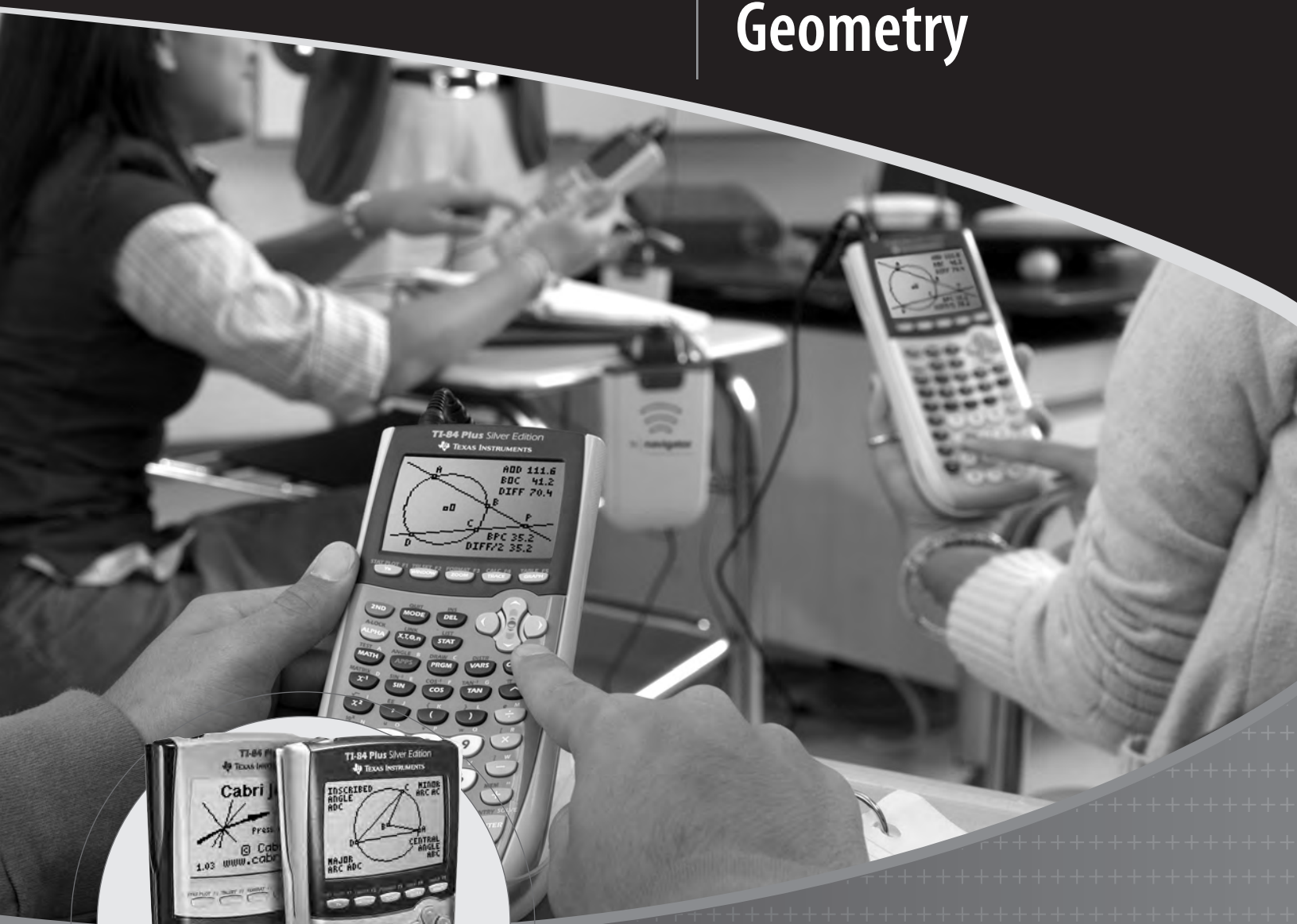


# Getting Started »

# Cabri™ Jr. Geometry



### ***Important notice regarding book materials***

Texas Instruments makes no warranty, either expressed or implied, including but not limited to any implied warranties of merchantability and fitness for a particular purpose, regarding any programs or book materials and makes such materials available solely on an “as is” basis. In no event shall Texas Instruments be liable to anyone for special, collateral, incidental, or consequential damages in connection with or arising out of the purchase or use of these materials, and the sole exclusive liability of Texas Instruments, regardless of the form of action, shall not exceed the purchase price of the book. Moreover, Texas Instruments shall not be liable for any claim of any kind whatsoever against the use of these materials by any other party.

Permission is hereby granted to teachers to reprint or photocopy in classroom, workshop, or seminar quantities the page or sheets in this work that carry a Texas Instruments copyright notice. These pages are designed to be reproduced by teachers for use in their classes, workshops, or seminars, provided each copy made shows the copyright notice. Such copies may not be sold, and further distribution is expressly prohibited. Except as authorized above, prior written permission must be obtained from Texas Instruments Incorporated to reproduce or transmit this work or portions thereof in any other form or by any other electronic or mechanical means, including any information storage or retrieval system, unless expressly permitted by federal copyright law. Send inquiries to this address:

Texas Instruments Incorporated  
7800 Banner Drive, MS 3918  
Dallas, Texas 75251  
Attention: Manager, Business Services


Copyright © 2006 Texas Instruments Incorporated. Except for the specific rights granted herein, all rights are reserved.

Printed in the United States of America.

T<sup>3</sup>™, Cabri™ Jr. and TI-Navigator™ are trademarks of Texas Instruments Incorporated.

We invite your comments and suggestions about this book. Call us at 1-800-TI-CARES or send e-mail to [to-cares@ti.com](mailto:to-cares@ti.com). You can also call or send e-mail to request information about other current and future publications from Texas Instruments. Visit the TI World Wide Web home page. The web address is: [education.ti.com](http://education.ti.com)

# Getting Started With Cabri™ Jr.

Introduction .....		2
<b>Activities</b>	<b>Description</b>	
Activity 1	Midpoint of a Segment .....	3
Activity 2	Drawing and Measuring and Angle .....	5
Activity 3	Perpendicular Bisector of a Line Segment .....	6
Activity 4	Measuring Angles in a Triangle .....	7
Activity 5	Intersecting Lines and Vertical Angles .....	9
Activity 6	Parallel Lines Cut by a Transversal .....	11
Activity 7	Points on the Perpendicular Bisector of a Segment .....	13
Activity 8	Incenter of a Triangle .....	15
Activity 9	Circumcenter of a Triangle .....	17
Activity 10	Orthocenter of a Triangle .....	19
Activity 11	Exploring Diameter and Circumference .....	21
Activity 12	Inscribing a Circle in a Triangle.....	23
Activity 13	Circumscribing a Circle About a Triangle.....	25
Activity 14	Investigating Segments in a Right Triangle.....	26
Activity 15	Investigating Segment Lengths in a Triangle.....	28
Activity 16	Investigating Segments in a Triangle.....	30
Activity 17	Exploring the Centroid of a Triangle.....	32
Activity 18	Investigating Segments in a Quadrilateral .....	34
Activity 19	Angles in a Quadrilateral.....	36
Activity 20	Perpendicular Segments in a Circle.....	38
Activity 21	Drawing a Line Tangent to a Circle .....	40
Activity 22	Inscribed Angles Intercepting the Same Arc .....	41
Activity 23	Slopes of Parallel and Perpendicular Lines .....	44
Activity 24	Reflecting a Triangle in the Coordinate Plane.....	46
Activity 25	Investigating Equations of Lines .....	48
<b>Cabri Jr. Basics</b>		
Basic 1	Exploring the Menus .....	50
Basic 2	Naming and Saving a File.....	51
Basic 3	Opening and Editing a File.....	52
Basic 4	Moving Figures .....	53
Basic 5	Labeling Points .....	54
 <b>TI-Navigator™ Tips</b>		
Screen Capture	Viewing student work .....	56
Quick Poll	Multiple choice, true/false, or open-ended questions.....	59
Activity Center	Contributing points .....	64
Activity Center	Contributing an equation.....	69
Send to Class	Sending an APP VAR.....	74

# Getting Started With Cabri™ Jr.

## Introduction

This book is designed for new users of Cabri Jr. The activities provide the basic steps of using the drawing and measurement tools of the application within the context of familiar geometry concepts. The total time indicated at the top of the page includes five minutes for introduction and vocabulary review and five minutes to summarize the activity. Many of the activities include TI-Navigator™ extensions which are indicated by a TI-Navigator icon.



These 25 fundamental explorations use Cabri Jr. tools to help make and support conjectures. Hopefully, the experience of working through these activities will serve as a springboard for learning more about Cabri Jr. as a tool for deeper investigations using the richness of construction and proof.

Before beginning the activities, it is suggested that new users familiarize themselves with the fundamentals of Cabri Jr. by working through **Cabri Jr. Basics**, which are the five basic activities found at the back of the book.

The **NCTM Standards** are listed with the permission of the National Council of Teachers for Mathematics (NCTM), [www.nctm.org](http://www.nctm.org). NCTM does not endorse the content or validity of these alignments.

## About the Author

Ruth Casey is a mathematics teacher in Lawrenceburg, Kentucky, where she teaches Algebra 2, Geometry, Data & Measurement and also serves as department chair. She received her undergraduate degree in mathematics from the University of Kentucky and her Masters' Degree in secondary education from Georgetown College. She is a National Board Certified Teacher in Adolescent and Young Adult Mathematics. About to complete her 29th year teaching in public schools, Ruth has taught many levels of mathematics from eighth grade math through Calculus. She lives in Frankfort, Kentucky with her husband Kerry, a National Board Certified physics teacher, and 19 year-old son Brian who have given their unwavering support over the years as her involvement in education has taken her beyond the classroom.

Ruth is a National Instructor for Teachers Teaching with Technology (T<sup>3</sup>™) and her role as a leader in professional development has offered many opportunities to work with teachers at the local, state, and national level. She has received the Presidential Award for Excellence in the Teaching of Mathematics, been recognized as a Tandy Scholar, and was chosen as a Christa McAuliffe Fellow. She was selected as a recipient of the 2004 Leadership Award from the T<sup>3</sup> program.

She has been on the development team for T<sup>3</sup> materials and was an author for the Glencoe / McGraw-Hill *Algebra 1* and *Algebra 2* books. Ruth is a frequent speaker at national, regional, and state conferences and institutes on the use of technology as a tool for teaching and learning mathematics. She is currently serving on the Teacher Advisory Council of the National Academy of Sciences and is a member of the Board of Directors for the National Council of Teachers of Mathematics.

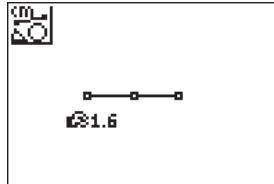
Approximate  
Total Time:  
25 minutes

# Midpoint of a Segment

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a segment
- Find the midpoint
- Measure the segment and each half
- Change the length



This activity allows us to review the basic geometry definitions of *segment* and *midpoint*, while learning to use drawing and measurement tools. We can then explore changes in measurements as we alter the figure.

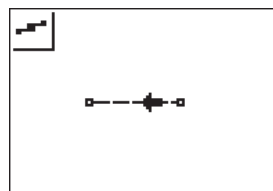
**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



1

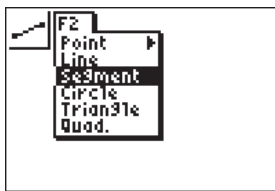
Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application.

Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [4] [ENTER] to choose "No.")



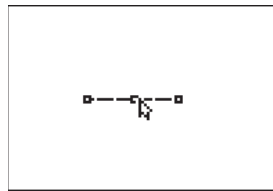
4

Move the cursor until the segment is dashed and flashing then press [ZOOM] for F3 and move down to **Midpoint** and press [ENTER].



2

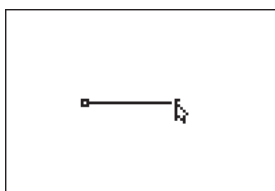
Press [WINDOW] for the F2 menu. Move to **Segment** and press [ENTER] to activate the segment drawing tool.



5

Press [ENTER] again to mark the midpoint.

Press [CLEAR] to exit the Midpoint drawing tool.

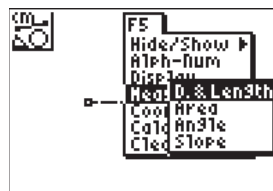


3

Move the pencil to the desired location of one endpoint and press [ENTER].

Move to the other endpoint of the segment and press [ENTER].

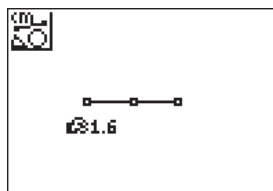
Press [CLEAR] to exit the Segment drawing tool.



6

Press [GRAPH] for F5 and move down to **Measure** and right to **D. & Length**.

Press [ENTER].

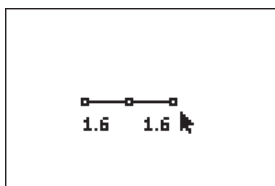


7

Move until the midpoint is flashing then press [ENTER].

Move the pencil to an endpoint, and when it is also flashing, press [ENTER]. The distance from the midpoint to the endpoint is displayed. The *hand* indicates that the measurement can be moved. Use the arrow keys to move it to a convenient location, and then press [CLEAR] to turn off the *hand*.

# Midpoint of a Segment



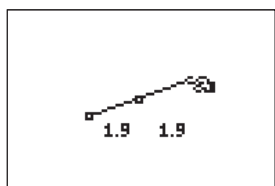
8

The measurement tool is still active so return the pencil until the midpoint is flashing. Press **[ENTER]** then move until the other endpoint flashes and press **[ENTER]**. Move the measurement to a convenient location away from the segment. Press **[CLEAR]** to turn off the *hand* and **[CLEAR]** to exit the measurement tool.



10

To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **2nd [MODE]** for **[QUIT]**.)



9

Use the arrow keys to move until one endpoint is flashing, press **[ALPHA]** to activate the *hand*. Use **[↑]****[↓]****[←]****[→]** to change the location of the endpoint of the segment. Since the midpoint has been marked, the measurements will change as the segment changes.



## For TI-Navigator™ Users

Use Screen Capture to observe and assess individual progress in drawing and exploring. For help, see page 56.

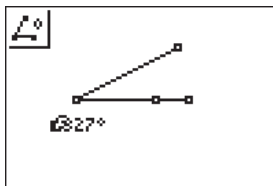
# Drawing and Measuring an Angle

Approximate  
Total Time:  
25 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw an angle
- Find the measure of the angle
- Change the angle



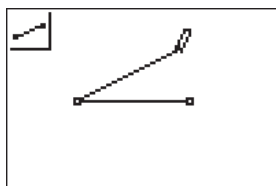
We can use our knowledge of naming angles as we learn about measuring angles with the measurement tool. We can also review classifying angles as we change the angle measure to obtain acute, right, or obtuse angles.

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



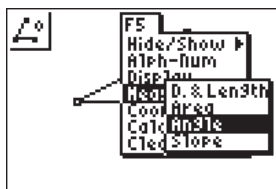
1

Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application. Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [↓] [ENTER] to choose "No.")



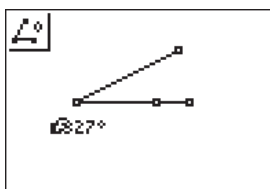
2

Press [WINDOW] for the F2, move to **Segment**, and press [ENTER]. Move to the right and mark an endpoint by pressing [ENTER]. Now move left and mark another endpoint by pressing [ENTER] again. This point will be the vertex of the angle so press [ENTER] to start a new segment with the same endpoint. Move up and right to end the segment with [ENTER]. You should have two segments with a common endpoint.



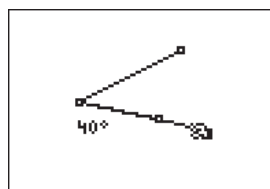
3

Press [GRAPH] for F5 and move to **Measure and Angle**. Press [ENTER]. You will now select 3 points to determine the angle. As in naming angles, the second point selected is the vertex of the angle.



4

Move to last endpoint you marked, and when it is flashing, press [ENTER] to choose that point. Move until the vertex of the angle is flashing and press [ENTER]. The third point defining the angle to be measured can be any point along the other side of the angle (or the endpoint of the segment). Press [ENTER] to select the third point. The angle measure will appear with the *hand*. Move it to a convenient location away from the angle. Press [CLEAR] to turn off the *hand*. Press [CLEAR] again to exit the angle measure tool.



5

Move the pointer to an endpoint of one of the sides. Press [ALPHA] to activate the hand. Use [↑] [↓] to change the angle measure.



6

To exit the APP, press [Y=] for the F1 menu. Move to **Quit**, then press [ENTER]. (Or you can press [2nd] [MODE] for [QUIT].)



### For TI-Navigator™ Users

Use Quick Poll to review naming & measuring angles (e.g. What is the vertex of angle ABC? Give the measure of an angle which is obtuse.). For help, see page 59.

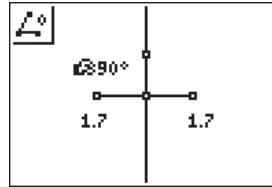
# Perpendicular Bisector of a Line Segment

Approximate  
Total Time:  
20 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a segment
- Draw its perpendicular bisector
- Measure the two halves of the segment
- Measure an angle formed
- Change the length and position of the segment



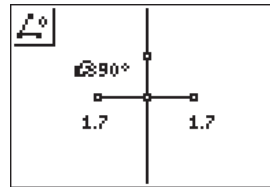
After drawing a segment and its perpendicular bisector, we are able to observe right angles and congruent segments. In addition, we can see that changing the length or orientation of the segment will also change the perpendicular bisector.

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



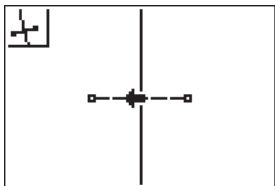
1

Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application. Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [4] [ENTER] to choose "No.")



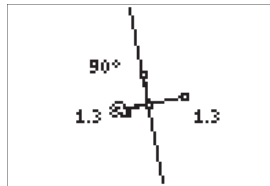
4

Now you can measure each half of the segment and an angle formed by the intersection of the segment and the perpendicular bisector. The measurement tools are found in the F5 menu.



2

Press [WINDOW] for F2 and choose **Segment** to draw a line segment. Move the pencil to the desired location of one endpoint of the segment and press [ENTER]. Move to the location of the other endpoint and press [ENTER]. Press [ZOOM] and move to **Perp. Bis.** then press [ENTER]. Move the big arrow until the segment is flashing. Press [ENTER] and the perpendicular bisector is drawn.



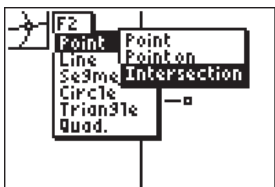
5

Press [ALPHA] and grab an endpoint of the segment to change its length and position. You will be able to see the measurements of the segments change as the segment changes length and position. The angle will remain  $90^\circ$ .



### For TI-Navigator™ Users

Use Screen Capture to observe and assess individual progress in drawing and exploring. For help, see page 56.



3

Press [WINDOW] for F2 and choose **Point** then move right and down to **Intersection** and press [ENTER]. Move until both the segment and the perpendicular bisector are both flashing and press [ENTER]; the intersection point will be marked.



6

To exit the APP, press [Y=] for the F1 menu. Move to **Quit**, then press [ENTER]. (Or you can press [2nd] [MODE] for [QUIT].)

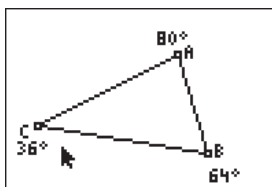
# Measuring Angles in a Triangle

Approximate  
Total Time:  
30 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a triangle
- Label the vertices
- Measure the interior angles
- Find the sum of the angles
- Change the angles of the triangle



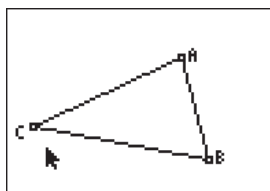
This activity provides a wonderful opportunity for discovery and conjecture about the sum of the angles in a triangle. It could also be used to reinforce a previous lesson about triangles and their interior angles.

**NTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



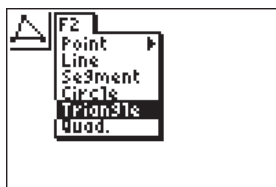
1

Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[◀]** **[ENTER]** to choose "No.") Press **[ENTER]**, or any key, to begin using the application.



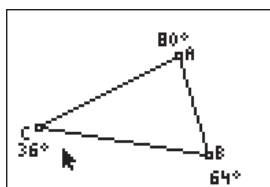
5

Move the cursor to vertex B and when the point is blinking, press **[ENTER]** **[APPS]** **[ENTER]** to label vertex B. Move to vertex C and when the point is blinking, press **[ENTER]** **[PRGM]** **[ENTER]** to label vertex C.



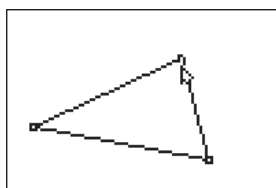
2

Press **[WINDOW]** for F2, move down to **Triangle** and press **[ENTER]**.



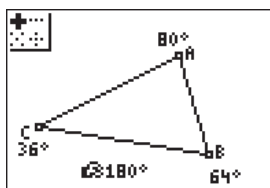
6

Use F5 to measure each angle. When you have measured angle A, use the *hand* to move the number to a convenient location. Press **[CLEAR]** then measure angle B. Repeat for angle C.



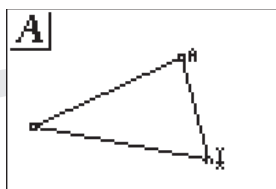
3

Move to the location of a vertex and press **[ENTER]**. Move to the second vertex and press **[ENTER]**. Move to the third vertex and press **[ENTER]**. Press **[CLEAR]** to exit the triangle drawing tool.



7

Press **[GRAPH]** for F5 and move down to **Calculate**. Press **[ENTER]**. Move the arrow until an angle measure has a flashing underline and press **[ENTER]**. Repeat this until the measures for all three vertices are flashing. Press **[+]** and the sum of the angle measures will be displayed.



4

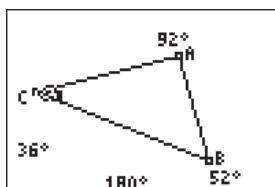
Press **[GRAPH]** for the F5 menu and move down to **Alpha-Num** and press **[ENTER]**. When the text cursor is near vertex A and the point is blinking, press **[ENTER]** **[MATH]** **[ENTER]** to label vertex A.



### For TI-Navigator™ Users

Use Screen Capture to identify problems with labeling. For help, see page 56.

