Manipulatives for
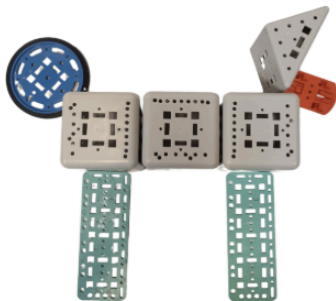# TK-12 RoboBlocky Math
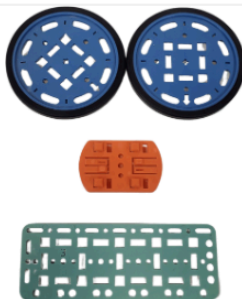

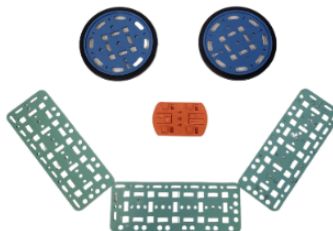BlockDog BlockHouse BlockHouse2

Face3 Face4 WheelFlower1

Contact: service@barobo.com

1 Introduction

RoboBlocky Math (http://www.roboblocky.com/curriculum) is an innovative curriculum designed for learning math with coding and robotics. It is the nation's first and only comprehensive TK-12 math program integrating mathematics with coding and robotics, fully aligned with state math standards and approved for adoption by the California State Board of Education (SBE) under the new California Math Framework.

RoboBlocky Math uses a common set of manipulatives (Linkbot robots and their accessories) across **all grade levels (TK–12)** and instructional pathways, including Core, Accelerated and Highly Accelerated, and Intervention and Enrichment curricula. The same manipulatives are also used across Barobo computer science, STEAM, Expanded Learning programs, and the RoboPlay Challenge Competition and RoboParade. This unified TK–12 platform fosters instructional continuity, promotes student collaboration and peer mentoring, and enables educators to share resources and collaborate effectively.

This document describes a typical Linkbot Classroom Bundle, the OmniBot, and the associated activity mats, and sample instructional applications.

2 4-Linkbot Bundle for Grades TK-12

The Linkbot is a patented, reconfigurable modular robot invented to be simple and versatile for hands-on learning mathematics with coding and robotics. It enables teachers with little or no prior experience in coding or robotics, along with their students, to move beyond the textbook and apply mathematical concepts to the physical world. Using Barobo-invented SnapConnect technology, which is also patented and allows easy, secure connections without special tools, multiple Linkbots and accessories can be assembled to create a wide range of two-dimensional and three-dimensional shapes and robotic systems for diverse tasks and projects, including the cross grade level **RoboParade**, **RoboToss**, and **RoboPlay Challenge competitions.**

The 4-Linkbot Bundle serves as a foundational set for classroom teaching and learning and may also be used by student teams participating in RoboPlay Challenge competitions. Additional bundles, including 8-Linkbot and 16-Linkbot configurations, as well as individual accessories, are available and may be shared across classrooms and among teachers.

The first image below illustrates a 4-Linkbot Bundle. The second image identifies the components and their corresponding names included in the 4-Linkbot Bundle.

4 Linkbot Classroom Bundle
Product Parts

Name	Picture	Name	Picture	Name	Picture
Linkbot-I (Joints 1 and 3 can move, Joint 2 is fixed)	4	L Connector	4	Screwdriver	1
Linkbot Dongle	4	3" Rectangle Connector	4	Hacky Sack	1
36" USB Cable	4	4" Rectangle Connector	4	A pack of screws and nuts	1
7" USB Cable	4	5" Rectangle Connector	4	Cube Connector	8
Snap Connector	42	T Connector	4	Triangle Connector	4
3.5" Wheel	8	U Connector	2	Link Block Connector	4
4" Wheel	8	Small Ball Caster	2	Link Blocks	10 of each color
Ball Caster	4	Snap Connector Cap	8	#6-32 X 5/16" Screw	25
Push Scoop	4	RGBY Foam Cubes	4 of each color	8"x10" Resealable Bag	4
Gripper Pair	2	Circle Connector	2	Activity Mat: MathGrid	1
Bridge Connector	4	Cylinder Connector	1	8-Port USB Charger	1

3 The OmniBot Pack for Grades TK-12

The OmniBot Pack is an accessory for the Linkbot that combines two Linkbot-I robots to create a four-wheeled OmniBot capable of moving in all directions. In addition to moving forward and backward, the OmniBot can turn, travel in circular paths, and move sideways and diagonally, making it a versatile base platform for a wide range of applications. The Pen Connector and Pen Adapter extend the OmniBot's functionality by enabling drawing and design, allowing students in TK–5 to explore geometric shapes, patterns, and spatial relationships using a wide variety of standard markers and pencils. The OmniBot's multi-directional movement makes it especially effective for TK–K students as they learn and practice orientation concepts such as left, right, up, and down through hands-on movement.

