Lattice paths — Grids up to 10

Name: ______________________ Date: ____________

Count the routes across a grid, moving only right or up, and show why it is a combination, not a power of two.

1. A counter crosses a board 7 blocks wide and 2 blocks tall, moving only right or up one block at a time from the bottom-left corner to the top-right corner.

How many different routes are there?

Why

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2. A counter crosses a board 3 blocks wide and 9 blocks tall, moving only right or up one block at a time from the bottom-left corner to the top-right corner.

How many different routes are there?

Why

____

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Count the routes across a grid, moving only right or up, and show why it is a combination, not a power of two.

3. An ant walks a park 5 blocks wide and 2 blocks tall, from one corner to the opposite one, only ever going right or up one block at a time.

How many different routes are there?

Why

____

4. An ant walks a park 3 blocks wide and 8 blocks tall, from one corner to the opposite one, only ever going right or up one block at a time.

How many different routes are there?

Why

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Lattice paths · Grids up to 10 — Answer key

> **If they are stuck**
> - Do not draw the routes. Every route is the same length; count which of its steps go right, and that is a combination.

1. Every route is 9 steps — 7 to the right and 2 up — so a route is just which 2 of the 9 steps go up. That is 9 choose 2, built up one factor at a time: 1 × 9 = 9, 9 ÷ 1 = 9, 9 × 8 = 72, 72 ÷ 2 = 36. So 36 routes. It is not 512 (two choices at every step would count routes that run off the grid).

2. Every route is 12 steps — 3 to the right and 9 up — so a route is just which 3 of the 12 steps go right. That is 12 choose 3, built up one factor at a time: 1 × 12 = 12, 12 ÷ 1 = 12, 12 × 11 = 132, 132 ÷ 2 = 66, 66 × 10 = 660, 660 ÷ 3 = 220. So 220 routes. It is not 4096 (two choices at every step would count routes that run off the grid).

3. Every route is 7 steps — 5 to the right and 2 up — so a route is just which 2 of the 7 steps go up. That is 7 choose 2, built up one factor at a time: 1 × 7 = 7, 7 ÷ 1 = 7, 7 × 6 = 42, 42 ÷ 2 = 21. So 21 routes. It is not 128 (two choices at every step would count routes that run off the grid).

4. Every route is 11 steps — 3 to the right and 8 up — so a route is just which 3 of the 11 steps go right. That is 11 choose 3, built up one factor at a time: 1 × 11 = 11, 11 ÷ 1 = 11, 11 × 10 = 110, 110 ÷ 2 = 55, 55 × 9 = 495, 495 ÷ 3 = 165. So 165 routes. It is not 2048 (two choices at every step would count routes that run off the grid).