تدريبات مراجعة نهائية وفق الهيكل الوزاري منهج ريفيل

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M.B.S School C3

School Operation Sector 2

Council 6 Cluster 6

Grade 9 Mathematics

General Stream

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EoT3 Exam Coverage in Term 2

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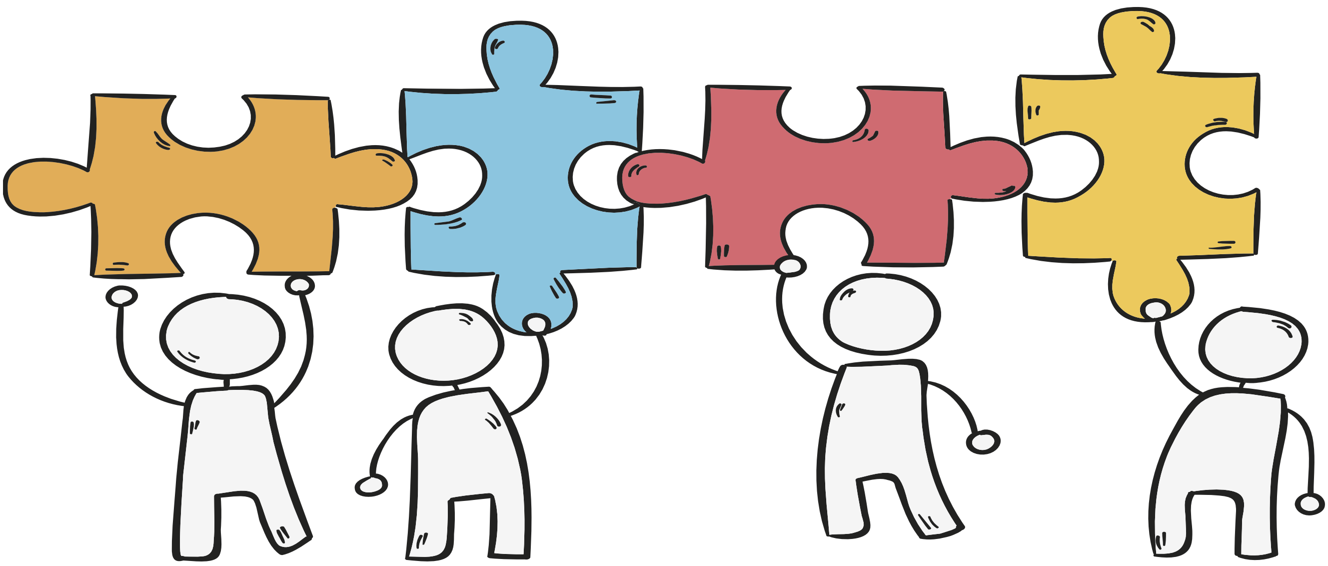
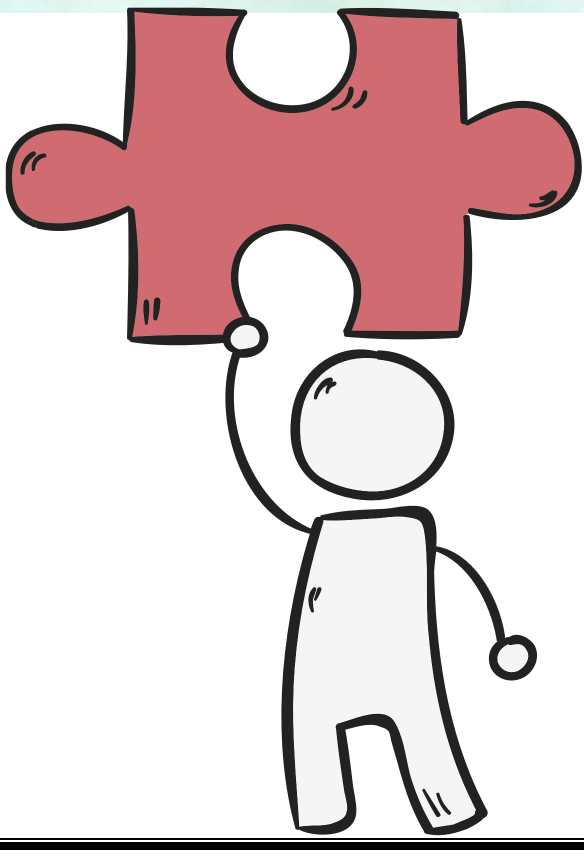


WELCOME TO...

Unit 7

Systems of Linear Equations and Inequalities

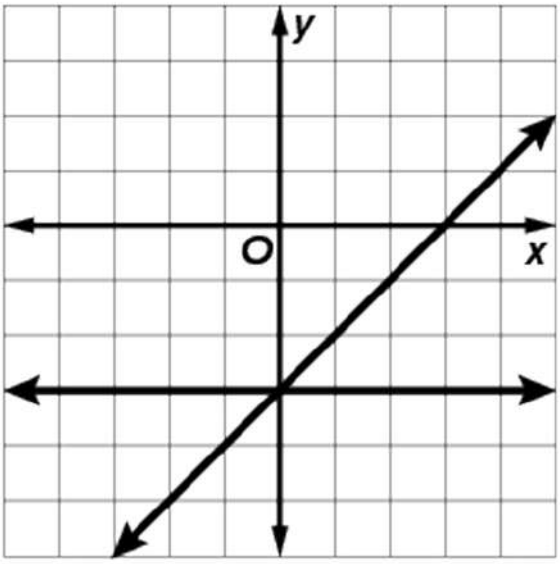


5 | Determine the number of solutions to a system of linear equations, if any.	11 - 16	Page 395
17 | Solve linear equations by graphing.		

Graph each system and determine the number of solutions it has. If it has one solution, determine its coordinates.

11. $y = -3$
$y = x - 3$

SOLUTION:



The graphs of the lines appear to intersect at the point $(0, -3)$. If you substitute 0 for x and -3 for y into the equations, both are true.

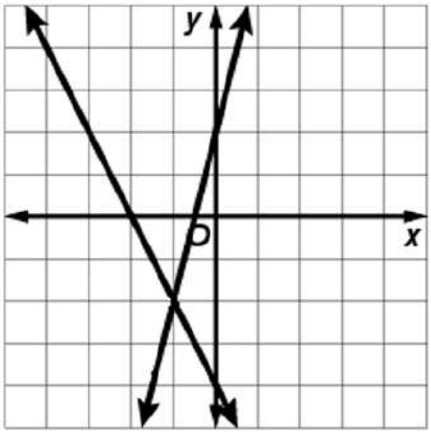
$y = -3$ Original equation
$-3 = -3$ Substitution.

$y = x - 3$ Original equation
$-3 = 0 - 3$ Substitution.
$-3 = -3$ Simplify.

Therefore, $(0, -3)$ is the solution of the system.

12. $y = 4x + 2$
$y = -2x - 4$

SOLUTION:



The graphs of the lines appear to intersect at the point $(-1, -2)$. If you substitute -1 for x and -2 for y into the equations, both are true.

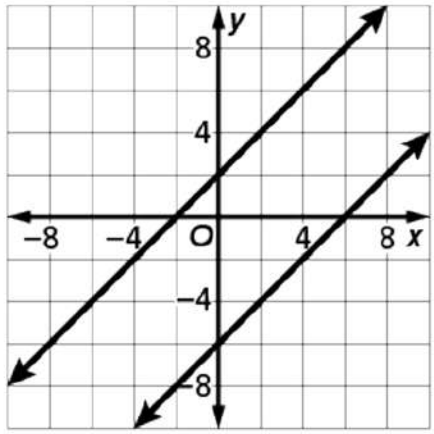
$y = 4x + 2$	Original equation
$-2 = 4(-1) + 2$	Substitution.
$-2 = -2$	Simplify.

$y = -2x - 4$	Original equation
$-2 = -2(-1) - 4$	Substitution.
$-2 = -2$	Simplify.

Therefore, $(-1, -2)$ is the solution of the system.

13. $y = x - 6$
$y = x + 2$

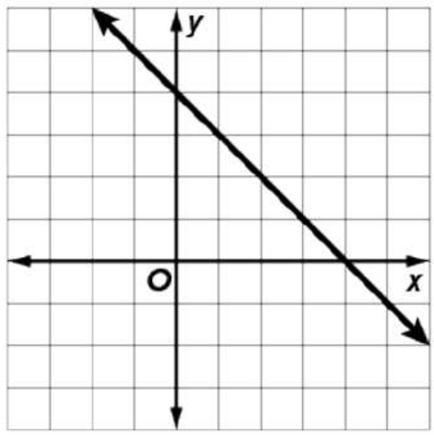
SOLUTION:



The lines have the same slope but different y-intercepts, so the lines are parallel. Because they do not intersect, this system has no solution.

14. $x + y = 4$
$3x + 3y = 12$

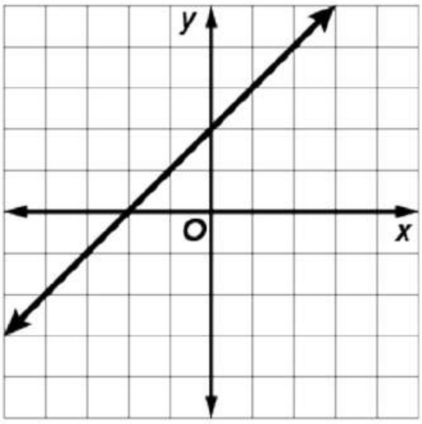
SOLUTION:



The lines are the same so this system has infinitely many solutions.

15. $x - y = -2$
$-x + y = 2$

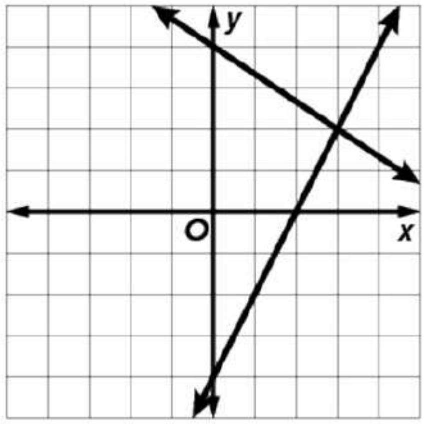
SOLUTION:



The lines are the same so this system has infinitely many solutions.

16. $2x + 3y = 12$
$2x - y = 4$

SOLUTION:



The graphs of the lines appear to intersect at the point (3, 2). If you substitute 3 for x and 2 for y into the equations, both are true.

$2x + 3y = 12$	Original equation
$2(3) + 3(2) = 12$	Substitution.
$12 = 12$	Simplify.

$2x - y = 4$	Original equation
$2(3) - (2) = 4$	Substitution.
$4 = 4$	Simplify.

Therefore, (3, 2) is the solution of the system.

MCQ- الأسئلة الموضوعية		
L7-2 | Substitution.		
1 | Solve various systems of linear equations by using substitution	Check, Example 2,3	400-401
	1-15	403

Example 2 Solve and Then Substitute

Use substitution to solve the system of equations.

$5x - 3y = -25$
$x + 4y = 18$

Step 1 Solve the second equation for x since the coefficient is 1.

$x + 4y = 18$	Second equation
$x = 18 - 4y$	Subtract $4y$ from each side.

Step 2 Substitute $18 - 4y$ for x in the first equation.

$5x - 3y = -25$	First equation
$5(18 - 4y) - 3y = -25$	Substitute $18 - 4y$ for x.
$90 - 20y - 3y = -25$	Distributive Property
$90 - 23y = -25$	Combine like terms.
$-23y = -115$	Subtract 90 from each side.
$y = 5$	Divide each side by -23.

Step 3 Substitute 5 for y in either equation to find x.

$x + 4y = 18$	Second equation
$x + 4(5) = 18$	Substitute 5 for y.
$x + 20 = 18$	Simplify.
$x = -2$	Subtract 20 from each side.

The solution is $(-2, 5)$.

Check

Use substitution to solve the system of equations.

$5x + 3y = 5$
$x + 2y = -13$

Example 3 Use Substitution When There are No or Many Solutions

Use substitution to solve the system of equations.

$4x + 2y = -8$

$y = -2x - 4$

Substitute $-2x - 4$ for y in the first equation.

$4x + 2y = -8$	First equation
$4x + 2(-2x - 4) = -8$	Substitute $-2x - 4$ for y.
$4x - 4x - 8 = -8$	Distributive Property
$-8 = -8$	Simplify.

The equation $-8 = -8$ is an identity. Thus, there are an infinite number of solutions.

When graphed, the equations are the same line.

Check

Select the correct statement about the system of equations.

$-x + 2y = 2$

$y = \frac{1}{2}x + 1$

A. This system has no solution.

B. This system has one solution at $\left(\frac{2}{3}, \frac{4}{3}\right)$.

C. This system has one solution at $\left(\frac{4}{3}, \frac{2}{3}\right)$.

D. This system has infinitely many solutions.

Use substitution to solve each system of equations.

1. $y = 5x + 1$
   $4x + y = 10$

SOLUTION:

The first equation is already solved for y. Substitute $5x + 1$ for y in the second equation.

$4x + y = 10$	Equation 2
$4x + (5x + 1) = 10$	Substitute $5x + 1$ for y.
$9x + 1 = 10$	Combine like terms.
$9x = 9$	Subtract 1 from each side.
$x = 1$	Divide each side by 9.

Substitute 1 for x in either equation to find y.

$y = 5x + 1$	Equation 1
$y = 5(1) + 1$	Substitute for x.
$y = 6$	Simplify.

The solution is (1, 6).

ANSWER:

(1, 6)

2. $y = 4x + 5$
   $2x + y = 17$

SOLUTION:

The first equation is already solved for y. Substitute $4x + 5$ for y in the second equation.

$2x + y = 17$	Equation 2
$2x + (4x + 5) = 17$	Substitute $4x + 5$ for y.
$6x + 5 = 17$	Combine like terms.
$6x = 12$	Subtract 5 from each side.
$x = 2$	Divide each side by 6.

Substitute 2 for x in either equation to find y.

$y = 4x + 5$	Equation 1
$y = 4(2) + 5$	Substitute for x.
$y = 13$	Simplify.

The solution is (2, 13).

ANSWER:

(2, 13)

3. $y = 3x - 34$
$y = 2x - 5$

SOLUTION:

The first equation is already solved for y. Substitute $3x - 34$ for y in the second equation.

$y = 2x - 5$	Equation 2
$3x - 34 = 2x - 5$	Substitute $3x - 34$ for y.
$x - 34 = -5$	Subtract $2x$ from each side.
$x = 29$	Add 34 to each side.

Substitute 29 for x in either equation to find y.

$y = 3x - 34$	Equation 1
$y = 3(29) - 34$	Substitute for x.
$y = 53$	Simplify.

The solution is (29, 53).

ANSWER:

(29, 53)

4. $y = 3x - 2$
$y = 2x - 5$

SOLUTION:

The first equation is already solved for y. Substitute $3x - 2$ for y in the second equation.

$y = 2x - 5$	Equation 2
$3x - 2 = 2x - 5$	Substitute $3x - 2$ for y.
$x - 2 = -5$	Subtract $2x$ from each side.
$x = -3$	Add 2 to each side.

Substitute −3 for x in either equation to find y.

$y = 3x - 2$	Equation 1
$y = 3(-3) - 2$	Substitute for x.
$y = -11$	Simplify.

The solution is (−3, −11).

ANSWER:

(−3, −11)

5. $2x + y = 3$
$4x + 4y = 8$

SOLUTION:

Solve the first equation for y since the coefficient is 1.

$2x + y = 3$	Equation 1
$y = 3 - 2x$	Subtract $2x$ from each side.

Substitute $3 - 2x$ for y in the second equation.

$4x + 4y = 8$	Equation 2
$4x + 4(3 - 2x) = 8$	Substitute $3 - 2x$ for y.
$4x + 12 - 8x = 8$	Distributive Property
$-4x + 12 = 8$	Combine like terms.
$-4x = -4$	Subtract 12 from each side.
$x = 1$	Divide each side by -4.

Substitute 1 for x in either equation to find y.

$2x + y = 3$	Equation 1
$2(1) + y = 3$	Substitute for x.
$y = 1$	Subtract 2 from each side.

The solution is (1, 1).

ANSWER:

(1, 1)

6. $3x + 4y = -3$
$x + 2y = -1$

SOLUTION:

Solve the second equation for x since the coefficient is 1.

$x + 2y = -1$	Equation 2
$x = -1 - 2y$	Subtract $2y$ from each side.

Substitute $-1 - 2y$ for x in the first equation.

$3x + 4y = -3$	Equation 1
$3(-1 - 2y) + 4y = -3$	Substitute $1 - 2y$ for x.
$-3 - 6y + 4y = -3$	Distributive Property
$-3 - 2y = -3$	Combine like terms.
$-2y = 0$	Add 3 to each side.
$y = 0$	Divide each side by -2.

Substitute 0 for y in either equation to find x.

$x + 2y = -1$	Equation 2
$x + 2(0) = -1$	Substitute for y.
$x = -1$	Simplify.

The solution is (−1, 0).

ANSWER:

(−1, 0)

7. $y = -3x + 4$

$-6x - 2y = -8$

SOLUTION:

The first equation is already solved for y. Substitute $-3x + 4$ for y in the second equation.

$-6x - 2y = -8$	Equation 2
$-6x - 2(-3x + 4) = -8$	Substitute $-3x + 4$ for y.
$-6x + 6x - 8 = -8$	Distributive Property
$-8 = -8$	Combine like terms.

The equation $-8 = -8$ is an identity. Thus, there are an infinite number of solutions. When graphed, the equations are the same line.

ANSWER:

infinitely many

8. $-1 = 2x - y$

$8x - 4y = -4$

SOLUTION:

Solve the first equation for y.

$-1 = 2x - y$	Equation 1
$-1 - 2x = -y$	Subtract $2x$ from each side.
$1 + 2x = y$	Multiply each side by -1.

Substitute $1 + 2x$ for y in the second equation.

$8x - 4y = -4$	Equation 2
$8x - 4(1 + 2x) = -4$	Substitute $1 + 2x$ for y.
$8x - 4 - 8x = -4$	Distributive Property
$-4 = -4$	Combine like terms.

The equation $-4 = -4$ is an identity. Thus, there are an infinite number of solutions. When graphed, the equations are the same line.

ANSWER:

infinitely many

9. $x = y - 1$

$-x + y = -1$

SOLUTION:

The first equation is already solved for x. Substitute $y - 1$ for x in the second equation.

$-x + y = -1$	Equation 2
$-(y - 1) + y = -1$	Substitute $y - 1$ for x.
$-y + 1 + y = -1$	Distributive Property
$1 = -1$	Combine like terms.

The equation $1 = -1$ is a false statement. Thus, there is no solution.

ANSWER:

no solution

10. $y = -4x + 11$

$3x + y = 9$

SOLUTION:

The first equation is already solved for y. Substitute $-4x + 11$ for y in the second equation.

$3x + y = 9$	Equation 2
$3x + (-4x + 11) = 9$	Substitute $-4x + 11$ for y.
$-x + 11 = 9$	Combine like terms.
$-x = -2$	Subtract 11 from each side.
$x = 2$	Multiply each side by -1.

Substitute 2 for x in either equation to find y.

$y = -4x + 11$	Equation 1
$y = -4(2) + 11$	Substitute for x.
$y = 3$	Simplify.

The solution is (2, 3).

ANSWER:

(2, 3)

11. $y = -3x + 1$
$2x + y = 1$

SOLUTION:

The first equation is already solved for y. Substitute $-3x + 1$ for y in the second equation.

$$\begin{aligned} 2x + y &= 1 && \text{Equation 2} \\ 2x + (-3x + 1) &= 1 && \text{Substitute } -3x + 1 \text{ for } y. \\ -x + 1 &= 1 && \text{Combine like terms.} \\ -x &= 0 && \text{Subtract 1 from each side.} \\ x &= 0 && \text{Multiply each side by } -1. \end{aligned}$$

Substitute 0 for x in either equation to find y.

$$\begin{aligned} y &= -3x + 1 && \text{Equation 1} \\ y &= -3(0) + 1 && \text{Substitute for } x. \\ y &= 1 && \text{Simplify.} \end{aligned}$$

The solution is (0, 1).

ANSWER:
(0, 1)

12. $3x + y = -5$
$6x + 2y = 10$

SOLUTION:

Solve the first equation for y since the coefficient is 1.

$$\begin{aligned} 3x + y &= -5 && \text{Equation 1} \\ y &= -3x - 5 && \text{Subsubtract } 3x \text{ from each side.} \end{aligned}$$

Substitute $-3x - 5$ for y in the second equation.

$$\begin{aligned} 6x + 2y &= 10 && \text{Equation 2} \\ 6x + 2(-3x - 5) &= 10 && \text{Substitute } -3x - 5 \text{ for } y. \\ 6x - 6x - 10 &= 10 && \text{Distributive Property} \\ -10 &= 10 && \text{Combine like terms.} \end{aligned}$$

The equation $-10 = 10$ is a false statement. Thus, there is no solution.

ANSWER:
no solution

13. $5x - y = 5$
$-x + 3y = 13$

SOLUTION:

Solve the first equation for y since the coefficient is -1.

$$\begin{aligned} 5x - y &= 5 && \text{Equation 1} \\ -y &= 5 - 5x && \text{Subtract } 5x \text{ from each side.} \\ y &= -5 + 5x && \text{Multiply each side by } -1. \end{aligned}$$

Substitute $-5 + 5x$ for y in the second equation.

$$\begin{aligned} -x + 3y &= 13 && \text{Equation 2} \\ -x + 3(-5 + 5x) &= 13 && \text{Substitute } -5 + 5x \text{ for } y. \\ -x - 15 + 15x &= 13 && \text{Distributive Property} \\ 14x - 15 &= 13 && \text{Combine like terms.} \\ 14x &= 28 && \text{Add 15 to each side.} \\ x &= 2 && \text{Divide each side by 14.} \end{aligned}$$

Substitute 2 for x in either equation to find y.

$$\begin{aligned} -x + 3y &= 13 && \text{Equation 1} \\ -2 + 3y &= 13 && \text{Substitute for } x. \\ 3y &= 15 && \text{Add 2 to each side.} \\ y &= 5 && \text{Divide each side by 3.} \end{aligned}$$

The solution is (2, 5).

ANSWER:
(2, 5)

14. $2x + y = 4$
$-2x + y = -4$

SOLUTION:

Solve the first equation for y since the coefficient is 1.

$$\begin{aligned} 2x + y &= 4 && \text{Equation 1} \\ y &= 4 - 2x && \text{Subtract } 2x \text{ from each side.} \end{aligned}$$

Substitute $4 - 2x$ for y in the second equation.

$$\begin{aligned} -2x + y &= -4 && \text{Equation 2} \\ -2x + (4 - 2x) &= -4 && \text{Substitute } 4 - 2x \text{ for } y. \\ -4x + 4 &= -4 && \text{Combine like terms.} \\ -4x &= -8 && \text{Subtract 4 from each side.} \\ x &= 2 && \text{Divide each side by } -4. \end{aligned}$$

Substitute 2 for x in either equation to find y.

$$\begin{aligned} 2x + y &= 4 && \text{Equation 1} \\ 2(2) + y &= 4 && \text{Substitute for } x. \\ y &= 0 && \text{Subtract 4 from each side.} \end{aligned}$$

The solution is (2, 0).

ANSWER:
(2, 0)

MCQ- الأسئلة الموضوعية		
L7-3 | Elimination Using Addition and Subtraction.		
2 | Solve systems of equations by using elimination with addition and subtraction	15 - 27	Page 409

16. $-x + 3y = 6$
$x + 3y = 18$

SOLUTION:

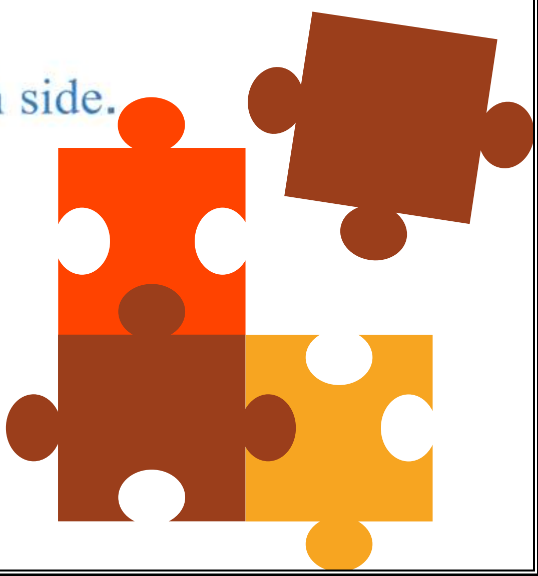
Since x and $-x$ have opposite coefficients, add the equations to eliminate the variable x.

$-x + 3y = 6$ Equation 1
$x + 3y = 18$ Equation 2
$6y = 24$ Add the equations.
$y = 4$ Divide each side by 6.

Solve for the other variable.

$x + 3y = 18$ Equation 2
$x + 3(4) = 18$ Substitution
$x + 12 = 18$ Multiply
$x = 6$ Subtract 12 from each side.

The solution is (6, 4).



17. $$\begin{aligned} 3x + 4y &= 19 \\ 3x + 6y &= 33 \end{aligned}$$

SOLUTION:

Since x and x have the same coefficients, subtract the equations to eliminate the variable x.

$$\begin{aligned} 3x + 4y &= 19 && \text{Equation 1} \\ 3x + 6y &= 33 && \text{Equation 2} \\ -2y &= -14 && \text{Subtract the equations.} \\ y &= 7 && \text{Divide each side by } -2. \end{aligned}$$

Solve for the other variable.

$$\begin{aligned} 3x + 4y &= 19 && \text{Equation 1} \\ 3x + 4(7) &= 19 && \text{Substitution} \\ 3x + 28 &= 19 && \text{Multiply.} \\ 3x &= -9 && \text{Subtract 28 from each side.} \\ x &= -3 && \text{Divide each side by 3.} \end{aligned}$$

The solution is $(-3, 7)$.

