DIG INTO PROPORTIONAL REPRESENTATIONS: PAINT MIXTURES

Presented by MathLinks Authors
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For more information about our core programs for middle school and intervention programs for grades 6-9, please visit:

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In this session, we will:

- Use pictures of mixtures to illustrate and compare proportional relationships.
- Critique the reasoning of students using mixture pictures to solve problems.
- Transition mixture pictures into tape diagrams.
- Compare the solution of a problem using tape diagrams to its solution using an equation (proportion).

Proportional Reasoning vs. Proportions

Proportional reasoning is the ability to compare quantities multiplicatively.

A proportion is an equation stating that the values of two ratios are equal.

Some proportional reasoning tools and representations include:

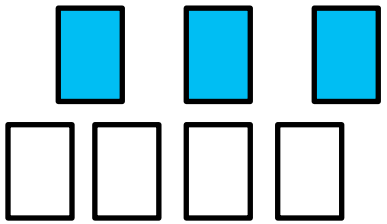
- Equivalent ratios
- Tables
- Tape diagrams
- Double number lines
- Equations (proportions)

"paint mixture pictures"

Paint Mixtures

These cards represent mixtures for mixing shades of blue paint. Arrange theses cards from lightest blue to darkest blue.

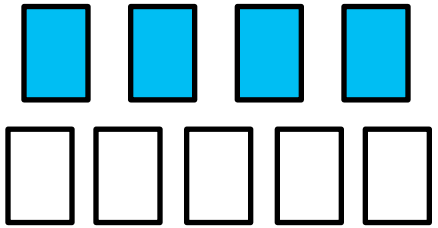
A.



B.

C.

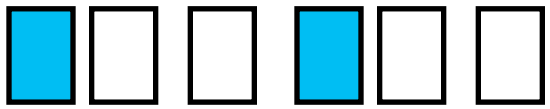
D.



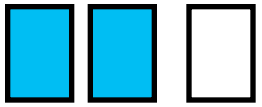
Critique Jody's Reasoning

Jody said, "Mixture B and mixture C will be the same because they both have the same number of cups of blue."

B.



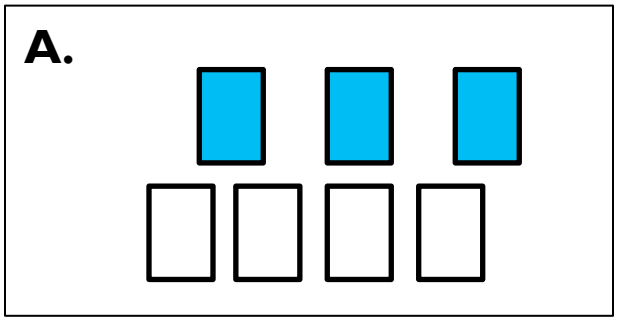
C.

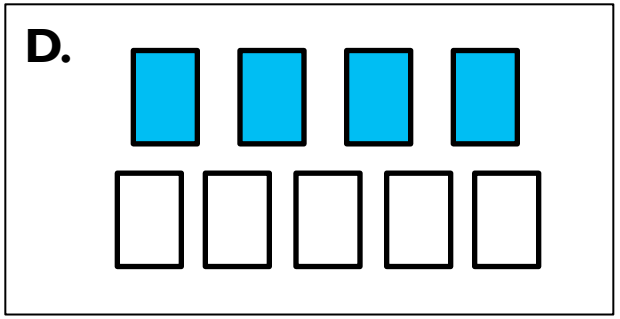


What's wrong with Jody's thinking?

