

Math Domain

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|--|---|---|
| <input type="checkbox"/> Number/Quantity | <input checked="" type="checkbox"/> Shape/Space | <input type="checkbox"/> Function/Pattern |
| <input type="checkbox"/> Chance/Data | <input type="checkbox"/> Arrangement | |

Math Actions (possible weights: 0 through 4)

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|--|--|
| <input type="checkbox"/> 0 Modeling/Formulating | <input type="checkbox"/> 3 Manipulating/Transforming |
| <input type="checkbox"/> 2 Inferring/Drawing Conclusions | <input type="checkbox"/> 1 Communicating |

Math Big Ideas

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|---|---|--|
| <input checked="" type="checkbox"/> Scale | <input type="checkbox"/> Reference Frame | <input checked="" type="checkbox"/> Representation |
| <input type="checkbox"/> Continuity | <input type="checkbox"/> Boundedness | <input type="checkbox"/> Invariance/Symmetry |
| <input type="checkbox"/> Equivalence | <input type="checkbox"/> General/Particular | <input type="checkbox"/> Contradiction |
| <input type="checkbox"/> Use of Limits | <input type="checkbox"/> Approximation | <input type="checkbox"/> Other |

1. Since the scale of the shirt pattern is 1 : 3, the relationship between the length of **any** line in the diagram and the corresponding line on the real garment is

$$\frac{L}{L_{real}} = \frac{1}{3}$$

where L is the length of a line on the patter and L_{real} is the length of the corresponding line on the real garment.

2. Here our rule is

$$\frac{L_{size12}}{L_{size5}} = 1.5$$

3. The ratio of the weights of any two similar objects may be represented by

$$\frac{Weight_{large}}{Weight_{small}} = \frac{Length_{large} \cdot Width_{large} \cdot Thickness_{large} \cdot Density_{large}}{Length_{small} \cdot Width_{small} \cdot Thickness_{small} \cdot Density_{small}}$$

Because the small and large flags are made from the same material both the thickness and the density of the flags are the same. Therefore, the ratio of the weights is equal to the ratio of the areas. The ratio of a length in the large flag to the corresponding length in the small flag is 20 to 1, so the ratio of the area is 400 : 1. Since the small flag weighs 1/8 lb., the large flag weighs 50 lb.

	partial level	full level
Modeling/ Formulating (weight: 1)		Recognize the geometric similarity of the large and small flags.
Transforming/ Manipulating (weight: 3)	Give partial calculations of scaled quantities.	Give complete, accurate calculations of scaled quantities.
Inferring/ Drawing Conclusions (weight: 2)	Infer the scaled lengths in 1 and 2.	Draw conclusions about the relationship between the scaling of weights and the scaling of volumes. Recognize that the scaling of volumes is the same as the scaling of areas if the flags are made of the same material.
Communicating (weight: 1)	Use inconsistent or improper units.	Describe all quantities clearly and consistently.