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"Making Education Work for All Georgians"

Middle/High School Activities for Students and Parents

Note: Parents will need to assess their child's ability to engage in the following activities and decide whether certain activities are age-appropriate. This list is being provided to help parents identify teachable moments at home that are both innovative and cost-effective.

Clean Water Using the Sun!

What You Need:

- a wide plastic basin
- a smaller jar or glass for collecting the clean water
- a large piece of transparent plastic, plastic wrap can work
- string or rubber band to hold plastic in place
- a stone
- salt

What You Do:

1. Mix salt in some tap water. Put salty water in the bottom of your basin. Make sure the water is below the height of your collecting jar.
2. Place your collecting jar in the middle of your basin.
3. Cover the basin with the plastic wrap. Make sure that it is secured tightly at the edges. Use a string or rubber band to seal off the edges.
4. Place a stone in the middle of the plastic wrap just above your collecting jar.
5. Carefully move your solar still into the sun.
6. Observe carefully.
7. After a few hours, when you take your solar still apart, taste the water in the collecting jar. What happened? Did you notice drops of water appearing on the inside of the plastic? Where did they come from?
8. Try to think about and describe the two changes of state that have occurred to the water that collects in the collecting jar.

What Happened?

When water evaporates it leaves all of its impurities behind. If there are any bacteria or dissolved salts, they are left behind in the basin. Only pure water evaporates and is condensed on the plastic. This is why the water in the collecting jar is not salty.

Watch Acids and Bases Produce Color!

What You Need:

- Bowl
- 1/4 cup water
- 1/4 cup vinegar
- 1/2 teaspoon turmeric
- 1/2 cup rubbing alcohol
- 1 teaspoon baking soda
- Clear drinking glass

What You Do:

1. Have your child combine the turmeric and rubbing alcohol in the bowl.
2. Combine the baking soda and water in the glass.
3. Help your child to pour a sufficient amount of the turmeric/alcohol combination into the glass to effect a color change. Ask her to observe the reaction. What color was produced?
4. Have your child pour the vinegar into the glass.

What's Going On? Adding the pH indicator to the basic solution should have turned it red. Adding an acid (vinegar) made it foam and revert to its original yellow color.

Match That! A Spatial Observation Game

What You Need:

- Duplicate set of common household items (coins or Legos work great, as long as there are at least two of each item)
- Cloth large enough to cover items
- Timer
- Paper and pen or pencil

What You Do:

1. Arrange five related items on a table. For example, one penny, one nickel, one dime, and two quarters.
2. Set the timer for 30 seconds and have your child study the arrangement of coins during that time. He may not write anything down to help him remember.
3. At the end of the 30 seconds, cover the coins with the cloth.
4. Give your student the duplicate set of items (another penny, nickel, dime, and two quarters in this case) and have him arrange the items in the same pattern as the ones under the cloth.
5. When he is satisfied with his arrangement, remove the cloth and compare the patterns. Award 1 point for each coin that matches the pattern, being as specific as possible – is

the coin facing head or tails up, is it turned in the same direction? Use the paper and pen to keep track of the points.

6. Your turn! Now your child gets to set the pattern for you. Take your turn and tally the score.
7. Continue play by rearranging the items and adding one more item each round for a total of five rounds. In addition, up the challenge by decreasing the time allowed for observation each round by five seconds. Keep track of each of your scores for each round.
8. At the end of five rounds, tally the score for each player and crown the champion of observation!

Experiment with Magnetism: Making a Hanging Compass!

