2-D Geometry & Measurement Units in *Investigations*

2nd Edition

Kindergarten

Make a Shape, Build a Block — 2-D & 3-D Geometry

Students explore geometry using a variety of materials including Geoblocks, pattern blocks, interlocking cubes and geoboards. They describe, sort, and compose and decompose two- and three-dimensional shapes. They think about shapes in their environment and match two-dimensional shapes to three-dimensional objects.

Counting and Comparing — Measurement and The Number System

Students explore numbers through a variety of counting activities. They build knowledge of the counting sequence, use numerals to represent quantities, represent equivalent amounts and develop skills for accurate counting. They also begin to compare quantities. As an introduction to linear measurement, students measure and compare the lengths of objects using direct comparison.

Measuring and Counting — Measurement & The Number System

Students gain a deeper understanding of numbers and number relationships as they engage in activities in which they count, combine, and compare amounts. They develop visual images of numbers and solve problems in which they find different combinations of the same number. Students are introduced to addition and subtraction situations through story problem contexts. Work with linear measurement continues as students use non-standard units to measure the length of objects and paths.

Grade 1

Making Shapes and Designing Quilts — 2-D Geometry

This geometry unit focuses on two-dimensional shapes and the relationships between them. Students observe, describe, compare, classify, represent, and compose and decompose 2-D shapes. Students learn to use geometric language to describe and identify important features of familiar 2-D shapes. As they sort and describe groups of shapes they begin to distinguish specific attributes of triangles and quadrilaterals. As a final project, students create paper quilts by repeating combinations of triangles and squares.

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Grade 1 continued...

Fish Lengths and Animal Jumps — Measurement

This unit focuses on developing the ideas about linear measurement, which include understanding what length is and developing a foundation of skills for accurate linear measurement using nonstandard and standard units. As students measure with a variety of units they investigate the idea that different-sized units result in different measurements. Using a real world context, students measure with inch tiles and grapple with the idea of partial units and "at least as long as," ideas that are important in both measurement and number and operations. They also solve story problems which involve comparing length.

Classroom Routine: Quick Images: Drawing Shapes

Grade 2

Shapes, Blocks and Symmetry — 2-D & 3-D Geometry

Students identify two and three-dimensional shapes, focus on the properties of rectangles and rectangular prisms and identify and create symmetrical designs. Students also achieve fluency with the doubles addition combinations.

Measuring Length and Time — Measurement

Students investigate linear measurement as it applies to length and distance. They work with a variety of linear units including standard units of inches, feet, yards, centimeters and meters. Students build on their work with telling time as they measure, record and calculate duration of events using timelines and schedules.

Classroom Routine: Quick Images: Drawing Shapes

2-D Geometry & Measurement Units in *Investigations*

Grade 3

2nd Edition

Perimeter, Angles, and Area — **2-D Geometry & Measurement**

This unit develops ideas about the attributes of 2-dimensional (2-D) and how they are classified (the definition of a triangle, rectangle and square), linear measurement (which includes perimeter), area, and the measurement of angles. Using the context of perimeter, students continue to develop their ability to use measurement tools as they work on accurate linear measurement techniques. Students learn to identify angles by their relationship to a right angle (is the angle greater than, less than, or equal to a 90 degree angle?). They develop an understanding of area as the amount of flat space an object covers and determine the area of 2-D shapes in square units.

Ten-Minute Math: Quick Images: 2-D

Grade 4

Size, Shape, and Symmetry — **2-D Geometry & Measurement**

This first geometry and measurement unit focuses on classifying two- dimensional shapes, comparing the size of angles, and working with linear and area measurement, Students define and categorize polygons by identifying sets of shapes that have a common attribute, and use 90 degrees as a reference for finding the measurement of other angles. They continue their measurement work from earlier grades by measuring distance and perimeter, using both U.S. and metric units, and finding the area of polygons in square units.

Ten-Minute Math: Quick Images: 2-D

Grade 5

Measuring Polygons — **2-D Geometry & Measurement**

Students create polygons using "power polygon" pieces and discuss, apply, and evaluate definitions of these polygons. They focus on properties of quadrilaterals, and also study similarity of 2-d shapes. Measurement work includes finding measures of angles using known angles, and finding perimeter and area of rectangles.

Ten-Minute Math: Quick Images: 2-D

2-D Geometry & Measurement Units in *Investigations*

1st Edition

Kindergarten

Making Shapes and Building Blocks — Exploring Geometry

Students are introduced to geometry by looking at the 2-D and 3-D shapes in their classroom environment. Using a variety of materials including pattern blocks, Geoblocks, clay and the Shapes software students observe, describe, construct and represent 2-D and 3-D shapes. Through Pattern Block Puzzles, block structures and a game called Fill the Hexagon, students explore how shapes can be combined to make other shapes. In addition, students begin to work with 2-D representations of 3-D objects as they try to match Geoblocks to 2-D outlines of the block face

Grade 1

Quilt Squares and Block Towns — 2-D and 3-D Geometry

Students use the Shapes software, pattern blocks and Geoblocks to explore relationships among shapes. They build and sort their own boxes. They draw and build other three-dimensional constructions as they plan and create their own town. They examine the connections between two dimensions and three dimensions, using Geoblocks and other manipulatives to match faces and solids. Students explore geometric patterns in depth.