# Measuring Angles in a Triangle



8

Press **CLEAR** **CLEAR** to disable the *hand* and to exit the calculate tool. Move to a vertex and when it is flashing, press **ALPHA**. Use the *hand* to move the vertex and record what happens to the angle measures and their sum. Move to a different vertex and explore changes there.



9

To exit the APP, press **Y=** for the F1 menu. Move to **Quit**, then press **ENTER**. (Or you can press **2nd** **MODE** for **[QUIT]**.)

10

Based on their observations, students will be able to make a conjecture about the sum of the measures of the angles of a triangle.

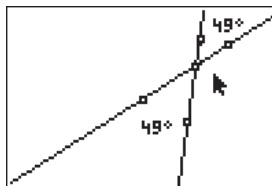
Approximate  
Total Time:  
20 minutes

# Intersecting Lines and Vertical Angles

## ACTIVITY OVERVIEW:

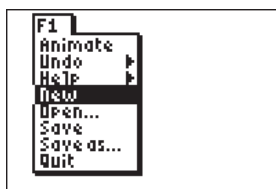
### In this activity we will

- Draw two intersecting lines
- Measure one pair of vertical angles
- Move a line to change the angles
- Observe the changes in the angle measures



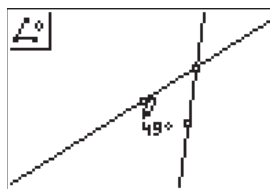
In this activity we are able to visualize and explore the angles that are formed when two lines intersect. By measuring the angles, we can enhance our understanding of *vertical angles*, *supplementary angles*, and a *linear pair*.

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



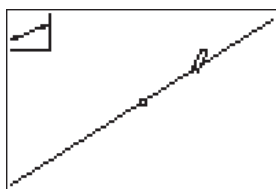
1

Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [ ] [ENTER] to choose "No.")



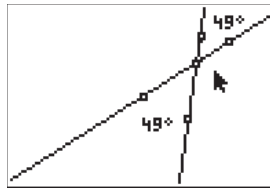
4

Use F5 to measure the angle formed by the 3 marked points. Move the angle measure to a convenient location and press [CLEAR] to deactivate the *hand*.



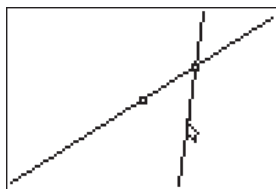
2

Press [WINDOW] for F2 and press [ ] [ENTER] to select **Line**. Press [ENTER] to mark one point on the line. Move the pointer [ ] and [ ] several times and press [ENTER] to mark the other point defining the line.



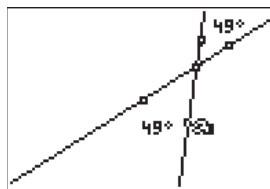
5

The **Angle Measure** tool is still active so now mark points forming the other vertical angle. You will first mark a point on one line, move to the intersection point, then mark a point on the second line. When the angle measure is displayed it can be moved to a convenient location. Press [CLEAR] to deactivate the *hand*.



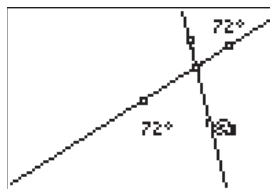
3

The **Line** tool is still active so press [ENTER] again to mark this point as one of the points that will determine another line. Press [ ] to move away from that point and press [ENTER] to mark the other point on the new line. Press [CLEAR] to disable the **Line** tool.



6

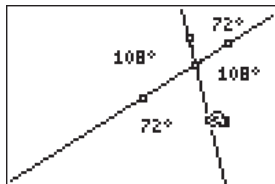
Move the pointer to one of the marked points which defined a line. Press [ALPHA] to grab the point.



7

Move the point left or right to change the angles formed. Observe that the measures of the vertical angles both change as the angle changes.

# Intersecting Lines and Vertical Angles



8

Extension: Measure the other angles formed by the intersecting lines. Which angles are congruent? Which angles are supplementary?



9

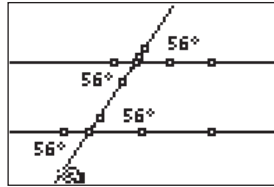
To exit the APP, press  $\boxed{Y=}$  for the F1 menu. Move to **Quit**, then press  $\boxed{\text{ENTER}}$ . (Or you can press  $\boxed{2\text{nd}} \boxed{\text{MODE}}$  for [QUIT].)

Approximate  
Total Time:  
30 minutes

# Parallel Lines Cut By A Transversal

## ACTIVITY OVERVIEW: In this activity we will

- Draw parallel lines
- Draw a transversal
- Explore angle relationships

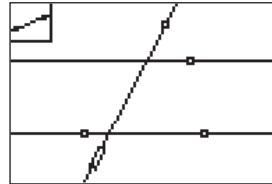


We can develop and strengthen our knowledge about the angles formed when parallel lines are cut by a transversal. The measurement tool helps us discover the relationships between and among the various angles in the figure.

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

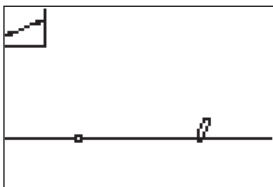


**1**  
Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application. Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [↓] [ENTER] to choose “No.”)

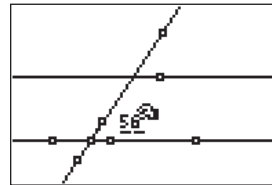


**4**  
Press [WINDOW] for F2 and select **Line**. Move up and mark a point by pressing [ENTER]. Move down and left and press [ENTER] to mark the second point defining the transversal of the two parallel lines.

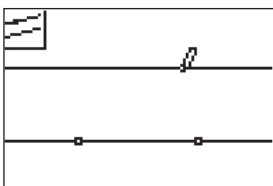
Now we will measure angles and explore angle relationships.



**2**  
Press [WINDOW] for F2, move to **Line** and press [ENTER]. Move down and to the left and press [ENTER] to mark one point on the line. Move to the right and press [ENTER] to mark the second point defining the line.

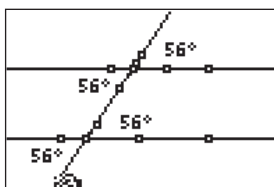


**5**  
Press [GRAPH] for F5. Move down to **Measure**, then right and down to **Angle** then press [ENTER]. You must select three points to identify the angle. Move the pencil until one of the lines is flashing and press [ENTER] to select a point on that line. Move the pencil until one of the parallel lines and the transversal are both flashing and press [ENTER]. This will mark their intersection as the vertex of the angle. Move the pencil to the other line forming a side of the angle. Press [ENTER] when that line is flashing. Move the measurement to a convenient location. Press [CLEAR] to turn off the hand.



**3**  
Press [ZOOM] for F3, move to **Parallel**, and press [ENTER]. Move the pencil until the line is blinking. Press [ENTER] then press [↑] until the second line is in the desired location. Press [ENTER] to mark the point through which the parallel line is drawn.

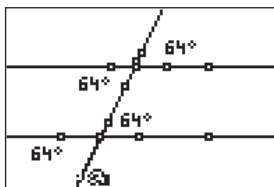
# Parallel Lines Cut By A Transversal



6

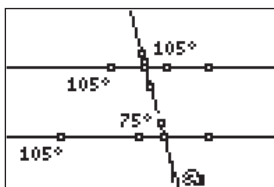
With the angle measuring tool active, measure some of the other angles formed—corresponding, alternate interior, alternate exterior...

Move each measurement to a convenient location. Press **[CLEAR]** to turn off the hand.



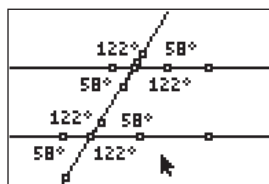
7

Move the pointer to one of the points which defined the location of the transversal. Press **[ALPHA]** to activate the *hand* and move this point. Observe the angle measures as the position of the transversal changes.



## 8 Extensions

Move the transversal until one of the angles has “crossed over” and observe that you now have consecutive interior angles that are supplementary.



9

Measure the remaining angles and observe the relationships among the angle measures.



## For TI-Navigator™ Users

Activity Center: Load a background image of parallel lines cut by a transversal with angles named. Instruct students to move their cursors to: the interior, the exterior, to an angle with a specific characteristic (congruent to a given angle, supplementary to a given angle, ...).



10

To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd] [MODE]** for **[QUIT]**.)

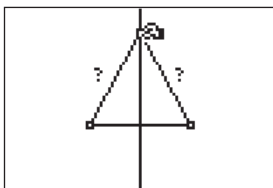
# Points on the Perpendicular Bisector of a Segment

Approximate  
Total Time:  
20 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a line segment
- Draw the perpendicular bisector
- Investigate the distance between a point on the perpendicular bisector and endpoints of the segment.



By using the drawing and measurement tools of Cabri Jr., we can illustrate the concept of “equidistant from the endpoints of a segment.” We can move a point on the perpendicular bisector and observe the changes that occur.

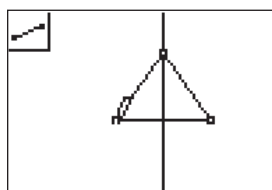
**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



1

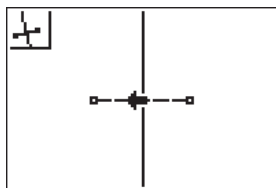
Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application.

Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [↓] [ENTER] to choose “No.”)



4

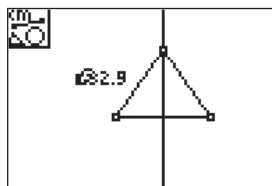
Press [WINDOW], move to **Segment**, and press [ENTER]. Move the pencil until the point drawn on the bisector is flashing and press [ENTER]. Move to one of the segment endpoints, and once it is flashing, press [ENTER]. Now create another segment between the point on the perpendicular bisector and the other endpoint. (The distance from the endpoints to the point on the perpendicular bisector can be measured without the segments, but they provide a better illustration of the distance measured.)



2

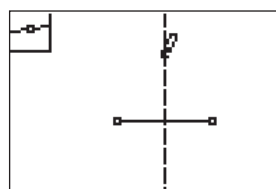
Press [WINDOW] for the F2 menu, move to **Segment**, and press [ENTER]. Move the pencil to the desired location of the first endpoint of the segment and press [ENTER]. Move right to the desired location of the second endpoint and press [ENTER].

Press [ZOOM], move to **Perp. Bis.**, and press [ENTER] to access the tool. Move the pencil until it becomes an arrow and the segment is flashing. Press [ENTER] and the perpendicular bisector is drawn.



5

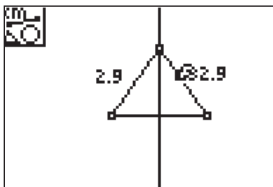
Press [GRAPH] for F5. Move down to **Measure**, move right to select **D. & Length**, and press [ENTER]. Move the pencil near one of the segments and when it is dashed and flashing, press [ENTER]. The *hand* is active and the measurement can be moved to a convenient location. Press [ENTER] to place the measurement and deactivate the *hand*.



3

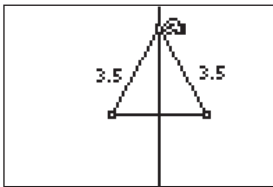
Press [WINDOW] for the F2 menu, move to **Point**, move right and down to **Point on** and press [ENTER]. Move the pencil until the perpendicular bisector is flashing, and press [ENTER].

# Points on the Perpendicular Bisector of a Segment



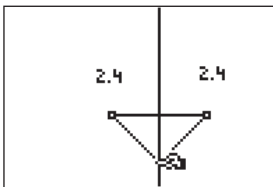
6

The measurement tool is still active and you can now measure the distance from the point on the perpendicular bisector to the other endpoint of the segment. Move the pencil to the other segment and press **[ENTER]** when it is flashing. The new measurement appears and can be placed where desired by pressing **[ENTER]**. Press **[CLEAR]** to deactivate the measurement tool.



7

Move the arrow near the point on the perpendicular bisector. When the point is flashing, press **[ALPHA]** to activate the *hand*. Move the point up to a new location on the perpendicular bisector and observe the changes in the measurements of the distances to the endpoints.



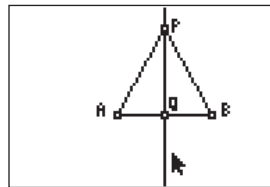
8

Move the point down to a new location on the perpendicular bisector and observe the changes in the measurements of the distances to the endpoints.



9

To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd] [MODE]** for **[QUIT]**.)



10

$\overline{AP} \cong \overline{BP}$  and  $\overline{PQ} \perp \overline{AB}$

Conjecture: Any point on the perpendicular bisector of a line segment is \_\_\_\_\_ from the endpoints of the segment.

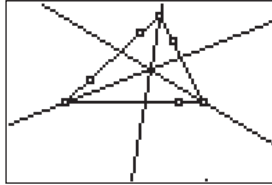
# Incenter of a Triangle

Approximate  
Total Time:  
30 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a triangle
- Draw the bisector of each angle of the triangle
- Locate the *incenter*
- Explore properties of the *incenter*



In this activity we will observe a special characteristic of the bisectors of the angles in a triangle. We will be able to test our conjecture by changing the size and shape of the triangle.

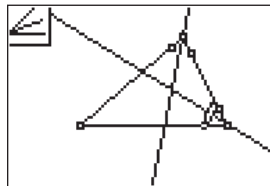
**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



1

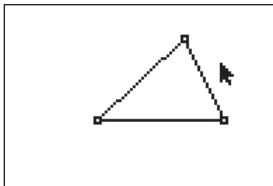
Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application.

Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [↓] [ENTER] to choose “No.”)



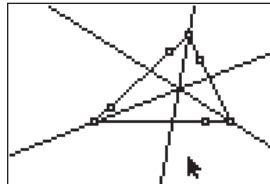
4

With the **Angle Bis.** tool still active, press [ENTER] to select that point again OR move to another point on the side of the triangle and press [ENTER]. Move to the next vertex point and press [ENTER], then move to a point on the other side forming the angle and press [ENTER].



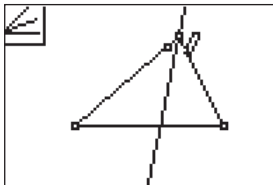
2

Press [WINDOW] for F2, move down to **Triangle** and press [ENTER]. Move to the location of a vertex and press [ENTER]. Move to the second vertex and press [ENTER]. Move to the third vertex and press [ENTER]. Press [CLEAR] to exit the triangle drawing tool.



5

With the **Angle Bis.** tool still active, press [ENTER] to select that point again OR move to another point on the side of the triangle and press [ENTER]. Move to the remaining vertex point and press [ENTER], then move to a point on the other side forming the angle and press [ENTER]. Press [CLEAR] to exit the **Angle Bis.** tool.



3

Press [ZOOM] for the F3 menu, move to **Angle Bis.**, and press [ENTER]. Move the pencil until one side of the triangle is flashing then press [ENTER]. This marks a point on the side of the triangle. Move until the vertex point flashes and press [ENTER]. Move until the other side forming the angle is flashing and press [ENTER] again. You have used 3 points to identify an angle and the angle bisector has been drawn.



6

What appears to be true about the intersection of the bisectors of the angles of the triangle?

(They appear to intersect at a common point.)

Move to a vertex of the triangle, press [ALPHA] to activate the *hand* and move the vertex to a new location.

# Incenter of a Triangle



7

Press **CLEAR** to deactivate the *hand* and move to a different vertex of the triangle. Press **ALPHA** and move the point at this vertex.

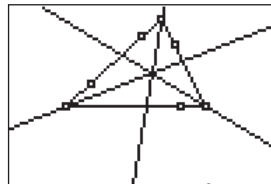
What appears to be true about the intersection of the bisectors of the angles of the triangle?



8

Press **CLEAR** to deactivate the *hand* and move to a different vertex of the triangle. Press **ALPHA** and move the third point defining the triangle.

What appears to be true about the intersection of the bisectors of the angles of the triangle?



9

The bisectors of the angles of the triangle intersect at a common point. This point is called the *incenter* of the triangle.



## For TI-Navigator™ Users

You may wish to save this file and send it to students as an APP VAR for exploration and investigation in Activity 12. For help, see page 74.



10

To exit the APP, press **Y=** for the F1 menu. Move to **Quit**, then press **ENTER**. (Or you can press **2nd** **MODE** for **QUIT**.)

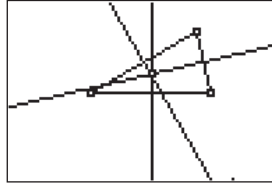
# Exploring the Circumcenter of a Triangle

Approximate  
Total Time:  
30 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a triangle
- Draw the perpendicular bisector of each side
- Locate the *circumcenter*
- Explore properties of the *circumcenter*



What happens when you draw the perpendicular bisectors of all three sides of a triangle? Does the same thing occur in any triangle? We can find answers to these questions as we develop an understanding of the *circumcenter* of a triangle.

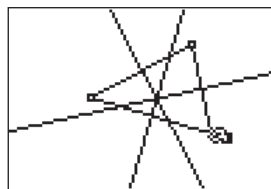
**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



1

Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[ENTER]**, or any key, to begin using the application.

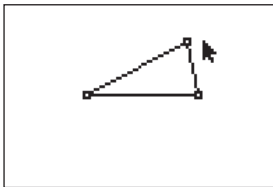
Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose "No.")



4

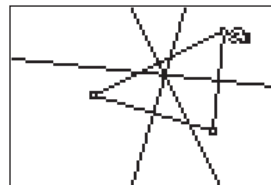
What appears to be true about the intersection of the perpendicular bisectors of the sides of the triangle? (They appear to intersect at a common point.)

Move to a vertex of the triangle, press **[ALPHA]** to activate the *hand* and move the vertex to a new location.



2

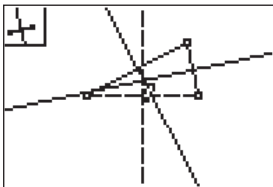
Press **[WINDOW]** for the F2 menu, move down to **Triangle** and press **[ENTER]**. Move to the location of a vertex and press **[ENTER]**. Move to the second vertex and press **[ENTER]**. Move to the third vertex and press **[ENTER]**. Press **[CLEAR]** to exit the triangle drawing tool.



5

Press **[CLEAR]** to deactivate the *hand* and move to a different vertex of the triangle. Press **[ALPHA]** and move the point at this vertex.

What appears to be true about the intersection of the perpendicular bisectors of the sides of the triangle?



3

Press **[ZOOM]** for the F3 menu and move down to **Perp. Bis.** and press **[ENTER]**. Move the arrow until one side of the triangle is selected (flashing) and press **[ENTER]**. The **Perp. Bis.** tool is still active, so move to another side of the triangle and press **[ENTER]** when the side is flashing. Repeat for the third side of the triangle. Press **[CLEAR]** to exit the **Perp. Bis.** drawing tool.

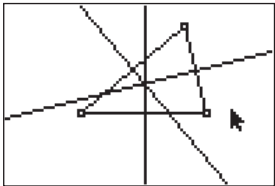


6

Press **[CLEAR]** to deactivate the *hand* and move to a different vertex of the triangle. Press **[ALPHA]** and move the third point defining the triangle.

What appears to be true about the intersection of the perpendicular bisectors of the sides of the triangle?

# Exploring the Circumcenter of a Triangle



7

The perpendicular bisectors of the sides of the triangle intersect at a common point. This point is called the *circumcenter* of the triangle.

What is true about the *circumcenter* of an acute triangle? an obtuse triangle? a right triangle?



8

To exit the APP, press  $\boxed{Y=}$  for the F1 menu. Move to **Quit**, then press  $\boxed{\text{ENTER}}$ . (Or you can press  $\boxed{2\text{nd}} \boxed{\text{MODE}}$  for  $\boxed{\text{QUIT}}$ .)



## For TI-Navigator™ Users

You may wish to save this file as an APP VAR for later exploration and investigation. The APPVAR can be sent to everyone as you begin Activity 13. For help, see page 74.

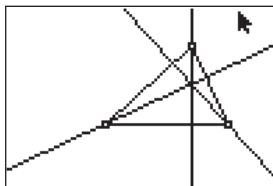
Approximate  
Total Time:  
30 minutes

# Exploring the Orthocenter of a Triangle

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a triangle
- Draw the altitudes of the triangle
- Locate the *orthocenter*
- Explore properties of the *orthocenter*



Do you know how to construct a line perpendicular to a given line and through a given point?

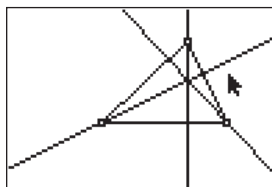
This activity is a great companion to that construction as we use the Cabri Jr. tools to draw *altitudes* in a triangle.

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



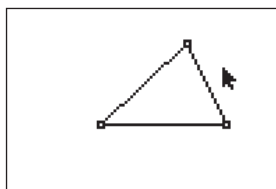
1

Press [APPS]. Move down to the CabriJr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application. Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [↓] [ENTER] to choose "No.")



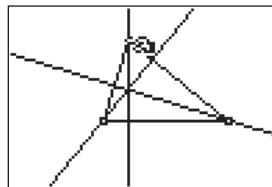
5

With the **Perp.** tool still active, move until the pencil is near the third vertex. When the point is flashing, press [ENTER] then move until the opposite side is flashing and press [ENTER]. Press [CLEAR] to exit the **Perp.** drawing tool.



2

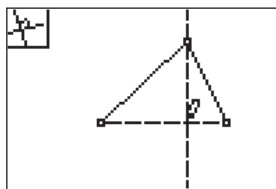
Press [WINDOW] for F2, move down to **Triangle** and press [ENTER]. Move to the location of a vertex and press [ENTER]. Move to the second vertex and press [ENTER]. Move to the third vertex and press [ENTER]. Press [CLEAR] to exit the triangle drawing tool.



6

What appears to be true about the intersection of the altitudes of the triangle?  
(They appear to intersect at a common point.)

Move to a vertex of the triangle, press [ALPHA] to activate the *hand* and move the vertex to a new location.



3

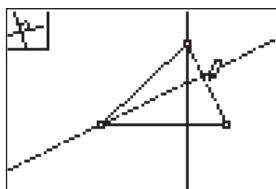
Press [ZOOM] for the F3 menu, move to **Perp.**, and press [ENTER]. Move the pencil to a vertex and when it is flashing, press [ENTER]. Move the arrow to the side opposite the vertex and when it is flashing, press [ENTER]. This will draw a line through the vertex and perpendicular to the opposite side.



7

Press [CLEAR] to deactivate the *hand* and move to a different vertex of the triangle. Press [ALPHA] and move the point at this vertex.