What You Need:

- Clear wide-mouthed glass jar or plastic cup
- Pencil
- String
- Large steel sewing needle
- Smaller steel needles
- Magnet

What You Do:

1. Carefully rub the pointed end of the needle on one end of the magnet 30 to 50 times. This will align the electrons in the needle, magnetizing it.
2. To test that the large needle is magnetized, place one of the smaller steel needles on the tabletop. Have your child try to pick up the small needle with the large one. If it works, the large needle is magnetized. If it doesn't work, repeat step 1, making sure to rub in only one direction to keep from mis-aligning the electrons.
3. Once the needle is magnetized, have your child knot one end of a piece of string around the middle of the large needle. Adjust the placement of the knot so that the needle hangs level from the string.
4. Have your child knot the other end of the string around the middle of the pencil.
5. Have your child lay the pencil across the mouth of the jar or cup so that the needle is hanging inside. Shorten the string if the needle is touching the bottom of the jar. The needle will now turn to point to magnetic North.
6. Watch as the needle turns to point to magnetic North. You've created a compass!

SAT Card Shark: Strategies for Sentence Completion!

What You Need:

- Your teen's favorite card game, such as Solitaire or Uno
- Post-it notes, smaller than the playing cards
- Pen

What You Do:

1. Use the pen to write strategies for Sentence Completion Items on individual post-it notes. (See the list of strategies below.)
2. Attach the post-it notes to the front of various playing cards.
3. Your teen can play her card game as usual. As she encounters the strategies notes, she reads them and then peels them off the cards. At the end of the game, she can re-stick the post-it notes to the cards so the game is ready for her next study break.

Strategies:

- **Do the questions in the order they appear.** (In this portion of the test, the questions are arranged in order by difficulty, with the least difficult appearing first.)
- **Think of an answer that might fit in the sentence *before* you look at the answer choices.**
- **Look for transitional words.** (Transitional words are words such as “however,” “but,” “in contrast,” etc. They indicate that something important is about to come up in the sentence, such as a contrasting or supporting point.)
- **Don't randomly guess.** (You're better off leaving an answer blank than guessing randomly on the SAT. No points are deducted for blank answers.)
- **Look for appositions.** (An apposition is a word or phrase placed next to another word or phrase to define or clarify it. For example: “The cat, who had orange and black fur, blended in nicely with the sunflowers.” Appositions are usually set off by commas, and often give critical clues to the sentence completion. They may even provide a paraphrased version of the answer!)
- **Look for familiar word parts in unfamiliar words.** (Suffixes, prefixes, root words, and related words can really help to break apart an unknown vocabulary word into meaningful parts so that you can guess at its likely meaning.)
- **Mark any questions you skip over in the test booklet so you can go back to it later if you have time.**

How Do Oil Spills Harm Wildlife?

What You Need:

- Liquid soap
- Water
- Corn oil
- Toothbrush
- Vegetable oil
- Feather

What You Do:

1. Encourage your child to make a chart titled "Absorbed," "Repelled," and "Changes" across the top.

2. Ask him to also write "Water," "Oil," and "Liquid Soap" along the left side. Draw lines to make a grid.
3. Give your child the feather to examine. Ask him to look closely at the feather. What is its structure?
4. Have him dip the feather in the water. He should record whether the feather absorbed or repelled the water.
5. Instruct your child to dip the feather in the oil. Ask him to again record whether the feather absorbed or repelled the oil. Did anything else unusual happen to the feather?
6. Sprinkle water on the oil-soaked feather. Does the feather absorb or repel the water this time?
7. Invite your child to place some water in the bowl and add the liquid soap.
8. Try to remove the oil with the soapy water and the toothbrush.
9. What were the results? When he added oil, the feather should have drooped, and lost its ability to repel water.
10. Ask your child how well he was able to clean the feather. Did it return to its original condition?

What's Going On?

Feathers are constructed of strands of hair and miniature "hooks." This construction keeps the feathers close to the body, and maintains warmth and dryness. Oil compromises this ability, and endangers the bird's life.

Make a Homemade Thermometer!

What You Need:

- Tap water
- Rubbing alcohol
- 11-ounce clear, narrow-necked plastic bottle
- Red food coloring
- Clear plastic drinking straw
- Modeling clay
- Store bought thermometer (optional)

What You Do:

1. Add equal parts of tap water and rubbing alcohol to the bottle, filling about 1/8 to a 1/4 of the bottle.
2. Add a couple drops of red food coloring and mix by shaking the bottle.
3. Put the straw in the bottle, but don't let the straw touch the bottom.
4. Use the modeling clay to seal the straw in place. Leave a portion of the straw sticking out from the bottle, making sure the clay forms a tight seal around the straw and over the bottle mouth, but don't close off the straw's opening.

