TI-nspire™

Grade level: 8-10
Subject: Geometry
Time required: 45 to 90 minutes

Inscribed Regular Polygons

by – Johanna Bowman

Activity overview

Students will calculate the changing area and perimeter of inscribed regular polygons as the number of sides increase. The measurements will be recorded and then listed in a spreadsheet for analysis. Students will be learning how to use the measurement tool on the TI-Nspire and the Hide/Show function to identify each separate polygon. Students will be asked to predict the general results for the given process with a 50 sided regular polygon.

Concepts

Regular Polygons
Geometric Analysis
Inductive Reasoning

Teacher preparation

Load calculator activity on each student calculator. Have viewscreen or multi-media projector available to display instructor's calculator activity for discussion.

Classroom management tips

Students may need to work in pairs for peer assistance. An assessment rubric and an explanation of expectations should be provided.

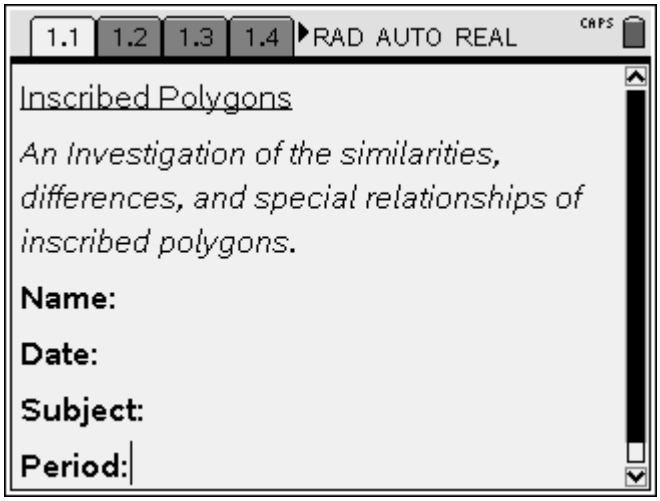
TI-Nspire Applications

None

Step-by-step directions

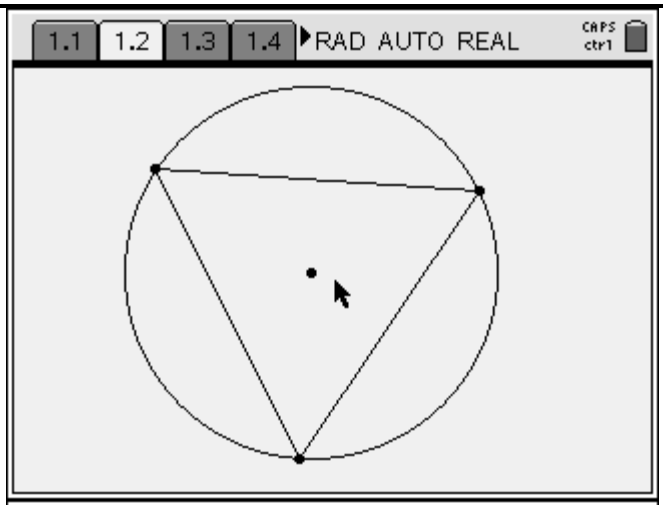
Students should open the calculator activity as the instructor displays the same activity on the viewscreen or projector. Students should enter the information on this page and then immediately save the file with the correct filename. The students will be able to re-open the file and it will allow them to quickly save the document at the end of class when they might forget to name the file and save it.

The overview of the lesson should be discussed and an assessment rubric with an explanation of expectations should be provided.



Students should make the observation that the equilateral triangle is inscribed in the given circle and that the calculator tools can be used to quickly measure the area and the perimeter of the triangle.

