

Task: Walking Task		7th Grade
<p>Casey and Jasmine are walking down the 7th grade hall together. Jasmine is taller than Casey, so Casey takes 5 steps for every 4 of Jasmine's.</p> <p>A. Write several ratios for the number of Casey's steps to the number of Jasmine's steps. Describe any patterns.</p> <p>B. When they reach the end of the hall, they have taken 117 steps together. How many steps did each student take? Explain your reasoning in words.</p>		
Common Core State Standards for Mathematical Content		Common Core State Standards for Mathematical Practice
<p>7.RP.2. Recognize and represent proportional relationships between quantities.</p> <p>a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.</p> <p>b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</p> <p>c. Represent proportional relationships by equations. <i>For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.</i></p> <p>d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.</p>		<ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
Essential Understandings		
<ul style="list-style-type: none"> • A rate is a set of infinitely many equivalent ratios. • A proportion is a relationship of equality between two ratios. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change. • Proportional reasoning is complex and involves understanding that if one quantity in a ratio is multiplied or divided by a particular factor, then the other quantity must be multiplied or divided by the same factor to maintain the proportional relationship. • A ratio is a multiplicative comparison of two quantities, or it is a joining of two quantities in a composed unit. 		
Explore Phase		
Possible Solution Paths	Assessing and Advancing Questions	
<p>PART A: Students write ratios for Casey's steps to Jasmine's steps as: 5/4, 10/8, 15/12, etc. (they may write them in another form, e.g. 10:8, 5:4, 15:12, etc.) The ratios for Casey's steps to Jasmine's steps are always 5/4 Casey's steps are always 1.25 times Jasmine's Casey's steps go up by 5 each time and Jasmine's steps always go up by 4.</p>	<p><u>Assessing</u> How can you express a ratio between two quantities? What two quantities are we interested in for this task? (MP1, MP2)</p> <p><u>Advancing</u> How can you write a ratio equivalent to the one you have? (MP7) What do you notice about how the ratios are related to one another? (MP7)</p>	

PART B:

Students may set up a table:

Casey	Jasmine
5	4
10	8
15	12
20	16
25	20
30	24
35	28
40	32
45	36
50	40
55	44
60	48
65	52

Assessing

Tell me about your table. How did you know which values to use for Casey and Jasmine? (MP1, MP2, MP8)

Advancing

What is the ratio for 65 and 52? What is the relationship between the 5 and the 65? Between the 4 and 52? (MP7)

Students may take the total number of steps, 117 and divide by 9, $117 \div 9 = 13$. Casey will take $5 \times 13 = 65$ steps; Jasmine will take $4 \times 13 = 52$ steps.

Assessing

Tell me about your equation. Why did you divide by 9? (MP1, MP2)

Advancing

Think about how the ratios you wrote for part A. How are those ratios related? (MP7)

How can you use the 9 to answer the question? What does the 13 tell you? (MP3, MP7)

Possible Student Misconceptions**PART A:**

Students may set up the ratio for the number of Jasmine's steps to the number of Casey's steps.

Students may not be able to scale up from the 5 and 4 given in the task.

Assessing

Let's read part A together. Does it matter how you set your ratio up based on what the task says? Why or why not? (MP6, MP7)

Advancing

Now we have the correct ratio. How can you generate other equivalent ratios? (MP6, MP7)

PART B:

Students may attempt to divide 117 by 4 or 117 by 5, the parts. Students are not realizing that 117 represents the total amount of steps taken and that they should divide by 9.

Assessing

What does the 117 in the task represent? (MP2)

Advancing

Think about dividing the total amount of steps by only one person's steps. Why is that problematic? What else might you consider trying? (MP1, MP7)

<p>Students may think that Casey always takes one more step than Jasmine (additive misconception) and think it is 58 steps for Jasmine and 59 steps for Casey.</p>	<p><u>Assessing</u> I see you have 117 steps total with 58 and 59. Is the ratio of these steps consistent with your work from part A? (MP3)</p> <p><u>Advancing</u> If Casey walks 5 steps for every 4 of Jasmine, must this be true no matter how many steps they walk? How can you maintain the ratios from part A? (MP3, MP7)</p>
<p>Entry/Extensions</p>	<p>Assessing and Advancing Questions</p>
<p>If students can't get started....</p>	<p><u>Assessing</u> Tell me what you are trying to do for part A. For part B? (MP1, MP2)</p> <p><u>Advancing</u> If Jasmine walks 8 steps, how many would Casey walk? How many did they walk together? How could you use the relationship to figure out part B? (MP2, MP7)</p>
<p>If students finish early....</p>	<p><u>Assessing</u> What is the ratio for the number of steps you found for part B? (7)</p> <p><u>Advancing</u> What is the relationship between the ratios you found in part A and the number of steps you found in part B? (MP7, MP8)</p>
<p>Discuss/Analyze</p>	
<p>Whole Group Questions</p>	
<p>PART A: Tell me the first thing you wrote on your paper. What is important to remember when expressing ratios? (MP6) How are the ratios you wrote for part A related? What patterns did you see? (MP7)</p>	
<p>PART B: <u>Equivalent Ratios in a Table</u> I know some people made a table to solve part B. How did this help? (MP8) What is the relationship between the steps given in the problem and the answer you gave? (MP7) Looking at your table, how could you scale up the 5 and the 4 to answer the question more efficiently? (MP2, MP7) If $5 \times 13 = 65$ and $4 \times 13 = 52$, how is the 13 related to the 117? (MP7) If Casey walked 130 steps, how could you quickly determine how many steps Jasmine took? (MP8)</p> <p><u>Scaling the Whole</u> Some of you divided 117 by 9. How did you know to divide by 9? What did this tell you? (MP1, MP2, MP7) How are the 117 and 9 related? (MP7) Who can show how this method connects to using the table? (MP3)</p>	