



Predict the Score

The Crusaders and the Blue Jays just finished the first half of their basketball game.

0:00			
Halftime Score		Final Score	
Crusaders	30	?	
Blue Jays	20	?	

1 Predict the final score. **Explain your reasoning.**

I think each team will score about the same amount in the second half. My prediction is that the Crusaders final score will be 40 and the Blue Jays final score will be 40.



ACTIVITY 1

MATHia CONNECTION

- Differentiating Additive and Multiplicative Relationships

Ratios

TOPIC 1

LESSON 1

Getting
Started

1

2

Activity

3

4

5

Talk
the Talk

Additive and Multiplicative Reasoning

HABITS OF MIND

- Attend to precision.

Robena and Eryn each predicted the final score of a basketball game between the Crusaders and the Blue Jays.

- Analyze each prediction.

Robena



	Halftime Score	Final Score
Crusaders	30	60
Blue Jays	20	40

I think the final score will be double the score at halftime.

Eryn



	Halftime Score	Final Score
Crusaders	30	50
Blue Jays	20	40

I think the Crusaders will play hard enough to stay 10 points ahead of the Blue Jays.

- Describe the reasoning that Robena and Eryn used to make each statement.

Robena multiplied the halftime scores by 2 to predict the final score.

Eryn added 20 points to each halftime score to maintain a difference of 10 points

- Based on the two predictions, which team scored more points in the second half?

In Robenas prediction the Crusaders scored more points

In Eryns prediction the two teams scored equal amount of points



One of the students used *additive reasoning* to make her comparison and the other used *multiplicative reasoning*. **Additive reasoning** focuses on the use of addition and subtraction for comparisons. **Multiplicative reasoning** focuses on the use of multiplication and division.

- 2 Which student used additive reasoning and which used multiplicative reasoning?

Eryn used additive reasoning.
Robena used multiplicative reasoning.

➤ Read the age scenario and answer each question.

Vicki and her nephew Benjamin share the same birthday. They were both born on March 4.

Vicki: "Today I'm 40 years old, and you're 10. I'm 4 times as old as you are!"

Benjamin: "Wow, you're old!"

Vicki: "Yeah, but in 5 years, I'll be 45, and you'll be 15. Then I will only be three times as old as you."

Benjamin: "I'm catching up to you!"

Vicki: "And 15 years after that, I'll be 60 and you'll be 30. Then I'll only be twice as old as you!"

Benjamin: "In enough time, I'll be older than you, Aunt Vicki!"

- 3 Is Vicki correct about how their ages change? Is Benjamin correct in thinking that he will eventually be older than his aunt?



Vicki and Benjamin will always be 30 years apart in age. The multiplicative relationship between Vicki's age and Benjamin's age at any given time is not the same.



- 4 The table shown represents the different statements between Vicki and Benjamin. Let V represent Vicki's age and B represent Benjamin's age.

Verbal Statement	Numeric Value	Relationship	
		Equation	Comparison
Today I'm 40 years old, and you're 10.	$V = 40, B = 10$	$V = B + 30$	<i>additive</i>
I'm 4 times as old as you are!	$V = 40, B = 10$	$V = 4B$	<i>multiplicative</i>
Yeah, but in 5 years, I'll be 45, and you'll be 15.	$V = 45, B = 15$	$V = B + 30$	<i>additive</i>
Then I will only be three times as old as you.	$V = 45, B = 15$	$V = 3B$	<i>multiplicative</i>
And 15 years after that, I'll be 60 and you'll be 30.	$V = 60, B = 30$	$V = B + 30$	<i>additive</i>
Then I'll only be twice as old as you!	$V = 60, B = 30$	$V = 2B$	<i>multiplicative</i>

- a Complete the last column by identifying each relationship as either additive or multiplicative.
- b At any point in this age scenario, which relationship does not change?

The additive relationship does not change.



Comparing Quantities

HABITS OF MIND

- Attend to precision.

➤ Let's think about a different comparison of two quantities.

The school colors at Riverview Middle School are a shade of green and white. The art teacher, Mr. Raith, knows to get the correct color of green it takes 3 parts blue paint to every 2 parts yellow paint.

There are different ways to think about this relationship and make comparisons. One way is to draw a picture or model.

From the model, you can make comparisons of the different quantities.

- blue parts to yellow parts
- blue parts to total parts
- yellow parts to blue parts
- yellow parts to total parts



Each comparison is called a *ratio*. A **ratio** is a comparison of two quantities that uses division. The comparisons in the first column are part-to-part ratios because you are comparing the individual quantities. The comparisons in the second column are part-to-whole ratios because you are comparing one of the parts to the total number of parts.

Suppose Mr. Raith needs 2 parts blue paint and 5 parts yellow paint to make green paint.

- 1 Compare the quantities of blue and yellow paint in Mr. Raith's mixture by writing all possible ratios for each type.

(a) Part-to-part ratios

2 parts blue 5 parts yellow
5 parts yellow 2 parts blue

What is the difference between the part-to-part ratios that you wrote?

The numerators and denominators switch

(b) Part-to-whole ratios

2 parts blue 5 parts yellow
7 total parts 7 total parts

What is the difference between the part-to-whole ratios that you wrote?

The numerators change but the denominators stay the same.