

The image features a decorative background with a repeating pattern of light gray geometric shapes, including circles, triangles, and octagons, set against a darker gray background. A large, white, horizontally-oriented oval with a dark gray border is centered in the upper half of the image. To the left of this oval, three dark gray triangles of varying sizes are stacked vertically, pointing towards the oval. Inside the oval, the text "Developing the Law of Tangents" is written in a bold, black, serif font, arranged in two lines.

**Developing the
Law of Tangents**

Law of Tangents

AAAS Benchmarks Addressed: Including, but not limited to the following:

2. Nature of Mathematics:
 - A-Patterns and Relationships.
9. The Mathematical World:
 - B- Symbolic Relationships
 - C- Shapes
 - E – Reasoning

National Science Education Standards Addressed: Including, but not limited to the following:
Science as Inquiry, Content Standard A

Objectives: SWBAT measure the angles of a right triangle using a protractor.

SWBAT measure the length of the sides of a right triangle.

SWBAT calculate the ratios of the sides of a right triangle.

SWBAT determine a relationship between the ratio of the “height” and “distance” side of a triangle and the angle. (Law of Tangents)

SWBAT apply their discovered relationship to other triangles.

Materials: Worksheets with triangles, rulers and protractors.

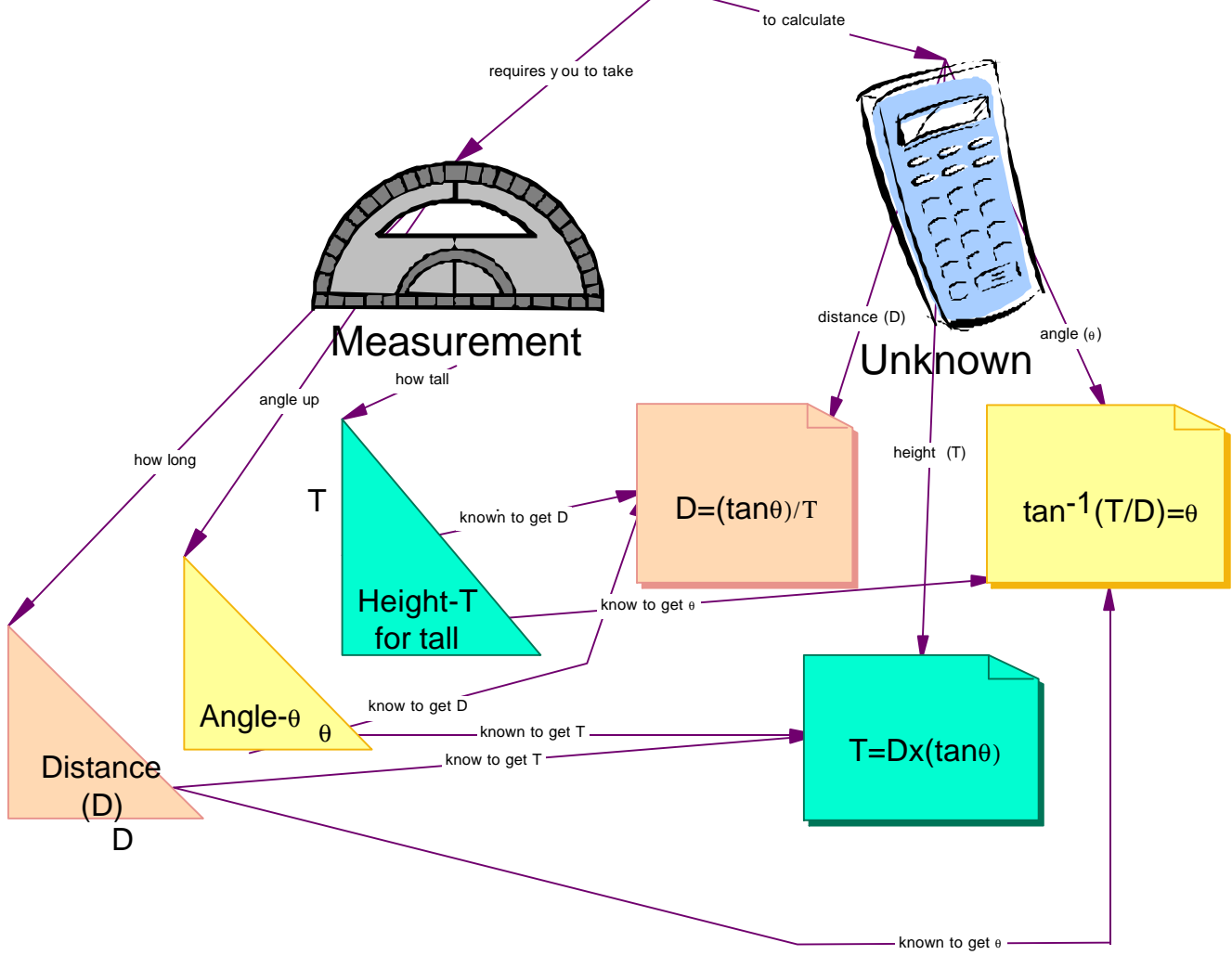
Lesson:

