

Activity description: USING TURTLE LOGO

Turtle logo is a programming language developed by Seymour Papert. His intent was to provide a tool for learning how to solve problems in a visual way, and in a simple-enough environment for kids to understand and learn on their own.

Age level: 9+

Time frame: 1/2 hour or more.

Needed: computers with internet access

Activity: in pairs students will learn to draw shapes and pictures using turtle logo.

Motivation: reinforces math skills, problem-solving skills, and communication skills. Particularly applicable to middle-school math, *e.g.* geometry, angles, coordinate systems.

Getting started

STEP 1: Go to <http://www.calormen.com/logo/>

STEP 2: Start programming!

It's easiest to explain how to use logo through examples.

Example 1 – draw a square. Type the following commands and watch what happens.

- forward 100
- left 90
- forward 100
- left 90
- forward 100
- left 90
- forward 100

Voila – you have a square!

Now you know the basic commands, to move forward a certain amount, or turn the turtle left (or right) a certain amount. Common angles are 90 degrees (a right-angle turn), 45 degrees (half a right-angle) or 180 degrees (turn right around). Remember that 360 degrees will turn you right around so you are pointing in the direction you started.

On the next page are some other useful commands – try them!

- **clean** – clean up the screen
- **hideturtle** (bring it back with showturtle)
- **setpencolor 5** (draw a line to see what changes. Experiment with other numbers!)
- **setpensize 10** (same as for setpencolor)
- **penup** and **pendown**
- **back** (works the same as forward, only backwards)
- **setxy 0 0** Note: the middle of the screen is 0 0, and as you move right the x value (the first number) increases and as you move up the y value (the second number) increases. Try setxy 0 50 and setxy 50 0 to see what I mean. you might want to do a penup before trying these!
- **home**
- **arc 45 100** Note: the first value is the angle of the arc while the second is the radius of the circle that the arc is a part of. Experiment with other numbers.
- **clearscreen**

CHALLENGE 1 – draw a triangle

- draw a triangle using your own choice of pensize and pencolor

Now, you might notice that you have typed the same commands multiple times. There must be a better way!

Example 2 – repetition. Try typing the following. What do you get?

- repeat 3 [forward 100 right 120]

CHALLENGE 2 – draw an octagon

- use what you have learned so far to draw a red octagon

Now you might notice that to draw a triangle the easiest way was to have angles of 120 degrees. This is $360/3$. For the octagon you probably used angles of 45 degrees. This is $360/8$. By the way, you can do math right in Logo – so you could have a command like right $360/8$ and Logo will take care of the division for you! But what if you want to sometimes draw an octagon, sometimes a square, and sometimes a pentagon? How could we choose?

This uses variables and procedures. Try typing the following. *HINT: you might want to store your program in a text editing program and then cut and paste it into the logo window. On a mac you can use textedit, or on a pc you can use notepad.*

```
to shape :numsides
  repeat numsides [ forward 70 right 360/numsides ]
end
```

Now type shape 8. What happens? Now type shape 4. What happens? Play with it!

CHALLENGE 3 – write your own procedure.

Copy what we did above. Change the name from “shape” to whatever you want. Enter as many commands as you like, then the last line should be end.

Now you can try some of the challenges below.

Advanced Challenges

- draw a house.
- draw a car
- draw a happy face
- draw a flower
- draw a star
- come up with your own challenge!

- something to try: repeat 100 [left 15 repeat 3 [forward 50 left 120]]