

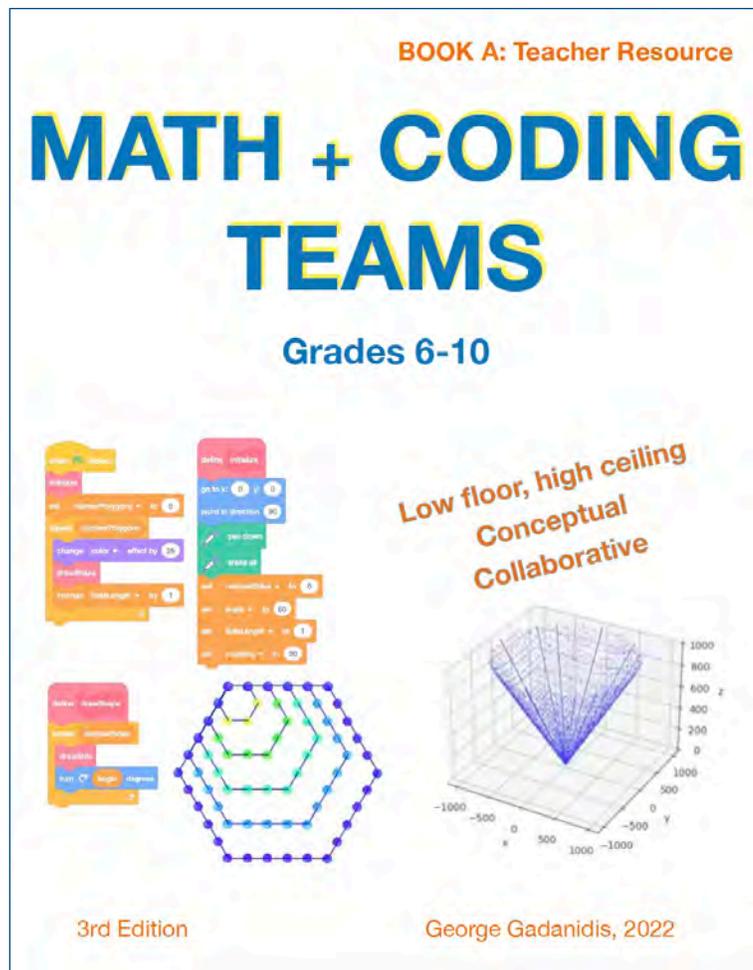
# MATH + CODING TEAMS, Gr. 6-10

206 pages (in PDF)

\$9 / teacher licence

\$19 / school licence

## MATH + CODING TEAMS, Gr. 6-10



### COLLABORATIVE LEARNING

- Low floor & high ceiling design
- Coding brings math to life
- Conceptual surprises & insights
- A revitalized classroom culture

### USING THIS RESOURCE

*Math + Coding Teams* may be used in 2 complementary ways:

- For mathematics education, to bring math concepts and relationships to life dynamically through code.
- For computer science education, to introduce coding concepts in the context of solving mathematics problems.

The tasks may be used as:

- Collaborative team activities.
- Extension or enrichment activities.
- Starting points for project-based learning.

### *Math + Coding Teams, 6-10, includes 2 Books*

- **Book A** (120 pages) is designed as a teacher resource. It contains: (a) Student Tasks & (b) Teacher Notes (and solutions).
- **Book B** (56 pages) is designed as a resource that may be shared with students.

See the Table of Contents in the next 2 pages, along with math & coding concepts addressed.