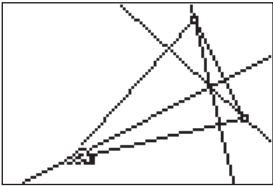
What appears to be true about the intersection of the altitudes of the angles of the triangle?



4

With the **Perp.** tool still active, move until the pencil is near another vertex. When the point is flashing, press [ENTER] then move so that the opposite side is flashing and press [ENTER].

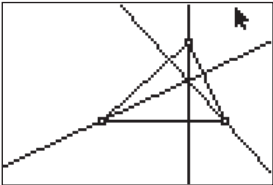
# Exploring the Orthocenter of a Triangle



8

Press **CLEAR** to deactivate the *hand* and move to a different vertex of the triangle. Press **ALPHA** and move the third point defining the triangle.

What appears to be true about the intersection of the altitudes of the angles of the triangle?



9

The altitudes of a triangle intersect at a common point. This point is called the *orthocenter* of the triangle.

What is true about the *orthocenter* of an acute triangle? an obtuse triangle? a right triangle?



10

To exit the APP, press **Y=** for the F1 menu. Move to **Quit**, then press **ENTER**. (Or you can press **2nd MODE** for [QUIT].)

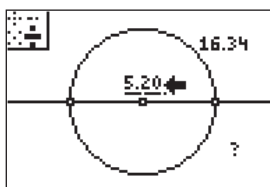
Approximate  
Total Time:  
30 minutes

# Exploring the Diameter and Circumference of a Circle

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a circle
- Measure the diameter of the circle
- Measure the circumference of the circle
- Calculate the ratio of the circumference to the diameter



What might we have in common with Archimedes? This exploration into the relationship between a circle's circumference and its diameter will lead us to our own "discovery" of a value for  $\pi$ .

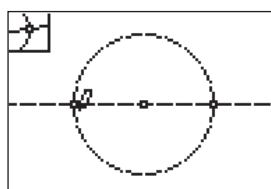
**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



1

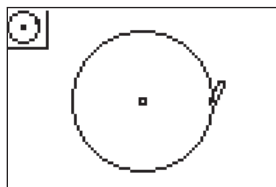
Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[ENTER]**, or any key, to begin using the application.

Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose "No.")



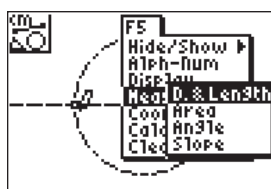
4

Press **[WINDOW]** for F2 and move to **Point**. Move to the right and down to select **Intersection**. Press **[ENTER]**. Move the pencil until both the line and the circle are flashing. Press **[ENTER]** to mark the point which is the intersection of the circle and the line. Now we have two points on the circle which are the endpoints of a diameter.



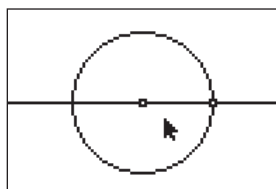
2

Press **[WINDOW]** for the F2 menu, move down to **Circle**, and press **[ENTER]**. Press **[ENTER]** to mark the center of the circle, then move the pencil to indicate the length of the radius, and press **[ENTER]** to complete the circle.



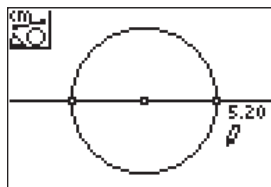
5

To measure the circle's diameter, press **[GRAPH]** for F5 and move down and right to select **Measure, D. & Length**. Press **[ENTER]**.



3

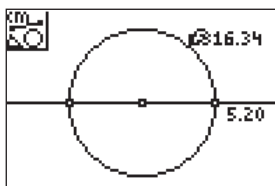
Draw a line through the two points which determined the circle. To do this, press **[WINDOW]** for the F2 menu, move to **Line**, then press **[ENTER]**. Move the pencil until the point on the circle is flashing, and press **[ENTER]**. Now move the pencil until the center of the circle is flashing, and press **[ENTER]**. Press **[CLEAR]** to exit the line drawing tool.



6

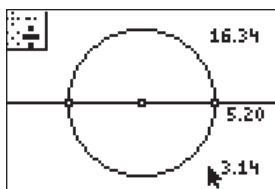
Move the pencil until one endpoint of the diameter is flashing then press **[ENTER]**. Move to the other endpoint of the diameter and when it is flashing, press **[ENTER]**. Press **[+]** to see the measurement rounded to hundredths. The *hand* is active so you can move the measurement to a convenient location then press **[ENTER]**.

# Exploring the Diameter and Circumference of a Circle



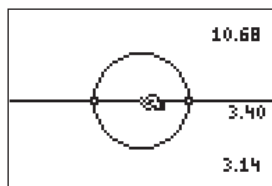
7

The **Measurement** tool is still active so now you can find the circumference of the circle. Move the pencil until the circle is flashing. Press **[ENTER]** then **[=]** to see the circumference rounded to hundredths. Move the *hand* until the measurement is in a convenient location. Press **[ENTER]**. Press **[CLEAR]** to turn off the measurement tool.



8

Press **[GRAPH]** for F5 and move down to **Calculate**. Press **[ENTER]**. Move the arrow until the circumference measurement shows a flashing underline and press **[ENTER]** then **[=]**. Move the arrow until the diameter measurement has a flashing underline and press **[ENTER]** again. The number displayed is the ratio of the circle's circumference to its diameter.



9

To explore this relationship with other circles, press **[CLEAR]** to turn off the **Calculate** tool. Move the arrow until the point which defined the circle's radius or its center is flashing. Press **[ALPHA]** to activate the *hand*. Grab the point and move it to change the size of the circle.

To confirm that the ratio is still 3.14, repeat the **Calculate** procedure. (It is actually being recalculated each time the circle changes, but it is impossible to tell this since the number is unchanging.)



10

To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd] [MODE]** for **[QUIT]**.)

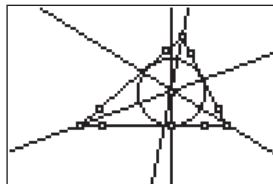
# Inscribing a Circle in a Triangle

Approximate  
Total Time:  
25 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a triangle
- Draw the bisector of each angle of the triangle
- Locate the *incenter*
- Find the distance from the *incenter* to a side of the triangle
- Inscribe a circle in the triangle



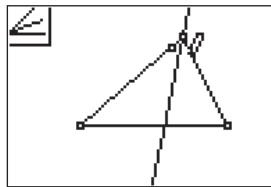
In Activity 8 we bisected the angles of a triangle and found the incenter of the triangle. How far is it from the incenter to each side of the triangle? We will use this distance as the radius of a circle with center at the *incenter* as we inscribe a circle in a triangle.

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



1

Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application. Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [↓] [ENTER] to choose “No.”)



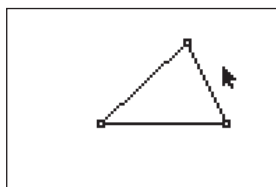
3

Press [ZOOM] for the F3 menu, move to **Angle Bis.**, and press [ENTER]. Move the pencil until one side of the triangle is flashing then press [ENTER]. This marks a point on the side of the triangle. Move until the vertex point flashes and press [ENTER]. Move until the other side forming the angle is flashing and press [ENTER] again. You have used 3 points to identify an angle and the angle bisector has been drawn.



### For TI-Navigator™ Users

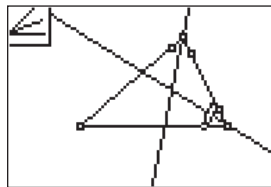
Send an APP VAR: You may have saved the figure from Activity 8 as an APP VAR. If so, send it via TI-Navigator, then have students *Open* the file to begin the activity with the triangle and its angle bisectors already drawn. For help, see page 74.



2

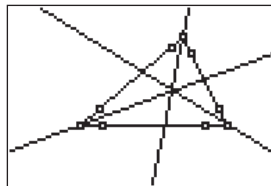
Press [WINDOW] for F2, move down to **Triangle** and press [ENTER]. Move to the location of a vertex and press [ENTER]. Move to the second vertex and press [ENTER]. Move to the third vertex and press [ENTER]. Press [CLEAR] to exit the triangle drawing tool.

Next you will use the tools in F3 to draw the bisector of each angle in the triangle.



4

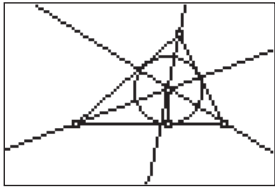
With the **Angle Bis.** tool still active, press [ENTER] to select that point again OR move to another point on the side of the triangle and press [ENTER]. Move to the next vertex point and press [ENTER], then move to a point on the other side forming the angle and press [ENTER].



5

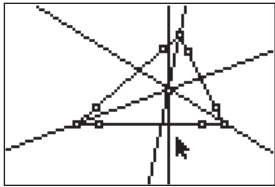
With the **Angle Bis.** tool still active, press [ENTER] to select that point again OR move to another point on the side of the triangle and press [ENTER]. Move to the remaining vertex point and press [ENTER], then move to a point on the other side forming the angle and press [ENTER]. Press [CLEAR] to exit the **Angle Bis.** tool.

# Inscribing a Circle in a Triangle



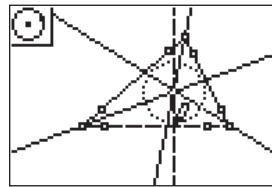
6

The bisectors of the angles of the triangle intersect at a common point. This point is called the *incenter* of the triangle and it is equidistant from the sides of the triangle. The *incenter* is also the center of the circle *inscribed* in the triangle. In the next steps we will find the distance from the *incenter* to a side of the triangle and use this distance as the radius of a circle with its center at the *incenter*.



7

Press **ZOOM** for the F3 menu, move to **Perp.**, and press **ENTER**. Move to the *incenter* (two of the angle bisectors will be flashing indicating that you want their intersection) and press **ENTER**. Move the arrow to a side of the triangle and press **ENTER**. You now have a line through the *incenter* and perpendicular to one of the sides of the triangle.



8

Press **WINDOW** for the F2 menu, move to **Circle**, and press **ENTER**. Move the pencil until the *incenter* is flashing and press **ENTER**. Move the pencil until you are at the intersection of the side and the line perpendicular to it. Press **ENTER** when both are flashing to draw a circle with its center at the *incenter* and with a radius determined by the perpendicular distance from the *incenter* to the side of the triangle. This is the *inscribed* circle.



9

To exit the APP, press **Y=** for the F1 menu. Move to **Quit**, then press **ENTER**. (Or you can press **2nd** **MODE** for **[QUIT]**.)

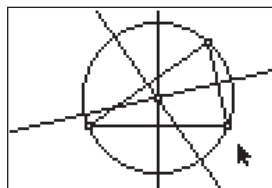
# Circumscribing a Circle About a Triangle

Approximate  
Total Time:  
20 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a triangle
- Draw the perpendicular bisector of each side
- Locate the *circumcenter*
- Find the distance from the *circumcenter* to a vertex of the triangle
- Draw the *circumcircle* of the triangle.



How far is it from the *circumcenter* of a triangle to each vertex of the triangle? This distance determines the radius of a special circle that we will draw using the *circumcenter* as the center of the circle.

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



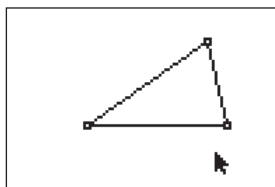
1

Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application. Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [4] [ENTER] to choose "No.")



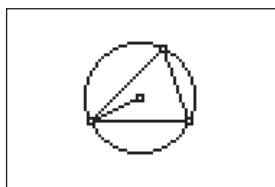
### For TI-Navigator™ Users

Send an APP VAR: You may have saved the figure from Activity 9 as an APP VAR. If so, send it via TI-Navigator, and then have students *Open* the file to begin the activity with the triangle and its *circumcenter* already located. For help, see page 74.



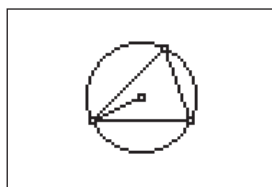
2

Press [WINDOW] for F2, move down to **Triangle** and press [ENTER]. Move to the location of a vertex and press [ENTER]. Move to the second vertex and press [ENTER]. Move to the third vertex and press [ENTER]. Press [CLEAR] to exit the triangle drawing tool.



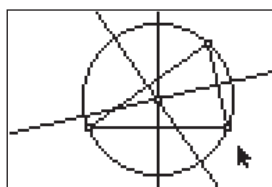
3

Press [ZOOM] for the F3 menu and move down to **Perp. Bis.** and press [ENTER]. Move the arrow until one side of the triangle is selected (flashing) and press [ENTER]. The **Perp. Bis.** tool is still active, so move to another side of the triangle and press [ENTER] when the side is flashing. Repeat for the third side of the triangle. Press [CLEAR] to exit the **Perp. Bis.** drawing tool.



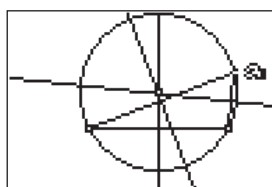
4

The perpendicular bisectors of the sides of any triangle intersect at a common point. This point is called the *circumcenter* of the triangle and is equidistant to the vertices. This point is also the center of the *circumcircle* of the triangle. This is the circle with its center at the *circumcenter* and a radius equal to the distance from the *circumcenter* to a vertex.



5

Press [WINDOW] for F2, move down to **Circle** and press [ENTER]. Move the pencil until two of the perpendicular bisectors are flashing and press [ENTER]. This will mark the *circumcenter* of the triangle as the center of the circle you are drawing. Move the pencil until a vertex point is flashing and press [ENTER]. Press [CLEAR] to turn off the **Circle** tool.



6

Move to a vertex, press [ALPHA], and observe the changes in the *circumcenter* and the circle as you move the vertex.



7

To exit the APP, press [Y=] for the F1 menu. Move to **Quit**, then press [ENTER]. (Or you can press [2nd] [MODE] for [QUIT].)

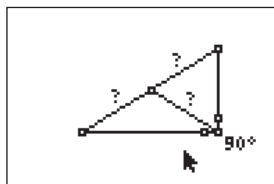
# Investigating Segments in a Right Triangle

Approximate  
Total Time:  
20 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a right triangle
- Find the midpoint of the hypotenuse
- Measure the distances from the midpoint of the hypotenuse to each vertex
- Make a conjecture about these distances



In this activity, we will review definitions of terms such as *right triangle*, *hypotenuse*, *midpoint*, *vertices*, and *equidistant*. We will then discover an important characteristic of the midpoint of the hypotenuse.

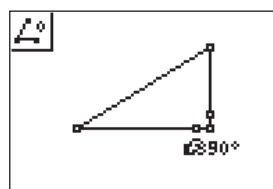
**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



1

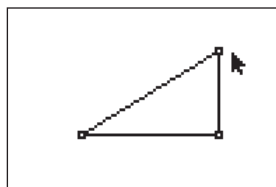
Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[ENTER]**, or any key, to begin using the application.

Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose "No.")



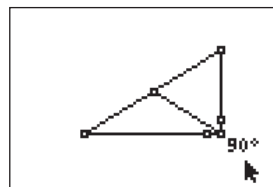
5

Move the pencil until a side of the triangle is flashing, then press **[ENTER]** to mark a point on the side. Move the pencil until the vertex of the angle to be measured is flashing. Press **[ENTER]**. Move the pencil until a second side is flashing. Press **[ENTER]** to mark the third point naming the angle. The measurement of the interior angle is displayed and the pointer changes to a *hand*. Use the arrow keys to move the measurement to a convenient location. Press **[CLEAR]** to deactivate the *hand*.



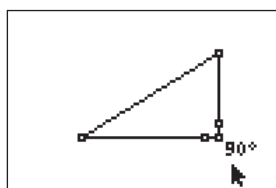
2

Press **[WINDOW]** for F2, move down to **Triangle** and press **[ENTER]**. Press **[ENTER]** to mark the first vertex of a triangle. Move the cursor several times to the right and press **[ENTER]** to mark the second vertex. Move the cursor straight up several times and press **[ENTER]** to mark the third vertex of the triangle.



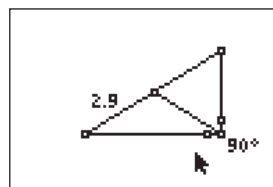
6

Press **[ZOOM]** for the F3 menu, move down to **Midpoint** and press **[ENTER]**. Move the arrow until the hypotenuse is flashing and press **[ENTER]**. Press **[WINDOW]** for the F2 menu, move down to **Segment** and press **[ENTER]**. Move the pencil until the midpoint of the hypotenuse is flashing and press **[ENTER]**. Move until the vertex point of the right angle is flashing and press **[ENTER]**.



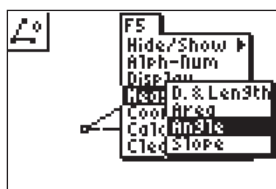
3

Since the triangle was drawn using only moves to the right and up, it should be a right triangle. This can be supported by using the angle measuring tool in the F5 menu as shown in the next steps.



7

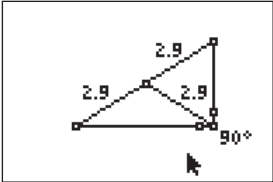
Next we measure the lengths of the segments drawn from the midpoint of the hypotenuse to each vertex. Press **[GRAPH]** for the F5 menu and move down to **Measure** and right to **D. & Length**. Press **[ENTER]**. Move to one endpoint of the hypotenuse and press **[ENTER]**. Move to the midpoint of the hypotenuse and press **[ENTER]**. Move the measurement to a convenient location.



4

Press **[GRAPH]** for the F5 menu, move down to **Measure**. Move right and down to **Angle** and press **[ENTER]**. To measure an angle you will select three points. As in naming an angle, the second point will be the vertex of the angle. Each of the other two points can be a vertex or any point on the side of the side of the triangle.

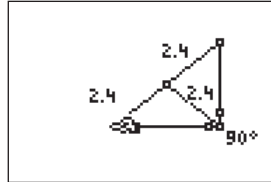
# Investigating Segments in a Right Triangle



8

The **Measurement** tool is still active, so repeat the process above until you have the measurements for the other two segments (from the midpoint to a vertex).

Based on the measurements, what appears to be true about the distance from the midpoint of the hypotenuse of a right to each of the vertices?



9

The midpoint of the hypotenuse of a right triangle is equidistant from the vertices of the triangle.

Test this conjecture by moving the vertices at the acute angles to change the lengths of the sides of the triangles. (Be careful not to change the right angle.)



10

To exit the APP, press  $\boxed{F1}$  for the F1 menu. Move to **Quit**, then press  $\boxed{ENTER}$ . (Or you can press  $\boxed{2nd}$   $\boxed{MODE}$  for  $\boxed{QUIT}$ .)

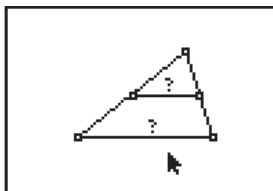
# Investigating Lengths of Segments in a Triangle

Approximate  
Total Time:  
20 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a triangle
- Find the midpoints of two sides of the triangle
- Draw and measure the segment joining the midpoints of these two sides
- Compare the length of this segment to the length of the third side of the triangle



If you connect the midpoints of two sides of a triangle, you have drawn a midsegment of the triangle.

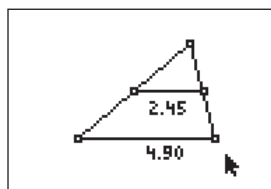
How does the length of this segment relate to the third side of the triangle? What if you draw a different midsegment?

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



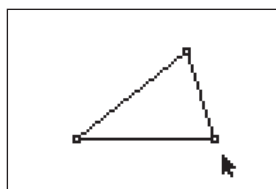
1

Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[ENTER]**, or any key, to begin using the application. Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose “No.”)



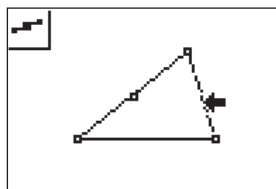
5

Press **[GRAPH]** for the F5 menu to measure the length of the segment joining the two midpoints. Move down to **Measure** and right to **D & Length**. Press **[ENTER]**. Move the arrow until the segment joining the midpoints is flashing. Press **[ENTER]**. Press **[+]** to see the measurement rounded to hundredths. Move the measurement to a convenient location. Press **[CLEAR]** to turn off the *hand*. With the measurement tool still active, move until the third side of the triangle is flashing and press **[ENTER]**. Press **[+]** for hundredths. Move the measurement to a convenient location. Press **[CLEAR]** to turn off the *hand*. Press **[CLEAR]** again to exit the measurement tool.



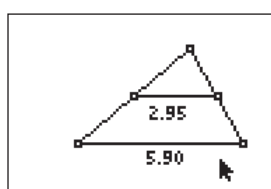
2

Press **[WINDOW]** for F2, move down to **Triangle** and press **[ENTER]**. Move to the location of a vertex and press **[ENTER]**. Move to the second vertex and press **[ENTER]**. Move to the third vertex and press **[ENTER]**. Press **[CLEAR]** to exit the triangle drawing tool.



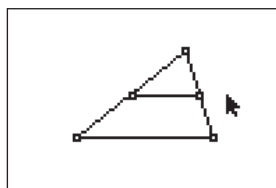
3

Press **[ZOOM]** for the F3 menu, move down to **Midpoint** and press **[ENTER]**. Move the arrow until a side of the triangle is flashing and press **[ENTER]**. Move until another side of the triangle is flashing and press **[ENTER]**.



6

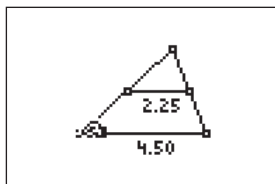
How does the length of the segment joining the midpoints of two sides of a triangle compare to the length of the third side? Test this conjecture on other triangles by moving to a vertex, pressing **[ALPHA]**, changing the position of the vertex, and observing the changes in the measurements of the segments.



4

To draw the segment joining the two midpoints, press **[WINDOW]**, move down to **Segment**, and press **[ENTER]**. Move the pencil until one midpoint is flashing and press **[ENTER]**. Move the pencil until the other midpoint is flashing and press **[ENTER]**.

# Investigating Lengths of Segments in a Triangle



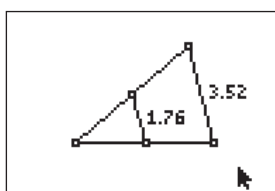
7

"The measure of the segment joining the midpoints of two sides of a triangle is one-half the measure of the third side."



9

To exit the APP, press  $\boxed{Y=}$  for the F1 menu. Move to **Quit**, then press  $\boxed{\text{ENTER}}$ . (Or you can press  $\boxed{2\text{nd}} \boxed{\text{MODE}}$  for  $\boxed{\text{QUIT}}$ .)



