
Classifying Quadrilaterals

Kimberley Thomas

Time Required60 - 90 minutes

Activity Overview

In this activity, students will classify quadrilaterals graphed on the Cartesian coordinate plane. Students will justify their classifications with segment and angles measurements. A review of the hierarchy of quadrilaterals is at the beginning of the document.

Topic: Hierarchy of Quadrilaterals and Coordinate Proofs

Classifying quadrilaterals based upon side length relationships, angle measurements, parallel or perpendicular sides, diagonal relationships.

Hierarchy of quadrilaterals (quadrilateral, parallelogram, rhombus, square, rectangle, kite, trapezoid, isosceles trapezoid)

Connection to Common Core Standard

G.GPE.4 Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$.

Teacher Preparation and Notes

This activity can be used as a review of a quadrilateral unit or pieces of it can be used to teach throughout a quadrilateral unit. Another use of the document is to assign problems to different small groups and have each small group present to the class. Students can then record the group findings on the student worksheet.

TI-Nspire Navigator

Use screen capture and student presenter throughout the activity to check for understanding and to promote classroom discourse. This activities lends itself to “jig-sawing” concepts. Assign student groups different characteristics to find (side length, slope, diagonals, etc) then report back to the class. Then send out a quick poll asking for the final classification of the quadrilateral.

The Classroom

Each student should have the ClassifyQuadrilaterals.tns file on the Nspire handheld. Students should work in pairs or small groups.

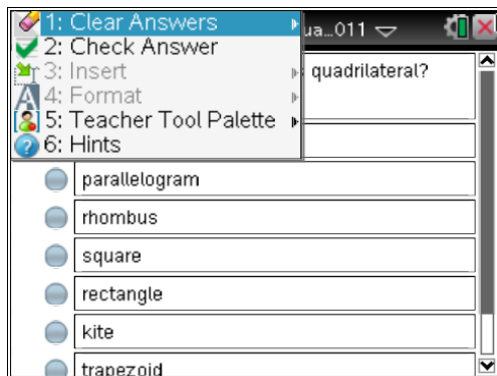
Problem 1 reviews the different classes of quadrilaterals. Students can then reference this information throughout the activity. Depending on the level of students and how much information they already have to reference, problem one can be simplified to just a class discussion or possible bell work.

The teacher should lead the class through problem 2 to set the expectations of what it means to justify the classification given by the group.

Associated Materials

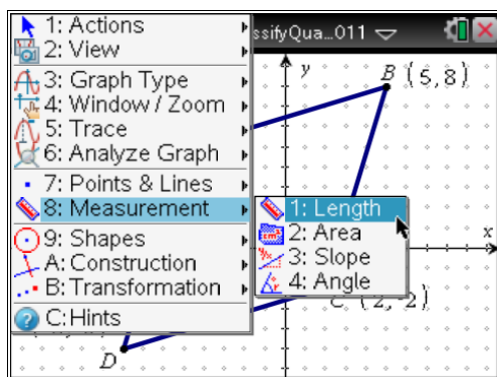
- *ClassifyQuadrilaterals.tns*
- *ClassifyQuadrilateralsStudent.doc*
- *ClassifyQuadrilateralsTchr.doc*
- *QuadrilateralQuickPolls.tns*

Additional Activity Notes and Tips



This document is a self-check. That means when there is a question page, students can press **menu** to check answers. If this is the first time students have had this option in an TI-Nspire document, you may want to have groups check with the teacher at the end of a completed problem and then the teacher can show the students how to check their answers. The check does not provide any justifications.