18. $$\begin{aligned} x + 4y &= -8 \\ x - 4y &= -8 \end{aligned}$$

SOLUTION:

Since y and $-y$ have opposite coefficients, add the equations to eliminate the variable y.

$$\begin{aligned} x + 4y &= -8 && \text{Equation 1} \\ x - 4y &= -8 && \text{Equation 2} \\ 2x &= -16 && \text{Add the equations.} \\ x &= -8 && \text{Divide each side by 2.} \end{aligned}$$

Solve for the other variable.

$$\begin{aligned} x - 4y &= -8 && \text{Equation 2} \\ -8 - 4y &= -8 && \text{Substitution} \\ -4y &= 0 && \text{Add 8 to each side.} \\ y &= 0 && \text{Divide each side by } -4. \end{aligned}$$

The solution is $(-8, 0)$.

19. $$\begin{aligned} 3x + 4y &= 2 \\ 4x - 4y &= 12 \end{aligned}$$

SOLUTION:

Since y and $-y$ have opposite coefficients, add the equations to eliminate the variable y.

$$\begin{aligned} 3x + 4y &= 2 && \text{Equation 1} \\ 4x - 4y &= 12 && \text{Equation 2} \\ 7x &= 14 && \text{Add the equations.} \\ x &= 2 && \text{Divide each side by 7.} \end{aligned}$$

Solve for the other variable.

$$\begin{aligned} 4x - 4y &= 12 && \text{Equation 2} \\ 4(2) - 4y &= 12 && \text{Substitution} \\ 8 - 4y &= 12 && \text{Multiply} \\ -4y &= 4 && \text{Subtract 8 from each side.} \\ y &= -1 && \text{Divide each side by } -4. \end{aligned}$$

The solution is $(2, -1)$.

20. $$\begin{aligned} 3x - y &= -1 \\ -3x - y &= 5 \end{aligned}$$

SOLUTION:

Since x and $-x$ have opposite coefficients, add the equations to eliminate the variable x.

$$\begin{aligned} 3x - y &= -1 && \text{Equation 1} \\ -3x - y &= 5 && \text{Equation 2} \\ -2y &= 4 && \text{Add the equations.} \\ y &= -2 && \text{Divide each side by } -2. \end{aligned}$$

Solve for the other variable.

$$\begin{aligned} -3x - y &= 5 && \text{Equation 2} \\ -3x - (-2) &= 5 && \text{Substitution} \\ -3x &= 3 && \text{Subtract 2 from each side.} \\ x &= -1 && \text{Divide each side by } -3. \end{aligned}$$

The solution is $(-1, -2)$.

21. $2x - 3y = 9$
$-5x - 3y = 30$

SOLUTION:

Since y and y have the same coefficients, subtract the equations to eliminate the variable y.

$2x - 3y = 9$	Equation 1
$-5x - 3y = 30$	Equation 2
$7x = -21$	Subtract the equations.
$x = -3$	Divide each side by 7.

Solve for the other variable.

$-5x - 3y = 30$	Equation 2
$-5(-3) - 3y = 30$	Substitution
$15 - 3y = 30$	Multiply
$-3y = 15$	Subtract 15 from each side.
$y = -5$	Divide each side by -3.

The solution is $(-3, -5)$.

22. $x - y = 4$
$2x + y = -4$

SOLUTION:

Since y and $-y$ have different coefficients, add the equations to eliminate the variable y.

$x - y = 4$	Equation 1
$2x + y = -4$	Equation 2
$3x = 0$	Add the equations.
$x = 0$	Divide each side by 3.

Solve for the other variable.

$x - y = 4$	Equation 1
$0 - y = 4$	Substitution
$y = -4$	Divide each side by -1.

The solution is $(0, -4)$.

23. $3x - y = 26$
$-2x - y = -24$

SOLUTION:

Since y and y have the same coefficients, subtract the equations to eliminate the variable y.

$3x - y = 26$	Equation 1
$-2x - y = -24$	Equation 2
$5x = 50$	Subtract the equations.
$x = 10$	Divide each side by 5.

Solve for the other variable.

$3x - y = 26$	Equation 1
$3(10) - y = 26$	Substitution
$30 - y = 26$	Multiply.
$-y = -4$	Subtract 20 from each side.
$y = 4$	Divide each side by -1.

The solution is $(10, 4)$.

24. $5x - y = -6$
$-x + y = 2$

SOLUTION:

Since y and $-y$ have different coefficients, add the equations to eliminate the variable y.

$5x - y = -6$	Equation 1
$-x + y = 2$	Equation 2
$4x = -4$	Add the equations.
$x = -1$	Divide each side by 4.

Solve for the other variable.

$5x - y = -6$	Equation 1
$5(-1) - y = -6$	Substitution
$-5 - y = -6$	Multiply.
$-y = -1$	Add 5 to each side.
$y = 1$	Divide each side by -1.

The solution is $(-1, 1)$.

25. $6x - 2y = 32$
$4x - 2y = 18$

SOLUTION:

Since y and y have the same coefficients, subtract the equations to eliminate the variable y.

$6x - 2y = 32$	Equation 1
$4x - 2y = 18$	Equation 2
$2x = 14$	Subtract the equations.
$x = 7$	Divide each side by 2.

Solve for the other variable.

$4x - 2y = 18$	Equation 2
$4(7) - 2y = 18$	Substitution
$28 - 2y = 18$	Multiply
$-2y = -10$	Subtract 28 from each side.
$y = 5$	Divide each side by -2.

The solution is (7, 5).

27. $7x + 4y = 2$
$7x + 2y = 8$

SOLUTION:

Since x and x have the same coefficients, subtract the equations to eliminate the variable x.

$7x + 4y = 2$	Equation 1
$7x + 2y = 8$	Equation 2
$2y = -6$	Subtract the equations.
$y = -3$	Divide each side by 2.

Solve for the other variable.

$7x + 4y = 2$	Equation 1
$7x + 4(-3) = 2$	Substitution
$7x - 12 = 2$	Multiply.
$7x = 14$	Add 12 to each side.
$x = 2$	Divide each side by 7.

The solution is (2, −3).

26. $3x + 2y = -19$
$-3x - 5y = 25$

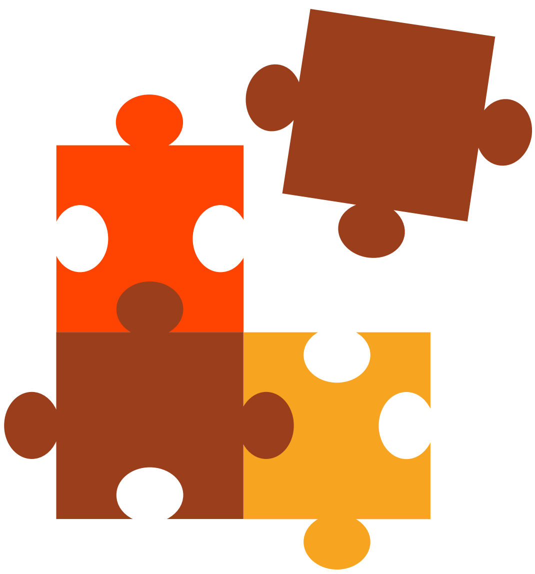
SOLUTION:

Since x and $-x$ have opposite coefficients, add the equations to eliminate the variable x.

$3x + 2y = -19$	Equation 1
$-3x - 5y = 25$	Equation 2
$-3y = 6$	Add the equations.
$y = -2$	Divide each side by 2.

Solve for the other variable.

$-3x - 5y = 25$	Equation 2
$-3x - 5(-2) = 25$	Substitution
$-3x + 10 = 25$	Multiply
$-3x = 15$	Subtract 10 from each side.
$x = -5$	Divide each side by -3.



The solution is (−5, −2).

MCQ- الأسئلة الموضوعية		
L7-3 | Elimination Using Addition and Subtraction		
3 | Solve systems of equations by using elimination with addition and subtraction.	**28 - 30** **33 - 38**	**Page 410**

28. Twice a number added to another number is 15. The sum of the two numbers is 11. Find the numbers.

SOLUTION:

Write the equations.

$2x + y = 15$ Twice a number added to another number is 15.
$x + y = 11$ The sum of the two numbers is 11.

Since y and y have the same coefficients, subtract the equations to eliminate the variable y.

$2x + y = 15$ Equation 1
$x + y = 11$ Equation 2
$x = 4$ Subtract the equations.

Solve for the other variable.

$x + y = 11$ Equation 2
$4 + y = 11$ Substitution
$y = 7$ Subtract 4 from each side.

The solution is 4 and 7.

29. Twice a number added to another number is −8. The difference of the two numbers is 2. Find the numbers.

SOLUTION:

Write the equations.

$2x + y = -8$ Twice a number added to another number is −8.
$x - y = 2$ The difference of the two numbers is 2.

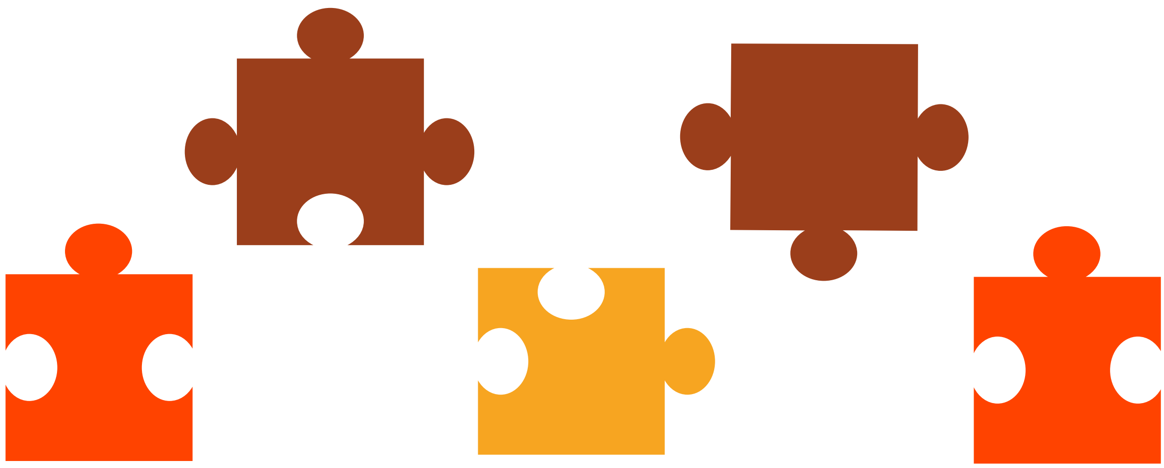
Since y and $-y$ have opposite coefficients, add the equations to eliminate the variable y.

$2x + y = -8$ Equation 1
$x - y = 2$ Equation 2
$3x = -6$ Add the equations.
$x = -2$ Divide each side by 3.

Solve for the other variable.

$x - y = 2$ Equation 2
$-2 - y = 2$ Substitution
$-y = 4$ Add 2 to each side.
$y = -4$ Multiply each side by −1.

The solution is −2 and −4.



30. The difference of two numbers is 2. The sum of the same two numbers is 6. Find the numbers.

SOLUTION:

Write the equations.

$x - y = 2$ The difference of two numbers is 2.

$x + y = 6$ The sum of the same two numbers is 6.

Since y and $-y$ have opposite coefficients, add the equations to eliminate the variable y.

$x - y = 2$ Equation 1

$x + y = 6$ Equation 2

$2x = 8$ Add the equations.

$x = 4$ Divide each side by 2.

Solve for the other variable.

$x - y = 2$ Equation 1

$4 - y = 2$ Substitution

$-y = -2$ Subtract 4 from each side.

$y = -2$ Multiply each side by -1.

The solution is 4 and 2.

Use elimination to solve each system of equations.

33. $$4(x+2y)=8$$
$$4x+4y=12$$

SOLUTION:

Complete distribution on first equation to determine whether to add or subtract.

$4(x+2y)=8$ Equation 1
$4x+8y=8$ Distributive Property

Since $4x$ and $4x$ have the same coefficients, subtract the equations to eliminate the variable x.

$4x+8y=8$ Equation 1
$4x+4y=12$ Equation 2
$4y=-4$ Subtract the equations.
$y=-1$ Divide each side by 4.

Solve for the other variable.

$4x+4y=12$ Equation 2
$4x+4(-1)=12$ Substitution
$4x-4=12$ Multiply.
$4x=16$ Add 4 to each side.
$x=4$ Divide each side by 4.

The solution is (4, −1).

34. $3x - 5y = 11$
$5(x + y) = 5$

SOLUTION:

Complete distribution on the second equation to determine whether to add or subtract.

$5(x + y) = 5$ Equation 2
$5x + 5y = 5$ Distributive Property

Since $-5y$ and $5y$ have opposite coefficients, add the equations to eliminate the variable y.

$3x - 5y = 11$ Equation 1
$5x + 5y = 5$ Equation 2
$8x = 16$ Add the equations.
$x = 2$ Divide each side by 8.

Solve for the other variable.

$5x + 5y = 5$ Equation 2
$5(2) + 5y = 5$ Substitution
$10 + 5y = 5$ Multiply.
$5y = -5$ Subtract 10 from each side.
$y = -1$ Divide each side by 5.

The solution is $(2, -1)$.

35. $4x + 3y = 6$
$3(x + y) = 7$

SOLUTION:

Complete distribution on the second equation to determine whether to add or subtract.

$3(x + y) = 7$ Equation 2
$3x + 3y = 7$ Distributive Property

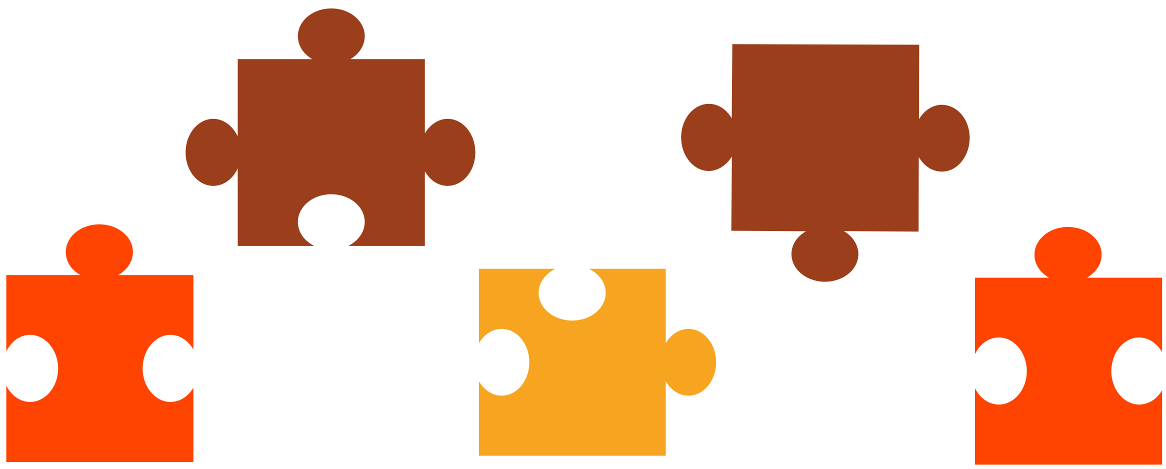
Since $3y$ and $3y$ have the same coefficients, subtract the equations to eliminate the variable y.

$4x + 3y = 6$ Equation 1
$3x + 3y = 7$ Equation 2
$x = -1$ Subtract the equations.

Solve for the other variable.

$4x + 3y = 6$ Equation 1
$4(-1) + 3y = 6$ Substitution
$-4 + 3y = 6$ Multiply.
$3y = 10$ Add 4 to each side.
$y = 3\frac{1}{3}$ Divide each side by 3.

The solution is $\left(-1, 3\frac{1}{3}\right)$.



36. $0.3x - 2y = -28$
$0.8x + 2y = 28$

SOLUTION:

Since $-2y$ and $2y$ have opposite coefficients, add the equations to eliminate the variable y.

$0.3x - 2y = -28$	Equation 1
$0.8x + 2y = 28$	Equation 2
$1.1x = 0$	Add the equations.
$x = 0$	Divide each side by 1.1.

Solve for the other variable.

$0.8x + 2y = 28$	Equation 2
$0.8(0) + 2y = 28$	Substitution
$2y = 28$	Multiply.
$y = 14$	Divide each side by 2.

The solution is (0, 14).

37. $\frac{1}{2}q - 4r = -2$
$\frac{1}{6}q - 4r = 10$

SOLUTION:

Since $-4r$ and $-4r$ have the same coefficients, subtract the equations to eliminate the variable r.

$\frac{1}{2}q - 4r = -2$	Equation 1
$\frac{1}{6}q - 4r = 10$	Equation 2
$\frac{1}{3}q = -12$	Subtract the equations.
$q = -36$	Multiply each side by 3.

Solve for the other variable.

$\frac{1}{2}q - 4r = -2$	Equation 1
$\frac{1}{2}(-36) - 4r = -2$	Substitution
$-18 - 4r = -2$	Multiply.
$-4r = 16$	Add 18 to each side.
$r = -4$	Divide each side by -4.

The solution is (−36, −4).

38. $$\frac{1}{2}x + \frac{1}{3}y = -1$$
$$-\frac{1}{2}x + \frac{2}{3}y = 10$$

SOLUTION:

Since $\frac{1}{2}x$ and $-\frac{1}{2}x$ have opposite coefficients, add the equations to eliminate the variable y.

$$\frac{1}{2}x + \frac{1}{3}y = -1 \quad \text{Equation 1}$$
$$-\frac{1}{2}x + \frac{2}{3}y = 10 \quad \text{Equation 2}$$
$$y = 9 \quad \text{Add the equations.}$$

Solve for the other variable.

$$\frac{1}{2}x + \frac{1}{3}y = -1 \quad \text{Equation 1}$$
$$\frac{1}{2}x + \frac{1}{3}(9) = -1 \quad \text{Substitution}$$
$$\frac{1}{2}x + 3 = -1 \quad \text{Multiply.}$$
$$\frac{1}{2}x = -4 \quad \text{Subtract 3 from each side.}$$
$$x = -8 \quad \text{Multiply each side by 2.}$$

The solution is $(-8, 9)$.

FRQ- الأسئلة الموضوعية		
L7-4 | Elimination Using Multiplication.		
16 | Solve systems of equations by using elimination with multiplication.	1 – 12	Page 417

Use elimination to solve each system of equations.

1. $x + y = 2$
$-3x + 4y = 15$

SOLUTION:

The coefficients of x will be opposites if the first equation is multiplied by 3.

$x + y = 2$	Equation 1
$3(x + y) = 3(2)$	Multiply each side by 3.
$3x + 3y = 6$	Simplify.

Add the equations.

$3x + 3y = 6$	Equation 1
$-3x + 4y = 15$	Equation 2
$7y = 21$	The variable x is eliminated.
$y = 3$	Divide each side by 7.

Substitute 3 for y in either equation to find the value of x.

$3x + 3y = 6$	Equation 1
$3x + 3(3) = 6$	Substitution
$3x = -3$	Subtract 9 from each side.
$x = -1$	Divide each side by 3.

The solution is $(-1, 3)$.

2. $x - y = -8$
$7x + 5y = 16$

SOLUTION:

The coefficients of y will be opposites if the first equation is multiplied by 5.

$x - y = -8$	Equation 1
$5(x - y) = 5(-8)$	Multiply each side by 5.
$5x - 5y = -40$	Simplify.

Add the equations.

$5x - 5y = -40$	Equation 1
$7x + 5y = 16$	Equation 2
$12x = -24$	The variable y is eliminated.
$x = -2$	Divide each side by 12.

Substitute -2 for x in either equation to find the value of y.

$x - y = -8$	Equation 1
$-2 - y = -8$	Substitution
$-y = -6$	Add 2 to each side.
$y = 6$	Multiply each side by -1.

The solution is $(-2, 6)$.

3.
$$\begin{aligned} x + 5y &= 17 \\ -4x + 3y &= 24 \end{aligned}$$

SOLUTION:

The coefficients of x will be opposites if the first equation is multiplied by 4.

$$\begin{aligned} x + 5y &= 17 && \text{Equation 1} \\ 4(x + 5y) &= 4(17) && \text{Multiply each side by 4.} \\ 4x + 20y &= 68 && \text{Simplify.} \end{aligned}$$

Add the equations.

$$\begin{aligned} 4x + 20y &= 68 && \text{Equation 1} \\ -4x + 3y &= 24 && \text{Equation 2} \\ 23y &= 92 && \text{The variable } x \text{ is eliminated.} \\ y &= 4 && \text{Divide each side by 23.} \end{aligned}$$

Substitute 4 for y in either equation to find the value of x.

$$\begin{aligned} x + 5y &= 17 && \text{Equation 1} \\ x + 5(4) &= 17 && \text{Substitution} \\ x &= -3 && \text{Subtract 20 from each side.} \end{aligned}$$

The solution is $(-3, 4)$.

4.
$$\begin{aligned} 6x + y &= -39 \\ 3x + 2y &= -15 \end{aligned}$$

SOLUTION:

The coefficients of x will be opposites if the second equation is multiplied by -2.

$$\begin{aligned} 3x + 2y &= -15 && \text{Equation 2} \\ -2(3x + 2y) &= -2(-15) && \text{Multiply each side by } -2. \\ -6x - 4y &= 30 && \text{Simplify.} \end{aligned}$$

Add the equations.

$$\begin{aligned} 6x + y &= -39 && \text{Equation 1} \\ -6x - 4y &= 30 && \text{Equation 2} \\ -3y &= -9 && \text{The variable } x \text{ is eliminated.} \\ y &= 3 && \text{Divide each side by } -3. \end{aligned}$$

Substitute 3 for y in either equation to find the value of x.

$$\begin{aligned} 6x + y &= -39 && \text{Equation 1} \\ 6x + (3) &= -39 && \text{Substitution} \\ 6x &= -42 && \text{Subtract 20 from each side.} \\ x &= -7 && \text{Divide each side by 6.} \end{aligned}$$

The solution is $(-7, 3)$.

5.
$$\begin{aligned} 2x + 5y &= 11 \\ 4x + 3y &= 1 \end{aligned}$$

SOLUTION:

The coefficients of x will be opposites if the first equation is multiplied by -2.

$$\begin{aligned} 2x + 5y &= 11 && \text{Equation 1} \\ -2(2x + 5y) &= -2(11) && \text{Multiply each side by } -2. \\ -4x - 10y &= -22 && \text{Simplify.} \end{aligned}$$

Add the equations.

$$\begin{aligned} -4x - 10y &= -22 && \text{Equation 1} \\ 4x + 3y &= 1 && \text{Equation 2} \\ -7y &= -21 && \text{The variable } x \text{ is eliminated.} \\ y &= 3 && \text{Divide each side by } -7. \end{aligned}$$

Substitute 3 for y in either equation to find the value of x.

$$\begin{aligned} 2x + 5y &= 11 && \text{Equation 1} \\ 2x + 5(3) &= 11 && \text{Substitution} \\ 2x &= -4 && \text{Subtract 15 from each side.} \\ x &= -2 && \text{Divide each side by 2.} \end{aligned}$$

The solution is $(-2, 3)$.

6.
$$\begin{aligned} 3x - 3y &= -6 \\ -5x + 6y &= 12 \end{aligned}$$

SOLUTION:

The coefficients of y will be opposites if the first equation is multiplied by 2.

$$\begin{aligned} 3x - 3y &= -6 && \text{Equation 1} \\ 2(3x - 3y) &= 2(-6) && \text{Multiply each side by 2.} \\ 6x - 6y &= -12 && \text{Simplify.} \end{aligned}$$

Add the equations.

$$\begin{aligned} 6x - 6y &= -12 && \text{Equation 1} \\ -5x + 6y &= 12 && \text{Equation 2} \\ x &= 0 && \text{The variable } y \text{ is eliminated.} \end{aligned}$$

Substitute 0 for x in either equation to find the value of y.

$$\begin{aligned} 3x - 3y &= -6 && \text{Equation 1} \\ 3(0) - 3y &= -6 && \text{Substitution} \\ -3y &= -6 && \text{Simplify.} \\ y &= 2 && \text{Multiply each side by } -3. \end{aligned}$$

The solution is $(0, 2)$.

7. $3x + 4y = 29$
$6x + 5y = 43$

SOLUTION:

The coefficients of x will be opposites if the first equation is multiplied by −2.

$3x + 4y = 29$	Equation 1
$-2(3x + 4y) = -2(29)$	Multiply each side by −2.
$-6x - 8y = -58$	Simplify.

Add the equations.

$-6x - 8y = -58$	Equation 1
$6x + 5y = 43$	Equation 2
$-3y = -15$	The variable x is eliminated.
$y = 5$	Divide each side by −3.

Substitute 5 for y in either equation to find the value of x.

$3x + 4y = 29$	Equation 1
$3x + 4(5) = 29$	Substitution
$3x = 9$	Subtract 20 from each side.
$x = 3$	Divide each side by 3.

The solution is (3, 5).

8. $8x + 3y = 4$
$-7x + 5y = -34$

SOLUTION:

Multiply both equations by a constant so the coefficients of x will be opposites.

$8x + 3y = 4$	Original Equation	$-7x + 5y = -34$
$7(8x + 3y) = 7(4)$	Multiply by a constant.	$8(-7x + 5y) = 8(-34)$
$56x + 21y = 28$	Distributive Property	$-56x + 40y = -272$

Add the equations.

$56x + 21y = 28$	Equation 1
$-56x + 40y = -272$	Equation 2
$61y = -244$	The variable x is eliminated.
$y = -4$	Divide each side by 61.