8

Test the conjecture using different sides of the triangle.



#### For TI-Navigator™ Users

Use Screen Capture to observe and assess individual progress in drawing and exploring. For help, see page 56.

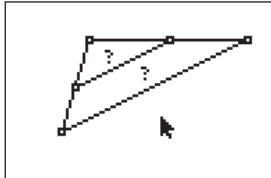
# Investigating Segments in a Triangle

Approximate  
Total Time:  
25 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a triangle
- Find the midpoints of two sides
- Draw a segment to join the midpoints
- Explore the relationships between the segment and the third side of the triangle—their lengths and the slopes of the lines containing the segments



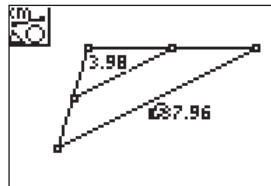
In the previous activity, we investigated the *midsegments* of a triangle. We will continue exploring these segments and extend our understanding of the relationships that exist by examining the *slopes* of lines containing the segments.

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



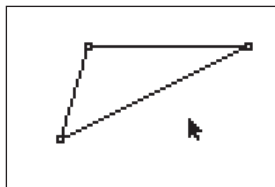
1

Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application. Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [↓] [ENTER] to choose “No.”)



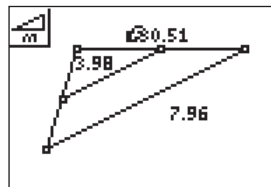
5

Press [GRAPH] for the F5 menu to measure the length of the segment joining the two midpoints. Move down to **Measure** and right to **D & Length**. Press [ENTER]. Move the arrow until the segment joining the midpoints is flashing. Press [ENTER]. Press [+] to see the measurement rounded to hundredths. Move the measurement to a convenient location. Press [CLEAR] to turn off the *hand*. With the measurement tool still active, find the measure of the third side of the triangle. Press [CLEAR] to exit the measurement tool.



2

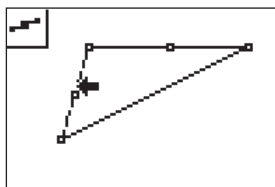
Press [WINDOW] for F2, move down to **Triangle** and press [ENTER]. Move to the location of a vertex and press [ENTER]. Move to the second vertex and press [ENTER]. Move to the third vertex and press [ENTER]. Press [CLEAR] to exit the triangle drawing tool.



6

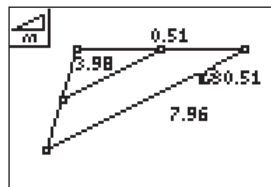
How does the slope of the line containing the segment joining the midpoints compare to the slope of the third side?

Press [GRAPH] for F5 and move to **Measure** then right and down to **Slope**. Press [ENTER]. Move the arrow until the segment joining the midpoints is flashing. Press [ENTER] then [+] to view it rounded to hundredths. Move the measurement to a convenient location then press [CLEAR] to turn off the *hand*.



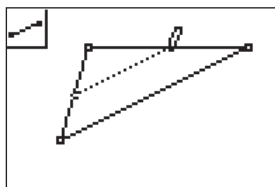
3

Press [ZOOM] for the F3 menu, move down to **Midpoint** and press [ENTER]. Move the arrow until a side of the triangle is flashing and press [ENTER]. Move until another side of the triangle is flashing and press [ENTER].



7

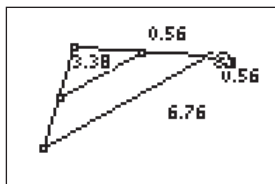
With the **Slope** tool still active, move to the third side of the triangle. Press [ENTER] when the side is flashing. Press [+] to view the measurement rounded to hundredths. Move the measurement to a convenient location then press [CLEAR] to turn off the *hand*. Press [CLEAR] again to turn off the **Slope** tool.



4

To draw the segment joining the two midpoints, press [WINDOW] for F2, move to **Segment** and press [ENTER]. Move the pencil until one midpoint is flashing and press [ENTER]. Move the pencil until the other midpoint is flashing and press [ENTER]. How does the length of the segment joining the midpoints of two sides of a triangle compare to the length of the third side?

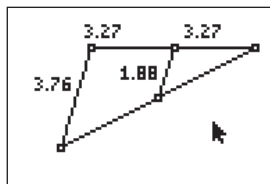
# Investigating Segments in a Triangle



8

"The segment joining the midpoints of two sides of a triangle is parallel to the third side and has measure equal to one-half the measure of the third side."

Test this conjecture on other triangles by moving to a vertex, pressing **[ALPHA]**, changing the position of the vertex, and observing the changes in the slopes and measurements of the segments.



9

Further test these conjectures using different sides of the triangle.



10

To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd] [MODE]** for **[QUIT]**.)

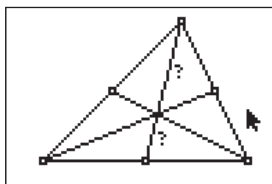
# Exploring the Centroid of a Triangle

Approximate  
Total Time:  
25 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a triangle
- Draw the medians of the triangle
- Locate the *centroid*
- Explore measures of the segments in the triangle



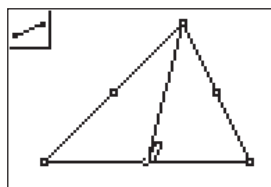
The *median* of a triangle is a line segment drawn from one vertex to the midpoint of the opposite side of the triangle. What happens when we draw all three medians of a triangle?

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



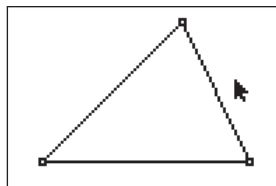
### 1 \_\_\_\_\_

Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[ENTER]**, or any key, to begin using the application.  
Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose “No.”)



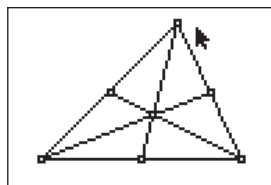
### 4 \_\_\_\_\_

Now we will draw the medians of the triangle. To draw a segment from a vertex to the midpoint of the opposite side press **[WINDOW]** for F2. Move to **Segment** and press **[ENTER]**. Move the pencil until a vertex is flashing and press **[ENTER]**. Move the pencil until the midpoint of the opposite side is flashing and press **[ENTER]**.



### 2 \_\_\_\_\_

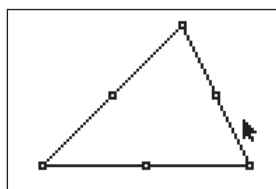
Press **[WINDOW]** for F2, move down to **Triangle** and press **[ENTER]**. Move to the location of a vertex and press **[ENTER]**. Move to the second vertex and press **[ENTER]**. Move to the third vertex and press **[ENTER]**. Press **[CLEAR]** to exit the triangle drawing tool.



### 5 \_\_\_\_\_

With the **Segment** tool still active, draw the other two medians of the triangle.

When all three medians are drawn, press **[CLEAR]** to turn off the segment tool.



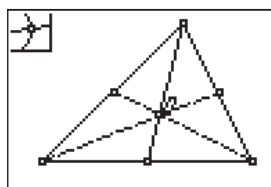
### 3 \_\_\_\_\_

To draw the medians we must first locate the midpoints of the sides. Press **[ZOOM]** for the F3 menu, move down to **Midpoint** and press **[ENTER]**. Move the arrow until a side of the triangle is flashing and press **[ENTER]**. Move until another side of the triangle is flashing and press **[ENTER]**. Move until the third side of the triangle is flashing and press **[ENTER]**.



### For TI-Navigator™ Users

Use Screen Capture to observe and assess individual progress in drawing and exploring. For help, see page 56.

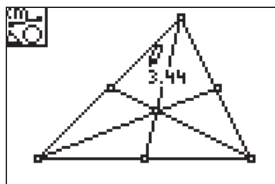


### 6 \_\_\_\_\_

The medians of the triangle intersect at a common point. This point is called the *centroid* of the triangle.

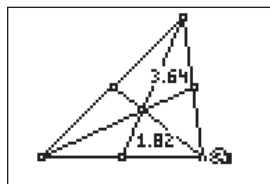
To mark this point, press **[WINDOW]** for the F2 menu. Move to **Point**, then right and down to **Intersection**. Press **[ENTER]**. Move the pencil until two of the medians are flashing then press **[ENTER]**. How does the length of the segment from a vertex to the centroid compare to the length of the segment from the centroid to the midpoint?

# Exploring the Centroid of a Triangle



7

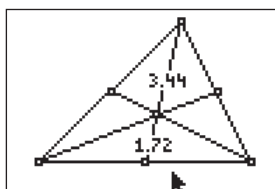
Press **GRAPH** for the F5 menu. Move to **Measure** and **D. & Length**. Press **ENTER**. Move to a vertex and press **ENTER** when the point is flashing. Move to the *centroid* and press **ENTER** when the point is flashing. Press **+** to display the measurement rounded to hundredths. Move the measurement to a convenient location then press **CLEAR** to turn off the *hand*.



9

It appears that the segment from the vertex to the *centroid* is twice the length of the segment from the *centroid* to the midpoint.

Test this conjecture by changing the triangle. Move to a vertex and press **ALPHA** when the point is blinking. Move the point and observe the changes in the measures of the segments.



8

Move the pencil until the *centroid* flashes. Press **ENTER**. Move until the midpoint is flashing and press **ENTER**. Press **+** to display hundredths. Move the measurement, press **CLEAR** to turn off the *hand*, and then press **CLEAR** to exit the measurement tool.



10

To exit the APP, press **=** for the F1 menu. Move to **Quit**, then press **ENTER**. (Or you can press **2nd** **MODE** for **QUIT**.)

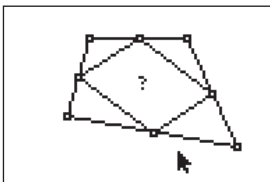
# Investigating Segments in a Quadrilateral

Approximate  
Total Time:  
30 minutes

## ACTIVITY OVERVIEW:

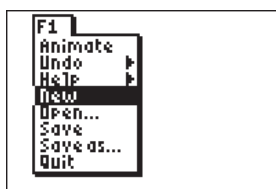
### In this activity we will

- Draw a quadrilateral
- Find the midpoints of the sides
- Draw segments to join the midpoints of adjacent sides
- Explore characteristics of the shape formed



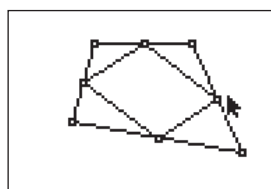
What are the properties of the shape formed by connecting the midpoints of adjacent sides of a quadrilateral? How can we use our knowledge of geometry, along with the tools of CabriJr, to support our conjectures about the shape?

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



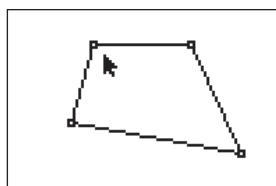
1

Press **[APPS]**. Move down to the CabriJr APP and press **[ENTER]**. Press **[V=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[◀]** **[ENTER]** to choose "No.")



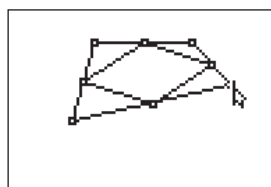
5

With the same midpoint flashing, press **[ENTER]** to begin a new segment. Move the pencil until the midpoint of the next side is flashing and press **[ENTER]**. Press **[ENTER]** again with that same midpoint flashing and move to the fourth midpoint and press **[ENTER]**. For the last segment, press **[ENTER]** with the fourth midpoint flashing. Move to the original midpoint and press **[ENTER]**. Press **[CLEAR]** to turn off the midpoint tool.



2

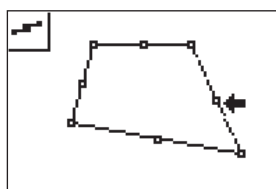
Press **[WINDOW]** for F2, move down to **Quad.** and press **[ENTER]**. Move to the location of a vertex and press **[ENTER]**. Move to the second vertex and press **[ENTER]**. Move to the third vertex and press **[ENTER]**. Move to the fourth vertex and press **[ENTER]**. Press **[CLEAR]** to exit the quadrilateral drawing tool.



6

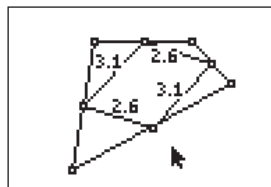
What appears to be true about the quadrilateral formed by connecting the midpoints?

Move the arrow to a vertex of the original quadrilateral. When the point is flashing, press **[ALPHA]**. Grab the vertex and move it to change the shape of the original quadrilateral. Observe changes in the quadrilateral formed by the midpoints.



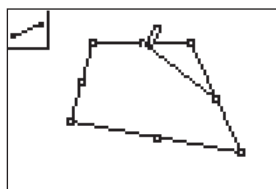
3

Press **[ZOOM]** for the F3 menu, move down to **Midpoint** and press **[ENTER]**. Move the arrow until a side of the quadrilateral is flashing and press **[ENTER]**. Move until another side of the quadrilateral is flashing and press **[ENTER]**. Move until a third side of the quadrilateral is flashing and press **[ENTER]**. Move until the fourth side of the quadrilateral is flashing and press **[ENTER]**.



7

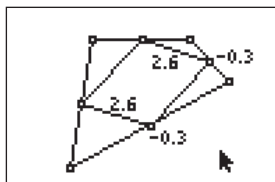
The quadrilateral formed by joining the midpoints appears to be a parallelogram. We can test this conjecture by showing that *both pairs of opposite sides are congruent*. Press **[GRAPH]** to use the **Measure** and **D. & Length** tool from the F5 menu. Move the pencil until one side of the figure is flashing and press **[ENTER]**. Repeat to find the measurements for the remaining sides of the quadrilateral.



4

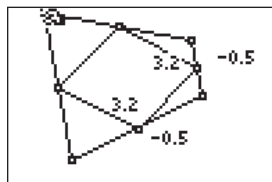
To draw the segments joining the midpoints of adjacent sides, press **[WINDOW]**, move to **Segment** and press **[ENTER]**. Move the pencil until one midpoint is flashing and press **[ENTER]**. Move the pencil until the midpoint of an adjacent side is flashing and press **[ENTER]**.

# Investigating Segments in a Quadrilateral



8

We can also test the conjecture by showing that *one pair of opposite sides is parallel and congruent*. In the previous step we showed opposite sides congruent, so now we must test their slopes. Press **GRAPH** for F5 and move to **Measure** then right and down to **Slope**. Press **ENTER**. Move the pencil until one side of the figure is flashing and press **ENTER**. Repeat to find the slope of the opposite side of the quadrilateral. Press **CLEAR** to exit the **Slope** tool.



9

Test this conjecture on other quadrilaterals by moving to a vertex of the original quadrilateral. When the vertex point is flashing, pressing **ALPHA**, change the position of the vertex, and observe the changes in the measurements of the segments and the slopes.



10

To exit the APP, press **Y=** for the F1 menu. Move to **Quit**, then press **ENTER**. (Or you can press **2nd** **MODE** for **QUIT**.)

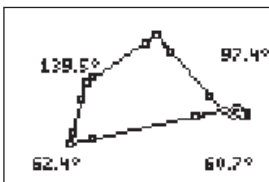
# Measuring Angles in a Quadrilateral

Approximate  
Total Time:  
25 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a quadrilateral
- Find the measure of each interior angle
- Find the sum of the measures of the interior angles



This activity allows us to use an interactive, investigative approach to determining the sum of the interior angles of a quadrilateral. We will use Cabri Jr. to draw, measure, and calculate as we explore the angles of quadrilaterals.

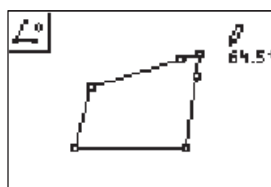
**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



1

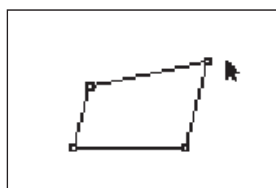
Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[ENTER]**, or any key, to begin using the application.

Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose "No.")



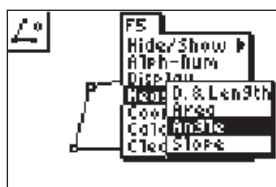
4

Move the pencil until a side of the quadrilateral is flashing, then press **[ENTER]** to mark a point on the side. Move the pencil until the vertex of the angle to be measured is flashing. Press **[ENTER]**. Move the pencil until a second side is flashing. Press **[ENTER]** to mark the third point naming the angle. The measurement of the interior angle is displayed and the pointer changes to a *hand*. Press **[+]** to display the angle measurement rounded to tenths. Use the arrow keys to move the measurement to a convenient location. Press **[CLEAR]** to deactivate the *hand*.



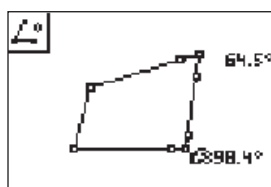
2

Press **[WINDOW]** for F2, move to **Quadrilateral** and press **[ENTER]**. Move to the location of a vertex and press **[ENTER]**. Move to the second vertex and press **[ENTER]**. Move to the third vertex and press **[ENTER]**. Move to the fourth vertex and press **[ENTER]**. Press **[CLEAR]** to exit the quadrilateral drawing tool.



3

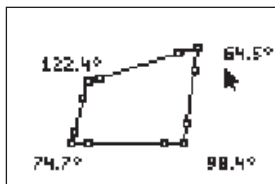
Press **[GRAPH]** for the F5 menu, move down to **Measure**. Move right and down to **Angle** and press **[ENTER]**. To measure an interior angle you will select three points. As in naming an angle, the second point will be the vertex of the angle. Each of the other two points can be a vertex of the quadrilateral or any point on the side of the quadrilateral.



5

The angle measurement tool is still active, so we will repeat the preceding step to find the measure of another angle of the quadrilateral. To do this, move the pencil until a side is flashing. Press **[ENTER]** to mark a point on that side. Move the pencil until the vertex of the angle to be measured is flashing, then press **[ENTER]**. Move the pencil until a second side is flashing. Press **[ENTER]** to mark the third point naming the angle. The measurement of the angle is displayed and the pointer changes to a *hand*. Press **[+]** to display the angle measurement rounded to tenths. Use the arrow keys to move the measurement to a convenient location. Press **[CLEAR]** to deactivate the *hand*.

# Measuring Angles in a Quadrilateral

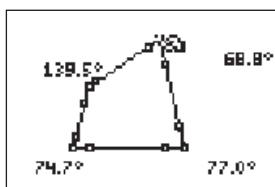


6

Repeat the preceding step to find the measures of the remaining two interior angles of the quadrilateral.

Press **CLEAR** to exit the measurement tool.

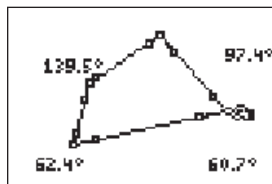
Record the measures of the four angles. Find the sum of the angles. In the example:  
 $122.4^\circ + 64.5^\circ + 98.4^\circ + 74.7^\circ = 360^\circ$ .



7

Move the arrow until one of the vertices of the quadrilateral is flashing and press **ALPHA** to activate the *hand*. Use the arrow keys to move the vertex to form a new quadrilateral.

Record the measures of the four angles. Find the sum of the angles. In the example:  
 $139.5^\circ + 68.6^\circ + 77.0^\circ + 74.7^\circ = 360^\circ$ .



8

Press **CLEAR** to turn off the *hand* and move the pointer to a different vertex. Press **ALPHA** to activate the *hand* and move the vertex to a new location.

Record the measures of the four angles. Find the sum of the angles. In the example:  
 $139.5^\circ + 97.4^\circ + 60.7^\circ + 62.4^\circ = 360^\circ$ .

Make a conjecture: The sum of the interior angles of a quadrilateral is \_\_\_\_\_.



9

To exit the APP, press **Y=** for the F1 menu. Move to **Quit**, then press **ENTER**. (Or you can press **2nd** **MODE** for **QUIT**.)

10

Note: Sometimes there may be a rounding error in the angle measures and the sum may not be exactly  $360^\circ$ . This is a limitation of the software.

Also, we did not use the **Calculate** feature of the F5 menu since it allows you to add at most 3 values and we want the sum of all four interior angles.

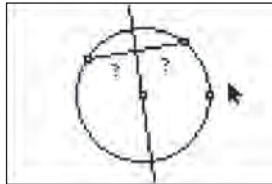
# Perpendicular Segments in a Circle

Approximate  
Total Time:  
20 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a circle
- Draw a chord
- Draw a line perpendicular to the chord and passing through the center of the circle
- Explore the lengths of the two segments of the chord



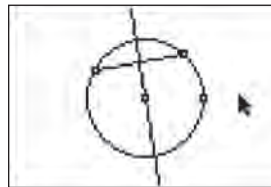
What is a chord of a circle? What happens if you draw a line perpendicular to the chord and through the center of the circle? Will the same thing happen with a different chord? What if you change the size of the circle?

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



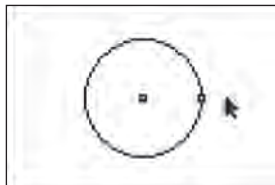
1

Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[ENTER]**, or any key, to begin using the application. Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose "No.")



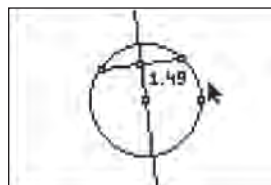
4

Press **[ZOOM]** for the F3 menu, move to **Perp.** and press **[ENTER]**. Move the pointer until the chord is flashing and press **[ENTER]**. Move the pencil until the center of the circle is flashing and press **[ENTER]**. This will draw a line perpendicular to the chord and through the center. Press **[CLEAR]** to deactivate the **Perp.** tool. What appears to be true about the two parts of the chord?



2

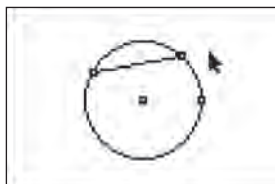
Press **[WINDOW]** for F2, move down to **Circle** and press **[ENTER]**. Move to the desired location of the center and press **[ENTER]**. Move to indicate the length of the radius and press **[ENTER]**. Press **[CLEAR]** to turn off the **Circle** tool.



5

The perpendicular line appears to have bisected the chord. To test this, we will measure the segments.

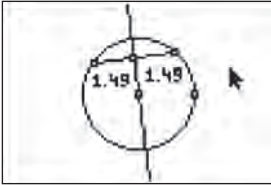
Press **[GRAPH]** for the F5 menu to measure the lengths of the two segments of the chord. Move down to **Measure** and right to **D & Length**. Press **[ENTER]**. Move the pencil until one endpoint of the chord is flashing. Press **[ENTER]**. Move the pencil until the chord and the perpendicular line are flashing and press **[ENTER]**. This displays the segment length and marks the intersection of the chord and the perpendicular line. Press **[+]** to see the measurement rounded to hundredths. Move the measurement to a convenient location. Press **[CLEAR]** to turn off the *hand*.



