**Name** _____ **Date** _____

**Subject:** Algebra
**Unit 15:** Trigonometry

**Concept Strand:** Measurement

**Standard:** The student measures quantities in the real world and uses the measures to solve problems.

**Benchmarks:**
- ❑ MA.B. 2.4.1 selects and uses direct (measured) or indirect (not measured) methods of measurement as appropriate.

**Content Focus:**
- ❑ Learn and apply relationships among similar triangles andtrigonometric ratios.

**Language Focus:**
- ❑ Comparatives and Superlatives
  *The hypotenuse is twice as long as the shorter leg.*
  *The hypotenuse of a right triangle is the longest side.*
- ❑ Equatives
  *It is three times as long as the shorter leg.*

**ESOL Instructional Strategies**
- ❑ Activate student prior knowledge
- ❑ Alternative Assessment
- ❑ Community Language Learning Groups
- ❑ Cooperative Learning Groups
- ❑ Graphic Organizers
- ❑ Heritage Language Support
- ❑ Individualized instruction
- ❑ Modification of Text
- ❑ Total Physical Response
- ❑ Use of visuals

**Content Activities:**

**Text:**

**Materials:**

**Preparation:**

**Activity Descriptions:**

## Vocabulary - English
## Unit 15: Trigonometry

acute
angle
complementary
congruent
corresponding
cosine
depression
elevation
equilateral
hypotenuse
isosceles
obtuse
opposite
protractor
right
side
similar
sine
tangent
triangle
trigonometric ratio

## Vokabilè - Kreyòl
## Chapit 15: Trigonometri

| | |
|---|---|
| acute | egi |
| angle | ang |
| complementary | konplemantè |
| congruent | kongriyan |
| corresponding | korespondan |
| cosine | kosinis |
| depression | depresyon |
| elevation | elevasyon |
| equilateral | ekilateral |
| hypotenuse | ipoteniz |
| isosceles | izosèl |
| obtuse | obti |
| opposite | opoze |
| protractor | rapòtè |
| right | dwat |
| side | kote |
| similar | sanblab |
| sine | sinis |
| tangent | tanjant |
| triangle | triyang |
| trigonometric ratio | rapò trigonometrik |

## Vocabulary - Spanish
## Unit 15: Trigonometry

| | |
|---|---|
| acute | agudo |
| angle | ángulo |
| complementary | complementario |
| congruent | congruente |
| corresponding | correspondiente |
| cosine | coseno |
| depression | depresión |
| elevation | elevación |
| equilateral | equilátero |
| hypotenuse | hipotenusa |
| isosceles | isósceles |
| obtuse | obtuso |
| opposite | opuesto |
| protractor | transportador de ángulos; semicírculo |
| right | recto - rectángulo |
| side | lado/ cateto |
| similar | similar |
| sine | seno |
| tangent | tangente |
| triangle | triángulo |
| trigonometric ratio | razón /relación trigonométrico |

## Summary - English
## Unit 15: Trigonometry

1. Every triangle has three angles. Each angle is obtuse, acute, or right. An obtuse angle is greater than 90º. An acute angle is less than 90º. A right angle is exactly 90º. A right triangle has one right angle. The two shorter sides of a right triangle are called the legs. The hypotenuse of a right triangle is the longest side. It is the side opposite the right angle.

2. The sum of the measures of the three angles in a triangle is 180º. Two angles are complementary if their sum is 90º. Two angles are supplementary if their sum is 180º.

3. A 30-60-90 triangle is a special right triangle. It has one 30º angle, one 60º angle, and one 90º angle. The hypotenuse is twice as long as the shorter leg, and the longer leg is 3 times the shorter leg.

4. Similar triangles have proportional sides and equal angles.

5. The ratios of the sides of a right triangle have special relationships, called the sine, cosine, and tangent. We can use these to find the size of the angles and sides of any right triangles.

## Rezime - Kreyòl
## **Chapit 15:** Trigonometri

1. Tout triyang gen twa ang. Chak ang sa yo gen dwa, obti, egi oubyen dwat. Valè yon ang obti plis pase 90°. Valè yon ang egi pi piti pase 90°. Yon ang dwat vo egzakteman 90°. Yon triyang dwa gen yon sèl ang dwat. De lòt kote ki pi kout nan triyang dwat la rele janm. Ipoteniz yon triyang dwat se kote ki pi long nan triyang sa a. Li se kote ki anfas oswa opoze ak ang dwat la.

