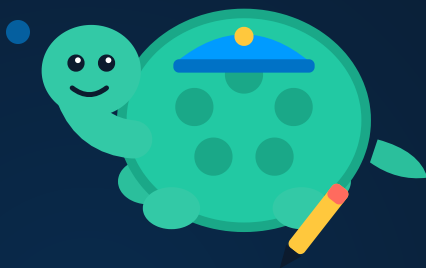


A TURTLE GRAPHICS ADVENTURE • GRADES
1-3

MSWLogo for Little Coders

Draw shapes and patterns with Mavi, your
turtle friend!



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MSWLogo for Little Coders

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This book is part of the Mavi Foundation's free and subsidised learning programmes for children. Every program in this book was written and tested in **MSWLogo**, a free Logo for Windows computers.

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Printed for the Mavi Foundation • Not for sale



BEFORE WE BEGIN

Preface

Long ago, some clever teachers had a wonderful idea: what if a child could teach a computer to draw, just by giving it simple, clear steps? They made a friendly helper called the **turtle**, and a language called **Logo** to talk to it.

In this book you will meet **Mavi**, our turtle. You will tell Mavi to walk, to turn, and to lift or drop a pen — and wherever Mavi walks with the pen down, a line appears. From just a few little commands, you will draw squares, stars, circles, flowers and more.

Every picture in this book was really drawn by these exact commands. Type them into MSWLogo yourself, watch Mavi move, then change a number and see what happens. That is how coders learn — by playing, trying, and trying again.





A note for grown-ups

This book introduces real Logo through turtle graphics, the gentlest possible doorway into coding. Children give the turtle short, clear instructions and watch a picture appear — instant, visual feedback that makes each idea concrete.

■ Getting MSWLogo

MSWLogo is **free**. Install it on any Windows computer (search ‘MSWLogo download’). It opens with two parts: a big white **drawing screen** where the turtle lives, and a **Commander** strip at the bottom where children type.

■ How to run a command

Type one command in the Commander box and press **Enter** (or click **Execute**). Try `FD 100` first. Use `CS` to clear the screen and send the turtle home between drawings.



FOR THE INSTRUCTOR

Helping your little coder

A few small habits make a big difference in how confidently children take to the turtle.



How to help

Encourage children to **predict** before running (“Where will the turtle go?”), then check. Mistakes are useful — just CS and try again. One shape per sitting is plenty for the youngest coders.

SAY HELLO TO



Meet **Mavi**, your turtle friend

Hi! I'm **Mavi**, a little turtle. I carry a pen on my back. When my pen is **down**, I leave a line everywhere I walk. Tell me how far to walk and which way to turn, and together we will draw amazing shapes!



Mavi says: I only understand short, clear commands — like FD 100 or RT 90. Give me one at a time!

Three little signs to know:



A **code card** — the commands you type into MSWLogo.



A **turtle screen** — the picture I draw for you.

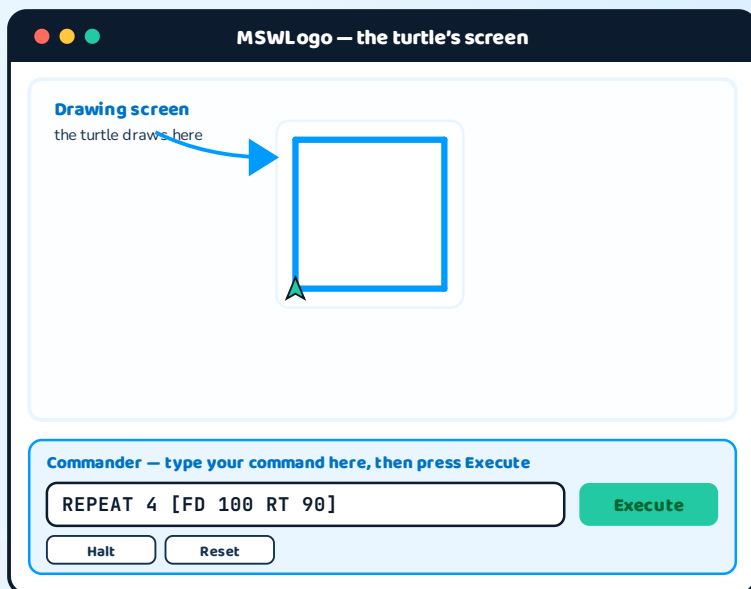


A yellow **TRY IT!** — your turn to change something and play.



