



Is it Fair to Trick Kids?

3rd Grade

A THINKLAW MATH LAB

OBJECTIVE

Thinkers will **use mistake analysis** to think like a test maker to write multiple choice questions that would trick fictional character Joe Schmo.

Lesson Outline



1. In the thinkstarter, thinkers will respond to 2 Family Feud-style questions about standardized math tests.
2. Thinkers will analyze 6 standardized math questions. Thinkers will determine the top 3 mistakes classmates might make when solving these problems.
3. Thinkers will use the top mistakes to craft multiple choice questions that might trick Joe Schmo.
4. Thinkers will synthesize these experiences to name the top 3 ways thinking like a test maker can help students take standardized tests.
5. In the thinkBigger, thinkers will determine if it is fair for test makers to use mistake analysis to trick kids. Thinkers will brainstorm arguments from both sides.



Indiana Academic Standards



3.CA.2: Solve real-world problems involving addition and subtraction of multi-digit whole numbers (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem). (E)

3.CA.3: Model the concept of multiplication of whole numbers using equal-sized groups, arrays, area models, and equal intervals on a number line. Model the properties of 0 and 1 in multiplication using objects or drawings. (E)

3.DA.1: Collect, organize, and graph data from observations, surveys, and experiments using scaled bar graphs and pictographs. Solve real-world problems by analyzing and interpreting the data using grade-level computation and comparison strategies. (E)

3.M.2: Choose and use appropriate units and tools to estimate and measure length, weight, and temperature. Estimate and measure length to a quarter-inch, weight in pounds, and temperature in degrees Celsius and Fahrenheit.

3.M.3: Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes (e.g., by representing the problem on a number line diagram). (E)

3.M.5: Find the area of a rectangle with whole number side lengths by modeling with unit squares and show that the area is the same as would be found by multiplying the side lengths. Identify and draw rectangles with the same perimeter and different areas or with the same area and different perimeters. (E)

E: Essential IDOE standards

Standards for Mathematical Practice



PS.1

Make sense of problems and persevere in solving them.

PS.2

Reason abstractly and quantitatively.

PS.3

Construct viable arguments and critique the reasoning of others.

PS.4

Model with mathematics.

PS.5

Use appropriate tools strategically.

PS.6

Attend to precision.

PS.7

Look for and make use of structure.

PS.8

Look for and express regularity in repeating reasoning.

Lesson Materials



- thinkLaw Student Work pages
- Writing Utensils
- Sample Release Items from your State Math Test (Optional)
- Sample Problems from your Curriculum (Optional)

PowerPoint Presentation:



Instructor's Note:

Asking a Family Feud-style question is a quick strategy you can use with any content.

Instructor's Note:

Have thinkers answer the questions and then give them the opportunity to share. What was the top response for the class?

Probing Questions:

- Have you ever watched Family Feud? What do you like about the show? Why do you think the show is so popular?
- Share a time you made a mistake on a math test. What did

you learn from that mistake? How has that mistake helped you avoid mistakes on other tests?

- Why do you think students rush through tests? What types of mistakes do you make when you rush?
- What do you do when you think a question on a test is confusing? What strategies can you use if you cannot ask for help?
- What qualities should a test maker possess? If you were to interview a person to be a test maker, what questions would you ask? Why are the answers to these questions important?

SEL Instructor's Note:

It is not uncommon for students to feel nervous before taking a math test.

- How do you feel before you take a math test? How do you think these feelings impact your performance on a test?
- What can you do to feel less stress when you take a test? How would that strategy help you feel better?

Name _____

Is it Fair to Trick Kids?

A thinkLaw Math Lab

thinkStarter

Family Feud is a game show. Two families compete. The host asks a survey question that was asked to a group of 100 people, such as, "Name the hour that you get up on Sunday mornings." Contestants must guess the most popular response. The game continues until one family has guessed all the answers on the board, or until time runs out.



Answer these Family Feud-style questions.

If we surveyed 100 students in our school and asked them "What is the most common mistake that students make on math tests?", what would be the #1 response?

- 1 Misreading or Misunderstanding the Question
- 2 Making Careless Computation Errors
- 3 Rushing Through the Test

If we surveyed 100 students in our school and asked them "What are the ways test makers try to trick kids on standardized math tests?", what would be the #1 response?

- 1 Using Similar Answer Choices
- 2 Using Problems that Require Multiple Steps
- 3 Using Common Mistakes in Answer Choices

thinkStarter Summary

There are common mistakes that students make on math tests. The people who make tests use mistake analysis to help them write questions that will trick kids. **Mistake analysis** is when you spend time thinking critically about

mistakes. Is this fair? In this thinkLaw math lab, we will think more about mistake analysis and thinking like a test maker.