2. Sòm mezi twa ang nan yon triyang egal 180°. Si valè de ang nan triyang la egal 90°, sa vle di ang sa yo konplemantè. Men si valè de ang nan triyang la egal 180° sa vle di ang sa yo siplemantè.

3. Yon triyang ki gen twa kote l yo egal 30-60-90 se yon triyang dwat espesyal. Li gen yon ang 30°, yon ang 60° ak yon ang 90°. Ipoteniz triyang sa a de fwa menm longè ak kote ki pi kout la, epi kote ki pi long lan egal 3 kote ki pi kout la.

4. Triyang sanblab yo gen kote yo pwopòsyonèl ak ang yo egal youn ak lòt.

5. Rapò kote yo nan yon triyang dwat gen yon seri relasyon espesyal ki rele sinis, kosinis ak tanjant. Nou kab itilize eleman sa yo pou jwenn valè ang yo ak kote yo nan nenpòt triyang dwat.

## Summary - Spanish
## **Unit 15:** Trigonometry

1. Todo triángulo tiene tres ángulos. Los ángulos pueden ser obtusos agudos, o rectos. Un ángulo obtuso es mayor de $90^{o}$. Un ángulo agudo es menor de $90^{o}$. Un ángulo recto mide exactamente $90^{o}$. Un triángulo rectángulo tiene un ángulo recto. Los dos lados más cortos de un triángulo rectángulo se llaman catetos. La hipotenusa de un triángulo rectángulo, es el lado mas largo. Es el lado opuesto al ángulo recto.

2. La suma de las medidas de los tres ángulos de un triángulo es $180^{o}$. Dos ángulos son complementarios si suman $90^{o}$. Dos ángulos son suplementarios si suman $180^{o}$.

3. Un triángulo 30-60-90 es un triángulo rectángulo especial. Tiene un ángulo de $30^{o}$, un ángulo de $60^{o}$ y un ángulo de $90^{o}$. La hipotenusa mide el doble de largo que el lado o cateto más corto y el cateto más largo mide \/ 3, multiplicado por la longitud del lado más corto.

4. Los triángulos similares son los que tienen lados proporcionales y ángulos iguales.

5. Las proporciones de los lados de un triángulo rectángulo tienen relaciones especiales llamadas seno, coseno y tangente. Podemos usar estas relaciones para encontrar el tamaño de los ángulos y lados de cualquier triángulo rectángulo.

## Listening Activities

1. **Minimal Pairs** (Beginning) See page 4 for instructions.

*sine/side*
*right/white*
*sides/size*

2. **Bingo** (Beginning) See page 4 for instructions. Choose 24 vocabulary words or phrases from the unit summary or from the students' classroom texts. Be sure to coordinate Bingo vocabulary with the material you will be reading to the students. This is a sample Bingo vocabulary list taken from the unit summary.

*triangle, three, obtuse, acute, right, greater, less, exactly, shorter, longest, opposite, sum, three angles, complimentary, special, twice as, longer, similar, equal, ratios, sine, cosine, tangent, of any*

3. **Follow Directions** (Intermediate) See page 5 for additional instructions. Write the following words on the board: *acute, angle, congruent, complementary, supplementary, obtuse, hypotenuse, equilateral.* Provide each team with the following list:

1. *<A = 40º*
2. *<C = 130º*
3. *<E = 90º*
4. *<B = 50º*
5. *<D = 45º*
6. *Side 1 = 4, Side 2 = 4, Side 3 = 4*
7. *<F = 45º*

Use the following instructions:

*Draw a box around the acute angles.*
*Underline the equilateral triangle.*
*Color the obtuse angle blue.*
*Circle the congruent angles.*
*Draw a star next to the complement of angle A.*
*Color the supplement of angle B red.*
*Name the hypotenuse of triangle DFE.*

4. **Team Spelling Test** (Intermediate) See page 5 for specific instructions. The teacher says the singular form and the team writes the plural form.

| | |
|---|---|
| *congruent angle* | *congruent angles* |
| *cosine* | *cosines* |
| *isosceles triangle* | *isosceles triangles* |

| | |
|---|---|
| *opposite sides* | *opposite sides* |
| *right angle* | *right angles* |
| *similar angle* | *similar angles* |
| *sine* | *sines* |
| *tangent* | *tangents* |
| *trigonometry* | *trigonometry* |

5. **Dictation** (Intermediate) See page 6 for instructions.

6. **Interview** (Intermediate, Advanced) See page 6 for instructions.

## Speaking Activities

1. **Intentional Intonation** (Beginning) See page 7 for specific instructions.

