interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two way tables, graphs, flowcharts, and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

Assessment Results

This task was developed by the Mathematics Assessment Resource Service and administered as part of almātional, normed math assessment. For comparison purposes, teachers may be interested in the results of the national assessment, including the total points possible file and a ate

Photographs This problem gives you the chance to: · use proportion in a real life geometric context The product of the construction of the control of t sheet of paper. The photograph is wineites wide and winging was and a make sum Diagram 1 Diagram 2 Find the measurements of the small photographs for each arrangement. Show your calculations and explain how you figured it out. Diagram.l

	ne measurements-of the cheet of paper are	wide-and	high,
	agram 2	wide and	high.
7-75	TMINING OF THE STATE OF THE STA		Diogram I

Photographs	Ru	bric
The core elements of performance required by this task are: • use proportion in a real life geometric context		
Based on these, credit for specific aspects of performance should be assigned as follows	points	section points

1. Diagram 1:

The height of the smaller copy = 1/2 of 6 inches = 3 inches

Uses proportional reasoning correctly: Height/width = 6/4 = 3/width or Size of photo/Size of copy = 6/3 = 4/width Width = 2 inches Accept verbal referen =gmcfenws

7th Grade – Task 2: Photographs

Work the task and examine the rubric. Can you find 2 or more ways to solve for the height in diagram 2?

What do you think are the key mathematics the task is trying to assess?

Look at student work for diagram 1.

How many of your students:

Used a	Used a scale	Assumed the width	Found a width
proportion to find	factor to find the	was 6 "by looking",	other than 2"
the width of 2"	width of 2"	so $4 + 2 = 6$	

- What experiences have students had with enlarging and shrinking shapes? Have they made their own enlargements or answered questions looking at diagrams? How are these experiences different?
- Have your students discussed "not drawn to scale" explicitly? Do you think they understand what this means?
- How could you design an activity that would show students why you can't tell "just by looking"?

Look at student work for diagram 2. How many of your students thought the height was:

 1.5	4	5	3	Other

- Do you think your students understood the corresponding sides between the large and small diagrams?
- What are some of the false assumptions your students made?
- What experiences do students need to help them connect procedures with problem-solving? How can you help students learn in a way that the information transfers to new situations or can be applied to solving problems?

Student A, continued

Student B is able to use scale factors to solve the problem. For diagram 1, the student uses a scale factor of 1/2. For diagram 2, the student uses a scale factor of 0.75. *How might the student have arrived at the scale factor of 0.75?*

Student B

Student C also uses scale factors to solve for the missing dimensions. *How are the three strategies related? What is similar? What is different?*

Student C



Student G fills in numbers, but it is unclear where the numbers come from or what the students assumptions were. Diagram 1 could have been solved using proportional reasoning or visual estimation. What do you want in a good explanation? Why is just numbers insufficient?

Student G

Seventh Grade

7th Grade Task 2 Photographs

Student Task	Reason about geometric relationships in a diagram. Use proportions to	
	find missing dimensions of a photograph.	
Core Idea 1	Develop, analyze and explain methods for solving problems	
Number and	involving proportional reasoning, such as scaling and finding	
Operations	equivalent ratios.	
Core Idea 4	 Understand relationships among the angles, side lengths, 	
Geometry	perimeters, and areas of similar objects.	
and	Develop and critique inductive and deductive arguments	
Measurement	concerning geometric ideas and relationships, such as	
	congruence and similarity.	
	 Solve problems involving similarity and scale factors, using 	
	proportional reasoning	

Based on teacher observations, this is what seventh graders knew and were able to do:

- Find the vertical dimensions of the photographs.
- Add their dimensions together to find the size of the paper.

Areas of difficulty for seventh graders:

- Using proportional reasoning or scale factor to find the horizontal dimensions
- Understanding corresponding parts in proportional figures
- Understanding "not drawn to scale" or why visual estimation is not acceptable

Strategies used by successful students:

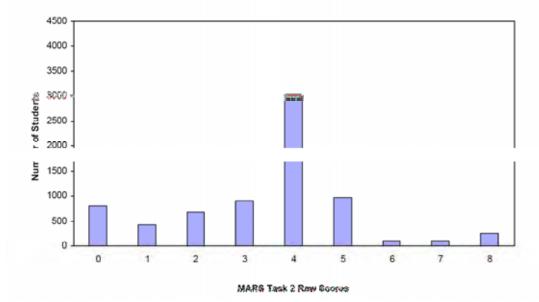
• Setting up and solving p.9(o) tttT141Tf13.920013.9282.92392.16Tm0411Fd5te

Task 2 - Photographs

Mean: 3.41 StdDev: 1.82

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	1	430	17.0%	86.9%	
	2	671	26.3%	83.0%	
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	4	2225127	**!-***!.4%	~~[] 65.8%	1
	5	969	93.8%	19.6%	
•			,		1
	1	95	96.5%	4.8%	
	8	254	160 094	Q शक्य	





The maximum score available for this task is 8 points.

The minimum score for a level 3 response, meeting standard, is 3 points.

Most students, about 83%, could find the height photograph in diagram 1 and the width of the photograph in diagram 2. Many students, 74%, could also find the size of the paper for diagram 1. More than half the students, 61% could find the base and height for the photograph in diagram 1, width of the diagram 2, and the size of the paper. Only 19% could use of proportional thinking, either using proportions or scale factor, to explain how they found the second dimension in either diagram. Less than 5% of the students could meet all the demands of the task. More than 10% of the students scored no points on this task. 90% of the students with this score attempted the task.

Photographs

Points	Understandings	Misunderstandings
0	90% of the students with this score attempted the task.	7% of the students thought the height in diagram 1 was 2 inches. 7% thought the width of diagram 1 was 1".
2	Students knew that the height of diagram 1 and width of diagram 2 was 3 inches. They could understand the smaller photos were half of the 6 inches of the larger photo.	Many students assumed the first photo was a square to find the missing dimension or that if 3 was half of 6, then $4 + 4 = 8$ for the height in diagram 2.
3	Students could also add the missing dimensions in diagram 1 to find the size of the piece of paper.	
4	Students knew that the height of diagram 1 and width of diagram 2 was 3 inches. Students could find the size of the paper in diagram 1. Students could find the missing width for diagram 1.	By assuming the paper to be a square, students could get the dimension without using proportional reasoning. Students did not have the concept of "not drawn to scale".
5	Students could use proportional reasoning to find the missing dimensions for diagram 1.	In trying to use this logic to solve the for missing height in diagram 2, students failed to match corresponding sides.
8	Students could use proportions or scale factors to find missing dimensions of similar figures. Students could interpret diagrams to find the dimensions of the full sheets of paper.	ı U

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Implications for Instruction

Students at this grade level need to transition from additive thinking to multiplicative thinking or