What Would Joe Schmo Do?

Today we are going to think about Joe Schmo. Joe always falls for the trick answer. Joe does not read the directions carefully. Joe does not complete all the steps in a problem. We are going to think about the mistakes Joe may make on a math test.



Question 1



Today, Colin's Bakery made 283 cookies and sold 146 cookies. To the nearest ten, what is the number of cookies that are left to sell tomorrow?

If we surveyed 100 students in our school and asked them "What mistake would Joe Schmo make on this question?", what would be the #1 response?	
1	Joe will forget to round to the nearest ten.
2	Joe may round incorrectly.
3	Joe may subtract incorrectly.

Use these top three mistakes to write a multiple-choice question. Be sure to also include the correct response.

Today, Colin's Bakery made 283 cookies and sold 146 cookies. To the nearest ten, what is the number of cookies that are left to sell tomorrow?	
A	137 cookies (Did Not Round)
B	143 cookies (Computation Error + Did Not Round)
C	140 cookies (Correct Answer)
D	130 cookies (Rounded Incorrectly)

Question 2

Andrea baked two batches of brownies. Each batch has 36 brownies. Which is closest to the total number of brownies Andrea baked?



Instructor's Note:

The student materials for thinkLaw lessons are editable. The questions in this lesson are sample 3 grade standardized math questions. Feel free to switch out the examples to be released items from your own test or questions from your current math unit.

Instructor's Note:

Do the first example together.

First, carefully read the question. How could this problem be solved? The first problem requires two steps. Thinkers need to first subtract 146 from 283. That totals 137, but the problem does not ask for the exact amount. The problem asks for the number to be rounded to the nearest 10.

Second, think about what could go wrong. Ask

thinkers to brainstorm a list of potential mistakes.

- This problem has two steps. What problems might occur in the first step?
- What problems might occur in the second step?

Rank the mistakes. Which mistake is the most likely? Identify the top three mistakes.

Third, use the top 3 mistakes to help you create the 3 incorrect responses to your multiple choice questions. One response does need to be the correct response.

- Think about the order you choose for your three responses. Where do you want to place the correct response? What response do you want to put in the choice A position? Why? What mistake is Joe Schmo likely to make?
- Why did you choose each incorrect response? How did the mistake analysis help you choose the incorrect responses you wanted to use?

Instructor's Note: Thinkers will have different responses. The responses shown in red are just sample responses.

Probing Questions:

- Why do test makers use words like closest? How might that word confuse test takers?
- Why do you think test makers use multiple-choice questions? How do they trick students?
- What strategies do you use when you see a multiple-choice question?
- Do you read all the answer choices when you take a multiple-choice test? Why or why not?

Instructor's Note:

Problem 2 is not looking for the exact answer. One option is thinkers could round 36 to 40. Multiplying 40 times 2 is 80.

If we surveyed 100 students in our school and asked them "What mistake would Joe Schmo make on this question?", what would be the #1 response?

- 1 This problem is not asking for the exact answer.
- 2 Joe may round incorrectly.
- 3 Joe may multiply incorrectly.

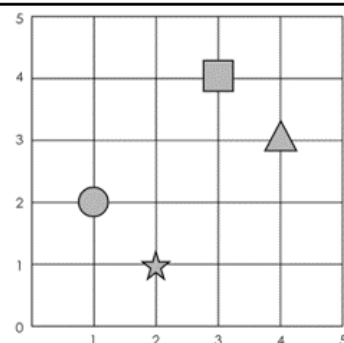
Use these top three mistakes to write a multiple-choice question. Be sure to also include the correct response.

Andrea baked two batches of brownies. Each batch has 36 brownies. Which is closest to the total number of brownies Andrea baked?

- A 40 brownies (Rounded but did not Multiply)
- B 80 brownies (Correct, Rounded then Multiplied)
- C 60 brownies (Rounded Incorrectly)
- D 120 brownies (Multiplied by 3 instead of 2)

Question 3

Which ordered pair shows the location of the square?



If we surveyed 100 students in our school and asked them "What mistake would Joe Schmo make on this question?", what would be the #1 response?

- 1 Joe may mix up (x, y).
- 2 Joe may tell the location of a different shape.
- 3 Joe may be one number off on the grid.

Use these top three mistakes to write a multiple-choice question. Be sure to also include the correct response.