5. To test if the homemade thermometer works have your child place his hands around the bottle and observe what happens to the mixture in the bottle.

Other ways to test the thermometer are by placing it in a windowsill and observing how it reacts to the heat or cold there, or placing the thermometer in a bowl of hot water (always be careful!), followed up by placing the bottle into the refrigerator and the freezer.

What's Going On?

Just like any thermometer, the mixture expands when it's heated. As the alcohol-water mixture expands it moves up through the straw. If the bottle were to get very hot, the liquid would have come through the top of the straw.

As an extension, mark a scale for the thermometer; you'll need a real thermometer. By placing your homemade one in different areas of temperature you can use the store-bought thermometer to identify the exact temperature: use a pen to mark the line of the liquid on the bottle and write its value. Find other areas of varying warmth or coolness to create a temperature range for your thermometer.

Make Beeswax Lip Balm!

What You Need:

- 2 tbsp coconut oil
- 1 tbsp of beeswax
- ½ tsp honey
- ¼ tsp baking soda
- Several clean tin lids, or small tin or glass jars
- 1 microwave-safe bowl
- 1 fork or whisk
- Wax paper
- Saran wrap or aluminum foil
- Essential oils (optional)

What You Do:

1. Place the beeswax and coconut oil in a microwave-safe bowl. Use less beeswax for a softer lip balm or the entire tablespoon for a firm lip balm.
2. Cover the bowl with a piece of wax paper and heat the beeswax and coconut oil in the microwave for 3 minutes, checking it every 30 seconds to make sure it doesn't overheat.
3. After the mixture is melted, take it out of the microwave, being careful not to spill it or burn yourself.
4. Add the baking soda, honey, and essential oil to the mixture. Whisk together, using the fork, for at least a minute.
5. After the mixture appears consistent throughout, pour it equally among the tin lids or jars.

6. Carefully place the containers into the refrigerator; let cool. If you do not have access to a refrigerator, set the tin lids aside in a cool area to give it a chance to harden.
7. Place a piece of plastic wrap over each tin of lip balm to keep dust out and moisture in. If using small jars, simply close them up with their accompanying lids.

Make Loofah Soap!

What You Need:

- Large loofah sponge
- Block of glycerin soap – available at craft stores
- Soap fragrance (optional) - available at craft stores
- Glass measuring cup
- Metal spoon
- Microwave
- Plastic wrap
- Tall glass drinking glasses
- Knife
- Scissors

What You Do:

1. Dampen the loofah in water and squeeze out the excess. Cut the loofah in half with the scissors into 3 inch pieces.
2. Cut a generous piece of plastic wrap and sit a piece of loofah down in the center of the plastic. Pick the plastic wrap up and lower the loofah into one of the glasses, with the plastic wrap covering the sides of the glass. Do this with the other pieces. Make sure that the plastic wrap edges hang over the edge of the top of the glass so that you can pour the soap into the cup without it touching the glass.
3. Next, cut the glycerin soap base into squares and put them into the glass measuring cup. Begin to heat this in the microwave at 30 second intervals. Do not heat the soap for more than 30 seconds at a time. Do not let the soap boil. Stir the soap in between.
4. When the soap is melted you can add your fragrance. Add to the specifications of the product that you purchased. Most likely it will not be very much. Fragrances are very concentrated, so use caution.
5. Pour the soap in the glasses, over the loofahs. Let them sit overnight to set up and cool.
6. Remove the soap from the drinking glass and then remove the plastic wrap. If you have trouble removing it from the glass, put it in the freezer for about 10 minutes.
7. Use a knife to cut the loofah soap into slices. You can store this for a few months. It makes a great exfoliating soap and it really scrubs well!