Critique Ed's Reasoning

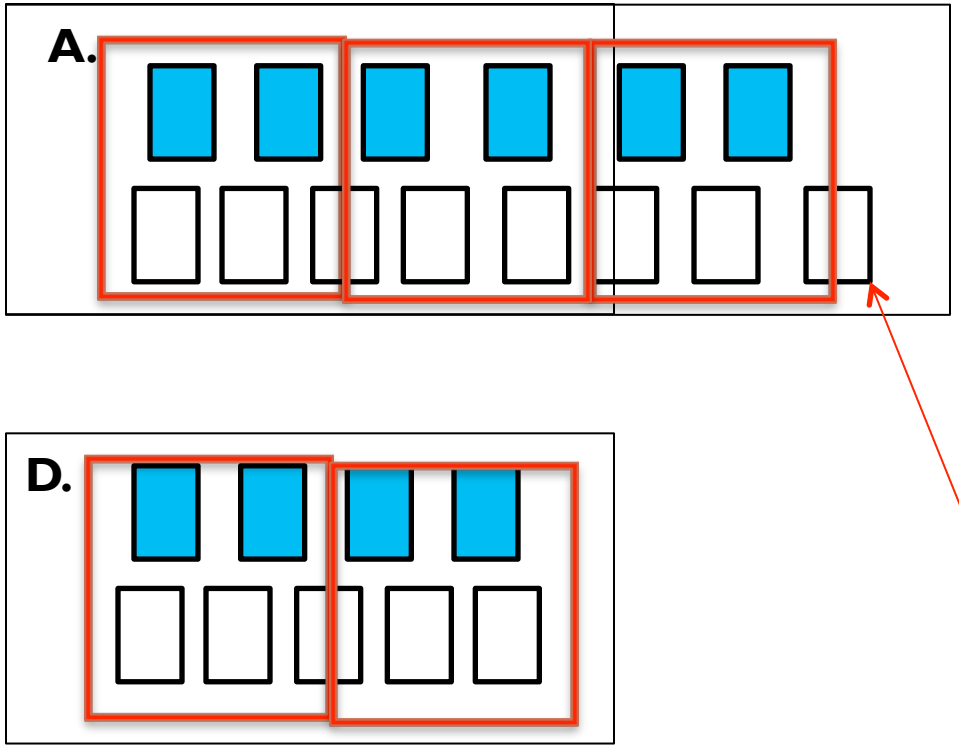
Ed said, "Mixture A and mixture D will be the same because mixture A has one more cup of white than blue, and mixture D has one more cup of white than blue."



