geometry

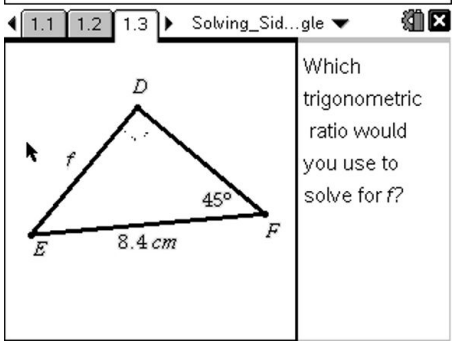
Step-by-step directions

Students are to estimate the length of side f in the triangle drawn on page 1.2.

Note: A review of the naming convention for triangles should be given before the activity.

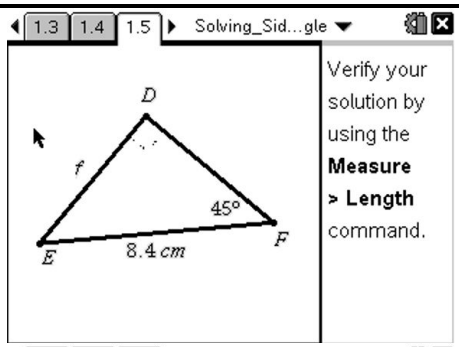


Students are to determine which ratio is necessary to solve for side f and then solve for side f using the Calculator on page 1.4 in the triangle given.

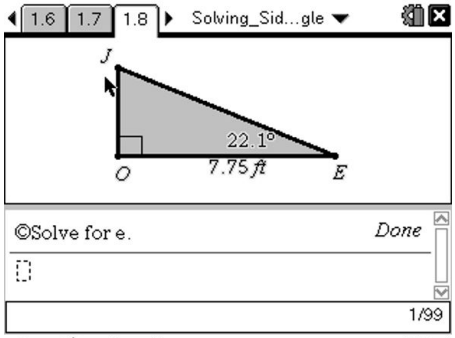


Students are to verify their solution using the Measure tool in the Graphs & Geometry page on 1.5.

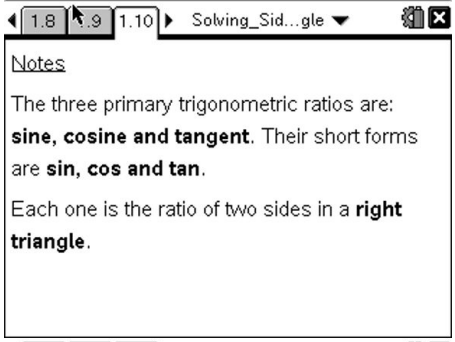
Note: The answers will not match exactly as the display digits in the Graphs & Geometry page are rounded and then used by the students in their calculations. A discussion about the importance of leaving rounding until the final answer can be addressed. Also, the solution can be arrived at by means involving no trigonometry since this is an isosceles triangle.



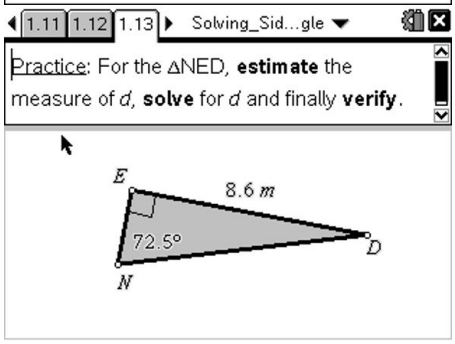
Students will go through the same process for the triangle given on pages 1.6-1.9.



The primary trigonometric ratios will be defined on page 1.10 and given on page 1.11. The mnemonic device used to remember the ratios is to be given to students on page 1.12.



The last two pages of the file provide two practices problems for students. Students are encouraged to verify their solutions using the Measure tool.