3

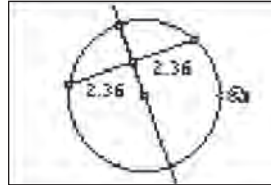
Press **[WINDOW]** for F2, move to **Segment** and press **[ENTER]**. Move the pencil until the circle is flashing and press **[ENTER]** to mark one endpoint of a chord. Move the pencil until the circle is again flashing and press **[ENTER]** to mark the other endpoint of the chord. Press **[CLEAR]** to deactivate the **Segment** tool.

# Perpendicular Segments in a Circle



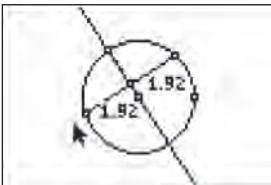
6

With the measurement tool still active, find the length of the other segment of the chord. Move until the point of intersection of the chord and the perpendicular line is flashing, then press **ENTER**. Move until the other endpoint of the chord is flashing and press **ENTER**. Press **+** to display the measure rounded to hundredths. Move the measurement to a convenient location and press **CLEAR** to deactivate the *hand*. Press **CLEAR** to exit the measurement tool.



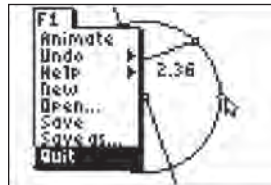
8

Since the line perpendicular to the chord passes through the circle's center, it contains a diameter and a radius which are also perpendicular to the chord. This illustrates part of the familiar theorem: In a circle, if a diameter or radius is perpendicular to a chord, then it bisects the chord (and its arc).



7

It appears that a line which is perpendicular to a chord and passes through the center of a circle also bisects the chord. Test this conjecture by changing the length or location of the chord. Move the pointer until one endpoint of the chord is flashing. Press **ALPHA** and move the point to a different location. Observe the changes in the segment measures as the chord is moved. You can explore this further by changing the size of the circle.



9

To exit the APP, press **Y=** for the F1 menu. Move to **Quit**, then press **ENTER**. (Or you can press **2nd** **MODE** for **QUIT**.)

# Drawing a Line Tangent to a Circle

Approximate  
Total Time:  
20 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a circle
- Draw a radius of the circle
- Construct a line perpendicular to the radius at its endpoint. This will be a tangent line.



“In a plane, if a line is perpendicular to a radius of a circle at its endpoint on the circle, then the line is a tangent.”

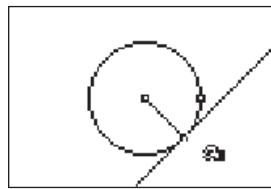
We can use this theorem and our skills with the drawing tools of Cabri Jr. to draw a line tangent to a circle.

**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



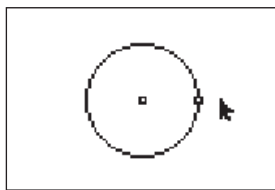
1

Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[ENTER]**, or any key, to begin using the application. Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose “No.”)



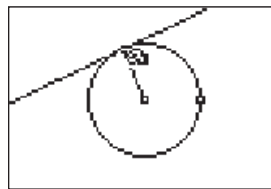
5

Move the pointer until the endpoint of the radius on the circle is flashing and press **[ALPHA]** to turn on the *hand*. Move this endpoint of the radius to a different location on the circle and observe movement of the line. Press **[CLEAR]** to turn off the *hand*.



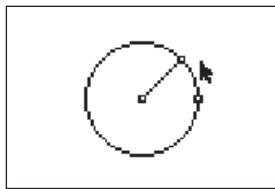
2

Press **[WINDOW]** for F2, move down to **Circle** and press **[ENTER]**. Move to the desired location of the center and press **[ENTER]**. Move to indicate the length of the radius and press **[ENTER]**. Press **[CLEAR]** to turn off the **Circle** tool.



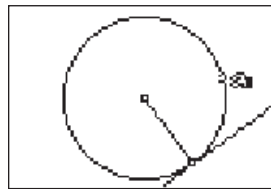
6

We have drawn a line tangent to the circle using the theorem: “In a plane, if a line is perpendicular to a radius of a circle at its endpoint on the circle, then the line is a tangent.”



3

Press **[WINDOW]** for F2, move down to **Segment**, and press **[ENTER]**. Move the pencil until the center of the circle is flashing and press **[ENTER]**. Move the pencil until the circle is flashing and press **[ENTER]**. Press **[CLEAR]** to turn off the **Segment** tool.



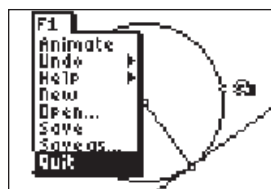
7

You can change the size of the circle and observe that the line remains tangent at the endpoint of the radius. To do this, move the pointer until the other point on the circle is flashing and press **[ALPHA]**. Move this point to change the size of the circle.



4

Press **[ZOOM]** for F3, move to **Perp.** and press **[ENTER]**. Move the pencil until the endpoint of the radius on the circle is flashing and press **[ENTER]**. Move until the radius is also flashing and press **[ENTER]**. This draws a line through the endpoint on the circle and perpendicular to the radius. Press **[CLEAR]** to turn off the **Perp.** tool.



8

To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd]** **[MODE]** for **[QUIT]**.)

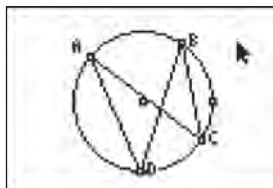
# Inscribed Angles Intercepting The Same Arc

Approximate  
Total Time:  
30 minutes

## ACTIVITY OVERVIEW:

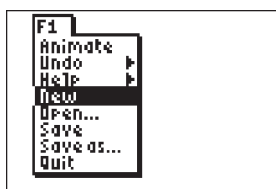
### In this activity we will

- Draw a circle
- Mark two points on the circle to determine an arc
- Mark two points to be the vertices of inscribed angles
- Observe the relationship between the inscribed angles



This activity gives us the opportunity to investigate angles inscribed in a circle. By drawing and measuring certain angles, we can establish the relationship between angles that intercept the same arc.

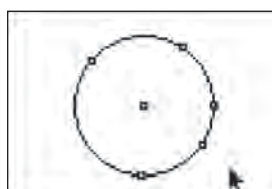
**NCTM Geometry Standard:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.



1

Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[ENTER]**, or any key, to begin using the application.

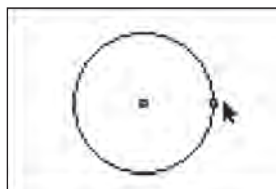
Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose “No.”)



4

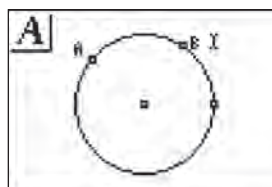
Now we will mark two more points along the “bottom” of the circle. Each of these points will be the vertex of an inscribed angle.

The **Point** tool is still active, so move until the circle is flashing and press **[ENTER]**. Move the pencil until the circle is again flashing and press **[ENTER]**. Press **[CLEAR]** to turn off the **Point** tool.



2

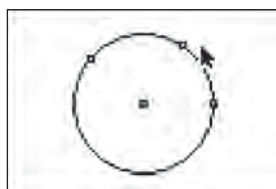
Press **[WINDOW]** for F2, move down to **Circle** and press **[ENTER]**. Move to the desired location of the center and press **[ENTER]**. Move to indicate the length of the radius and press **[ENTER]**. Press **[CLEAR]** to turn off the **Circle** tool.



5

Now we will name the points that determine the arc.

Press **[GRAPH]** for F5, move to **Alpha-Num**, and press **[ENTER]**. Move the text cursor until one of the two points of the arc is flashing and press **[ENTER]**. Press **[MATH]** (for the alpha character A) then press **[ENTER]**. Move the text cursor until the other point of the arc is flashing and press **[ENTER]**. Press **[APPS]** (for the alpha character B), then press **[ENTER]**. We now have  $\widehat{AB}$ .

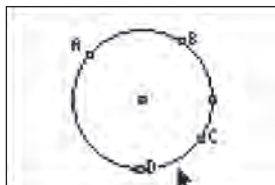


3

We will mark two points along the “top” of the circle to determine a minor arc of the circle.

Press **[WINDOW]** for F2, move to **Point**, then right to **Point** and press **[ENTER]**. Move the pencil until the circle is flashing and press **[ENTER]** to mark a point on the circle. Move the pencil until the circle is flashing again and press **[ENTER]** to mark a second point on the circle.

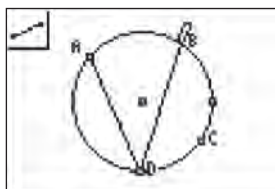
# Inscribed Angles Intercepting The Same Arc



6

Now we will name the points that will be the vertices of the inscribed angles.

The **Alpha-Num** labeling tool is still active, so move to one of the points along the “bottom” of the circle. When the point is flashing, press **[ENTER]** **[PRGM]** **[ENTER]**. Move the text cursor to the other point that you placed along the “bottom” of the circle and press **[ENTER]** **[x-1]** **[ENTER]**. Press **[CLEAR]** to turn off the **Alpha-Num** tool.

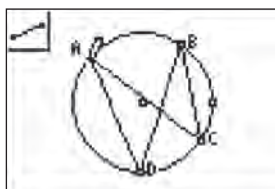


7

Next we will draw segments that will form the sides of the inscribed angles.

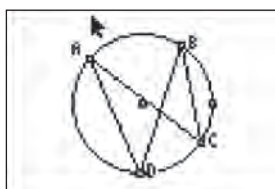
Press **[WINDOW]**, move to **Segment**, and then press **[ENTER]**. Move the pencil until the point at A is flashing and press **[ENTER]**. Move until the point at D is flashing and press **[ENTER]**. You should now see AD.

With point D still flashing, press **[ENTER]** to begin a new segment. Move until the point at B is flashing and press **[ENTER]**.



8

With point B still flashing, press **[ENTER]** to begin a new segment. Move until the point at C is flashing and press **[ENTER]**. With the point at C still flashing, press **[ENTER]** to begin a new segment. Move until the point at A is flashing and press **[ENTER]**. Press **[CLEAR]** to turn off the **Segment** tool.

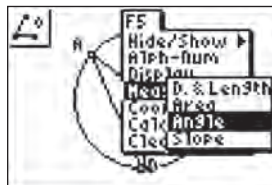


9

$\angle BCA$  and  $\angle BDA$  are inscribed angles that intercept the same arc. What appears to be true about these angles?

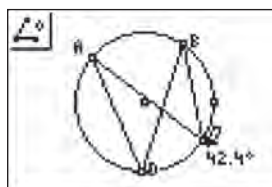
These angles appear to be congruent.

We can use the measurement tool to find their measures.



10

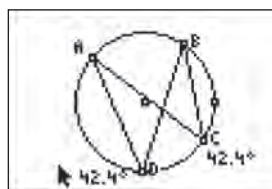
Press **[GRAPH]** for the F5 menu, move down to **Measure**. Move right and down to **Angle** and press **[ENTER]**. To measure an angle you will select three points. As in naming an angle, the second point will be the vertex of the angle. Each of the other two points can be one of the labeled points or any point on a side of the angle.



11

We will first find the measure of  $\angle BCA$ .

Move the pencil until the point at B is flashing, then press **[ENTER]**. Move the pencil until the vertex of the angle to be measured, the point at C, is flashing. Press **[ENTER]**. Move the pencil until the point at A is flashing. Press **[ENTER]** to mark the third point naming the angle. The measurement of the inscribed angle is displayed and the pointer changes to a *hand*. Press **[+]** to display the angle measurement rounded to tenths. Use the arrow keys to move the measurement to a convenient location. Press **[CLEAR]** to deactivate the *hand*.

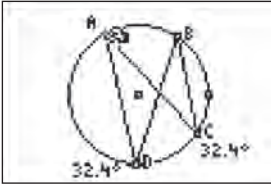


12

The **Angle** measurement tool is still active so now we will find the measure of  $\angle BDA$ .

Move the pencil until the point at B is flashing, then press **[ENTER]**. Move the pencil until the vertex of the angle to be measured, the point at D, is flashing. Press **[ENTER]**. Move the pencil until the point at A is flashing. Press **[ENTER]** to mark the third point naming the angle. The measurement of the inscribed angle is displayed and the pointer changes to a *hand*. Press **[+]** to display the angle measurement rounded to tenths. Use the arrow keys to move the measurement to a convenient location. Press **[CLEAR]** to deactivate the *hand*. Press **[CLEAR]** to turn off the **Angle** tool.

# Inscribed Angles Intercepting The Same Arc

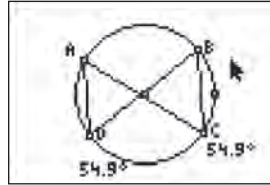


13

The inscribed angles have the same measure. This illustrates the theorem: "If inscribed angles intercept the same arc (or congruent arcs), then the angles are congruent."

To further explore this, move the pointer until the point at A is flashing, press **[ALPHA]**, and move the point. Press **[CLEAR]** to turn off the *hand*.

You can observe that as the arc changes, the measures of the inscribed angles change, but stay equal to each other.



14

You can explore this further by moving any of the points A, B, C, or D. Move until the desired point is flashing, press **[ALPHA]**, then move the point to a new location. Press **[CLEAR]** to turn off the *hand*. Repeat the steps to move a different point.



**For TI-Navigator™ Users**

Use Screen Capture to check students' progress. For help, see page 56.



15

To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd] [MODE]** for **[QUIT]**.)

# Investigating the Slopes of Parallel and Perpendicular Lines

Approximate  
Total Time:  
25 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a line
- Draw a line parallel to the original line
- Draw a line perpendicular to the original line
- Explore the relationships between the slopes of parallel and perpendicular lines



How are the equations of parallel and perpendicular lines related? The drawing and measurement tools allow us to set the stage for investigation as we explore the slopes of lines.

**NCTM Geometry Standards:** Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships. Specify locations and describe spatial relationships using coordinate geometry and other representational systems.



1

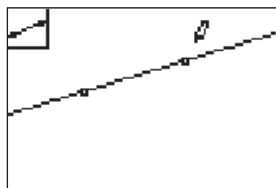
Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose “No.”)



5

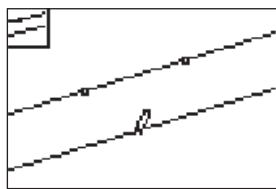
How are the slopes of these lines related?

Press **[GRAPH]** for F5 and move to **Measure** then right and down to **Slope**. Press **[ENTER]**. Move the arrow until one line is flashing and press **[ENTER]**. Move the measurement to a convenient location then press **[CLEAR]** to turn off the *hand*. With the **Slope** tool still active, move until another line is flashing and press **[ENTER]**. Move the measurement to a convenient location then press **[CLEAR]** to turn off the *hand*. The **Slope** tool is still active so move to the third line is flashing and press **[ENTER]**. Move this measurement and press **[CLEAR]** to turn off the *hand*.



2

Press **[WINDOW]** for F2, move to **Line** and press **[ENTER]**. Move to the desired location and press **[ENTER]** to mark one point on the line. Move the pencil to the desired location of the other point defining the line and press **[ENTER]**.



3

Press **[ZOOM]** for the F3 menu, move **Parallel** and press **[ENTER]**. Move until the line is flashing and press **[ENTER]**. Move the pencil to a new location to mark a point through which the parallel line will pass, then press **[ENTER]**.



6

The parallel lines have the same slopes, but the perpendicular lines do not. To explore the relationship between the slopes of the perpendicular lines, we can find the product of their slopes.

Press **[GRAPH]** for the F5 menu and move to **Calculate** then press **[ENTER]**.



4

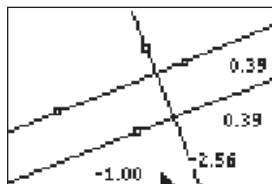
Press **[ZOOM]** for the F3 menu, move **Perp.** and press **[ENTER]**. Move until the original line is flashing and press **[ENTER]**. Move the pencil to a new location to mark a point through which the perpendicular line will pass, then press **[ENTER]**.

# Investigating the Slopes of Parallel and Perpendicular Lines



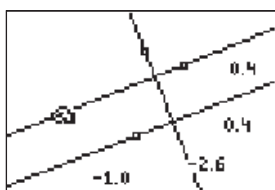
7

Move until one of the slope values has a flashing underline then press **[ENTER]**. Move until the slope of a perpendicular line has a flashing underline and press **[ENTER]**. At this time, both of the slope values should be flashing. Press **[X]** and the product of these slopes will be displayed. Move this value to a convenient location and press **[CLEAR]** to turn off the *hand*. Press **[CLEAR]** again to turn off the **Calculate** tool.



9

When using the **Calculate** tool, rounding errors may occur. To display the values rounded to hundredths, move until the value has a flashing underline and press **[+]**. Repeat this for the remaining values. (This can also be done when the slope values are originally found by pressing **[+]** when the *hand* is on the value.)



8

Move the pointer to the first point marked on the original line. Press **[ALPHA]** to activate the *hand* and move the point around the screen. Since the parallel line and the perpendicular line were drawn with respect to the original line, they will both move as you move the point on the original line. Observe the changes in the slopes and in the product. Press **[CLEAR]** to deactivate the *hand*.



10

To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd] [MODE]** for **[QUIT]**.)

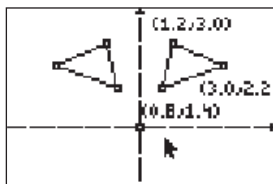
# Reflecting a Triangle in the Coordinate Plane

Approximate  
Total Time:  
40 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a triangle
- Find the coordinates of the triangle
- Reflect the triangle across the y-axis
- Find the coordinates of the reflected triangle
- Explore the relationship between the original coordinates and the coordinates of the reflected triangle



This activity provides a wonderful opportunity to blend coordinate geometry with our experience using drawing tools. We can visualize symmetry and reflecting a point across the y-axis.

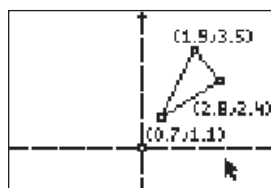
**NCTM Geometry Standards:** Specify locations and describe spatial relationships using coordinate geometry and other representational systems. Apply transformations and use symmetry to analyze mathematical situations.



1

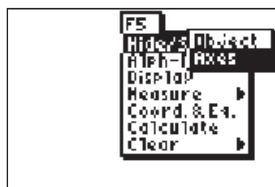
Press [APPS]. Move down to the Cabri Jr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application.

Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [←] [ENTER] to choose “No.”)



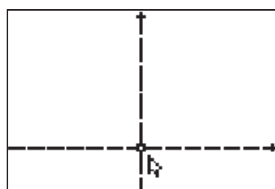
5

Press [GRAPH] for the F5 menu, move to **Coord. & Eq**, and then press [ENTER]. Move until a vertex is flashing and press [ENTER]. The coordinates of that vertex are displayed and can be moved to a convenient location. Press [CLEAR] to deactivate the *hand*. Move until another vertex of the triangle is flashing and then press [ENTER]. Use the hand to move the coordinates, then press [CLEAR]. Move until the third vertex is flashing and press [ENTER]. Move the coordinates then press [CLEAR] to deactivate the *hand*. Press [CLEAR] again to turn off the **Coord. & Eq** tool.



2

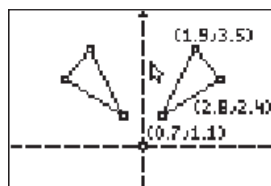
To show the axes, press [GRAPH] for the F5 menu, move to **Hide/Show**, and then move right and down to **Axes**. Press [ENTER].



3

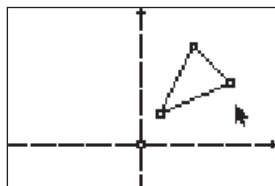
Move until the origin is flashing and press [ALPHA] to activate the *hand*. Move the origin until the axes are positioned as shown in the figure.

Press [CLEAR] to deactivate the *hand*.



6

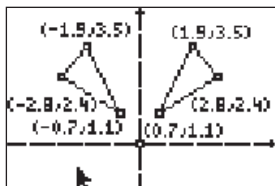
To reflect the triangle across the y-axis, press [TRACE] for the F4 menu, move to **Reflection**, and then press [ENTER]. Move until all sides of the triangle are flashing and press [ENTER]. Move until the y-axis is flashing and press [ENTER]. Press [CLEAR] to turn off the **Reflection** tool.



4

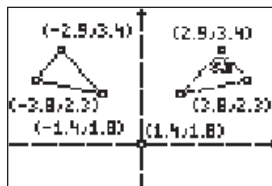
To draw a triangle in the first quadrant, press [WINDOW] for the F2 menu. Move to **Triangle** and press [ENTER]. Move the pencil to the desired location of one of the vertices and press [ENTER]. Move to a second vertex and press [ENTER]. Move to the third vertex and press [ENTER]. Press [CLEAR] to turn off the **Triangle** tool.

# Reflecting a Triangle in the Coordinate Plane



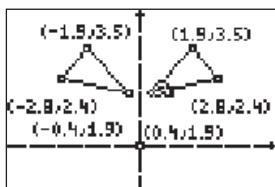
7

Press **GRAPH** for the F5 menu, move to **Coord. & Eq**, and then press **ENTER**. Find the coordinates of the vertices of the reflected triangle using the same procedure as when finding the coordinates of the vertices of the original triangle.



9

Press **CLEAR** to deactivate the *hand*. Move until all three sides of the original triangle are flashing and press **ALPHA**. Move the triangle and observe the changes in coordinates.



8

What can you conclude about the coordinates of a figure when it is reflected across the y-axis?

It appears that the coordinates  $(x, y)$  becomes  $(-x, y)$  in the reflected image.

Test this conjecture by changing the original triangle. Move until a vertex is flashing, press **ALPHA**, and then move the point. Observe the changes in the coordinates of the vertices of both triangles.



## For TI-Navigator™ Users

**Activity Center:** Load a background image of a triangle in Quadrant 1. Have students mark a point on the triangle then mark a second point which is the image of the first point reflected across the y-axis. For help, see page 64.



10

To exit the APP, press **Y=** for the F1 menu. Move to **Quit**, then press **ENTER**. (Or you can press **2nd** **MODE** for **[QUIT]**.)

