

Curriculum topics:

- Patterns
- Creativity
- Critical thinking
- Logic
- Puzzles

Subjects:

**Mathematics,
Language Arts,
Physical Science**

Grade range: 3-12

Who we are:

Resource Area for Teaching (RAFT) helps educators transform the learning experience through affordable “hands-on” activities that engage students and inspire the joy and discovery of learning.

For more ideas and to see RAFT Locations

www.raft.net/visit-raft-locations

ATTRIBUTE SUDOKU

Make some creative connections!



Students who enjoy puzzles will find this activity very intriguing. This provides opportunities for both “logical” and “visual” thinkers to shine!

Materials required

Per team of 1-4 students:

- Grid with nine spaces in a 3x3 matrix, at least 5 cm (2") on a side (download a master of a grid at www.raft.net/raft-idea?isid=726)
- Variety of small objects (such as bottle caps, corks, paper clips, rubber bands, pebbles, magnets, photos), which vary in appearance (such as color, shape, texture) each needs to fit into the grid above, 18 or more
- Bin or bag to hold above items

Teacher tip: use the same or similar items for each group – this will allow better comparisons between the puzzles created by different teams.

Design Challenge Introduction

Attribute Sudoku can be used to achieve a number of different learning objectives. It is particularly valuable as a tool for stimulating creative thinking. Here is a simple way to introduce the activity:

Hold up a familiar object, such as a spoon. What are some “attributes” of this object? (Metal, grey, narrow)



Hold up a second object, such as a paper clip. What attributes does it have in common with the spoon? (It is also metal, grey, and narrow!)

With a little prompting, the students can discover there are dozens of creative ways to make connections between any two objects.

Doing the activity (for teams 1-4 students)

Object of the activity

Goal: Select nine objects and sort them into three groups of three. The objects in each group need to share a common attribute. Place the objects on a grid so each attribute is represented once in each row and column. See the illustration (page 1) and the key (right) for an example of an Attribute Sudoku.

SWEET	SOFT	METAL
SOFT	METAL	SWEET
METAL	SWEET	SOFT

Note that none of the soft items are sweet or metal. Elegant solutions are based on unique attributes!

Introducing the activity

If needed, introduce students to the idea of Sudoku using the RAFT Idea Sheet *Tactile Sudoku*.

1

Model this activity for the students as a class. Have students stand in a circle around the collection of small objects. Select a random object. Invite the students discuss the object:

- What is the object made of?
- What is it normally used for? What else could it be used for?
- What do you notice about its shape, color, weight, texture, etc.?
- What is unusual about it?



2 Place the object in the center of the Sudoku grid as shown in figure 1.

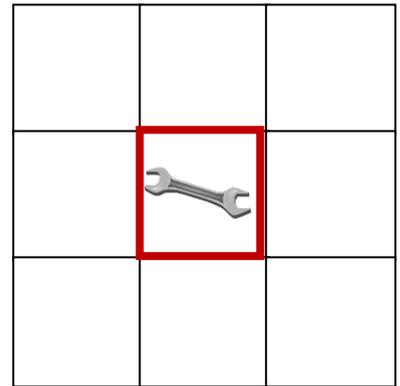


Figure 1

3 Ask a student to select another object and answer the same questions about it. The goal is to find at least one thing it has in common with the first item that was discussed. Let's say they are both "metal." Put it in a corner of the grid as shown in figure 2.

Teacher tip: Some students will be very literal about attributes. Encourage far-fetched attributes!

4 Invite the students to look through the remaining items and find another metal item. Put that item in the corner of the grid so the three metal objects form a diagonal as shown in figure 3.

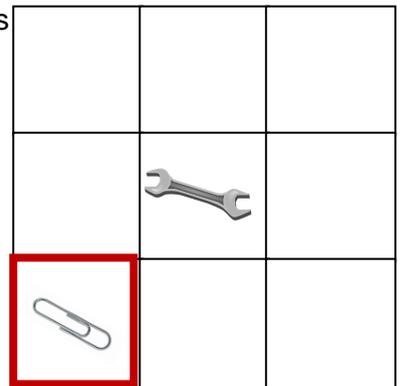


Figure 2

5 Now find an object that is not metal. Put it in an empty square as shown in figure 4.

6 Find another object that shares an attribute with the last item. (Say they are both "sweet.") Keep going in this manner until all nine squares are filled and the goals of the game are met.

