Paper Bots

In this package you will find an engaging activity that you can do at home using materials found around your house and included in this package. This workshop is typically reserved as preparation for a visit to our makerspace where students would learn the basics of woodworking to create a wooden robot. It has been modified for at home learning. You will need access to a printer for this activity.

This lesson focuses on mathematics specifically measurements and geometry and is connected to the Ontario Curriculum for Grades 3-6. We hope you enjoy this lesson and are awed, inspired and enlightened.

CURRICULUM CONNECTIONS – Mathematics

Grade 3 – Mathematics: Measurement

- Estimate, measure, and record length, height, and distance, using standard units.
- Compare standard units of length and select and justify the most appropriate standard unit to measure length.

Grade 4 – Mathematics: Measurement

- Estimate, measure, and record length, height, and distance, using standard units.
- Select and justify the most appropriate standard unit to measure the side lengths and perimeters of various polygons.

Grade 5 – Mathematics: Measurement

- Select and justify the most appropriate standard unit to measure length, height, width and distance and to measure the perimeter of various polygons.

Grade 6 – Mathematics: Measurement

- Demonstrate an understanding of the relationship between estimated and precise measurements, and determine and justify when each kind is appropriate.
- Select and justify the appropriate metric unit to measure length or distance in a given real-life situation.

PAPER ROBOTS

60 minutes

This activity will assist children to work with 3D materials and assemble something out of abstract shapes. They will be making a 3D paper robot.

Materials

- Access to a printer
- Paper (various colours if wanted)
- Clear tape
- Markers
- Scissors
- Prism nets (see attached)
- Glue
- ROBOT PLANNING (see attached)

Pre Lesson Set Up

Gather materials and print multiple copies of the prism nets provided. Children may choose to use multiples of the net prisms to construct their robot (ie. three cones, four cubes, etc.)

Instructions

Introduction (10 minutes)

Ask the children to identify the prisms on the handouts.

Explain that they will be constructing paper robots out of the shapes. If this is the first time child(ren) have worked with prism nets, explain that they are a 2-dimensional shape that can be folded to form a 3-dimensional shape or solid. During the construction process, the child(ren) will need to consider certain things:

- How will they attach the arms and legs? Do the legs have to be attached using the prisms? Can they use rolled paper instead?
- How will the arms be attached? Do they need to cut a hole in one of the prisms and an arm poke through it?

Development (15 minutes)

- Get the child(ren) to plan out their robot using the attached worksheet. What shapes will they use? How many shapes do they need?
- What measurements will they need to take?
- How big will it be?
- Will the head, arms or legs be able to rotate?

Do not give them prism pieces until they have shown their plan. Attached is a handout to assist in planning.

Further Exploration (25 minutes)

Allow the child(ren) to begin constructing. Once they have finished construction, they can decorate their robot by adding a face and personal touches.

Conclusion (10 minutes)

Ask your child(ren) to share and discuss their robots.

- Why did you choose the shapes you did to make your robot?
- What was the hardest part of putting your robot together?
- What would you do differently if you were to build another one?
- If your robot could move, what kind of things would they help with?

ROBOT JOBS

(25 minutes)

Robots are designed to do specific jobs. How they are constructed will determine what they look like. For example, a robot designed to type on a computer would have to have fingers to hit the keys. This is an important part of any design process. You must think of what the purpose of the robot will be before you design it. This ensures the parts required are all present.

In this activity, children may choose to construct a new robot or use the one from the previous activity.

Materials

- Access to a printer
- Paper (various colours if wanted)
- Clear tape
- Markers
- Scissors
- Prism nets (see attached)
- Glue
- ROBOT PLANNING (see attached)
- What Can My Robot Do? Worksheet (see attached)

