

Math Domain

- | | | |
|--|---|---|
| <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)

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

Math Big Ideas

- | | | |
|--|---|---|
| <input type="checkbox"/> Scale | <input type="checkbox"/> Reference Frame | <input checked="" type="checkbox"/> Representation |
| <input type="checkbox"/> Continuity | <input type="checkbox"/> Boundedness | <input checked="" 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 |

Pre-Activity

This pre-activity is designed to alert students to two basic premises:

- The area of any geometric figure is invariant under dissection, and
- The area of any geometric figure may be found by adding up the area of its component parts.

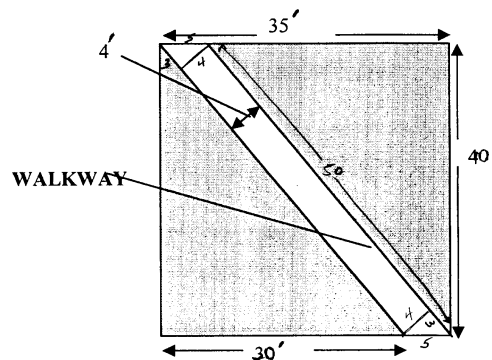
Students should be able to describe finding the area of the parallelogram by summing the areas of the rectangle and the two triangles that form it, or by summing the two rectangles, or by summing the triangles and subtracting from the original rectangular space.

Task

The hypotenuse of the two large right triangles, each having sides of 30ft. and 40ft, is 50 ft. The small triangles formed at each end of the walkway are 3-4-5 right triangles, so subtracting 3 ft. from each of the 50 ft. sides gives the dimension of the rectangle as 47 x 4, or 188 square feet. Each small triangle is 6 square feet, so the sum of the component parts of the walkway is 200 square feet.

It is also possible to arrive at a solution without using the Pythagorean theorem. The total area of the 35' x 40' rectangle is 1400 square feet. The area of each of the right triangles may be found by calculating $\frac{1}{2}bh$, or $\frac{1}{2}(30)(40)$, for a total of 1200 square feet. Subtracting this from the whole area leaves a walkway of 200 square feet.

Still another approach is to treat the walkway as a long, skinny parallelogram with a base of 5 feet and a height of 40 feet, giving total area of 200 square feet.



	partial level (1 or 2)	full level (3)
Modeling/ Formulating (weight: 3)	Student is partially successful in developing a strategy to formulate the geometric properties of the walkway.	Student develops a successful strategy to formulate the geometric properties of the walkway that covers all of the given conditions.
Transforming/ Manipulating (weight: 2)	Some of the interim calculations are incorrect, which leads to an incorrect final answer for the total area of the walkway.	All calculations are correct.
Inferring/ Drawing Conclusions (weight: 2)	Student makes an incorrect inference, either in regard to how to dissect the figure, or which approach to use in order to calculate the area.	All inferences are correct regarding the dissection of the figure, and the mathematical process to be applied.
Communicating (weight: 2)	Explanation of answer is incomplete as to process, or unclear as to assumptions and inferences.	Explanation is clear and complete, and describes the mathematical process in an orderly, sequential fashion.