S.T.E.A.M. Type 3 – Activity #1

Dear Parents/Caregivers:

Welcome aboard! This activity sheet, along with the accompanying You Tube instructional video (see above), offers your children some fascinating explorations with trains. These activities are based on an educational design known as S.T.E.A.M. (**S**cience, **T**echnology, **E**ngineering, **A**rt, and **M**ath) - a way to learn about a topic through purposeful investigations, creative and critical thinking opportunities, imagination, and focused learning adventures.

These projects can all be done at home using simple materials. Watch the accompanying video with your child and gather the necessary materials for each activity. Allow your child to complete each project to the best of her or his capabilities - encouraging and assisting where necessary. Take some time to talk about how each activity relates to trains in general and the Northern Central Railway in particular. You're in for quite an adventure!

BE SURE TO CHECK OUT OUR YOUTUBE CHANNEL FOR TUTORIALS ON EACH ACTIVITY

S (Science):

Materials: two metal spoons, about four feet of cotton string, two paper clips, a sharp pencil, two styrofoam cups.
Directions: 1) use a pencil to punch a small hole in the bottom of each cup. 2) thread the string through the hole in one cup (from the outside to the inside). 3) tie the end of the string to the middle of a paper clip. 4) pull the string tight so the paper clip rests inside the cup. 5) thread the other end of the string through the bottom of the other cup, tie it to a paper clip, and pull it tight against the bottom of the cup. 6) hold the string in the middle so that the two cups hang down. 7) tie a small loop in the middle of the string. 8) insert the handle of one spoon through the loop. 9) hold the two cups (one in each hand) and allow the spoon to hang down. 10) put one cup over each ear (like headphones) and bend over so the string does not touch any part of your body or clothing. 11) ask a friend or parent to tap the hanging spoon with the other metal spoon. What do you hear?

Trains make lots of different sounds: whistles, creaks, groans, clickety-clacks, and screeching brakes. Sound is simply vibrations that travel through the air. In this activity, hitting the hanging spoon with another spoon made the spoon vibrate. Those vibrations traveled up the string and into the cups. Your ears picked up those vibrations and your brain interpreted them as sound.

T (Technology):

Throughout history, humans developed several devices to make work easier. The best-known ones are called **simple machines** and include the wheel and axle, the inclined plane, the lever, the pulley, the screw, and the wedge. The chart below lists those six simple machines and includes examples of each one. With your child, walk around your house to locate some of the examples in the chart below. Check off the ones you discover. Then, look at some You Tube videos of trains, on-line photos of trains, or walk around the NCR station or a NCR train to see if you can locate a few of these examples. Again, check off the ones you discover. There's room to add any new discoveries not on this list.

SIMPLE MACHINE	EXAMPLES
Lever	☐ shovel ☐ see-saw ☐ hammer ☐ wheelbarrow ☐ ☐
Pulley	☐ clothesline ☐ flagpole ☐ window blinds ☐ ☐
Wheel and Axle	☐ doorknob ☐ car ☐ train wheels ☐ bicycle ☐ ☐
Inclined Plane	☐ stairs ☐ ramp ☐ slide ☐ ladder ☐ ☐
Wedge	☐ knife ☐ ax ☐ plow ☐ saw ☐ scissors ☐ ☐
Screw	☐ drill ☐ bolt ☐ screw ☐ bottle top ☐ light bulb ☐ ☐

E (Engineering):

Materials: colored craft sticks, plastic drinking cups

Directions: 1) Place two rows of plastic cups upside down and side by side on a table. 2) Criss-cross colored craft sticks on the bottoms of each of the cups (see the photo on the next page) so it looks like railroad tracks. 3) You are beginning to build a bridge (or train trestle) for an imaginary train. 4) Try to create one or more of the following bridges:

- A long straight bridge
- The curviest bridge possible
- A bridge that crosses over a gap between two tables (pretend the gap is a river that must be crossed).
- A two-story bridge
- A bridge that goes over a pile of books (a mountain).

Bridges or train trestles are an important part of any railroad system. They allow trains to cross over deep valleys or wide rivers. This activity will help demonstrate the challenges railroad engineers often face when they need to get a train over or past some geographical barriers.

A (Art):

Materials: craft sticks, masking tape, colored markers

Directions: 1) Line up 8-15 craft sticks side by side and flat (see the photo on the left below). 2) Secure the sticks together with strips of masking tape. 3) Flip the secured sticks over so that the taped side is on the bottom. 4) Draw a picture of a train across all of the craft sticks (you may want to use an on-line photo or illustration of a train as a guide). 4) When your drawing is complete, turn the sticks over and remove the masking tape from the back. 5) Jumble up the pieces so they are out of order. 6) Give the sticks to a friend or family member and ask them to arrange the sticks in the right order to re-create your original drawing. HINT: To make your puzzle more challenging, tape more sticks together before creating your train drawing.

M (Math):

Geometry is the study of lines, angles, and shapes. Throughout the world, there are several basic geometric shapes including squares, rectangles, circles, ovals, and triangles. If you look hard enough, you can find these shapes throughout your house, around your neighborhood…in fact, almost everywhere you look. For example, this piece of paper is a rectangle and the letter "O" (printed several times on this sheet) is an example of a circle.

Directions: 1) Walk around your house and locate examples of various geometric shapes. 2) Check off the examples you find on the chart below. 3) Add any additional examples not on this chart. 4) Look at on-line photos or You Tube videos of trains, locomotives, railroads, or train tracks. 5) How many geometric shapes can you find on those illustrations? 6) Write what you discover in the blank spaces on the chart.

Geometric Shape	In My House	On a Train
Squares	☐ window ☐ shirt pocket ☐	☐ compartment ☐ seat back ☐
Rectangles	☐ doorway ☐ bench ☐	☐ steps ☐ floorboard ☐
Circles	☐ tires ☐ plate ☐	☐ bolt head ☐ wheels ☐
Ovals	☐ mirror ☐ coffee table ☐	☐ design ☐ insignia ☐
Triangles	☐ corner shelf ☐ door handle ☐	☐ roof line ☐ coupling ☐

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These activities support the following National Science Education Standards (K-4):

- Science as inquiry
- Physical Science
- Science and technology
- Science in personal and social perspectives

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