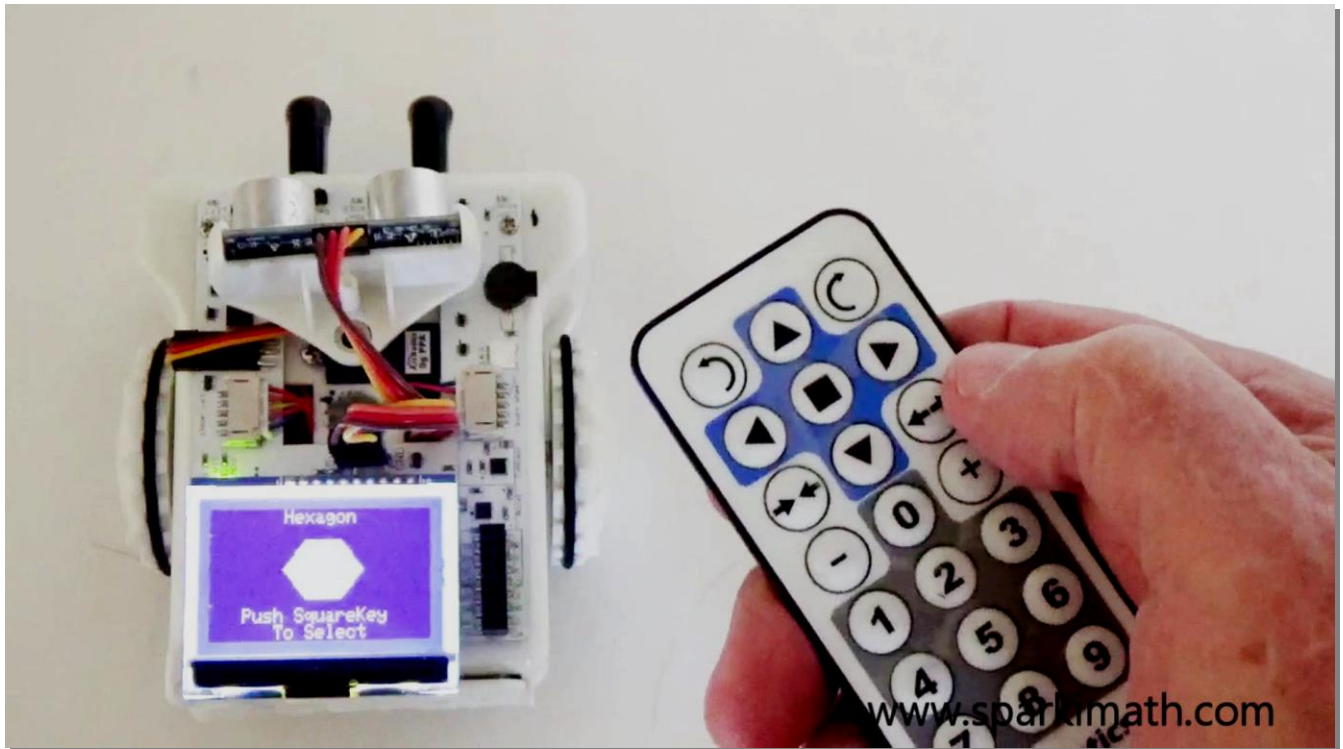


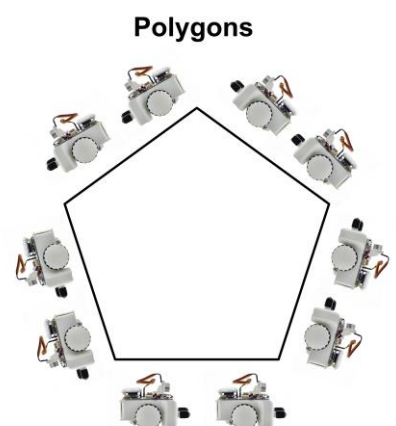
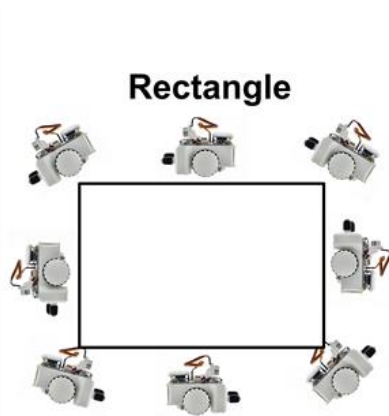
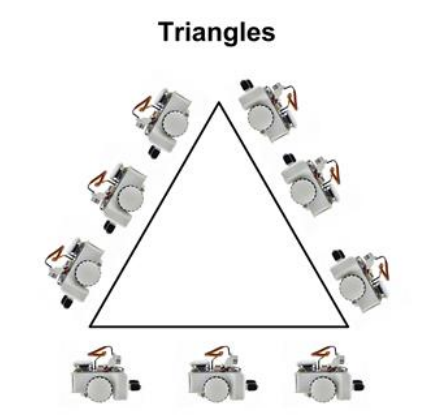
# SparkiMath Teacher's Guide

