Classify and Understand

Sorting activities to help students understand
Science concepts

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Sorting Activities for Science

These activities are designed to help students understand scientific concepts

How to Use the Sorts:

1. Copy onto card-stock then cut them up and have students work in pairs to put them back together.

2. Give a partially filled out sort and have students work in pairs to finish it.

3. Students make their own sorts on index cards or a blank template for other groups to solve.

Type of Sorts:

1. Stand and Sort: Each student receives a card and silently walks around to find others who have a card that goes with the set.

2. Sit and Sort: Students work in pairs or individually to organize the cards into either given categories or self-created categories.

3. Categories defined vs. undefined: In a **defined sort**, the categories are clearly marked and there is usually only 1 or 2 correct answers. For example, there are 4 headers all planets, all in simplified form and in bold. Students must find cards which describe features of each planet, visual image, location and historical fact.

In an **undefined sort,** students take a group of science terms create some order of their own. In these situations, students must impose some order on the cards, sort them, and then name the heading or classification system. For example, pass out space related terms from the textbook: *Mars, Apollo 13, Armstrong, lift, drag, gravity, comet, NASA, light year, atmosphere, radiation, John F. Kennedy, solar system, orbit, eclipse, moon, satellite, Soviet Union, propulsion…* Students might group the terms by size, origin, location, purpose, person, place, substance, breakthrough, force, political. Then they would describe how they group them and offer their rationale. Terms that were unknown could be put to the side and defined later.

Keys to Making a Defined Sort

1. **Deepening understanding of concepts**: In order to make the sorting cards more effective think about how you can expand the way the topic or concept is developed. For example, for a term like predator you might give the following: a description; a picture of a predator; description of the role they play; origin of the word (Latin root, prefix, suffix); and non-examples, or hints, or special circumstances. For a number concept like 2 meters give the following: 200 centimeters, about 2 yards; the height of a very tall person; .02 kilometers, metric unit for length from the Greek word metron: to measure, related words: thermometer, perimeter, metronome, a picture of a 2 meter object, and a question: How many meters are in 10 K race? Or if you run a 10K race in 40 minutes, how many meters per second are you running?

2. **Difficulty levels**: One of the most important things to consider when creating a sort is its challenge level. Often it works best to build in some easy parts and some more rigorous parts. It can also be helpful to have two or three sorts with a variety of difficulty levels but on the same topic. This will allow students who finish early or are ready for a more difficult task to try an another sort.

3. **When students finish**: It's important to have a task ready when students finish early. Consider the following:

   a. Have students add more order (go from big to small; organize vertically as well as horizontally (i.e. put all definitions in the same row)
   b. Have an answer key so students can check their own
   c. Have students make their own sort using a template to guide them
   d. Have students complete a worksheet sort, with some boxes empty
   e. Have some open problems on the sort that need solutions
   f. Have students try a more difficult sort

g. Play a quiz game (have partner turn a card upside down while partner looks away, partner has to name the upside down card)
h. Partners choose one sorting group/category and present it to the class

4. **Questions to ask,** while students are working or when they say "finished"
   A. How did you get started? Which did you find easiest to sort? Why?
   B. How are you working together? How do you share the work? What did you do when you got stuck?
   C. Can you think of another way to organize this? Can you organize them from greatest to least? Can you find a way to organize them horizontally as well as vertically?
   D. What if this card was changed to this… What if you added another row, what would it be? Can you think of something that would have made this more difficult?
   E. If I put this card here, why would it be wrong? Can you understand my mistake? What would you tell me to help me to get me on the right track?
   F. Could there be more than one way to sort these?
   G. How do you know you have it correct? Did you make any small mistakes when you were working? How did you correct them?
   H. Did this deepen your understanding at all? Why or why not? What would have made it better?

Delineate	**Justify**	**Infer**	**Interpret**
Describe precisely in detail; outline; define; indicate exact position	Show or prove to be right	Use prior knowledge and clues to make educated guess; Deduce or conclude; Read between the lines	Explain the meaning of; Translate; Describe what you have found out
From Latin: *De* = out *Lineare* = line	From Latin: *Jus* = law, right	From Latin: *In* = into *Ferre* = bring	From Latin: *Interpres* = translator *Inter* =between
On maps, colors are used to _____ the boundaries of countries. It is difficult to _____ the difference between the candidates positions.	Can you _____ your math answer and prove it is correct. Does the end _____ the means?	Based on the dialogue and his tone, I can _____ that Snape does not like Harry Potter.	Students must _____ the words and phrases to see how specific word choices shape meaning.
	GIVEN: △ABC has a 30° and a 60° angle PROVE: △ABC is a right triangle Conclusions | Justifications 1.) Let ∠A=30° and ∠B=60° | 1.) This information is given. 2.) m∠C=90° | 2.) The Triangle Sum Theorem says that the sum of the angles of any triangle is always 180°. 3.) △ABC is a right triangle | 3.) The definition of a right triangle says it must have a 90° angle.		

Sedimentary Rock	**Metamorphic Rock**	**Igneous Rock**	**Processes that move/change rocks**
Made of particles eroded from other rocks	Created when other rocks are transformed by heat or pressure	Created when Magma cools and hardens	Transportation, Deposition, Lithification, Consolidation
Deposited into layers (strata) and squeezed into rock	Comes from Greek word meaning to change form	Hot material can crystallize into different minerals	Volcanic eruptions
Fossils often found here	Occurs at 300-700 degrees Celsius	Can cool above or below ground and at different rates	Heat/pressure
Sandstone Shale Limestone Coal	Marble Slate Schist Quartzite	Obsidian Basalt Pumice	Weathering And Erosion

Genetics	**Anatomy and physiology**	**Ecology**	**Cell biology**
DNA	Digestive system	producers	membrane
Punnett Square	Nervous system	consumers	prokaryotes
genotype	Circulatory system	Nitrogen cycle	Photosynthesis and respiration
recessive	hormones	predation	Mitosis and meiosis

Adaptation	**Water Cycle**	**Electricity**	**Machines**
Camouflage	Precipitation	Circuit	Lever
Body fat	Condensation	Conductor	Ramp
Fur	Evaporation	Insulator	Wheel and axle
Large paws	Water vapor	Electrons	Complex machine

Inner Planets	Outer Planets	Galaxy	Satellite
Group of 4 planets closest to sun	Group of 4 planets furthest from sun	Any huge group of stars in the universe clustered together	The name for one orbiting body that goes around another
Mercury Venus Earth Mars	Jupiter Saturn Uranus Neptune	Milky Way Andromeda	the moon; communication devices; spy cameras
Are terrestrial, having rocky or solid surfaces	Are mostly huge and gaseous	The nearest one is light year away	Are often man-made and used for commercial purposes
My very eager mother…	Just served us nachos	Our galaxy appears as a white stretch across sky	Held in position by a balance of gravity and centrifugal force. Can lose speed and fall to earth over time.
