

Pi (III) and Precision

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Activity overview

Students will collect measurements of everyday items; can, coin, mint candy, and a cup. Students will find the measures of the diameter and the circumference. Students will then manipulate their measurements and look at the data relationship numerically and graphically. Students will then look at the accuracy of their data collection using the linear relationship of pi on a coordinate graph.

Concepts

Pi, Diameter, Circumference, Data Prediction and Accuracy. Scatter plot, Function,

Teacher preparation

Materials needed: Coin, mint (starlight) candy, Can cup. (Depending on how many groups you will have set up in your room you will need one of each of the following items for each group.

Measurements for these items can be made in centimeters.

Classroom management tips

Groups of four are ideal for this activity. That way a student is responsible for measure one item each. Students can use their own handheld to complete the investigation, but the data collection can be done cooperatively.

TI-Nspire Applications

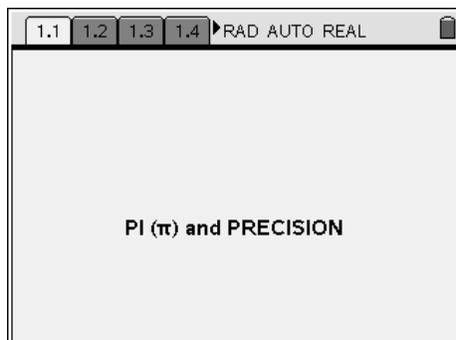
PreAlg_PiPrecisionstudent.tns

(Blank-given to students in order to collect the data)

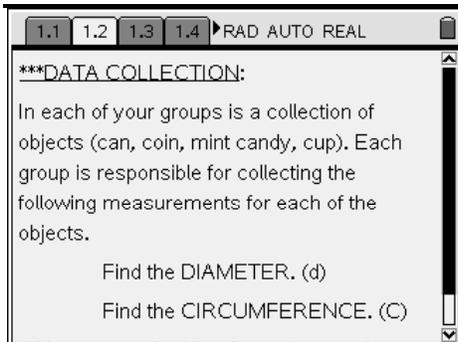
PreAlgebra_Pi Precision.tns

(Example of data that could be collected.)

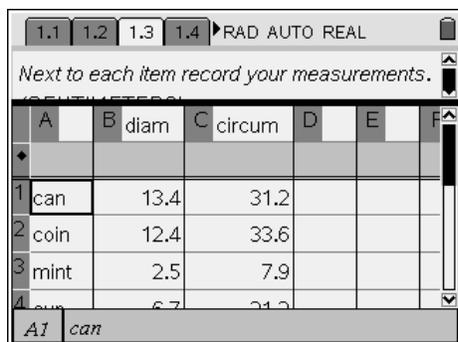
Step-by-step directions



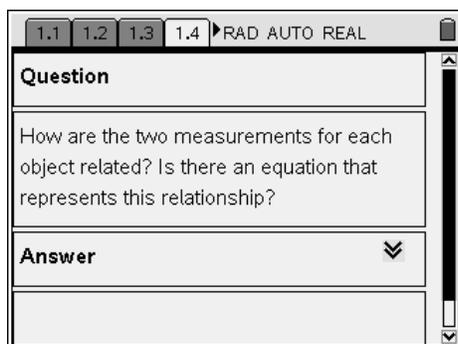
(1.1) Title Page



(1.2): Directions for data collection of the four items.

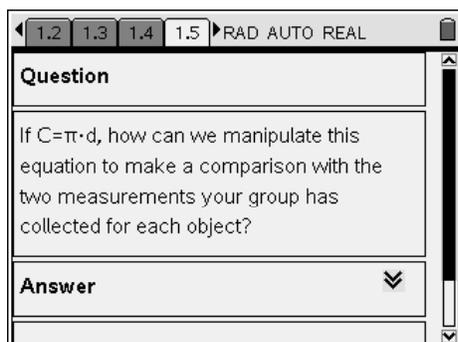


(1.3): This example data; students will have to measure their own data. Students will look at a blank table and are responsible for filling in the data table.



(1.4): Students will have to recall how diameter and circumference are related through a given equation.

$$C = \pi \cdot d$$



(1.5): Student should now be able to manipulate the given equation in order to calculate the value of pi.

1.3 1.4 1.5 1.6 RAD AUTO REAL

Question

Explain in your own words what the equation $\pi = \frac{C}{d}$ represents.

Answer

(1.6): Students should understand that the relationship or value of pi is the quotient of circumference and diameter.

