



Playful STEM learning

The Brain Workout Academy

Engineering /
Science

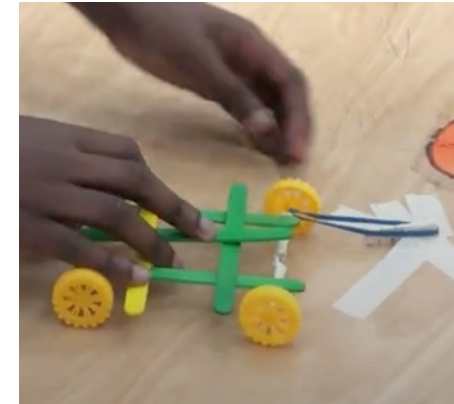
Geometry

**Playful STEM
Learning**

Algebra /
Numbers

Logic / Critical
Thinking

Engineering / Science



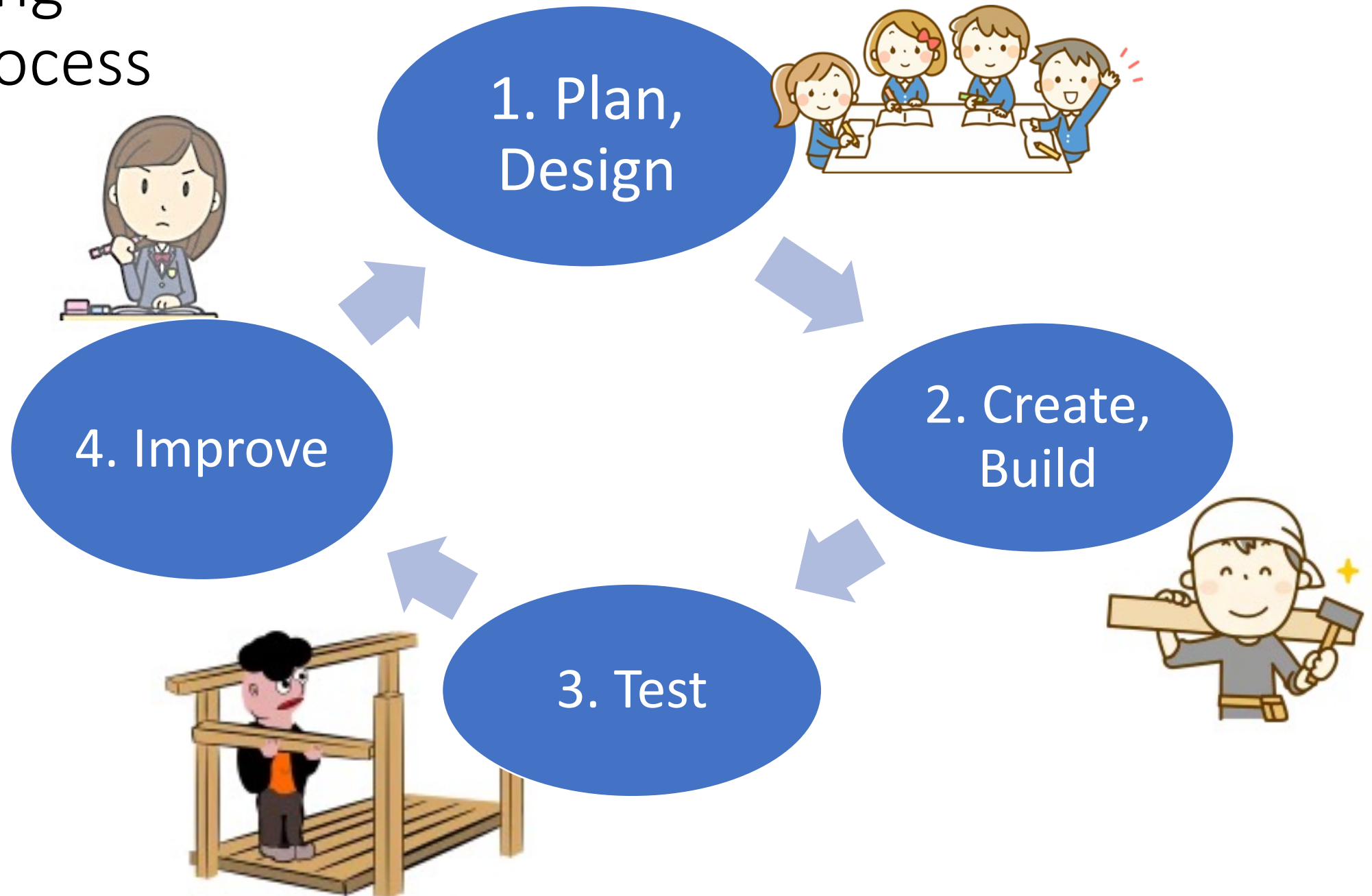
Build a stable tall tower.

