

SCAVENGER HUNT



CLASSIFYING QUADRILATERALS ON THE COORDINATE PLANE

Every Fourth Corner: Parallelograms from Three Corners

The fourth corner from coordinates · checked by midpoints · the cards
check the answers

FREE

ANSWER

$(-3, 3)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(4, 6), Q(1, 5) and R(-2, -5).

Find the fourth corner, S.

Write each move as two numbers, across and then up.

U

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1. **Tape the 16 cards around the room**, in any order. Each card has a large letter in its bottom left corner. Start each group at a *different* one of these eight cards: *U E C G M J V A*.
2. **Say this once:** “Each card gives three corners of parallelogram PQRS, in order. Find the move from Q to R. Make the same move from P. That is S, like (4, 3). Check that PR and QS have the same midpoint. Then walk to the card with S at the top.”
3. **Each group writes one line per card.** Eight right answers bring the group back to its first card.

16 cards	pages 3–10, one copy. There are two cards on each sheet. Cut the whole stack once.
Record sheet	page 11, one per student. It shows a parallelogram PQRS and a worked example.
Answers	pages 12–13, for you only. Do not put them up in the room.

In a parallelogram PQRS, side PS matches side QR. So the move from Q to R, made from P, lands on S. The diagonals PR and QS cut each other in half, so they have the same midpoint. That gives every group a check on its own answer before it walks.

Eight of the sixteen cards make the ring. A group reaches the other eight only by a wrong answer, but all the cards look the same. Two mistakes take turns around the ring. Some students make the move from P to Q, starting at R. That puts the corners in the wrong order, so the diagonal PR becomes a side. Others copy a negative coordinate without its minus sign. Each mistake lands on a card off the ring, and that card sends the group back to the card it got wrong.

The check is the length of the group’s list. A clean run is **eight lines**. Each wrong answer adds two. Every card has a line in italics under its question. It tells a group that arrived by a wrong answer what to check. A group that arrived by a right answer skips it. Guessing does not work: no single rule, such as walking to the nearest point, gets more than one of the cards.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.

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ANSWER

$(-6, -1)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(6, -3), Q(6, -6) and R(-3, 0).

Find the fourth corner, S.

Opposite corners are P and R, and Q and S.

A

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ANSWER

$(-3, 9)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(-4, -5), Q(3, 2) and R(1, 6).

Find the fourth corner, S.

A minus sign belongs to its number. Copy the three corners again.

B

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ANSWER

$(-1, 4)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(-6, 1), Q(0, 0) and R(3, -5).

Find the fourth corner, S.

Check S with the midpoints. Both coordinates must match.

C

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ANSWER

$(9, 1)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(4, -6), Q(3, 4) and R(-4, 6).

Find the fourth corner, S.

Is a minus sign lost anywhere? Check each coordinate against the card.

D

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ANSWER

$(1, -4)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(6, 6), Q(2, -3) and R(-5, -5).

Find the fourth corner, S.

A move to the left or down is a negative number.

E

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ANSWER

$(-1, -2)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(-2, -2), Q(-5, 4) and R(-2, 2).

Find the fourth corner, S.

Copy every negative coordinate with its minus.

F

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ANSWER

$(-3, -4)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(-5, -1), Q(-5, 3) and R(-1, 5).

Find the fourth corner, S.

A midpoint can end in a half, like 2.5. Keep the half.

G

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ANSWER

$(9, -6)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(2, 4), Q(5, -4) and R(2, -4).

Find the fourth corner, S.

Side PS matches side QR, so make the move from Q to R, starting at P.

H

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ANSWER

$(-1, 0)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(-4, -5), Q(2, -6) and R(0, 3).

Find the fourth corner, S.

Opposite sides of a parallelogram have equal slopes. Check one pair.

J

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ANSWER

$(-7, -6)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(2, -6), Q(-3, -6) and R(-6, 1).

Find the fourth corner, S.

The corners go in order: P, Q, R, S. Check that PR and QS have the same midpoint.

K

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ANSWER

$(2, -5)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(-4, -5), Q(0, -5) and R(-2, 4).

Find the fourth corner, S.

Is S opposite Q? The midpoint of QS must be the midpoint of PR.

L

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ANSWER

$(-1, 1)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(3, 0), Q(0, -3) and R(-4, -3).

Find the fourth corner, S.

Plot P, Q and R on scrap paper. S closes the shape.