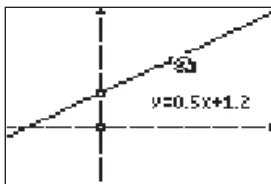
# Investigating Equations of Lines

Approximate  
Total Time:  
25 minutes

## ACTIVITY OVERVIEW:

### In this activity we will

- Draw a line and find its equation
- Move the points defining the line and observe the changes in the equation
- Draw another line and observe changes in its equation



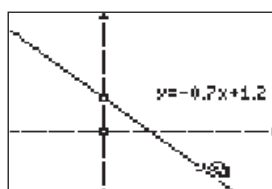
We can explore the equations of lines written in the form:  $y = mx + b$ . By moving points defining the lines, we can view the related changes in the parameters of the equations.

**NCTM Geometry Standard:** Specify locations and describe spatial relationships using coordinate geometry and other representational systems.



1

Press **[APPS]**. Move down to the Cabri Jr APP and press **[ENTER]**. Press **[ENTER]**, or any key, to begin using the application. Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose “No.”)



5

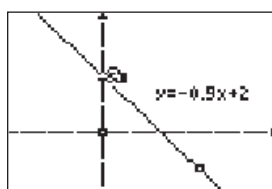
Move until the point (not on the y-axis) is flashing and press **[ALPHA]**. Move the point up and down and observe the changes in the equation of the line.

The slope of the line changes as the point moves. The y-intercept stays constant since it was one of the two points used to define the line.



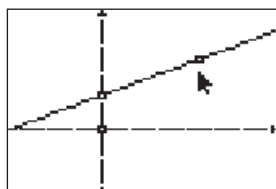
2

To show the axes, press **[GRAPH]** for the F5 menu, move to **Hide/Show**, and then move right and down to **Axes**. Press **[ENTER]**.



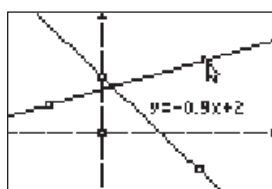
6

Press **[CLEAR]** and move until the y-intercept is flashing. Press **[ALPHA]** and move the point up and down on the axis. Observe that the y-intercept and the slope both change as the point is moved.



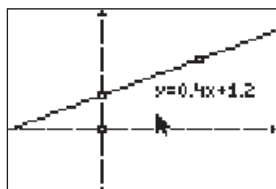
3

Press **[WINDOW]** for F2, move to **Line** and press **[ENTER]**. Move until the y-axis is flashing and press **[ENTER]** at some location on the axis to mark the y-intercept of the line. Move to the right and up and press **[ENTER]**. This marks the second point that defines the line.



7

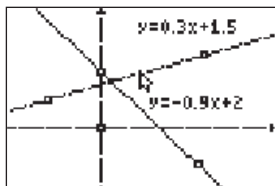
Draw another line using two more points, neither of which is the y-intercept of the new line. To do this press **[WINDOW]** for F2, move to **Line** and press **[ENTER]**. Move to a location in the second quadrant and press **[ENTER]**. Move to a location in the first quadrant and press **[ENTER]**. This marks the second point that defines the line.



4

Press **[GRAPH]** for the F5 menu, move to **Coord. & Eq.** and press **[ENTER]**. Move until the line is flashing and press **[ENTER]**. The equation of the line is displayed and can be moved to a convenient location. Press **[CLEAR]** to deactivate the *hand*. Press **[CLEAR]** again to turn off the **Coord. & Eq.** tool.

# Investigating Equations of Lines



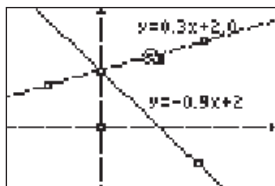
8

To find the equation of the new line, press **GRAPH** for the F5 menu, move to **Coord. & Eq.** and press **ENTER**. Move until the new line is flashing and press **ENTER**. The equation of the line is displayed and can be moved to a convenient location. Press **CLEAR** to deactivate the *hand*. Press **CLEAR** again to turn of the **Coord. & Eq.** tool.



10

To exit the APP, press **Y=** for the F1 menu. Move to **Quit**, then press **ENTER**. (Or you can press **2nd** **MODE** for [QUIT].)



9

Move until the new line is flashing and press **ALPHA**. Unlike the first line, this entire new line can be moved up or down keeping the same slope since the y-intercept was not one of the defining points.

You can also use the *hand* to move either of the points used to define the line. This will change the slope and the y-intercept.



## For TI-Navigator™ Users

Activity Center: Have students submit equations with certain characteristics (e.g. with a specific slope, parallel to a given line, with the same y-intercept as a given line). For help, see page 69.

# Exploring the Menus

## Cabri™ Jr. Basic 1

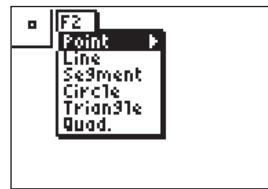
### ACTIVITY OVERVIEW:

#### In this activity we will practice

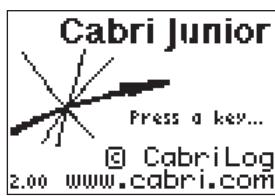
- Accessing the Cabri Jr. application
- Navigating the menus
- Exiting the APP



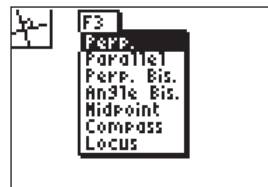
**1** \_\_\_\_\_  
Turn the calculator ON and press **[APPS]**.



**6** \_\_\_\_\_  
Press **[WINDOW]** to access the F2 menu. This menu is for basic constructions.



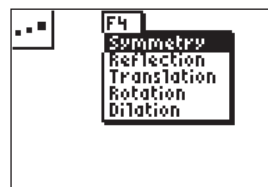
**2** \_\_\_\_\_  
Move down the list using **[↓]** until you find Cabri Jr. Press **[ENTER]** to select the application. (Or simply press the number to the left of Cabri Jr.)  
Press **[ENTER]**, or any key, to begin using the application.



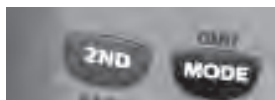
**7** \_\_\_\_\_  
Press **[ZOOM]** to access the F3 menu.



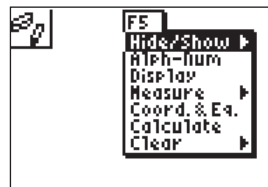
**3** \_\_\_\_\_  
Explore the F2 menu by pressing **[Y=]**. F1 is mainly for file management and Help.  
F2, F3, F4, and F5 are for construction tools and options.



**8** \_\_\_\_\_  
Press **[TRACE]** to access the F4 menu.



**4** \_\_\_\_\_  
To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd] [MODE]** for **[QUIT]**.)



**9** \_\_\_\_\_  
Press **[GRAPH]** to access the F5 menu.



**5** \_\_\_\_\_  
The keys on the top row of the calculator are called "soft keys" when using an APP. We will use practice using the keys **[Y=] [WINDOW] [ZOOM] [TRACE] [GRAPH]** to access menus in Cabri Jr.



**10** \_\_\_\_\_  
To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd] [MODE]** for **[QUIT]**.)

# Naming and Saving a File

## ACTIVITY OVERVIEW:

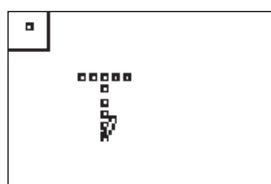
### In this activity we will

- Access the Cabri Jr. application
- Draw points from the F1 menu
- Name and save a file



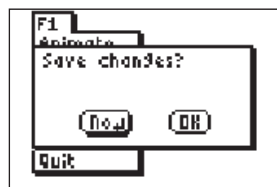
**1**

Turn the calculator ON and press [APPS]. Move down the list using  $\downarrow$  until you find Cabri Jr. Press [ENTER] to select the application. (Or simply press the number to the left of Cabri Jr.) Press [ENTER], or any key, to begin using the application.



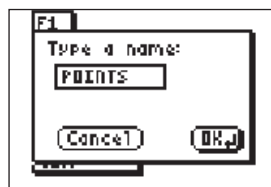
**4**

Use the arrow keys to move the pencil around the screen. Press [ENTER] each time you want to mark a point.



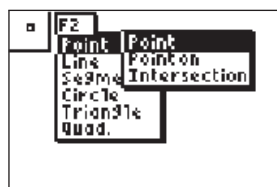
**2**

Press  $\overline{Y}$  for the F1 menu and select **New**. (If asked to **Save changes?** press  $\downarrow$  [ENTER] to choose "No.")



**5**

Press  $\overline{Y}$  for the F1 menu and move down to **Save** and press [ENTER]. Name the file POINTS by pressing the  $\overline{8}$   $\overline{7}$   $\overline{X}$ 2 [LOG]  $\overline{4}$  [LN]. (These are the keys with the *alpha* characters for the word POINTS.) Press [ENTER] to save the file.



**3**

Press [WINDOW] for the F2 menu. When you are on **Point** in the menu, move right to **Point**, then press [ENTER].



**6**

To exit the APP, press  $\overline{Y}$  for the F1 menu. Move to **Quit**, then press [ENTER]. (Or you can press  $\overline{2nd}$  [MODE] for [QUIT].)

# Opening and Editing a File

## Cabri™ Jr. Basic 3

### ACTIVITY OVERVIEW:

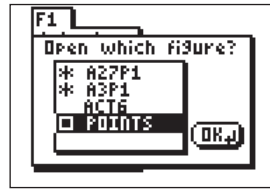
#### In this activity we will

- Access the Cabri Jr. application
- Open the file called **POINTS**
- Edit and save the file



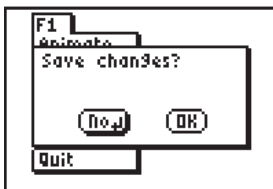
1

Turn the calculator ON and press [APPS]. Move down the list using  $\downarrow$  until you find Cabri Jr. Press [ENTER] to select the application. (Or simply press the number to the left of Cabri Jr.) Press [ENTER], or any key, to begin using the application.



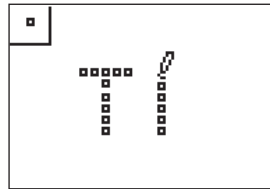
4

Move to the file **POINTS** and press [ENTER].



2

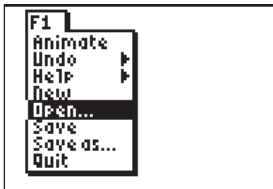
Press  $\downarrow$  for the F1 menu and select **New**. (If asked to **Save changes?** press  $\leftarrow$  [ENTER] to choose "No.")



5

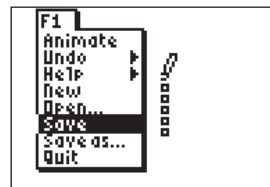
When the file opens, press [WINDOW] for the F2 menu. When you are on **Point** in the menu, move right to **Point**, then press [ENTER].

Use the arrow keys to move the pencil around the screen. Press [ENTER] each time you want to mark a point.



3

Press  $\downarrow$  for the F1 menu, move to **Open**, then press [ENTER].



6

Press  $\downarrow$  for the F1 menu, move to **Save** and press [ENTER]. The file has been edited and saved with the same name.



7

To exit the APP, press  $\downarrow$  for the F1 menu. Move to **Quit**, then press [ENTER]. (Or you can press [2nd] [MODE] for [QUIT].)

## ACTIVITY OVERVIEW:

### In this activity we will

- Access the Cabri Jr. application
- Draw a point and a line segment
- Practice moving the figures



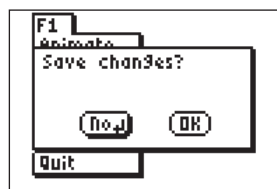
1

Turn the calculator ON and press **[APPS]**.



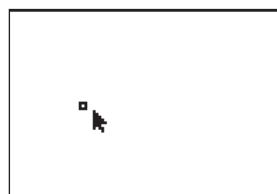
2

Move down the list using **[↓]** until you find Cabri Jr. Press **[ENTER]** to select the application. (Or simply press the number to the left of Cabri Jr.) Press **[ENTER]**, or any key, to begin using the application.



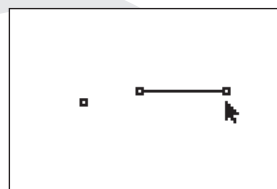
3

Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose "No.")



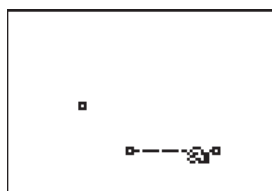
4

Press **[WINDOW]** for the F2 menu. When you are on **Point** in the menu, move right to **Point**, then press **[ENTER]**. Move around the screen and press **[ENTER]** to mark a point.



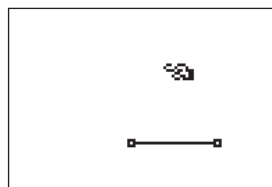
5

Press **[WINDOW]** for the F2 menu, move to **Segment** then press **[ENTER]**. Move the pencil to the location of one endpoint of the segment and press **[ENTER]**. Move to the location of the other endpoint and press **[ENTER]**. Press **[CLEAR]** to exit the segment drawing tool.



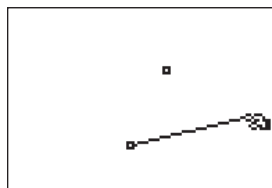
6

Move the arrow until the segment is flashing and press **[ALPHA]**. The *hand* will appear and you can move the segment to a new location. Press **[ALPHA]** or **[CLEAR]** to turn off the *hand* and leave the segment in the new location.



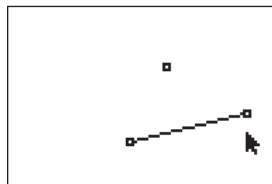
7

Move the arrow until the point is flashing and press **[ALPHA]**. The *hand* will appear and you can move the point to a new location. Press **[ALPHA]** or **[CLEAR]** to turn off the *hand* and leave the point in the new location.



8

Move the arrow until one endpoint of the segment is flashing and press **[ALPHA]** to grab this point with the *hand*. You can change the position of this endpoint. (You are moving the point rather than the segment.)



9

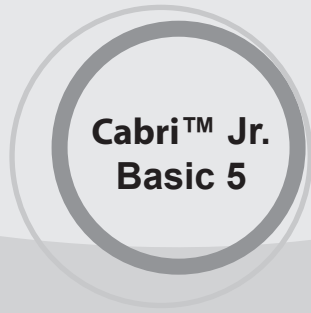
Press **[ALPHA]** or **[CLEAR]** or **[ENTER]** to turn off the *hand*.



10

To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd]** **[MODE]** for **[QUIT]**.)

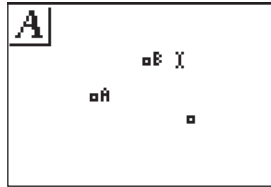
# Labeling Points



## ACTIVITY OVERVIEW:

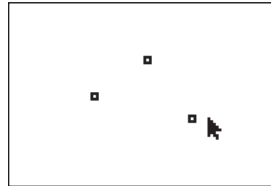
### In this activity we will

- Access the Cabri Jr. application
- Draw some points
- Label each point



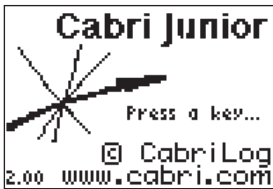
### 1

Turn the calculator ON and press **[APPS]**.



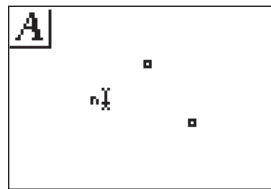
### 6

Press **[CLEAR]** to exit the point drawing tool.



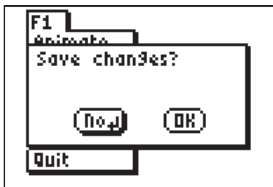
### 2

Move down the list using **[↓]** until you find Cabri Jr. Press **[ENTER]** to select the application. (Or simply press the number to the left of Cabri Jr.) Press **[ENTER]**, or any key, to begin using the application.



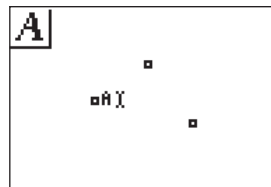
### 7

Press **[GRAPH]** for the F5 menu and move down to **Alpha-Num** and press **[ENTER]**. Move the text cursor to one of the points.



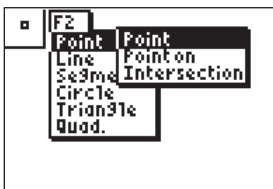
### 3

Press **[Y=]** for the F1 menu and select **New**. (If asked to **Save changes?** press **[↓]** **[ENTER]** to choose "No.")



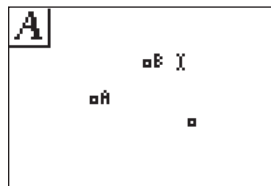
### 8

When the text cursor is near one of the points and the point is blinking, press **[ENTER]** **[MATH]** **[ENTER]** to label Point A. (You selected **[MATH]** because the alpha character associated with that key is the letter "A.")



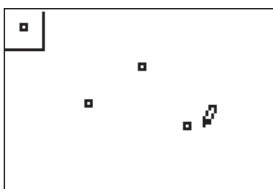
### 4

Press **[WINDOW]** for the F2 menu. When you are on **Point** in the menu, move right to **Point**, then press **[ENTER]**.



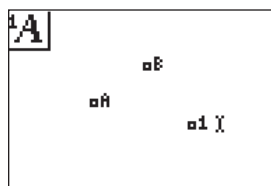
### 9

Move the cursor to another point and when the point is blinking, press **[ENTER]** **[APPS]** **[ENTER]** to label point B. (You selected **[APPS]** because the alpha character associated with that key is the letter "B.")



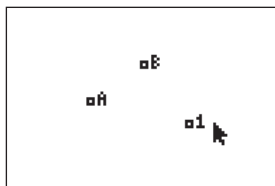
### 5

Move around the screen using the arrow keys and press **[ENTER]** to mark a point when the pencil is at the desired location. Make two more points by moving around the screen and pressing **[ENTER]** at the desired location of each point.



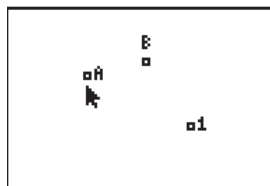
### 10

To label a figure with a number rather than a letter, press **[ALPHA]**. Move to the third point and when the point is blinking, press **[ENTER]** **[1]** **[ENTER]** to label point 1.



**11**

Press **[CLEAR]** to exit the labeling tool.



**13**

To move a point and its label, move the arrow until the point is flashing and press **[ALPHA]** to engage the *hand*. As you move around the screen, the point and label will move together.

Press **[ALPHA]** or **[ENTER]** or **[CLEAR]** when you reach the desired location and the *hand* will disappear.



**12**

You can change the location of a label.

To move the label "B", move the arrow until the underlined portion of B is flashing. Press **[ALPHA]** to engage the *hand* and move the label to the new location. Press **[ALPHA]** or **[ENTER]** or **[CLEAR]** when the label is in the desired location and the *hand* will disappear.



**14**

To exit the APP, press **[Y=]** for the F1 menu. Move to **Quit**, then press **[ENTER]**. (Or you can press **[2nd] [MODE]** for **[QUIT]**.)

# Using Screen Capture

## TI-Navigator Tips

### USING SCREEN CAPTURE

#### Overview

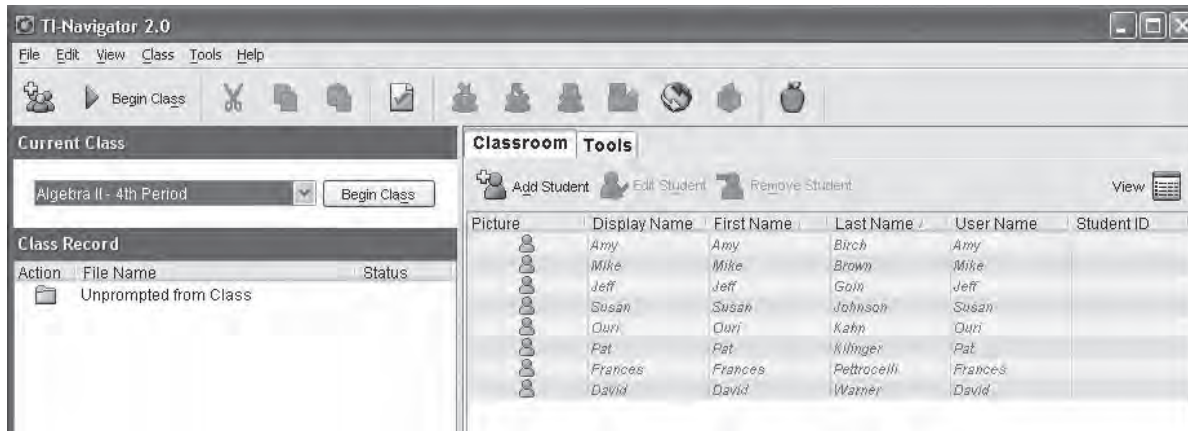
This tour details the use of Screen Capture in the TI-Navigator™ software and covers the following areas

1. Capturing screens from entire class
2. Refreshing screens
3. Capturing screens from one or more students

#### 1. Launch the TI-Navigator Software

Click **Start > Programs > TI Tools > TI-Navigator > TI-Navigator**.

The TI-Navigator computer home screen opens.



#### 2. Start a Class

Assure that your TI-Navigator™ network hardware is connected and powered and calculators containing the necessary apps are connected.

Choose a Class to begin in the **Current Class** selector and click **Begin Class**.



# Using Screen Capture

## TI-Navigator Tips

### 3. Open the Tools Tab and launch the Screen Capture tool

- A. Click the **Tools** tab near the upper middle of the home screen.
- B. Click the **Screen Capture** icon.



### 4. Select Students

- A. Default setting will be to collect screens from the entire class; however you can also select to collect specific students' screens.