Substitute −4 for y in either equation to find the value of x.

$8x + 3y = 4$	Equation 1
$8x + 3(-4) = 4$	Substitution
$8x = 16$	Add 12 to each side.
$x = 2$	Divide each side by 8.

The solution is (2, −4).

9. $8x + 3y = -7$
$7x + 2y = -3$

SOLUTION:

Multiply both equations by a constant so the coefficients of x will be opposites.

$8x + 3y = -7$	Original Equation	$7x + 2y = -3$
$7(8x + 3y) = 7(-7)$	Multiply by a constant.	$-8(7x + 2y) = -8(-3)$
$56x + 21y = -49$	Distributive Property	$-56x - 16y = 24$

Add the equations.

$56x + 21y = -49$	Equation 1
$-56x - 16y = 24$	Equation 2
$5y = -25$	The variable x is eliminated.
$y = -5$	Divide each side by 5.

Substitute -5 for y in either equation to find the value of x.

$8x + 3y = -7$	Equation 1
$8x + 3(-5) = -7$	Substitution
$8x = 8$	Add 15 to each side.
$x = 1$	Divide each side by 8.

The solution is $(1, -5)$.

10. $4x + 7y = -80$
$3x + 5y = -58$

SOLUTION:

Multiply both equations by a constant so the coefficients of x will be opposites.

$4x + 7y = -80$	Original Equation	$3x + 5y = -58$
$3(4x + 7y) = 3(-80)$	Multiply by a constant.	$-4(3x + 5y) = -4(-58)$
$12x + 21y = -240$	Distributive Property	$-12x - 20y = 232$

Add the equations.

$12x + 21y = -240$	Equation 1
$-12x - 20y = 232$	Equation 2
$y = -8$	The variable x is eliminated.

Substitute -8 for y in either equation to find the value of x.

$4x + 7y = -80$	Equation 1
$4x + 7(-8) = -80$	Substitution
$4x = -24$	Add 56 to each side.
$x = -6$	Divide each side by 4.

The solution is $(-6, -8)$.

11. $12x - 3y = -3$
$6x + y = 1$

SOLUTION:

The coefficients of y will be opposites if the second equation is multiplied by 3.

$$\begin{aligned} 6x + y &= 1 && \text{Equation 2} \\ 3(6x + y) &= 3(1) && \text{Multiply each side by 3.} \\ 18x + 3y &= 3 && \text{Simplify.} \end{aligned}$$

Add the equations.

$$\begin{aligned} 12x - 3y &= -3 && \text{Equation 1} \\ 18x + 3y &= 3 && \text{Equation 2} \\ 30x &= 0 && \text{The variable } y \text{ is eliminated.} \\ x &= 0 && \text{Divide each side by 30.} \end{aligned}$$

Substitute 0 for x in either equation to find the value of y.

$$\begin{aligned} 12x - 3y &= -3 && \text{Equation 1} \\ 12(0) - 3y &= -3 && \text{Substitution} \\ -3y &= -3 && \text{Simplify.} \\ y &= 1 && \text{Multiply each side by } -3. \end{aligned}$$

The solution is (0, 1).

12. $-4x + 2y = 0$
$10x + 3y = 8$

SOLUTION:

Multiply the first equation by 10 and the second equation by 4 so the coefficients of x will be opposites.

$$\begin{aligned} -4x + 2y &= 0 && \text{Original Equation} && 10x + 3y = 8 \\ 10(-4x + 2y) &= 10(0) && \text{Multiply by a constant.} && 4(10x + 3y) = 4(8) \\ -40x + 20y &= 0 && \text{Distributive Property} && 40x + 12y = 32 \end{aligned}$$

Add the equations.

$$\begin{aligned} -40x + 20y &= 0 && \text{Equation 1} \\ 40x + 12y &= 32 && \text{Equation 2} \\ 32y &= 32 && \text{The variable } x \text{ is eliminated.} \\ y &= 1 && \text{Divide each side by 32.} \end{aligned}$$

Substitute 1 for y in either equation to find the value of x.

$$\begin{aligned} -4x + 2y &= 0 && \text{Equation 1} \\ -4x + 2(1) &= 0 && \text{Substitution} \\ -4x &= -2 && \text{Subtract 2 from each side.} \\ x &= \frac{1}{2} && \text{Divide each side by } -4. \end{aligned}$$

The solution is $\left(\frac{1}{2}, 1\right)$.

MCQ- الأسئلة الموضوعية		
L7-5 | Systems of Inequalities.		
4 | Solve system of inequalities by graphing.	1 – 6	Page 423
	15 - 16	Page 428

Solve each system of inequalities by graphing.

1. $y < 6$
   $y > x + 3$

Solution…

Step 1→ Convert the inequality to equal sign

$y = 6$, $y = x + 3$

Step 2→ Draw a table:

x	-1	0	1
y	6	6	6
(x, y)	$(-1, 6)$	$(0, 6)$	$(1, 6)$

$<$ **dashed**

x	0	-3
y	3	0
(x, y)	$(0, 3)$	$(-3, 0)$

$>$ **dashed**

Step 3→ What does the inequality sign represent?

Step 4→ Substitution

$y < 6$

$(0, 0)$

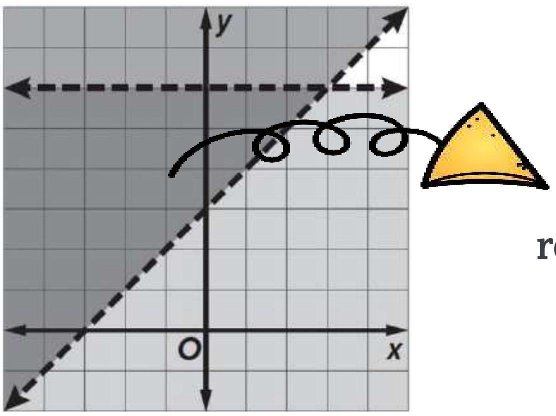
$0 < 6 \rightarrow True$

$y > x + 3$

$(0, 0)$

$0 > 3$ False

Step 5→ Draw the graph



The solution region is the shaded region shared by the two inequalities.

Solve each system of inequalities by graphing

2. $y \geq 0$

$y \leq x - 5$

Solution…

Step 1→Convert the inequality to equal sign

$y = 0$, $y = x - 5$

Step 2→Draw a table:

x	-1	0	1
y	0	0	0
(x, y)	$(-1, 0)$	$(0, 0)$	$(1, 0)$

$\geq$ **solid**

x	0	5
y	-5	0
(x, y)	$(0, -5)$	$(5, 0)$

$\leq$ **solid**

Step 3→ What does the inequality sign represent?

Step 4→ Substitution

$y \geq 0$

$(1, 1)$

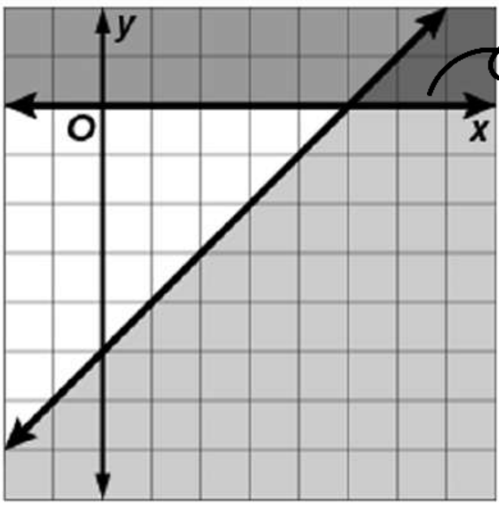
$1 \geq 0 \rightarrow True$

$y \leq x - 5$

$(0, 0)$

$0 \leq -5 \rightarrow$ False

Step 5→ Draw the graph



The solution region is the shaded region shared by the two inequalities.

Solve each system of inequalities by graphing

3. $y \le x + 10$
$y > 6x + 2$

Solution…

Step 1→ Convert the inequality to equal sign

$y = x + 10$, $y = 6x + 2$

Step 2→ Draw a table:

x	0	-10
y	10	0
(x, y)	$(0, 10)$	$(-10, 0)$

$\le$ **solid**

x	0	-1\3=-0.33
y	2	0
(x, y)	$(0, 2)$	$(-0.33, 0)$

$>$ **dashed**

Step 3→ What does the inequality sign represent?

Step 4→ Substitution

$y \le x + 10$

$(0, 0)$

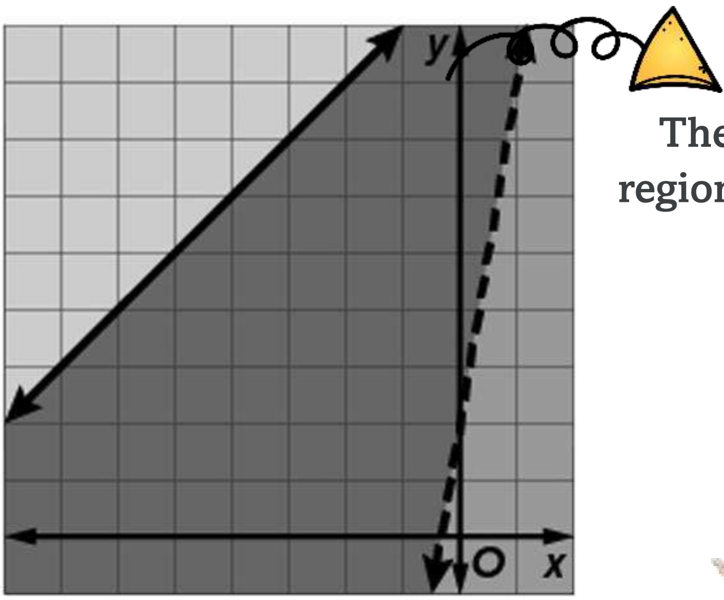
$0 \le 10 \rightarrow True$

$y > 6x + 2$

$(0, 0)$

$0 > 2 \rightarrow$ False

Step 5→ Draw the graph



The solution region is the shaded region shared by the two inequalities.

Solve each system of inequalities by graphing

4. $y \geq x + 10$
$y \leq x - 3$

Solution…

Step 1→ Convert the inequality to equal sign

$y = x + 10$, $y = x - 3$

Step 2→ Draw a table:

x	0	-10
y	10	0
(x, y)	$(0, 10)$	$(-10, 0)$

$\geq$ **solid**

x	0	3
y	-3	0
(x, y)	$(0, -3)$	$(3, 0)$

$\leq$ **solid**

Step 3→ What does the inequality sign represent?

Step 4→ Substitution

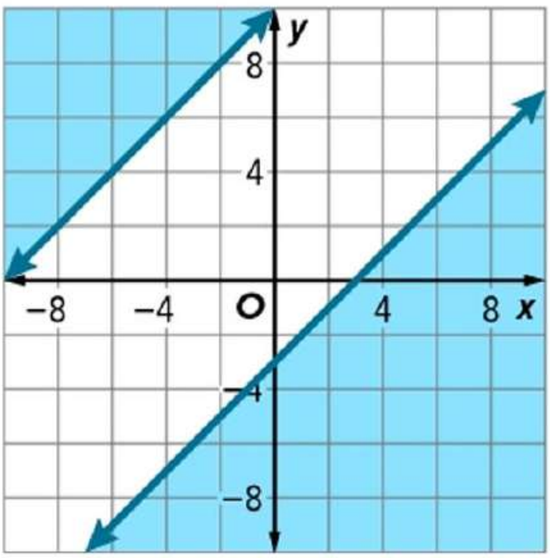
$y \geq x + 10$
$(0, 0)$

$0 \geq 10 \rightarrow$ **False**

$y \leq x - 3$
$(0, 0)$

$0 \leq -3 \rightarrow$ **False**

Step 5→ Draw the graph



The graphs do not intersect, so there is no solution..

Solve each system of inequalities by graphing

5. $y < 5x - 5$
$y > 5x + 9$

Solution…

Step 1→Convert the inequality to equal sign

$y = 5x - 5$, $y = 5x + 9$

Step 2→Draw a table:

x	0	1
y	-5	0
(x, y)	$0, -5)$	$(1, 0)$

x	0	-9\5=-1.8
y	9	0
(x, y)	$(0, -5)$	$(-1.8, 0)$

$<$ **dashed** $>$ **dashed**

Step 3→ What does the inequality sign represent?

Step 4→ Substitution

$y < 5x - 5$

$(0, 0)$

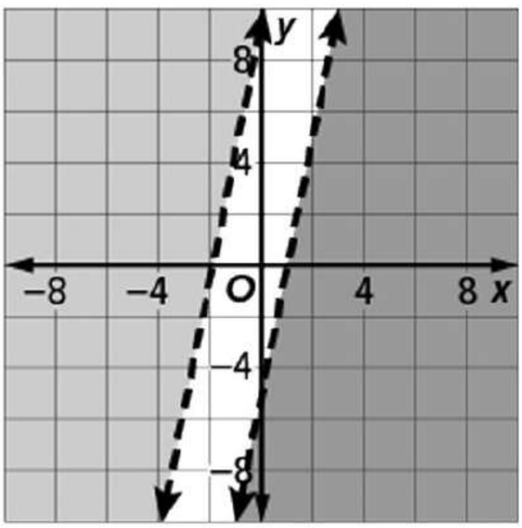
$0 < -5 \rightarrow$ False

$y > 5x + 9$

$(0, 0)$

$0 > 9 \rightarrow$ False

Step 5→ Draw the graph



The graphs do not intersect, so there is no solution…

Solve each system of inequalities by graphing

6. $y \geq 3x - 5$

$3x - y > -4$

$\rightarrow -y > -3x - 4$

$\frac{-y}{-1} > \frac{-3x}{-1} - \frac{4}{-1} \rightarrow y < 3x + 4$

Solution…

Step 1→ Convert the inequality to equal sign

$y = 3x - 5$, $y = 3x + 4$

Step 2→ Draw a table:

x	0	0
y	0	0
(x, y)	$(-1, 0)$	$(0, 0)$

$\geq$ **solid**

x	0	5
y	-5	0
(x, y)	$(0, -5)$	$(5, 0)$

$<$ **Solid**

Step 3→ What does the inequality sign represent?

Step 4→ Substitution

$y \geq 3x - 5$

$(0, 0)$

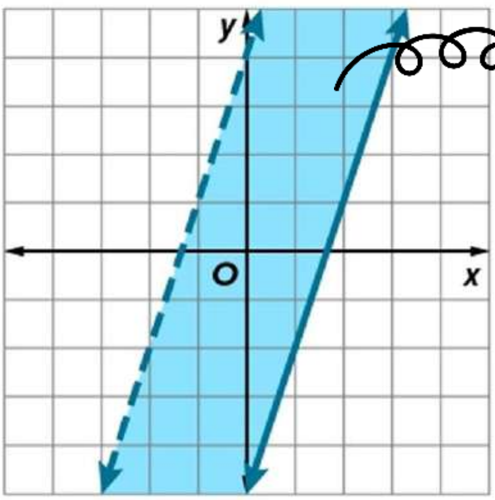
$0 \geq -5 \rightarrow True$

$y < 3x + 4$

$(0, 0)$

$0 < 4 \rightarrow True$

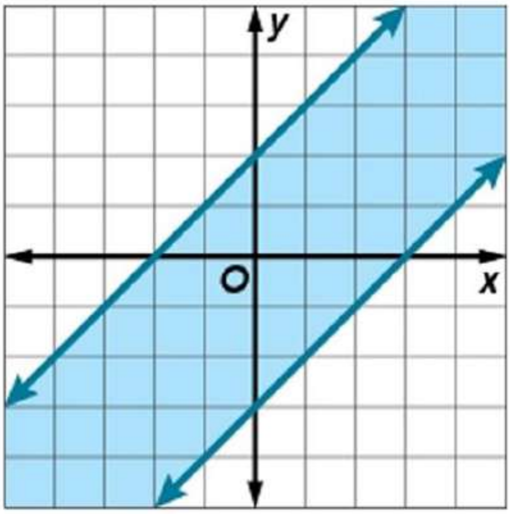
Step 5→ Draw the graph



The solution region is the shaded region shared by the two inequalities.

Write a system of inequalities for each graph.

15.



SOLUTION:

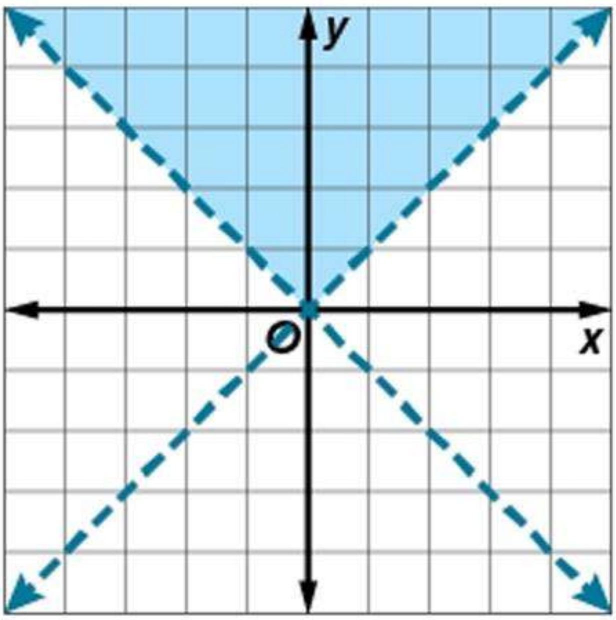
The top line has a y-intercept of 2 and a slope of 1. Since the solutions are below the line and the line is solid, use the less than or equal to symbol.

$y \leq x + 2$

The bottom line has a y-intercept of -3 and a slope of 1. Since the solutions are above the line and the line is solid, use the greater than or equal to symbol.

$y \geq x - 3$

16.



SOLUTION:

The line that goes from the top left corner to the bottom right corner has a y-intercept of 0 and a slope of -1. Since the solutions are above the line and the line is dashed, use the greater than symbol.

$y > -x$

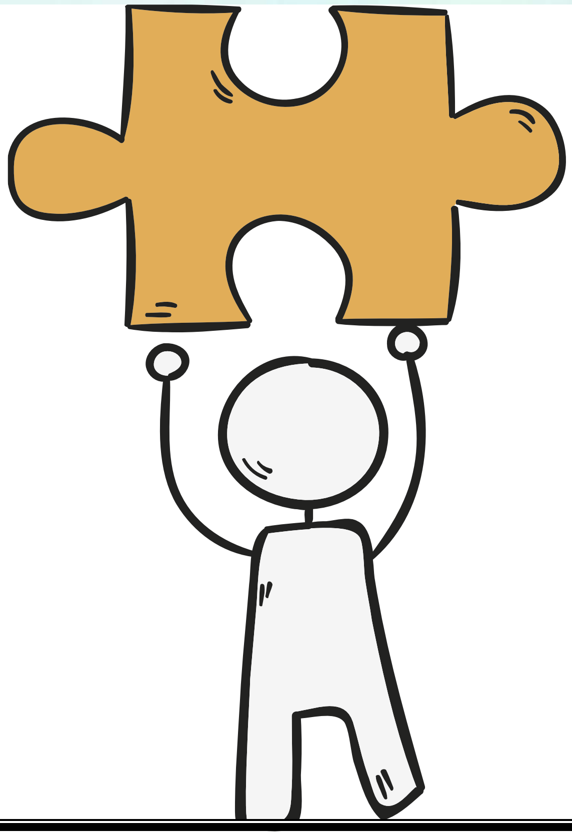
The line that goes from the top right corner to the bottom left corner has a y-intercept of 0 and a slope of 1. Since the solutions are above the line and the line is dashed, use the greater than symbol.

$y > x$

WELCOME TO...

Unit 10

Tools of Geometry Inequalities



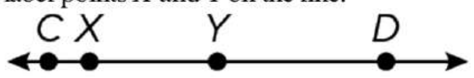
MCQ- الأسئلة الموضوعية		
L10-2 | Points, Lines, and Planes.		
6| Identify intersecting lines and planes.	20 - 28	566

USE TOOLS **Draw and label a figure for each relationship.**

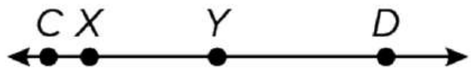
20. Points X and Y lie on $\overleftrightarrow{CD}$.

SOLUTION:

First, draw a line and label points C and D. Then label points X and Y on the line.



ANSWER:



21. Two planes do not intersect.

SOLUTION:

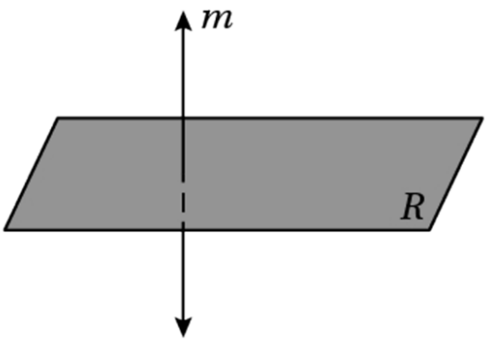
Draw two planes that resemble parallelograms that appear parallel.

22. Line m intersects plane R at a single point.

SOLUTION:

Draw plane R (represented by a parallelogram).

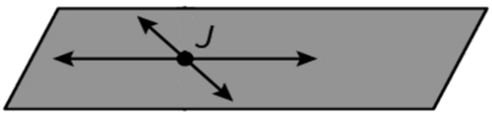
Draw a line, m, passing through it from above and below.



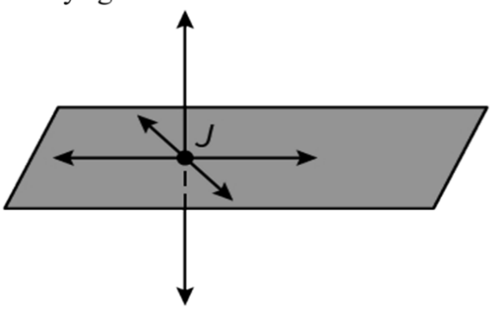
23. Three lines intersect at point J but do not all lie in the same plane.

SOLUTION:

Draw a plane, represented with a parallelogram. Draw two lines that lie in the plane and intersect one another. Label the point of their intersection, J.



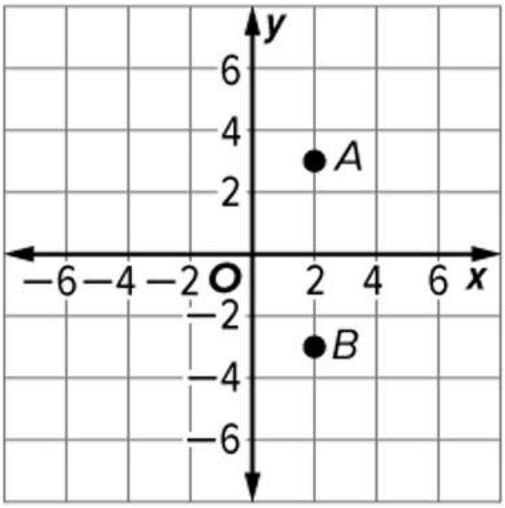
Draw a third line, not in the plane, that intersects the plane exactly at the point of intersection of the two lines lying in it.



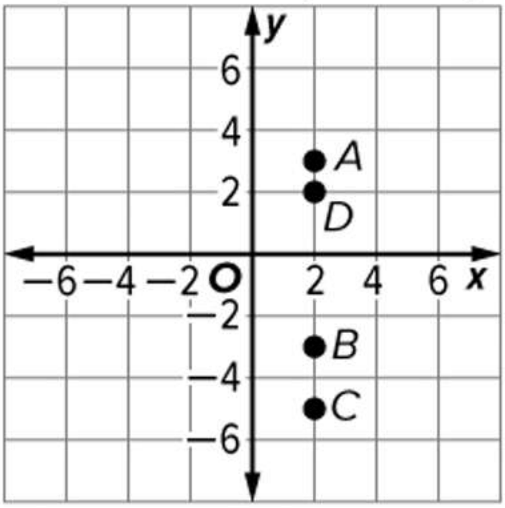
24. Points $A(2, 3)$, $B(2, -3)$, C, and D are collinear, but A, B, C, D, and F are not.

SOLUTION:

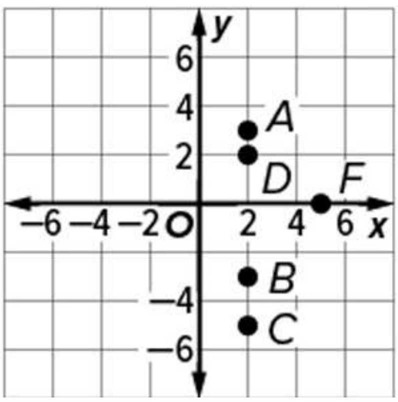
Draw a coordinate grid with points A and B plotted with the coordinates as specified.



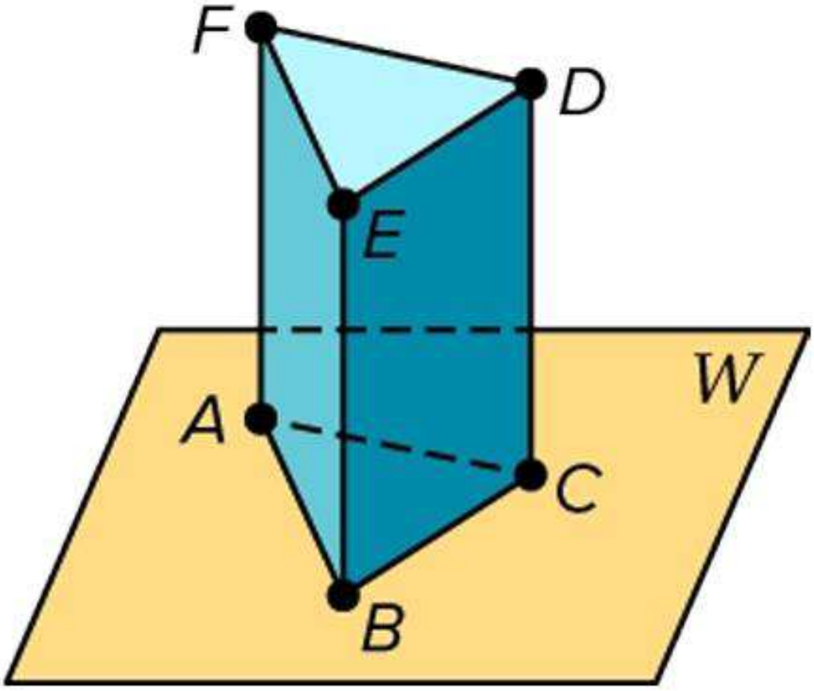
Plot points C and D anywhere along the line $x = 2$.