Instructor's Note:

Thinkers are considering the most common mistakes that an individual might make when answering the question. Practicing this skill teaches thinkers to pause and consider mistakes that might be easy to make within a multiple-choice question. In this strategy, we ask thinkers to make reasonable predictions and inferences.

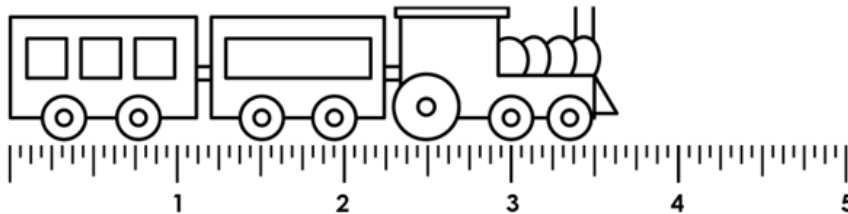
Instructor's Note:

Using a fictional character allows thinkers to step back and speculate about how someone else might miss the response. This approach is more comfortable than thinking about how they might miss the answer. In class, you can always ask, "How would ____ answer this question?" if thinkers are hesitant to share their own ideas. Asking how another person would answer a question or what mistake someone else will make creates a layer of psychological safety.

Which ordered pair shows the location of the square?	
A	(4, 3) (Switched x and y)
B	(4, 4) (Off One Number on the Grid)
C	(1, 2) (Location of the Circle)
D	(3, 4) (Correct Answer)

Question 4

To the nearest half-inch, how long is the toy train?



If we surveyed 100 students in our school and asked them "What mistake would Joe Schmo make on this question?", what would be the #1 response?	
1	Joe may round incorrectly.
2	Joe may round to the nearest whole number.
3	Joe may incorrectly label the measurement.

Use these top three mistakes to write a multiple-choice question. Be sure to also include the correct response.

To the nearest half-inch, how long is the toy train?	
A	$3\frac{1}{2}$ centimeters (Wrong label, but correct number)
B	3 inches (Rounded Incorrectly)
C	$3\frac{1}{2}$ inches (Correct Answer)
D	4 inches (Rounded Incorrectly)

Instructor's Note:

For problem 3, thinkers should first locate the square. Thinkers should look at the bottom, or x-axis first. The square is located on 3 on the x-axis. Next, thinkers should look at the left side, or the y-axis. The square is located on the 4 of the y-axis.

Instructor's Note:

For problem 4, thinkers should use the ruler below the train. The train goes just slightly past the 3.5-inch mark. The question asks thinkers to round to the nearest half inch.

Probing Questions:

- What are common mistakes students make with measurement?
- What is the EXACT measurement of the train?
- Why do you think this question asks students to measure to the nearest half-inch?

Instructor's Note:

The Family Feud exercise is helpful when writing multiple choice questions. Too often, if we ask thinkers to prepare their own multiple-choice responses to a question, students will select silly answers for the wrong responses. We are asking thinkers to make reasonable predictions and inferences. We are helping them develop the habit of putting themselves in the shoes of others, which also helps to develop empathy.

Instructor's Note:

For problem 5, thinkers should read the clock on the right. The minute hand is on the 9, or 45-minute mark, and the hour hand is closer to 8 than 7.

Probing Questions:

- What are common mistakes students make with reading clocks?
- Do you think this time is a.m. or p.m.? Why?

Instructor's Note:

For problem 6, thinkers can first count the whole squares. Thinkers should then count the half squares. Thinkers should add the two totals together.

Question 5

Katrice will leave for school at the time shown on the clock.
What times does the clock show?



If we surveyed 100 students in our school and asked them "What mistake would Joe Schmo make on this question?", what would be the #1 response?

- | | |
|---|---|
| 1 | Joe may switch the minute and the hour hands. |
| 2 | Joe may not remember that 9 = 45. |
| 3 | Joe may misread the smaller hand. |

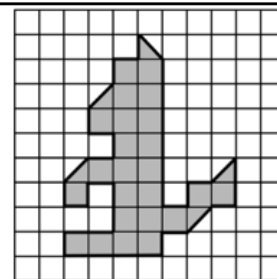
Use these top three mistakes to write a multiple-choice question. Be sure to also include the correct response.

Katrice will leave for school at the time shown on the clock. What times does the clock show?

- | | |
|---|---------------------------------------|
| A | 8:45 (Misread Hour Hand) |
| B | 9:37 (Switched Minute and Hour Hands) |
| C | 7:45 (Correct) |
| D | 8:09 (Misread hands) |

Question 6

How many square units were used to make the figure?



If we surveyed 100 students in our school and asked them "What mistake would Joe Schmo make on this question?", what would be the #1 response?