Cleaning Copper Pennies!

What You Need:

- 20 dull and dirty pennies

- ¼ cup white vinegar
- 1 teaspoon salt
- A clear shallow bowl (not metal)
- Paper towels
- Spoon

What You Do:

1. Put the salt and vinegar into the bowl and stir until it dissolves.
2. Put the pennies into the bowl for about 5 minutes. Watch them when they first go in. What do you see?
3. Take half the pennies out and place them on a paper towel.
4. Take the second half out and rinse them off very well. Place them on a paper towel and mark it as being “rinsed”.
5. Wait about an hour and then check back on your two piles. What differences are there between the two? Record the differences and make some guesses about why they are different. The rinsed pennies will be bright and new looking.

What Happened?

When the vinegar and salt dissolve the copper oxide they make it easier for the copper atoms to join with the oxygen in the air and the chlorine in the salt. When the pennies are not rinsed it allows the chemical reaction to occur. This makes up a compound called malachite which is what coats the dark pennies.

Make Baking Soda Toothpaste!

What You Need:

- 1/4 cup baking soda
- 1 tablespoon salt
- Water
- Peppermint oil
- Mixing bowl
- Spoon
- Toothbrush
- Jar with lid
- Measuring cups and spoons
- Internet access (optional)

What You Do:

1. Mix the baking soda and salt together in the mixing bowl.
2. Add a few drops of peppermint oil to the mixture.
3. Gradually add small amounts of water to the dry ingredients, stirring constantly as you do.
4. Continue adding water until the mixture reaches a thick paste.

5. Wet your toothbrush and add a pinch of the mixture to the bristles.
6. Brush your teeth, rinse your mouth out with water, and analyze the results.
7. End the activity by looking up the ingredients in regular, store bought toothpaste. Can you identify all the ingredients? Compare it to the toothpaste you have just made and decide which you prefer.

CSI Science: Get the Fingerprints!

What You Need:

- Pencil
- Index card or piece of white paper
- Transparent tape or clear packing tape
- Talcum powder or cornstarch
- Small paint or makeup brush with very soft bristles
- Spoon or drinking glass
- Cocoa powder
- Identiprint (optional)

The patterns of ridges on our fingers are unique. No two individuals, even identical twins, have fingerprints that are exactly alike. We leave impressions, or prints, of these patterns on everything we touch. The prints can be visible, as when our fingers are dirty or oily, or they can be "latent," as when they are made only by the sweat that is always present on our finger ridges. Not even injuries such as burns or scrapes can change the fingerprint structure.

What You Do:

1. The easiest and cheapest method to take a fingerprint is to rub pencil lead all over a small area of paper or index card to make an "ink" pad. Press your fingers onto the penciled area, then lift the prints from your fingers with transparent tape and place the tape on a white index cards for reading.
2. A "high-tech," neat, and not too expensive fingerprint method is to use "Identiprint" materials. Identiprint is a commercial system used by retail merchants to put customers' thumbprints on the backs of their checks without making an inky mess. Special "ink" pads and self-stick labels take a dark, clear print without leaving any visible residue on the thumb. Ask your local retail merchant to give you a small supply for use with your child.
3. A day or two before the activity, place your fingerprints on some common household object such as a drinking glass, table top, or spoon.
4. Have your teen look at his fingerprints with the magnifying class and try to identify what type he has. The Federal Bureau of Investigation categorizes prints by three main patterns: arches, loops, and whorls. Have your teen use the Internet to find pictures to help him identify the unique characteristics of his fingerprints.

5. To dust for fingerprints, sprinkle talcum powder or cornstarch on dark surfaces and cocoa powder on light surfaces where you left visible prints. Have him use the small paint or makeup brush to gently swipe off the excess powder.
6. Next place a large piece of transparent tape, or clear packing tape, over the print, carefully peeling off the fingerprint and placing it on an index card or piece of white paper. Challenge him to identify the arches, loops, and whorls within the lifted “latent” fingerprints to see if it’s yours or his!