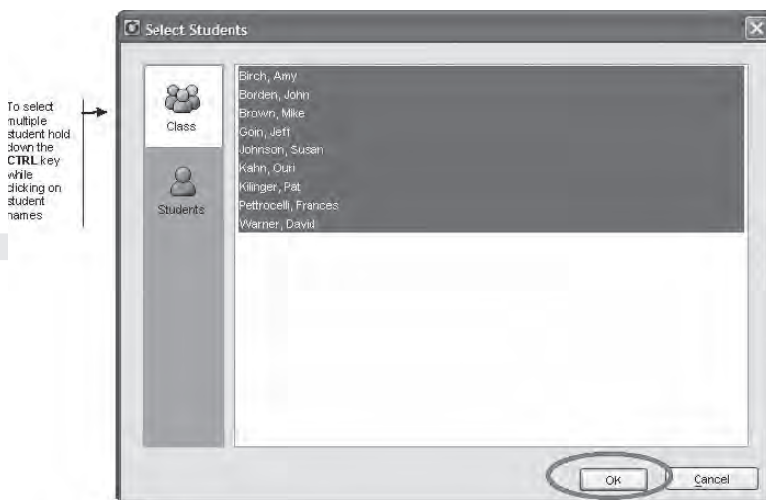
- To select the entire class click on the **Class** icon



- To select specific students click on the **Student** icon



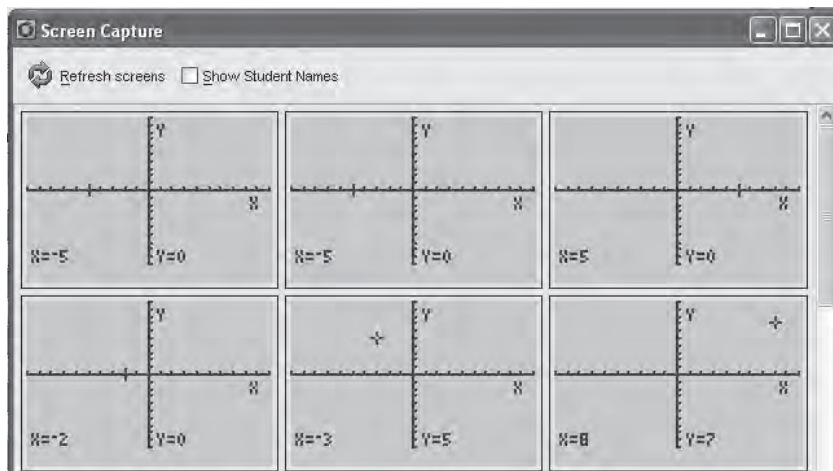
- B. Click the **OK** button.



# Using Screen Capture

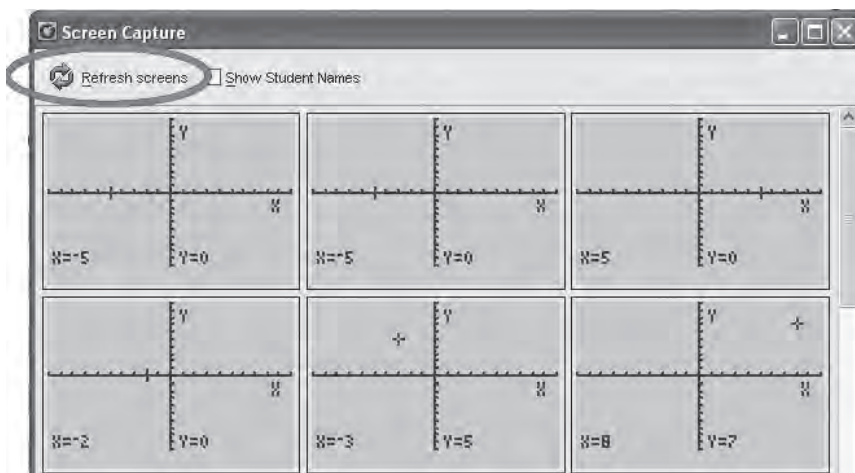
## TI-Navigator Tips

C. The **Screen Capture** window opens and student screens are collected.



## 5. Refresh Student Screens

Click on the **Refresh** to capture a fresh set of student screens.



### USING QUICK POLL

#### Overview

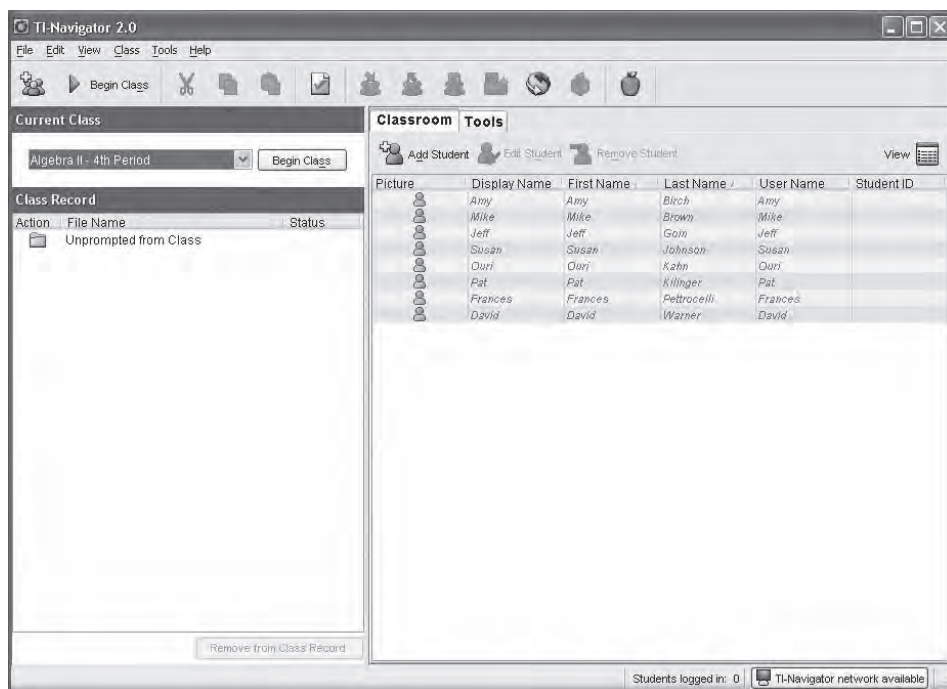
This tour details the use of Quick Poll in the TI-Navigator™ system and covers the following areas

1. Sending Quick Poll to students
2. Viewing poll summary
3. Showing student names
4. Sending poll results to students

#### 1. Launch the TI-Navigator Software

Click **Start > Programs > TI Tools > TI-Navigator > TI-Navigator**.

The TI-Navigator computer home screen opens.



#### 2. Start a Class

Assure that your TI-Navigator™ network hardware is connected and powered and calculators containing the necessary apps are connected.

Choose a Class to begin in the **Current Class** selector and click **Begin Class**.



# Using Quick Poll

## TI-Navigator Tips

### 3. Open the Tools Tab and launch the Quick Poll tool

A. Click the **Tools** tab near the upper middle of the home screen.



B. Click the **Quick Poll** icon.

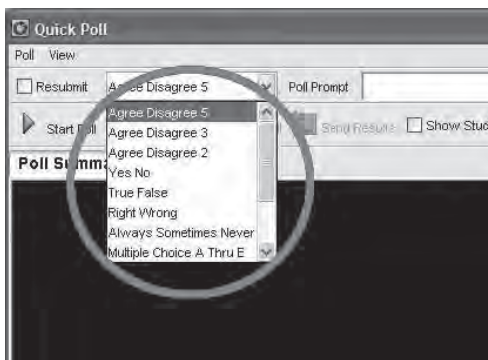
The **Quick Poll** window opens.

### 4. Select Type of Poll

A. There is a variety of polling question types you can send, including:

- Agree/Disagree
- Yes/No
- True/False
- Right/Wrong
- Always/Sometimes/Never
- Multiple Choice
- Open Response

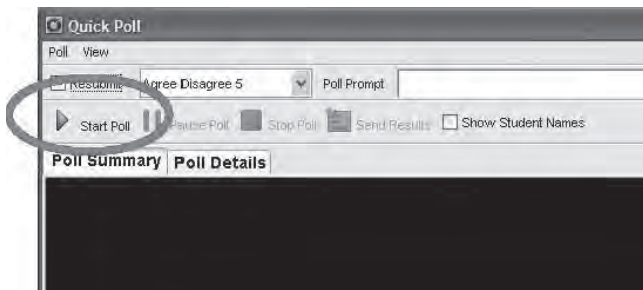
B. Select the **type of poll** to send to class from the Drop-down list.



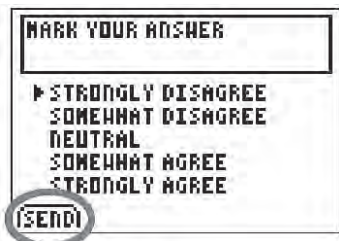
## TI-Navigator Tips

### 5. Start Poll

- A. Click on the **Start Poll** button.



The poll opens on students calculators.



- B. Students submit their answers by pressing **Send**.

### 6. View Student Responses

- A. To view poll results graphically click the **Poll Summary** Tab.

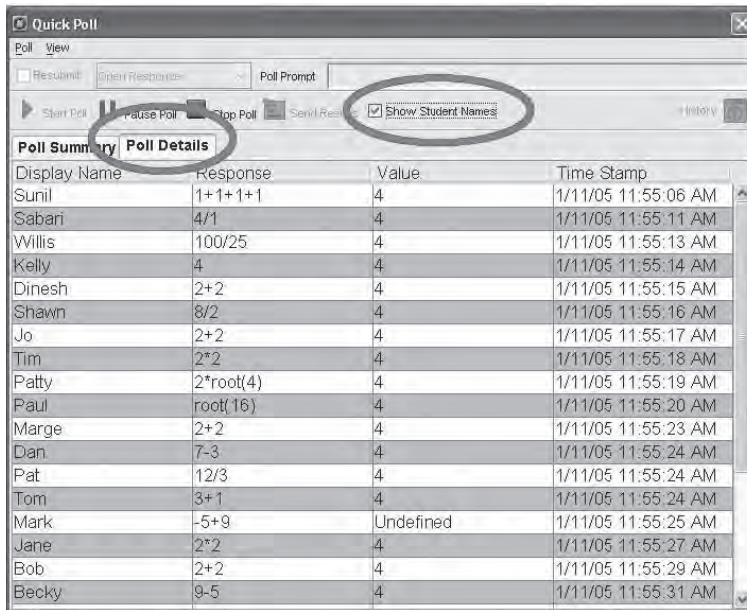


# Using Quick Poll

## TI-Navigator Tips

B. To view poll results in a table click the **Poll Details** Tab.

To view show student Display Names click the **Show Student Names** check box



Display Name	Response	Value	Time Stamp
Sunil	1+1+1+1	4	1/11/05 11:55:06 AM
Sabari	4/1	4	1/11/05 11:55:11 AM
Willis	100/25	4	1/11/05 11:55:13 AM
Kelly	4	4	1/11/05 11:55:14 AM
Dinesh	2+2	4	1/11/05 11:55:15 AM
Shawn	8/2	4	1/11/05 11:55:16 AM
Jo	2+2	4	1/11/05 11:55:17 AM
Tim	2*2	4	1/11/05 11:55:18 AM
Patty	2*root(4)	4	1/11/05 11:55:19 AM
Paul	root(16)	4	1/11/05 11:55:20 AM
Marge	2+2	4	1/11/05 11:55:23 AM
Dan	7-3	4	1/11/05 11:55:24 AM
Pat	12/3	4	1/11/05 11:55:24 AM
Tom	3+1	4	1/11/05 11:55:24 AM
Mark	-5+9	Undefined	1/11/05 11:55:25 AM
Jane	2*2	4	1/11/05 11:55:27 AM
Bob	2+2	4	1/11/05 11:55:29 AM
Becky	9-5	4	1/11/05 11:55:31 AM

## 7. Other Poll Options

A. To allow students to change their selection, click the **Resubmit** check box.

Note: **Resubmit** must be selected before starting the poll.



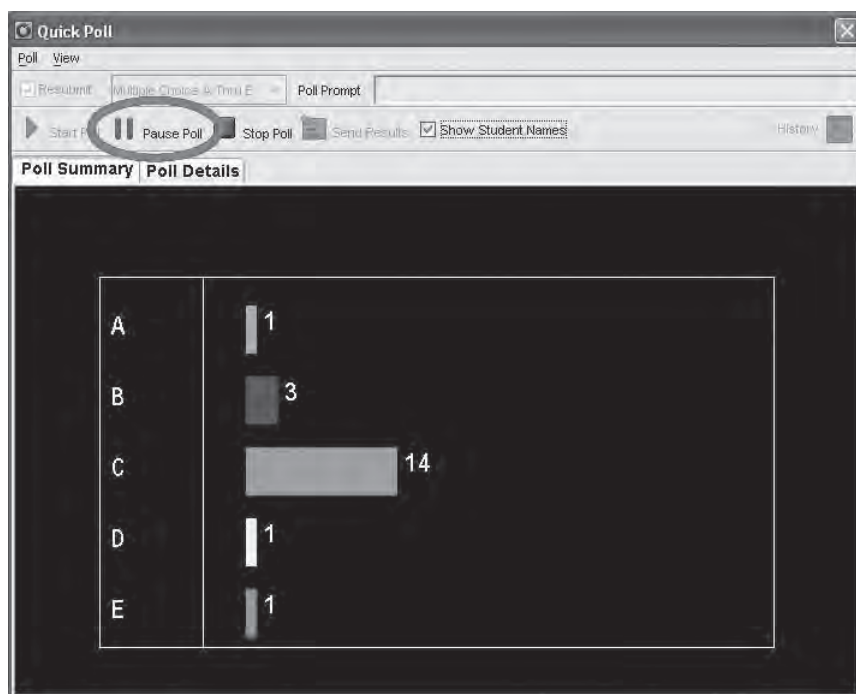
B. To send poll results to students click the **Send Results** button.

The results will be sent to each student's calculator.

# Using Quick Poll

## TI-Navigator Tips

- C. If you want to temporarily keep students from responding to a poll, click the **Pause Poll** button.



# Contributing Points in Activity Center

## TI-Navigator Tips

### CONTRIBUTING POINTS IN ACTIVITY CENTER

#### Overview

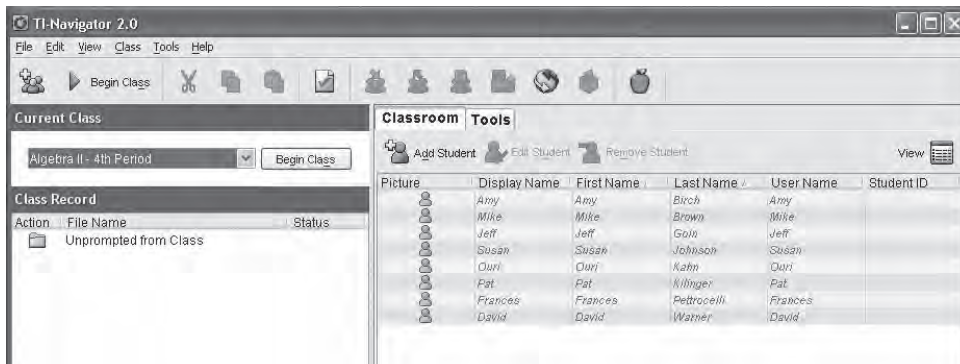
This tour details the use of Points in Activity Center and covers the following areas

1. Selecting Contributing Points for Student Input
2. Configuration Options for Contributing Points
3. Starting Activity
4. Changing Appearance of Student Cursors

#### 1. Launch the TI-Navigator™ Software

Click **Start > Programs > TI Tools > TI-Navigator > TI-Navigator**.

The TI-Navigator computer home screen opens.



#### 2. Start a Class

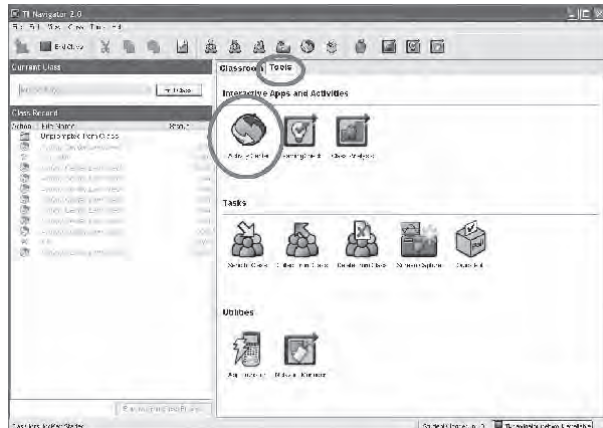
Assure that your TI-Navigator™ network hardware is connected and powered and calculators containing the necessary apps are connected.



Choose a Class to begin in the **Current Class** selector and click **Begin Class**.

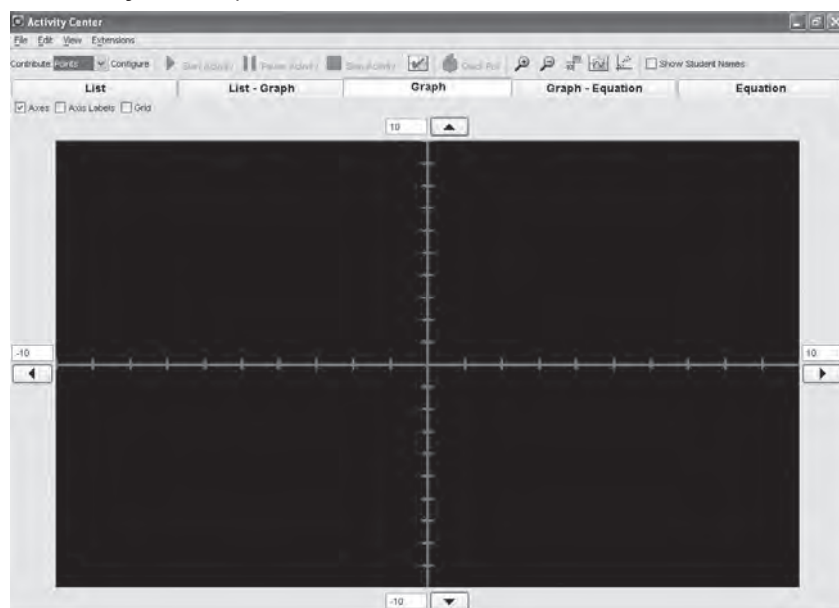
#### 3. Open the Tools Tab and launch the Activity Center

A. Click the **Tools** tab near the upper middle of the home screen.



B. Click the **Activity Center** icon.

The **Activity Center** opens.



#### 4. Select Type of Input for Student

Select **Points** from the Drop-down list.



#### 5. Define Configuration settings for Contribute Point Activity

A. Click on the **Configure** button.



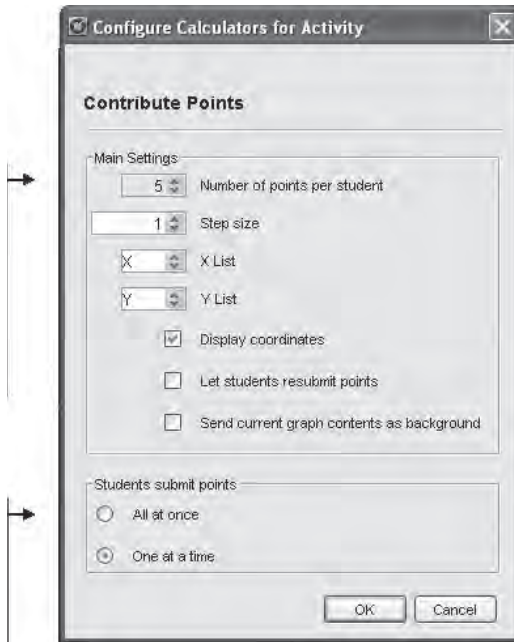
# Contributing Points in Activity Center

## TI-Navigator Tips

- B. Select Configuration for Point Activity.

With the **Main Settings** you can select how many points for your student to drop, the step size the student's cursor will move, and the lists that the X and Y coordinates will be stored in

If you select that students will submit points all at once, their cursors will not appear on the screen until they submit all of the points.



- C. Click **Start Activity** to allow students to enter the **Activity Center** and begin contributing their data.



## 6. Have students login, enter the Activity Center and contribute data.

- A. Students login and chose **ACTIVITY CENTER** from the **TI-NAVIGATOR HOME** screen.

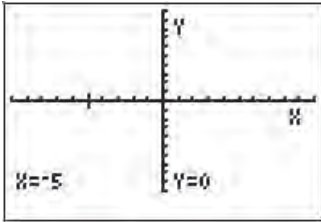


Note: If you have not started the Activity, students will see the following screen.

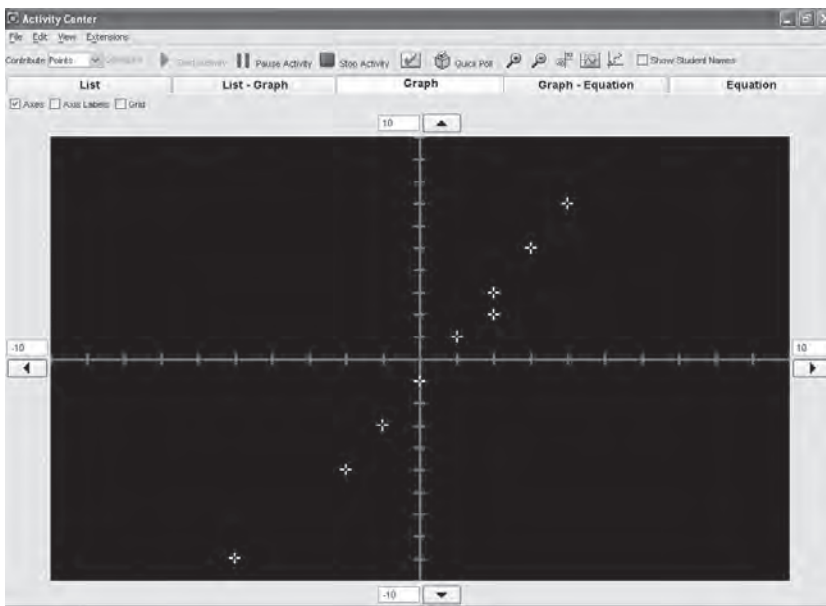


The **Activity Center** will open.