4 Activity Mats

Several activity mats are available for use with Linkbot hardware across different grade levels. In addition, RoboBlocky includes a variety of built-in activities that display the mats on a virtual grid. These activities can be implemented using either virtual robots or physical Linkbot hardware, providing flexible options for classroom use.

The robotics activities on these mats effectively engage students not only in learning math concepts in real-world contexts but also in developing academic math vocabulary. Students in grades **TK–2** participate through **Math Talk**, while students in grades **3–12** engage in **Math Discourse**, supporting reasoning, communication, and problem-solving skills at every level.

4.1 RoboCount for Grades TK-K

RoboCount Activity Mat (Grades TK-K)
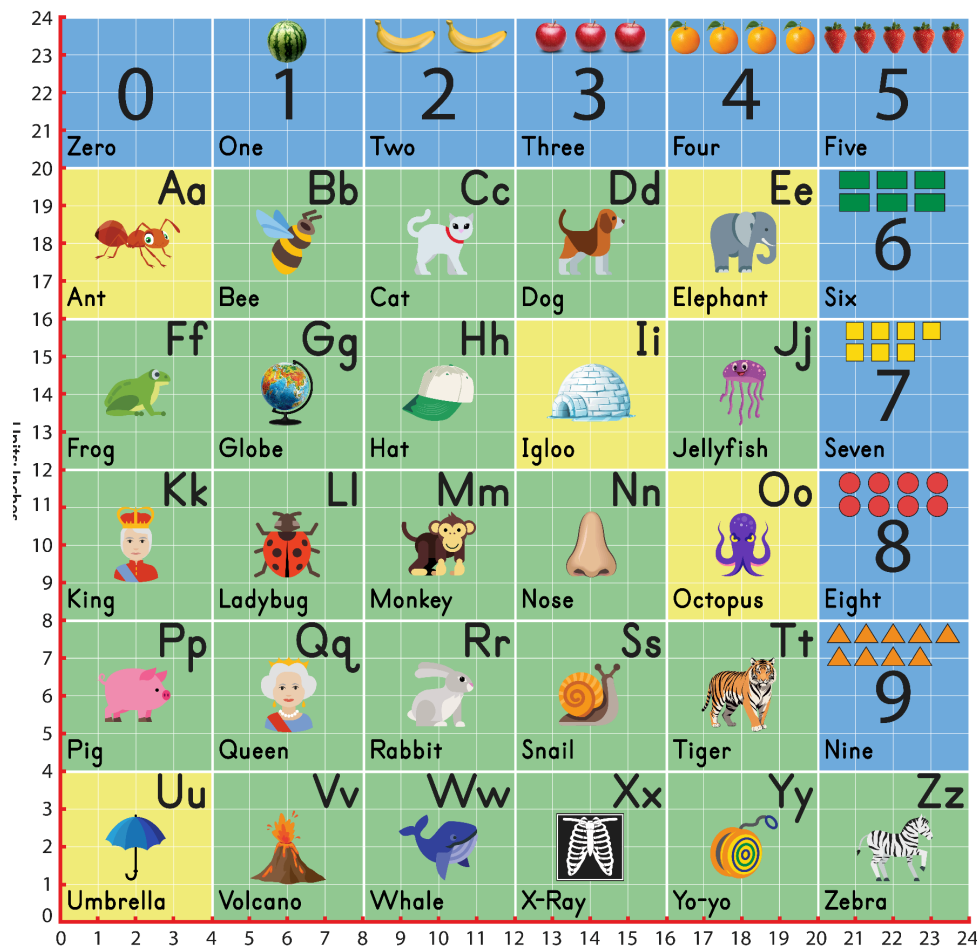
The RoboCount activity mat is designed to support TK-K students in developing both numeracy and literacy skills.

4.2 RoboVillage for Grades TK-K

RoboVillage Activity Mat (Grades TK-K)

4.3 MathGrid for Grades TK-12

MathGrid Activity Mat (Grades TK-12)
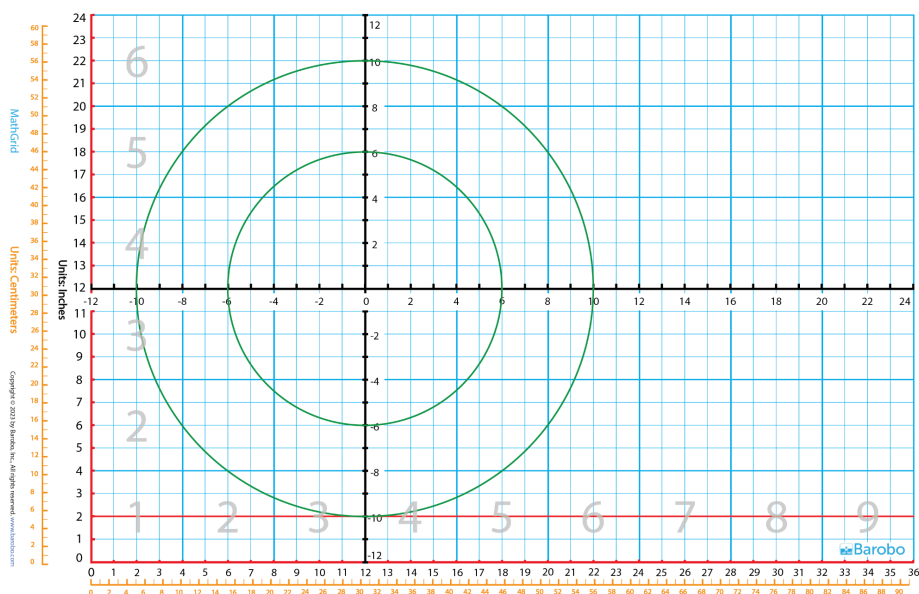
4.4 RoboTown for Grades 1-12