[www.sparkimath.com](http://www.sparkimath.com)

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## No Programming Required!



## Introduction

**SparkiMath1** teaches young students about basic shapes like triangles, squares, rectangles, pentagons, hexagons and octagons. It uses the Sparki robot from ArcBotics as the platform to accomplish this goal plus the remote keypad and felt marker pen that comes with it. Nothing else is required except four (4) AA batteries.

## Two Modes

**SparkiMath1** has two modes:

- **Sparki Mode**
- **SparkiMath1 Mode**

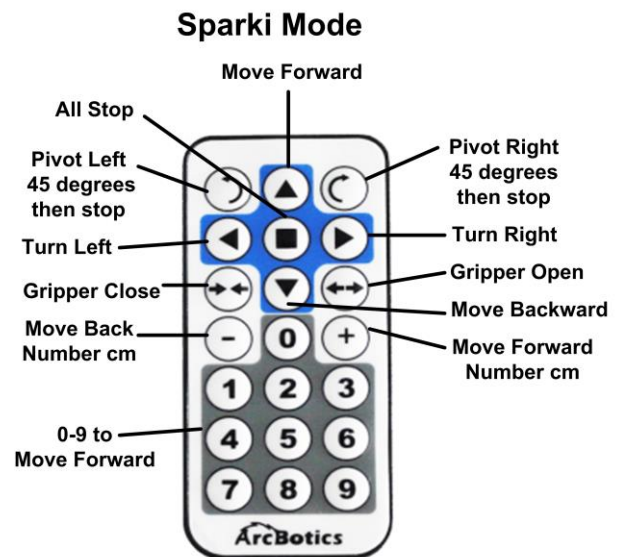
## Sparki Mode

At power on Sparki is in **Sparki Mode** and the Sparki logo is present on the screen at all times.

The keypad at the right shows the functions of the various keys in Sparki Mode.

Pushing the Square Key four (4) times in succession switches to **SparkiMath1 Mode** where you can do exercises in shapes like triangles, rectangles, pentagons, hexagons and octagons.

**Pushing the reset button or turning Sparki Off and On is the only way to get back to Sparki Mode again.**



**DO NOT  
REPROGRAM SPARKI OR ELSE THE SPARKIMATH1  
PROGRAM WILL BE DESTROYED**

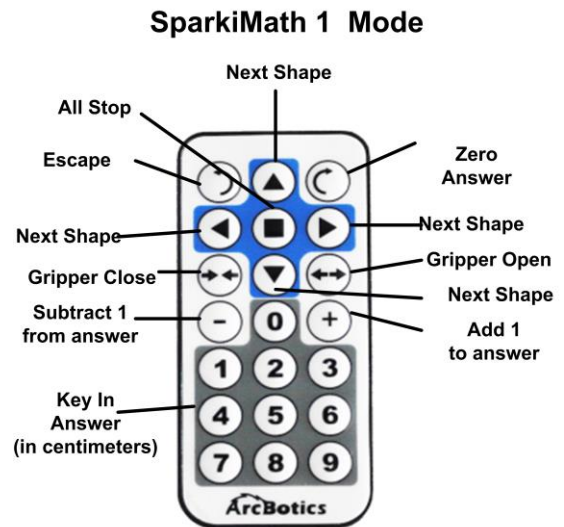
## SparkiMath1 Mode

Pushing the Square Key four (4) times in succession switches from **Sparki Mode** to **SparkiMath1 Mode**. Each time the Square Key is pushed the LED becomes a brighter blue color. Pushing any other key will extinguish the LED and we'll stay in **Sparki Mode**.

