Formative Assessments in Geometry and Measurement: Putting Essential Understanding into Practice

Dusty Jones
Sam Houston State University

Overview

• Introduction
• Formative assessment tasks
  • Finding Right Angles in Shapes
  • Characterizing Obtuse Angles
  • Using Clues to Classify Rectangles
  • Is it a Square?
• Helping students move forward

Formative Assessment

• Gathering evidence about students’ knowledge during instruction
• Asking questions and listening to responses
• Presenting tasks and analyzing students’ work
• Using that evidence to adjust instruction to meet students’ needs

A bit about me

• High school mathematics teacher
• Mathematics education researcher/Mathematics teacher educator
• Parent of three children
• Fourth-grade teacher

From my daughter, at age 7

Driving Questions

1. How will you collect evidence on what your students understand?
2. What will you do with that evidence to inform future instruction?
Angle Measurement Tasks

• How can this task help us?
• How might students respond?
• How did students respond?

Finding Right Angles in Shapes

Which of these shapes have at least one right angle?

A  B  C  D

Circle the shape or shapes that have a right angle.

• How can this task help us?
• How might students respond?

How did students respond?

<table>
<thead>
<tr>
<th>Grade</th>
<th>Shape</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>30%</td>
<td>32%</td>
<td>33%</td>
<td>31%</td>
<td>28%</td>
</tr>
<tr>
<td>4</td>
<td>30%</td>
<td>35%</td>
<td>32%</td>
<td>29%</td>
<td>30%</td>
</tr>
<tr>
<td>5</td>
<td>30%</td>
<td>33%</td>
<td>35%</td>
<td>31%</td>
<td>28%</td>
</tr>
<tr>
<td>Total</td>
<td>30%</td>
<td>34%</td>
<td>33%</td>
<td>30%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Typical student responses

Matthew was in 3rd grade.

Addie was in 4th grade.

Eli was in 3rd grade.

Characterizing Obtuse Angles

All the angles shown below are obtuse:

All the angles below are not obtuse:

After looking at all these angles, write a description of an obtuse angle:

• How can this task help us?
• How might students respond?
How did students respond?

Examine my students’ responses.
What do students understand about obtuse angles?
What additional information would you like to know?
Where do we go next?

A possible next step
Identifying Obtuse Angles

Which of the shapes below have at least one obtuse angle?

A possible next step

Shape Classification Tasks

How can this task help us?
How might students respond?
How did students respond?

Using Clues to Classify Rectangles

How can this task help us?
How might students respond?
How did students respond?

Examine my students’ responses.

What do students understand about rectangles?

What additional information would you like to know?

Where do we go next?

A possible next step

Is This a Rectangle?

More and Jasmin were talking about this shape:

- Sarah: It is a square because it has all sides the same length and four right angles.
- Dudley: The shape is NOT a square, but if you turn it, then it could be a square.
- Marissa: The shape is a diamond; it is not square.

How did students respond?

Sarah: It is a square because it has all sides the same length and four right angles.

Dudley: The shape is NOT a square, but if you turn it, then it could be a square.

Marissa: The shape is a diamond; it is not square.
How did students respond?
Sarah: It is a square because it has all sides the same length and four right angles.
Dudley: The shape is NOT a square, but if you turn it, then it could be a square.
Marissa: The shape is a diamond; it is not square.

- Examine my students’ responses.
- What do students understand about squares?
- What additional information would you like to know?
- Where do we go next?

Driving Questions
1. How will you collect evidence on what your students understand?
2. What will you do with that evidence to inform future instruction?

Resources from NCTM
Developing Essential Understanding of Geometry and Measurement for Teaching Mathematics in Grades 3-5
Lehrer & Blavin 2014

Putting Essential Understanding of Geometry and Measurement into Practice in Grades 3-5
Chval, Lannin, & Jones 2016

Questions? Comments?
Dusty Jones
Sam Houston State University
DLJones@shsu.edu