RoboTown Activity Mat (Grades 1-12)

RoboExploration Activity Mat (Grades 1-12)

5 Application of Accessories as Manipulatives for Grades TK-2: Counting, 2D Shapes, and 3D Shapes

The following sections highlight selected ways in which 4-Linkbot Bundle accessories are used to support counting, two-dimensional shapes, and three-dimensional shapes for students in grades TK–2 within RoboBlocky lessons and activities.

5.1 Numbers Created with Link Blocks for TK and Kindergarten

5.2 2D Composite Shapes

| 4RectangleConnector | 5RectangleConnector | BlockBus | BlockDeer | BlockDinosaur | BlockDog | BlockHouse | BlockHouse2 |

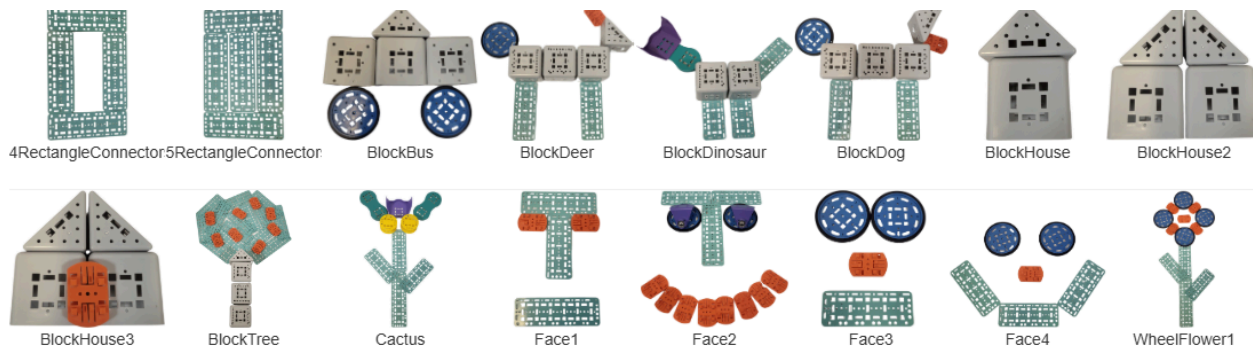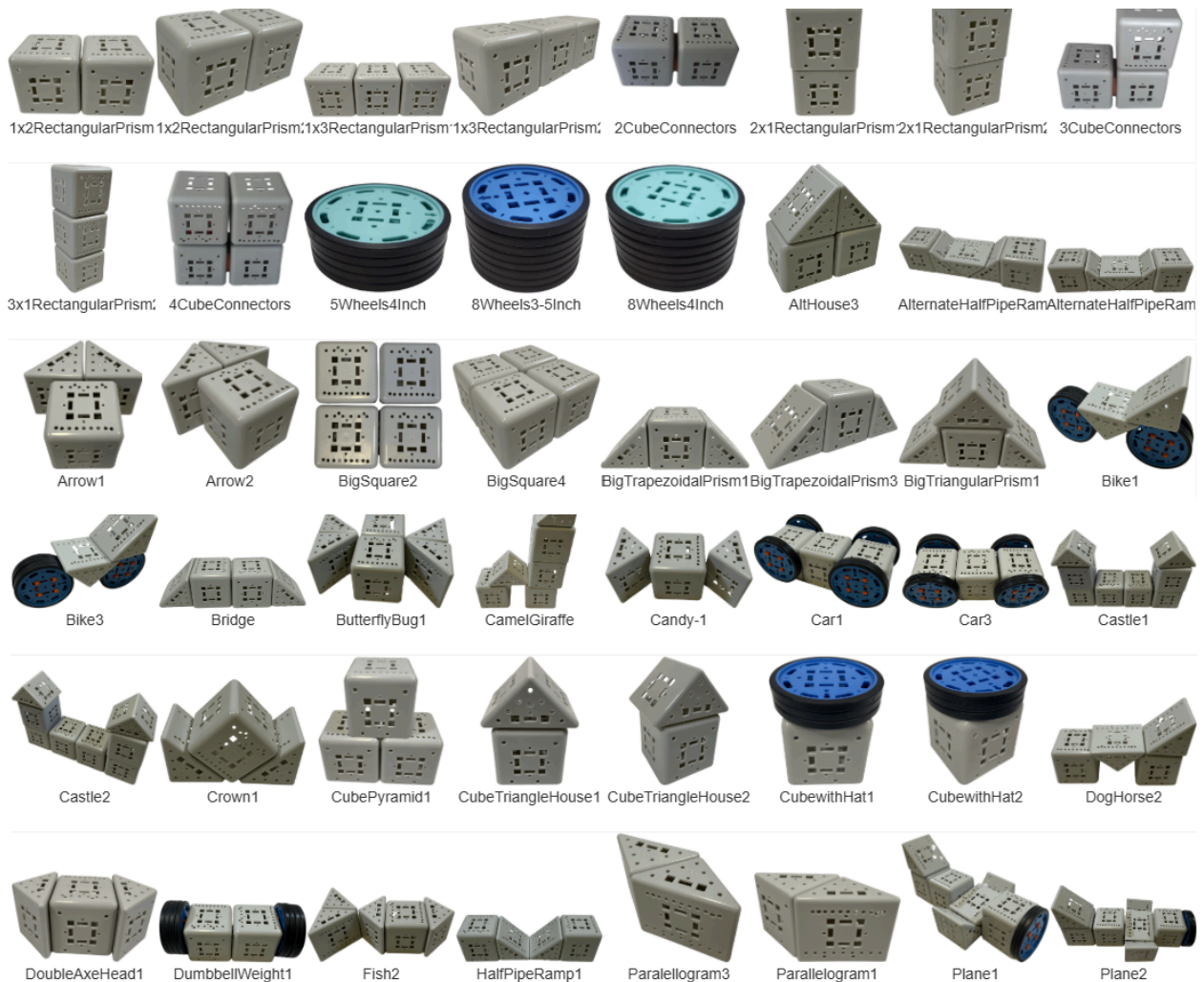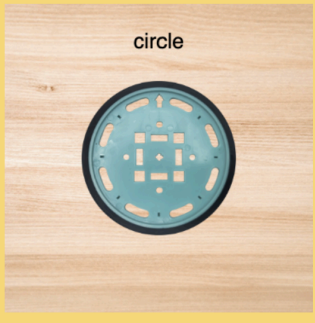| BlockHouse3 | BlockTree | Cactus | Face1 | Face2 | Face3 | Face4 | WheelFlower1 |

