LESSON MAKER PRO

Corner Check

Find a missing corner and test your construction.

HIGH SCHOOL · GDA.GM.G.29.a

GDA.GM.G.29.a "Construct figures, using technology and other tools, in order to make and test conjectures about their properties."

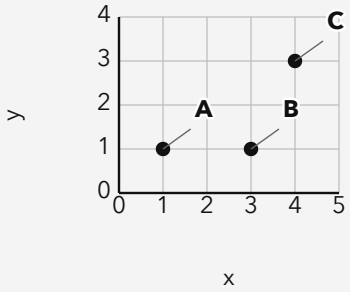
NAME _____ DATE _____

THE MIDPOINT TEST

For consecutive corners P, Q, and R of a parallelogram, find the fourth corner with S = P + R - Q. To test the construction, find the midpoints of PR and QS. The midpoints match if the diagonals bisect each other.

WORKED EXAMPLE

A(1, 1), B(3, 1), and C(4, 3) are consecutive corners. Find D and test it.



1. Use D = A + C - B.
2. D = (1 + 4 - 3, 1 + 3 - 1) = (2, 3).
3. Midpoint of AC: ((1 + 4)/2, (1 + 3)/2) = (5/2, 2).
4. Midpoint of BD: ((3 + 2)/2, (1 + 3)/2) = (5/2, 2).

Answer: D = (2, 3). The matching midpoints confirm the construction.

PRACTICE 4 problems

1 A(5, 5), B(8, 5), and C(9, 7) are consecutive corners of a parallelogram. Find D.

ANSWER _____

2 A(6, 8), B(9, 8), and C(10, 12) are consecutive corners. Find D and the shared diagonal midpoint.

ANSWER _____

3 For A(5, 6), B(9, 6), C(11, 10), and D(7, 10), do the diagonals bisect each other? Give their shared midpoint.

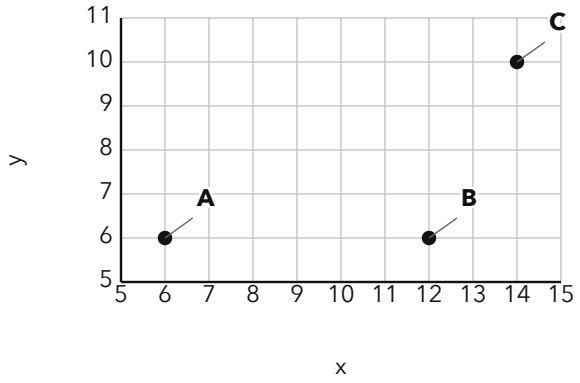
ANSWER _____

4 For A(6, 5), B(10, 5), C(12, 9), and D(8, 10), do the diagonals bisect each other? Give both midpoints.

ANSWER _____

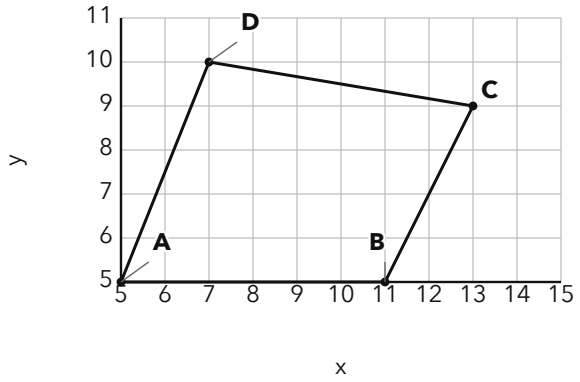
APPLY IT Show your work

1 A skate park plan marks three consecutive corners of a parallelogram ramp. Find D, then test the diagonal midpoints.



ANSWER _____

2 A game designer plots a four-corner arena. Does its outline form a parallelogram? Test the diagonal midpoints.



ANSWER _____

CHALLENGE One step up

Consecutive corners are A = (a, b), B = (c, d), and C = (e, f). Show with midpoint formulas why D = (a + e - c, b + f - d) makes ABCD a parallelogram.

WORK SPACE AND ANSWER

ANSWER KEY # Corner Check

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A(5, 5), B(8, 5), and C(9, 7) are consecutive corners of a parallelogram. Find D.	**D = (6, 7)**
2	A(6, 8), B(9, 8), and C(10, 12) are consecutive corners. Find D and the shared diagonal midpoint.	**D = (7, 12); midpoint = (8, 10)**
3	For A(5, 6), B(9, 6), C(11, 10), and D(7, 10), do the diagonals bisect each other? Give their shared midpoint.	**Yes; both midpoints are (8, 8).**
4	For A(6, 5), B(10, 5), C(12, 9), and D(8, 10), do the diagonals bisect each other? Give both midpoints.	**No. AC has midpoint (9, 7); BD has midpoint (9, 15/2).**

PART 2 · APPLY IT

1. **D = (8, 10); both diagonal midpoints are (10, 8).** Calculate D = (6 + 14 - 12, 6 + 10 - 6) = (8, 10). The midpoint of each diagonal is (10, 8).
2. **No. AC has midpoint (9, 7); BD has midpoint (9, 15/2).** Read the vertices from the grid and find each diagonal midpoint. Their y-coordinates differ, so the diagonals do not bisect each other.

CHALLENGE

The midpoint of AC is ((a + e)/2, (b + f)/2). The midpoint of BD is ((c + a + e - c)/2, (d + b + f - d)/2), which simplifies to the same point. Since the diagonals bisect each other, ABCD is a parallelogram.

Accept equivalent midpoint notation. In the challenge, the student must show that both diagonal midpoint coordinates match.