The MSWLogo window

When you open MSWLogo, you see a window with two important parts. This is where all the magic happens.



- ★ **The drawing screen** — the big white space where Mavi walks and draws. Mavi starts in the middle, facing up.
- ★ **The Commander** — the strip at the bottom. Type a command in the white box and press **Enter** or click **Execute**.
- ★ Try typing `REPEAT 4 [FD 100 RT 90]` and watch a square appear!

What is Logo?

Logo lets you draw by giving a turtle clear, simple steps.

Logo is a coding language made for children. Instead of typing hard words, you send a little **turtle** short commands, and it draws as it moves.

MSWLogo is a free kind of Logo for Windows computers. It shows the turtle on the screen so you can watch every step it takes.



In this chapter you will...

A little history

The turtle and the pen



A little history

Logo was made way back in **1967** by a group of teachers and scientists who wanted a language just for children. One of them, **Seymour Papert**, believed children learn big ideas best by **playing** and making things.

The name **Logo** comes from an old Greek word, *logos*, meaning ‘word’ or ‘thought’. Its most famous idea is the **turtle** that carries a pen and draws wherever it walks.



MSWLogo was made in the 1990s by **George Mills**, using the Logo ‘engine’ built by **Brian Harvey**. Because it is free, schools all over the world use it.

- ★ Logo’s turtle began as a real little robot that rolled on the floor with a pen!
- ★ You can imagine *you* are the turtle — walk it out with your feet to plan a shape.
- ★ The same turtle can draw a tiny dot or a picture that fills the whole screen.



How it works

The turtle and the pen

Mavi always holds a pen.

When the pen is **down**, Mavi draws a line while walking.

When the pen is **up**, Mavi moves without drawing — handy for leaving gaps.

Mavi also has a **direction**. It starts facing straight up.

When you say **RIGHT** or **LEFT**, Mavi spins on the spot to face a new way, then walks that way next.



Mavi says: My pen starts **down**, so I draw right away. Say PU any time you want me to move without a line.

Talking to the turtle

A few short commands tell Mavi how to walk, turn, and draw.

Every drawing is made from just a handful of commands. Learn these, and you can draw almost anything.

Remember: give Mavi **one clear command** at a time.



In this chapter you will...

Walk: FORWARD and BACK

Turn: RIGHT and LEFT

Pen up and pen down

REPEAT — the magic word



Walk: FORWARD and BACK

FD means forward, **BK** means back. The number is how many steps to walk.

FD 100 walks forward 100 steps, drawing a line.



my_drawing.lgo

FD 100
BK 40

► What the turtle draws





Mavi says: Big number, long line. Small number, short line.

Turn: RIGHT and LEFT

RT turns right, **LT** turns left. The number is how far to turn, in degrees.

RT 90 is a quarter turn. Mavi spins but does not move.



● ● ● my_drawing.lgo

FD 80 RT 90 FD 80

► What the turtle draws



Mavi says: A full turn all the way around is 360 degrees.

Pen up and pen down

PU lifts the pen, so Mavi walks with no line.

PD puts it back down.

Use PU to leave a gap, then PD to draw again.



my_drawing.lgo

```
FD 40 PU FD 40
PD FD 40
```

► What the turtle draws

A diagram showing a vertical blue line on a white background. The line is composed of two segments: a top segment and a bottom segment, with a clear gap between them. A blue arrow points upwards from the top segment, indicating the direction of movement.



Mavi says: See the gap in the middle? That is where the pen was up.

REPEAT – the magic word

REPEAT does the steps inside the square brackets [] again and again.

REPEAT 4 [FD 100 RT 90] draws a square — four sides in one short line!



● ● ● my_drawing.lgo

```
REPEAT 4 [FD 100  
RT 90]
```

► What the turtle draws



Mavi says: REPEAT saves you from typing the same thing over and over.