5.3 3D Composite Shapes

| 1x2RectangularPrism | 1x2RectangularPrism | 1x3RectangularPrism | 1x3RectangularPrism | 2CubeConnectors | 2x1RectangularPrism | 2x1RectangularPrism | 3CubeConnectors |

| 3x1RectangularPrism | 4CubeConnectors | 5Wheels4Inch | 8Wheels3-5Inch | 8Wheels4Inch | AltHouse3 | AlternateHalfPipeRam | AlternateHalfPipeRam |

| Arrow1 | Arrow2 | BigSquare2 | BigSquare4 | BigTrapezoidalPrism1 | BigTrapezoidalPrism3 | BigTriangularPrism1 | Bike1 |

| Bike3 | Bridge | ButterflyBug1 | CamelGiraffe | Candy-1 | Car1 | Car3 | Castle1 |

| Castle2 | Crown1 | CubePyramid1 | CubeTriangleHouse1 | CubeTriangleHouse2 | CubewithHat1 | CubewithHat2 | DogHorse2 |

| DoubleAxeHead1 | DumbbellWeight1 | Fish2 | HalfPipeRamp1 | Paralellogram3 | Parallelogram1 | Plane1 | Plane2 |

PyramidRoof	RectangularPrismofTr	RectangularPrismofTr	Rocket2	SharkFins1	ShortStack	Snail2	TriangleConnectors-Parallelogram

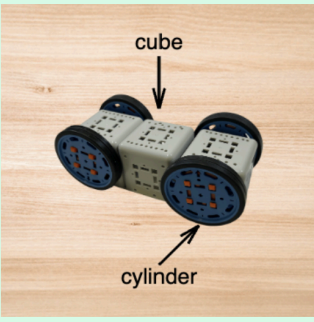|		
TriangleConnectors3	TriangleConnectors4	TriangleConnectors5

