

SCAVENGER HUNT



THE DISTANCE AND MIDPOINT FORMULAS

The Distance Formula: Exact Answers

Two points on every card · simplest radical form · the cards check the answers

FREE

ANSWER

$$3\sqrt{5}$$

How far apart are these two points?

(3, 2) and (-5, -4)

Exact answer, in simplest radical form.

Square, add, and then take the square root. The root is the final step.

B

chooseyourlesson.com

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: *B N L F C E A K*.
2. **Say this once:** “Find the distance between the two points on your card. Write across and up first. Then square them, add, and take the square root. Leave the answer exact, like $3\sqrt{3}$. Then walk to the card with that answer 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 the distance formula on a right triangle.
Answers	pages 12–13, for you only. Do not put them up in the room.

Every card gives two points. The distance between them is $\sqrt{(\text{across}^2 + \text{up}^2)}$, where across is the difference of the x -coordinates and up is the difference of the y -coordinates. Every answer is exact, in simplest radical form. Four of the eight ring answers are whole numbers, so students see the root give a whole number. No calculator is needed. A student who leaves $\sqrt{148}$ in place of $2\sqrt{37}$ finds no card with that answer: ask the student to simplify.

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. There are two mistakes. In the first, the student forgets the square root and gives the sum of the squares. In the second, the student subtracts each point’s own x and y instead of the two x -coordinates and the two y -coordinates. Each of these lands on a card off the ring. 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 simple rule, such as adding across and up, gets more than four of the cards. If a group keeps coming back to the same cards, ask: “Which numbers did you subtract for across? Is your distance shorter than across plus up?”



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.
chooseyourlesson.com — 135 free geometry lessons.

ANSWER

$$3\sqrt{2}$$

How far apart are these two points?

(9, 9) and (-7, -3)

Exact answer, in simplest radical form.

A distance is longer than each leg and shorter than both together. Is the root in your work?

A

chooseyourlesson.com

ANSWER

$$3\sqrt{5}$$

How far apart are these two points?

(3, 2) and (-5, -4)

Exact answer, in simplest radical form.

Square, add, and then take the square root. The root is the final step.

B

chooseyourlesson.com

ANSWER

$$4\sqrt{2}$$

How far apart are these two points?

$(-1, -5)$ and $(4, 7)$

Exact answer, in simplest radical form.

Write the root sign first. Put the sum of the squares under it.

C

chooseyourlesson.com

ANSWER

$$2\sqrt{29}$$

How far apart are these two points?

$(-4, -5)$ and $(2, 3)$

Exact answer, in simplest radical form.

Never subtract a point's y from its own x. Pair x with x.

D

chooseyourlesson.com

ANSWER

13

How far apart are these two points?

$(-1, 4)$ and $(2, 7)$

Exact answer, in simplest radical form.

Subtract the two x-coordinates first. Then subtract the two y-coordinates.

E

chooseyourlesson.com

ANSWER

15

How far apart are these two points?

$(8, -9)$ and $(4, -5)$

Exact answer, in simplest radical form.

Write one point under the other. Subtract down each column.

F

chooseyourlesson.com

ANSWER

169

How far apart are these two points?

$(9, -8)$ and $(5, -4)$

Exact answer, in simplest radical form.

Square each leg, add the squares, and take the root of the sum.

G

chooseyourlesson.com

ANSWER

100

How far apart are these two points?

$(-5, 1)$ and $(-2, 7)$

Exact answer, in simplest radical form.

Under the root sign go the two squares. Take the root at the end.

H

chooseyourlesson.com

ANSWER

400

How far apart are these two points?

$(-4, 1)$ and $(-7, -2)$

Exact answer, in simplest radical form.

Check the size. The distance is shorter than the two legs put together. Keep the root.

J

chooseyourlesson.com

ANSWER

20

How far apart are these two points?

$(7, -2)$ and $(1, -5)$

Exact answer, in simplest radical form.

Across uses the x-coordinate of each point. Up uses the y-coordinate of each point.

K

chooseyourlesson.com

ANSWER

$$2\sqrt{37}$$

How far apart are these two points?

(5, 6) and (-7, -3)

Exact answer, in simplest radical form.

Is your distance longer than across plus up? Then check the root.

L

chooseyourlesson.com

ANSWER

$$\sqrt{370}$$

How far apart are these two points?

(-3, -7) and (6, 5)

Exact answer, in simplest radical form.

Line up the two points. The x-coordinates make one column, the y-coordinates another.

M

chooseyourlesson.com

ANSWER

10

How far apart are these two points?

$(-7, 3)$ and $(-5, -9)$

Exact answer, in simplest radical form.

Across is x minus x . Up is y minus y . Check each one.

N

chooseyourlesson.com

ANSWER

$5\sqrt{2}$

How far apart are these two points?

$(1, 5)$ and $(-4, -7)$

Exact answer, in simplest radical form.

Read your two legs again. Is across from the x -coordinates? Is up from the y -coordinates?

P

chooseyourlesson.com

ANSWER

$$3\sqrt{13}$$

How far apart are these two points?