Commands to know & tips

Commands to know

FD / FORWARD	walk forward and draw
BK / BACK	walk backward and draw
RT / RIGHT	turn to the right
LT / LEFT	turn to the left
PU / PENUP	lift the pen (no line)
PD / PENDOWN	put the pen down (draw)
REPEAT n []	do the steps inside n times
CS	clear the screen, turtle goes home
HT / HIDETURTLE	hide the turtle arrow
HOME	send the turtle back to the middle

Mavi's top tips

- ★ Start every new drawing with **CS** to clear the screen and send Mavi home.
- ★ To draw a shape with equal sides, turn by **$360 \div \text{number of sides}$** . A triangle: $360 \div 3 = 120^\circ$.
- ★ Change one number and run it again — that is the best way to learn what each part does.

Shapes with straight lines

Walk forward and turn by a corner to draw squares, letters and more.

These shapes use straight walks and simple quarter turns (RT 90 or LT 90).

Try each one, then change a number to make it bigger or smaller.



In this chapter you will...

A straight line

A corner

A square

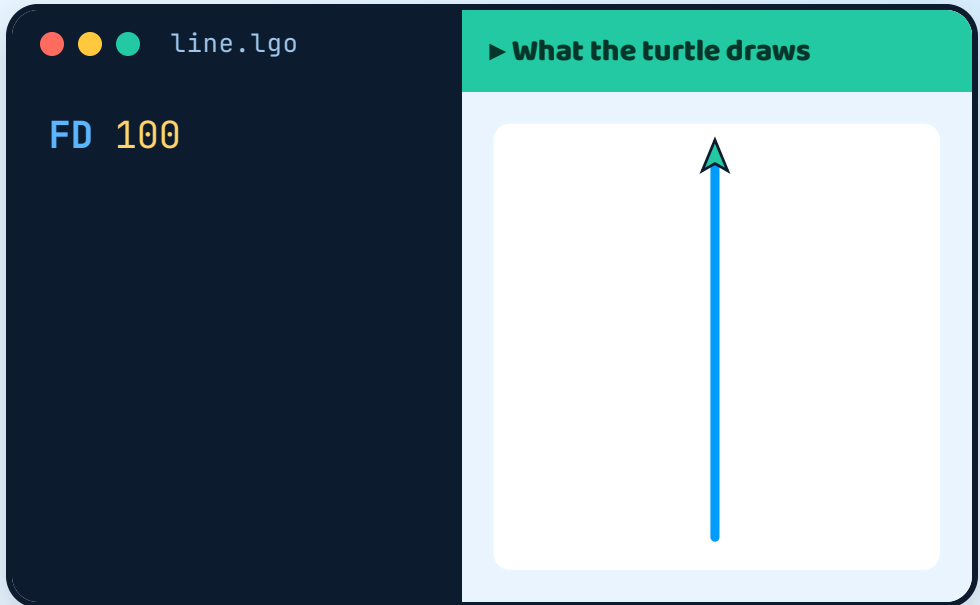
A tall door

The letter L



A straight line

The turtle walks forward and leaves a line behind it.



Mavi says

Type this into the Commander and watch me walk it out, step by step!

TRY IT!

Type it into MSWLogo exactly, then press Enter.

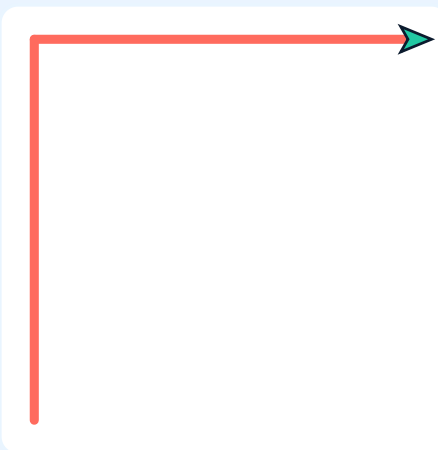
A corner

Walk, turn right a quarter turn, then walk again.

corner.lgo

```
FD 100 RT 90 FD  
100
```

► What the turtle draws





Mavi says

Change a number and run it again — see how the shape changes.

TRY IT!

Make the number after FD bigger — what happens?

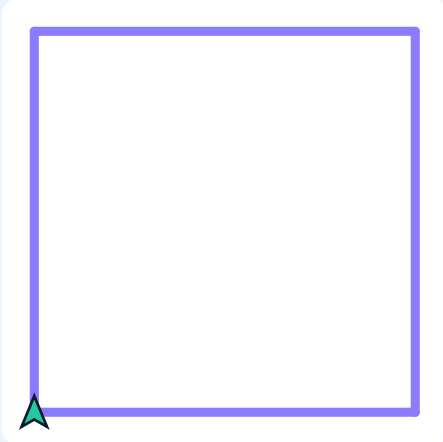
A square

Four sides and four right turns — REPEAT does the work.