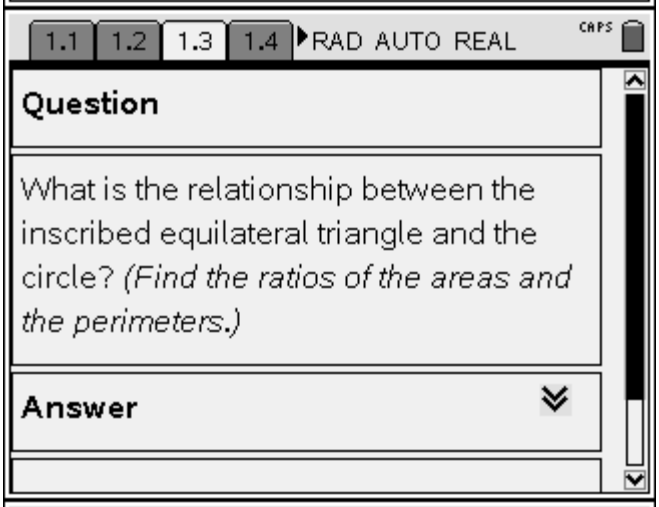
It should also be noted that the triangle is much smaller than the circle and that should lead to the discussion of how much smaller is the triangle. Does the triangle cover half or more than half of the circle? How can that relationship be determined?



Students should use the calculator tools to measure the areas and perimeters and then determine the ratio of the triangle to the circle for both comparisons.

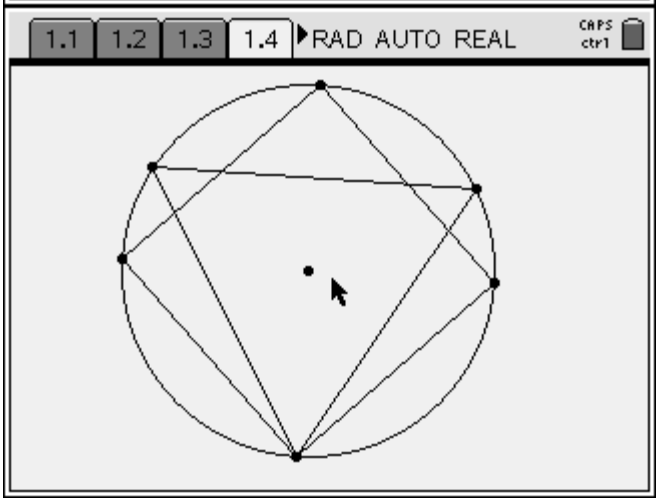
A calculator page can be inserted to allow the students to work within the document and to learn to navigate back and forth between the pages.

Answers should be entered into the note page with the correct units of measurement. Students should be encouraged to write brief explanations about their work.

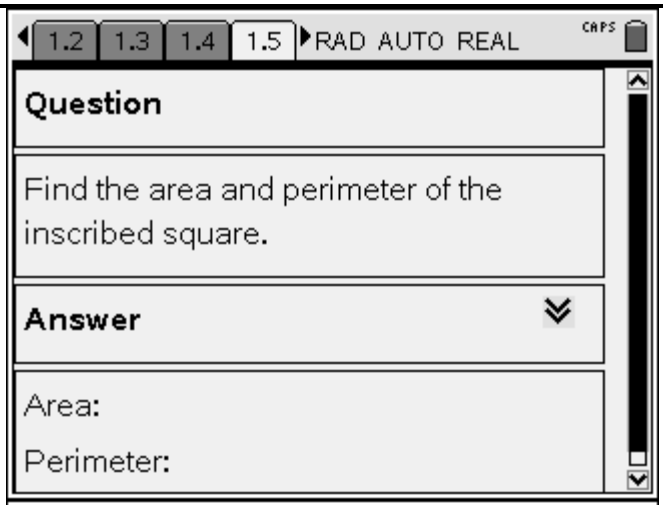


Some students may have difficulty in seeing the overlapping polygons. The Hide/Show function can be used here to hide the triangle as the student measures the perimeter and area of the square.

The students should be encouraged to compare the increase in area and make other observations about the relationships within the figure.



The student can easily use the measurement tool to calculate the perimeter and the area. The answers should include units of measurement.