Instructions *(5 minutes)*

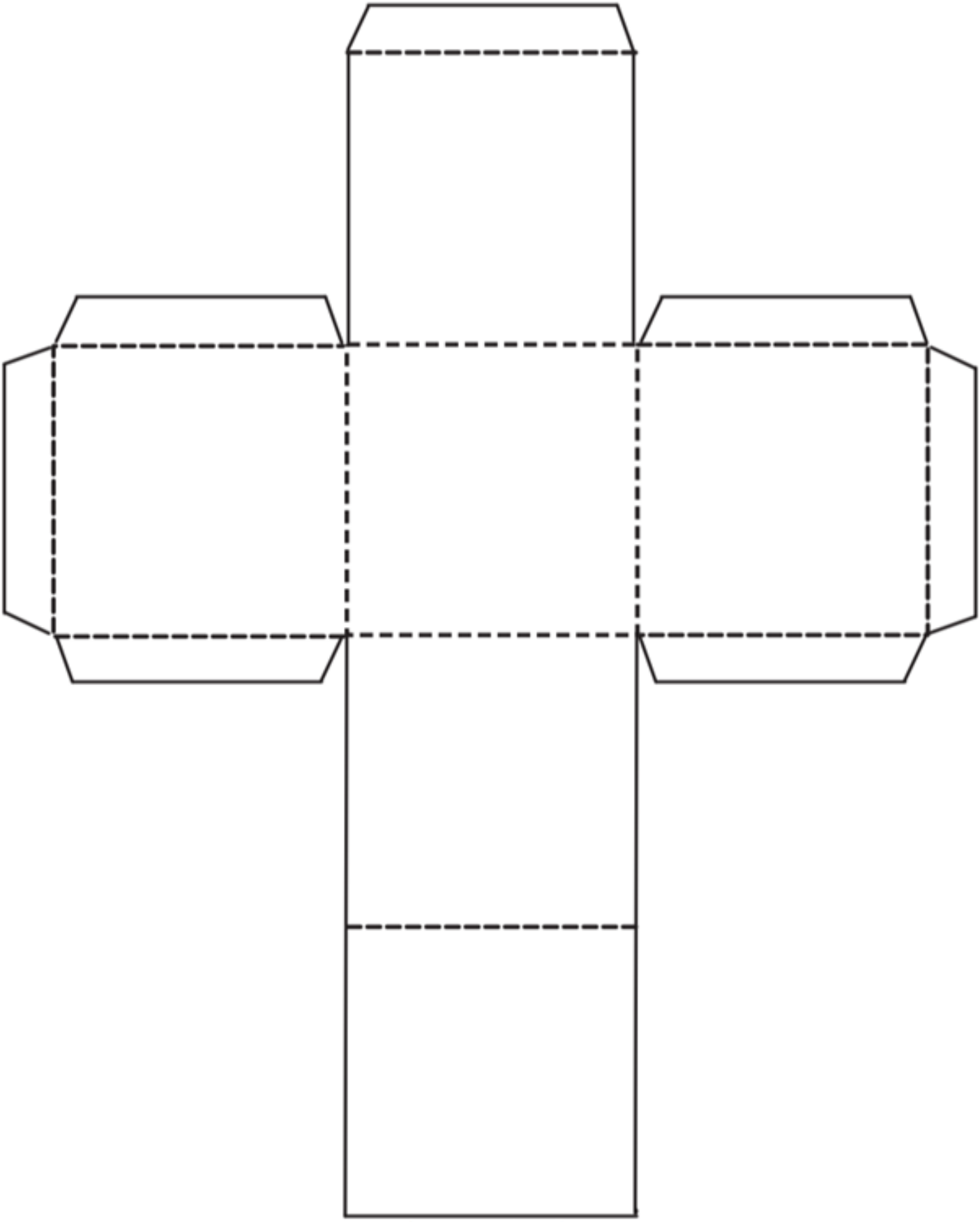
Different sizes, widths and heights are key in determining the role and strengths of something. If you were to build a robot that was designed to lift heavy things, what would it look like? Would it be tall and skinny? Short and stout? Have a discussion with your child(ren) about the different qualities and characteristics something might have and the different roles it might play.

Development (15 minutes)

Child(ren) must then come up with a name and the occupation their robot would have if it was a real electronic robot. When engineers are designing something to be manufactured, think of a car, they use clay, wood or other materials as a prototype for the design before they create the real thing. The child(ren) can use their paper robot as the prototype and will pretend they are building this robot with mechanical parts and they must speak of its purpose.

Attached is a sheet to help them in this activity.

Conclusion (5 minutes)
Have a discussion with the child(ren) about what role(s) they gave their robots and get them to justify their responses.



ROBOT PLANNING Name: _____

Design your robot here and fill in the blanks. When designing something, you must know how much material you will need. If you were constructing something out of wood, you would need to know in advanced how much to get cut.

Write in the numbers or materials needed for your robot.

I need _____ cubes.
I need _____ rectangular prisms.
I need _____ cones.
I will make arms using _____.

I will make legs using _____.

Will my robot's head, arms or legs be able to pivot? _____

What will my robot look like?

What Can My Robot Do? Name: _____

Robot name: _____

Robot occupation: _____

My robot is able to: _____

_____

_____

My robot is able to do these things because: _____

_____

_____

_____

_____

_____

_____

_____

If I were to build this robot with real mechanical and robotic parts I would add:

_____

_____

_____

_____

_____

_____

_____