Plot point F anywhere else in the coordinate grid that is not on the line $x = 2$.



Refer to the figure for Exercises 25-28.



25. How many planes are shown in the figure?

SOLUTION:

There are five planes shown in the figure: planes *W*, *BCDE*, *ABEF*, *ACDF*, and *DEF*.

ANSWER:

5

---

26. How many of the planes contain points *F* and *E*?

SOLUTION:

There are two planes shown in the figure that contain points *F* and *E*: planes *ABEF* and *DEF*.

27. Name four points that are coplanar.

SOLUTION:

Four coplanar points are shown in what appear to be the sides of the triangular prism formed, *A, B, E, F* or *B, C, D, E* or *A, C, D, F*.

ANSWER:

A, B, E, F or *B, C, D, E* or *A, C, D, F*

28. Are points *A, B,* and *C* coplanar? Explain.

SOLUTION:

Points *A, B,* and *C* all lie in plane *W*, so they are coplanar by definition.

ANSWER:

Yes; sample answer: Points *A, B,* and *C* lie in plane *W*.

MCQ- الأسئلة الموضوعية		
L10-3 | **Line Segments**.		
7 | Calculate with measures.	**34 - 38**	**575**

34. Find the length of $\overline{UW}$ if W is between U and V, $UV = 16.8$ centimeters, and $VW = 7.9$ centimeters.

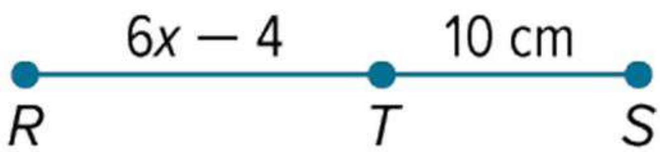
SOLUTION:

$UW + VW = UV$	Betweenness of points
$UW + 7.9 = 16.8$	Substitution
$UW = 8.9$	Subtract 7.9 from each side.

UW is 8.9, so the length of $\overline{UW}$ is 8.9 cm.

---

35. Find the value of x if $RS = 24$ centimeters.



SOLUTION:

$RT + TS = RS$	Betweenness of points
$6x - 4 + 10 = 24$	Substitution
$6x + 6 = 24$	Simplify.
$6x = 18$	Subtract 6 from each side.
$x = 3$	Divide each side by 6 and simplify.

---

37. Find the value of x if $\overline{PQ} \cong \overline{RS}$, $PQ = 9x - 7$, and $RS = 29$.

SOLUTION:

$PQ = RS$	Definition of Congruence
$9x - 7 = 29$	Substitution
$9x = 36$	Add 7 to each side and simplify.
$x = 4$	Divide each side by 9.

36. Find the length of $\overline{LO}$ if M is between L and O, $LM = 7x - 9$, $MO = 14$, and $LO = 10x - 7$.

SOLUTION:

Solve for x.

$LM + MO = LO$	Betweenness of points
$7x - 9 + 14 = 10x - 7$	Substitution
$7x + 5 = 10x - 7$	Simplify.
$-3x + 5 = -7$	Subtract $10x$ from each side. Simplify.
$-3x = -12$	Subtract 5 from each side. Simplify.
$x = 4$	Divide each side by -3. Simplify.

Now find LO.

$LO = 10x - 7$	Given
$= 10(4) - 7$	$x = 4$
$= 33$	Simplify.

$LO = 33$, so the length of $\overline{LO}$ is 33 in.

---

38. Find the measure of $\overline{NL}$.

SOLUTION:

$MN + NL = ML$	Betweenness of points
$2.1 + NL = 5.8$	Substitution
$NL = 3.7$	Subtract 2.1 from each side and simplify.

$NL = 3.7$, so the length of $\overline{NL}$ is 3.7 cm.

MCQ- الأسئلة الموضوعية		
L10-4 | **Distance.**		
8 | Find the distance between two points using the distance formula.	31 - 40	583

- Find the distance between each pair of points. Round to the nearest tenth, if necessary.

31. $M(-4, 9), N(-5, 3)$

SOLUTION:

Use the Distance Formula.

$$\begin{aligned} MN &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} && \text{Distance Formula} \\ &= \sqrt{(-5-(-4))^2+(3-9)^2} && \text{Substitution} \\ &= \sqrt{(-1)^2+(-6)^2} && \text{Subtract.} \\ &= \sqrt{37} && \text{Simplify.} \\ &\approx 6.1 && \text{Simplify.} \end{aligned}$$

The distance between M and N is about 6.1 units.

32. $C(4, 2), D(7\ 5)$

SOLUTION:

Use the Distance Formula.

$$\begin{aligned} CD &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} && \text{Distance Formula} \\ &= \sqrt{(5-2)^2+(7-4)^2} && \text{Substitution} \\ &= \sqrt{3^2+3^2} && \text{Subtract.} \\ &= \sqrt{18} && \text{Simplify.} \\ &\approx 4.2 && \text{Simplify.} \end{aligned}$$

The distance between C and D is about 4.2 units.

33. $A(5, 1), B(3, 6)$

SOLUTION:

Use the Distance Formula.

$$\begin{aligned} AB &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} && \text{Distance Formula} \\ &= \sqrt{(3-5)^2+(6-1)^2} && \text{Substitution} \\ &= \sqrt{(-2)^2+5^2} && \text{Subtract.} \\ &= \sqrt{29} && \text{Simplify.} \\ &\approx 5.4 && \text{Simplify.} \end{aligned}$$

The distance between A and B is about 5.4 units.

35. $S(6, 4), T(3, 2)$

SOLUTION:

Use the Distance Formula.

$$\begin{aligned} ST &= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2} && \text{Distance Formula} \\ &= \sqrt{(3-6)^2+(2-4)^2} && \text{Substitution} \\ &= \sqrt{(-3)^2+(-2)^2} && \text{Subtract.} \\ &= \sqrt{13} && \text{Simplify.} \\ &\approx 3.6 && \text{Simplify.} \end{aligned}$$

The distance between S and T is about 3.6 units.

34. $V(4, 4)$, $X(5, 8)$

SOLUTION:

Use the Distance Formula.

$$\begin{aligned} VX &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance Formula} \\ &= \sqrt{(5-4)^2 + (8-4)^2} && \text{Substitution} \\ &= \sqrt{1^2 + 4^2} && \text{Subtract.} \\ &= \sqrt{17} && \text{Simplify.} \\ &\approx 4.1 && \text{Simplify.} \end{aligned}$$

The distance between V and X is about 4.1 units.

37. $W(-8, 1)$, $Y(0, 6)$

SOLUTION:

Use the Distance Formula.

$$\begin{aligned} WY &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance Formula} \\ &= \sqrt{(0-(-8))^2 + (6-1)^2} && \text{Substitution} \\ &= \sqrt{8^2 + 5^2} && \text{Subtract.} \\ &= \sqrt{89} && \text{Simplify.} \\ &\approx 9.4 && \text{Simplify.} \end{aligned}$$

The distance between W and Y is about 9.4 units.

38. $B(3, -4)$, $C(5, -5)$

SOLUTION:

Use the Distance Formula.

$$\begin{aligned} BC &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance Formula} \\ &= \sqrt{(5-3)^2 + (-5-(-4))^2} && \text{Substitution} \\ &= \sqrt{2^2 + (-1)^2} && \text{Subtract.} \\ &= \sqrt{5} && \text{Simplify.} \\ &\approx 2.2 && \text{Simplify.} \end{aligned}$$

The distance between B and C is about 2.2 units.

36. $M(3, -3)$, $N(8, -1)$

SOLUTION:

Use the Distance Formula.

$$\begin{aligned} MN &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance Formula} \\ &= \sqrt{(-3-(-1))^2 + (3-8)^2} && \text{Substitution} \\ &= \sqrt{(-2)^2 + (-5)^2} && \text{Subtract.} \\ &= \sqrt{29} && \text{Simplify.} \\ &\approx 5.4 && \text{Simplify.} \end{aligned}$$

The distance between M and N is about 5.4 units.

39. $R(6, 11)$, $T(3, -7)$

SOLUTION:

Use the Distance Formula.

$$\begin{aligned} RT &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance Formula} \\ &= \sqrt{(3-6)^2 + (-7-11)^2} && \text{Substitution} \\ &= \sqrt{(-3)^2 + (-18)^2} && \text{Subtract.} \\ &= \sqrt{333} && \text{Simplify.} \\ &= 3\sqrt{37} && \text{Simplify.} \\ &\approx 18.2 && \text{Simplify.} \end{aligned}$$

The distance between R and T is about 18.2 units.

40. $A(-3, 8)$, $B(-1, 4)$

SOLUTION:

Use the Distance Formula.

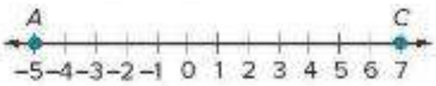
$$\begin{aligned} AB &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance Formula} \\ &= \sqrt{(-1-(-3))^2 + (4-8)^2} && \text{Substitution} \\ &= \sqrt{2^2 + (-4)^2} && \text{Subtract.} \\ &= \sqrt{20} && \text{Simplify.} \\ &\approx 4.5 && \text{Simplify.} \end{aligned}$$

The distance between A and B is about 4.5 units.

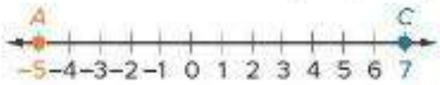
MCQ- الأسئلة الموضوعية		
L10-5| Locating Points on a Number Line.		
9| Find a point on a directed line segment on a number line that is a given fractional distance from the initial point	**15 – 21**	**Page 590**

Example 1 Locate a Point at a Fractional Distance

Find B on $\overline{AC}$ that is $\frac{1}{4}$ of the distance from A to C.



Point A is the initial endpoint, and point C is the terminal endpoint.



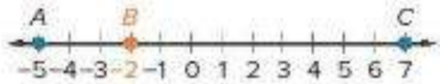
Use the equation to calculate the coordinate of point B.

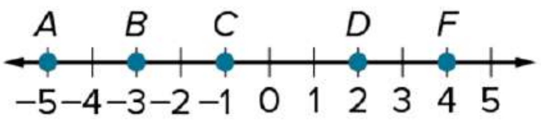
$B = x_1 + \frac{a}{b}(x_2 - x_1)$ Coordinate equation

$= -5 + \frac{1}{4}(7 - (-5))$ $x_1 = -5, x_2 = 7$, and $\frac{a}{b} = \frac{1}{4}$

$= -2$ Simplify.

Point B is located at −2 on the number line.





15. Find the coordinate of point X on $\overline{AF}$ that is $\frac{1}{3}$ of the distance from A to F.

SOLUTION:

Point A is the initial endpoint, and point F is the terminal endpoint.

Use the equation to calculate the coordinate of point X.

$X = x_1 + \frac{a}{b}(x_2 - x_1)$ Coordinate equation

$= -5 + \frac{1}{3}[4 - (-5)]$ $x_1 = -5, x_2 = 4$, and $\frac{a}{b} = \frac{1}{3}$

$= -2$ Simplify.

Point X is located at –2 on the number line.

16. Find the coordinate of point Y on $\overline{AC}$ that is $\frac{1}{4}$ of the distance from A to C.

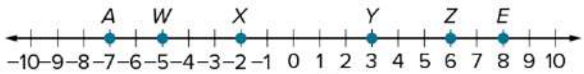
SOLUTION:

Point A is the initial endpoint, and point C is the terminal endpoint.

Use the equation to calculate the coordinate of point Y.

$$\begin{aligned} Y &= x_1 + \frac{a}{b}(x_2 - x_1) && \text{Coordinate equation} \\ &= -5 + \frac{1}{4}[-1-(-5)] && x_1 = -5,\ x_2 = -1, \text{ and } \frac{a}{b} = \frac{1}{4} \\ &= -4 && \text{Simplify.} \end{aligned}$$

Point Y is located at –4 on the number line.



17. Which point on $\overline{AE}$ is $\frac{2}{3}$ of the distance from A to E?

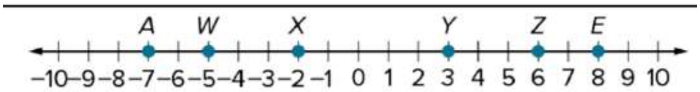
SOLUTION:

Point A is the initial endpoint, and point E is the terminal endpoint.

Use the equation to calculate the coordinate of the point.

$$\begin{aligned} ? &= x_1 + \frac{a}{b}(x_2 - x_1) && \text{Coordinate equation} \\ &= -7 + \frac{2}{3}[8-(-7)] && x_1 = -7,\ x_2 = 8, \text{ and } \frac{a}{b} = \frac{2}{3} \\ &= 3 && \text{Simplify.} \end{aligned}$$

Point Y is located at 3 on the number line. So, point Y is $\frac{2}{3}$ the distance from A to E.



18. Point X is what fractional distance from E to A?

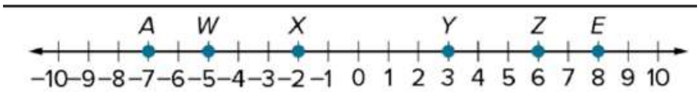
SOLUTION:

Point E is the initial endpoint, and point A is the terminal endpoint.

Use the equation to calculate the fractional distance.

$X = x_1 + \frac{a}{b}(x_2 - x_1)$	Coordinate equation
$-2 = 8 + \frac{a}{b}(-7 - 8)$	$X = -2$, $x_1 = 8$, and $x_2 = -7$
$\frac{2}{3} = \frac{a}{b}$	Simplify.

Point X is $\frac{2}{3}$ of the distance from E to A.



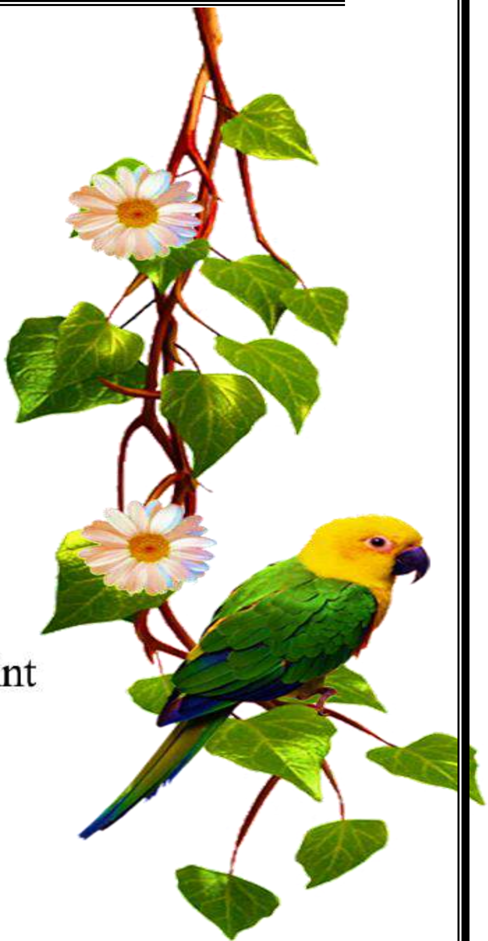
19. Find the coordinate of point M on $\overline{AE}$ that is $\frac{1}{5}$ of the distance from A to E.

SOLUTION:

Point A is the initial endpoint, and point E is the terminal endpoint.

Use the equation to calculate the coordinate of point M.

$M = x_1 + \frac{a}{b}(x_2 - x_1)$	Coordinate equation
$= -7 + \frac{1}{5}[8 - (-7)]$	$x_1 = -7$, $x_2 = 8$, and $\frac{a}{b} = \frac{1}{5}$
$= -4$	Simplify.



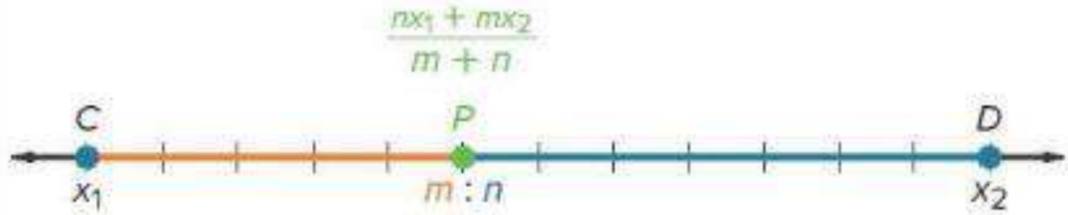
Point M is located at –4 on the number line.

Learn Locating Points on a Number Line with a Given Ratio

You can calculate the coordinate of an intermediary point that partitions the directed line segment into a given ratio.

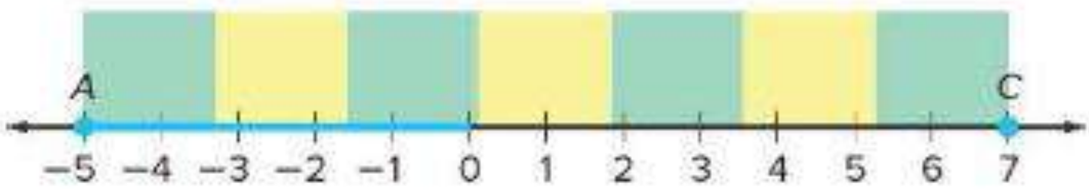
Key Concept • Section Formula on a Number Line

If C has coordinate x_1 and D has coordinate x_2, then a point P that partitions the line segment in a ratio of $m{:}n$ is located at coordinate $\frac{nx_1 + mx_2}{m + n}$, where $m \neq -n$.



Example 3 Locate a Point on a Number Line When Given a Ratio

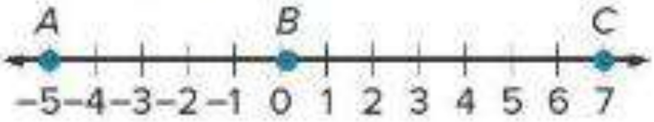
Find B on $\overline{AC}$ such that the ratio of AB to BC is 3:4.



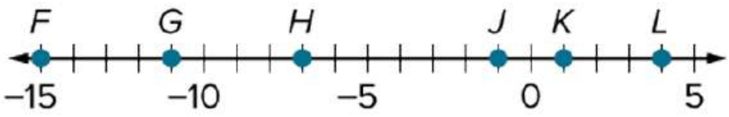
Use the Section Formula to determine the coordinate of point B.

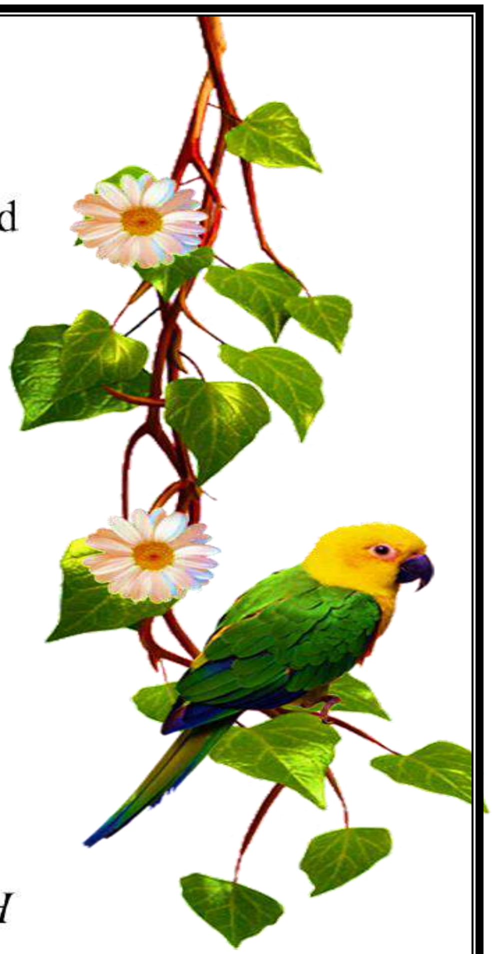
$$B = \frac{nx_1 + mx_2}{m + n}$$ Section Formula

$$= \frac{4(-5) + 3(7)}{3 + 4} = \frac{1}{7}$$ $m = 3$, $n = 4$, $x_1 = -5$, and $x_2 = 7$



So, B is located at $\frac{1}{7}$ on the number line.





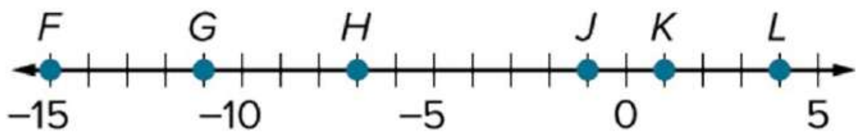
20. The ratio of FX to XK is 1:1. Which point is located at X?

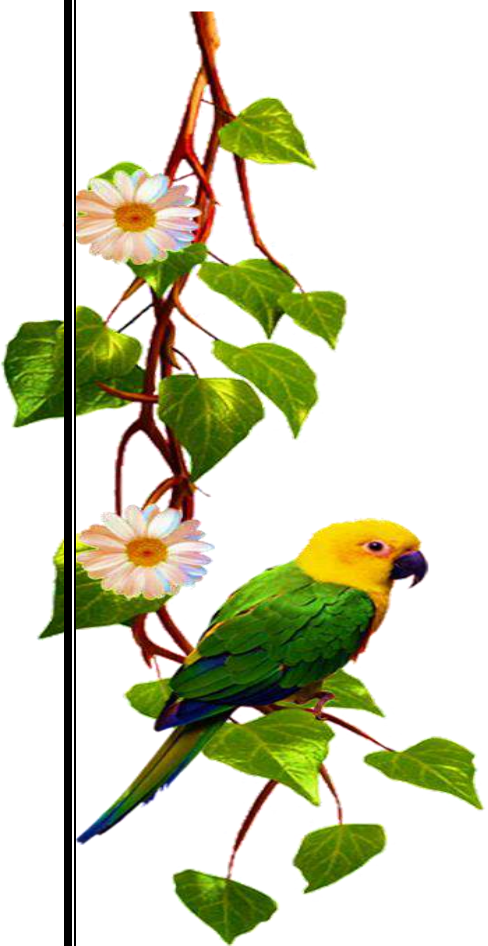
SOLUTION:

Use the Section Formula to determine the coordinate of point X.

$$\begin{aligned} X &= \frac{nx_1 + mx_2}{m+n} && \text{Section Formula} \\ &= \frac{1(-15)+1(1)}{1+1} && m=1,\ n=1,\ x_1=-15,\ \text{and } x_2=1 \\ &= -7 && \text{Simplify.} \end{aligned}$$

Point X is located at –7 on the number line. Point H is located at X.





21. Find the coordinate of Q on $\overline{FL}$ such that ratio of FQ to QL is 12:7.

SOLUTION:

Use the Section Formula to determine the coordinate of point Q.

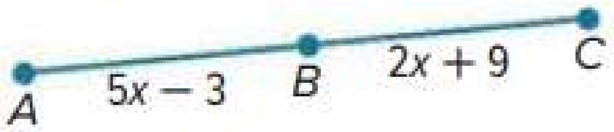
$$\begin{aligned} Q &= \frac{nx_1 + mx_2}{m+n} && \text{Section Formula} \\ &= \frac{7(-15)+12(4)}{12+7} && m=12,\ n=7,\ x_1=-15,\ \text{and } x_2=4 \\ &= -3 && \text{Simplify.} \end{aligned}$$

Point Q is located at –3 on the number line.

MCQ- الأسئلة الموضوعية		
L 10-7 | Midpoints and Bisectors.		
10 | Find missing values using the definition of a segment bisector.	Example 6	603
	39 - 48	606

Example 6 Find the Total Length

Find the measure of $\overline{AC}$ if B is the midpoint of $\overline{AC}$.



Because B is the midpoint, $AB = BC$. Use this equation to solve for x.

$AB = BC$	Definition of midpoint
$5x - 3 = 2x + 9$	Substitution
$3x - 3 = 9$	Subtract $2x$ from each side.
$3x = 12$	Add 3 to each side.
$x = 4$	Divide each side by 3.

The length of $\overline{AC}$ is equal to the sum of AB and BC. So, to find the length of $\overline{AC}$, substitute 4 for x in the expression $5x - 3 + 2x + 9$.

$AC = 5x - 3 + 2x + 9$	Length of $\overline{AC}$
$= 5(4) - 3 + 2(4) + 9$	$x = 4$
$= 20 - 3 + 8 + 9$	Multiply.
$= 34$	Simplify.

The measure of $\overline{AC}$ is 34.

Suppose M is the midpoint of $\overline{FG}$. Find each missing measure.

39. $FM = 5y + 13$, $MG = 5 - 3y$, $FG = ?$

SOLUTION:

Because M is the midpoint, $FM = MG$. Use this equation to solve for y.

$$\begin{aligned} FM &= MG && \text{Definition of midpoint} \\ 5y + 13 &= 5 - 3y && \text{Substitution} \\ 8y + 13 &= 5 && \text{Add } 3y \text{ to each side.} \\ 8y &= -8 && \text{Subtract 13 from each side} \\ y &= -1 && \text{Divide each side by 8.} \end{aligned}$$

The length of $\overline{FG}$ is equal to the sum of FM and MG. So, to find the length of $\overline{FG}$, substitute –1 for y in the expression $5y + 13 + 5 - 3y$.

$$\begin{aligned} FG &= 5y + 13 + 5 - 3y && \text{Length of } \overline{FG} \\ &= 5(-1) + 13 + 5 - 3(-1) && y = -1 \\ &= -5 + 13 + 5 + 3 && \text{Multiply.} \\ &= 16 && \text{Simplify.} \end{aligned}$$

The measure of $\overline{FG}$ is 16.

