

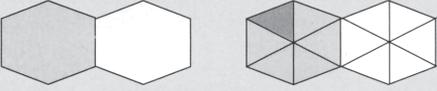
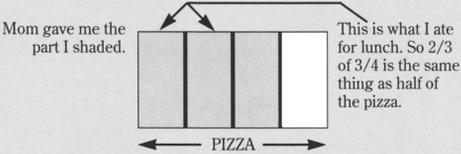
<b>Lower-Level Demands</b>	<b>Higher-Level Demands</b>
<p><i>Memorization</i>                      What is the rule for multiplying fractions?                      Expected student response:                      You multiply the numerator times the numerator and the denominator times the denominator.                      or                      You multiply the two top numbers and then the two bottom numbers.</p>	<p><i>Procedures with Connections</i>                      Find <math>1/6</math> of <math>1/2</math>. Use pattern blocks. Draw your answer and explain your solution.                      Expected student response:                        First you take half of the whole, which would be one hexagon. Then you take one-sixth of that half. So I divided the hexagon into six pieces, which would be six triangles. I only needed one-sixth, so that would be one triangle. Then I needed to figure out what part of the two hexagons one triangle was, and it was 1 out of 12. So <math>1/6</math> of <math>1/2</math> is <math>1/12</math>.</p>
<p><i>Procedures without Connections</i>                      Multiply:  <math display="block">\frac{2}{3} \times \frac{3}{4}</math> <math display="block">\frac{5}{6} \times \frac{7}{8}</math> <math display="block">\frac{4}{9} \times \frac{3}{5}</math></p>	<p><i>Doing Mathematics</i>                      Create a real-world situation for the following problem:  <math display="block">\frac{2}{3} \times \frac{3}{4}</math>                      Solve the problem you have created without using the rule, and explain your solution.                      One possible student response:                      For lunch Mom gave me three-fourths of a pizza that we ordered. I could only finish two-thirds of what she gave me. How much of the whole pizza did I eat?                      I drew a rectangle to show the whole pizza. Then I cut it into fourths and shaded three of them to show the part Mom gave me. Since I only ate two-thirds of what she gave me, that would be only two of the shaded sections.  </p>
<p>Expected student response:  <math display="block">\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = \frac{6}{12}</math> <math display="block">\frac{5}{6} \times \frac{7}{8} = \frac{5 \times 7}{6 \times 8} = \frac{35}{48}</math> <math display="block">\frac{4}{9} \times \frac{3}{5} = \frac{4 \times 3}{9 \times 5} = \frac{12}{45}</math></p>	

Fig. 4. Sample tasks for four levels of cognitive demand. From Smith and Stein (1998).

<b>Implement tasks that promote reasoning and problem solving</b> <b>Teacher and student actions</b>	
<b>What are <i>teachers</i> doing?</b>	<b>What are <i>students</i> doing?</b>
<p>Motivating students' learning of mathematics through opportunities for exploring and solving problems that build on and extend their current mathematical understanding.</p> <p>Selecting tasks that provide multiple entry points through the use of varied tools and representations.</p> <p>Posing tasks on a regular basis that require a high level of cognitive demand.</p> <p>Supporting students in exploring tasks without taking over student thinking.</p> <p>Encouraging students to use varied approaches and strategies to make sense of and solve tasks.</p>	<p>Persevering in exploring and reasoning through tasks.</p> <p>Taking responsibility for making sense of tasks by drawing on and making connections with their prior understanding and ideas.</p> <p>Using tools and representations as needed to support their thinking and problem solving.</p> <p>Accepting and expecting that their classmates will use a variety of solution approaches and that they will discuss and justify their strategies to one another.</p>