Title: Transparent, Translucent, and Opaque
Grade(s): 4th
Subject(s): Science
Author: Brenda Daniels, Angelia Groves, Tikki Hines, Valencia Eaton Jacobs
Overview: Students will become familiar with transparent, translucent, and opaque objects. Students predict whether items are transparent, translucent, or opaque. Student groups will create a product that demonstrates these concepts.

Content Standards: SC(4) 3. Recognize how light interacts with transparent, translucent, and opaque materials.
TC (3-5) 12. Create a product using digital tools.

Local/National Standards: Content Standard B Develop an understanding of light.

Primary Learning Objectives: Students will be able to recognize transparent, translucent, and opaque objects.
Additional Learning Objectives: Students will be able to produce a complete product based on RAFT (Role, Audience, Format, Topic)

Approximate Duration of Lesson: Two days / 90 minute lessons (2nd day may be needed to complete products)

Materials and Equipment:
For Teacher: Board & markers
For Students:
1.) Transparent and Opaque by Angela Royston
2.) Light Prediction Sheet
3.) Assessment sheet
4.) Bag of materials per group of 2-4 students. Include examples of transparent, translucent, and opaque materials, e.g.:
   - saran wrap
   - wax paper
   - sheer fabric
   - white tissue paper
   - construction paper
   - astro turf
   - wood
   - plexi glass
   - frosted glass

Technology Resources Needed: Computer, Internet Access, LCD projector or Promethean Board, programs (see websites listed in “Attachments”)

Background/Preparation:
Collect materials that represent each of these characteristics when they interact with light:
- Transparent – Most light rays pass through the material
- Translucent – Some light rays pass through the material
- Opaque – No light passes through the material

Procedures/Activities:
Step 1 a) The teacher has placed one of 3 items (a piece of wrapping paper, a clear drinking glass or candle
b) Have students observe the characteristics of each object and how it interacts with light. Students will examine how:

- The wrapping paper does not allow light to pass through;
- The glass or candle holder allows most light to pass through;
- The fabric softener sheet allows only some light to pass through.

Step 2

a) The teacher will go over the three items (wrapping paper, candle holder, and fabric softener sheet) and how light interacts with each.

b) The teacher will write the terms for the three types of materials on the board:

- **Transparent**- allows most light to shine through (glass candle holder),
- **Translucent**- allows some light to pass through (fabric softener sheet),
- **Opaque**- does not allow light to pass through (wrapping paper).

Step 3

a) The teacher will show students the Translucent, Transparent, and Opaque video (link below).

b) The teacher will ask the students what the definitions of transparent, translucent, and opaque are based on what they viewed and heard from the video.


Step 4

a) Hold up the wrapping paper or other opaque object and ask students what happens to the light that shines on an opaque object? (Most of it is reflected back into the room and our eyes, but some of it is absorbed by the object.) Write the terms reflected and absorbed on the board.

b) Hold up the fabric softener sheet or other translucent object and ask students what happens to the light that shines on a translucent object? (Most of the light is scattered by the object and then reflected back. Some of the light is absorbed, and some of it passes through the object.) Ask students to give evidence from their observations to support each of the explanations for what happens to light.

c) Hold up the glass or other transparent object and ask students what happens to light that shines on a transparent object? (Most of it passes through the
object, but some light is reflected back to our eyes, which is why we can see the glass.)

Step 5 (If time is not available, this can be assigned for homework. Students can locate every day objects that illustrate each of the levels of transparency.)
   a) Take a brief in-school field trip. Walk the students down the hallway, into the cafeteria, and outside the school building. Ask students to look for the different types of objects and share as they find an item that is transparent, translucent, or opaque.
   b) After returning to the classroom, have students brainstorm items around the community or in their homes that are transparent, translucent, and opaque. Make a chart on the board of the different items that are transparent, translucent, and opaque.