Bigger, Taller, Heavier, Smaller — Measuring

Students work with linear measurement, comparing objects of various size (Is this object bigger or smaller than my pencil?) as well as iterating units (e.g., How many hands long is this desk? How many cubes long is this object?). They explore volume and capacity (e.g., How many of these containers fill that bigger one? Which 2 of 5 bottles hold the same amount of water?). They look at area, covering outlines of shapes with pattern blocks, and creating their own sets of blocks which fit inside a certain shape outline. Finally, they explore weighing and balancing as they determine which of 2 objects is heavier, using their sense of weight (comparing objects in their hands) as well as balance scales.

2-D Geometry & Measurement Units in *Investigations*

1st Edition

Grade 2

Shapes, Halves and Symmetry — Geometry and Fractions

In this 5 week unit, the primary emphasis is on students investigating the structure of 2- and 3-dimensional shapes. Using pattern blocks, Geoblocks, square tiles, and the Shapes computer software, students explore the structure of shapes and how they can be decomposed or put together into other shapes. They investigate the structure of rectangular arrays by covering rectangles with tiles, building rectangles, drawing rectangles, and describing rectangles. They find halves of rectangles and other 2- and 3-dimensional shapes. They explore symmetry making symmetrical designs and pictures.

How Long? How Far? — Measurement

In this unit, students explore linear measurement using direct and indirect comparison, non-standard units, and the Geo-Logo software. In the first investigation, students indirectly compare lengths and find equivalent lengths using materials such as string or adding machine tape. They use non-standard units to measure length, and develop strategies for iterating and counting units. As they work with units of different sizes, students explore the relationship between the size of the unit and the number of units needed. In the second investigation, students construct and measure simple paths, in both on- and off-computer activities. They make and compare paths in the classroom, and, using Geo-Logo software, they estimate the length of straight paths and investigate turns as they direct the turtle through mazes and grids, and construct shapes and pictures.

Grade 3 continued...

Flips, Turns, and Area — 2-D Geometry

In this unit, which can be done with or without computers, students explore shape, area, and geometric motions (slides, flips, and turns) through tetrominoes—arrangements of four squares with full sides touching. Students find all possible tetrominoes, and use interlocking cubes, paper cutouts, and a specially designed computer program as they try to cover rectangles with their tetrominoes. On geoboards or dot paper, they use squares and triangles of unit and half-unit sizes to create many different (non congruent) shapes with an area of four square units. They explain how they found the area of a shape that is 5, 6, or 7 square units.

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Grade 3

1st Edition

Turtle Paths — 2-D Geometry

Students explore problems involving paths, lengths of paths, perimeter, and turns. Students create paths on the floor, on paper mazes, and on the computer using Geo-Logo. They write commands, such as forward 5, left turn 90, forward 2, to provide directions for other students or for the computer turtle to move along these paths. They use the Turtle Turner (protractor) to estimate and measure turtle turns in multiples of 30°. Students define triangles and draw them with the Geo-Logo turtle. Students solve problems involving lengths and turns, and draw rectangles (and other paths) having a total path length of 200 turtle steps. The unit ends with each student writing procedures to design a face on the computer.

Grade 4 continued...

Mathematical Thinking at Grade 4 — Introduction

This unit introduces the important processes of doing mathematics that students will use all year: mathematical, using a variety of tools and models to explore mathematics, and communicating about mathematical ideas through drawing, writing, and talking. Students use interlocking cubes and play money to show 100 and $1 in many ways, estimate and determine how many hundreds there are in a box of cubes, and play games involving money and hundreds. Students complete and find patterns on a 300 chart, and work on related problems sets involving addition, subtraction, and money. Also, students use pattern blocks to make patterns with mirror and rotational symmetry, build designs from oral descriptions, and they make symmetrical patterns on a geoboard.

Different Shapes, Equal Pieces — Fractions and Area

In this unit, which uses an area model for fractions, students represent fractions, find equivalent fractions, and order fractions. Students divide the area on a geoboard into halves, fourths, and eighths and compare various-shaped fourths to show they are the same size. They divide dot paper rectangles into thirds, sixths, and twelfths and make designs by coloring in specified fractions of the area. Students make decks of fraction cards and play games with the cards to practice finding equivalent fractions and ordering fractions.

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Grade 4

Sunken Ships and Grid Patterns — 2-D Geometry

Students name and locate points on a coordinate grid with ordered pairs of numbers, both positive and negative. They make coordinate mystery pictures and measure distances on the grid using "taxicab paths." They play Sunken Ships, identifying points on the grid and using distance feedback in their strategy for selecting a next possible location. Students discuss properties of rectangles and write rectangle procedures for the computer using Geo-Logo. They place rectangles symmetrically on a computer bulletin board. They analyze a general Geo-Logo procedure for making rectangles and use the procedure to draw and create complex rectangle patterns.

Grade 5

Picturing Polygons — 2-D Geometry

Students create polygons with shape pieces. They construct, apply, discuss, and evaluate mathematical definitions of these shapes. They analyze the properties of polygons so they can draw them on coordinate grids on and off the computer. They investigate various properties of triangles, quadrilaterals, and regular polygons, asking which remain constant and which change when making larger and smaller similar shapes. They write procedures for regular polygons using Geo-Logo turtle commands, measure lengths and angles of polygons off-computer, and look at patterns in sums of angles and of turns.