You'll know when you switch to **SparkiMath1 Mode** because Sparki claps his grippers and then shakes his head "NO" (the servo moves from left to right and the LED flashes red).

Now look at the screen where you're presented with five (5) shape problems:

- Triangle 3 sides student selected angles
- Rectangle 4 sides 90 degree angles
- Pentagon 5 sides 108 degree angles
- Hexagon 6 sides 120 degree angles
- Octagon 8 sides 135 degree angles



### Primary Key Functions in SparkiMath1 Mode

- Use the up/ down or left/right arrow keys to switch among the shape problems.
- Then select the shape problem by pushing the Square Key.
- The 0 to 9 keys as well as the plus (+) and minus (-) keys are necessary to key in values for the shapes as well as to answer the questions.
- Push the Square Key to Enter the value or answer.
- The right "loop" key can be used to clear the answer (to zero)
- The left "loop" key can be used to Escape to the Shape Mode menu once a question is asked (Sparki MUST NOT be moving for this to work).
- The Gripper Keys also work independently of the problems...but only when Sparki is not moving.
- The blue LED will flash with each key push.
- Four continuous Square Key pushes will get back to the Shape Mode Menu. The blue LED will get brighter for each push.

Note 1: The left loop (ESC) key will not work in cases where Sparki is moving. If all is lost, push the reset button under the LED screen to start over.

Note 2: Sparki always moves to the left (CCW).

Note 3: All values are in centimeters for length or degrees for angles.

Right Answers – Sparki's grippers will "clap" three times and the green LED will flash.

Wrong Answers – Sparki's servo will "shake his head NO" and the red LED will flash.

## Triangles

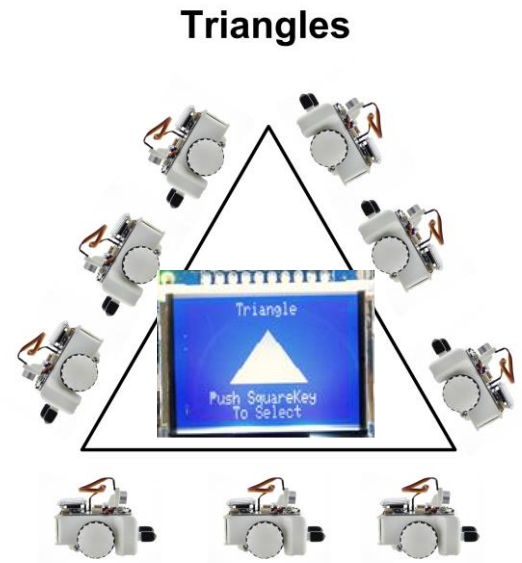
There are four (4) fundamental triangle types:

- Equilateral (all sides and angles are the same)
- Isosceles (2 sides and 2 angles are the same)
- Right (one 90-degree angle)
- Scalene (all sides and angles are different)

SparkiMath1 can solve any of the above triangles.

### Operation

1. To get into **SparkiMath1 Mode** push the Square Key four (4) times in succession.
2. The Triangle symbol should appear.
3. Push the Square Key once to select it.
4. "Enter 1<sup>st</sup> side" by keying in a side length in centimeters. For best results use 10 to 30 or else Sparki will need a lot of room to move.



If you make a mistake push the right-loop key. This will set the answer back to zero. You can also push the plus or minus keys to adjust your answer accordingly.

5. Push the Square Key to Enter this value.
6. "Enter 2<sup>nd</sup> side" by keying in another side length in centimeters. It can be the same length or something else depending on the type of triangle you want to draw.
7. Push the Square key to Enter this value.
8. "Enter 1<sup>st</sup> angle" by keying in the angle between side1 and side2. This should be between 10 and 170 degrees for best results.
9. Push the Square key to Enter this angle.
10. Sparki will immediately begin to draw the complete triangle.
11. When the triangle is complete, Sparki will stop and ask the first question.
12. Key in your answer and push the Square Key.
13. If you're right, Sparki will "clap his hands", but if you're wrong, Sparki will "shake his head NO". Then he will go on to draw the bottom side and first angle.
14. After the first side and angle are drawn, Sparki will ask the second question. After your answer the second side and angle are drawn.
15. Finally, Sparki will ask the last question; then we're back to the Triangle Mode.
16. You can push the Square Key again to do another Triangle problem or push any of the arrow keys to select another shape.

