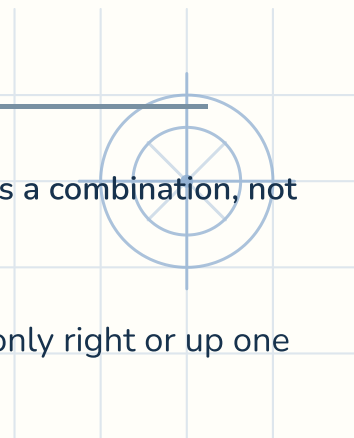


Lattice paths — Grids up to 10

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 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: $1 \times 9 = 9$, $9 \div 1 = 9$, $9 \times 8 = 72$, $72 \div 2 = 36$. So 36 routes. It is not 512 (two choices at every step would count routes that run off the grid).

36

- 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

.....

.....

.....



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.

- 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

.....

.....

.....



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: $1 \times 9 = 9$, $9 \div 1 = 9$, $9 \times 8 = 72$, $72 \div 2 = 36$. So 36 routes. It is not 512 (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: $1 \times 7 = 7$, $7 \div 1 = 7$, $7 \times 6 = 42$, $42 \div 2 = 21$. So 21 routes. It is not 128 (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: $1 \times 12 = 12$, $12 \div 1 = 12$, $12 \times 11 = 132$, $132 \div 2 = 66$, $66 \times 10 = 660$, $660 \div 3 = 220$. So 220 routes. It is not 4096 (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: $1 \times 11 = 11$, $11 \div 1 = 11$, $11 \times 10 = 110$, $110 \div 2 = 55$, $55 \times 9 = 495$, $495 \div 3 = 165$. So 165 routes. It is not 2048 (two choices at every step would count routes that run off the grid).