Assessment and evaluation

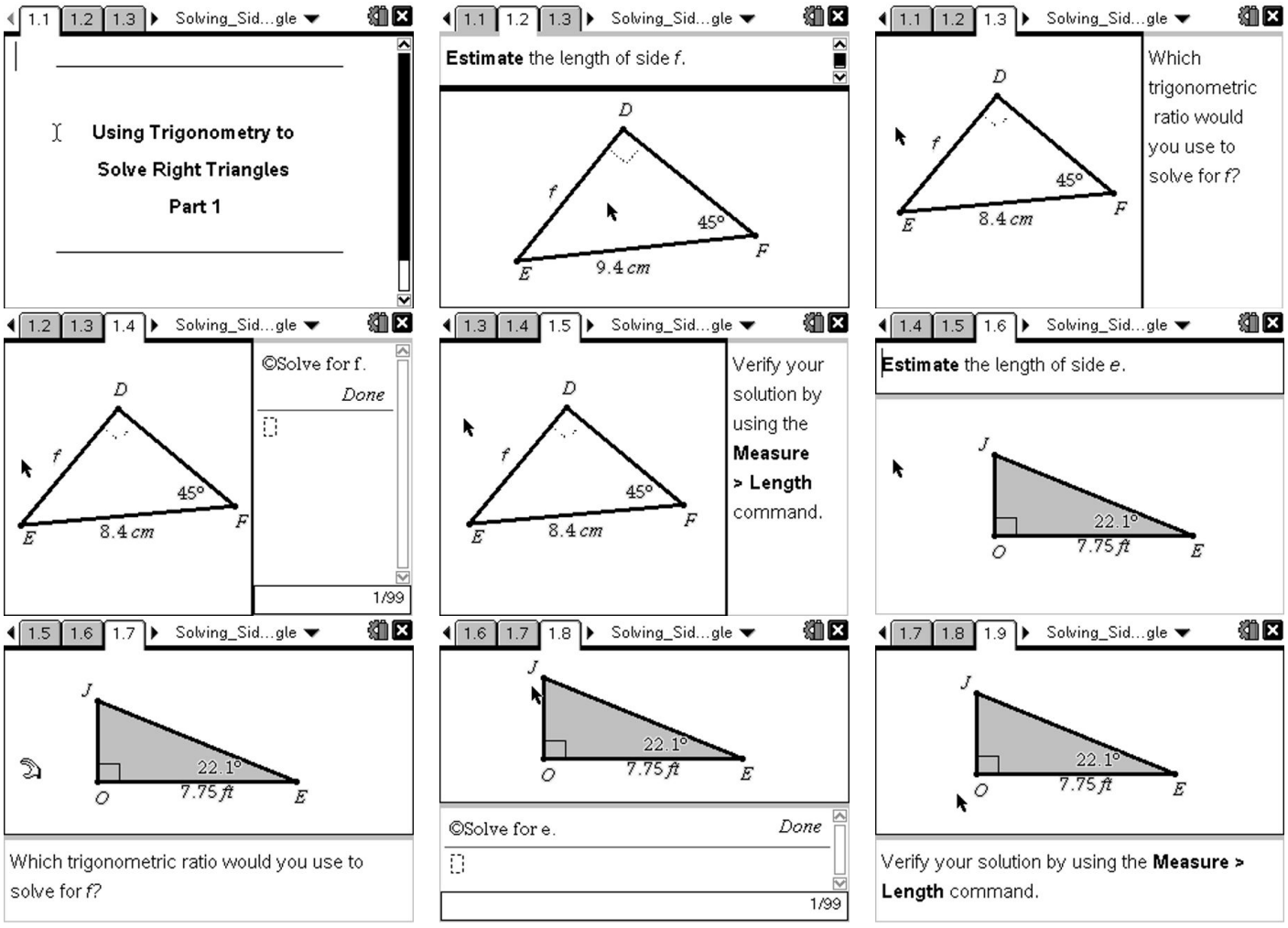
- *Entire activity can be used as a formative assessment tool or the last two problems on pages 1.13 and 1.14 can be assessed for student understanding.*

Activity extensions

- *Students can be asked to solve the triangles given in the activities in order to review other math concepts (Pythagorean Relation and sum of the angles in triangle).*

Student TI-Nspire Document

Solving Sides in a Right Triangle



1.8 | 1.9 | 1.10 | Solving_Sid...gle

Notes

The three primary trigonometric ratios are: **sine, cosine and tangent**. Their short forms are **sin, cos and tan**.

Each one is the ratio of two sides in a **right triangle**.

1.9 | 1.10 | 1.11 | Solving_Sid...gle

Sine is the ratio of:

Cosine is the ratio of:

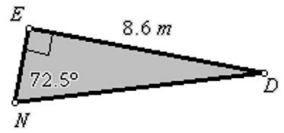
Tangent is the ratio of:

1.10 | 1.11 | 1.12 | Solving_Sid...gle

In order to remember these ratios we use the mnenomic or memory tool:

1.11 | 1.12 | 1.13 | Solving_Sid...gle

Practice: For the ΔNED, **estimate** the measure of *d*, **solve** for *d* and finally **verify**.



1.12 | 1.13 | 1.14 | Solving_Sid...gle

Problem:

Zeke is installing a satellite dish on the side of his house. He stands 15 feet away from his house and using a clinometer measures the **angle of elevation** to be 56°. Determine the height of his house.

Insert a **Calculator** page to do your work.

EOL