5.4 Applications of Manipulatives in TK RoboBlocky Math

8.9.1 Shapes with Linkbot Parts (Part A: Plane Shapes)
i a

circle

8.9.2 Shapes with Linkbot Parts (Part B: Plane Shapes)
i a P

8.9.3 Shapes with Linkbot Parts (Part C: Plane Shapes)
i a P

9.5.1 Shapes with Linkbot Parts (Part D: Solid Figures)
i a

cube

9.5.2 Shapes with Linkbot Parts (Part E: Solid Figures)
i a P

cylinder

9.5.3 Shapes with Linkbot Parts (Part F: Solid Figures)
i a P

cube

cylinder

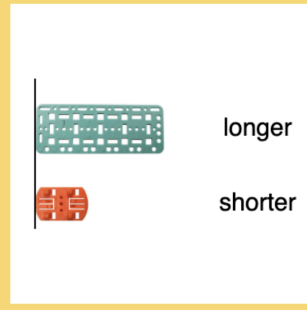**10.9.1** Positions of Linkbot Accessories (Part A: Positions) ⓘ ⓐ
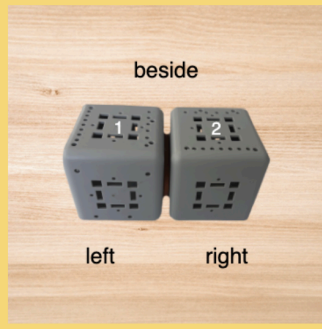
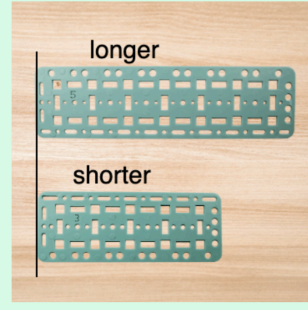**10.9.2** Positions of Linkbot Accessories (Part B: Positions) ⓘ ⓐ ⓟ
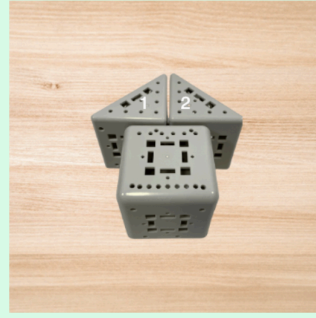
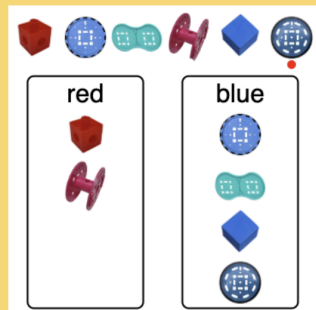**10.9.3** Positions of Linkbot Accessories (Part C: Positions) ⓘ ⓐ ⓟ

11.5.1 Measurements of Linkbot Accessories (Part A: Measurements) ⓘ ⓐ
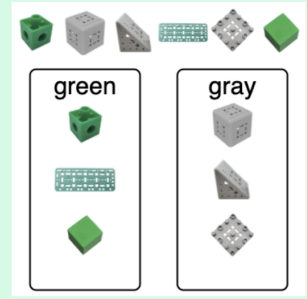

11.5.2 Measurements of Linkbot Accessories (Part B: Measurements) ⓘ ⓐ
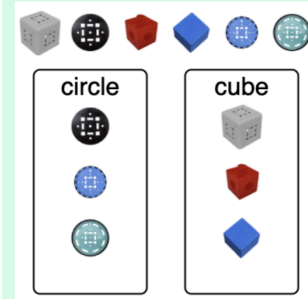

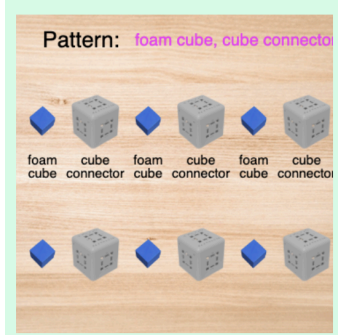**12.5.1** Classify Linkbot Accessories (Part A: Classify) ⓘ ⓐ
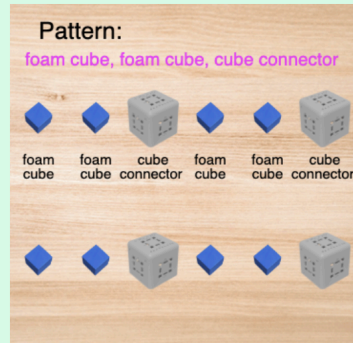

