Covering Shapes with Unit Squares

Spot mistakes, reason, and work backward

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

A complete cover leaves no gaps and puts no two tiles on top of each other. Each tile covers 1 square unit. Find how many cells the whole shape has, then subtract the cells already covered. Stacking tiles does not cover extra surface.

Worked example

The shaded cells each have one unit-square tile. How many more tiles finish the cover without gaps or overlaps?

1. The surface has $4 \times 1 = 4$ unit-square spaces; 2 are already covered.

2. Cover every empty space once: $4 - 2 = 2$ additional tiles.

Answer: 2 more tiles.

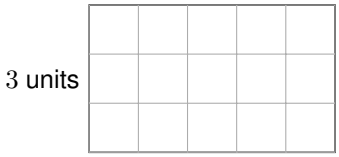


Shaded = one covering tile

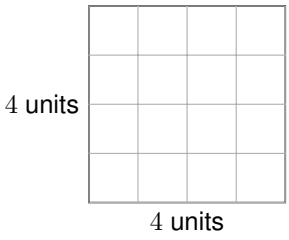
Practice Problems

Show your thinking.

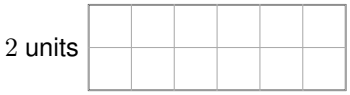
1. 15 unit tiles are placed on a 5-by-3 mat. Two tiles are stacked in one cell and one cell is empty. Is the mat fully covered?



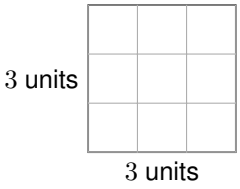
2. This surface has 16 unit-square spaces. 6 are empty; each other space has exactly one tile. How many tiles are placed?



3. A helper puts 11 unit tiles on this 6-by-2 surface, with no overlaps. Can it be fully covered?



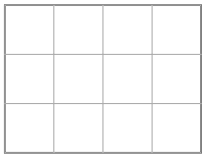
4. This surface has 9 unit-square spaces. 5 are empty; each other space has exactly one tile. How many tiles are placed?



5. 10 unit tiles are placed on a 5-by-2 mat. Two tiles are stacked in one cell and one cell is empty. Is the mat fully covered?



6. Draw boundaries that pair neighboring unit squares, so every square belongs to exactly one pair. How many pairs cover the rectangle?



Answer Key

1. No; move the top stacked tile to the empty cell.
2. 10 tiles.
3. No; one unit-square gap remains.
4. 4 tiles.
5. No; move the top stacked tile to the empty cell.
6. 6 pairs.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. There are 15 tiles, but the stack covers only one space, leaving $15 - 1 = 14$ different cells covered.

2. Moving the extra stacked tile fills the one gap: $14 + 1 = 15$ cells covered once.

Problem 2

1. One tile sits in each occupied space. Subtract the empty ones: $16 - 6 = 10$.

2. Check: $10 + 6 = 16$. Each tile must cover one different space.

Problem 3

1. The surface has $6 \times 2 = 12$ square units.

2. $12 - 11 = 1$ space is unfilled. A complete cover needs one tile in every space.

Problem 4

1. One tile sits in each occupied space. Subtract the empty ones: $9 - 5 = 4$.

2. Check: $4 + 5 = 9$. Each tile must cover one different space.

Problem 5

1. There are 10 tiles, but the stack covers only one space, leaving $10 - 1 = 9$ different cells covered.

2. Moving the extra stacked tile fills the one gap: $9 + 1 = 10$ cells covered once.

Problem 6

1. The rectangle contains $4 \times 3 = 12$ unit squares. In every row, pair columns 1 and 2, then columns 3 and 4.

2. That makes 2 neighboring pairs in each of 3 rows: $3 \times 2 = 6$ pairs cover every cell once.

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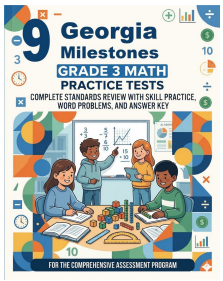

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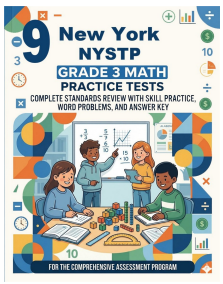

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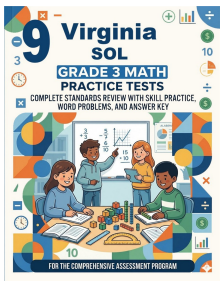

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