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Sorting
Grade 1-2

Introduction
Noticing similarities and differences in shapes and designs is an important part of being mathematical. It is valuable for students to see that shapes and designs have many different characteristics and can be sorted in a variety of ways. This task is great for language development, being descriptive, paying attention to detail and being specific. These are all mathematical skills that are valuable to develop. This task also allows for them to be creative and create their own collections with a variety of characteristics. This activity is a series of sorting activities: sorting emoji, making their own collection for sorting, and sorting puzzles. You can split it into a series of 2 or 3 days of lessons depending on the amount of time you have for math in your class or chose one of the activities to do with your class.

Video
Strategies for Learning Mathematics, https://youcubed.org/weeks/week-3-grade-1-2/

Agenda for the activity

Activity	Time	Description	Materials
Mindset Message	5 min	Play the mindset video, ***Strategies for Learning Mathematics***, https://youcubed.org/weeks/week-3-grade-1-2/	• Mindset Video day 1, ***Strategies for Learning Mathematics***
Emoji Sort	15-20 min	Introduce the emoji sort to students. • Have students cut out the emoji. • Working with a partner, have students find different ways to sort emoji. Have students record with pictures and words the different ways they sorted the emoji. • Have students share with another pair or as a whole class some of their categories for sorting the emoji.	• Emoji Handout (1 per pair) • Blank white paper for recording their ways of sorting • Colored pencils/ pens

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Create your own Collection	20 min	Have groups of students create their own collection. • What collections could have different characteristics that allow you to sort? • Students create pictures of their collections • Students come up with three different ways their collections could be sorted	• Blank white paper for drawing collections • Blank white paper for recording ways of sorting • Colored pencils/ pens
Share Collections	10 min	Have students swap collections with another group. • How can you sort this group's collection? Record your categories for sorting. • Compare how you sorted with the group you swapped with. • Give students a chance to walk around the room and see the different collections other students created.	
Sorting Puzzles	20 min	Introduce students to the first sorting puzzle. • Try the puzzle once as a class so students understand the directions. • Let them work on the puzzle with a partner, completing it in more than one way. Have them consider their strategy. • As a class, share what they noticed and strategies for the first sorting puzzle. Introduce the second sorting puzzle. • Try it as a class, then have students work on it with a partner. Have them try the puzzle a couple of different ways. What do they notice? How many pieces can they use? Why can't they use all of the pieces? Could they adapt the pieces so they could complete the puzzle?	• Puzzles Handout • Shapes Handout
Debrief	10 min	What did they notice while working on the puzzle? How many pieces were they able to use? What ideas did they have for adapting the pieces? the guidelines?	

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Debrief Mindset Message	5 min	Ask students to reflect on all the Strategies for Learning Mathematics from the video: 1) Draw it out, 2) Teamwork, 3) Experiment, 4) Look for different resources, 5) Start with a smaller case. Highlight some moments when you saw individuals and groups using these strategies or ask students to share when they used the strategy or saw someone else use the strategy.	

Activity

Emoji Sorting:
This is a series of sorting activities. You may choose to split up these activities over multiple days depending on the time you have for your math lesson.

In pairs, have students sort the emoji and then describe and record their categories for sorting. For example, they could sort based on those that have glasses and those that do not. Encourage students to describe their categories in whatever way they can with enough specificity that others will understand: using pictures or words. For K, have students glue down the emoji on a paper with their categories and then share with their neighbors the different ways they sorted the emoji.

Once they have sorted in one way, have them find another way to sort. Can they come up with a way to sort that has three different categories rather than only two? After they have had a chance to sort the emoji into a few different categories and have had an opportunity to record their categories, they can compare their sorting categories with a different pair of students. Which categories have they created that are the same? Which categories are different? As a class, share some of the different ways that students sorted the emoji.

In pairs or in groups, have students create their own collection of at least eight items with different characteristics. What are different characteristics they can add to their collections that lead to more ways of sorting their collections? They should come up with and record at least 3 different ways to sort their items. Encourage students to be creative and draw pictures to represent their collection.

