K-2 Sorting Toys

| **Lesson Overview** | |
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| **Description** | The purpose of this lesson is to introduce students to data collection, organization, and analysis through a hands-on survey about toy preferences. Students will learn to categorize data, create visual representations, and draw conclusions from their findings. |
| **Subject Area(s)** | Mathematics |
| **Grade Band(s)** | K-2 |

| **Learning Progression Alignment** | |
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| **Strand** | A - Data Literacy and Responsibility |
| **Substrand** | A1 - Nature of Data |
| **Concept** | A.1.1 Data types and forms |
| **Competency** | K-2.A.1.1a - Recognize that data can exist as quantitative, ordinal, categorical, and other values. Data also can be "nontraditional" forms such as graphical or other media. |
| **Strand** | A - Data Literacy and Responsibility |
| **Substrand** | A3 - Investigative Dispositions |
| **Concept** | A.3.1 The investigative process |
| **Competency** | K-2.A.3.1a - Recognize there is an investigative process for exploring questions about the world. |
| **Competency** | K-2.A.1.1a - Recognize that data can exist as quantitative, ordinal, categorical, and other values. Data also can be "nontraditional" forms such as graphical or other media. |
| **Strand** | B - Creation and Curation |
| **Substrand** | B1 - Organization and Processing |
| **Concept** | B.1.2 Organizing and structure |
| **Competency** | K-2.B.1.2a - Collect and record data on case cards, wherein each card represents a single case. |
| **Strand** | B - Creation and Curation |
| **Substrand** | B2 - Designing for Data Collection |
| **Concept** | B.2.1 Designing data-based investigations |
| **Competency** | K-2.B.2.1a - Formulate simple questions that guide data collection and analysis about familiar contexts, using appropriate support. |
| **Strand** | C - Analysis and Modeling Techniques |
| **Substrand** | C1 - Summarizing Data |
| **Concept** | C.1.4 Frequency tables |
| **Competency** | K-2.C.1.4a - Sort objects into a frequency table based on shared characteristics. |
| **Strand** | E - Visualizations and Communication |
| **Substrand** | E1 - Representations and Dynamic Visualizations |
| **Concept** | E.1.1 Sense-making with visualizations |
| **Competency** | K-2.E.1.1a - Create data visualizations to represent an aspect of the student's daily life. |

| **Tool(s)** | |
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| **Type** | No-Code |
| **Tool** | None |
| **Dataset** | Created by class toys / survey |
| **Materials Needed** | Assortment of toys (students bring their favorite toy from home) Survey cards (provided below) Chart paper and markers Sorting mats (provided below) Sticky notes or counters Digital camera (optional) |