# CONTENTS

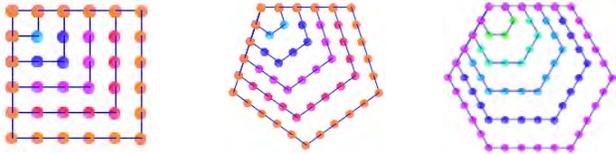
## Math + Coding Teams

4

### 1. Polygonal Numbers + Scratch

- Student Task
- Teacher Notes

7  
18



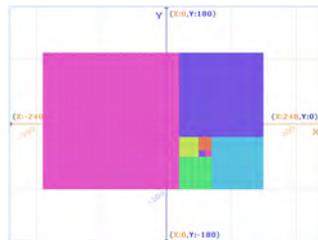
**Math:** Growing patterns; geometric patterns; algebraic expressions; polygon properties

**Scratch:** Turtle graphics; repeat; sub-programs; variables; lists

### 2. Golden Ratio + Scratch

- Student Task
- Teacher Notes

24  
28



**Math:** Growing patterns; geometric patterns; algebraic expressions; history

**Scratch:** Turtle graphics; repeat; sub-programs; variables; lists

### 3.A Sumerian Triples + Scratch

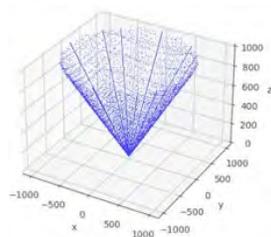
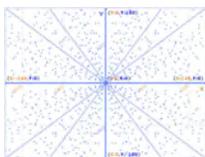
- Student Task
- Teacher Notes

35  
36

### 3.B Sumerian Triples + Python

- Student Task
- Teacher Notes

42  
43



**Math:** Side relationships of right triangles; “Pythagorean” triples; graphical representations; history; [complex numbers; vectors]

**Scratch:** Nested repeat; conditional statements; sub-programs; variables; lists

**Python:** Lists; nested repeat; conditional statements; 2D plots; [3D plots]

### 4.A Infinity + Scratch

- Student Task
- Teacher Notes

49  
50

### 4.B Infinity + Python

- Student Task
- Teacher Notes

53  
54



**Math:** Visual representations of fractions; shrinking patterns; limit of an infinite series; history

**Scratch:** Turtle graphics; sub-programs; variables; sprite motion

**Python:** repeat; variables; 2D plots; tabular output

### 5.A. Linear relations + Scratch

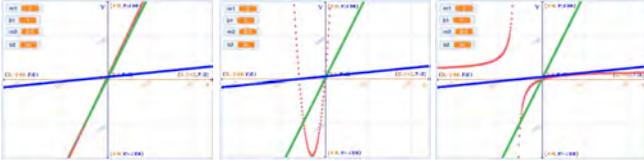
- Student Task
- Teacher Notes

59  
63

### 5.B Linear relations + Python

- Student Task
- Teacher Notes

69  
73



**Math:** Linear & non-linear relations; “operations” on linear equations; graphical representations of relations

**Scratch:** Nested repeat; conditional statements; sub-programs; variables

**Python:** Lists; nested repeat; conditional statements; 2D plots

### 6.A. Finding Primes + Scratch

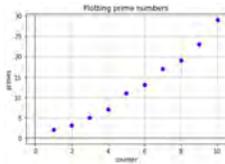
- Student Task
- Teacher Notes

80  
86

### 6.B Finding Primes + Python

- Student Task
- Teacher Notes

92  
98



**Math:** Prime numbers; number theory; algebraic expressions; modulo arithmetic; history

**Scratch:** Repeat; conditional statements; sub-programs; variables; code efficiency; modulo arithmetic

**Python:** Lists; repeat; conditional statements; 2D plots; code efficiency; modulo arithmetic

### 7.A Estimating Pi + Scratch

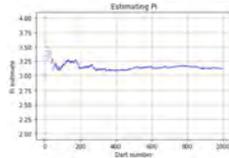
- Student Task
- Teacher Notes

102  
111

### 7.B Estimating Pi + Python

- Student Task
- Teacher Notes

115  
119



**Math:** Meaning of Pi; experimental probability

**Scratch:** Repeat; lists; conditional statements; sub-programs; variables

**Python:** Lists; repeat; conditional statements; 2D plots

# MATH LESSONS COLLECTIONS, Gr. 6-10

388 pages (in PDF)