(9, 9) and (-3, -7)

Exact answer, in simplest radical form.

Name each leg. The x-coordinates give across, and the y-coordinates give up.

Q

chooseyourlesson.com

ANSWER

$$225$$

How far apart are these two points?

(3, -7) and (-9, -5)

Exact answer, in simplest radical form.

Compare your answer with across plus up. A distance is always less. Where is the root?

R

chooseyourlesson.com

Scavenger Hunt — where I went

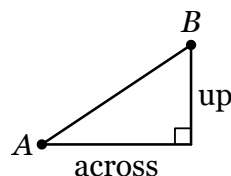
The distance formula

Name _____

Period _____

Date _____

For each card, write across and up, then the distance. **Leave the distance exact, in simplest radical form, like $3\sqrt{3}$. Do not use a decimal.** Then find the card with your answer 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.**



across = the difference of the two x -coordinates. **up** = the difference of the two y -coordinates. Subtract in the same order both times.

Distance = $\sqrt{(\text{across}^2 + \text{up}^2)}$. The distance is a length. It is longer than each leg and shorter than across + up.

Leave every length exact, in simplest radical form: $\sqrt{27} = \sqrt{9 \times 3} = 3\sqrt{3}$. Do not use a decimal.

Card letter	across	up	Distance (exact)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Why does the drone get home before the taxi?

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

$3\sqrt{2} = \text{N}$ $4\sqrt{2} = \text{O}$ $3\sqrt{5} = \text{D}$ $5\sqrt{2} = \text{R}$ $10 = \text{E}$ $2\sqrt{29} = \text{U}$ $3\sqrt{13} = \text{N}$ $2\sqrt{37} = \text{T}$ $13 = \text{O}$ $15 = \text{U}$ $\sqrt{370} = \text{T}$ $20 = \text{R}$
 $100 = \text{O}$ $169 = \text{D}$ $225 = \text{O}$ $400 = \text{E}$

$3\sqrt{2}$	$4\sqrt{2}$	$3\sqrt{5}$	$5\sqrt{2}$	10	$2\sqrt{29}$	$3\sqrt{13}$	$2\sqrt{37}$	13	15	$\sqrt{370}$	20	100	169	225	400



135 free geometry lessons — worksheets, worked answers and lesson plans.
chooseyourlesson.com

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.

B (10) → N (2√37) → L (15) → F (4√2) → C (13) → E (3√2) → A (20) → K (3√5) → B

Why does the drone get home before the taxi? The answer is *NO DETOUR!* It is read along the boxes of the record sheet, which run from the smallest number to the largest. Across and up are found here by subtracting the first point from the second. The other order gives the same distance.

Card	The two points	Answer, and why	The common wrong answer on this card, and why	Letter of its top
1 B	(3, 2) and (-5, -4).	10. across = $-5 - 3 = -8$, up = $-4 - 2 = -6$. $\sqrt{((-8)^2 + (-6)^2)} = \sqrt{100} = 10$.	100. The root is left out. 100 is the square of the distance. It is more than across + up = 14, so it cannot be a distance.	D
2 N	(-7, 3) and (-5, -9).	2√37. across = $-5 - (-7) = 2$, up = $-9 - 3 = -12$. $\sqrt{(2^2 + (-12)^2)} = \sqrt{148} = \sqrt{4 \times 37} = 2\sqrt{37}$.	2√29. Each point's own x and y: $-7 - 3 = -10$ and $-5 - (-9) = 4$, so $\sqrt{((-10)^2 + 4^2)} = 2\sqrt{29}$. Across must use the two x-coordinates.	E
3 L	(5, 6) and (-7, -3).	15. across = $-7 - 5 = -12$, up = $-3 - 6 = -9$. $\sqrt{((-12)^2 + (-9)^2)} = \sqrt{225} = 15$.	225. The root is left out. 225 is the square of the distance. It is more than across + up = 21, so it cannot be a distance.	T
4 F	(8, -9) and (4, -5).	4√2. across = $4 - 8 = -4$, up = $-5 - (-9) = 4$. $\sqrt{((-4)^2 + 4^2)} = \sqrt{32} = \sqrt{16 \times 2} = 4\sqrt{2}$.	√370. Each point's own x and y: $8 - (-9) = 17$ and $4 - (-5) = 9$, so $\sqrt{(17^2 + 9^2)} = \sqrt{370}$. Across must use the two x-coordinates.	U
5 C	(-1, -5) and (4, 7).	13. across = $4 - (-1) = 5$, up = $7 - (-5) = 12$. $\sqrt{(5^2 + 12^2)} = \sqrt{169} = 13$.	169. The root is left out. 169 is the square of the distance. It is more than across + up = 17, so it cannot be a distance.	O
6 E	(-1, 4) and (2, 7).	3√2. across = $2 - (-1) = 3$, up = $7 - 4 = 3$. $\sqrt{(3^2 + 3^2)} = \sqrt{18} = \sqrt{9 \times 2} = 3\sqrt{2}$.	5√2. Each point's own x and y: $-1 - 4 = -5$ and $2 - 7 = -5$, so $\sqrt{((-5)^2 + (-5)^2)} = 5\sqrt{2}$. Across must use the two x-coordinates.	O
7 A	(9, 9) and (-7, -3).	20. across = $-7 - 9 = -16$, up = $-3 - 9 = -12$. $\sqrt{((-16)^2 + (-12)^2)} = \sqrt{400} = 20$.	400. The root is left out. 400 is the square of the distance. It is more than across + up = 28, so it cannot be a distance.	N
8 K	(7, -2) and (1, -5).	3√5. across = $1 - 7 = -6$, up = $-5 - (-2) = -3$. $\sqrt{((-6)^2 + (-3)^2)} = \sqrt{45} = \sqrt{9 \times 5} = 3\sqrt{5}$.	3√13. Each point's own x and y: $7 - (-2) = 9$ and $1 - (-5) = 6$, so $\sqrt{(9^2 + 6^2)} = 3\sqrt{13}$. Across must use the two x-coordinates.	R