40. $FM = 3x - 4$, $MG = 5x - 26$, $FG = ?$

SOLUTION:

Because M is the midpoint, $FM = MG$. Use this equation to solve for x.

FM	$=$	MG	Definition of midpoint
$3x - 4$	$=$	$5x - 26$	Substitution
$-2x - 4$	$=$	-26	Subtract $5x$ from each side.
$-2x$	$=$	-22	Add 4 to each side
x	$=$	11	Divide each side by -2.

The length of $\overline{FG}$ is equal to the sum of FM and MG. So, to find the length of $\overline{FG}$, substitute 11 for x in the expression $3x - 4 + 5x - 26$.

FG	$=$	$3x - 4 + 5x - 26$	Length of $\overline{FG}$
	$=$	$3(11) - 4 + 5(11) - 26$	$x = 11$
	$=$	$33 - 4 + 55 - 26$	Multiply.
	$=$	58	Simplify.

The measure of $\overline{FG}$ is 58.

41. $FM = 8a + 1$, $FG = 42$, $a = ?$

SOLUTION:

Because M is the midpoint, $FM = \frac{1}{2}FG$. Use this equation to solve for a.

FM	$=$	$\frac{1}{2}FG$	Definition of midpoint
$8a+1$	$=$	$\frac{1}{2}(42)$	Substitution
$8a+1$	$=$	21	Multiply.
$8a$	$=$	20	Subtract 1 from each side
a	$=$	2.5	Divide each side by 8.

---

42. $MG = 7x - 15$, $FG = 33$, $x = ?$

SOLUTION:

Because M is the midpoint, $MG = \frac{1}{2}FG$. Use this equation to solve for x.

MG	$=$	$\frac{1}{2}FG$	Definition of midpoint
$7x-15$	$=$	$\frac{1}{2}(33)$	Substitution
$7x-15$	$=$	16.5	Multiply.
$7x$	$=$	31.5	Add 15 to each side.
x	$=$	4.5	Divide each side by 7.

43. $FM = 3n + 1$, $MG = 6 - 2n$, $FG = ?$

SOLUTION:

Because M is the midpoint, $FM = MG$. Use this equation to solve for n.

FM	$=$	MG	Definition of midpoint
$3n + 1$	$=$	$6 - 2n$	Substitution
$5n + 1$	$=$	6	Add $2n$ to each side.
$5n$	$=$	5	Subtract 1 from each side
n	$=$	1	Divide each side by 5.

The length of $\overline{FG}$ is equal to the sum of FM and MG. So, to find the length of $\overline{FG}$, substitute 1 for n in the expression $3n + 1 + 6 - 2n$.

FG	$=$	$3n + 1 + 6 - 2n$	Length of $\overline{FG}$
	$=$	$3(1) + 1 + 6 - 2(1)$	$n = 1$
	$=$	$3 + 1 + 6 - 2$	Multiply.
	$=$	8	Simplify.

The measure of $\overline{FG}$ is 8.

44. $FM = 12x - 4$, $MG = 5x + 10$, $FG = ?$

SOLUTION:

Because M is the midpoint, $FM = MG$. Use this equation to solve for x.

FM	$=$	MG	Definition of midpoint
$12x - 4$	$=$	$5x + 10$	Substitution
$7x - 4$	$=$	10	Subtract $5x$ from each side.
$7x$	$=$	14	Add 4 to each side
x	$=$	2	Divide each side by 7.

The length of $\overline{FG}$ is equal to the sum of FM and MG. So, to find the length of $\overline{FG}$, substitute 2 for x in the expression $12x - 4 + 5x + 10$.

FG	$=$	$12x - 4 + 5x + 10$	Length of $\overline{FG}$
	$=$	$12(2) - 4 + 5(2) + 10$	$x = 2$
	$=$	$24 - 4 + 10 + 10$	Multiply.
	$=$	40	Simplify.

The measure of $\overline{FG}$ is 40.

45. $FM = 2k - 5$, $FG = 18$, $k = ?$

SOLUTION:

Because M is the midpoint, $MG = \frac{1}{2}FG$. Use this equation to solve for x.

$$\begin{aligned} FM &= \frac{1}{2}FG && \text{Definition of midpoint} \\ 2k - 5 &= \frac{1}{2}(18) && \text{Substitution} \\ 2k - 5 &= 9 && \text{Multiply.} \\ 2k &= 14 && \text{Add 5 to each side.} \\ k &= 7 && \text{Divide each side by 2.} \end{aligned}$$

---

46. $FG = 14a + 1$, $FM = 14.5$, $a = ?$

SOLUTION:

Because M is the midpoint, $FG = 2FM$. Use this equation to solve for a.

$$\begin{aligned} FG &= 2FM && \text{Definition of midpoint} \\ 14a + 1 &= 2(14.5) && \text{Substitution} \\ 14a + 1 &= 29 && \text{Multiply.} \\ 14a &= 28 && \text{Subtract 1 from each side.} \\ a &= 2 && \text{Divide each side by 14.} \end{aligned}$$

47. $MG = 13x + 1$, $FG = 15$, $x = ?$

SOLUTION:

Because M is the midpoint, $MG = \frac{1}{2}FG$. Use this equation to solve for x.

$$\begin{aligned} MG &= \frac{1}{2}FG && \text{Definition of midpoint} \\ 13x + 1 &= \frac{1}{2}(15) && \text{Substitution} \\ 13x + 1 &= 7.5 && \text{Multiply.} \\ 13x &= 6.5 && \text{Subtract 1 from each side} \\ x &= 0.5 && \text{Divide each side by 13.} \end{aligned}$$

---

48. $FG = 11x - 15.6$, $MG = 10.9$, $x = ?$

SOLUTION:

Because M is the midpoint, $FG = 2MG$. Use this equation to solve for x.

$$\begin{aligned} FG &= 2MG && \text{Definition of midpoint} \\ 11x - 15.6 &= 2(10.9) && \text{Substitution} \\ 11x - 15.6 &= 21.8 && \text{Multiply.} \\ 11x &= 37.4 && \text{Add 15.6 to each side.} \\ x &= 3.4 && \text{Divide each side by 14.} \end{aligned}$$

FRQ - الأسئلة المقالية		
L 10-7 | Midpoints and Bisectors .		
18 | Find the midpoint of a segment.	Example 3	601
	19 - 30	606

Example 3 Find the Midpoint on the Coordinate Plane

Find the coordinates of M, the midpoint of $\overline{AB}$, for $A(-2, 1)$ and $B(8, 3)$.

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) \quad \text{Midpoint Formula}$$

$$= \left(\frac{-2 + 8}{2}, \frac{1 + 3}{2}\right) \quad \text{Substitution}$$

$$= \left(\frac{6}{2}, \frac{4}{2}\right) \text{ or } (3, 2) \quad \text{Simplify.}$$

Find the coordinates of the midpoint of a segment with the given endpoints.

19. (5, 11), (3, 1)

SOLUTION:

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) \quad \text{Midpoint Formula}$$

$$= \left(\frac{5 + 3}{2}, \frac{11 + 1}{2}\right) \quad \text{Substitution}$$

$$= \left(\frac{8}{2}, \frac{12}{2}\right) \text{ or } (4, 6) \quad \text{Simplify.}$$

---

20. (7, –5), (3, 3)

SOLUTION:

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) \quad \text{Midpoint Formula}$$

$$= \left(\frac{7 + 3}{2}, \frac{-5 + 3}{2}\right) \quad \text{Substitution}$$

$$= \left(\frac{10}{2}, \frac{-2}{2}\right) \text{ or } (5, -1) \quad \text{Simplify.}$$

23. (–5, 1), (2, 6)

SOLUTION:

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) \quad \text{Midpoint Formula}$$

$$= \left(\frac{-5 + 2}{2}, \frac{1 + 6}{2}\right) \quad \text{Substitution}$$

$$= \left(\frac{-3}{2}, \frac{7}{2}\right) \text{ or } (-1.5, 3.5) \quad \text{Simplify.}$$

21. (–8, –11), (2, 5)

SOLUTION:

$$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) \quad \text{Midpoint Formula}$$
$$= \left(\frac{-8+2}{2}, \frac{-11+5}{2}\right) \quad \text{Substitution}$$
$$= \left(\frac{-6}{2}, \frac{-6}{2}\right) \text{ or } (-3, -3) \quad \text{Simplify.}$$

22. (7, 0), (2, 4)

SOLUTION:

$$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) \quad \text{Midpoint Formula}$$
$$= \left(\frac{7+2}{2}, \frac{0+4}{2}\right) \quad \text{Substitution}$$
$$= \left(\frac{9}{2}, \frac{4}{2}\right) \text{ or } (4.5, 2) \quad \text{Simplify.}$$

26. (9, –3), (5, 1)

SOLUTION:

$$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) \quad \text{Midpoint Formula}$$
$$= \left(\frac{9+5}{2}, \frac{-3+1}{2}\right) \quad \text{Substitution}$$
$$= \left(\frac{14}{2}, \frac{-2}{2}\right) \text{ or } (7, -1) \quad \text{Simplify.}$$

27. (22, 4), (15, 7)

SOLUTION:

$$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) \quad \text{Midpoint Formula}$$
$$= \left(\frac{22+15}{2}, \frac{4+7}{2}\right) \quad \text{Substitution}$$
$$= \left(\frac{37}{2}, \frac{11}{2}\right) \text{ or } (18.5, 5.5) \quad \text{Simplify.}$$

24. (–4, –7), (12, –6)

SOLUTION:

$$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) \quad \text{Midpoint Formula}$$
$$= \left(\frac{-4+12}{2}, \frac{-7+(-6)}{2}\right) \quad \text{Substitution}$$
$$= \left(\frac{8}{2}, \frac{-13}{2}\right) \text{ or } (4, -6.5) \quad \text{Simplify.}$$

25. (2, 8), (8, 0)

SOLUTION:

$$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) \quad \text{Midpoint Formula}$$
$$= \left(\frac{2+8}{2}, \frac{8+0}{2}\right) \quad \text{Substitution}$$
$$= \left(\frac{10}{2}, \frac{8}{2}\right) \text{ or } (5, 4) \quad \text{Simplify.}$$

29. (–15, 4), (2, –10)

SOLUTION:

$$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) \quad \text{Midpoint Formula}$$
$$= \left(\frac{-15+2}{2}, \frac{4+(-10)}{2}\right) \quad \text{Substitution}$$
$$= \left(\frac{-13}{2}, \frac{-6}{2}\right) \text{ or } (-6.5, -3) \quad \text{Simplify.}$$

30. (–2, 5), (3, –17)

SOLUTION:

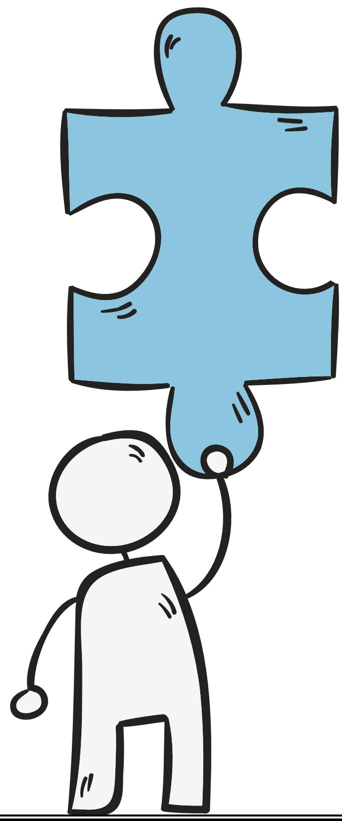
$$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) \quad \text{Midpoint Formula}$$
$$= \left(\frac{-2+3}{2}, \frac{5+(-17)}{2}\right) \quad \text{Substitution}$$
$$= \left(\frac{1}{2}, \frac{-12}{2}\right) \text{ or } (0.5, -6) \quad \text{Simplify.}$$

WELCOME

TO...

Unit 11

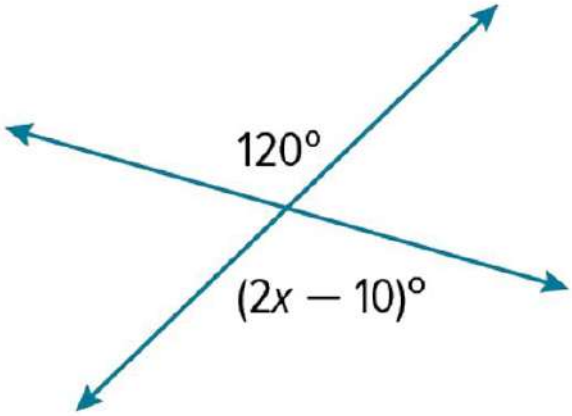
Angles and Geometric Figures



MCQ- الأسئلة الموضوعية		
L11-1 | Angles and Congruence.		
11 | Analyze figures using the definitions of angles and parts of angles.	15 - 17	622
	34 - 36	623

Find the value of each variable.

15.



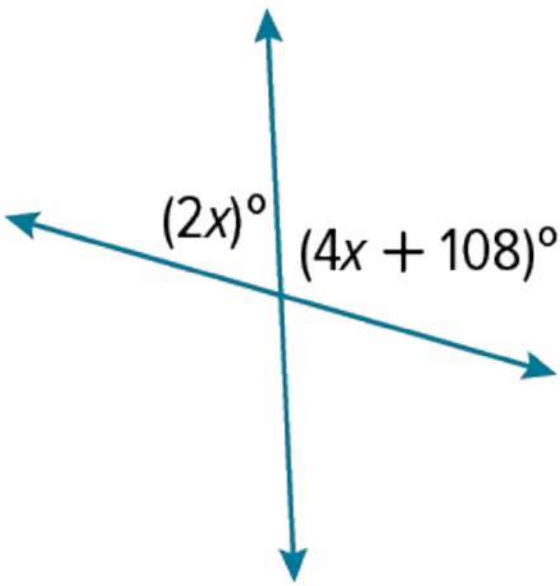
SOLUTION:

$2x - 10 = 120$ Vertical angles are congruent

$2x = 130$ Add 10 to each side and simplify.

$x = 65$ Divide each side by 2 and simplify.

16.



SOLUTION:

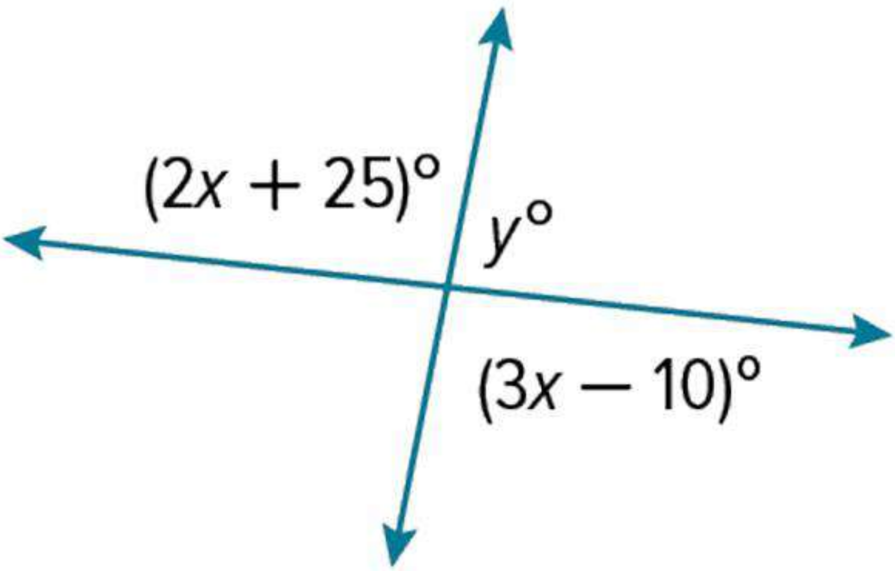
$2x + 4x + 108 = 180$ Angles in a linear pair sum to 180°

$6x + 108 = 180$ Simplify.

$6x = 72$ Subtract 108 from each side and simplify.

$x = 12$ Divide each side by 6 and simplify.

17.

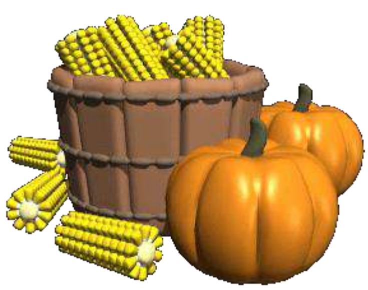


SOLUTION:

First use vertical angles to solve for x. Then use a linear pair and substitution to solve for y.

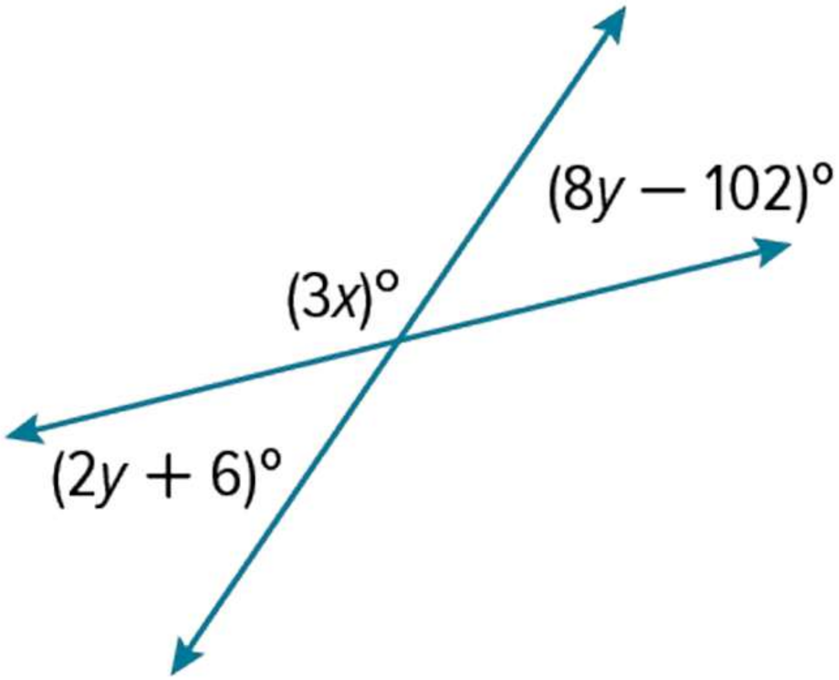
$2x+25=3x-10$	Vertical angles are congruent
$25=x-10$	Subtract $2x$ from each side and simplify.
$35=x$	Add 10 to each side and simplify.

$2x+25+y=180$	Angles in a linear pair sum to 180°.
$2(35)+25+y=180$	Substitution
$95+y=180$	Simplify.
$y=85$	Subtract 95 from each side and simplify.



Find the value of each variable.

34.

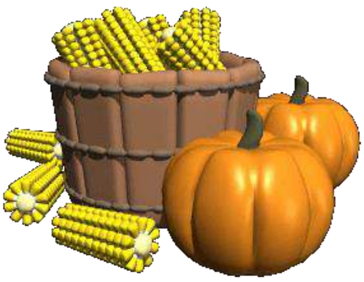


SOLUTION:

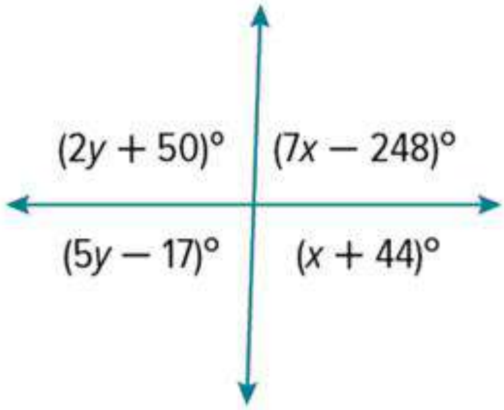
First use vertical angles to solve for y. Then use a linear pair and substitution to solve for x.

$2y + 6 = 8y - 102$	Vertical angles are congruent
$6 = 6y - 102$	Subtract $2y$ from each side and simplify.
$108 = 6y$	Add 102 to each side and simplify
$18 = y$	Divide each side by 6 and simplify.

$2y + 6 + 3x = 180$	Angles in a linear pair sum to 180°.
$2(18) + 6 + 3x = 180$	Substitution
$42 + 3x = 180$	Simplify.
$3x = 138$	Subtract 42 from each side and simplify
$x = 46$	Divide each side by 3 and simplify.



35.

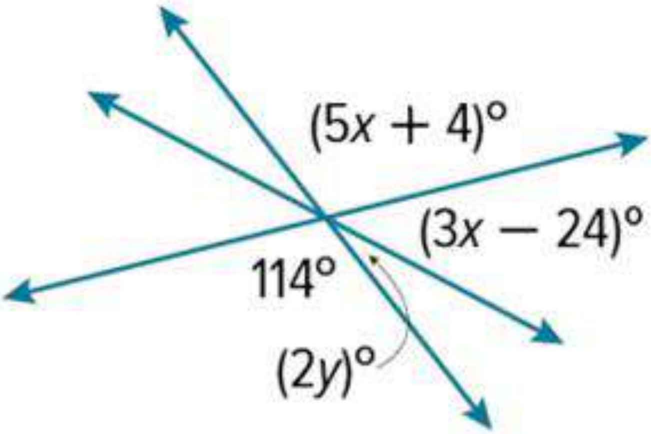


SOLUTION:

Use the definition of linear pair to solve for x and y.

$2y + 50 + 5y - 17 = 180$	Angles in a linear pair sum to 180°.
$7y + 33 = 180$	Simplify.
$7y = 147$	Subtract 33 from each side.
$y = 21$	Divide each side by 7 and simplify.

$7x - 248 + x + 44 = 180$	Angles in a linear pair sum to 180°.
$8x - 204 = 180$	Simplify.
$8x = 384$	Add 204 to each side.
$x = 48$	Divide each side by 8 and simplify.



SOLUTION:

First use vertical angles to solve for x. Then use a linear pair and substitution to solve for y.

$5x + 4 = 114$	Vertical angles are congruent
$5x = 110$	Subtract 4 from each side and simplify.
$x = 22$	Divide each side by 5 and simplify

$2y + 114 + 3x - 24 = 180$	Angles in a linear pair sum to 180°.
$2y + 114 + 3(22) - 24 = 180$	Substitution
$2y + 156 = 180$	Simplify.
$2y = 24$	Subtract 156 from each side and simplify.
$y = 12$	Divide each side by 2 and simplify.

FRQ- الأسئلة المقالية		
L11-2 | Angle Relationships.		
20 | Identify two complementary angles and two supplementary angles and find the measure of missing angles.	15 - 19	632

15. The measure of the supplement of an angle is 60° less than four times the measure of the complement of the angle. Find the measure of the angle.

قياس المكمل للزاوية أقل بمقدار 60 درجة من أربعة أمثال قياس المكمل للزاوية .أوجد قياس الزاوية.

SOLUTION:

Let x = the first angle, then the supplement $= 4(90 - x) = 60$

$x + 4(90 - x) = 180$	The sum of supplementary angles is 180°.
$x + 360 - 4x - 60 = 180$	Distributive property.
$300 - 3x = 180$	Combine like terms.
$-3x = -120$	Subtract 300 from each side.
$x = 40$	Divide each side by 2.

So, the angle is 40°.

16. $\angle 6$ and $\angle 7$ form a linear pair. Twice the measure of $\angle 6$ is twelve more than four times the measure of $\angle 7$. Find the measure of each angle.

SOLUTION:

$\angle 6$ and $\angle 7$ form a linear pair, so they must sum to 180°. Let $\angle 6 = x$, then $\angle 7 = 180 - x$.

$2(m\angle 6) - 12 = 4(m\angle 7)$	Relationship given in problem.
$2x - 12 = 4(180 - x)$	Substitution.
$2x - 12 = 720 - 4x$	Distributive property.
$6x = 732$	Add $4x$ and 12 to each side.
$x = 122$	Divide each side by 6.

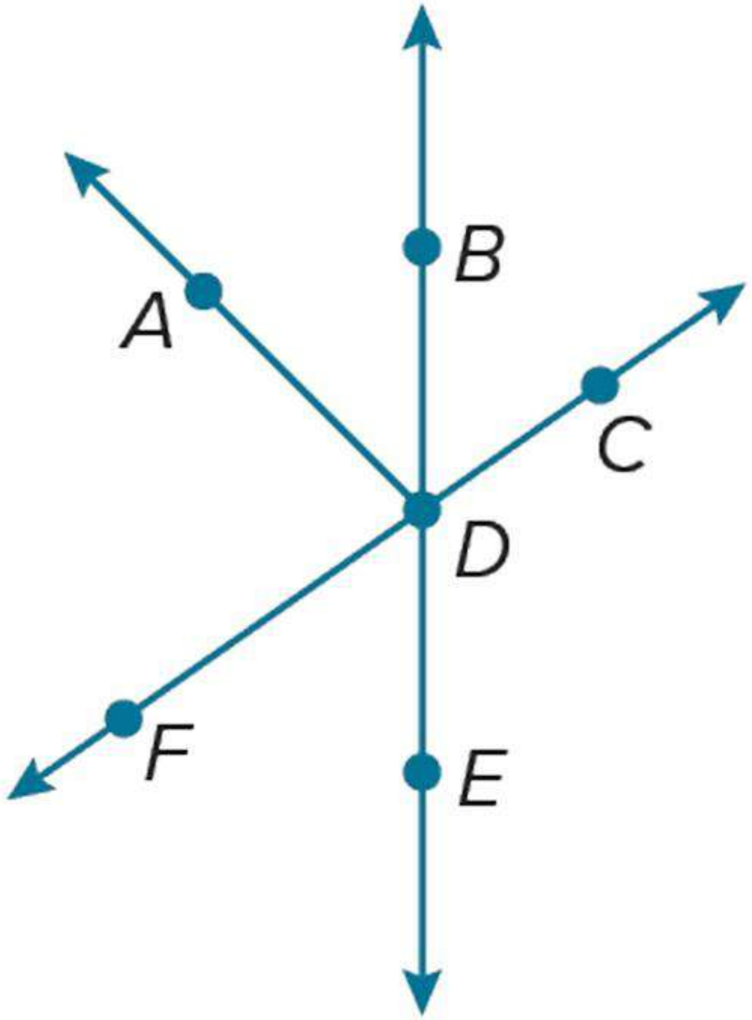
Find $\angle 7$.