4 x \$9 / teacher licence

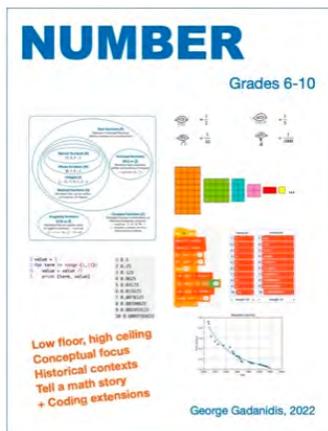
4 x \$19 / school licence

[LearnX.ca/math](https://LearnX.ca/math)

## MATH CONCEPTS COME TO LIFE

- Low floor & high ceiling design
- Historical contexts
- Coding extensions
- Conceptual surprises & insights

## NUMBER, 6-10



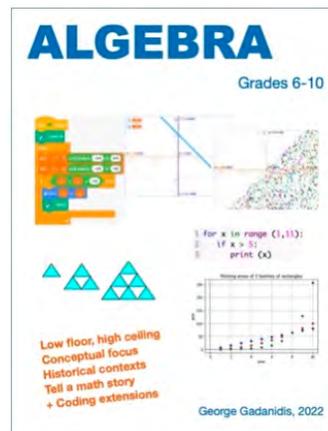
### Price

- \$9 / teacher licence
- \$19 / school licence

### Includes

- Student book (90 p.)
- Teacher resource (30 p.)

## ALGEBRA, 6-10



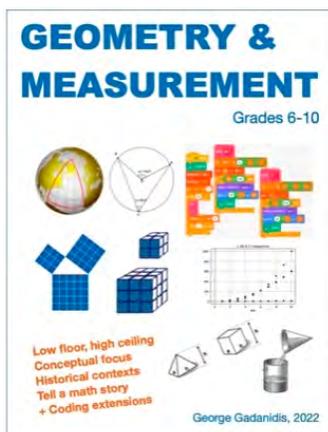
### Price

- \$9 / teacher licence
- \$19 / school licence

### Includes

- Student book (84 p.)
- Teacher resource (20 p.)
- 1 Story (20 p.)

## GEOMETRY & MEASUREMENT, 6-10



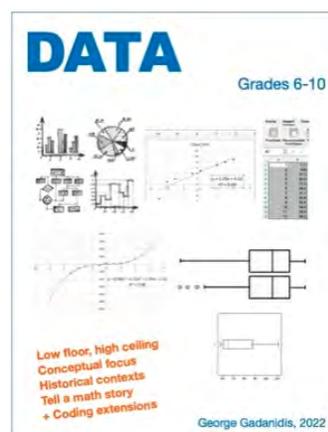
### Price

- \$9 / teacher licence
- \$19 / school licence

### Includes

- Student book (64 p.)
- Teacher resource (18 p.)
- 2 Stories (63 p.)

## DATA, 6-10



### Price

- \$9 / teacher licence
- \$19 / school licence

### Includes

- Student book (45 p.)
- Teacher resource (14 p.)

# MATH + CODING STORIES

Give math concepts a tangible feel

Both Stories (in PDF)

\$5 / teacher licence

\$9 / school licence

[LearnX.ca/math](http://LearnX.ca/math)

## REPEATING PATTERNS Gr. K & up



A story about colour patterns that repeat.

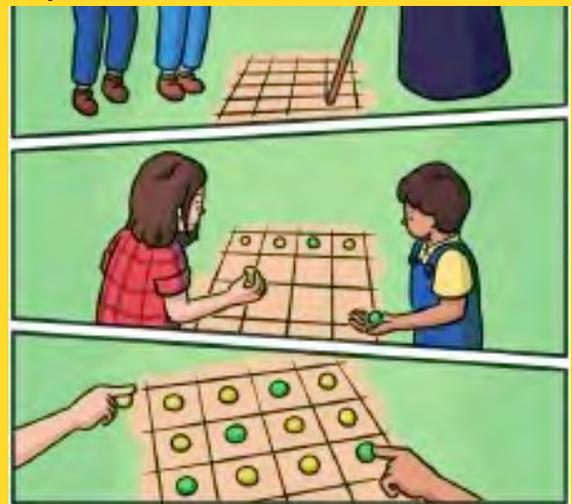
Each story page has a question to prompt reflection & discussion.

