

Reasoning Detectives

Sort arguments, then explain two choices.

CCSS.Math.Practice.MP3 "Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments..."

NAME _____

DATE _____

SOUND REASONING

Sound reasoning uses facts that support the conclusion. Each step makes sense.

A jar holds 5 marbles. Two jars hold 10 marbles because $5 + 5 = 10$.

FLAWED REASONING

Flawed reasoning has a step that does not give enough proof. The conclusion might be true, but the reason does not prove it.

Lee rolls a 4 one time. Lee says every roll will be a 4.

1 SORT

8 items

Circle SOUND or FLAWED for each argument, then choose two items and explain how you knew.

1. 15 is odd because it cannot be split into two equal whole-number groups.

SOUND

FLAWED

2. $9 + 6 = 15$. Therefore, $9 + 7 = 15$.

SOUND

FLAWED

3. 23 is prime because it is odd.

SOUND

FLAWED

4. Two rectangles are each 4 units long and 3 units wide. Their areas are equal.

SOUND

FLAWED

5. 16 is a square number because $4 \times 4 = 16$.

SOUND

FLAWED

6. $4 \times 8 = 32$, so $4 \times 9 = 36$.

SOUND

FLAWED

7. Adding 0 does not change a number. Therefore, $27 + 0 = 27$.

SOUND

FLAWED

8. A shape has 4 right angles and 4 equal sides. It is a square.

SOUND

FLAWED

2

PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ HOW I KNEW _____

ITEM # _____ HOW I KNEW _____

3

MAKE YOUR OWN

One of each

Write one new SOUND argument and one new FLAWED argument.

SOUND _____

FLAWED _____

CHALLENGE

Choose one FLAWED item and rewrite it so the reasoning becomes SOUND.

PART 1 • SORT

#	ITEM	CATEGORY	WHY
1	15 is odd because it cannot be split into two equal whole-number groups.	SOUND	This uses the definition of an odd number.
2	$9 + 6 = 15$. Therefore, $9 + 7 = 15$.	FLAWED	Changing 6 to 7 changes the sum. The correct sum is 16.
3	23 is prime because it is odd.	FLAWED	Being odd does not prove a number is prime. For example, 9 is odd and not prime.
4	Two rectangles are each 4 units long and 3 units wide. Their areas are equal.	SOUND	Rectangles with the same length and width have the same area.
5	16 is a square number because $4 \times 4 = 16$.	SOUND	This shows 16 as a number multiplied by itself.
6	$4 \times 8 = 32$, so $4 \times 9 = 36$.	FLAWED	The first fact does not explain why the second product is 36, even though the second product is true.
7	Adding 0 does not change a number. Therefore, $27 + 0 = 27$.	SOUND	The conclusion follows from the stated addition rule.
8	A shape has 4 right angles and 4 equal sides. It is a square.	SOUND	These are defining properties of a square.

PART 2 • PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 • MAKE YOUR OWN (SAMPLE ANSWERS)

- **SOUND:** 30 is even because 30 can be split into 2 equal groups of 15.
- **FLAWED:** 14 is greater than 10, so it must be 20.

Challenge: Item 2: $9 + 6 = 15$. Adding 1 to the second addend makes the sum 16, so $9 + 7 = 16$.

Accept any explanation that names the deciding feature from the rule box for the chosen item. Accept different Part 2 explanations when students correctly identify the missing proof or the fact that supports the conclusion.