*A 30-**60**-90 triangle is a special right triangle.* (Not 50)
*A 30-60-90 **triangle** is a special right triangle.* (Not a square)
*A 30-60-90 triangle is a **special** right triangle.* (Not an ordinary triangle)
*A 30-60-90 triangle is a special **right** triangle.* (Not an obtuse triangle)
*A 30-60-90 triangle is a special right **triangle**.* (Not a right square)

2. **Backwards Build-Up** (Beginning) See page 7 for specific instructions. Note that it is not necessary to teach all of these sentences on one occasion.

*a) The sum of the measures of the three angles in a triangle is 180º.*
*b) Two angles are complementary if their sum is 90º.*
*c) Two angles are supplementary if their sum is 180º.*
*d) Similar triangles have proportional sides and congruent angles.*
*e) The ratios of the sides of a right triangle have special relationships, called sine, cosine, and tangent.*

3. **Charades** (Intermediate) See page 7 for specific instructions. Below are listed some Charade suggestions:

*hypotenuse, right triangle, obtuse, protractor, supplementary.*

4. **Mixed up Sentence** (Intermediate) See page 8 for specific instructions.

5. **Twenty Questions** (Advanced) See page 8 for specific instructions. Subject suggestions are listed here.

*What's My Sine? (example questions: Are you opposite the hypotenuse? Are you an acute angle?)*

## Reading Activities

1. **Pre Reading** (Beginning) See page 9 for specific instructions. Use the paragraph below for your pre reading text.

> *Every triangle has three angles. The sum of these angles is 180º.Two angles whose sum is 90º are called complementary. Two angles whose sum is 180º are called supplementary. The sides of right triangles have special relationships, called ratios. These are the sine, cosine, and tangent. Learning to solve triangles can help us build many of the things we see around us.*

2. **Total Recall** (Intermediate, Advanced) See page 9 for specific instructions.

3. **Scan** (Intermediate, Advanced) See page 10 for specific instructions.

4. **True or False** (Intermediate, Advanced) See page 10 for specific instructions.

5. **Judgment** (Intermediate, Advanced) See page 11 for specific instructions.

6. **Story Grammars** (Advanced) See page 11 for specific instructions.

## Writing Activities

1. **Language Experience Story** (Beginning, Intermediate, Advanced) See page 12 for specific instructions. Have students create and dictate a unit appropriate word problem and the steps to solve it.

2. **Word Problems** Have teams each make a word problem based on the unit summary. Teams take turns posing the problem to other teams. Use the same rules as in SCAN (see page 8 for specific instructions on playing and scoring).

3. **Indirect Speech** (Beginning) See page 12 for specific instructions. Use the dialog written for Presenting Activity 1, Dialog.

> *ex.:* Equilateral Triangle: *Being me is so boring.*
>
> Isosceles Triangle: *At least people can pronounce your name.*
>
> *The isosceles triangle said that at least people could pronounce equilateral triangle.*

4. **Framed Paragraphs** (Intermediate) See page 12 for specific instructions.

5. **Opinion/Proof** (Intermediate) See page 13 for specific instructions.

6. **Spool Writing** (Intermediate) See page 14 for specific instructions.

7. **Organizing Information Through Power Thinking** (Intermediate) See page 14 for specific instructions.

8. **RAFT** (Advanced) See page 15 for specific instructions.

*ex.: Have the writer be a pair of similar triangles. The writer can explain how they are the same and how they might differ.*

9. **FCAT Writing (Expository Prompt)** See page 34 for additional information. Distribute the planning sheets and writing folders containing the writing prompt to the students. Remind students to budget their time. They should spend approximately 10 minutes on brainstorming and pre-writing, 25 minutes on drafting, and 10 minutes on editing. Record the time and give students the command to begin. After 45 minutes, ask the students to stop writing and place their planning sheets inside their folders.

*You have nearly completed Algebra 1.*

*Before you begin writing, think about what you have learned this year.*

*Now tell about it.*

## Presenting Activities

1. **Dialog** (Beginning) See page 16 for specific instructions. This activity may be used to write the dialog in paragraph form, using indirect speech. See Writing Activity 2, Indirect Speech.

Equilateral Triangle: *Being me is so boring.*

Isosceles Triangle: *At least people can pronounce your name.*

Equilateral Triangle*: But your name is so much more exotic.*

Isosceles Triangle: *Yes, but all sides like to be equal.*

*2.* **Show and Tell** (Intermediate) See page 17 for specific instructions.

3. **Making the News** (Advanced) See page 17 for specific instructions.

## Viewing Activities

See page 17 for specific instructions.