12.5.2 Classify Linkbot Accessories (Part B: Classify) ⓘ ⓐ ⓟ

12.5.3 Classify Linkbot Accessories (Part C: Classify) ⓘ ⓐ ⓟ

13.4.2 Patterns with Linkbot Accessories (Part B: Patterns) ⓘ ⓐ ⓟ

13.4.3 Patterns with Linkbot Accessories (Part C: Patterns) ⓘ ⓐ Ⓟ

Pattern:
foam cube, foam cube, cube connector

| foam cube | foam cube | cube connector | foam cube | foam cube | cube connector |
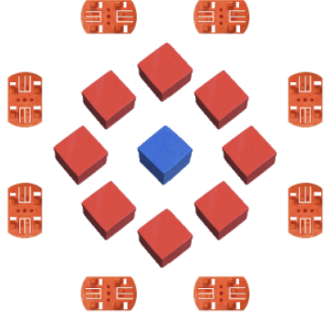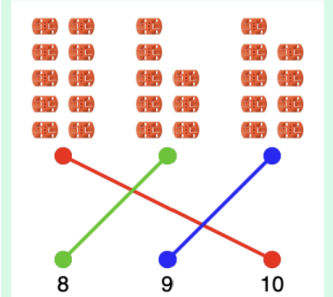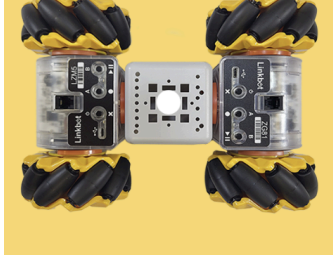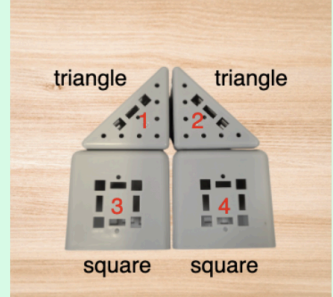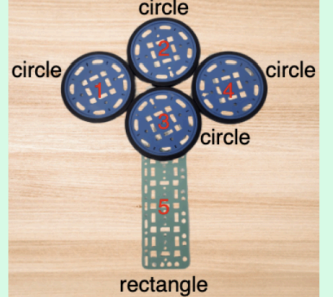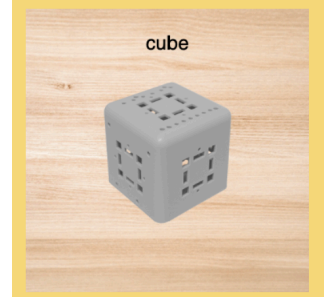
4.7.3 Use Robot for Addition and Subtraction (Part C: Addition) ⓘ ⓐ Ⓟ Ⓝ

7 + 2 = 9

ICE CREAM

in
0 1 2 3 4 5 6 7 8 9 10 11 12
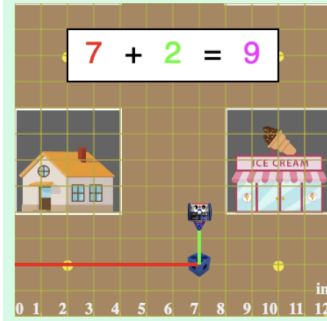
1.8.3 Fun with RoboCount (Part C: Count Up to 5) ⓘ ⓐ Ⓟ

1 One	2 Two	3 Three	4 Four	
			Tiger	
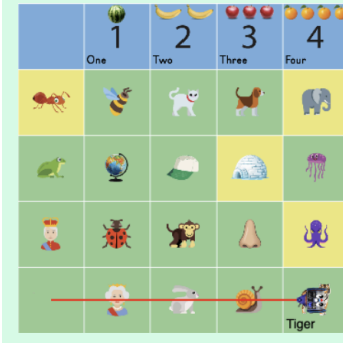
5.5 Applications of Manipulatives in Kindergarten RoboBlocky Math

1.2.4 Count Linkbot Parts ⓘ ⓐ ⓟ

3.1.6 Count the Objects (Within 7) ⓘ ⓐ ⓟ

3.2.4 Count the Objects (Within 9) ⓘ ⓐ ⓟ

4.1.5 Match Snap Connectors (Within 10) ⓘ ⓐ Ⓝ

8   9   10

8.5.1 Move an OmniBot Right or Left ⓘ ⓐ

9.11.1 2D Composite Shapes ⓘ ⓐ

9.11.4 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part C: Two-Dimensional Geometry) ⓘ ⓐ ⓟ

triangle   triangle

1   2

3   4

square   square

9.11.5 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part D: Two-Dimensional Geometry) ⓘ ⓐ ⓟ
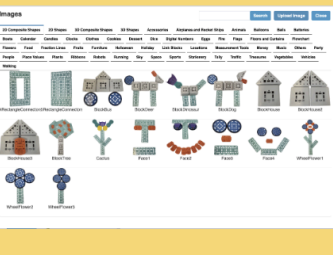
circle

circle   circle

circle

rectangle

10.11.2 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part E: Three-Dimensional Geometry) ⓘ ⓐ

cube

10.11.4 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part G: Three-Dimensional Geometry) ⓘ ⓐ Ⓟ

cube   cube
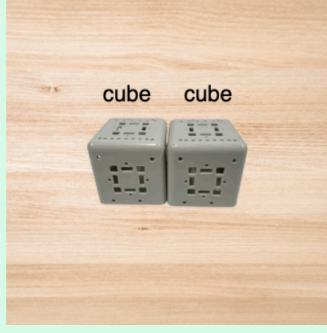
10.11.5 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part H: Three-Dimensional Geometry) ⓘ ⓐ Ⓟ