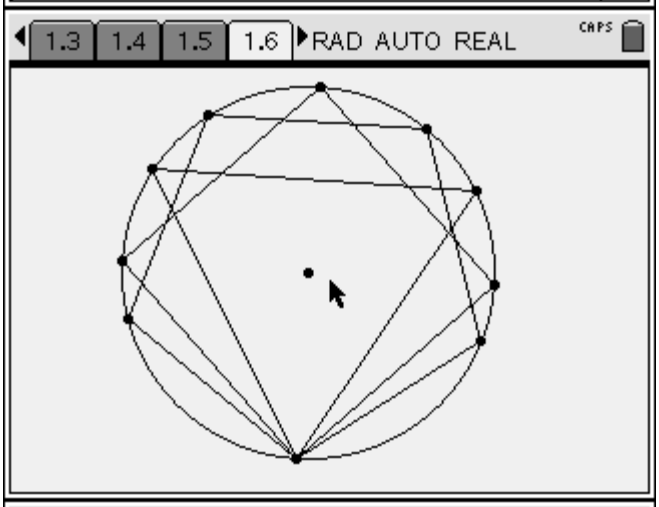
The Hide/Show tool may be used to identify the pentagon in the figure. It is also possible to use the Attributes Tool to change the thickness of the lines on the pentagon.

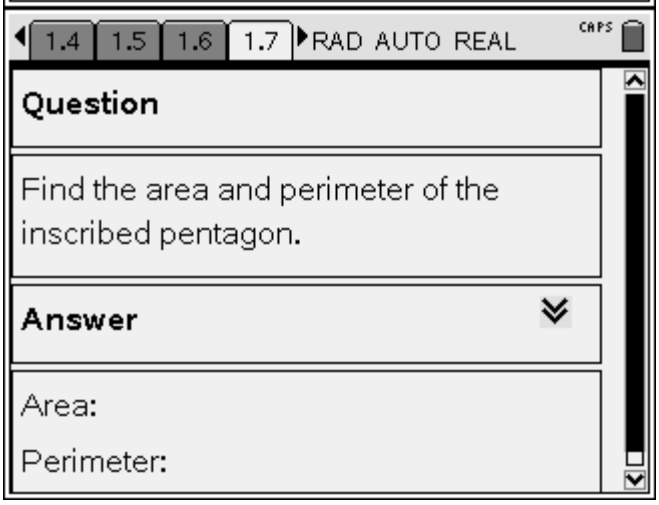
The measurements should be recorded on the next page, and students should be encouraged to make other observations about the relationships in the figure.

There should be a discussion of the changes in the areas as the number of sides of the inscribed polygon increase.

A similar analysis about the increasing perimeters should be investigated.

Measurements of the pentagon should be entered with the corrects units of measurement.