Extension: Certain chemical fumes react with the perspiration or organic residue left in a fingerprint. Have your teen experiment for themselves: all they will need is a square of aluminum foil folded in fourths, a glass jar, “Superglue,” and a smooth object like an ink pen. They should wipe down the object and then hold it for a minute so that their fingers leave prints. Set the object inside the jar. Next, put several drops of superglue on the middle of the pie plate and turn the jar upside down over it. The strong chemical fumes from the cyanoacrylate in the glue will react with the residue from their fingers enabling them to see white fingerprint images on the object after about half hour.

The ABC’s of Analyzing an SAT Essay Prompt!

What You Need:

- Sample SAT essay prompts, available online or in SAT review books
- Paper and pen

What You Do:

Choose one SAT essay prompt to practice. Go over the ABCs and DEFs of analyzing and responding to the prompt:

- **A** stands for **all**. Be sure to read **all** of the given prompt before beginning to write. In addition to the prompt itself, there may be an introductory paragraph containing background information about the prompt or its author. Read **all** of this information, as it may prove helpful in writing your response.
- **B** stands for **before**. **Before** you write, make a plan for your writing. What exactly is the question asking you to do? Underline key words in the prompt. Decide what your main position on the issue will be. Choose one or two strong examples that you will use to defend your perspective on the issue. Don’t forget that you may use your test booklet as scratch paper to make notes, but your essay must be written on the test paper. B also stands for **breathe**. Now that you have a plan in place **before** you write, you’re well on your way. Relax.
- **C** is for **coherent**. As you begin writing, be sure to make sure that your essay flows in a coherent way. This means that you’re staying on the topic, and the writing sticks together in an organized way. **Coherent** and well-organized writing begins with an introduction, has a body of support in the middle, and ends with a conclusion.

- **D** is for **develop**. SAT Essay scorers report that many low-scoring essays have great ideas, but the ideas lacked development. After you've stated your position in the essay, spend lots of time **developing** it by providing clear examples.
- **E** is for **explain**. It's better to choose only a few examples and **explain** them thoroughly than to choose many examples and leave them oversimplified in your essay. Don't move on to a second example if you haven't thoroughly explained the first. Always tie your examples back to the original essay prompt to keep them relevant.
- **F** is **first** person – point of view, that is. You may refer to yourself as "I" in your essay, since you are presenting your own personal opinions and experiences in the essay.

As your teen practices responding to SAT essay prompts, discuss the ABCs and the DEFs with him. Did he keep it coherent? Write it in the first person? Read all of the prompt before getting started? Set up a system for scoring his sample essays, and keep an eye on his improvement. He'll be ready for the test in no time!

Make a Quill Pen!

What You Need:

- Large wing feathers (A pack of plain turkey quill feathers can be bought for under \$3). Try to find feathers that are about 12" long or more, with a thick shaft.
- An art knife to cut the correct angle on the feather shaft
- Ink in a bottle - can be purchased at most craft and art supply stores. You might want to start with non-permanent ink until you are experienced.
- Cutting board
- Marker
- Tweezers

What You Do:

1. Select your feather. You need a feather long enough to hold comfortably, with a sturdy shaft (the spine of the feather). Prime wing feathers can be purchased from places like www.ostrich.com or you can gather one on a nature walk. Quill pens were most often made from goose feathers, but turkey feathers were also popular. You can leave the feather as is, or trim the sides of the feather for several inches, to leave more room for a better grip.
2. Follow the natural curve of the feather. You want your writing point to point down.
3. Take your marker and make a dot at the point where you'd like the writing tip to be. Place your marked feather on a cutting board. With a sharp knife, cut the end of the quill at a slant less than 45 degrees.
4. Take the tweezers and clean out any materials left in the cut shaft.
5. Dip your new quill pen into some non-permanent ink. Give your child a chance to experiment with the quill. How does using it change his penmanship?

Homework: Including Parents in the Process-Module 4

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