1.4 1.5 1.6 1.7 RAD AUTO REAL

If $\pi = \frac{C}{d}$ let's investigate this ratio with the measurements that you collected.

Make a prediction as to what your answer should look like.

(1.7): Students should be able to predict that the value of pi is approximately... 3.14159

1.5 1.6 1.7 1.8 RAD AUTO REAL

In cell ♦D type in the ratio of $=\frac{C}{d}$. You must

A	B d	C c	D
	=diam	=circum	=c/d
1 can	13.4	31.2	2.32836
2 coin	12.4	33.6	2.70968
3 mint	2.5	7.9	3.16
4	6.7	21.2	3.16419

A1 can

(1.8): The data table can now calculate C/d for the data that each of the students collected. Students should be able to see numerically that they may have many errors in regards to the measurements they collected.

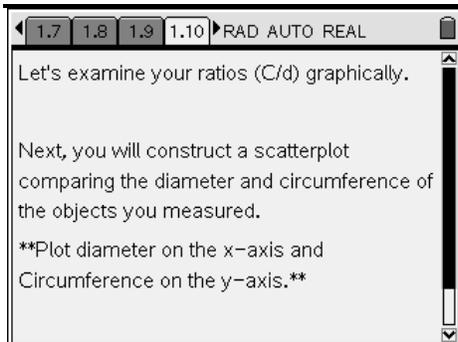
1.6 1.7 1.8 1.9 RAD AUTO REAL

Question

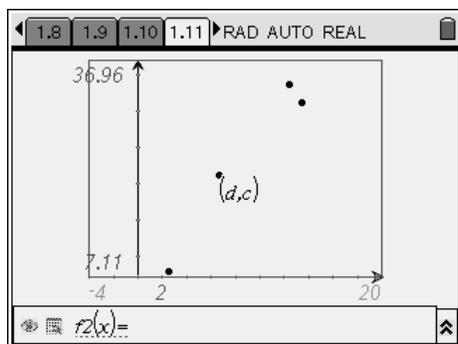
The ratio of $\frac{C}{d}$ should be equal to π . Do your answers equal the value of π ? Explain in your own words why they are not exact.

Answer

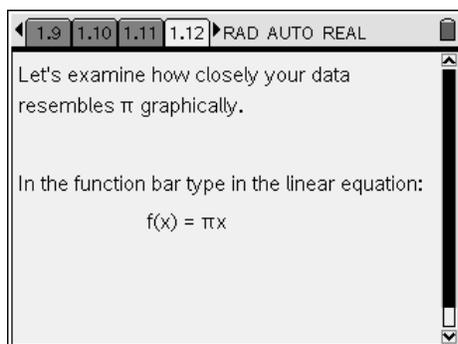
(1.9): Students should be able to explain that their answers are not exact because of the numerical comparison to their data and the actual value of pi.



(1.10): Directions for creating a scatter plot of the data that is represented in the table.

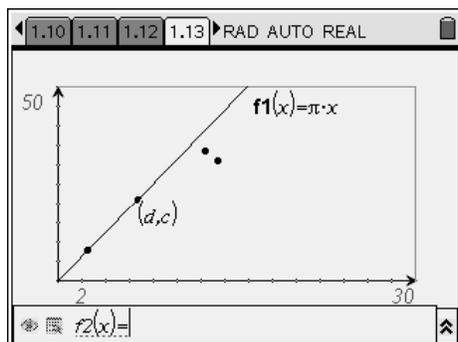


(1.11): Example data of the scatter plot from the data that was collected earlier.



(1.12): Students will look at how closely their data represents pi by inserting the following function.

$$f(x) = \pi x.$$



(1.13): Students can examine how accurate their data is by examining the outliers that they have according to the line that represents the value of π on the coordinate graph. This may lead students to go back to the first step of this investigation and measure their objects again in order to get a more accurate answer.



(1.14) Students will now complete the extension and summary questions in the investigation packet. This will be assigned for homework and in my case are unable to take their calculators home with them. You will have to change the name in the final page of this activity.

Assessment and evaluation

Teachers can look at each groups scatter plot and function input to see how accurately they measured the objects.

Activity extensions

- Students will complete similar practice problems that reflects the problem investigated in this activity.

Student TI-Nspire Document

PreAlg_PiPrecisionstudent.tns

The following pages are those in which students need to collect and input the data following the instructions above. These also need to type in explanations to other questions however, they are not included.