Step 6
   a) Explain to students they will be looking at different materials, which can be classified as transparent, translucent, or opaque.
   b) Give a bag of materials to each group of students.
   c) Students will use the Prediction Chart to predict whether each item in the bag is transparent, translucent, or opaque.
   d) Students will test their predictions by holding each object up to the light.
   e) On their Prediction Chart students should place a check by their correct predictions and explain what happens to the light shining on each type of object.
   f) Students and teachers will discuss the results together, comparing and contrasting their results.

Step 7 Group students into groups of four. Then, allow students time to create a product that demonstrates today’s topic. Use the attached RAFT topic question and table as a guide for student projects. Students should include the words transparent, translucent, and opaque in their projects.

Attachments: Prediction Chart
              Prediction Chart Answers
              Websites: www.xtranormal.com (Movie Maker)
                        www.edublogs.org (Blog)
                        http://learnenglishkids.britishcouncil.org/en/make-your-own (Comic Strip Maker)
                        www.glogster.com (Online Poster)

Assessment Strategies:
1. Assess the group RAFT product for quality and accuracy.
2. Have students use a magazine to locate two real world items in each category and classify on the assessment sheet as transparent,
translucent, or opaque.

**Extension:** Students can create an online poster using Glogster (see website list above).

**Remediation:** Students can be directed to the book *Transparent and Opaque* by Angela Royston. Students can read more information on the different types of objects as well as be informed of types of objects used and seen in everyday life. Students can read with the book on tape or can pair read.

**RAFT Table**

**Topic Question:** How do materials differ as they relate to absorbing light?

<table>
<thead>
<tr>
<th>Role</th>
<th>Audience</th>
<th>Format</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cartoonist</td>
<td>Self</td>
<td>Cartoon strip</td>
<td>Transparent</td>
</tr>
<tr>
<td>Videographer</td>
<td>Peer group</td>
<td>Video</td>
<td>Translucent</td>
</tr>
<tr>
<td>Rapper</td>
<td>Music lovers</td>
<td>Song/lyrics</td>
<td>Opaque</td>
</tr>
<tr>
<td>Blogger</td>
<td>Bloggers</td>
<td>Blog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>parents</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Name ___________________________ Date ______________

Transparent, Translucent, or Opaque
Predictions

Directions:
1. Observe the following items and predict whether each is transparent, translucent, or opaque.
2. Test your predictions and explain how each item affects the light that shines on it.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PREDICTION transparent, translucent, or opaque</th>
<th>Effect on Light (List main effect first)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Saran Wrap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Wax Paper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Astro Turf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Sheer Fabric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. White Tissue Paper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Construction Paper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Frosted glass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Wood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Plexiglass</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Transparent, Translucent, or Opaque

### Prediction Answers

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Classification</th>
<th>Effect on Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>透明,半透明,或不透明</td>
<td>透明,半透明,或不透明</td>
<td>透光，反射，吸收，不吸收，不透光</td>
</tr>
<tr>
<td>1. Saran Wrap</td>
<td>Transparent</td>
<td>Pass through, reflect a little</td>
</tr>
<tr>
<td>2. Wax Paper</td>
<td>Translucent</td>
<td>Scatter, reflect, absorb, pass through</td>
</tr>
<tr>
<td>3. Astro Turf</td>
<td>Opaque</td>
<td>Reflect, absorb</td>
</tr>
<tr>
<td>4. Sheer Fabric</td>
<td>Translucent</td>
<td>Scatter, reflect, absorb, pass through</td>
</tr>
<tr>
<td>5. White Tissue Paper</td>
<td>Translucent</td>
<td>Scatter, reflect, absorb, pass through</td>
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<td>6. Construction Paper</td>
<td>Opaque</td>
<td>Reflect, absorb</td>
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<td>7. Frosted glass</td>
<td>Translucent</td>
<td>Scatter, reflect, absorb, pass through</td>
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<td>8. Wood</td>
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<tr>
<td>9. Plexiglass</td>
<td>Transparent</td>
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