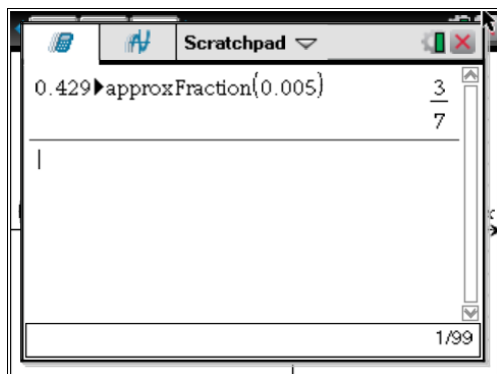
The teacher has the option to change the document to an exam using the teacher software. Use the Teacher Tool Palette to change Question Properties to Exam. This changes the entire document, not just one question.



It may be necessary to show students how to use the measure feature for segments and angles. Students can measure length, slope, and angles. To measure a length or a slope, select the measuring tool, click on the segment you want measured then click where you want the measurement displayed.

Remind students that to measure angles, they must make sure that it is the vertex point that is selected and that three points are needed to measure an angle with the vertex point in the middle.

Measured angles are displayed using three digits (float 3 setting). Be careful. Just because a whole number is displayed, that does not mean that the measure is a whole number. Ask students to sum angles using the scratch pad. If results are not expected (180 or 360) you can change the display of how many digits are shown for the measure by hovering over the measurement and pressing the **+** button. Similarly, to reduce the number of digits shown, press the **-** button.



The slope measurement will give results in decimal form. To compare slopes students may choose to calculate slope using the slope formula. The scratch pad is a great way to perform quick applications.

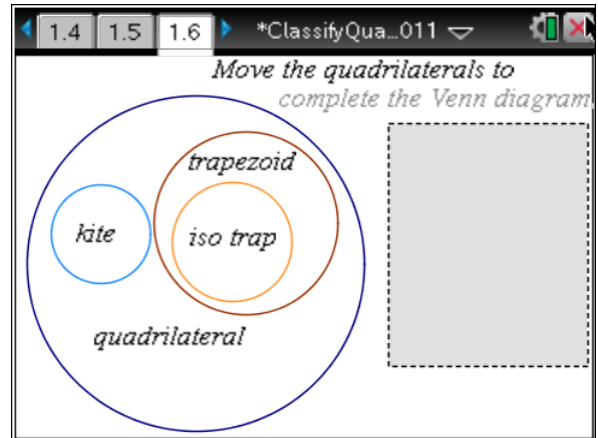
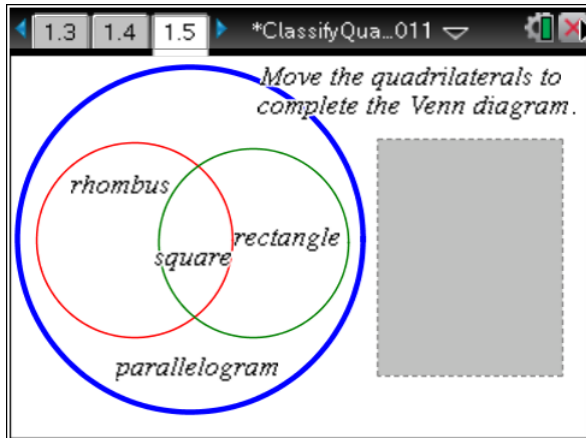
There is also a Approximate to Fraction command.

menu - Number – Approximate to Fraction

Students will need to change the default level of precision from -14 to -3.

Activity Answers

1.3 quadrilateral, parallelogram, rhombus, square, rectangle, kite, trapezoid, isosceles trapezoid



- 2.3 Square
- 3.3 Parallelogram
- 4.3 Isosceles Trapezoid
- 5.3 Rectangle
- 5.4 Diagonals are congruent
Diagonals bisect each other
- 6.3 Kite
- 7.3 Trapezoid
- 8.3 Rhombus
- 9.1 Rhombus, Square
- 9.3 Isosceles Trapezoid

Screen Shots

Problem 1

WHAT IS THE CLASSIFICATION?

Classifying quadrilaterals on the coordinate plane

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1.1

Problem 1

This activity will ask you to determine the classification of the quadrilateral graphed in each problem. You will need to justify your classification with specific measurements and calculations.