$\angle 7 = 180 - x$	Given
$= 180 - 122$	Substitution
$= 58$	Solve.

ANSWER:

$m\angle 6 = 122°$; $m\angle 7 = 58°$

Refer to the figure.



17. If $m\angle ADB = (6x - 4)°$ and $m\angle BDC = (4x + 24)°$, find the value of x such that $\angle ADC$ is a right angle.

SOLUTION:

If $\angle ADC$ is a right angle, then $m\angle ADC = 90°$.

Solve for x.

$m\angle ADB + m\angle BDC = m\angle ADC$	sum of parts = whole
$6x - 4 + 4x + 24 = 90$	Substitution
$x = 7$	Solve for x.

18. If $m\angle FDE = (3x - 15)°$ and $m\angle FDB = (5x + 59)°$, find the value of x such that $\angle FDE$ and $\angle FDB$ are supplementary.

SOLUTION:

If $\angle FDE$ and $\angle FDB$ are supplementary they sum to 180°.

Solve for x.

$m\angle FDE + m\angle FDB = 180$	Definition of supplementary angles
$3x - 15 + 5x + 59 = 180$	Substitution
$x = 17$	Solve for x.

ANSWER:

17

19. If $m\angle BDC = (8x + 12)°$ and $m\angle FDB = (12x - 32)°$, find $m\angle FDE$.

SOLUTION:

If $\angle BDC$ and $\angle FDB$ are supplementary they sum to 180°.

Solve for x.

$m\angle BDC + m\angle FDB = 180$	Definition of supplementary angles
$8x + 12 + 12x - 32 = 180$	Substitution
$x = 10$	Solve for x.

$\angle BDC$ and $\angle FDE$ are vertical angles so they are congruent.

$m\angle FDE = m\angle BDC$	Definition of supplementary angles
$= 8x + 12$	Substitution
$= 8(10) + 12$	Substitution
$= 92$	Solve.

ANSWER:

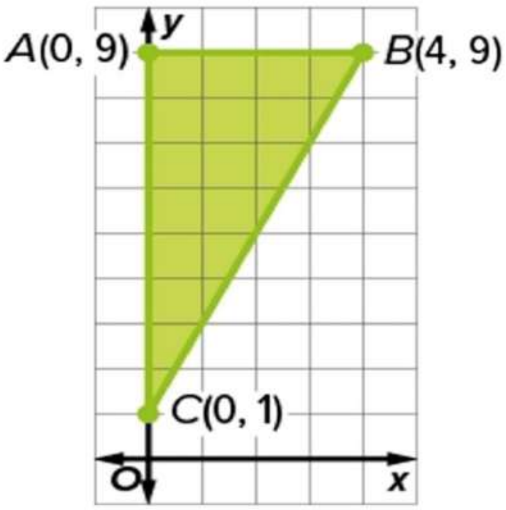
92°

MCQ- الأسئلة الموضوعية		
L11-3 | Two-Dimensional Figures.		
12 | Find perimeter, circumference, and area of two-dimensional figures.	1 - 6	641

✓ **Find the perimeter or circumference and area of each figure if each unit on the graph measures 1 centimetre. Round answers to the nearest tenth, if necessary.**

أوجد محيط كل شكل ومساحته إذا كان قياس كل وحدة على الرسم البياني 1 سنتيمتر .
وقرب الإجابات إلى أقرب جزء من عشرة، إذا لزم الأمر.

1.



$$P = 4 + 8 + \sqrt{80}$$
$$\approx 20.9 \text{ cm}$$

$$A = \frac{1}{2}bh$$
$$= \frac{1}{2}(4)(8)$$
$$= 16 \text{ cm}^2$$

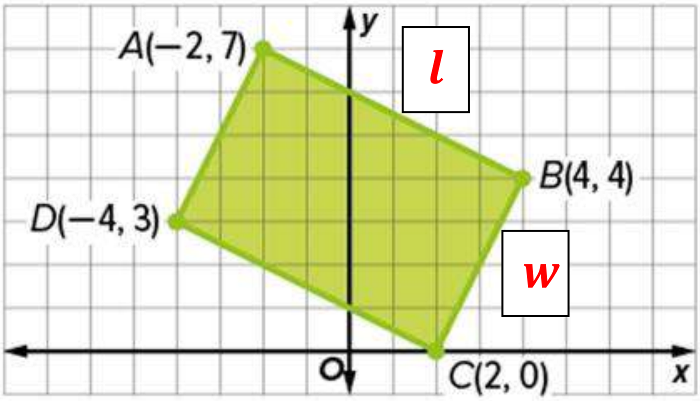
SOLUTION:

$$AB = 4 - 0$$
$$= 4$$

$$AC = 9 - 1$$
$$= 8$$

$$BC = \sqrt{(9-1)^2 + (4-0)^2}$$
$$= \sqrt{(8)^2 + (4)^2}$$
$$= \sqrt{64 + 16}$$
$$= \sqrt{80}$$

2.



SOLUTION:

$\textbf{Perimeter} = \textbf{P} =$ المحيط $= \textbf{2l} + \textbf{2w}$

$\textbf{Area} = \textbf{A} =$ المساحة $= \textbf{lw}$

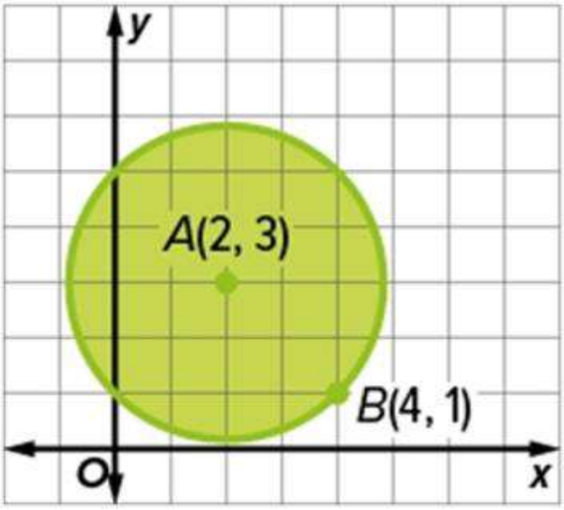
$$
\begin{aligned}
l &= \sqrt{(7-4)^2 + (-2-4)^2} \\
&= \sqrt{(3)^2 + (-6)^2} \\
&= \sqrt{9+36} \\
&= \sqrt{45}
\end{aligned}
$$

$$
\begin{aligned}
w &= \sqrt{(4-0)^2 + (4-2)^2} \\
&= \sqrt{(4)^2 + (2)^2} \\
&= \sqrt{16+4} \\
&= \sqrt{20}
\end{aligned}
$$

$$
\begin{aligned}
P &= 2(\sqrt{45}) + 2(\sqrt{20}) \\
&\approx 22.4 \text{ cm}
\end{aligned}
$$

$$
\begin{aligned}
A &= lw \\
&= (\sqrt{45})(\sqrt{20}) \\
&= 30 \text{ cm}^2
\end{aligned}
$$

3.



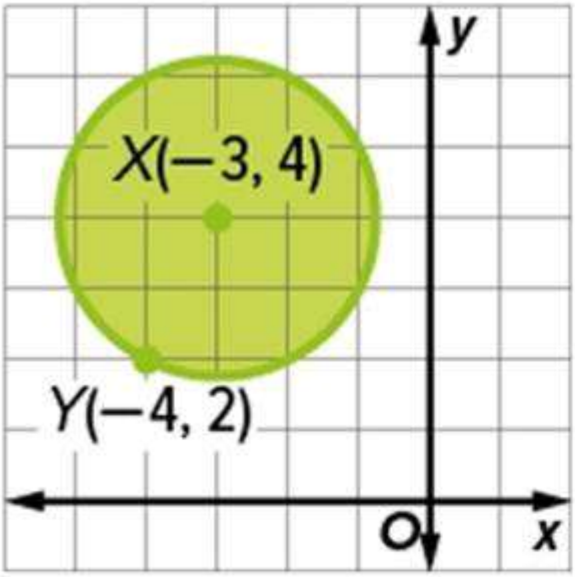
SOLUTION:

$$r = \sqrt{(3-1)^2 + (2-4)^2}$$
$$= \sqrt{(2)^2 + (-2)^2}$$
$$= \sqrt{4+4}$$
$$= \sqrt{8}$$

$$C = 2\pi r$$
$$= 2\pi(\sqrt{8})$$
$$\approx 17.8 \text{ cm}$$

$$A = \pi r^2$$
$$= \pi(\sqrt{8})^2$$
$$\approx 25.1 \text{ cm}^2$$

4.



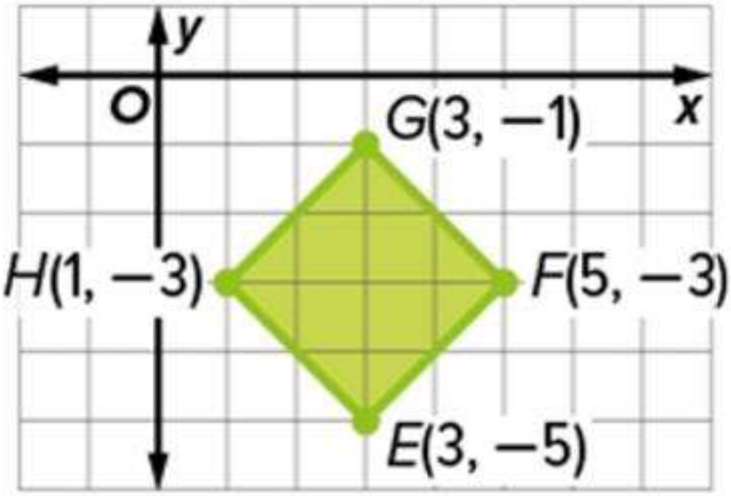
SOLUTION:

$$r = \sqrt{(4-2)^2 + (-3-(-4))^2}$$
$$= \sqrt{(2)^2 + (1)^2}$$
$$= \sqrt{4+1}$$
$$= \sqrt{5}$$

$$C = 2\pi r$$
$$= 2\pi(\sqrt{5})$$
$$\approx 14.0 \text{ cm}$$

$$A = \pi r^2$$
$$= \pi(\sqrt{5})^2$$
$$\approx 15.7 \text{ cm}^2$$

5.



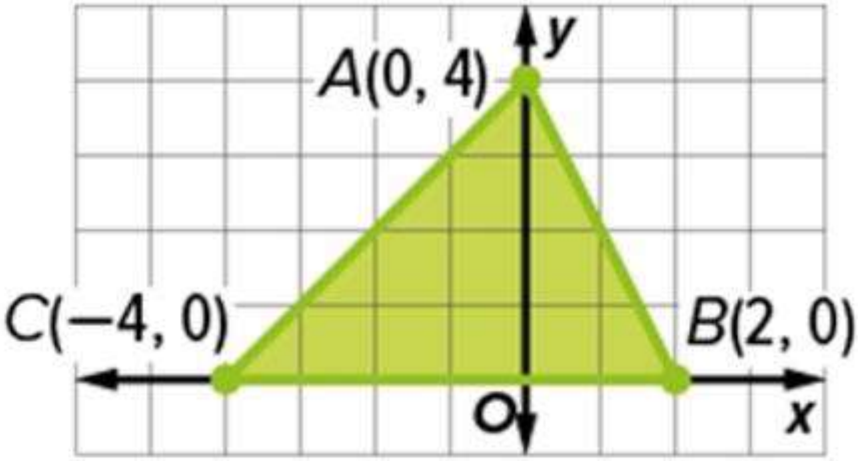
SOLUTION:

$$s = \sqrt{(-3-(-5))^2 + (5-3)^2}$$
$$= \sqrt{(2)^2 + (2)^2}$$
$$= \sqrt{4+5}$$
$$= \sqrt{8}$$

$$P = 4s$$
$$P = 4(\sqrt{8})$$
$$\approx 11.3 \text{ cm}$$

$$A = s^2$$
$$= (\sqrt{8})^2$$
$$= 8 \text{ cm}^2$$

6.



SOLUTION:

$$AB = \sqrt{(4-0)^2 + (0-2)^2}$$
$$= \sqrt{(4)^2 + (-2)^2}$$
$$= \sqrt{16+4}$$
$$= \sqrt{20}$$

$$AC = \sqrt{(4-0)^2 + (0-(-4))^2}$$
$$= \sqrt{(4)^2 + (4)^2}$$
$$= \sqrt{16+16}$$
$$= \sqrt{32}$$

$$BC = 2-(-4)$$
$$= 6$$

$$P = \sqrt{20} + 6 + \sqrt{32}$$
$$\approx 16.1 \text{ cm}$$

$$h = 4-0$$
$$= 4$$

$$A = \frac{1}{2}bh$$
$$= \frac{1}{2}(6)(4)$$
$$= 12 \text{ cm}^2$$

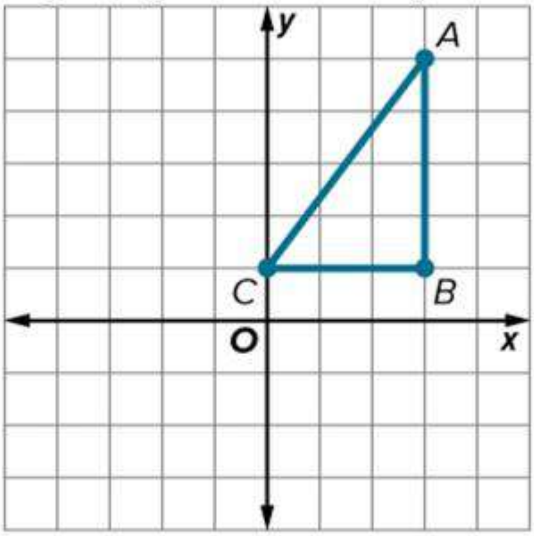
MCQ- الأسئلة الموضوعية		
L11-3| Two-Dimensional Figures.		
15| Calculate with measures.	14 - 20	643

Identify the figure with the given vertices. Find the perimeter and area of the figure.

14. $A(3, 5)$, $B(3, 1)$, $C(0, 1)$

SOLUTION:

Graph the figure on a coordinate plane.



$AB = 5 - 1$ Subtract y − coordinates for vertical line.
$= 4$ Simplify.

$BC = 3 - 0$ Subtract x − coordinates for horizontal line.
$= 3$ Simplify.

$AC = \sqrt{(5-1)^2 + (3-0)^2}$ Distance formula
$= \sqrt{(4)^2 + (3)^2}$ Simplify.
$= \sqrt{16+9}$ Simplify.
$= \sqrt{25}$ Simplify.
$= 5$ Simplify.

$P = 4 + 3 + 5$ Perimeter is the sum of all sides.
$= 12$ units Simplify.

$A = \frac{1}{2}bh$ Formula for area of a triangle.

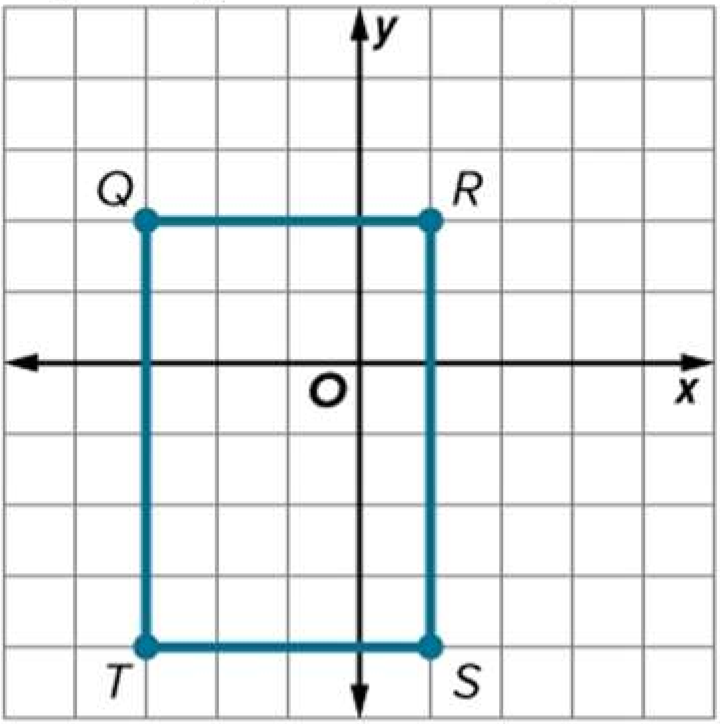
$= \frac{1}{2}(3)(4)$ Substitution

$= 6$ units^2 Simplify.

15. $Q(-3, 2)$, $R(1, 2)$, $S(1, -4)$, $T(-3, -4)$

SOLUTION:

Graph the figure on a coordinate plane.



$l = |-3 - 1|$ Subtract the x − coordinates for a horizontal line.
$= 4$ Simplify.

$w = |2 - (-4)|$ Subtract the y − coordinates for a vertical line.
$= 6$ Simplify.

$P = 2(4) + 2(6)$ Perimeter formula for a rectangle.
$= 20$ units Simplify.

$A = lw$ Formula for area of a rectangle.
$= (4)(6)$ Substitution
$= 24 \text{ units}^2$ Simplify.

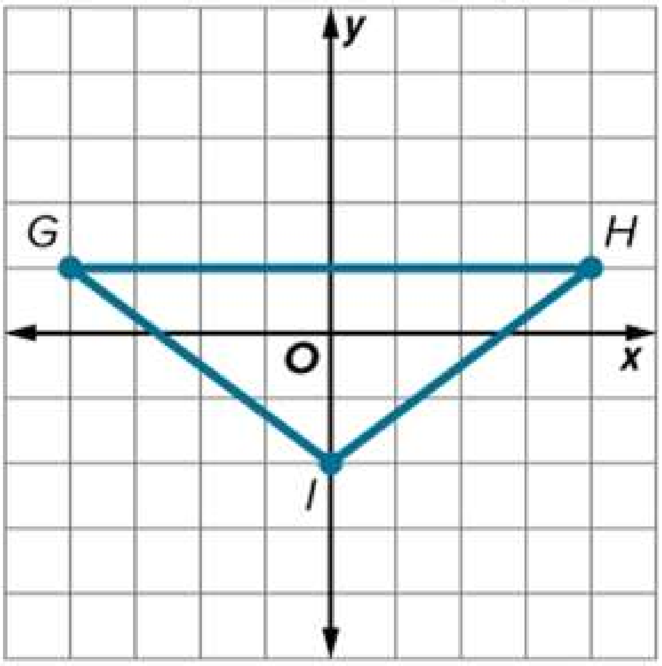
ANSWER:

quadrilateral; 20 units; 24 units^2

16. $G(-4, 1)$, $H(4, 1)$, $I(0, -2)$

SOLUTION:

Graph the figure on a coordinate plane.



$GH = |-4-4|$ Subtract x − coordinates for horizontal line.
$= 8$ Simplify.

$HI = \sqrt{(1-(-2))^2 + (4-0)^2}$ Distance formula
$= \sqrt{(3)^2 + (4)^2}$ Simplify.
$= \sqrt{9+16}$ Simplify.
$= \sqrt{25}$ Simplify.
$= 5$ Simplify.

$P = 8+5+5$ Perimeter is the sum of all sides.
$= 18$ units Simplify.

$h = |1-(-2)|$ Subtract y − coordinates for vertical line.
$= 3$ Simplify.

$A = \frac{1}{2}bh$ Formula for area of a triangle.

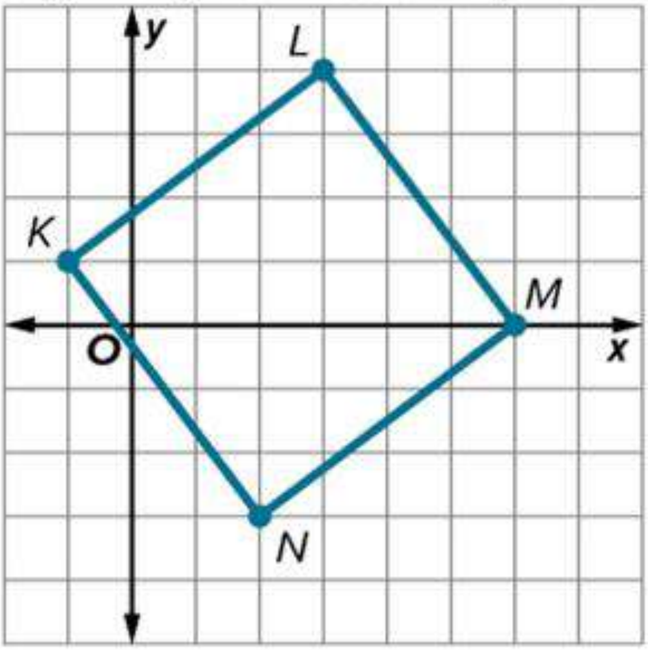
$= \frac{1}{2}(8)(3)$ Substitution

$= 12 \text{ units}^2$ Simplify.

17. $K(-1, 1)$, $L(3, 4)$, $M(6, 0)$, $N(2, -3)$

SOLUTION:

Graph the figure on a coordinate plane.



$l = \sqrt{(6-2)^2 + (0-(-3))^2}$	Distance formula
$= \sqrt{(4)^2 + (3)^2}$	Simplify.
$= \sqrt{16+9}$	Simplify.
$= \sqrt{25}$	Simplify.
$= 5$	Simplify.

$w = \sqrt{(2-(-1))^2 + (-3-1)^2}$	Distance formula
$= \sqrt{(3)^2 + (-4)^2}$	Simplify.
$= \sqrt{9+16}$	Simplify.
$= \sqrt{25}$	Simplify.
$= 5$	Simplify.

$P = 4(5)$	Perimeter formula for a square.
$= 20$ units	Simplify.

$A = s^2$	Formula for area of a square.
$= 5^2$	Substitution
$= 25$ units^2	Simplify.

18. Rectangle WXYZ has a length that is 5 more than three times its width.

a. Draw and label a figure for rectangle *WXYZ*.

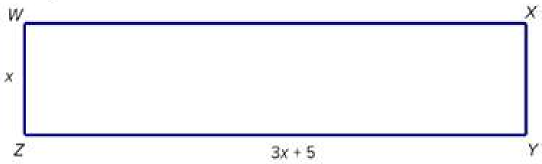
b. Write an algebraic expression for the perimeter of the rectangle.

c. Find the width if the perimeter is 58 millimeters. Explain how you can check that your answer is correct.

d. Use a ruler to draw and label $\overline{PQ}$, which is congruent to the segment representing the length of rectangle *WXYZ*. What is the measure of $\overline{PQ}$?

SOLUTION:

a. Draw a rectangle, label the vertices *W*, *X*, *Y*, and *Z*, label the width with x, and the length in terms of x, $3x + 5$.



b. An expression for the perimeter, where x is the width, would be either $2(3x + 5) + 2x$ or $8x + 10$.

c. Substitute 58 for the perimeter and solve to find the width.

$58 = 8x + 10$	Given.
$48 = 8x$	Subtract 10 from each side.
$6 = x$	Divide each side by 8.

To check that this answer is correct, use the value of the width to determine the length.

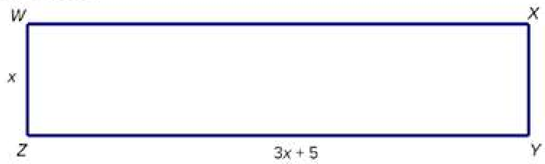
$l = 3x + 5$	Length of the rectangle.
$= 3(6) + 5$	Substution
$= 23$	Simplify.

The sum of all four sides, $23 + 23 + 6 + 6 = 58$.

d. After using a ruler to draw a segment that is 23 mm long, students should label the endpoints *P* and *Q*.

ANSWER:

a. Sample answer: Let x represent the width of *WXYZ*.



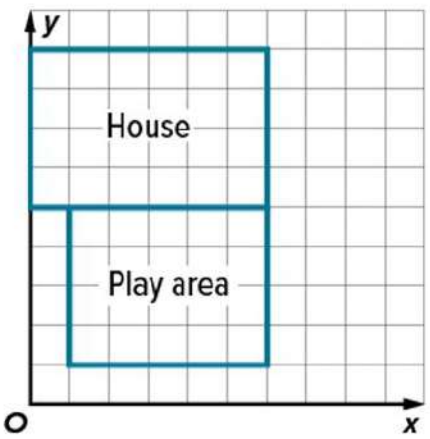
b. An expression for the perimeter, where x is th width, would be either $2(3x + 5) + 2x$ or $8x +$

c. Solving $58 = 8x + 10$ for x, the width is foun be 6 mm. To check that this answer is correct, u the value of the width to determine the length, 2 The sum of all four sides, $23 + 23 + 6 + 6$, shou equal 58.

d. 23 mm; Sample answer:

19. **FENCING** The figure shows Derek's house an his backyard on a coordinate grid. Derek is planning to fence in the play area in his backyarc Part of the play area is enclosed by the house an does not need to be fenced. Each unit on the coordinate grid represents 5 feet. The cost for tl fencing materials and installation is $10 per foot. How much will it cost Derek to install the fence? Explain.

