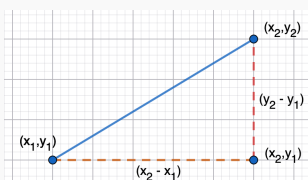


Distance and Midpoint in the Plane

THE DISTANCE FORMULA — from the Pythagorean theorem

How does the distance formula come from the Pythagorean theorem?



Taxicab distance

for travel along grid lines only

Euclidean distance

straight-line, any two points

Worked Example — Distance

Find the distance from (2, 4) to (8, 6)

Horizontal change: $(8-4) = 4$

Vertical change: $(6-4) = 2$

Distance: $\sqrt{4^2 + 2^2} = \sqrt{20} = 2\sqrt{5}$

Your turn: find the distance from (1, 3) to (5, 6)

THE MIDPOINT FORMULA

Midpoint of A(x_1 , y_1) and B(x_2 , y_2)

$M = (\quad , \quad)$

Worked Example — Midpoint and Missing Endpoint	
Find the midpoint of (2, 4) and (8, 6) $M = ((2+8)/2, (4+6)/2) = (\text{ ____ } , \text{ ____ })$	Find B if M = (5, 5) and A = (2, 4)

PROPORTIONAL REASONING — THE MAP ACTIVATOR

Proportional Reasoning — How Does the Map Calculate Distance?	
Conversion ratios: 1° latitude ≈ 69 miles 1° longitude at 42°N ≈ 53 miles Key idea:	Work through the calculation: <i>Start: 42.99027° N, 71.4243° W → End: 41.69886° N, 72.16748° W</i>