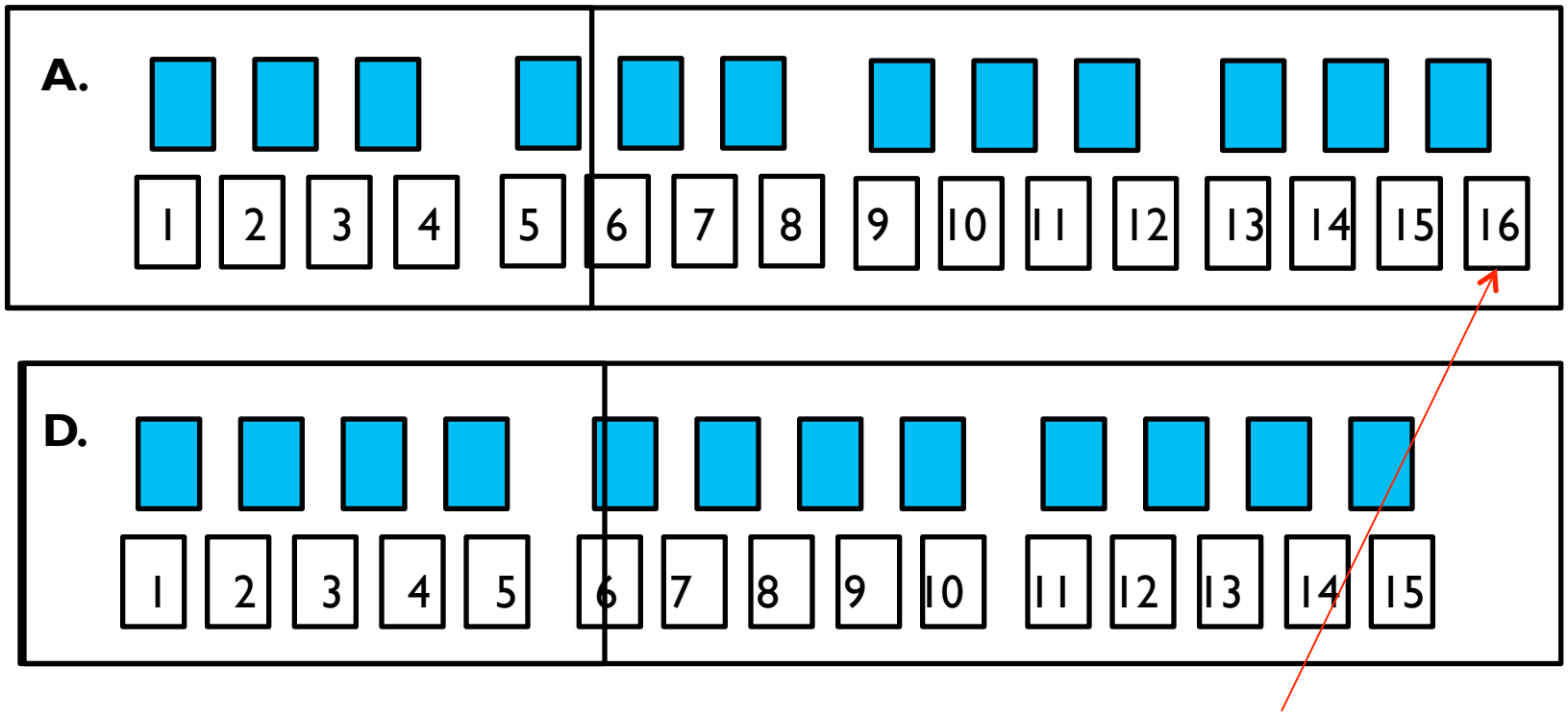


What's wrong with Ed's thinking?

A Closer Look at Mixtures A and D

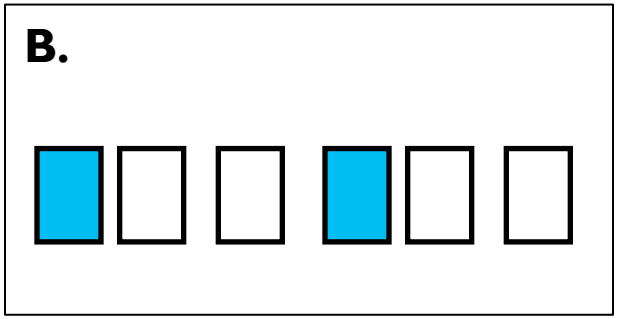


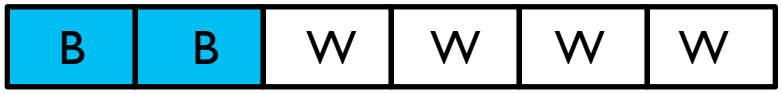
A Closer Look at Mixtures A and D

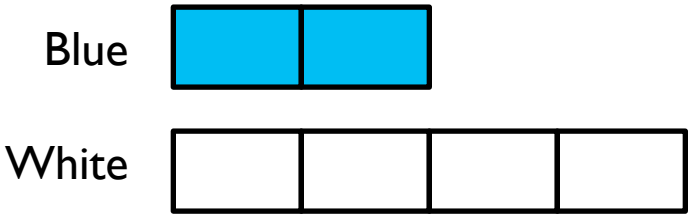


Extra white in mixture A means lighter blue paint.

Transition to Tape Diagrams



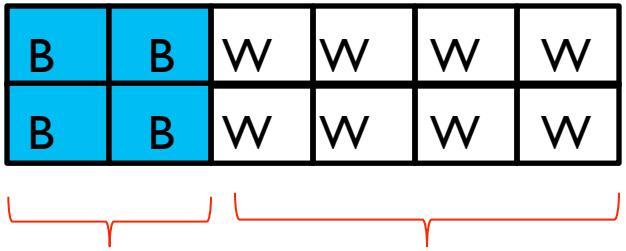
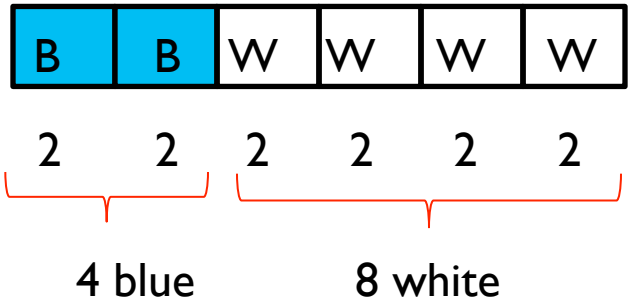