1. **Video Total Recall** (Intermediate, Advanced) See page 9 for specific instructions.

2. **Video True and False** (Intermediate, Advanced) See page 10 for specific instructions.

3. **Video Judgment** (Intermediate, Advanced) See page 11 for specific instructions.

## Vocabulary Activities

1. **Line of Fortune** (Beginning) See page 18 for specific instructions. Choose your words from the Unit Vocabulary.

2. **Concentration** (Beginning) See page 18 for specific instructions. Prepare cards with the following words for the students to match. Note that students need to match all three words.

| | | |
|---|---|---|
| *little* | *less* | *least* |
| *short* | *shorter* | *shortest* |
| *long* | *longer* | *longest* |
| *wide* | *wider* | *widest* |
| *great* | *greater* | *greatest* |

3. **Wrong Word** (Intermediate) See page 19 for specific instructions. Here are some suggestions:

a) *All triangles have three sines.*
b) *A 50º angle is obtuse.*
c) *A scalene triangle has two equal sides.*
d) *Complementary angles have a sum of 180º.*
e) *A right triangle has two right angles.*

4. **Jeopardy** (Intermediate) See page 19 for specific instructions.

| *Question* | *Answer* |
|---|---|
| a) *This is the sum of the angles in a triangle* | *180º* |
| a) *This is a right angle* | *90º* |
| a) *This is an obtuse angle* | *130º* |
| b) *This is a special right triangle* | *30-60-90* |
| b) *These are the sides of a right triangle* | *3-4-5* |
| b) *These are complementary angles* | *20º,70º* |

| | |
|---|---|
| *c) This is the sine* | *opposite / hypotenuse* |
| *c) This is the cosine* | *adjacent / hypotenuse* |
| *c) This is the tangent* | *opposite / adjacent* |

Note that another way to set up categories is by topic. Write the names of 3-5 major topics across the top of the board, then use construction paper with $100, $200, . . ., $500 written on each piece. Laminate these and put magnetic tape on the back. Each topic should be a different color. To choose, students might say *I'll take trigonometric ratios for $300*. Let's say your *trigonometric ratios* category cards are gray; remove the gray $300 from the board. This is a good test review exercise, and the number of dollars earned per team can be added to the group members' test scores. For example, if one group earns $700, each member of that group gets 7 additional points on his/her test. To minimize confusion, each group should choose a speaker before the game begins. No one else in the group can give the answer. Also, if this game gets too noisy, you can play silent Jeopardy, where the students write down their answer and you read it aloud. The game should take about 45 minutes to complete.

## Grammar Activities

1. **Cooperatives and Superlatives** See Algebra, Unit 7, Grammar Activity #1 for teaching suggestions for this topic.

2. **Equatives** use the construction *as ____ as.* The blank can be filled with a adverb. Equatives show that two things are equal.

Mother: *Bill, finish your lunch! We're late!*
Bill: *I'm eating as fast as I can.*

Bill is telling us that what is doing equals what he is capable of doing.

Ask students to think of other sentences using equatives.

*ex. Carlos is as tall as Jean.*

Ask students to explain the meaning of the following sentence:

*The longer leg is three times as long as the shorter leg.*

3. **Modified Single Slot Substitution Drills** (Beginning) See page 20 for specific instructions.

*(a) Two angles are complementary (b) if their sum is 90.*

possibilities (a): *three, a pair of, different, four*
possibilities (b): *when, since, because, unless*

4. **Word Order Cards** (Beginning) See page 21 for specific instructions.

5. **Sentence Builder** (Beginning) See page 21 for specific instructions.

6. **Multiple Slot Substitution Drills** (Intermediate) See page 21 for specific instructions.

*The cosine of an angle is the <u>relationship</u> between the side <u>adjacent</u> to the angle and the hypotenuse of a triangle.*
possibilities: *next to, ratio, different, near, opposite, close to, range, division.*

7. **Flesh It Out** (Intermediate) Written Format. See page 21 for specific instructions.

*a*) *Every/triangle/three/angles.*
*b) Obtuse/angle/greater/90.*
*c) Sum/measures/three/angles/triangle/180.*
*d) Two/angles/complementary/sum/90.*
*e) Sine/trigonometry/ratio.*

8. **Transformation Exercise** (Intermediate) See page 22 for specific instructions.

9. **Who, What, When, Where, Why** (Beginning) See page 22 for specific instructions.

10. **Sentence Stretchers** (Beginning) See page 23 for specific instructions.