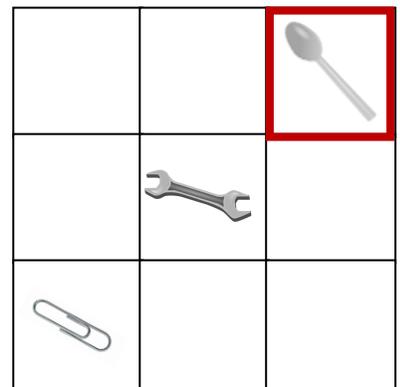


Figure 3

Teams do the activity independently

7 Have each team of students collect their bag of objects spread it out and review the items – brainstorming attributes, choosing 9 items – 3 groups of 3 items that share an attribute. Note: Students need to use different attributes from the ones used as a class above.

8 Have pairs of teams take turn figuring each other's puzzles. Encourage students to reason out loud – as it is very interesting/good feedback for the team who created the puzzle to hear how it is viewed by others.

9 Optional: Have teams select a new set of 9 objects and repeat.

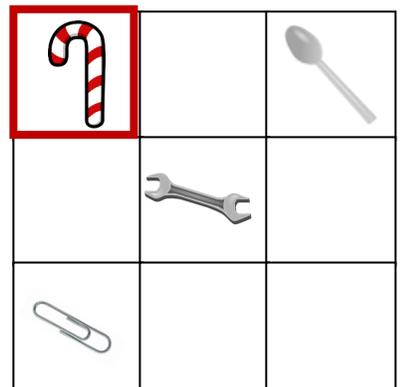


Figure 4

The content behind the activity

Seeing creative connections between things is a very valuable skill for designers. For example a creative designer noticed that an old-fashioned pointer stick and a laser beam have a common attribute – they both point in a straight line. Result: a laser pointer!

Curriculum Standards:

Patterns
(Common Core Math Standards: Operations & Algebraic Thinking, Grade 4, 5; Grade 5, 3)

Problem Solving and Reasoning
(Common Core Math Standards: Mathematical Practices Grades 3 - 12)

Science & Engineering Practices
(Next Generation Science Standards Grades 3 – 12)

Conversation & Discussion
(Common Core English Language Arts Standards: Grades 3 - 12, Speaking & Listening, 1 & 6)

Presentation of Knowledge and Ideas and Evaluation of Arguments
(Common Core English Language Arts Standards: Grades 3 - 12, Speaking & Listening, 3 & 4)

The content behind the activity (continued)

In all areas of work, being able to find common themes and shared attributes is a very useful skill.

- If three people have different opinions, can you find one thing they all agree on?
- If a customer has several different requirements, can you design one product that addresses them all?

Similarly, in the working world there is seldom “one right answer.” In this activity, different teams using the same materials will create very different Sudoku solutions. In fact it is almost guaranteed that no two teams will see the same materials in exactly the same way!

Learn more

- Add squares to the grid so the students need to find more unique attributes.
- Once the students make a grid successfully, challenge them to put the same objects in a different creative arrangement.

Related activities: See RAFT Idea Sheets:

Coming Full Circle - <http://www.raft.net/ideas/Coming Full Circle.pdf>

Sorting Trays - <http://www.raft.net/ideas/Sorting Trays.pdf>

Tactile Sudoku - <http://www.raft.net/ideas/Tactile Sudoku.pdf>

Thinking on the Outside of the Box - <http://www.raft.net/ideas/Thinking on the Outside of the Box.pdf>

This Reminds Me of the Fair - <http://www.raft.net/ideas/This Reminds Me of the Fair.pdf>

Resources

Visit www.raft.net/raft-idea?isid=726 for “how-to” video demos & more ideas!

See these websites for more information on the following topics:

- **Can Sudoku Make You Smarter?**
<http://voices.yahoo.com/how-playing-sudoku-may-benefit-mind-2670404.html>