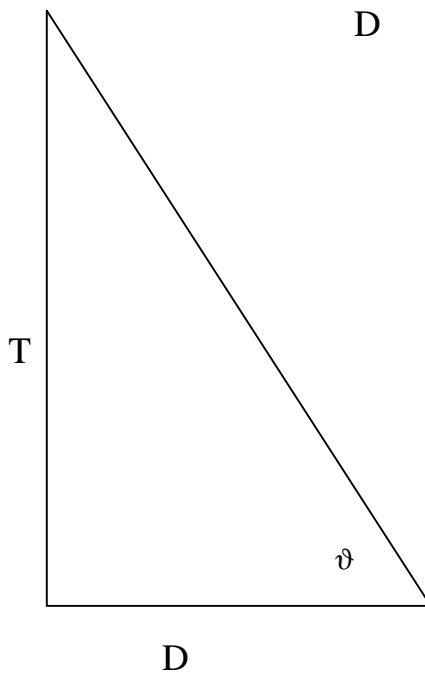
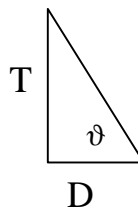
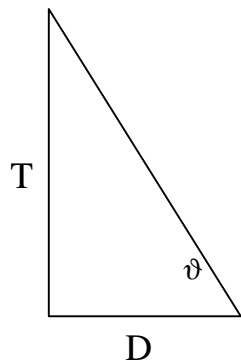
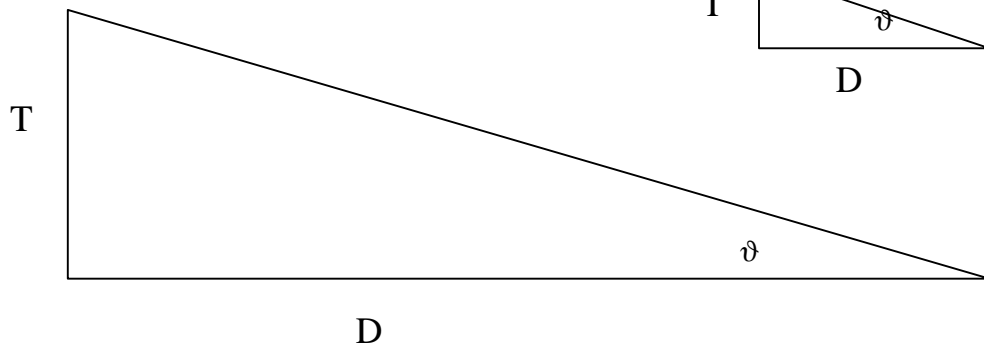
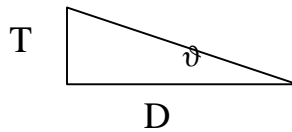
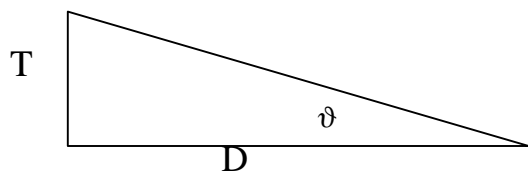
1. Pass out the materials. You may have the students work in a small group or individually, depending on materials and your style.
2. Show the children how to use the protractor and ruler if they are not yet familiar with them.
3. Ask the students to fill in the chart. I choose to call the height “T” for tall. I don’t want to use “h” for height because I don’t want the students to ever confuse it with hypotenuse. I choose to call the length D for distance since that is what they will be pacing off at the park.
4. Ask the students what they notice about the numbers. Hopefully they will come up with the correlation. (The same angle gives you the same T/D)
5. Ask the students if they think this is true for any right triangle with these angles? Ask how they might test this.
6. Ask the students how they think this might come in handy.
7. Share the law of tangents. How you do this will depend on the student’s prior knowledge. I have included a tangent chart. You may use this or have them use their calculator. When you define $\tan\theta = T/D$ you can ask the students how this might come in handy.
8. Assessment: Give them the worksheet with 2 of the 3 labeled and ask them to solve for the unknowns. Then ask them to check the answers with their measuring tools.
9. If the students are familiar with percent error you might go on with that, otherwise they can just look to see if the answers are close.