● ● ● square.lgo

```
REPEAT 4 [FD 100  
RT 90]
```

► What the turtle draws





Mavi says

Say the commands out loud as I move
— it almost sounds like a dance.

TRY IT!

Change the turn number and run it again.

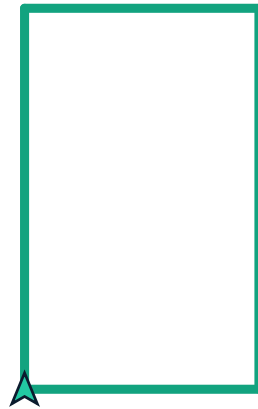
A tall door

A rectangle has two long sides and two short sides.

door.lgo

```
REPEAT 2 [FD 130  
RT 90 FD 80 RT  
90]
```

► What the turtle draws



Mavi says

Start with CS to clear the screen, then try this fresh.

TRY IT!

Draw it, then draw it again in a different spot with PU.

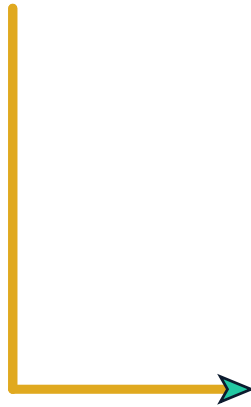
The letter L

Go up, come back down, then a little foot to the right.

letter_l.lgo

```
FD 120 BK 120 RT  
90 FD 70
```

► What the turtle draws



Mavi says

Predict where I will stop before you press Enter!

TRY IT!

Show a grown-up the shape you made!

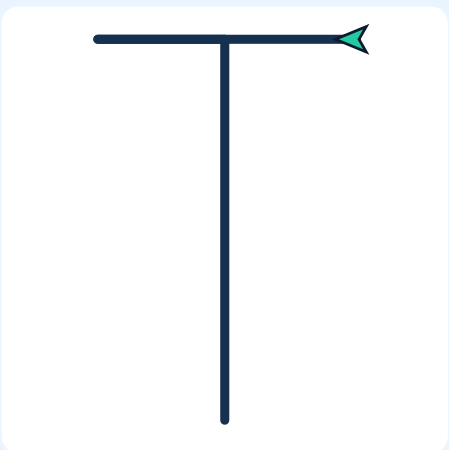
The letter T

A tall stem with a bar across the very top.

letter_t.lgo

FD 120 LT 90 FD
40 BK 80

► What the turtle draws





Mavi says

Type this into the Commander and watch me walk it out, step by step!

TRY IT!

Type it into MSWLogo exactly, then press Enter.

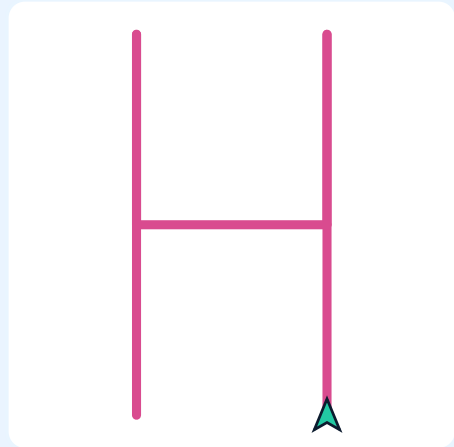
The letter H

Two tall lines joined by a bridge in the middle.

letter_h.lgo

```
FD 120 BK 60 RT
90 FD 60 LT 90
FD 60 BK 120
```

► What the turtle draws



Mavi says

Change a number and run it again —
see how the shape changes.

TRY IT!

Make the number after FD bigger — what happens?

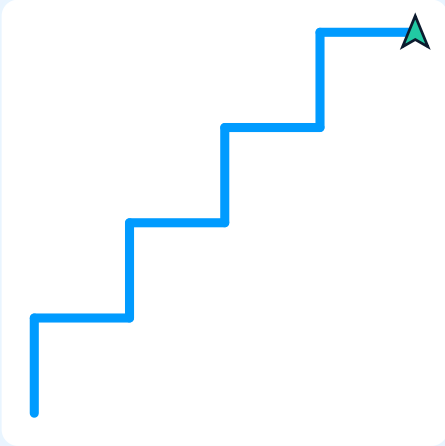
A staircase

Step up, step across, up, across — again and again.

steps.lgo

```
REPEAT 4 [FD 40  
RT 90 FD 40 LT  
90]
```

► What the turtle draws



Mavi says

Say the commands out loud as I move
— it almost sounds like a dance.

