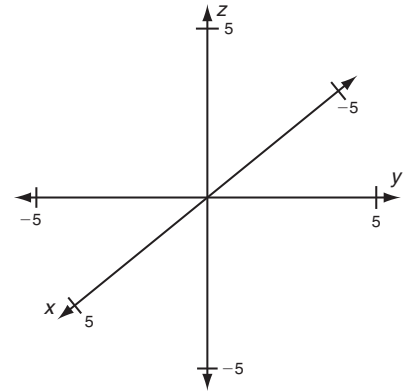


**LESSON** **Practice A**  
**3-5** **Linear Equations in Three Dimensions**

Graph each point in three-dimensional space.

1.  $(3, -2, 4)$ 
  - a. Locate the  $x$ -axis and estimate 3 units forward.
  - b. Estimate 2 units to the left ( $y$ -axis).
  - c. Estimate 4 units up ( $z$ -axis).
2.  $(-4, 0, -3)$
3.  $(2, 2, 2)$



Find the  $x$ -,  $y$ -, and  $z$ -intercepts for each equation.

4.  $2x - 6y - 3z = 12$
5.  $9x + 3y - 6z = 18$
6.  $3x - 5y + 10z = 15$

---



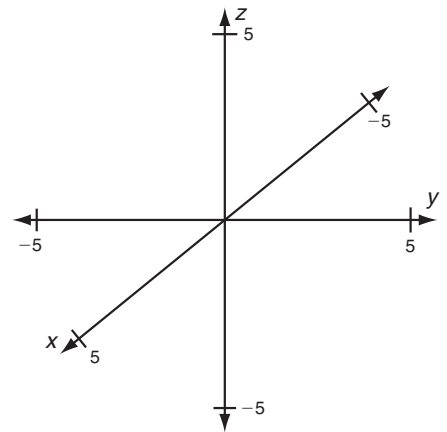
---



---

Graph the linear equation in three-dimensional space.

7.  $10x + 4y + 5z = 20$ 
  - a. Find the point that represents each intercept.  
 $x$ -intercept \_\_\_\_\_  
 $y$ -intercept \_\_\_\_\_  
 $z$ -intercept \_\_\_\_\_
  - b. Plot the three points.
  - c. Draw a plane through the points.



Solve.

8. Andrea's fish tank holds 30 gallons of water. Andrea estimates that every inch of a fish's length requires a gallon of water. She wants to purchase some corydoras that are 2 inches long, angelfish that are 5 inches long, and fancy guppies that are 3 inches long.

- a. Write an equation for the situation.  
 \_\_\_\_\_

- b. Complete the table for the maximum number of each type of fish Andrea can purchase.

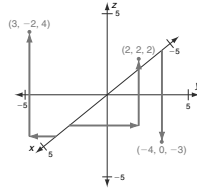
Corydoras	Angelfish	Guppies
4		4
	1	3
5	1	
	4	2

**LESSON** **Practice A**

**3-5 Linear Equations in Three Dimensions**

Graph each point in three-dimensional space.

- (3, -2, 4)
  - Locate the  $x$ -axis and estimate 3 units forward.
  - Estimate 2 units to the left ( $y$ -axis).
  - Estimate 4 units up ( $z$ -axis).
- (-4, 0, -3)
- (2, 2, 2)



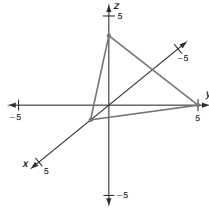
6; -2; -4
2; 6; -3
5; -3; 1.5

Find the  $x$ -,  $y$ -, and  $z$ -intercepts for each equation.

- $2x - 6y - 3z = 12$
- $9x + 3y - 6z = 18$
- $3x - 5y + 10z = 15$

Graph the linear equation in three-dimensional space.

- $10x + 4y + 5z = 20$ 
  - Find the point that represents each intercept.  
 $x$ -intercept (2, 0, 0)  
 $y$ -intercept (0, 5, 0)  
 $z$ -intercept (0, 0, 4)
  - Plot the three points.
  - Draw a plane through the points.



Solve.

- Andrea's fish tank holds 30 gallons of water. Andrea estimates that every inch of a fish's length requires a gallon of water. She wants to purchase some corydoras that are 2 inches long, angelfish that are 5 inches long, and fancy guppies that are 3 inches long.