Before you start, let's review...

1.2

Problem 1

What are the different classifications of quadrilaterals found in geometry?

Student: type response here

1.3

Problem 1

On the student worksheet, make a sketch and list the characteristics of each quadrilateral.

Consider the **sides**, **angles**, **diagonals**, and any other relationship or characteristic that you can describe.

1.4

Problem 1

Move the quadrilaterals to complete the Venn diagram.

rectangle
rhombus
parallelogram
square

1.5

Problem 1

Move the quadrilaterals to complete the Venn diagram.

iso trap
kite
quadrilateral
trapezoid

1.6

Problem 2

Consider the figure on page 2.2

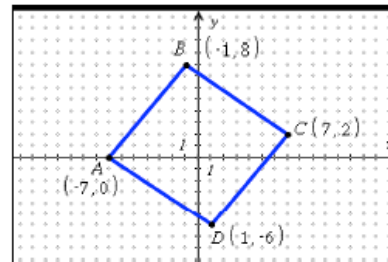
Use the **MEASUREMENT** tools found under the **MENU** to determine characteristics of the quadrilateral.

On your worksheet justify why each characteristic is true.

Finally, classify the quadrilateral.

2.1

Problem 2



2.2

Problem 2

What is the classification of the quadrilateral?

- quadrilateral
- parallelogram
- rhombus
- square
- rectangle
- kite
- trapezoid

2.3

Problem 2

Justify your answer.

Did you consider...

- slope
- side length
- parallel
- perpendicular
- diagonals
- angles - congruent or

2.4

Problem 3

Consider the figure on page 3.2

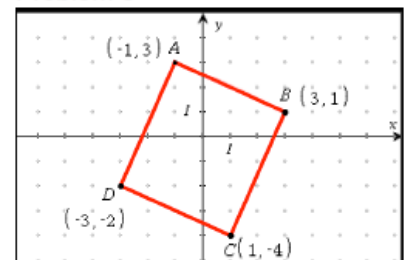
Use the **MEASUREMENT** tools found under the **MENU** to determine characteristics of the quadrilateral.

On your worksheet justify why each characteristic is true.

Finally, classify the quadrilateral.

3.1

Problem 3



3.2

Problem 3

What is the classification of the quadrilateral?

- quadrilateral
- parallelogram
- rhombus
- square
- rectangle
- kite
- trapezoid

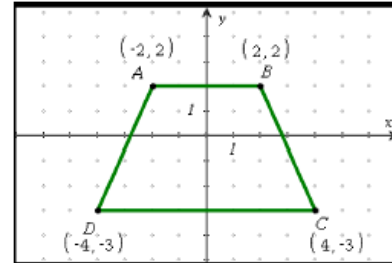
3.3

Problem 4

Consider the figure on page 4.2
Use the **MEASUREMENT** tools found under the **MENU** to determine characteristics of the quadrilateral.
On your worksheet justify why each characteristic is true.
Finally, classify the quadrilateral.

4.1

Problem 4



4.2

Problem 4

What is the classification of the quadrilateral?

- quadrilateral
- parallelogram
- rhombus
- square
- rectangle
- kite
- trapezoid

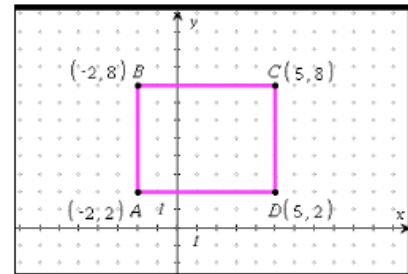
4.3

Problem 5

Consider the figure on page 5.2
Use the **MEASUREMENT** tools found under the **MENU** to determine characteristics of the quadrilateral.
On your worksheet justify why each characteristic is true.
Finally, classify the quadrilateral.

5.1

Problem 5



5.2

Problem 5

What is the classification of the quadrilateral?

