

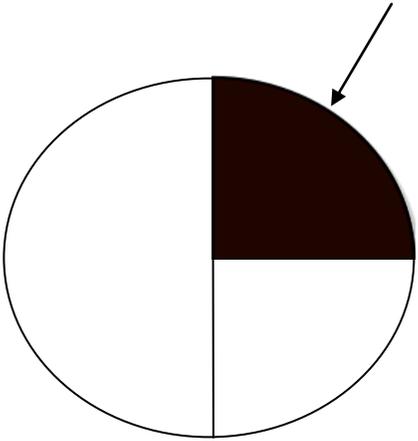
On-the-Spot Assessment:

What do they know? What misconceptions do they have?

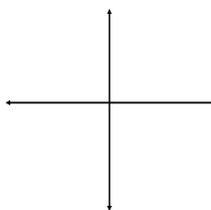
Below is a list of questions that you can ask any student to assess their understanding (and potential misconceptions) about various math concepts. Also included is the rationale for asking each question.

TIP: *When working with math, a correct answer is rarely enough information to assess a student's full breadth of understanding about a concept. We recommend that you always encourage students to explain their thinking and processes with prompts such as:*

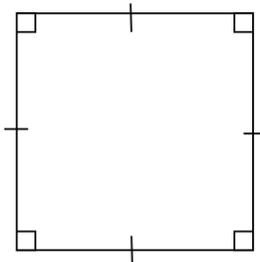
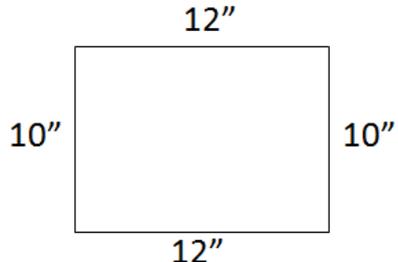
"Think out loud for me." "What is going on in your brain?" "Tell me what you are thinking."

Assessment Item	Rationale/Concept Addressed
$8 + 7 = \square + 6$	Common Misconception: A deep understanding of Equality. Ask students, 'What number goes in the box?' If students say '15', you need to teach students about what an equal sign means. (relational thinking)
$\frac{1}{2} + \frac{2}{4} =$	Common wrong answer: 3/6. Ask students to think aloud about their solution. You will learn a lot about their understanding of fractions. Students should have an intuitive sense of 'a half plus a half is 1 whole'.
$\frac{1}{4} + \frac{2}{4} =$	Common wrong answer: 3/8 Students may have a poor understanding of 'the bottom numbers need to be the same', but not remember the algorithm for adding fractions. Again, ask students to think aloud and look or them to use correct math vocabulary like 'denominator'.
What does the shaded section represent? 	Common wrong answer: 1/3 Students who answer 1/3 need to review the basic concept of fractions (part to whole) and draw pictures of fractions focusing on comparing equally sized parts. Note: Another thing to do with fractions is to ask point at the fraction bar and ask "what does this symbol tell you?". Many students do not know that a fraction bar represents division. $\frac{3}{4}$ ←
$4 + 3 \times 7$	Concept: Order of Operations. (If students answer 49, it is time to teach/review the order of operations)

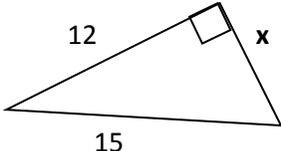
On-the-Spot Assessment (continued)