29 pages.



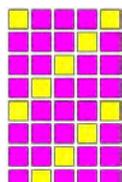
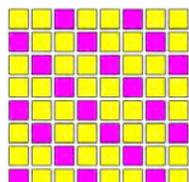
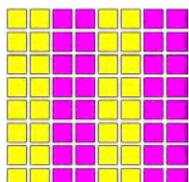
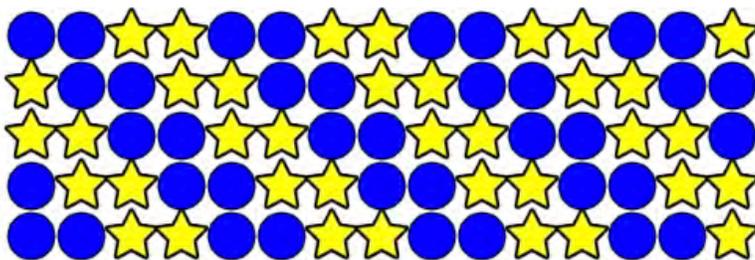
### A fractured fairytale

Hansel & Gretel discover a house made of colourful candies. The woman in the house shows them how to create repeating patterns on a grid. Should they stay for lunch ... or run back home?



## Comes with 2 coding apps

Repeat shape, colour, musical note & size

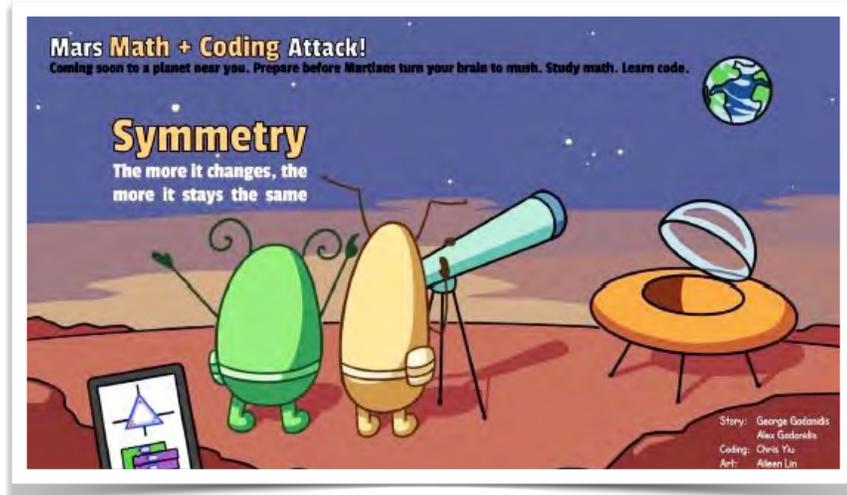


### See Gr. 1-3 Lesson Study

At [mkn-rcm.ca/repeating-patterns](http://mkn-rcm.ca/repeating-patterns)



# SYMMETRY — Gr. 3 & up



A story about symmetry and how to play with it with code. Each story page has a question to prompt reflection & discussion. With 6 pages of hands-on activities. 27 pages.

A symmetry is a transformation that leaves an object appearing unchanged. Which transformations leave the square looking unchanged?



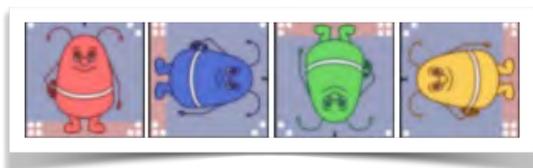
## Comes with 3 coding apps

Investigate symmetry as a transformation!

Imagine the 4 rotation symmetries of the square in a sandbox, moving & bumping into one another, and applying their rotations to one another.