- | | |
|---|-------------------------------------|
| 1 | Joe may miscount the halves. |
| 2 | Joe may miscount the squares. |
| 3 | Joe may count the halves as wholes. |

Probing Questions:

- What would school look like if EVERY student thought like a test maker?
- What advice would you give a friend about thinking like a test maker?
- Is thinking like a test maker cheating? Why or why not?

Instructor's Note:

One theme we repeat throughout the thinkLaw math labs is the idea that math is supposed to make sense! Before you begin to solve a test problem, press pause. What answer would make sense for this problem? What answers would not make sense for this problem?

Use these top three mistakes to write a multiple-choice question. Be sure to also include the correct response.

How many square units were used to make the figure?	
A	25.5 (Miscounted Halves)
B	24 (Did Not Count Halves)
C	27.5 (Miscounted)
D	26.5 (Correct Answer)



What are the top 3 ways thinking like a test maker helps you take a standardized test?

1	Press pause and think about common mistakes.
2	Look for the common mistakes. Cross them out.
3	Read all answer choices. Don't stop at choice A.

thinkBigger

Do you think it is fair for test makers to use mistake analysis to trick kids?

What is the best argument for each side?

It is fair for test makers to use mistake analysis.	It is NOT fair for test makers to use mistake analysis.
<ul style="list-style-type: none"> Using mistake analysis to write multiple choice questions is smart. Test takers are thinking deeply about the questions they write. If students know the content and take their time, they will not be fooled by the incorrect responses. 	<ul style="list-style-type: none"> Test makers are taking advantage of students who are in a hurry. Students see a response that looks like it could be correct and select that option. It's sneaky! Thinkers should be able to solve the problems without looking at incorrect answers.

Probing Questions:

- What surprised you most when you started to really think about multiple choice questions?
- In the past, have you made any "Joe Schmo" mistakes when testing? What mistakes did you make? How can you make sure that you do not continue to make these mistakes?
- How will you change your approach to multiple-choice questions after this analysis?
- Are there other common mistakes that students make while taking tests? How can test makers take advantage of those common mistakes?

- What do you think is easier? Taking a test or writing a test? Why?
- Do you think multiple choice questions are easier or harder than open response? Why?
- What type of questions are easier to grade? Multiple choice questions or open response questions? Why do you think so many standardized tests have multiple choice questions?

After the Lesson:

thinkLaw math labs include exit tickets for additional practice.

Remember, if you would like to use different numbers you can edit the Word version of the student work pages.

Name _____

Is it Fair to Trick Kids?

A thinkLaw Math Lab

What Would Joe Schmo Do?

Today we are going to think about Joe Schmo. Joe always falls for the trick answer. Joe does not read the directions carefully. Joe does not complete all the steps in a problem. We are going to think about the mistakes Joe may make on a math test.

Question 1



Janette has 12 cages in her pet store. Each cage can hold 6 guinea pigs. The store has 18 guinea pigs in its cages. What is the greatest number of guinea pigs Janette can add to her cages?

If we surveyed 100 students in our school and asked them, "What mistake would Joe Schmo make on this question?", what would be the #1 response?

- | | |
|---|--|
| 1 | This problem is not asking for the exact answer. |
| 2 | Joe may forget to subtract the 18 guinea pigs they already have. |
| 3 | Joe may multiply incorrectly. |

Use these top three mistakes to write a multiple-choice question. Be sure to also include the correct response.

Janette has 12 cages in her pet store. Each cage can hold 6 guinea pigs. The store has 18 guinea pigs in its cages. What is the greatest number of guinea pigs Janette can add to her cages?

- | | |
|---|--|
| A | 72 guinea pigs (Multiplied but did not Subtract) |
| B | 216 guinea pigs (Multiplied the incorrect numbers) |
| C | 54 guinea pigs (Correct, Multiplied then Subtracted) |
| D | 108 guinea pigs (Multiplied the incorrect numbers) |

Question 2

Gus built a fence around his rectangular garden. The perimeter of the garden is 28 feet. The length of the garden is 6 feet. What is the width of the garden in feet?



Instructor's Note:

thinkLaw math labs also include take-home student sheets that are available in English and Spanish. Encourage thinkers to try a mini version of the lesson at home with their families! Asking thinkers to reteach the lesson to their parents helps thinkers to practice synthesis and gives them additional practice with the material.

Is it Fair to Trick Kids?

thinkStarter

Family Feud is a game show. Two families compete. The host asks a survey question that was asked to a group of 100 people, such as, "Name the hour that you get up on Sunday mornings." Contestants must guess the most popular response. The game continues until one family has guessed all the answers on the board, or until time runs out.