Assessment Item	Rationale/Concept Addressed
<p>Which fraction is the smallest?</p> $\frac{1}{6} \quad \frac{2}{3} \quad \frac{1}{3} \quad \frac{1}{2}$	<p>Common wrong answer: $\frac{1}{2}$</p> <p>Many students believe that the smallest #'s in the problem always result in the smallest value. If students say $\frac{1}{2}$, draw pictures of each fraction.</p>
<p>Which fraction is the largest?</p> $\frac{4}{5} \quad \frac{3}{4} \quad \frac{5}{8} \quad \frac{7}{10}$	<p>Common wrong answer: $\frac{3}{4}$</p> <p>Many students who get the previous question correct, may get this question wrong because they think 'a smaller denominator makes a larger fraction' (this only works if the numerators are equivalent)</p>
<p style="text-align: center;">True or False: Multiplication always increases a number?</p>	<p>This question is False, but many students will say true. This gives evidence that they may not be comfortable with negative integers.</p>
<p style="text-align: center;">Which is greater? 0.8 or 0.79</p>	<p>Students often have a misconception that a 'longer number' is larger. Having student compare and order a variety of numbers (specifically rational numbers) is a great activity to do with students.</p>
<p style="text-align: center;">Which is larger? 2^3 or 3^2</p>	<p>This question gives you an understanding of students ability to work with exponents. A common misconception is that both are equivalent to 6.</p>
$57 + \frac{2}{10} + \frac{4}{100} =$	<p>Students should be able to solve this problem quickly without a calculator if they have a good understanding of place value. If students can not solve this quickly, have them read the expression out loud (2 tenths) and connect this to the tenths place. 57.24</p>
<p>Graph (-3,4)</p> 	<p>Having students graph one coordinate point on 'blank' axes gives a quick indication of students sophistication with graphing. Don't have students graph an equation until you are sure they can graph coordinate points.</p>
$4x - x =$	<p>Common wrong answer: 4.</p> <p>If students say '4'. Spend some time talking about the meaning of variables, that $4x$ represents 4 times 'x', that the coefficient of the second term is 1 and more.</p>

On-the-Spot Assessment (continued)

Assessment Item	Rationale/Concept Addressed
<p>Write 3 fractions that are equivalent to $\frac{3}{4}$.</p>	<p>You can always have students work on recognizing equivalent fractions. (This sets up proportional reasoning.)</p>
<p>What is the value of the number the arrow is pointing at?</p> <p style="font-size: 2em; font-weight: bold;">67,395</p> 	<p>Common wrong answer: 3</p> <p>We want students to have a deep understanding of place value. Our hope is students would see the value of this number as '300'. Work with students on composing and decomposing numbers.</p>
<p>True or False: 2 negatives make a positive</p>	<p>This is a mantra many students memorize in 7th grade, but this mantra does not work when you are adding negative integers like it does for multiplying negative integers. Students who say 'true' most likely have a shallow understanding of the operations associated</p>
<p>Do the following problem on a calculator:</p> $\frac{84 + 63}{7}$	<p>Common wrong answer: 93</p> <p>Most calculators automatically use the 'order of operations' when doing calculations. Many students enter this expression incorrectly into the calculator (mistakenly entering $84+63/7$). If students answer 93, teach them the correct way to use their calculators. Note; Using calculators in math is not 'cheating'. Students should be given access to calculators even if they</p>
<p>What is the name of the shape pictured below?</p> <p>a) Square b) Rectangle c) Parallelogram d) Trapezoid e) Rhombus f) Quadrilateral</p> 	<p>Common misconception: The shape to the left can only be called a square. Many students struggle with the fact that this shape is also a rhombus, quadrilateral, parallelogram and rectangle.</p>
<p>How many square inches are in the rectangle pictured below?</p> 	<p>Common wrong answer: 44 square inches.</p> <p>Students often confuse calculating perimeter with calculating area. Use this question as a springboard to talk about words that indicate finding area (square units, things that 'cover' like paint, wallpaper....). Talk about words that indicate perimeter ('around'). You can also go further with this and have students calculate volumes of rectangular prisms (volume 'fill')</p>

On-the-Spot Assessment (continued)

Assessment Item	Rationale/Concept Addressed
<p style="text-align: center;">Solve.</p> $34 = 7 + 6x$	<p>8th Grade Algebra ready problem. Have students solve this problem out loud to you. You can learn a lot about students ability to solve simple algebraic equations.</p> <p>Note: many students struggle with this problem simply because 'x' is on the right side of the equals sign.</p>
<p>Tell me every thing you can about the following equation. How would a geeky math teacher describe this equation?</p> $y = \frac{1}{3}x + 4$	<p>8th gr Algebra readiness problem—What I am listening for:</p> <ul style="list-style-type: none"> • Linear equation • Slope-intercept form • 4 is the y-intercept • 1/3 is the slope. Slope is a rate of change. Rise/run. • I expect students to describe orally what the graph of this equation would look like.
<p>Find the point of intersection:</p> $2x + 5y = 18$ $x + 15y = 59$	<p>High School algebra ready. MN state law says students should master solving systems of equations in 8th grade. There are many, many ways to solve this problem. Highlight or students that the solution to this problem is a coordinate point in the form (x,y).</p>
<p>Solve for x.</p> 	<p>8th grade students are expected to master applying the Pythagorean Theorem. I use this problem, with the ones above to see if students are ready for HS mathematics.</p>