LESSON MAKER PRO

Plot the Corners

Sketch prisms in three-dimensional space.

HIGH SCHOOL · MM.D3D.A.11.b

MM.D3D.A.11.b "Graph a point in space as the vertex of a right prism drawn in the appropriate octant with edges along the x, y, and z axes."

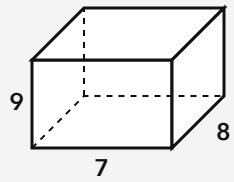
NAME _____ DATE _____

FROM EDGES TO COORDINATES

Start an axis-aligned right rectangular prism at O=(0,0,0). If its edge lengths along the x, y, and z axes are l, w, and h, the opposite vertex P has coordinates (±l, ±w, ±h). Choose each sign to show which direction that edge extends, then complete the prism in that sign octant.

WORKED EXAMPLE

Use the dimensions on the prism shown. Sketch it with O at the origin, extending in the x<0, y>0, z>0 octant. Label the opposite vertex P.

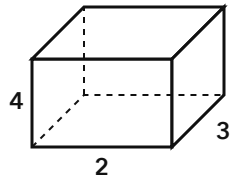


1. Read the edge lengths: l=7, w=8, and h=9.
2. From O, draw 7 units along negative x, 8 units along positive y, and 9 units along positive z.
3. Complete the prism and label the corner opposite O as P=(-7,8,9).

Answer: P=(-7,8,9), on a prism in the x<0, y>0, z>0 octant.

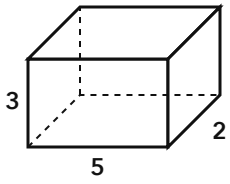
PRACTICE 6 problems

1 Use the dimensions on the prism. Sketch it from O in the x>0, y>0, z>0 octant. Label the opposite vertex P and write its coordinates.



ANSWER _____

2 Use the dimensions on the prism. Sketch it from O in the x<0, y>0, z>0 octant. Label the opposite vertex P and write its coordinates.



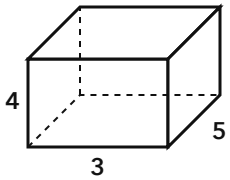
ANSWER _____

3 Sketch an axis-aligned right rectangular prism with opposite vertices O and P=(4,-3,2). Label P and state the sign octant containing the prism.

ANSWER _____

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4 Use the dimensions on the prism. Sketch it from O in the x>0, y<0, z<0 octant. Label the opposite vertex P and write its coordinates.



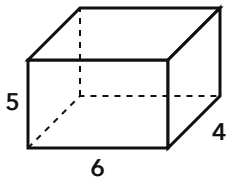
ANSWER _____

5 Sketch an axis-aligned right rectangular prism with opposite vertices O and P=(-2,-5,-3). Label P, then list the edge lengths along x, y, and z in that order.

ANSWER _____

_____

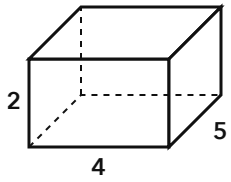
6 Use the dimensions on the prism. Sketch it from O in the x<0, y<0, z>0 octant. Label the opposite vertex P and write its coordinates.



ANSWER _____

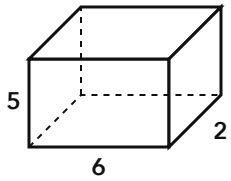
APPLY IT Show your work

1 A game designer places one corner of a rectangular hitbox at O. Its edge lengths are shown on the prism. The hitbox extends in the x<0, y>0, z>0 octant. Sketch it on labeled axes and give the coordinates of its opposite corner P.



ANSWER _____

2 For a concert visual, a designer maps a rectangular projection space from O. Its edge lengths are shown on the prism. The space extends in the x>0, y<0, z>0 octant. Sketch it on labeled axes and give the coordinates of its opposite corner P.



ANSWER _____

CHALLENGE One step up

Sketch an axis-aligned right rectangular prism with opposite vertices O and P=(-3,4,-12). Label P, state the prism's sign octant, and find the length of diagonal OP.

WORK SPACE AND ANSWER

ANSWER KEY

Plot the Corners

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the dimensions on the prism. Sketch it from O in the x>0, y>0, z>0 octant. Label the opposite vertex P and write its coordinates.	**P=(2,3,4); sketch the prism extending along positive x, positive y, and positive z.**
2	Use the dimensions on the prism. Sketch it from O in the x<0, y>0, z>0 octant. Label the opposite vertex P and write its coordinates.	**P=(-5,2,3); sketch the prism extending along negative x, positive y, and positive z.**
3	Sketch an axis-aligned right rectangular prism with opposite vertices O and P=(4,-3,2). Label P and state the sign octant containing the prism.	**Sketch a prism with edge lengths 4, 3, and 2 along positive x, negative y, and positive z. Its sign octant is x>0, y<0, z>0.**
4	Use the dimensions on the prism. Sketch it from O in the x>0, y<0, z<0 octant. Label the opposite vertex P and write its coordinates.	**P=(3,-5,-4); sketch the prism extending along positive x, negative y, and negative z.**
5	Sketch an axis-aligned right rectangular prism with opposite vertices O and P=(-2,-5,-3). Label P, then list the edge lengths along x, y, and z in that order.	**Sketch the prism in the x<0, y<0, z<0 octant. The edge lengths along x, y, and z are 2, 5, and 3.**
6	Use the dimensions on the prism. Sketch it from O in the x<0, y<0, z>0 octant. Label the opposite vertex P and write its coordinates.	**P=(-6,-4,5); sketch the prism extending along negative x, negative y, and positive z.**

PART 2 · APPLY IT

1. **P=(-4,5,2); the sketch extends along negative x, positive y, and positive z.** Use the figure's edge lengths 4, 5, and 2 for the x, y, and z coordinates. Apply the signs given for each axis.
2. **P=(6,-2,5); the sketch extends along positive x, negative y, and positive z.** Use the figure's edge lengths 6, 2, and 5 for the x, y, and z coordinates. Only the y-coordinate is negative.

CHALLENGE

The sketch extends along negative x, positive y, and negative z, so its sign octant is x<0, y>0, z<0. $OP=\sqrt{(3^2+4^2+12^2)}=13$.

Accept sketches with axes drawn at any clear angle if the edge directions and labeled opposite vertex are correct. The challenge diagonal can be found by applying the Pythagorean theorem twice.