## Rectangles

Sparki can draw a rectangle or a square; it all depends on the length of the sides you key in.

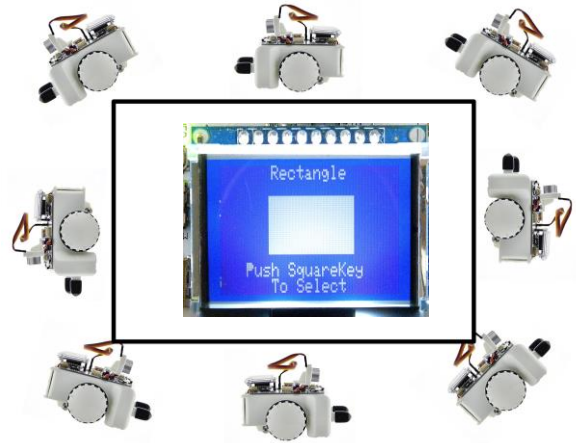
### Operation

1. To get into **SparkiMath1 Mode** push the Square Key four (4) times in succession.
2. Push the arrow keys (up, down, left or right) until the Rectangle screen appears.
3. Push the Square Key once to begin.
4. "Enter 1<sup>st</sup> side" by keying in a side length in centimeters. For best results use 10 to 30 or else Sparki will need a lot of room to move.

If you make a mistake push the right-loop key. This will set the answer back to zero. You can also push the plus or minus keys to adjust your answer accordingly.

5. Push the Square Key to Enter this value.
6. "Enter 2<sup>nd</sup> side" by keying in another side length in centimeters. It can be the same length if you want a square or another value depending on the type of rectangle you want to draw.
7. Push the Square key to Enter this value.
8. Spark will immediately begin to draw the complete rectangle or square. Each angle will be 90 degrees.
9. When the rectangle or square is complete, Sparki will stop and ask the first question.
10. Key in your answer and push the Square Key.
11. If you're right, Sparki will "clap his hands", but if you're wrong, Sparki will "shake his head NO". Then he will go on to draw the bottom side and a 90-degree angle.
12. After the first side and angle are drawn, Sparki will ask the second question.
13. This question / answer sequence repeats for all remaining sides.
14. Then we're back to the Rectangle Mode.
15. You can push the Square Key again to do another Rectangle problem or push any of the arrow keys to select another shape.

## Rectangle





## Pentagons, Hexagons and Octagons

The rest of the angular modes act the same. The only difference is the number of sides and their internal angles.

Pentagon 5 sides, 108 degrees

Hexagon 6 sides, 120 degrees

Octagon 8 sides, 135 degrees

### Operation

1. To get into **SparkiMath1 Mode** push the Square Key four (4) times in succession.
2. Push the arrow keys until the Pentagon, Hexagon or Octagon screen appears.
3. Push the Square Key once
4. "Enter 1<sup>st</sup> side" by keying in a side length in centimeters. For best results use 10 to 30 or else Sparki will need a lot of room to move.

If you make a mistake push the right-loop key. This will set the answer back to zero. You can also push the plus or minus keys to adjust your answer accordingly.

5. Push the Square Key to Enter this value. All you need is one side since the angles are predefined for each shape.
6. Sparki will immediately begin to draw the complete polygon.
7. When the polygon is complete, Sparki will stop and ask the first question.
8. Key in your answer and push the Square Key.
9. If you're right, Sparki will "clap his hands", but if you're wrong, Sparki will "shake his head NO".
10. After the first side and angle are drawn, Sparki will ask the second question.
11. This question / answer sequence repeats for the other sides and angles.
12. Then we're back to either the Pentagon, Hexagon or Octagon mode.
13. You can push the Square Key again to do another similar problem or push any of the arrow keys to select another shape.

## Polygons