cylinder

cube
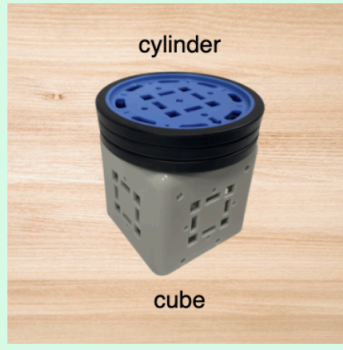
10.11.1 3D Composite Shapes ⓘ ⓐ

11.6.3 Big Idea Task: Measurements of Linkbot Accessories (Part C: Measurements) ⓘ ⓐ Ⓟ

11.6.4 Big Idea Task: Measurements of Linkbot Accessories (Part D: Measurements) ⓘ ⓐ Ⓟ Ⓝ

5 cubes long

7 cubes is longer

11.7.5 Drive Robots to Push Objects and Compare Weights ⓘ ⓐ Ⓟ

0 1 2 3 4 5 6 7 8 9 10
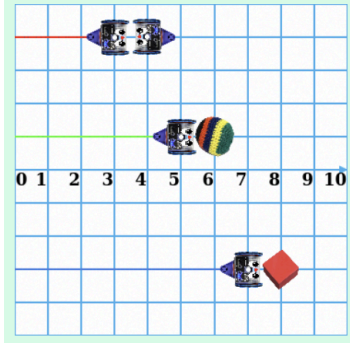
5.6 Applications of Manipulatives in Grade 1 RoboBlocky Math

12.6.1 3D Composite Shapes ⓘ ⓐ
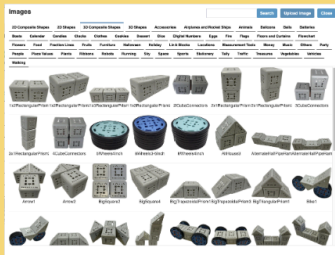
12.6.2 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part A: Three-Dimensional Geometry) ⓘ ⓐ
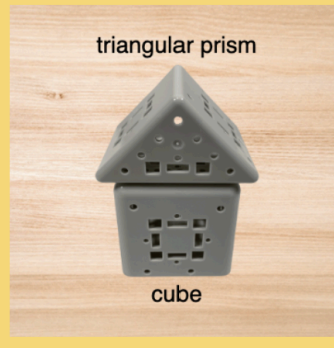
12.6.3 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part B: Three-Dimensional Geometry) ⓘ ⓐ Ⓟ

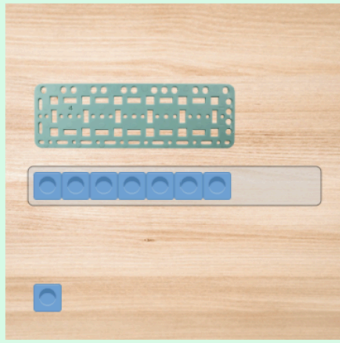**12.6.4 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part C: Three-Dimensional Geometry)** ⓘ ⓐ Ⓟ

12.6.5 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part D: Three-Dimensional Geometry) ⓘ ⓐ Ⓟ
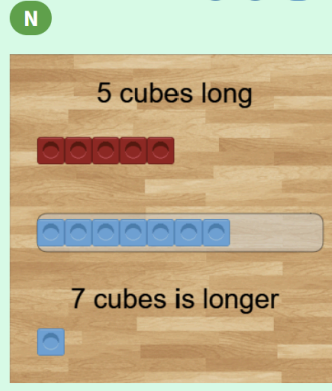

13.2.5 Draw a Trapezoid with OmniBot ⓘ

13.9.2 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part E: Two-Dimensional Geometry) ⓘ
ⓐ

rectangle

rectangle   rectangle

rectangle
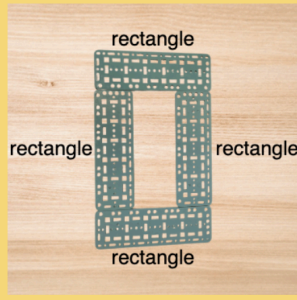
13.9.4 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part G: Two-Dimensional Geometry) ⓘ
ⓐ Ⓟ

triangle

square   square

circle
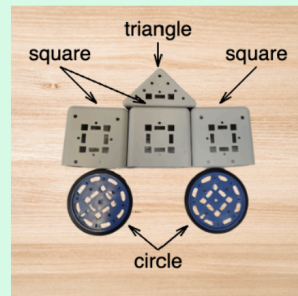
13.9.5 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part H: Two-Dimensional Geometry) ⓘ
ⓐ Ⓟ

circle

rectangle
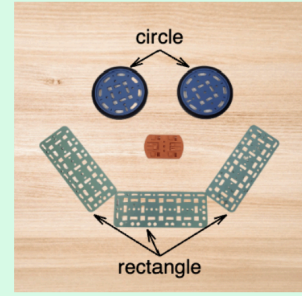
5.7 Applications of Manipulatives in Grade 2 RoboBlocky Math