M

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ANSWER

$(-6, -8)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(4, -5), Q(1, -5) and R(-4, 0).

Find the fourth corner, S.

Subtracting a negative number adds it. Check each minus sign.

N

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ANSWER

$(-5, -6)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(3, -5), Q(6, -3) and R(0, 5).

Find the fourth corner, S.

The move from Q to R is the move from P to S. Start the move at P.

T

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ANSWER

$(-3, 3)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(4, 6), Q(1, 5) and R(-2, -5).

Find the fourth corner, S.

Write each move as two numbers, across and then up.

U

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ANSWER

$(-6, 4)$

PQRS is a parallelogram. Its corners go in order around it: P, Q, R, S.
Three corners are

P(-2, 3), Q(2, 1) and R(-2, -3).

Find the fourth corner, S.

Is a minus sign lost anywhere? Copy each corner with care.

V

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Scavenger Hunt — where I went

The fourth corner

Name _____

Period _____

Date _____

Each card gives three corners of parallelogram PQRS. Find the fourth corner, S. Find the card with S at the top. A clean run is eight lines. Each card has a line in italics under its question. **If you are on a card because you went wrong, its line says what to check. If you were right, skip it.**

The corners go in order around the parallelogram: P, Q, R, S. Side PS matches side QR. P and R are opposite corners, and so are Q and S.

Find S: find the move from Q to R. Make the same move from P. For example, P(1, 2), Q(3, -1), R(6, 0): from Q to R is 3 right and 1 up. From P that gives S(4, 3).

Check S: the midpoint of PR and the midpoint of QS must be the same point. Here both are (3.5, 1).

Card letter	The move from Q to R	S	Midpoint of PR	Midpoint of QS
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Two diagonals of a parallelogram cross. What do they share?

Every point stands for a letter. Write the letter for each answer in the box above its point. Read the boxes you filled, left to right. **If they do not spell the answer, one of your answers is wrong.**

(-7, -6) = D (-6, -8) = O (-6, -1) = M (-6, 4) = I (-5, -6) = N (-3, -4) = D (-3, 3) = P (-3, 9) = I (-1, -2) = T
 (-1, 0) = O (-1, 1) = I (-1, 4) = N (1, -4) = T (2, -5) = I (9, -6) = M (9, 1) = P

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(-7, -6) (-6, -8) (-6, -1) (-6, 4) (-5, -6) (-3, -4) (-3, 3) (-3, 9) (-1, -2) (-1, 0) (-1, 1) (-1, 4) (1, -4) (2, -5) (9, -6) (9, 1)



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Scavenger Hunt — answers

For the teacher

The ring in order, with the answer found on each card. A group may begin anywhere on it. Wherever it begins, eight right answers bring it back to that card.

U (1, -4) → E (-1, 4) → C (-3, -4) → G (-1, 1) → M (-1, 0) → J (-6, 4) → V (-6, -1) → A (-3, 3) → U

Two diagonals of a parallelogram cross. What do they share? The answer is *MIDPOINT*! It is read along the boxes of the record sheet, which run in this order: by the first coordinate, then by the second.