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| **Lesson Plan** | |
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| **Lesson Focus** | *This lesson introduces students to the data science process through a familiar context - toys. Students will learn to ask investigative questions, collect categorical data through surveys, organize information using frequency tables, and create physical visualizations to communicate their findings.* |
| **Content Objective(s)** | By the end of this lesson, students will be able to:   * Formulate simple survey questions about toy preferences * Categorize toys into 4-5 distinct groups based on shared characteristics * Record survey responses accurately using tally marks and frequency tables * Create a physical bar graph representing class data * Draw at least 2 conclusions from their organized data using comparative language |
| **Prerequisite Knowledge & Skills** | Ability to count objects and use tally marks  Basic understanding of categories and grouping  Familiarity with comparative language (more, less, most, least)  Ability to ask and answer simple questions |
| **Lesson Details** | |
| **Lesson Hook & Warm-up**  **10 mins** | **Student Facing**  Students arrive with their favorite toy from home and participate in a "toy show-and-tell" circle where each student briefly shares what makes their toy special. |
| **Teacher Facing**   * Facilitate the sharing circle, encouraging students to notice similarities and differences between toys * Begin informal categorization by asking questions like "Who brought something you build with?" or "Whose toy has wheels?" * Record student observations on chart paper to reference later |
| **Activity 1 - Creating Categories and Survey Questions**  **20 mins** | **Student Facing**  - Students work as a class to sort their toys into 4-5 categories based on shared characteristics. They help create a simple pictorial survey question: "Which type of toy do you like best?" |
| **Teacher Facing**   * Guide students to identify natural groupings (building toys, stuffed animals, vehicles, games, art supplies) * Record agreed-upon categories on chart paper with simple drawings/labels * Model how to create and use the survey card * Demonstrate proper recording techniques using tally marks * Ensure all students understand the survey process before moving to data collection |
| **Activity 2 - Data Collection**  **15 mins** | **Student Facing**  Students move around the classroom conducting surveys with 3-5 classmates, recording responses on their survey cards using the agreed-upon categories. |
| **Teacher Facing**   * Monitor student interactions and data recording * Assist students with survey techniques and recording accuracy * Ensure each student collects data from the appropriate number of peers * Circulate to address any confusion about categories or recording methods |
| **Lesson Synthesis - Creating Class Data**  **15 mins** | **Student Facing**  Students come together to share their individual survey results and help create a class tally chart on the board, combining all responses into one large dataset. |
| **Teacher Facing**   * Create a large frequency table on chart paper or board * Call on students to share their data, adding tally marks for each response * Guide students to count totals for each category * Ask students to notice patterns as data accumulates * Introduce vocabulary: data, survey, category, total |
| **Closing Activity - Physical Graphing and Analysis**  **20 mins** | **Student Facing**  Students create a life-size bar graph on the floor using tape and toy images, then answer analysis questions about their data and develop 2-3 statements about class toy preferences. |
| **Teacher Facing**   * Create floor graph structure using tape * Guide students to place items/images in correct categories   + Facilitate discussion with questions:   + "Which toy category do most students prefer?"   + "Which category is least popular?"   + "How many more students prefer [most popular] than [least popular]?" * Record student conclusions on chart paper * Assess understanding through student responses and participation |
| **Student Follow Up & Practice** | * Students can survey family members at home using the same categories * Create picture graphs showing individual student preferences * Sort classroom toys by additional attributes (color, size) * Compare results with another class |
| **References** | * National standards for data analysis and probability (NCTM) * Computer Science Teachers Association K-12 Standards * Data Science Learning Progressions Framework |

### **Lesson Procedure**

#### **Day 1: Survey Preparation (30 minutes)**

1. **Introduction (20 min)**
   * Students get to showcase their favorite toys
   * Teacher guides discussion about different types
   * Create 4-5 toy categories as a class (e.g., building toys, stuffed animals, vehicles, games, art supplies)
   * Record categories on chart paper
2. **Survey Creation (10 min)**
   * Create a simple pictorial survey tool together
   * Demonstrate how to mark preferences on the survey
3. **Survey Practice (10 min)**
   * Students practice asking survey questions with a partner
   * "Which type of toy do you like best?"
   * Ensure proper recording of responses

#### **Day 2: Data Collection and Sorting (30 minutes)**

1. **Survey Implementation (15 min)**
   * Students conduct surveys with classmates
   * Each student collects data from 3-5 peers
2. **Data Compilation (15 min)**
   * Bring students together to compile data
   * Each student shares their survey results
   * Create a class tally chart on the board
   * Discuss total number of responses for each category

#### **Day 3: Data Representation and Analysis (30 minutes)**

1. **Physical Graph Creation (15 min)**
   * Create a life-size bar graph on the floor with tape
   * Students place toy images or actual toys in the correct category
   * Alternatively, students stand in the category of their favorite toy
2. **Analysis Questions (10 min)**
   * Which toy category do most students prefer?
   * Which toy category is least popular?
   * How many more students prefer [most popular] than [least popular]?
3. **Conclusions (5 min)**
   * As a class, develop 2-3 statements about toy preferences
   * Record statements on chart paper

### **Assessment**

* Check completed survey cards for accuracy
* Observe participation in physical graphing activity
* Listen for use of data comparison vocabulary

### **Extensions**

* Create a picture graph with images of each student by their preference
* Sort toys by multiple attributes (color and size)
* Compare toy preferences with another class

### **Survey Card**

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### **Sorting Mat**

This is what your sorting mat should look like (will want to recreate on a bigger space)