8.9.4 Big Idea Task: Measurements of Linkbot Accessories (Part D: Measurements in Customary Units) ⓘ ⓐ
Ⓟ

about 7 inches

about 6 inches

about 5 inches

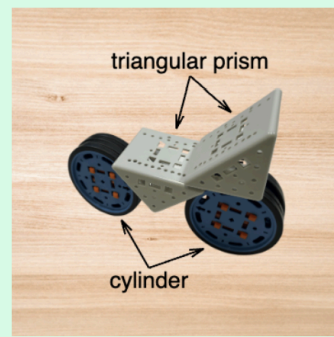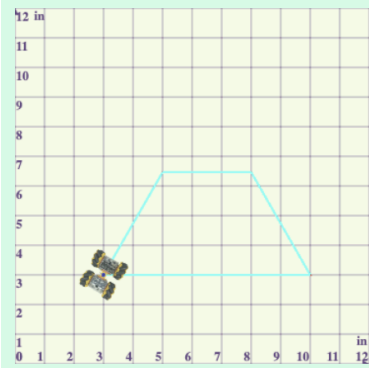0 1 2 3 4 5 6 7 8 9 10 11 12
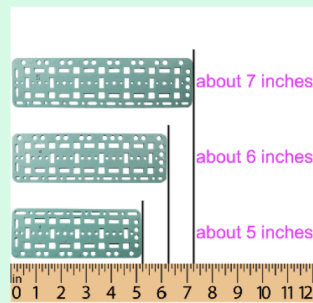
8.9.5 Big Idea Task: Measurements of Linkbot Accessories (Part E: Measurements in Customary Units) ⓘ ⓐ
Ⓟ

Linkbot

in 0 1 2 3 4 5 6 7 8 9 10 11 12

about 3 inches

12.4.2 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part A: Three-Dimensional Geometry) (i) (a)

2 cube connectors

12.4.3 Big Idea Task: Build Composite Shapes Using Linkbot Parts (Part B: Three-Dimensional Geometry) (i) (a) (P)

triangular prism
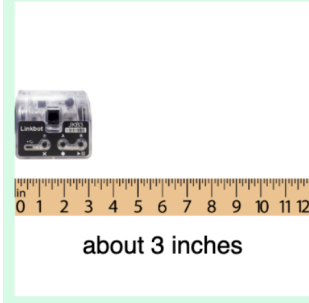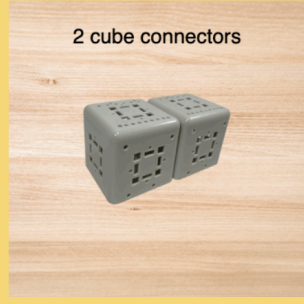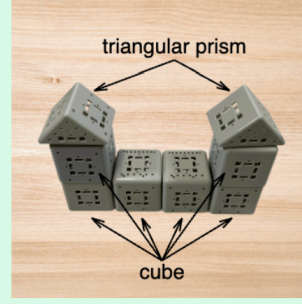
cube

6 Linkbot Robots in 4-Linkbot Bundle for Grades TK-12

Although hardware robots are not required, RoboBlocky Math offers the **optional use of Linkbot robots**, which are specially designed for math classrooms. **Linkbots are exceptionally easy to use, requiring no prior robotics experience**. While modular Linkbots as building blocks can be combined in various ways to create custom robot machines and incorporate additional sensors, as illustrated in Sample Robot Machines for TK-12 RoboBlocky Math, CS, and STEAM Programs, **the basic Linkbot configuration shown at the right is the primary one used throughout the curriculum.**

Certain sections of the curriculum are particularly suited for integrating both physical and virtual robots, depending on the lesson objectives and activities. These robotics projects are listed in the **Curriculum Overview** and in each **Chapter Guide**, which highlight where hands-on integration best supports student learning. This flexibility allows teachers to effectively accommodate different classroom setups, resources, and instructional goals.

The advantages of the Barobo manipulatives (Linkbot robots and their accessories) include:

- **TK-12 Versatility:** Uses the same platform and optional physical robots from TK through grade 12, fostering instructional continuity, collaboration, and community. Using the same physical and programming tools across all grade levels allows students to progressively deepen their learning while using the same versatile resources.

- **SnapConnect technology:** With Barobo patented SnapConnect technology, multiple Linkbots and accessories can be easily and quickly snapped together, without the need for special tools, to create a wide range of 2D and 3D shapes, and robotic systems for diverse tasks and projects, such as RoboPlay Challenge Competitions.

- **Ease of programming:** The multi-robot machines that students create can be easily programmed, allowing them to quickly engage with both math and coding concepts while seeing immediate results through interactive activities using the same platform.