TRY IT!

Change the turn number and run it again.

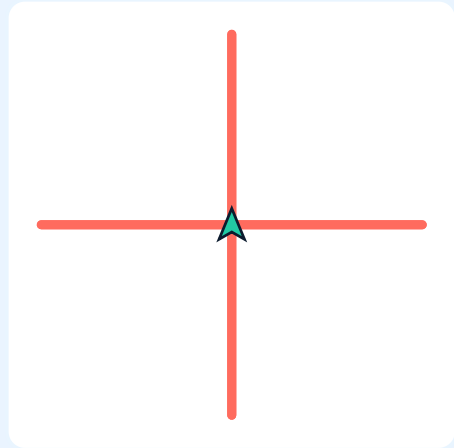
A plus sign

Four little lines that go out from the middle and come back.

plus.lgo

```
REPEAT 4 [FD 60  
BK 60 RT 90]
```

► What the turtle draws



Mavi says

Start with CS to clear the screen, then try this fresh.

TRY IT!

Draw it, then draw it again in a different spot with PU.

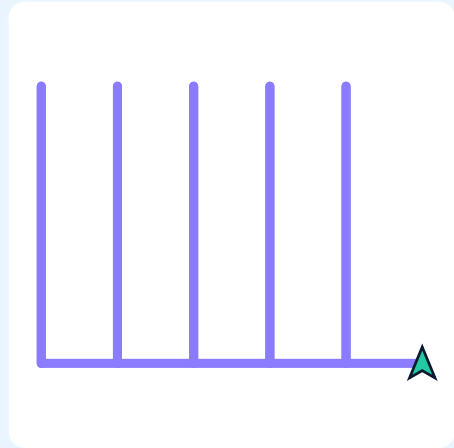
A comb

Lines standing in a row, like the teeth of a comb.

comb.lgo

```
REPEAT 5 [FD 80  
BK 80 RT 90 FD  
22 LT 90]
```

► What the turtle draws



Mavi says

Predict where I will stop before you press Enter!

TRY IT!

Show a grown-up the shape you made!

Shapes with angles

Turn by different angles and REPEAT to draw triangles, stars and circles.

To draw a shape with equal sides, turn by $360 \div$ the number of sides.

A triangle turns 120° , a hexagon 60° , a full circle in tiny steps!



In this chapter you will...

A triangle

A pentagon

A hexagon

An octagon

A star



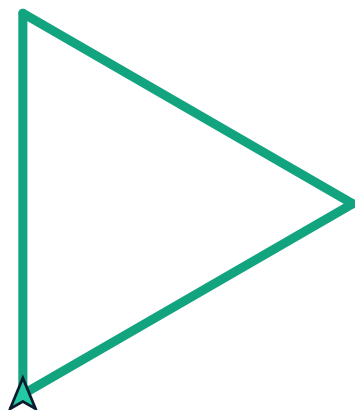
A triangle

Three sides. Mavi turns 120° at each corner.

triangle.lgo

```
REPEAT 3 [FD 120  
RT 120]
```

► What the turtle draws



Mavi says

Type this into the Commander and watch me walk it out, step by step!

TRY IT!

Type it into MSWLogo exactly, then press Enter.

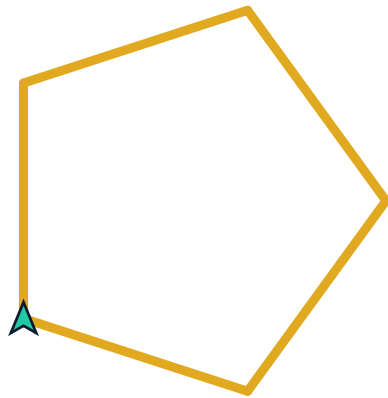
A pentagon

Five sides. Turn a little less each time: 72° .

pentagon.lgo

```
REPEAT 5 [FD 90  
RT 72]
```

► What the turtle draws



Mavi says

Change a number and run it again — see how the shape changes.