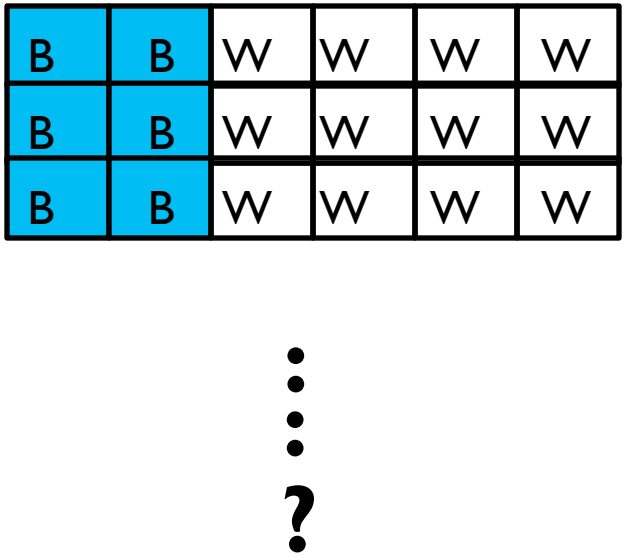
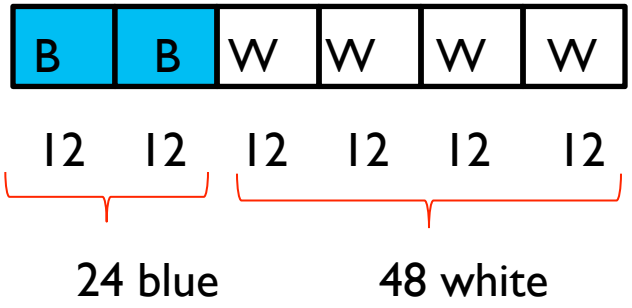
Tape diagrams:

- Strips partitioned into equal area rectangles
- Area represents relative sizes of quantities

How many gallons of blue paint and white paint are needed to make 12 gallons of paint using mixture B.

Alex's Solution	Andrea's Solution
	
"I drew the tape diagram again to make 12 boxes"	"I divided 12 by 6 figure out each box represents 2 gallons"

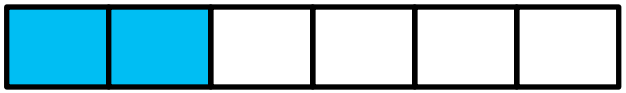
How many gallons of blue paint and white paint are needed to make 72 gallons of paint using mixture B.

What would Alex do?	What would Andrea do?
	

Equations (Proportions)

How many gallons of blue paint and white paint are needed to make 72 gallons of paint using mixture B?

Mixture B:



$$\frac{\text{blue}}{\text{total}}: \quad \frac{2}{6} = \frac{b}{72}$$

$$6b = 144$$

$$b = 24$$

24 gal blue

blue + white = total

$$24 + w = 72$$

$$w = 48$$

48 gal white

In this session, we:

- Used paint mixtures diagrams to explore proportional relationships
- Analyzed some common errors made by students who are not thinking proportionally
- Created tape diagrams and observed how students might use them to solve problems
- Compared a tape diagram solution to the more traditional proportion solution for a problem.

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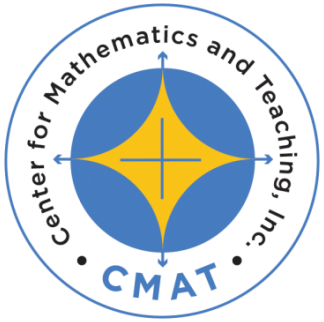

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THANK YOU!

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