- quadrilateral
- parallelogram
- rhombus
- square
- rectangle
- kite
- trapezoid

5.3

Problem 5

Because the figure is a _____, what do you know about the **diagonals**? Justify your answer using actual measurements from ABCD.
Student: type response here

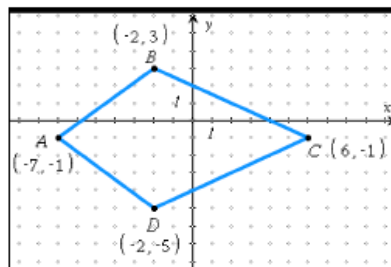
5.4

Problem 6

Consider the figure on page 6.2
Use the **MEASUREMENT** tools found under the **MENU** to determine characteristics of the quadrilateral.
On your worksheet justify why each characteristic is true.
Finally, classify the quadrilateral.

6.1

Problem 6



6.2

Problem 6

What is the classification of the quadrilateral?

- quadrilateral
- parallelogram
- rhombus
- square
- rectangle
- kite
- trapezoid

6.3

Problem 6

Go back to page 6.2 and find the measure of each **angle** in the quadrilateral?
Which **angle pairs** have a special relationship? Explain.

6.4

Problem 6

Go back to page 6.2 and draw in the diagonals by pressing **MENU - POINTS & LINES**.

What do you know about the **intersection of the diagonals**? Justify with measurements or calculations.

6.5

Problem 7

What is the classification of the quadrilateral?

- quadrilateral
- parallelogram
- rhombus
- square
- rectangle
- kite
- trapezoid

7.3

Problem 8

What is the classification of this quadrilateral?

- quadrilateral
- parallelogram
- rhombus
- square
- rectangle
- kite
- trapezoid

8.3

Problem 9

All **sides** are congruent.
Diagonals are perpendicular.
What is my classification?

- quadrilateral
- parallelogram
- rhombus
- square
- rectangle

9.2

Problem 7

Consider the figure on page 7.2

Use the **MEASUREMENT** tools found under the **MENU** to determine characteristics of the quadrilateral.

On your worksheet justify why each characteristic is true.

Finally, classify the quadrilateral.

7.1

Problem 8

Consider the figure on page 8.2

Use the **MEASUREMENT** tools found under the **MENU** to determine characteristics of the quadrilateral.

On your worksheet justify why each characteristic is true.

Finally, classify the quadrilateral.

8.1

Problem 8

Go back to page 8.2 and draw in the diagonals.

What do you know about the **intersection of the diagonals**?

What do you know about the **length** of the diagonals?

What do you know about the **angles** created by the diagonals?

8.4

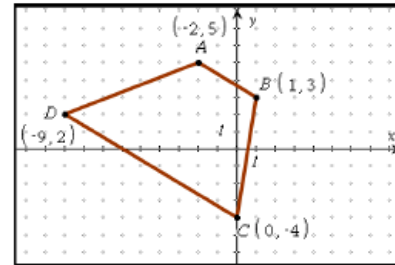
Problem 9

Exactly two pairs of **angles** are supplementary.
Diagonals bisect each other.
What is my classification?

- quadrilateral
- parallelogram
- rhombus
- square
- rectangle

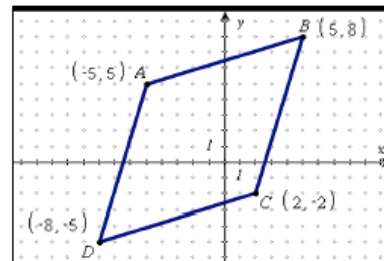
9.3

Problem 7



7.2

Problem 8



8.2

Problem 9

Now it is time to decide which quadrilateral is being described using words.

Be careful, if the description is not complete, more than one quadrilateral may be described.

9.1

Problem 10

Now make up a description for a different quadrilateral that was not described on page 9.2 or 9.3.

Write your description on the student worksheet and be prepared to share with the class.

10.1