TRY IT!

Make the number after FD bigger — what happens?

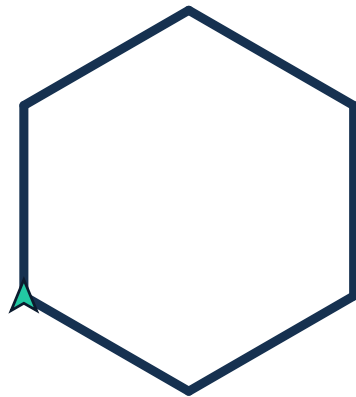
A hexagon

Six sides, turning 60° at every corner.

hexagon.lgo

```
REPEAT 6 [FD 80  
RT 60]
```

► What the turtle draws



Mavi says

Say the commands out loud as I move
— it almost sounds like a dance.

TRY IT!

Change the turn number and run it again.

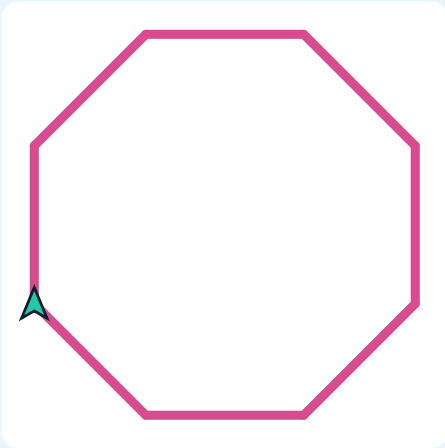
An octagon

Eight sides, turning just 45° each time.

● ● ● octagon.lgo

```
REPEAT 8 [FD 65  
RT 45]
```

► What the turtle draws



Mavi says

Start with CS to clear the screen, then try this fresh.

TRY IT!

Draw it, then draw it again in a different spot with PU.

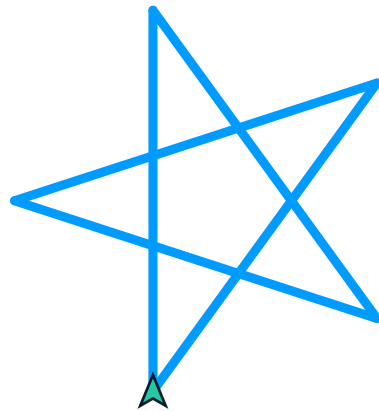
A star

Turn a big 144° and the lines cross into a star!

star.lgo

```
REPEAT 5 [FD 150  
RT 144]
```

► What the turtle draws



Mavi says

Predict where I will stop before you press Enter!

TRY IT!

Show a grown-up the shape you made!

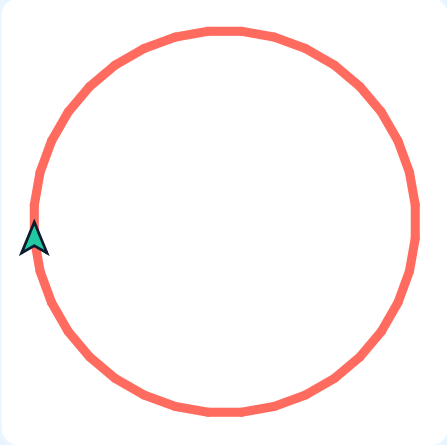
A circle

Lots of tiny steps and tiny turns look like a smooth circle.

● ● ● circle.lgo

```
REPEAT 36 [FD 15  
RT 10]
```

► What the turtle draws





Mavi says

Type this into the Commander and watch me walk it out, step by step!

TRY IT!

Type it into MSWLogo exactly, then press Enter.

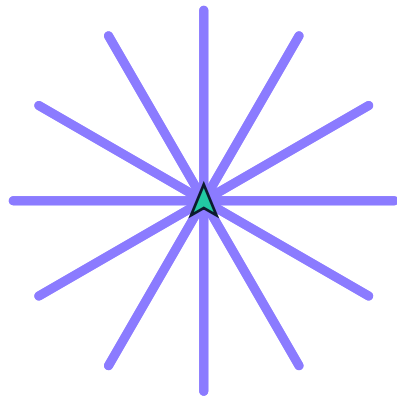
A sunburst

Go out, come back, turn a little — over and over.

sun.lgo

```
REPEAT 12 [FD 90  
BK 90 RT 30]
```

► What the turtle draws



Mavi says

Change a number and run it again — see how the shape changes.

