The Circumference/Diameter Ratio

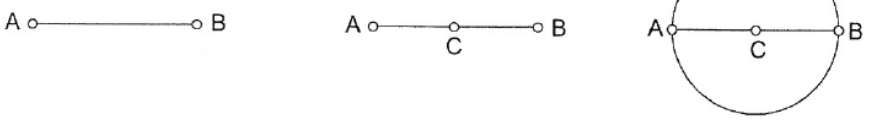
For GSP5

In this activity you'll discover a relationship between a circle's circumference and its diameter. Even if that relationship is familiar to you, the investigation may demonstrate it in a different way.

SKETCH AND INVESTIGATE

1. Construct $\overline{AB}$.
2. Construct point C, the midpoint of $\overline{AB}$.
3. Construct circle CB.

Be sure to position the pointer directly over point B and then release.



Step 1 Step 2 Step 3

Select the circle; then, in the Measure menu, choose **Circumference**.

4. Measure the circumference of the circle.

Select, in order, the length measurement and the circumference measurement. Then, in the Number menu, choose **Tabulate**.

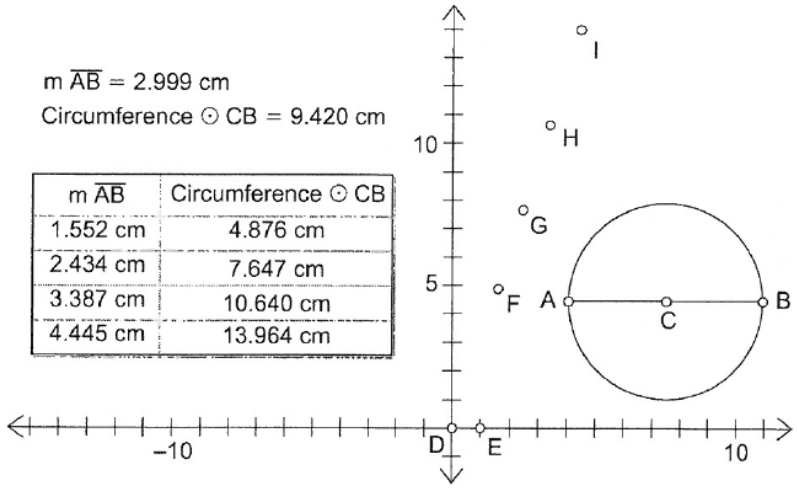
5. Measure AB (the diameter of the circle).
6. Make the circle small.
7. Make a table for the length measurement and the circumference measurement.

Double-click inside the table to add an entry.

8. Make the circle a little bigger; then add an entry to the table.
9. Repeat step 8 until your table has at least four entries.

Select the table and choose **Graph | Plot Table Data.**

10. Plot the table data. You may need to drag point E toward point D to scale your axes so that you can see the points.



For GSP5

Q1 Describe the points that appear on the graph.

Select, in order, the diameter measurement and the circumference measurement. Then, in the Graph menu, choose **Plot as (x, y)**.

11. Plot the diameter and circumference measurements as (x, y). Change the color of this point so you can tell it from other points on the graph. Also, in the Display menu, choose **Trace Plotted Point**.
12. Drag point A or point B to change your circle. Watch the plotted point.
13. Construct a ray from point D (the origin) to any of the plotted points.
14. Measure the slope of the ray.

Q2 How is the slope of the ray related to circumference/diameter ratio for the circles?

Q3 What's the significance of the fact that all the plotted points lie on this ray?

Q4 The circumference/diameter ratio is represented by the Greek letter π (pi). Complete the following formulas using π, C for circumference, and D for diameter:

$\pi =$ _____

$C =$ _____

Q5 Write a formula for circumference using C, π, and r (for radius).