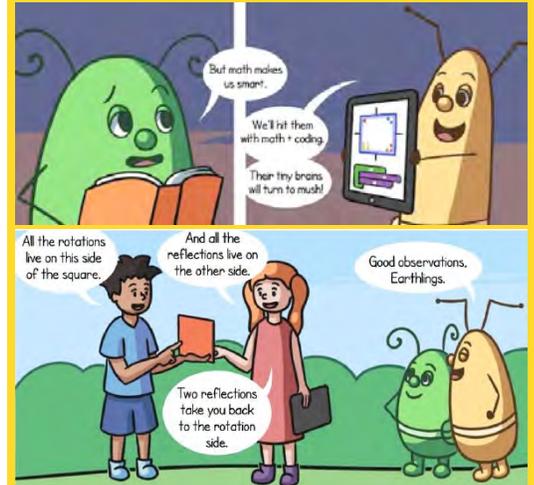
What will happen?



## Mars attack!

Martians plotted for centuries to conquer Earth, but failed.

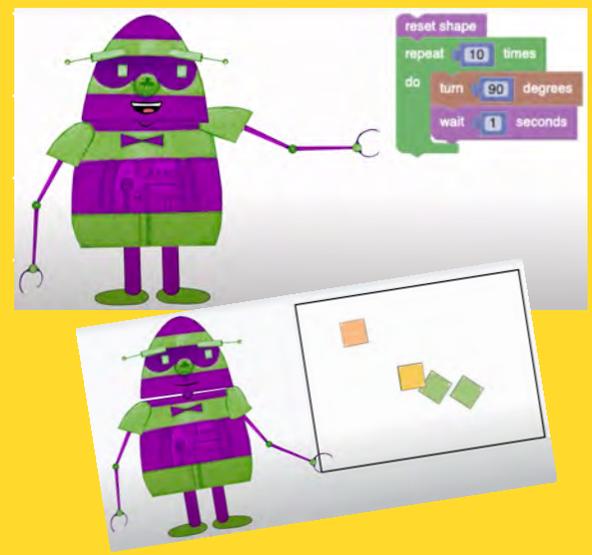
Now they have a devious new plan: **math + coding!**



Prepare your brain before Martians turn it to mush!

## And ... a workshop!

At [learnx.ca/symmetry](https://learnx.ca/symmetry)



# MATH TIME TRAVEL STORIES

Math in historical contexts!

Both Stories (in PDF)

\$5 / teacher licence

\$9 / school licence

[LearnX.ca/math](http://LearnX.ca/math)

## THE PLEASURE OF

## MAKING 10 Gr. 4 & up

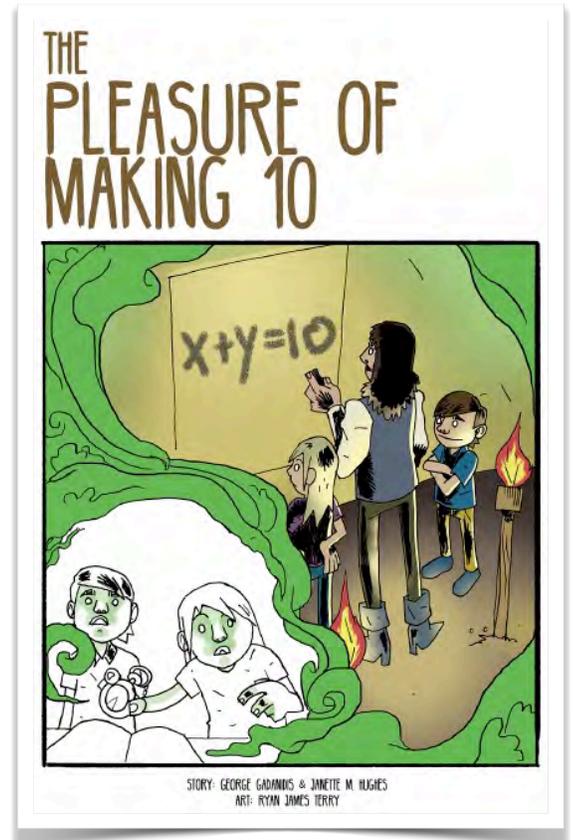
Molly and Alexander travel back in time in search of their grandfather. On their first expedition, they meet the philosopher & mathematician Rene Descartes. 34 pages.



