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Ideas you can touch
Ideas que puedes tocar

Engaging Parents

Using STEM as a strategy to engage families and parents

Parent Engagement

- Parent involvement can make a difference

Strategies for Parent Engagement

- Building connections and community
  - Parent workshops
  - Opportunities to participate – e.g., family science night

Equipping your staff

- Training parents to
  - Facilitate STEM activities at your after-school site
  - Become meaningful partners in education
  - Add to ability to help with homework

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Activity Title: Paper Towers

Focus Questions:
Can you build a paper tower strong enough to support a hardcover textbook at least 12 inches above the table for 30 seconds or more?
What is the lowest cost design you can build?

Materials: (maximum per person)
10 sheets of paper (8.5 inches x 11 inches)
10 inches of ½-inch-wide masking tape
12-inch ruler
Scissors
Hardcover textbook

Science, Technology, Engineering, and Math (STEM) Questions:
S - How might the thickness of the paper affect the strength of your tower?
T - What would make your tower stronger? What other materials would you want to use and why?
E - Are there shapes that are stronger than others? Can you design, test, and use evidence to prove that some shapes are stronger?
M - If your tower supported a 2 lb. book, how many pieces of paper would you need to support a 5 lb. book? How much would it cost? How about a 10 lb. book? How much would it cost? Suppose you wanted to use paper to hold up a 1000 lb. billboard. How many pieces of paper would you need and how much would it cost? (Ignore the effect of wind.)

Connections to Everyday Life:
Civil engineering, construction. Engineering projects often allow engineers to use only certain amounts or kinds of materials. Also, many materials come in standard sizes from the store, and engineers must adapt their design to make use of these materials.


• What kind of marks did your machine leave on the paper? Do the marks remind you of anything?
• What happens if you take away or add another drawing tool to your machine?
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Activity Title: Hinged Mirrors

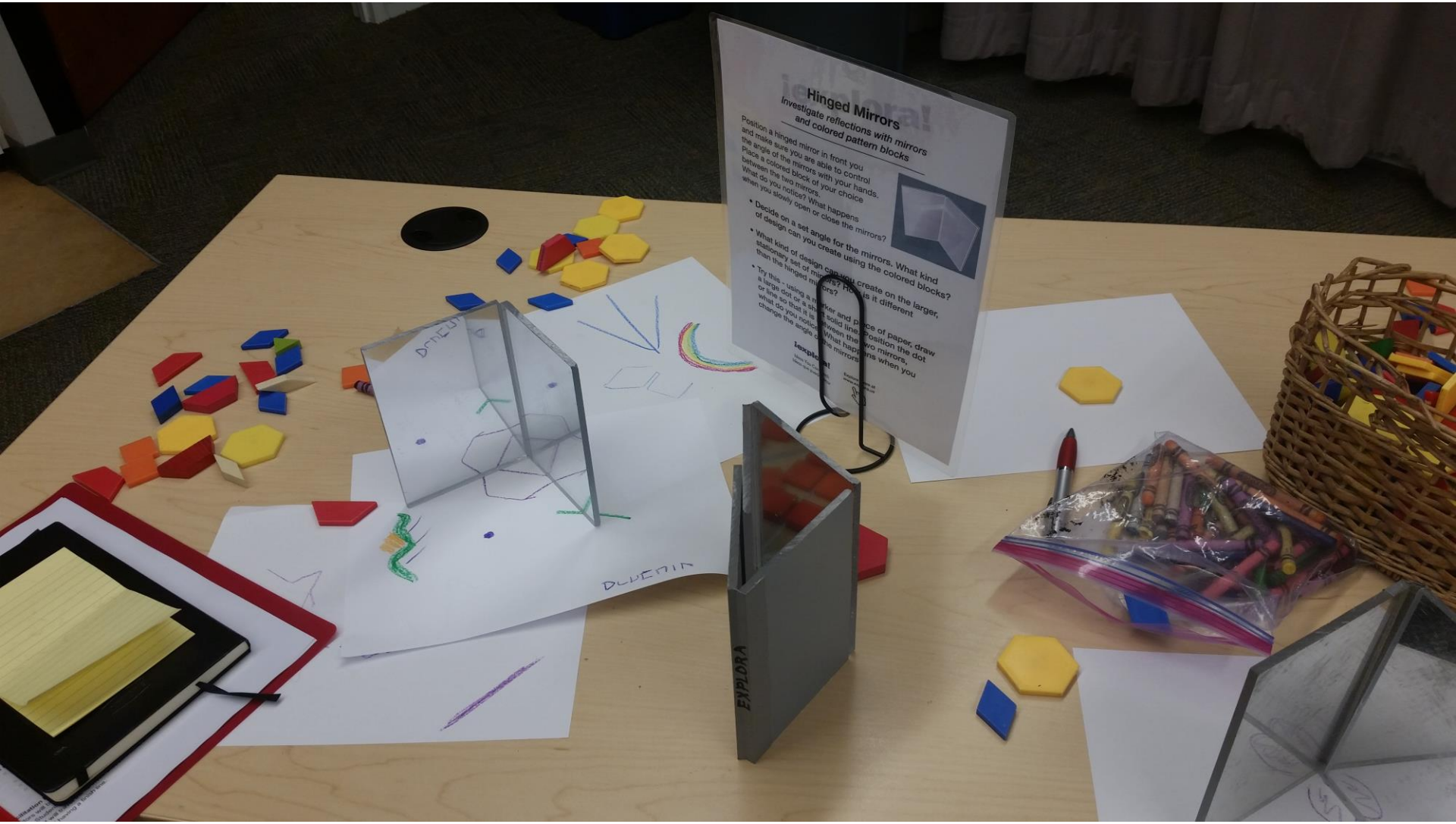
Take Home Message:
We can use mirrors to help see in places we could not see otherwise and to see ourselves. Mirrors can also be used to explore the ideas of symmetry and reflection.