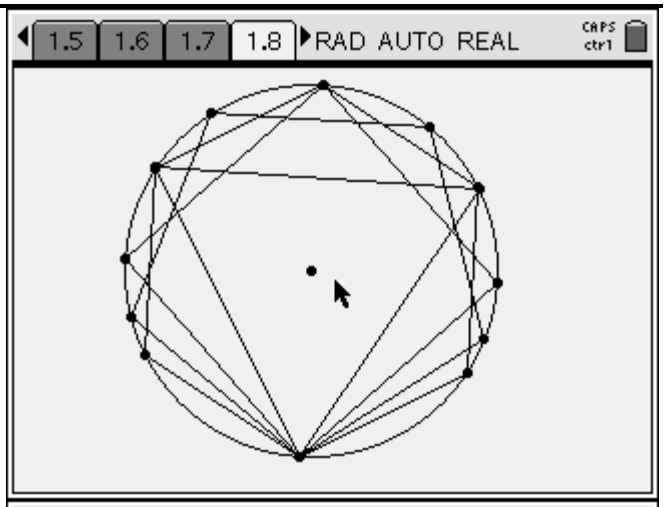




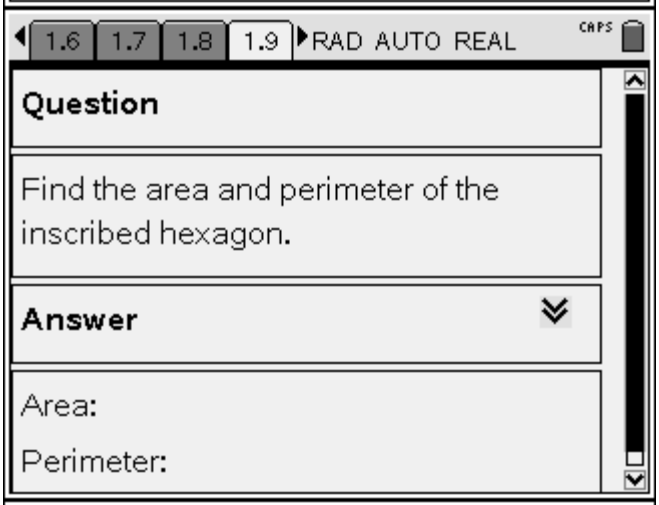
The overlapping polygons may again be isolated or emphasized by using the Hide/Show tool or Attributes to change the thickness of the lines. Lines can also be made dotted or dashed instead of solid.

Encourage the students to investigate the different tools available to assist them in their work.

Isolate the hexagon and measure the perimeter and the area.



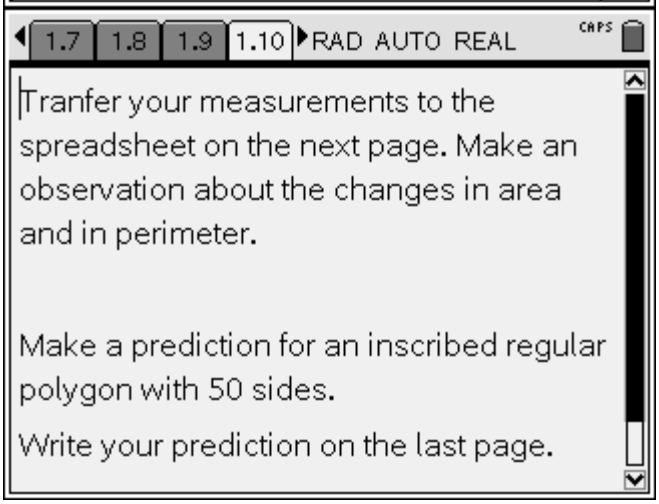
Measurements should be entered for the hexagon with correct units labeled.



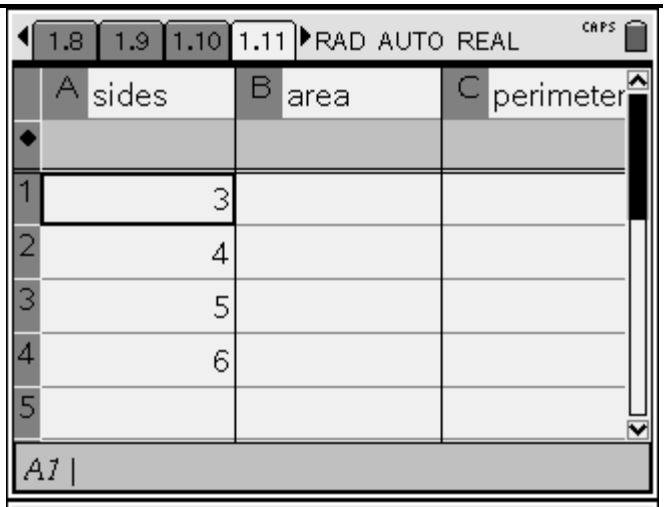
At the point the students should transfer the measurements to the spreadsheet to compare the increasing areas and perimeters.

Depending on the length of the lesson, the analysis and prediction can be mathematical or theoretical in nature.