Assessment: Grade worksheets as you see fit. *

* Adapted from lessons supplied by Greg Zulauf of the Muskegon Michigan Area Math/Science Center .

Law of Tangents $\tan\theta = T/L$



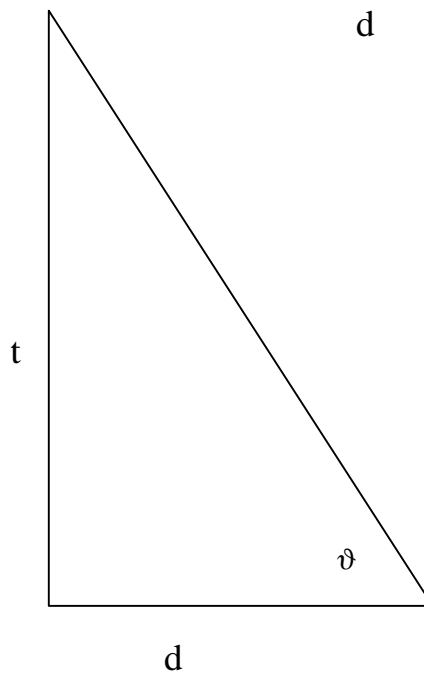
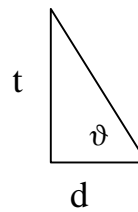
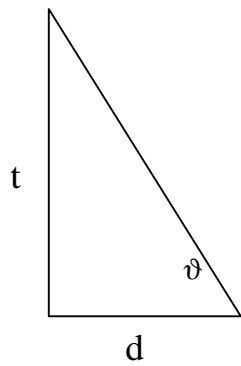
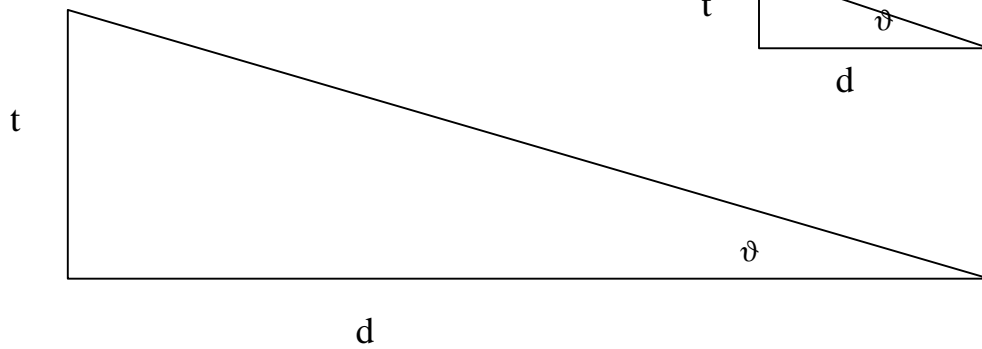
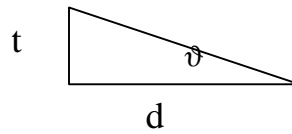
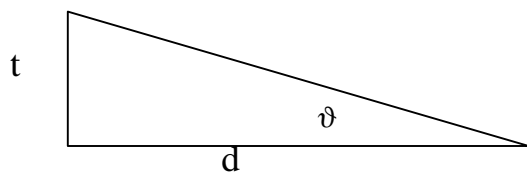


Exercise 1

Angle	t	d	t/d

Exercise 2

Triangle	Angle	t	d	t/d
1				
2				
3				
4				
5				



Exercise 1

Angle	t	d	t/d

Exercise 2

Triangle	Angle	t	d	t/d
1				
2				
3				
4				
5				