السياج يوضح الشكل منزل ديريك وفناءه الخلفي على شبكة إحداثيات .يخطط ديريك لتسييج منطقة اللعب في فنائه الخلفي .يحيط المنزل بجزء من منطقة اللعب ولا يحتاج إلى سياج .تمثل كل وحدة على شبكة الإحداثيات 5 أقدام .تبلغ تكلفة مواد السياج والتركيب 10 دولارات للقدم .كم ،



SOLUTION:

$650; The sides of the play area that are adjacent to the house do not need fencing. The sides of the play area on the grid have lengths of 4, 5, and 4 units.

$P = 4 + 5 + 4$ Perimeter is the sum of all sides.
$= 13$ Simplify.

So, the perimeter of the play area to be fenced on the grid is 13 units.

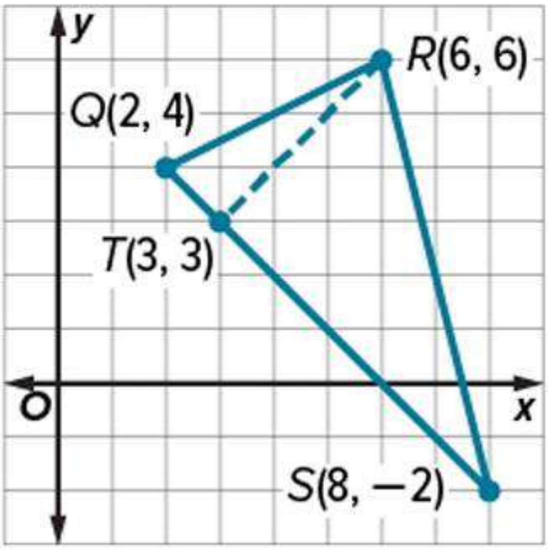
Fencing = (units)(feet per unit) Total fence length.
$= (13)(5)$ Substitution
$= 65$ Simplify.

Each unit on the coordinate grid represents 5 feet, so Derek will need 65 feet of fencing.

Total cost = (cost per foot)(feet) Total cost.
$= (10)(65)$ Substitution
$= 650$ Simplify.

The cost of the fencing is $10 per foot, so the total cost will be $650.

20. Explain a method to find the area of $\triangle QRS$ given that $\overline{RT} \perp \overline{QS}$. Then find the area. Show your work.



SOLUTION:

Sample answer: Use the distance formula to find the base QS and the height RT. Then use the area formula.

$$\begin{aligned} QS &= \sqrt{(4-(-2))^2+(2-8)^2} && \text{Distance formula} \\ &= \sqrt{(6)^2+(-6)^2} && \text{Simplify.} \\ &= \sqrt{36+36} && \text{Simplify.} \\ &= \sqrt{72} && \text{Simplify.} \end{aligned}$$

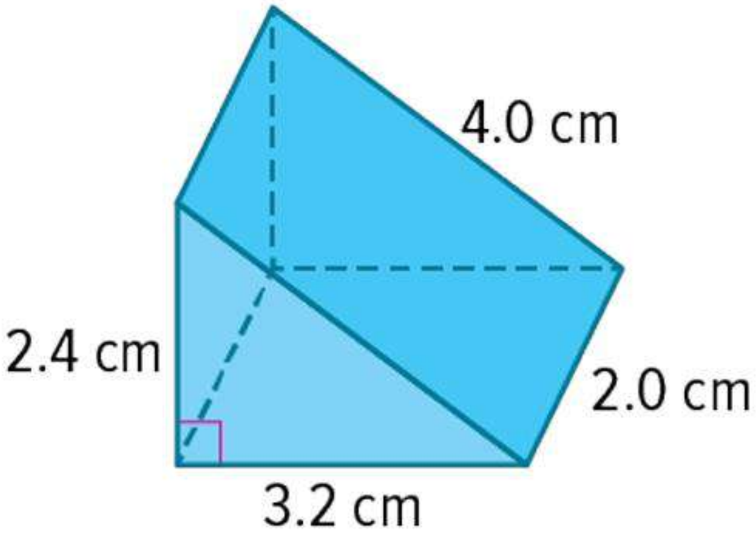
$$\begin{aligned} RT &= \sqrt{(6-3)^2+(6-3)^2} && \text{Distance formula} \\ &= \sqrt{(3)^2+(3)^2} && \text{Simplify.} \\ &= \sqrt{9+9} && \text{Simplify.} \\ &= \sqrt{18} && \text{Simplify.} \end{aligned}$$

$$\begin{aligned} A &= \frac{1}{2}bh && \text{Formula for area of a triangle.} \\ &= \frac{1}{2}(\sqrt{72})(\sqrt{18}) && \text{Substitution} \\ &= 18 \text{ units}^2 && \text{Simplify.} \end{aligned}$$

FRQ- الأسئلة المقالية		
L11-5 | Transformations in the Plane.		
19 | Find perimeter, circumference, and area of two-dimensional figures.	7 - 12	663

✓ Find the surface area and volume of each solid.
Round each measure to the nearest tenth, if necessary.

7.



SOLUTION:

The solid is a triangular prism with a triangular base.

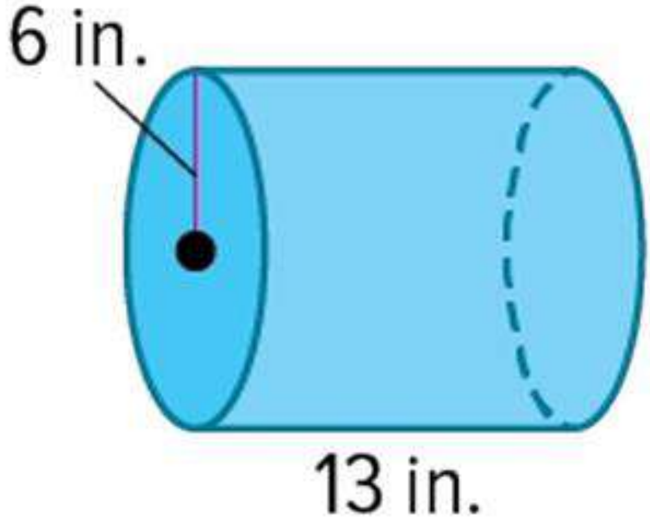
$P = 2.4 + 3.2 + 4.0$ Perimeter is the sum of all sides.
$P = 9.6$ Simplify.

$B = \frac{1}{2}(3.2)(2.4)$ Formula: area of a triangle.
$B = 3.84$ Simplify.

$S = Ph + 2B$ Formula: surface area of a prism.
$S = 9.6(2.0) + 2(3.84)$ Substitution.
$S = 26.88$ or 26.9 cm^2 Simplify.

$V = Bh$ Formula: volume of a prism.
$V = 3.84(2.0)$ Substitution.
$V = 7.68$ or 7.7 cm^3 Simplify.

8.



SOLUTION:

The solid is a cylinder with a circular base.

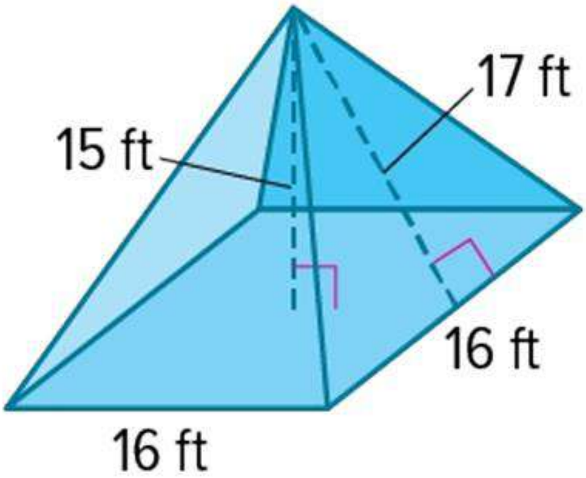
$S = 2\pi rh + 2\pi r^2$	Formula: surface area of a cylinder.
$S = 2\pi(6)(13) + 2\pi(6)^2$	Substitution.
$S = 228\pi$ or 716.3 in^2	Simplify.

$V = \pi r^2 h$	Formula: volume of a cylinder.
$V = \pi(6)^2(13)$	Substitution.
$V = 468\pi$ or 1470.3 in^3	Simplify.

ANSWER:

228π or about 716.3 in^2; 468π or about 1470.3 in^3

9.



SOLUTION:

The solid is a square pyramid with a square base.

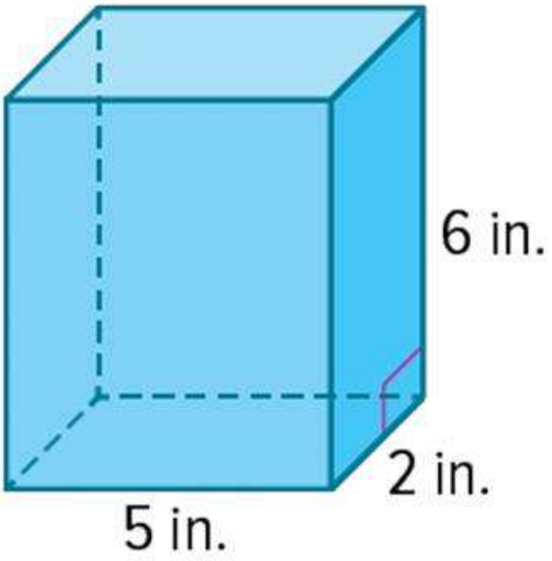
$P = 16 + 16 + 16 + 16$ Perimeter is the sum of all sides.
$P = 64$ Simplify.

$B = (16)^2$ Formula: area of a square.
$B = 256$ Simplify.

$S = \frac{1}{2}Pl + B$ Formula: surface area of a pyramid.
$S = \frac{1}{2}(64)(17) + 256$ Substitution.
$S = 800 \text{ ft}^2$ Simplify.

$V = \frac{1}{3}Bh$ Formula: volume of a pyramid.
$V = \frac{1}{3}(256)(15)$ Substitution.
$V = 1280 \text{ ft}^3$ Simplify.

10.



SOLUTION:

The solid is a rectangular prism with a rectangular base.

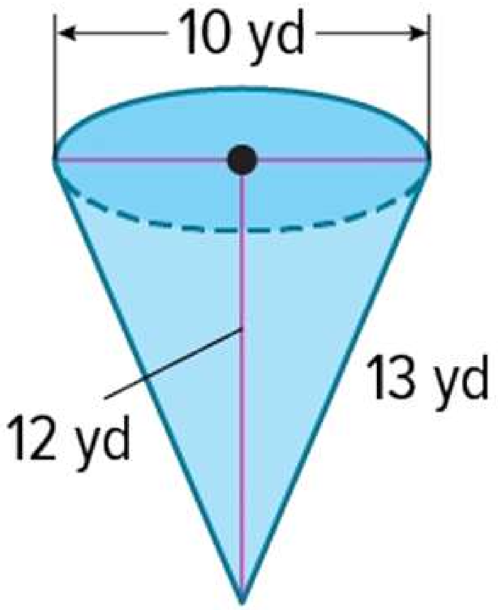
$P = 2l + 2w$	Formula for perimeter of a rectangle.
$P = 2(5) + 2(2)$	Substitution.
$P = 14$	Simplify.

$B = (l)(w)$	Formula: area of a rectangle.
$B = (5)(2)$	Substitution
$B = 10$	Simplify.

$S = Ph + 2B$	Formula: surface area of a prism.
$S = 14(6) + 2(10)$	Substitution.
$S = 104 \text{ in}^2$	Simplify.

$V = Bh$	Formula: volume of a prism.
$V = 10(6)$	Substitution.
$V = 60 \text{ in}^3$	Simplify.

11.



SOLUTION:

The solid is a cone with a circular base.

$r = \frac{1}{2}(10)$ Radius is one − half the diameter.

$r = 5$ Simplify.

$S = \pi r l + \pi r^2$ Formula: surface area of a cone.

$S = \pi(5)(13) + \pi(5)^2$ Substitution.

$S = 90\pi$ or 282.7 yd^2 Simplify.

$V = \frac{1}{3}\pi r^2 h$ Formula: volume of a cone.

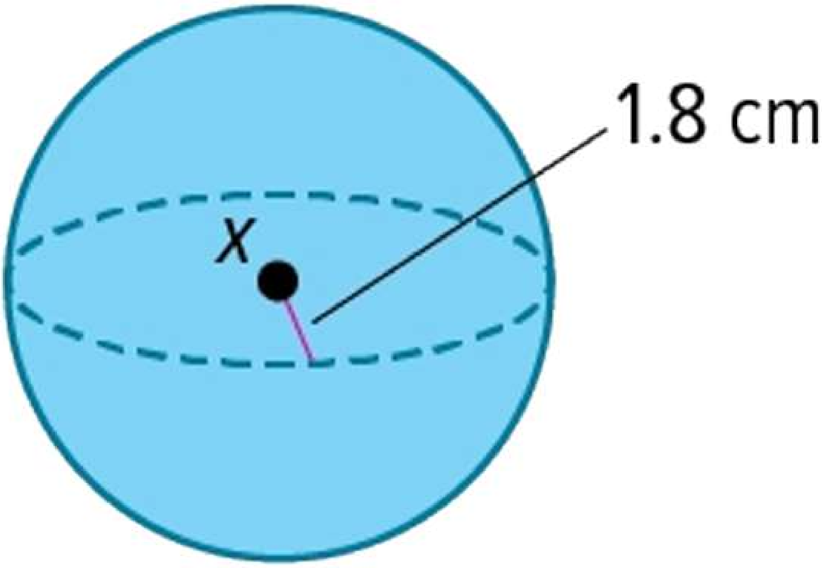
$V = \frac{1}{3}\pi(5)^2(12)$ Substitution.

$V = 100\pi$ or 314.2 yd^3 Simplify.

ANSWER:

90π or about 282.7 yd^2; 100π or about 314.2 yd^3

12.



SOLUTION:

The solid is a sphere and has no base.

$S = 4\pi r^2$ Formula: surface area of a sphere.

$S = 4\pi(1.8)^2$ Substitution.

$S = 12.96\pi$ or $40.7\ \text{cm}^2$ Simplify.

$V = \frac{4}{3}\pi r^3$ Formula: volume of a sphere.

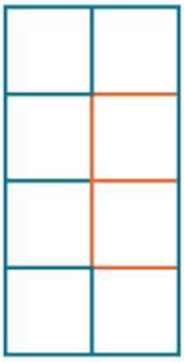
$V = \frac{4}{3}\pi(1.8)^3$ Substitution.

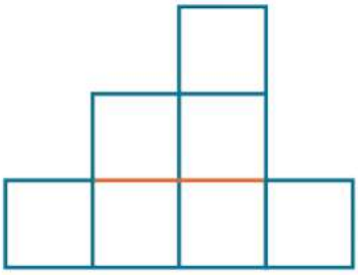
$V = 7.776\pi$ or $24.4\ \text{cm}^3$ Simplify.

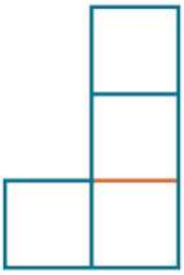
MCQ- الأسئلة الموضوعية		
L11-6 | Three-Dimensional Figures .		
14 | Draw isometric views of three-dimensional figures.	1 - 8	675

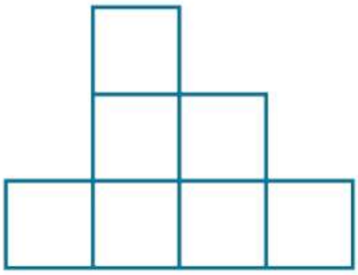
Make a model of a figure for each orthographic drawing.

1.



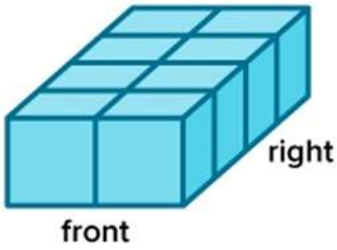




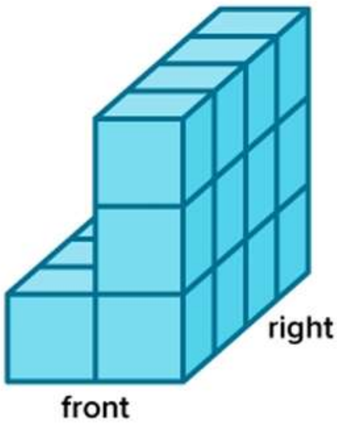


SOLUTION:

Create a base of the model. Start with a base that matches the top view.

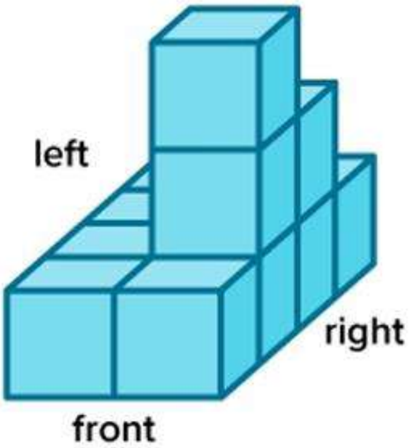


Use the front view.
• The front left side is 1 block high.
• The front right side is 3 blocks high.
• Highlighted segments indicate breaks where columns or rows of blocks appear at different depths.
• The highest 2 blocks in the front right column are farther back than the block below it.

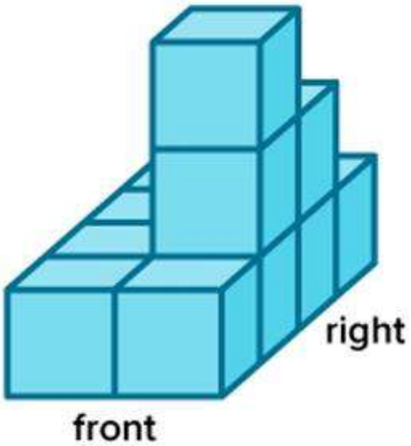


Use the left view to find where the breaks in the front view occur.
• The first column is 1 block high.
• The second column is 3 blocks high.

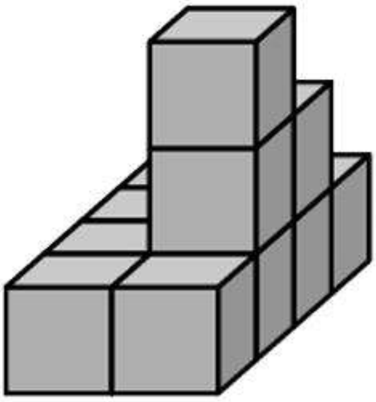
• The third column is 2 blocks high.
• The fourth column is 1 block high.
• Remove any unnecessary blocks.



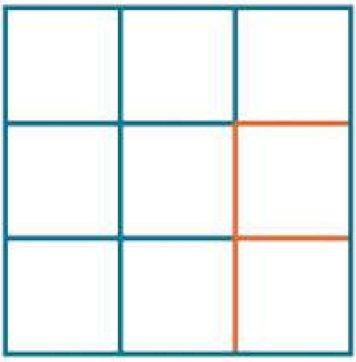
Use the right view to confirm that you have made the correct model.



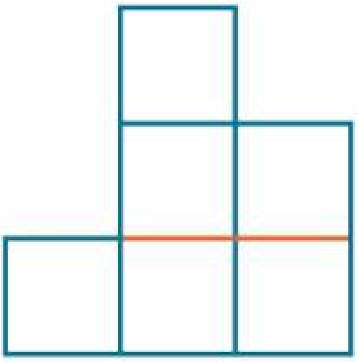
ANSWER:



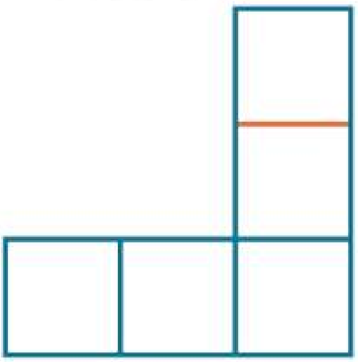
2.



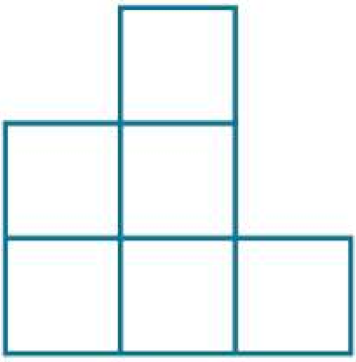
top view



left view



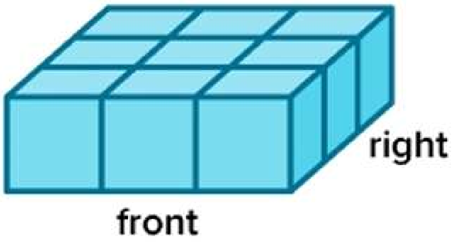
front view



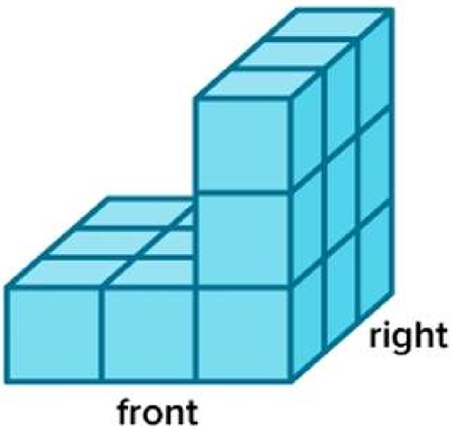
right view

SOLUTION:

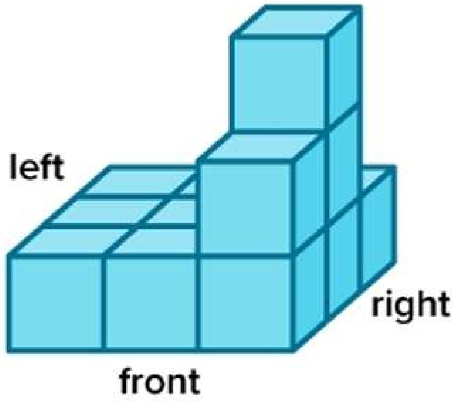
Create a base of the model. Start with a base that matches the top view.



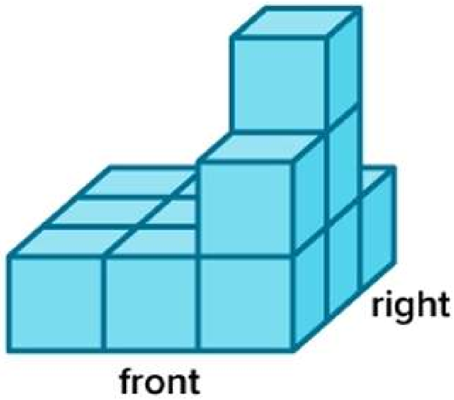
Use the front view.
• The front left side is 1 block high.
• The front middle side is 1 block high.
• The front right side is 3 blocks high.
• Highlighted segments indicate breaks where columns or rows of blocks appear at different depths.
• The highest block in the front right column is farther back than the two blocks below it.



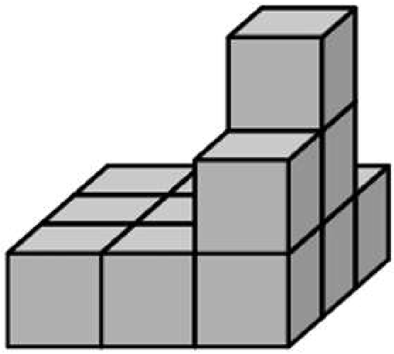
Use the left view to find where the breaks in the front view occur.
• The first column is 2 blocks high.
• The second column is 3 blocks high.
• The third column is 1 block high.



Use the right view to confirm that you have made the correct model.

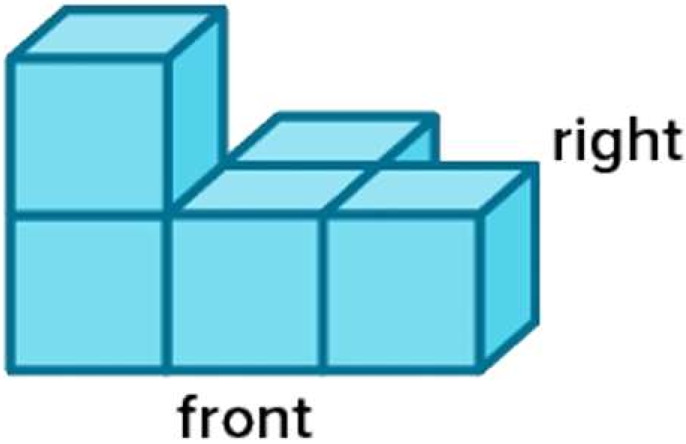


ANSWER:



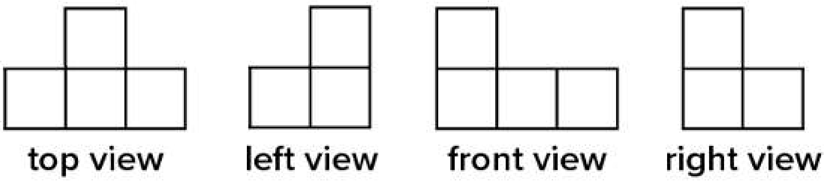
Make an orthographic drawing of each figure.

3.