Rene Descartes is said to have discovered the link between geometry and algebra.



As a philosopher, Descartes is known for proving his existence by stating *I think therefore I am*. Did he really exist, or was he a figment of his own imagination?

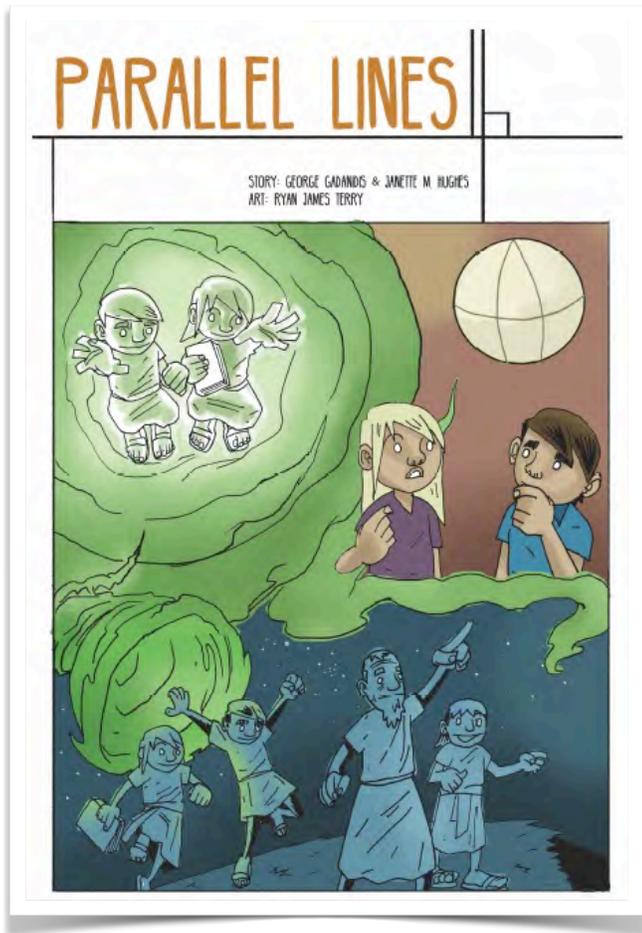


## Hands-on activities

The story comes with 8 pages of hands-on activities & coding extensions.



# PARALLEL LINES — Gr. 4 & up



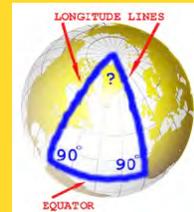
The story takes us back to the time of Menelaus of Alexandria, one of the first mathematicians to study the properties of lines on a sphere. 36 pages.



## Hands-on activities

The story comes with 8 pages of hands-on & coding extensions.

How many degrees in a triangle drawn on a sphere?



## Do parallel lines meet?

Euclid said "no". Was he right?

Before Menelaus, Euclid tried to prove his Parallel Lines Postulate, about parallel lines never meeting. He was not able to do this. Neither were other mathematicians after him. Why not?

It turns out that *parallel lines never meet* is an assumption and not a theorem. Different assumptions lead to different geometries, like the spherical geometry we live on!

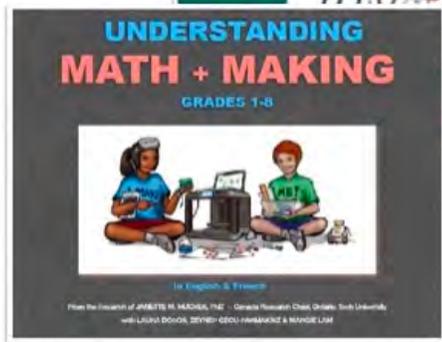
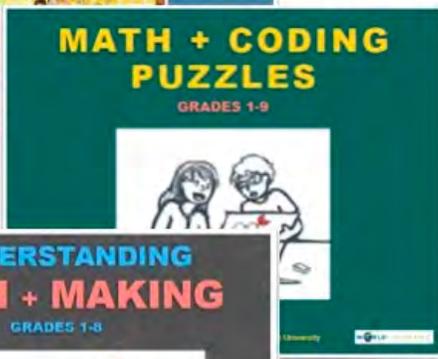
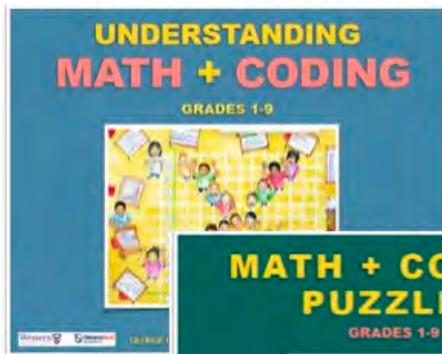


