LESSON MAKER PRO

Space Between Points

Find exact distances in three dimensions.

HIGH SCHOOL · MM.D3D.A.11.c

MM.D3D.A.11.c "Find the distance between two objects in space given the coordinates of each."

NAME _____ DATE _____

THE DISTANCE RULE

Subtract the matching coordinates of two points. Square the three differences, add them, then take the square root. If the answer is not a whole number, simplify the square root.

WORKED EXAMPLE

Find the distance between A(10, 10, 10) and B(14, 13, 22).

1. Subtract matching coordinates: 14 - 10 = 4, 13 - 10 = 3, and 22 - 10 = 12.
2. Square and add: $4^2 + 3^2 + 12^2 = 16 + 9 + 144 = 169$.
3. Take the square root: $\sqrt{169} = 13$.

Answer: 13 units

PRACTICE 6 problems

1 Find the distance between A(0, 0, 0) and B(4, 0, 0).

ANSWER _____

2 Find the distance between A(-2, 1, 0) and B(1, 5, 0).

ANSWER _____

3 Find the distance between A(0, 0, 0) and B(2, 3, 6).

ANSWER _____

4 Find the exact distance between A(-4, -1, 2) and B(2, 1, 4).

ANSWER _____

5 Find the exact distance between A(5, -3, -2) and B(-1, 1, 0).

ANSWER _____

6 Find the exact distance between A(-3, 4, -5) and B(3, -4, 1).

ANSWER _____

APPLY IT Show your work

1 Two drones are hovering above a sports field. Their positions are (0, 0, 4) and (6, 2, 7), with coordinates measured in meters. How far apart are the drones?

WORK SPACE

ANSWER _____

2 In a virtual reality game, two checkpoints are at (0, 2, 1) and (4, 6, 3). Each coordinate unit represents one meter. What is the straight-line distance between the checkpoints?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Points A(-2, 1, 0) and B(x, 5, 4) are 9 units apart. If $x > 0$, find x. Show how you know.

WORK SPACE AND ANSWER

Space Between Points

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the distance between A(0, 0, 0) and B(4, 0, 0).	**4 units**
2	Find the distance between A(-2, 1, 0) and B(1, 5, 0).	**5 units**
3	Find the distance between A(0, 0, 0) and B(2, 3, 6).	**7 units**
4	Find the exact distance between A(-4, -1, 2) and B(2, 1, 4).	**2√11 units**
5	Find the exact distance between A(5, -3, -2) and B(-1, 1, 0).	**2√14 units**
6	Find the exact distance between A(-3, 4, -5) and B(3, -4, 1).	**2√34 units**

PART 2 · APPLY IT

1. **7 meters** The coordinate differences are 6, 2, and 3. The distance is $\sqrt{(36 + 4 + 9)} = 7$ meters.
2. **6 meters** The coordinate differences are 4, 4, and 2. The distance is $\sqrt{(16 + 16 + 4)} = 6$ meters.

CHALLENGE

$x = 5$. Since $(x + 2)^2 + 4^2 + 4^2 = 9^2$, $(x + 2)^2 = 49$. The possible values are $x = 5$ and $x = -9$, so $x = 5$ because $x > 0$.

Accept equivalent exact radicals, such as $\sqrt{44}$ for $2\sqrt{11}$. Do not require decimal approximations.