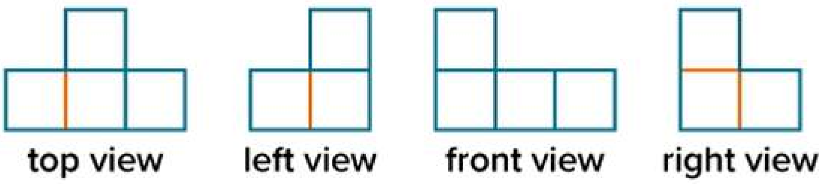


SOLUTION:

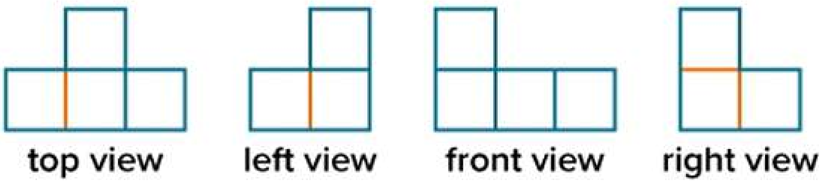
Step 1 Draw the visible features of each view.



Step 2 Mark each segment where a break occurs.



ANSWER:



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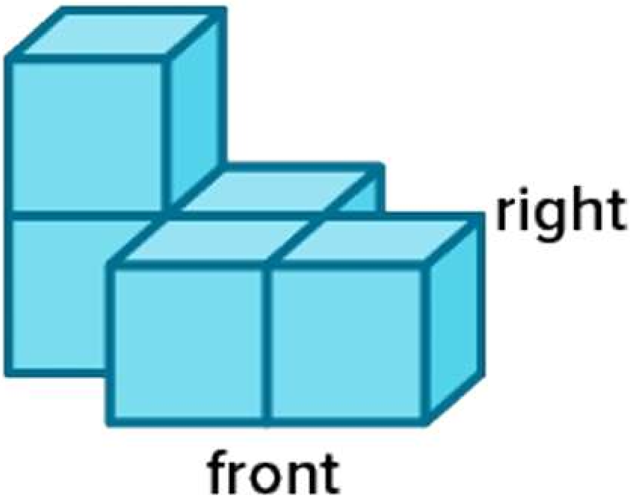
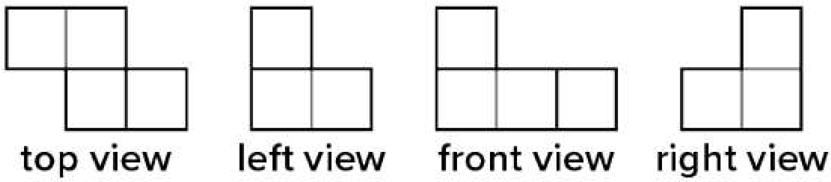
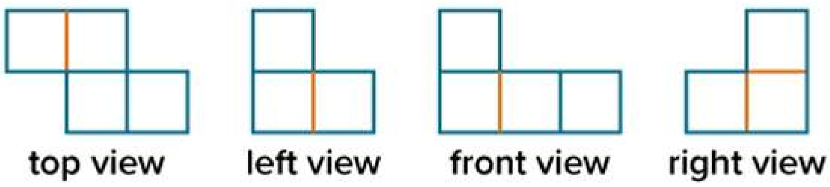


SOLUTION:

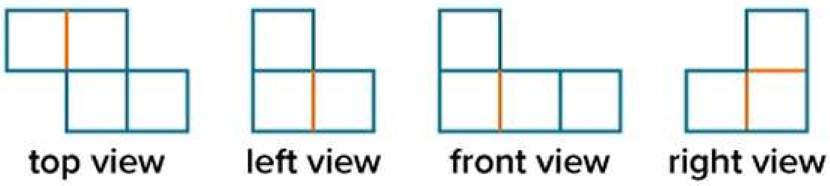
Step 1 Draw the visible features of each view.



Step 2 Mark each segment where a break occurs.



ANSWER:



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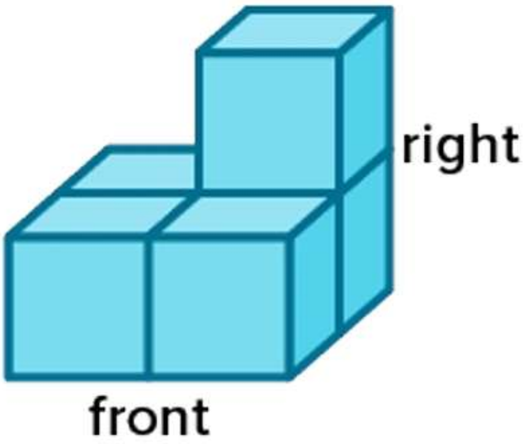
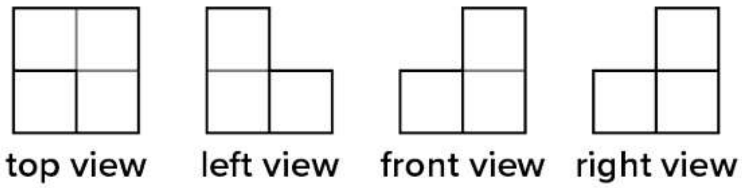
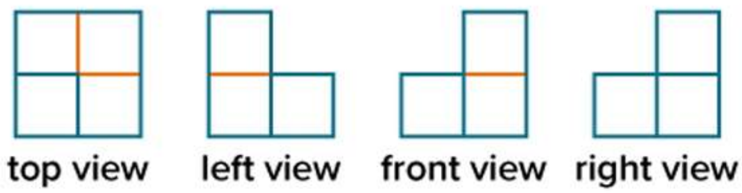


SOLUTION:

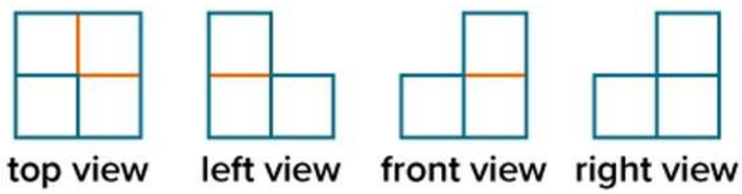
Step 1 Draw the visible features of each view.



Step 2 Mark each segment where a break occurs.



ANSWER:



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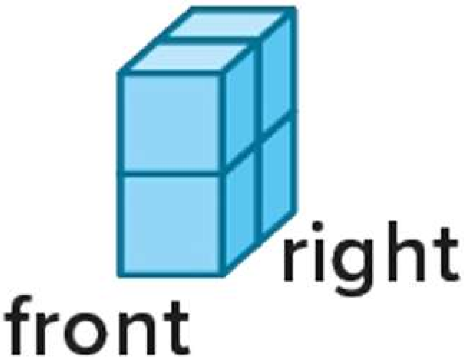
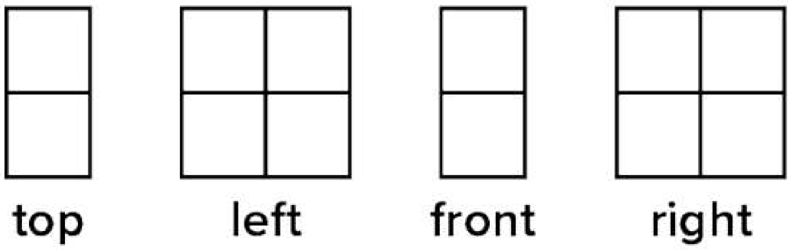
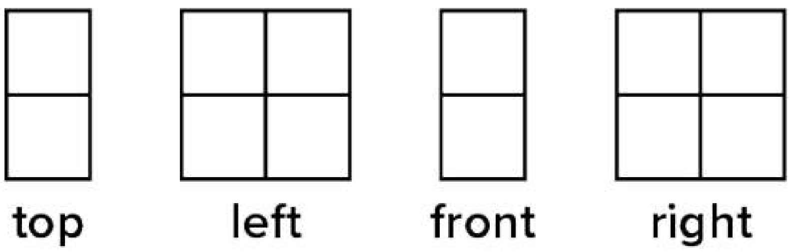


SOLUTION:

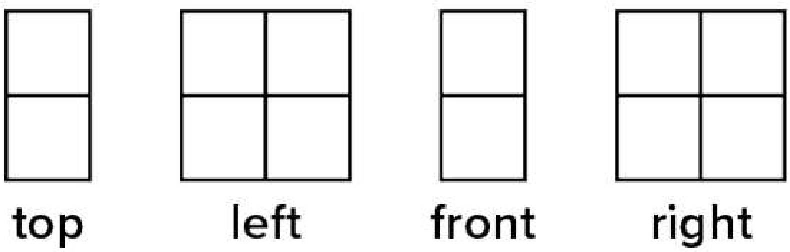
Step 1 Draw the visible features of each view.



Step 2 Mark each segment where a break occurs.



ANSWER:



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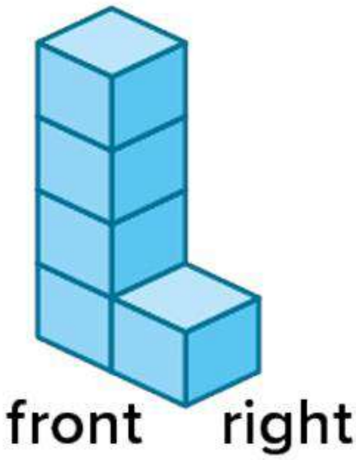
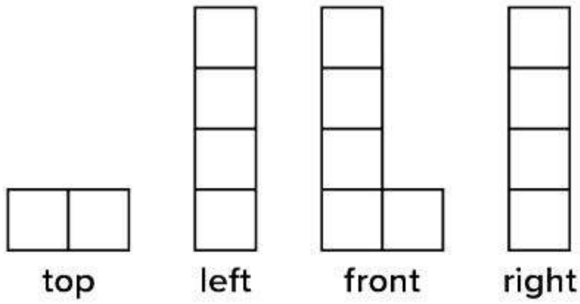
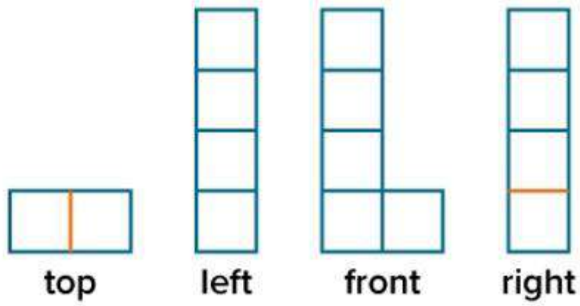


SOLUTION:

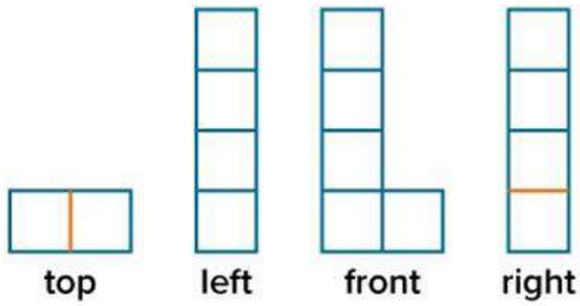
Step 1 Draw the visible features of each view.



Step 2 Mark each segment where a break occurs.



ANSWER:



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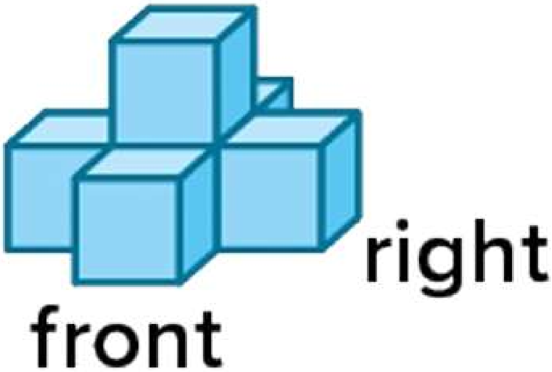
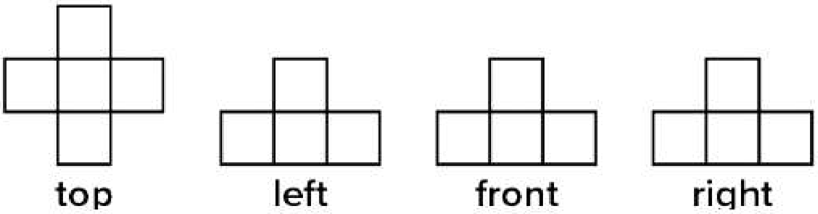
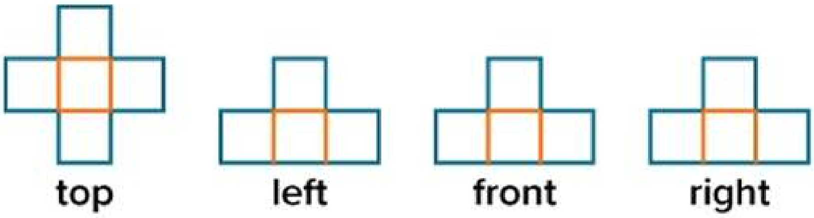


SOLUTION:

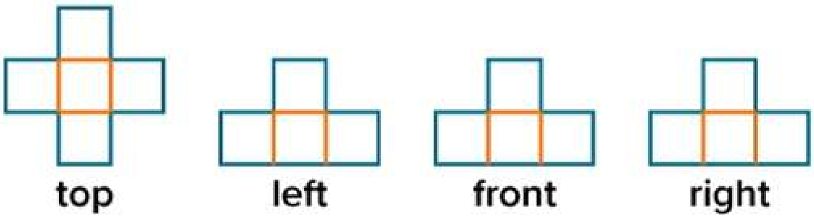
Step 1 Draw the visible features of each view.



Step 2 Mark each segment where a break occurs.



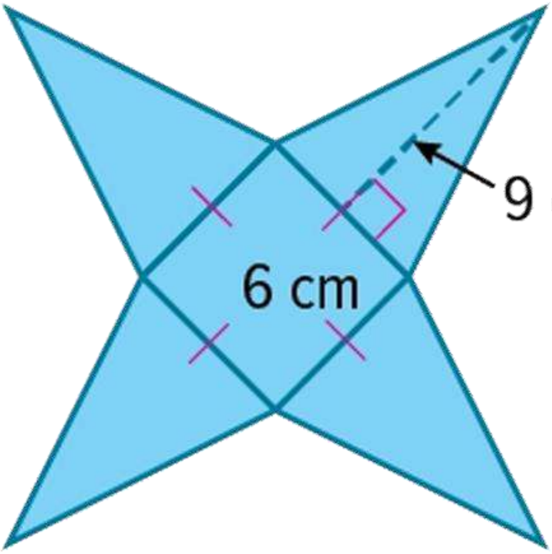
ANSWER:



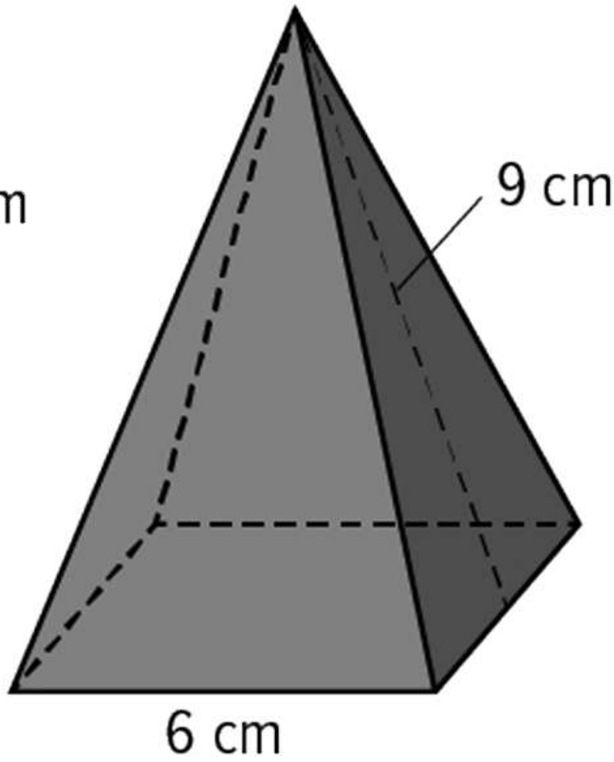
MCQ- الأسئلة الموضوعي		
L11-6 | Three-Dimensional Figures .		
13 | Find the surface area of a cylinder using models and nets.	9 - 12	676

Make a model of the solid that is represented by each net. Then identify the solid and find its surface area.

9.



SOLUTION:



The solid is a square pyramid.

$P = 4(6)$ The perimeter of a square is 4 times the side length.
$P = 24$ Simplify.

$B = (6)^2$ The base is a square and the area of a square is side squared.
$B = 36$ Simplify.

$S = \frac{1}{2}Pl + B$ Surface area formula of a pyramid

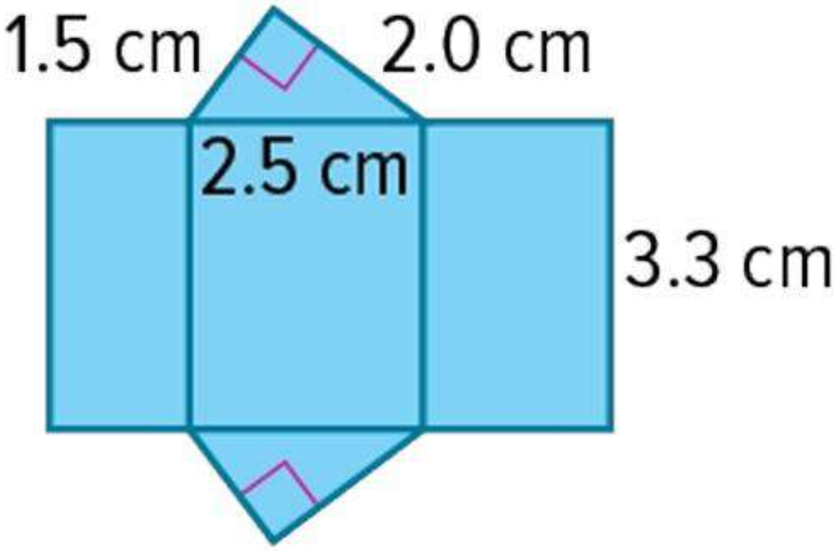
$S = \frac{1}{2}(24)(9) + 36$ Substitute.

$S = 144 \text{ cm}^2$ Simplify.

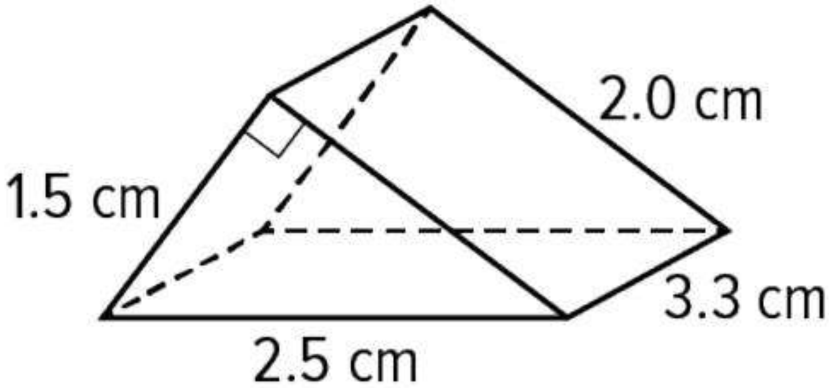
ANSWER:

square pyramid, 144 cm^2

10.



SOLUTION:



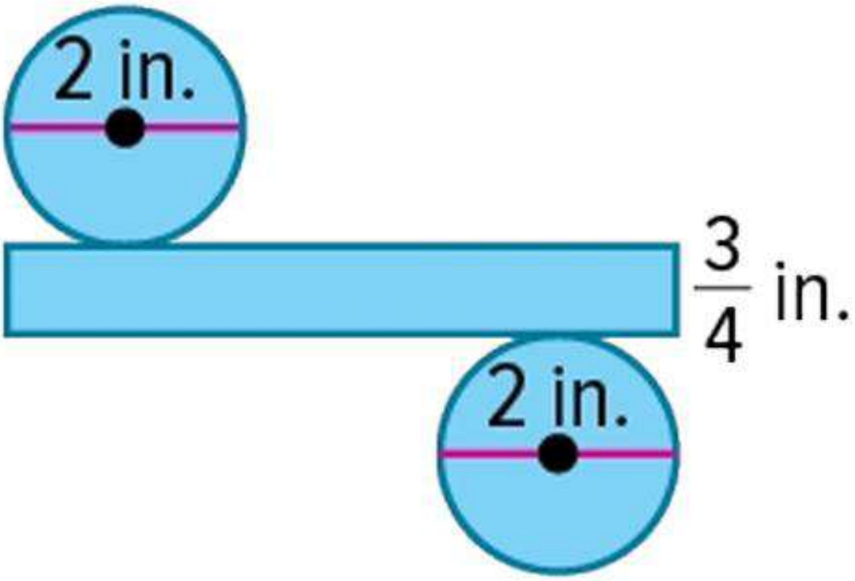
The solid is a triangular prism.

$P = 1.5 + 2.0 + 2.5$ The perimeter of a triangle is the sum of the sides.
$P = 6$ Simplify.

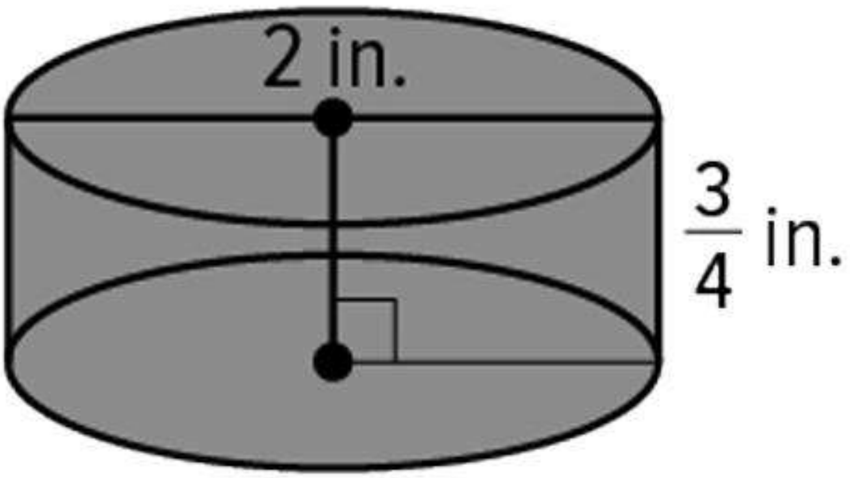
$B = \frac{1}{2}(1.5)(2.0)$ The base is a triangle and the area of a triangle is $\frac{1}{2}bh$.
$B = 1.5$ Simplify.

$S = Ph + 2B$ Surface area formula of a prism
$S = (6)(3.3) + 2(1.5)$ Substitute.
$S = 22.8 \text{ cm}^2$ Simplify.

11.



SOLUTION:



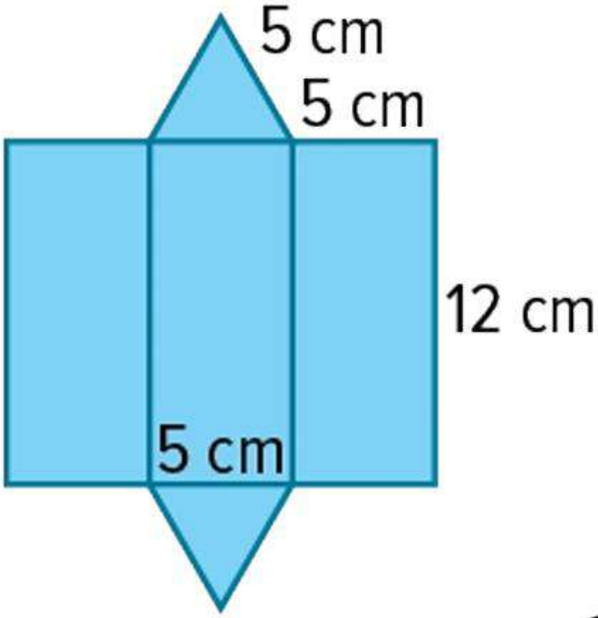
The solid is a cylinder.

$S = 2\pi rh + 2\pi r^2$ Surface area formula of a cylinder

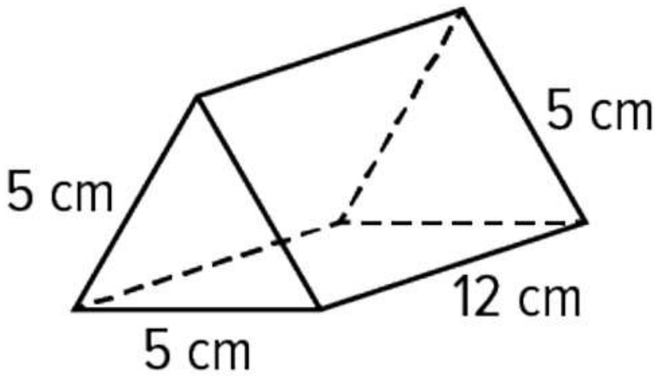
$S = 2\pi(1)\left(\frac{3}{4}\right) + 2\pi(1)^2$ Substitute.

$S = 3.5\pi$ or $11.0\ \text{in}^2$ Simplify.

12.



SOLUTION:



The solid is a triangular prism.

$P = 5 + 5 + 5$ The perimeter of a triangle is the sum of the sides.
$P = 15$ Simplify.

Use the Pythagorean theorem to find the height of the base.

$a^2 + b^2 = c^2$ Pythagorean Theorem
$2.5^2 + b^2 = 5^2$ Substitute.
$6.25 + b^2 = 25$ Simplify.
$b^2 = 18.75$ Simplify.
$b \approx 4.3$ Simplify.

$B = \frac{1}{2}(5)(4.3)$ The base is a triangle and the area of a triangle is $\frac{1}{2}bh$.
$B = 10.75$ Simplify.

$S = Ph + 2B$ Surface area formula of a prism
$S = (15)(12) + 2(10.75)$ Substitute.
$S = 201.5 \text{ cm}^2$ Simplify.


نحن قدها
WE ONLY GET STRONGER