# MATH + CODING + MAKING, Gr. 1-9

346 pages (in PDF)  
\$29 / teacher licence  
\$49 / school licence

LearnX.ca/math

## UNDERSTANDING MATH + CODING + MAKING, Gr. 1-9



### About Math + Making + Coding

- The 3 resources are shown on the left
- All lessons in both English & French
- Teacher notes and solutions for all lessons
- Conceptually rich math contexts
- A combination of hands-on & coding tasks
- Most lesson sections fit on a single page — may be laminated for use as centres activities

**02 BABY SEA TURTLE SURVIVAL WALKS**

Day 2:

- Students will be provided a coding overview for the robot they will be using with a specific focus on movement blocks in sequential orders and repeats/loops. Intro coding [video](#) for robot root, intro coding [video](#) for beebot/bluebot, intro coding [video](#) for dash/dot
- The teacher should set up areas for students to work in partners or groups of 4 (depending upon the number of devices or robots) with teacher designated start & end (suggested start bottom right and end top left or start bottom left and end top right). Students will each receive a device (pad or tablet) to code their robot. Student partners will code the repeating pattern for the robot to travel. Students will share their code with their teachers.  
(ex. of a repeating pattern path code for [robot root](#))

\*Note for students who are struggling with coding there are app tutorials

- Student partners will be provided robots to execute their repeating pattern path. Students will take their turtles covers and place or gently tape to the robot. Students will then take turns executing the code to successful completion
- After successful completion of the turtle walk demonstrated to the teacher, the teacher will then add obstacles (strategically as to ensure there is at least one possible repeated pattern path for students to code) to the area. Obstacles can include plastic bottles, pictures of holes, other trash/debris, seagulls, raccoons, and pictures of spotlights.

\*Note: If using an iRobot root or dash and dot, you could have the robot with the turtle on top travel over a large chart paper and then have the robot also draw its path as it travels. [turtle walk/line \(with robot\) video link](#)



**4. Turn and Stamp Patterns with Scratch**

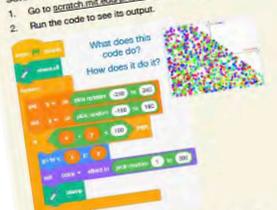
1. Go to [scratch.mit.edu/projects/4113473068/editor](https://scratch.mit.edu/projects/4113473068/editor)
2. Click on the STAMP code.
3. Click on the STAMP code again, and again ...
4. What else can you do with this code?
5. Click on the RESET code.
6. What does it do?
7. In the STAMP code, change the turn to 45.
8. Click on the STAMP code again, and again ...
9. How is this pattern different from the last one?
10. ...

**11. Plotting  $... + ... < 100$  with Scratch**

SCRATCH CODE

1. Go to [scratch.mit.edu/projects/408092053/editor/](https://scratch.mit.edu/projects/408092053/editor/)
2. Run the code to see its output.

What does this code do?  
How does it do so?



3. Run the code after each edit. What did you learn?

A.

B.

C.

MATCHING CHALLENGES

4. Edit the code to get each output.

A.

B.

C.

**Jobs as a variable**

15487945/editor

What does the code do?  
What results (colours may vary).



4. Create your own puzzles for others to solve.

C.

D.

E.

F.