Once they have finished making their collections, have them swap collections with another group and work on different ways of sorting the other group's collection. They can record their ways of sorting as they go. After they have had a chance to come up with a few different ways of sorting the collection have them compare their ideas with the group they exchanged collections with. Allow students to walk around and see different students collections.

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Sorting Puzzles:
This is a convenient spot to split this lesson over multiple days.

Have students cut out the shapes. Have students sort the shapes in different ways. As a class talk about the different ways that students sorted the shapes and the different characteristics of the shapes.

Describe the first sorting puzzle to students. You may want to try the puzzle once as a class so that students understand how the guidelines of the puzzle. With a partner, they will take turns placing shapes on the table next to each other. If they come to a point where they cannot make another turn, they can rearrange the shapes to see if they can complete the puzzle. This is a non-competitive puzzle where both students work together to complete the task. The rules of the puzzle are included below. As students are working on the puzzle ask them what strategies are helpful.

When students have had a chance to complete the first puzzle a couple times, ask students what they are noticing. Did they have any strategies that were helpful?

Introduce the second puzzle to students. Give them an opportunity to try it a couple of times. What are their strategies? Why can't they use all the pieces? Could they adapt the pieces that that they will work? Could they revise the puzzle so that they could use all of the pieces?

As a whole class debrief around these questions. Let students know that being a mathematician involves exploring ideas and asking questions. When they ask questions about something they are doing the work of mathematicians. This year in math class they will need to explore ideas and ask lots of questions.

Ask students to reflect on all the Strategies for Learning Mathematics from the video: 1) Draw it out, 2) Team-work, 3) Experiment, 4) Look for different resources, 5) Start with a smaller case. Highlight some moments when you saw individuals and groups using these strategies or ask students to share when they used the strategy or saw someone else use the strategy.

Materials:

- Scissors
- Emoji Handout
- Paper for recording sorting categories
- Paper for creating own collection
- Puzzles Handout and Shapes Handout

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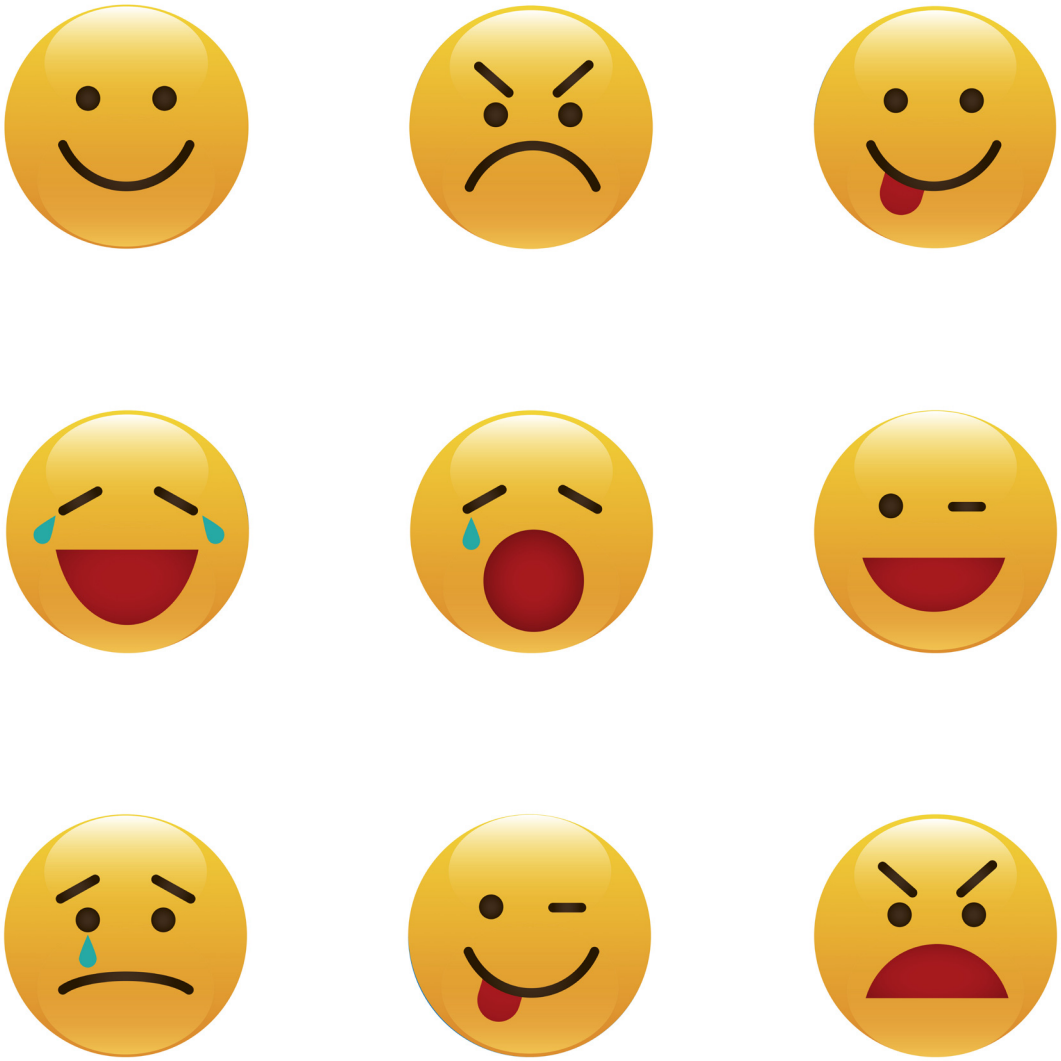
Sorting
Emoji Handout