Answer these Family Feud-style questions.

If we surveyed 100 students in our school and asked them "What is the most common mistake that students make on math tests?", what would be the #1 response?

1	
2	
3	

If we surveyed 100 students in our school and asked them "What are the ways test makers try to trick kids on standardized math tests?", what would be the #1 response?

1	
2	
3	

thinkStarter Summary

There are common mistakes that students make on math tests. The people who make tests use mistake analysis to help them write questions that will trick kids. **Mistake analysis** is when you spend time thinking critically about mistakes. Is this fair? In this thinkLaw math lab, we will think more about mistake analysis and thinking like a test maker.

What Would Joe Schmo Do?

Today we are going to think about Joe Schmo. Joe always falls for the trick answer. Joe does not read the directions carefully. Joe does not complete all the steps in a problem. We are going to think about the mistakes Joe may make on a math test.



¿Es Justo Engañar a los Niños?

piensaAranque

Family Feud o ¿Que Dice la Gente? es un programa de juegos. Compiten dos familias. El anfitrión hace una pregunta de encuesta que se hizo a un grupo de 100 personas, como: "Nombre la hora a la que te levantas los domingos por la mañana". Los concursantes deben adivinar la respuesta más popular. El juego continúa hasta que una familia haya adivinado todas las respuestas en el tablero, o hasta que se acabe el tiempo.

Responde a estas preguntas al estilo ¿Que Dice la Gente?

Si encuestamos a 100 estudiantes de nuestra escuela y les preguntamos "¿Cuáles son los errores más comunes que cometen los estudiantes en exámenes de matemáticas?", ¿Cuál sería la respuesta #1?

1	
2	
3	

Si encuestamos a 100 estudiantes de nuestra escuela y les preguntamos "¿Cuáles son las formas en que los fabricantes de exámenes intentan engañar a los niños en los exámenes estandarizados de matemáticas?", ¿Cuál sería la respuesta #1?

1	
2	
3	

piensaAranque Resumen

Hay errores comunes que cometen los estudiantes en los exámenes de matemáticas. Las personas que hacen las pruebas utilizan el análisis de errores para ayudarles a escribir preguntas que engañarán a los niños. El **análisis de errores** es cuando dedicas tiempo a pensar críticamente sobre los errores. ¿Es esto justo? En este laboratorio de matemáticas de thinkLaw, pensaremos más en el análisis de errores y en pensar como un creador de exámenes.

¿Qué haría Joe Schmo?

Hay vamos a pensar en Joe Schmo. Joe siempre cae en la trampa de la respuesta. Joe no lee las instrucciones cuidadosamente. Joe no sigue con todos los pasos de un



If we surveyed 100 students in our school and asked them "What mistake would Joe Schmo make on this question?", what would be the #1 response?

- | | |
|---|---|
| 1 | Joe may forget to divide the width by 2. |
| 2 | Joe may not subtract the length from the perimeter. |
| 3 | Joe may confuse perimeter and area. |

Use these top three mistakes to write a multiple-choice question. Be sure to also include the correct response.

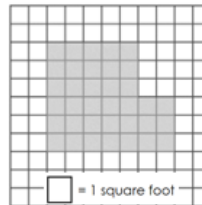
Gus built a fence around his rectangular garden. The perimeter of the garden is 28 feet. The length of the garden is 6 feet. What is the width of the garden in feet?

- | | |
|---|--|
| A | 8 feet (Correct Answer) |
| B | 16 feet (Did not Divide the Width by 2) |
| C | 14 feet (Did not Subtract the Length from the Perimeter) |
| D | 48 feet (Multiplied to find area) |

Question 3

The shaded figure on the grid represents the ceiling of a house.
What is the area of the ceiling in square feet?

If we surveyed 100 students in our school and asked them "What mistake would Joe Schmo make on this question?", what would be the #1 response?



- | | |
|---|---|
| 1 | Joe may multiply incorrectly. |
| 2 | Joe may look for the perimeter instead of the area. |
| 3 | Joe may count incorrectly. |

Use these top three mistakes to write a multiple-choice question. Be sure to also include the correct response.

The shaded figure on the grid represents the ceiling of a house. What is the area of the ceiling in square feet?

- | | |
|---|---|
| A | 42 square feet (Multiplied Incorrectly) |
| B | 36 feet (Correct Answer) |
| C | 30 square feet (Multiplied Incorrectly) |
| D | 48 feet (Counted Incorrectly) |