TRY IT!

Make the number after FD bigger — what happens?

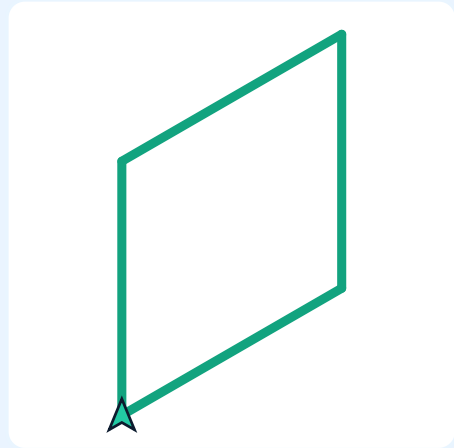
A diamond

A tilted square, turning 60° then 120° .

● ● ● diamond.lgo

```
REPEAT 2 [FD 100  
RT 60 FD 100 RT  
120]
```

► What the turtle draws



Mavi says

Say the commands out loud as I move
— it almost sounds like a dance.

TRY IT!

Change the turn number and run it again.

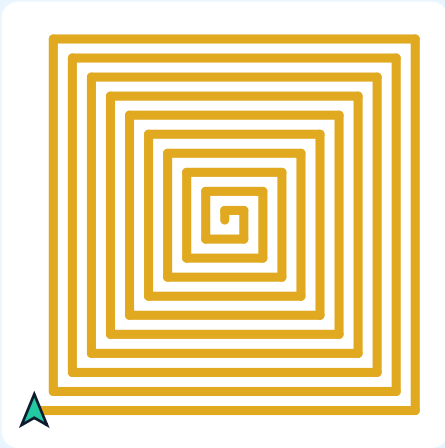
A spiral

Each line is a little longer, so it winds outward.

spiral.lgo

```
REPEAT 40 [FD  
REPCOUNT * 4 RT  
90]
```

► What the turtle draws



Mavi says

Start with CS to clear the screen, then try this fresh.

TRY IT!

Draw it, then draw it again in a different spot with PU.

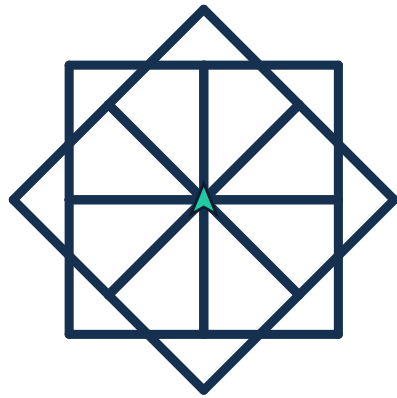
A flower

A square, turned a little, drawn again and again — a flower!

flower.lgo

```
REPEAT 8 [REPEAT  
4 [FD 55 RT 90]  
RT 45]
```

► What the turtle draws



Mavi says

Predict where I will stop before you press Enter!

TRY IT!

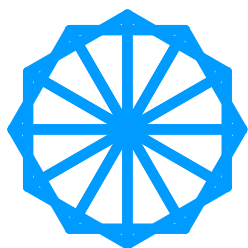
Show a grown-up the shape you made!



JUST FOR FUN

A pattern gallery

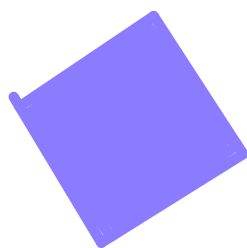
Put REPEAT inside another REPEAT and little shapes turn into big patterns. Try these — then invent your own!



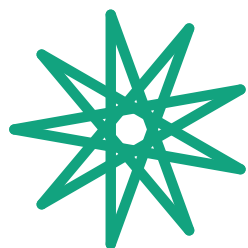
Triangle rosette



Hexagon flower



Spinning spiral



Star of nine



Nest of squares



Pointy sun

You did it!

You told a turtle how to walk, turn and draw — and made lines, squares, letters, stars, circles, spirals and flowers. That is real coding!

Little Coder's Command Box

FD / BK	walk forward or back
RT / LT	turn right or left
PU / PD	lift or drop the pen
REPEAT	do steps again and again
CS	clear the screen
360 ÷ sides	the turn for equal shapes



Keep drawing, keep exploring.

Every picture starts with one step.