Scavenger Hunt — the cards off the ring

For the teacher

A group reaches these eight cards only by a wrong answer. The number at the top of each one is the wrong answer from one ring card. Its right answer is the number at the top of that ring card, so the group goes to the card it got wrong and tries it again. If the group makes the same mistake here, it goes to another card off the ring. So a second wrong answer never moves a group forward.

Card	The two points	Answer, and why	The common wrong answer on this card, and why	Letter of its top
H	(-5, 1) and (-2, 7).	3√5 . across = $-2 - (-5) = 3$, up = $7 - 1 = 6$. $\sqrt{(3^2 + 6^2)} = \sqrt{45} = \sqrt{9 \times 5} = 3\sqrt{5}$.	3√13. Each point's own x and y: $-5 - 1 = -6$ and $-2 - 7 = -9$, so $\sqrt{((-6)^2 + (-9)^2)} = 3\sqrt{13}$. Across must use the two x-coordinates.	O
D	(-4, -5) and (2, 3).	10 . across = $2 - (-4) = 6$, up = $3 - (-5) = 8$. $\sqrt{(6^2 + 8^2)} = \sqrt{100} = 10$.	100. The root is left out. 100 is the square of the distance. It is more than across + up = 14, so it cannot be a distance.	U
R	(3, -7) and (-9, -5).	2√37 . across = $-9 - 3 = -12$, up = $-5 - (-7) = 2$. $\sqrt{((-12)^2 + 2^2)} = \sqrt{148} = \sqrt{4 \times 37} = 2\sqrt{37}$.	2√29. Each point's own x and y: $3 - (-7) = 10$ and $-9 - (-5) = -4$, so $\sqrt{(10^2 + (-4)^2)} = 2\sqrt{29}$. Across must use the two x-coordinates.	O
M	(-3, -7) and (6, 5).	15 . across = $6 - (-3) = 9$, up = $5 - (-7) = 12$. $\sqrt{(9^2 + 12^2)} = \sqrt{225} = 15$.	225. The root is left out. 225 is the square of the distance. It is more than across + up = 21, so it cannot be a distance.	T
G	(9, -8) and (5, -4).	4√2 . across = $5 - 9 = -4$, up = $-4 - (-8) = 4$. $\sqrt{((-4)^2 + 4^2)} = \sqrt{32} = \sqrt{16 \times 2} = 4\sqrt{2}$.	√370. Each point's own x and y: $9 - (-8) = 17$ and $5 - (-4) = 9$, so $\sqrt{(17^2 + 9^2)} = \sqrt{370}$. Across must use the two x-coordinates.	D
P	(1, 5) and (-4, -7).	13 . across = $-4 - 1 = -5$, up = $-7 - 5 = -12$. $\sqrt{((-5)^2 + (-12)^2)} = \sqrt{169} = 13$.	169. The root is left out. 169 is the square of the distance. It is more than across + up = 17, so it cannot be a distance.	R
J	(-4, 1) and (-7, -2).	3√2 . across = $-7 - (-4) = -3$, up = $-2 - 1 = -3$. $\sqrt{((-3)^2 + (-3)^2)} = \sqrt{18} = \sqrt{9 \times 2} = 3\sqrt{2}$.	5√2. Each point's own x and y: $-4 - 1 = -5$ and $-7 - (-2) = -5$, so $\sqrt{((-5)^2 + (-5)^2)} = 5\sqrt{2}$. Across must use the two x-coordinates.	E
Q	(9, 9) and (-3, -7).	20 . across = $-3 - 9 = -12$, up = $-7 - 9 = -16$. $\sqrt{((-12)^2 + (-16)^2)} = \sqrt{400} = 20$.	400. The root is left out. 400 is the square of the distance. It is more than across + up = 28, so it cannot be a distance.	N

Other mistakes lead to no card. A group might add across and up without squaring, drop the minus sign of a negative coordinate, add the coordinates instead of subtracting them, or make both of the two mistakes above at once. Its answer is then not the number at the top of any card.