Build a launcher
to propel your
paper airplane.

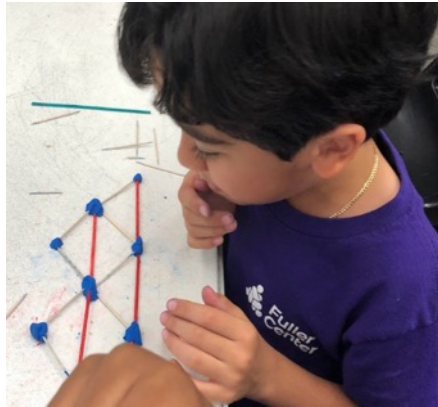
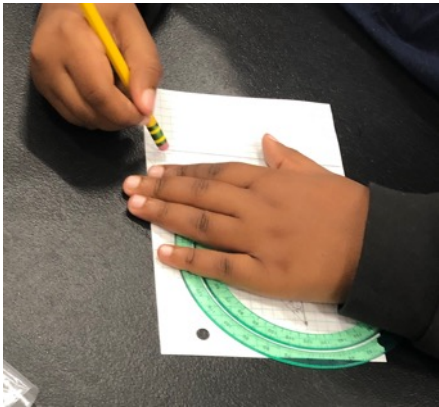
Build a catapult
and launch a chip
across a distance.

Build a rubber-
band operated
car.

Engineering Design Process



Geometry



Construct and measure angles.

Construct 2D shapes.

Construct 3D shapes; identify 3D shapes in real life.

Build a Clinometer to find how tall a palm tree is.

Algebra / Numbers

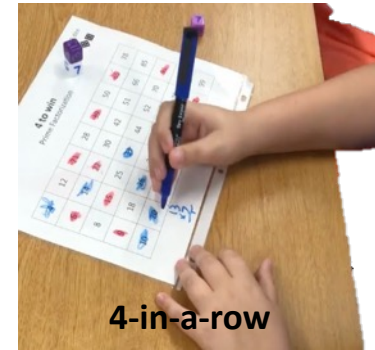


Times Table Game

x	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

The Factors Game

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30



Build arrays to represent factors of a number. Differentiate between composite and prime numbers.

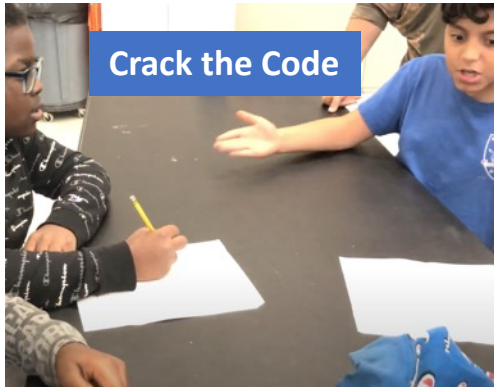
Recognize patterns and relationships in the Times Table to help memorize it.

Collect the multiples with the least number of factors.

Find the prime factorization of numbers up to 99.

Practice math fluency.

Logic / Critical Thinking



First One to 20

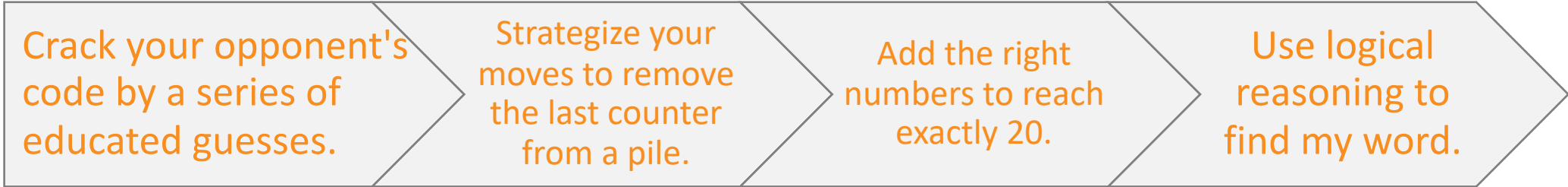
Can add 1, 2, or 3.

