

# Paving the Patio

# M001 scoring rubric

## Math Domain

Number/Quantity

Shape/Space

Function/Pattern

Chance/Data

Arrangement

## Math Actions (possible weights: 0 through 4)

1 Modeling/Formulating

4 Manipulating/Transforming

2 Inferring/Drawing Conclusions

2 Communicating

## Math Big Ideas

Scale

Reference Frame

Representation

Continuity

Boundedness

Invariance/Symmetry

Equivalence

General/Particular

Contradiction

Use of Limits

Approximation

Other

1. One 18" x 18" patio block covers **2.25** square feet.

**Twelve** 12" square stepping stones cover 12 square feet

There are two possible answers for the round blocks. If one treats a round block as being inscribed in an 18" square, it will take **45** blocks to tile 100 square feet. If one finds the area of a round block [254.5 sq. inches], it will take **56** blocks to make up 100 square feet. This is not a realistic solution, however, as circular objects cannot be fully tessellated.

About **113** of the 8" x 16" patio blocks will be needed to cover 100 square feet. If students give an answer of 112.5, it should not be given full credit.

2. The area to be covered is 180 square feet. You would need 180 of the 12" stepping stones, costing about \$268; 80 of the 18" square patio blocks, costing about \$266; 203 of 8"x16" patio blocks, costing about \$146; and either 81 round blocks costing about \$356, or 101 blocks costing about \$443, depending on how the area is considered. Therefore, the 8x16 patio blocks are the most economical.
3. There are 2 linear feet in each piece of edging block. The perimeter of the patio is 54 feet. At first glance it would seem that you would need 27 blocks. However, since the patio is a perfect rectangle, and you must allow for the thickness of the bricks at the corners, it would appear that an even number of blocks, namely 26, would do the job, at a cost of \$42.38.

	<b>partial level (1 or 2)</b>	<b>full level (3)</b>
<b>Modeling/ Formulating</b> (weight: 1)	Student is only partially successful in developing a strategy to answer <b>2</b> . or Student is not consistent in treating the area of the round blocks.	Student uses a consistent, correct strategy to determine costs in <b>2</b> .
<b>Transforming/ Manipulating</b> (weight: 4)	Some of the calculations are correct in <b>1, 2,</b> and <b>3</b> .	All of the calculations are correct. When approximations are given, they are correctly rounded up or down.
<b>Inferring/ Drawing Conclusions</b> (weight: 2)	Student is unable to draw a conclusion about the most economical block in <b>2</b> because of faulty proportional reasoning. or Gives an answer of 27 blocks for <b>3</b> .	Student gives a correct answer for <b>2</b> , and in all cases demonstrates a strong grasp of proportional reasoning.
<b>Communicating</b> (weight: 2)	Numerical answers not clearly presented, or justification of the answer to <b>2</b> is incomplete or unclear.	All prose and numerical answers are clear and complete, and include labels where needed.