11. **Look It Up** (Intermediate) Version Three See page 23 for specific instructions. Help the students find sentences with comparatives, superlatives, and equatives in the chapter.

12. **Rewrite the Paragraph** (Intermediate) See page 24 for specific instructions. Students rewrite the paragraph in the present tense.

*Every triangle had three angles. The sum of these angles was 180.Two angles whose sum was 90 were called complementary. Two angles whose sum was 180 were called supplementary. The sides of right triangles had special relationships, called ratios. These were the sine, cosine, and tangent. Learning to solve triangles helped us build many of the things we saw around us.*

Name _____ Date _____

**Unit 15, Exercise 1**

Fill in the blank with the correct word.

supplementary
angles
cosine
complimentary
triangle
right

Every _____ has three angles. Each angle is obtuse, acute or _____. The sum of the measure of the three _____ in a triangle is $180^{o}$. _____ angles are angles that form a right angle when joined together. _____ angles are angles that form a straight line when joined together. The ratios of a right triangle have special relationships called the sine, _____ and tangent.

Name _____ Date _____

**Unit 15, Exercise 2**

Find the statements that are *False* and rewrite them to make them *True*.

____ 1. An isosceles triangle is equal on all sides.

_____

____ 2. An obtuse angle measures more than $120^{o}$ and less than $180^{o}$.

_____

____ 3. Similar triangles have proportional vertices.

_____

____ 4. Complimentary angles have a sum of $60^{o}$.

_____

____ 5. The sine of an angle is the ratio of the opposite side and the hypotenuse.

_____

____ 6. A right triangle has three acute angles.

_____

____ 7. Two triangles are equilateral if they have proportional sides.

_____

____ 8. All angles have a ratio relationship called the sine, cosine, and tangent.

_____

____ 9. The hypotenuse is always the longest leg of a right triangle.

_____

____ 10. A 30-60-90 triangle is a special obtuse triangle.

_____

Name _____ Date _____

**Unit 15, Exercise 3** (FCAT Practice/Reading Comprehension)

Read the paragraph.

> Angles come in different shapes and sizes. Some are wider or narrower than others, but all angles are measured as part of a circle. Angles are measured in degrees from $0^o$ to $180^o$.

Think about what you have read. Now answer the questions.

1. What is the MAIN TOPIC of this paragraph?

_____

_____

_____

2. According to the paragraph, what is the largest area an angle can measure? Write a sentence to support your answer.

_____

_____

_____

3. In the work space below, draw a picture to represent this sentence:

**Angles are measured in degrees from $0^o$ to $180^o$.**

*Work Space*

Name _____ Date _____

**Unit 15, Exercise 4** (FCAT Practice/Reading Comprehension)

Read the paragraph.

Every triangle has three angles. Each angle is obtuse, acute, or right. An obtuse angle is greater than 90º. An acute angle is less than 90º. A right angle is exactly 90º. A right triangle has one right angle. The two shorter sides of a right triangle are called the legs. The hypotenuse of a right triangle is the longest side. It is the side opposite the right angle.

Think about what you have read. Now use information from the paragraph to draw a right triangle in the work space below. Be sure to label each part.

*Work Space*

In the remaining work space, use information from the paragraph to draw examples of an obtuse, acute and right angle. Be sure to write the name and degrees of each angle.

Name _____ Date _____

**Unit 15, Exercise 5**

Fill in the blanks.

Every triangle has three _____. The sum of these _____ is 180º. Two angles _____ sum is 90º are _____ complementary. Two angles whose _____ is 180º are called _____. The sides of right _____ have special relationships, called _____. These are the sine, _____, and tangent. Learning to _____ triangles can help us _____ many of the things _____ see around us.

Name _____ Date _____

**Unit 15, Exercise 6** Grammar

Choose the comparative or superlative. Then rewrite the sentence.

1. An acute angle measures _____ than 90º. (few, less, least)

_____

2. The hypotenuse is always the _____ side. (long, longer, longest)

_____

4. Obtuse angles measure _____ than 90º. (some, more, most)

_____

5. Adding a positive number to a positive number results in a sum _____ than either addend. (great, greater, greatest)

_____

6. Numbers to the left of a number line the numbers get _____ . (small, smaller, smallest)

_____

7. The hypotenuse is twice as long as the _____ leg. (short, shorter, shortest)

_____

8. Euclid may have been the _____ mathematician of all. (great, greater, greatest)

_____

9. Of the two methods, choose the method you find _____ . (easy, easier, easiest)

_____

10. The _____ possible number in a function is called the minimum number. (small, smaller, smallest)

_____