Addend	Total
1	1
3	4
2	6
3	9
3	12
1	13

Find My Word

Word	Before	After	Word	Before	After
Wash		✓			
well	✓	✓			
zone		✓			

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z



Teamwork



Play fun games that encourage teamwork, problem-solving skills, and hand-eye coordination. Appreciate the power of teamwork to achieve goals.

Grades 3-5: 10-session Sample Programs

A. Focus on Engineering and Geometry

B. Focus on Engineering and Algebra/Numbers

Tower Challenge	1	Paper Airplanes
Paper airplanes	2	Playground tiling
Angles	3	<ul style="list-style-type: none"> • Times Table Game • Math Race 4 operations
Geometry 2D	4	<ul style="list-style-type: none"> • Factors game
Catapult	5	Catapult
Playground tiling	6	Pico Fermi Bagels
Geometry 3D	7	Find My Word
Pico Fermi Bagels	8	4 in a row
Cars 1	9	Cars 1
Cars 2	10	Cars 2

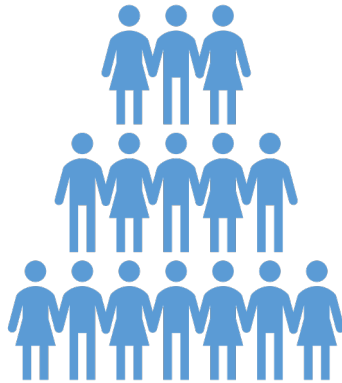
Grades 6-8: 10-session Sample Programs

A: Focus on Engineering and Geometry

B: Focus on Algebra/Numbers and Logic/Critical thinking

Tower Challenge	1	Catapult
Paper airplanes	2	<ul style="list-style-type: none"> • Times Table Game • Math Race 4 operations
Geometry 2D	3	<ul style="list-style-type: none"> • Factors game • Math Race exponent, square roots, cube roots
Geometry 3D	4	Pico Fermi Bagels
Catapult	5	The Last One Wins
<ul style="list-style-type: none"> • Factors game • 4 in a row 	6	First One to 20
Clinometer	7	Find My Word
Pico Fermi Bagels	8	4 in a row
Cars 1	9	Cars 1
Cars 2	10	Cars 2

Logistics to consider



Group size: 12-22 students



Double the STEM, Double the Success: We recommend implementing twice a week for maximum impact.

Playful STEM learning standards

Engineering / Science	<p>SC.35.CS-CS.1.2 Describe how models and simulations can be used to solve real-world issues in science and engineering.</p> <p>SC.68.CS-CS.2.2 Solve real-life issues in science and engineering.</p>
Geometry	<p>MA.5.GR.1.1 Classify triangles or quadrilaterals into different categories based on shared defining attributes. Explain why a triangle or quadrilateral would or would not belong to a category.</p> <p>MA.5.GR.1.2 Identify and classify three-dimensional figures into categories based on their defining attributes. Figures are limited to right pyramids, right prisms, right circular cylinders, right circular cones, and spheres.</p>
Algebra / Numbers	<p>MA.3.NSO.2.4 Multiply two whole numbers from 0 to 12 and divide using related facts with procedural reliability.</p> <p>MA.4.AR.3.1 Determine factor pairs for a whole number from 0 to 144. Determine whether a whole number from 0 to 144 is prime, composite or neither.</p> <p>MA.4.NSO.2.1 Recall multiplication facts with factors up to 12 and related division facts with automaticity.</p> <p>MA.K12.MTR.3.1 Complete tasks with mathematical fluency.</p> <p>MA.5.AR.2 Demonstrate an understanding of equality, the order of operations and equivalent numerical expressions.</p>

Playful STEM learning standards (cont.)

Logic/Critical Thinking	MA.K12.MTR.4.1 Engage in discussions that reflect on the mathematical thinking of self and others.
MTR (Mathematical Thinking and Reasoning Standards)	MA.K12.MTR.1.1 Actively participate in effortful learning both individually and collectively. MA.K12.MTR.5.1 Use patterns and structure to help understand and connect mathematical concepts. MA.K12.MTR.6.1 Assess the reasonableness of solutions. MA.K12.MTR.7.1 Apply mathematics to real-world contexts.
ELA	ELA.K12.EE.4.1 Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.



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