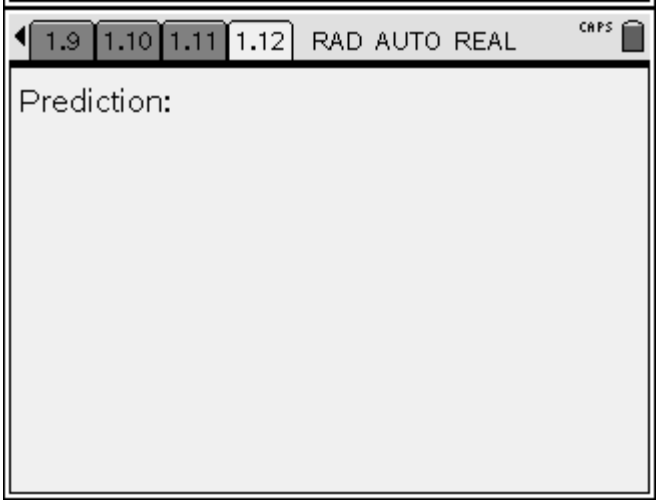
A written prediction should be expressed in complete sentences on the last page.



Numerical entries are transferred to this spreadsheet.



A written summary and prediction should be included in complete sentences.



Assessment and evaluation

- *Students should be given an assessment rubric and an explanation of expectations prior to the activity.*
-

Activity extensions

- *Some students will want to continue the pattern of inscribed polygons.*
- *Students should be encouraged to used circumscribed polygons in the same type of pattern and compare results.*
- *The history of mathematics and art can be explored to investigate similar geometric relationships in two and three dimensions.*

Student TI-Nspire Document

Inscribed Regular Polygons

1.1 1.2 1.3 1.4 RAD AUTO REAL

Inscribed Polygons

An Investigation of the similarities, differences, and special relationships of inscribed polygons.

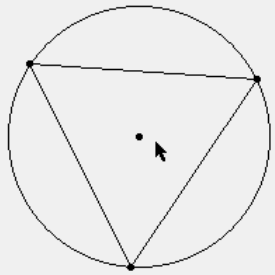
Name:

Date:

Subject:

Period:

1.1 1.2 1.3 1.4 RAD AUTO REAL



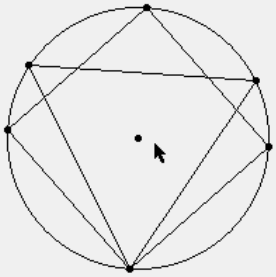
1.1 1.2 1.3 1.4 RAD AUTO REAL

Question

What is the relationship between the inscribed equilateral triangle and the circle? *(Find the ratios of the areas and the perimeters.)*

Answer

1.1 1.2 1.3 1.4 RAD AUTO REAL



1.2 1.3 1.4 1.5 RAD AUTO REAL

Question

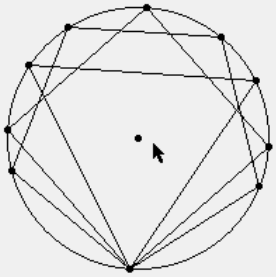
Find the area and perimeter of the inscribed square.

Answer

Area:

Perimeter:

1.3 1.4 1.5 1.6 RAD AUTO REAL



1.4 1.5 1.6 1.7 RAD AUTO REAL

Question

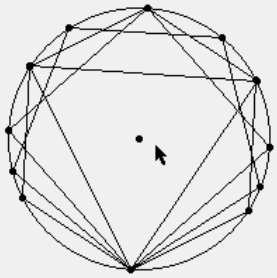
Find the area and perimeter of the inscribed pentagon.

Answer

Area:

Perimeter:

1.5 1.6 1.7 1.8 RAD AUTO REAL



1.6 1.7 1.8 1.9 RAD AUTO REAL

Question

Find the area and perimeter of the inscribed hexagon.

Answer

Area:

Perimeter:

1.7 1.8 1.9 1.10 RAD AUTO REAL

Tranfer your measurements to the spreadsheet on the next page. Make an observation about the changes in area and in perimeter.

Make a prediction for an inscribed regular polygon with 50 sides.

Write your prediction on the last page.

1.8 1.9 1.10 1.11 RAD AUTO REAL

	A sides	B area	C perimeter
1	3		
2	4		
3	5		
4	6		
5			

A1

1.9 1.10 1.11 1.12 RAD AUTO REAL

Prediction:

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