- Write an equation for the situation.  
 $2x + 5y + 3z = 30$

Corydoras	Angelfish	Guppies
4	2	4
8	1	3
5	1	5
2	4	2

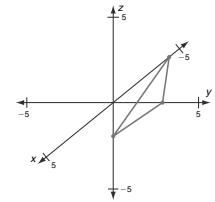
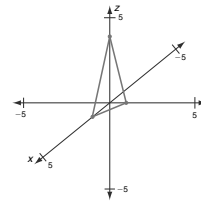
- Complete the table for the maximum number of each type of fish Andrea can purchase.

**LESSON** **Practice B**

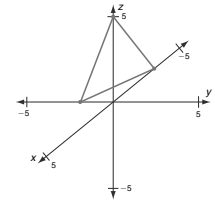
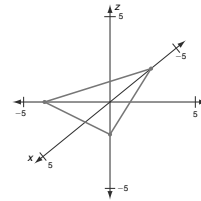
**3-5 Linear Equations in Three Dimensions**

Graph each linear equation in three-dimensional space.

- $8x + 16y + 4z = 16$
- $-6x + 8y - 12z = 24$



- $4x + 3y + 6z = -12$
- $10x + 15y - 6z = -30$



Solve.

- Bill is buying bulbs for his flower garden. Bags of iris bulbs are \$4 each, bags of tulip bulbs are \$3 each, and bags of daffodil bulbs are \$2 each. He spends \$24 in all.

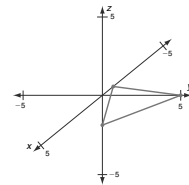
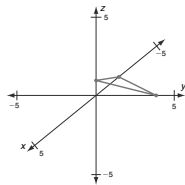
- Write an equation to represent the situation.  
 $4x + 3y + 2z = 24$
- Bill wants to buy 3 bags of iris bulbs and at least 2 bags of daffodil bulbs. What is the maximum number of bags of tulip bulbs he can buy?  
2 bags
- Bill buys 5 bags of daffodil bulbs and the same number of bags of tulip bulbs as iris bulbs. How many bags of each does he buy?  
2 bags of each

**LESSON** **Practice C**

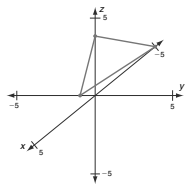
**3-5 Linear Equations in Three Dimensions**

Graph each linear equation in three-dimensional space.

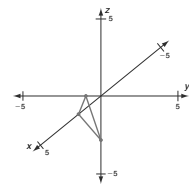
- $4x - 2y - 8z = -8$
- $-10x + 2y - 5z = 10$



- $\frac{2}{5}x + 2y - \frac{1}{2}z = -2$



- $9x - 18y - 6z = 18$



Solve.

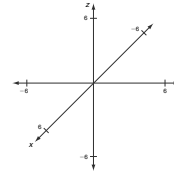
- Cars, vans, and minibuses have been rented to provide transportation to a company retreat. Cars hold 5 employees, vans hold 7 employees, and minibuses hold 14 employees. There are 72 employees to be transported.

- Write an equation to show  $x$ , the number of cars,  $y$ , the number of vans, and  $z$ , the number of minibuses needed to transport the employees.  
 $5x + 7y + 14z = 72$
- If only 1 minibus and 5 cars are available on the day of the retreat, how many vans will be needed to transport all of the employees?  
5 vans
- The same number of vans as minibuses were used for transportation. There were no empty seats in any van or minibus or in any of the cars that were rented. How many cars were rented?  
6 cars

**LESSON** **Review for Mastery**

**3-5 Linear Equations in Three Dimensions**

In a three-dimensional coordinate system, the  $x$ -axis projects out from the paper and the  $y$ - and  $z$ -axes lie in the plane of the paper.



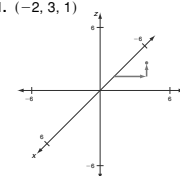
An **ordered triple**  $(x, y, z)$  is used to locate points in coordinate space. Points in three-dimensional space are graphed similarly to points graphed in two-dimensional space. First count  $x$  units along the projected  $x$ -axis, then move  $y$  units to the right or left, and finally move  $z$  units up or down.

To graph  $(3, 2, 4)$ , start at the origin.

Move 3 units forward along the $x$ -axis. This is the point $(3, 0, 0)$ .	Move 2 units to the right. This is the point $(3, 2, 0)$ .	Move 4 units up. This is the point $(3, 2, 4)$ .

Graph each point in three-dimensional space.

- $(-2, 3, 1)$



- $(2, 4, -3)$