Card	What the card asks	Answer, and why	The common wrong answer on this card, and why	Letter of its top
1 U	Corners P(4, 6), Q(1, 5) and R(-2, -5). Find S.	(1, -4) . From Q to R is 3 left and 10 down. The same move from P gives S(1, -4). Check: PR and QS both have midpoint (1, 0.5).	(-5, -6): the group makes the move from P to Q (3 left and 1 down) starting at R. That puts S opposite P instead of opposite Q, so PR becomes a side.	P
2 E	Corners P(6, 6), Q(-5, -5) and R(-2, -5). Find S.	(-1, 4) . From Q to R is 7 left and 2 down. The same move from P gives S(-1, 4). Check: PR and QS both have midpoint (0.5, 0.5).	(-1, -2): one minus sign is lost, Q's y = -3 copied as 3.	T
3 C	Corners P(-6, 1), Q(0, 0) and R(3, -5). Find S.	(-3, -4) . From Q to R is 3 right and 5 down. The same move from P gives S(-3, -4). Check: PR and QS both have midpoint (-1.5, -2).	(9, -6): the group makes the move from P to Q (6 right and 1 down) starting at R. That puts S opposite P instead of opposite Q, so PR becomes a side.	N
4 G	Corners P(-5, -1), Q(-5, 3) and R(-1, 5). Find S.	(-1, 1) . From Q to R is 4 right and 2 up. The same move from P gives S(-1, 1). Check: PR and QS both have midpoint (-3, 2).	(9, 1): one minus sign is lost, P's x = -5 copied as 5.	D
5 M	Corners P(3, 0), Q(0, -3) and R(-4, -3). Find S.	(-1, 0) . From Q to R is 4 left and 0 up. The same move from P gives S(-1, 0). Check: PR and QS both have midpoint (-0.5, -1.5).	(-7, -6): the group makes the move from P to Q (3 left and 3 down) starting at R. That puts S opposite P instead of opposite Q, so PR becomes a side.	I
6 J	Corners P(-4, -5), Q(2, -6) and R(0, 3). Find S.	(-6, 4) . From Q to R is 2 left and 9 up. The same move from P gives S(-6, 4). Check: PR and QS both have midpoint (-2, -1).	(-6, -8): one minus sign is lost, Q's y = -6 copied as 6.	O
7 V	Corners P(-2, 3), Q(2, 1) and R(-2, -3). Find S.	(-6, -1) . From Q to R is 4 left and 4 down. The same move from P gives S(-6, -1). Check: PR and QS both have midpoint (-2, 0).	(2, -5): the group makes the move from P to Q (4 right and 2 down) starting at R. That puts S opposite P instead of opposite Q, so PR becomes a side.	I
8 A	Corners P(6, -3), Q(6, -6) and R(-3, 0). Find S.	(-3, 3) . From Q to R is 9 left and 6 up. The same move from P gives S(-3, 3). Check: PR and QS both have midpoint (1.5, -1.5).	(-3, 9): one minus sign is lost, P's y = -3 copied as 3.	M

Scavenger Hunt — the cards off the ring

For the teacher

A group reaches these eight cards only by a wrong answer. The point at the top of each one is the wrong answer from one ring card. Its right answer is the point at the top of that ring card, so the group goes to the card it got wrong and tries it again.

Card	What the card asks	Answer, and why	The common wrong answer on this card, and why	Letter of its top
T	Corners P(3, -5), Q(6, -3) and R(0, 5). Find S.	(-3, 3) . From Q to R is 6 left and 8 up. The same move from P gives S(-3, 3). Check: PR and QS both have midpoint (1.5, 0).	—	N
F	Corners P(-2, -2), Q(-5, 4) and R(-2, 2). Find S.	(1, -4) . From Q to R is 3 right and 2 down. The same move from P gives S(1, -4). Check: PR and QS both have midpoint (-2, 0).	—	T
H	Corners P(2, 4), Q(5, -4) and R(2, -4). Find S.	(-1, 4) . From Q to R is 3 left and 0 up. The same move from P gives S(-1, 4). Check: PR and QS both have midpoint (2, 0).	—	M
D	Corners P(4, -6), Q(3, 4) and R(-4, 6). Find S.	(-3, -4) . From Q to R is 7 left and 2 up. The same move from P gives S(-3, -4). Check: PR and QS both have midpoint (0, 0).	—	P
K	Corners P(2, -6), Q(-3, -6) and R(-6, 1). Find S.	(-1, 1) . From Q to R is 3 left and 7 up. The same move from P gives S(-1, 1). Check: PR and QS both have midpoint (-2, -2.5).	—	D
N	Corners P(4, -5), Q(1, -5) and R(-4, 0). Find S.	(-1, 0) . From Q to R is 5 left and 5 up. The same move from P gives S(-1, 0). Check: PR and QS both have midpoint (0, -2.5).	—	O
L	Corners P(-4, -5), Q(0, -5) and R(-2, 4). Find S.	(-6, 4) . From Q to R is 2 left and 9 up. The same move from P gives S(-6, 4). Check: PR and QS both have midpoint (-3, -0.5).	—	I
B	Corners P(-4, -5), Q(3, 2) and R(1, 6). Find S.	(-6, -1) . From Q to R is 2 left and 4 up. The same move from P gives S(-6, -1). Check: PR and QS both have midpoint (-1.5, 0.5).	—	I

Other mistakes lead to no card. A group might start the move at the wrong corner in another way, make the wrong move on one coordinate only, lose a different minus sign, drop the minus from its answer, give the midpoint of PR as S, or swap the two coordinates. Its answer is then not the point at the top of any card, and the group knows to check its work.