B. The student will be able to move their cursor point around the screen.

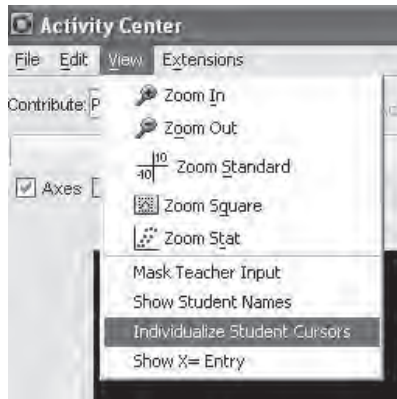


C. Students data will appear on the teacher computer.



## 7. Select unique cursors for each student

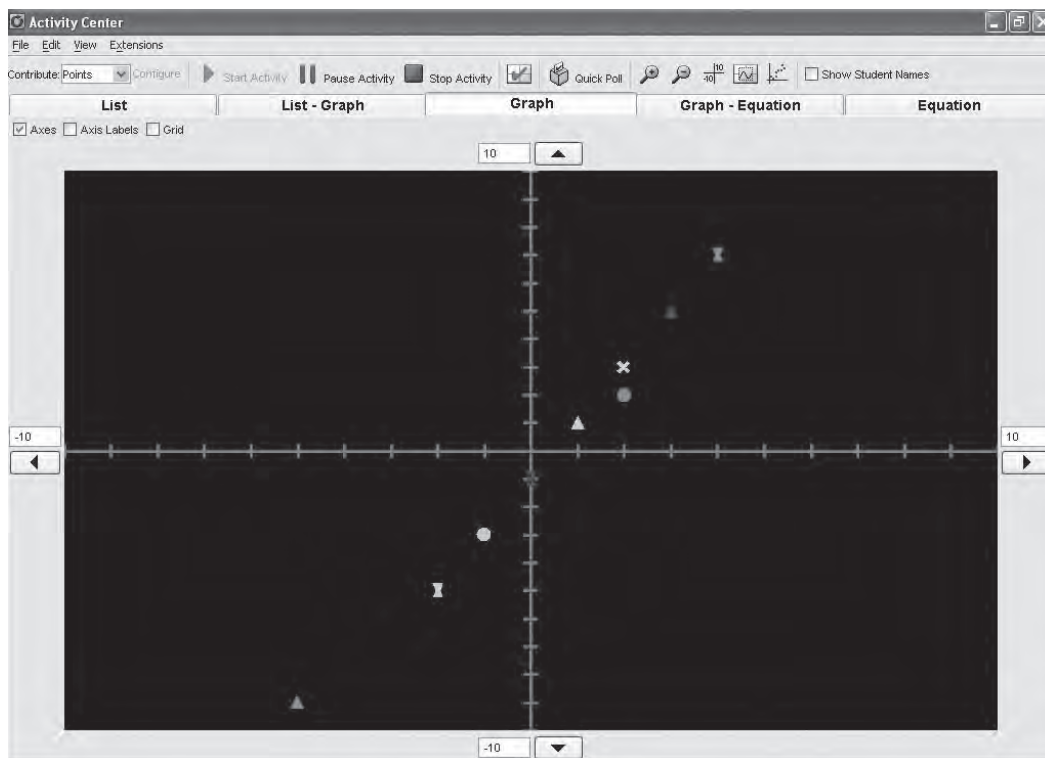
Click **View** → **Individualize Student Cursors**.



# Contributing Points in Activity Center

## TI-Navigator Tips

Student cursors will change to unique colors and shapes.



## CONTRIBUTING EQUATIONS IN ACTIVITY CENTER

### Overview

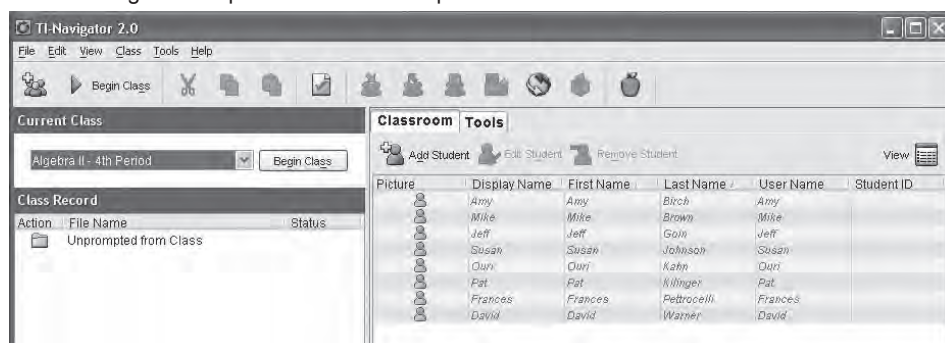
This tour details the use of Equations in Activity Center, including:

1. Selecting Contributing Equations for Student Input
2. Configuration Options for Contributing Equations
3. Starting Equation Activity
4. Viewing Equation data

### 1. Launch the TI-Navigator™ Software

Click **Start > Programs > TI Tools > TI-Navigator > TI-Navigator**.

The TI-Navigator computer home screen opens.



### 2. Start a Class

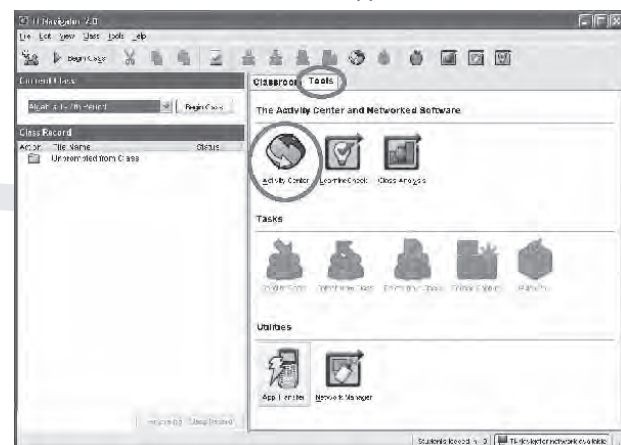
Assure that your TI-Navigator™ network hardware is connected and powered and calculators containing the necessary apps are connected.

Choose a Class to begin in the **Current Class** selector and click **Begin Class**.



### 3. Open the Tools Tab and launch the Activity Center

A. Click the **Tools** tab near the upper middle of the home screen.

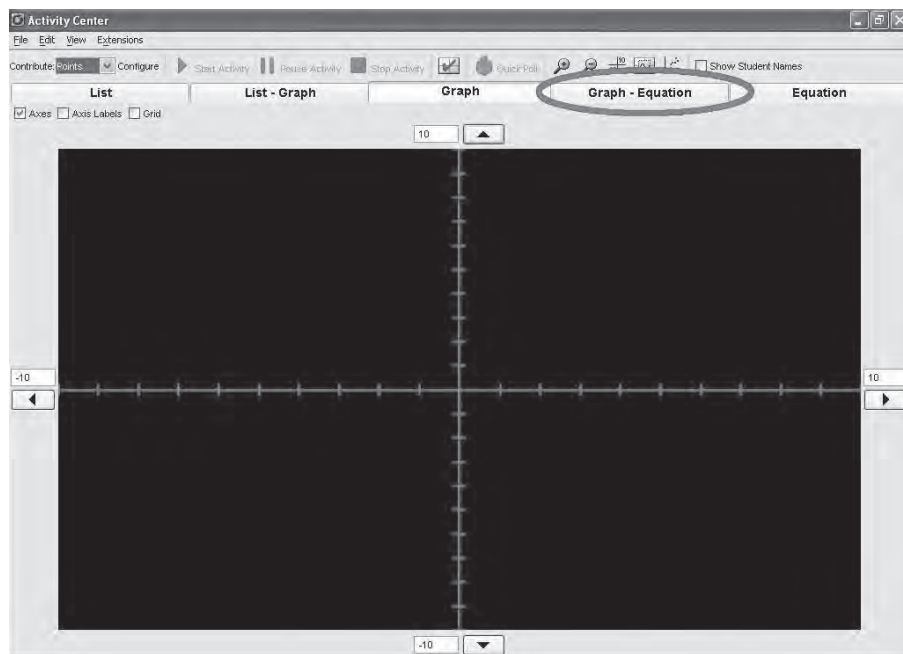


B. Click the **Activity Center** icon.

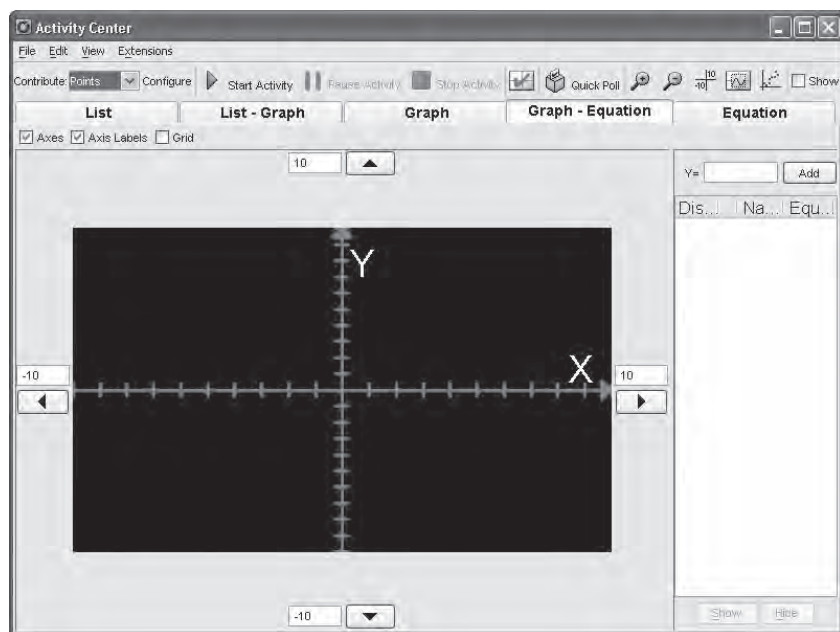
# Contributing Equations in Activity Center

TI-Navigator  
Tips

The Activity Center opens.



C. Click the **Graph-Equation** Tab.  
The **Graph-Equation** view will open.



## 4. Configure and start the Contribute Equations Activity

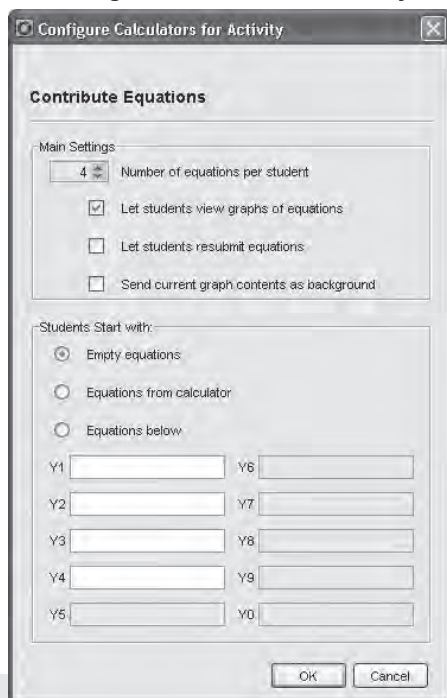
A. Click **Equations** from the **Contribute** selector.



B. Click the **Configure** button.



The **Configure Calculators for Activity** dialog box will open.



Click **OK**.

C. Click **Start Activity** to allow students to enter the **Activity Center** and begin contributing their data.



# Contributing Equations in Activity Center

## TI-Navigator Tips

### 5. Have students login, enter the Activity Center and contribute data

- A. Students login and chose **ACTIVITY CENTER** from the **TI-NAVIGATOR HOME** screen.



Note: If you have not started the Activity, students will see the following screen.

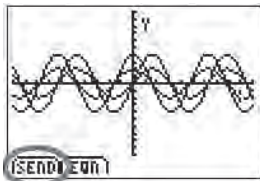


The **Activity Center** will open.

- B. Students enter equations.



- C. Because **Let students view graphs of equations** was enabled, students may choose to **Plot** ( $\pi$ ) their data on their calculators.



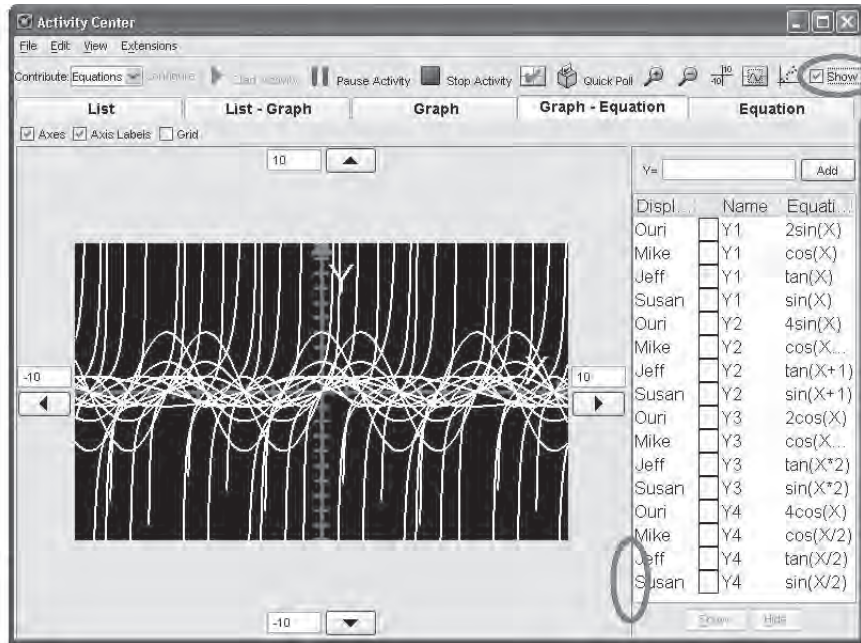
# Contributing Equations in Activity Center

D. Students **Send** (o) their data to the Activity Center on the teacher computer.

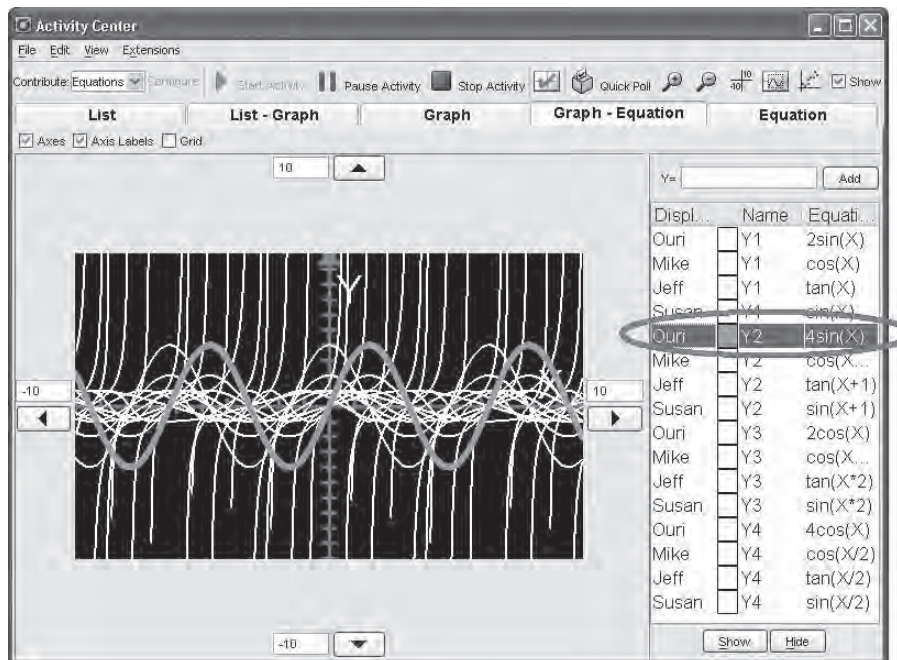
The data appear in the **Graph-Equation** view.

Click the **Show Student Names** option to display student names beside the equations they have contributed.

Click and drag the frame between the **Graph** screen and **Equation Gallery** to enlarge the viewable area for equations.



E. Click on any one equation to highlight it in the **Graph** screen.



# Sending Files

## TI-Navigator Tips

### SENDING FILES

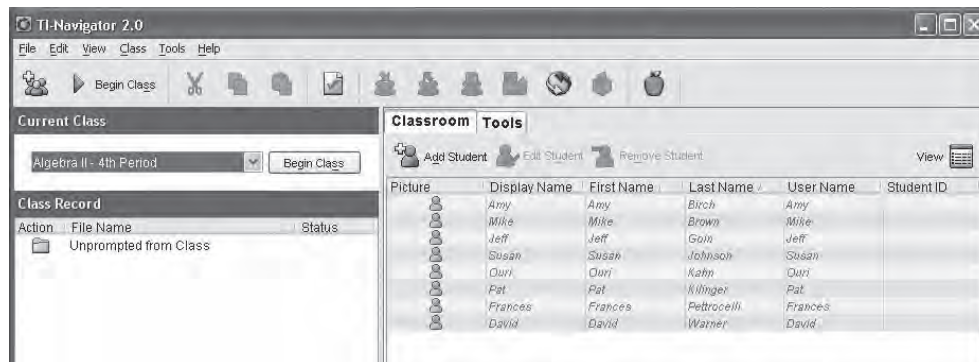
#### Overview

This tour details starting a class, sending a file to all students and viewing the transfer action in the Class Record.

#### 1. Launch the TI-Navigator™ Software

Click **Start > Programs > TI Tools > TI-Navigator > TI-Navigator**.

The TI-Navigator computer home screen opens.



#### 2. Start a Class

Assure that your TI-Navigator™ network hardware is connected and powered and calculators containing the necessary apps are connected. Choose a Class to begin in the **Current Class** selector and click **Begin Class**.



#### 3. Queue a file to be sent

Click **Tools > Send to Class**.

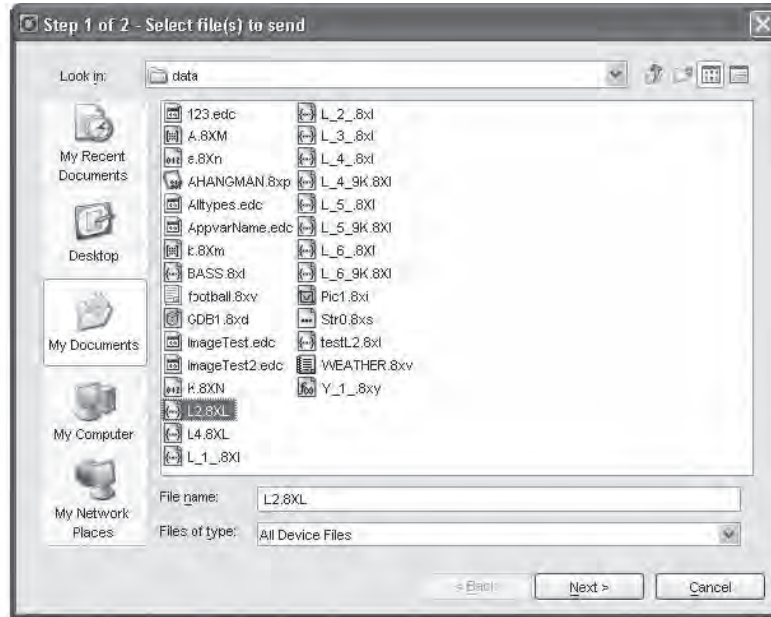


The first Send dialog box (Step 1) will open.

# Sending Files

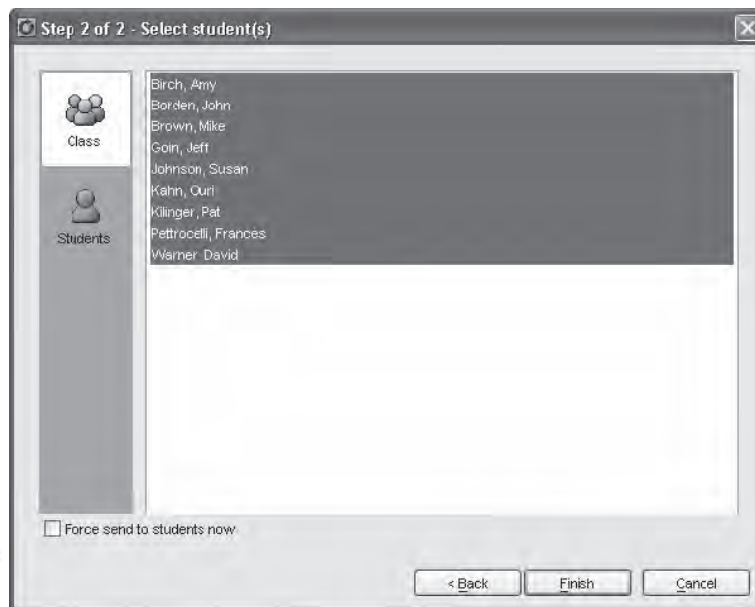
## TI-Navigator Tips

You can hold the  
Shift or Ctrl key to  
select multiple files.



Browse to a valid device file, select it and click **Next**.  
The final Send dialog box (Step 2) will open.

Choose Force  
Send to have  
student's  
automatically  
begin receiving  
the file on  
their devices  
immediately.



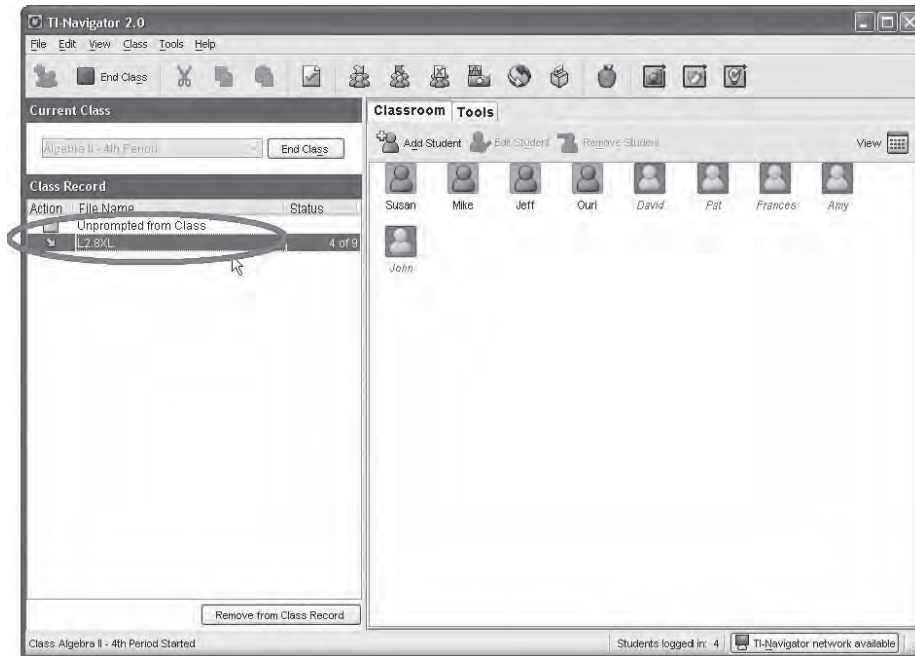
Choose one or more student(s) to receive the file.  
Click **Finish**.

# Sending Files

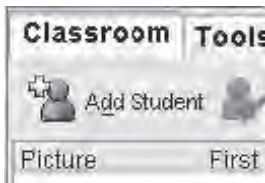
## TI-Navigator Tips

### 4. Select the Send Action in the Class Record

Click the Send Action that you just created in the Class Record.



If it is not already selected, click the **Classroom Tab**.



If it is not already selected, choose **Seating Chart** in the **Classroom View** selector.



A Seating Chart view of your class will open.

Notice that the students' icons to whom have received the file are highlighted in green. Those to whom the file was sent but have not yet received it have red-highlighted icons. If the file was not sent to a student, their icon will not be highlighted (not shown in this example).