Focus Questions:
How many reflections of yourself/an object can you make?
How do you increase or decrease the number of reflections?
How can you change a pattern or reflection by moving the mirrors?
How can you use mirrors to find the line of symmetry (where the reflection matches the object)?
Can you create a flower using only one drawn petal?
Can you make a secret message for friends to discover using mirrors?

Materials:
Non-consumables
Sets of 'hinged' mirrors - two mirrors taped together on one edge
Pattern blocks of various shapes, sizes, and colors

Consumables
Copy Paper
Washable Markers, crayons, colored pencils or pens

Set-Up Notes:
Place 3 to 6 hinged mirror sets around the table. A supply of the pattern blocks can be kept on the table in a small container. Containers for markers, pens, and the like can be used for organizing materials at the table. Basic designs with pattern blocks set up in a few mirrors can be a starting point for a student. Underneath other hinged mirrors, white copy paper with a large dot or a bold line drawn can be an entry point for shape investigation.


Hinged Mirrors
Investigate reflections with mirrors and colored pattern blocks
Position a hinged mirror in front you and make sure you are able to control the angle of the mirrors with your hands. Place a colored block of your choice between the two mirrors.
What do you notice? What happens when you slowly open or close the mirrors?
• Decide on a set angle for the mirrors. What kind of design can you create using the colored blocks?
• What kind of design can you create on the larger, stationary set of mirrors? How is it different than the hinged mirrors?
• Try this...using a
a large dot or a
or line so that it
what do you notice
change the angle
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Science, Technology, Engineering, and Math (STEM) Questions:
S - How does your reflection change when you move one mirror? What kinds of reflections do you make when you move both mirrors? After creating a design with the pattern blocks, how many reflections of your design do you see?
T - Where have you seen mirrors used to allow us to see in places not directly in front of us? How is symmetry used in spaceships and satellites, cars and roads, school buildings and desks? Why?
E - Can you position the mirrors so that half of your face is reflected? Can you make your reflection upside down? How can you design and reflect a pattern (using the paper/markers or pattern blocks)?
M - How many images (of yourself or an object) do you see? Encourage a systematic adjustment of the mirrors and ask, now how many images do you see? Can you find the line of symmetry in your reflection or design?

Connections to Everyday Life:
Use of Mirrors: at home, in the car, in stores, telescopes - to see where we can not
Symmetry: found in art, nature, music, architecture, geometry

The Art of Asking Great Questions

We often reward those who answer questions, not those who ask them.

We reward “right” answers.

We teach by telling.

Opening Questions

Provoke curiosity and invite involvement.

Low cognitive entry.

- What happens when you try this?
- What does this remind you of?
- Have you ever seen this before? Tell me about it.

Exploration Questions

Focus attention and encourage active play, experimentation, discovery, and thoughtfulness.

Brings in some higher level thinking

- What do you notice? (probe)
- What would happen if . . . .
- What difference did you notice?
- What might you try instead?
- In what ways are these the same? Different?

Making Meaning Questions

Solidify their experience into a true learning event. These questions help support reflection, learning, and understanding

- Why do you think that happened?
- What evidence makes you think that?
- What would happen if we changed . . . ?
- What do you think this tells us about . . . ?
- Do you have any idea how we could test this out? What would you need to find out more?

Why not “Why”?

Why not “Why”?

The parent is leading the child through a balancing activity. The child has just managed to balance the bird on her finger. The parent wants the child to articulate what is going on.

The parent asks: “why is the bird balancing?”

Instead: What did you try?

P: as you were trying to get the bird to balance on your finger, what things did you try?

C: I tried putting the body on my finger.

P: what happened?

C: Well, it fell off.

P: What was preventing it from staying on your finger?

C: the wings were too heavy, and the extra weight pulled it down.

P: how did you change the position of the bird to fix this problem?

C: I put the beak on my finger because that is closer to the heavier side so that there is the same amount of weight on both sides of my finger.

In summary

Ideas staff can use for:

Training parents to

- Facilitate STEM activities at your after-school site
- Become meaningful partners in education
- Add to ability to help with homework