Find as many different ways as you can to sort these emoji into groups.

Now make your own collection of items (at least 8 items) and show all the different ways you can sort them. Exchange collections and see how many ways you can sort your neighbor's collection.

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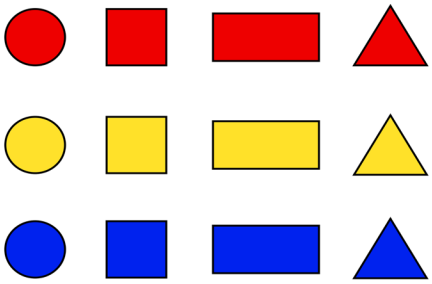
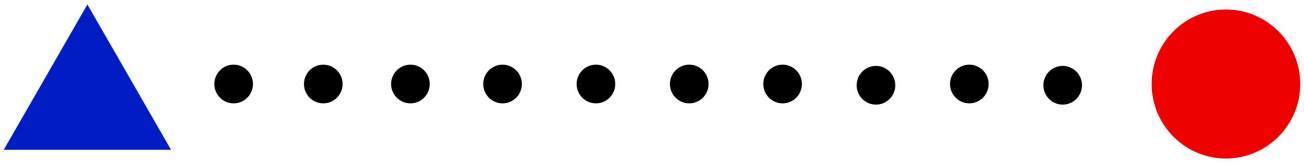
Sorting
Puzzles Handout

Here is a set of shapes.



Each of these pieces is either a different color or shape from the others.

For each of these puzzles arrange all of the shapes in a line starting with the blue triangle and ending with the red circle. With a partner take turns placing shapes. If at any time you get stuck, rearrange the pieces to see if you can complete the puzzle.



Puzzle 1:
Arrange all the shapes in a line so that you change either color or shape in the next piece along, but not both. (For example after the blue triangle you would have to either have a blue shape or another triangle.) Try this puzzle again. Is there more than one way to do this? What is your strategy?

Puzzle 2:
Arrange all the shapes in a line changing first the color then the shape then the color then the shape, continuing in this order. You won't be able to use all the pieces in this way. How many can you use? Try completing the puzzle in a few different ways. Why do you think you cannot use all the pieces? Can you adapt the pieces so that you can complete the puzzle? Could you adapt the puzzle so that you would be able to use all of the pieces?

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Sorting
Shapes Handout