6.1 ~ Solving Linear Systems Graphically & Algebraically - NOTES

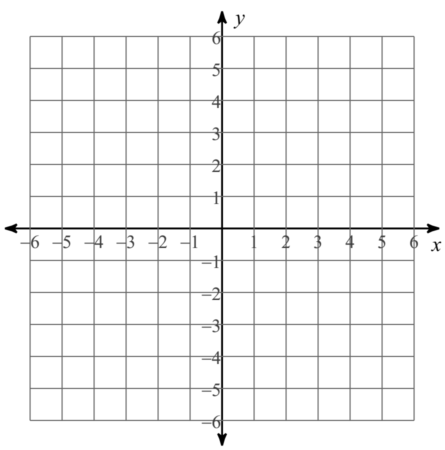
ACCESSING PRIOR KNOWLEDGE

1) How do you graph a line in slope-intercept form: $y = mx + b$?

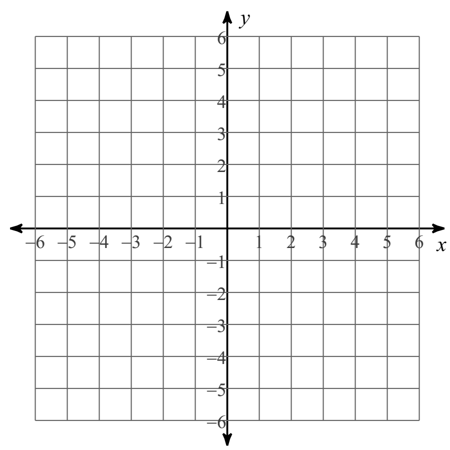
2) How do you graph a line given in standard form: $Ax + By = C$?

Sketch the graph of each line.

3) $y = 3x - 2$



4) $2x - 5y = 10$



5) How do you convert standard form - $Ax + By = C$ - to slope-intercept form, $y = mx + b$?

Write the slope-intercept form.

6) $2x - 3y = 15$

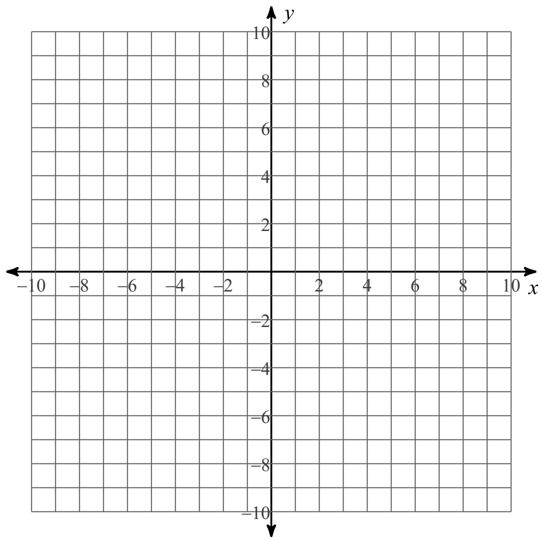
SOLVING LINEAR SYSTEMS GRAPHICALLY
Read the 6.1 example "Predicting the Solution of a System Using Graphing" in the Chapter 6 Summary.

7) How do you find the solution to a system of equations by graphing?

Graph each line. Identify the coordinates of the point of intersection.

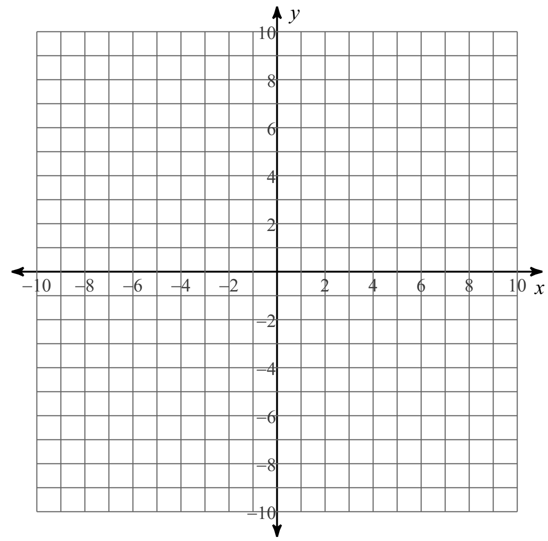
8) $y = \frac{5}{4}x - 2$

$y = -\frac{3}{2}x + 9$



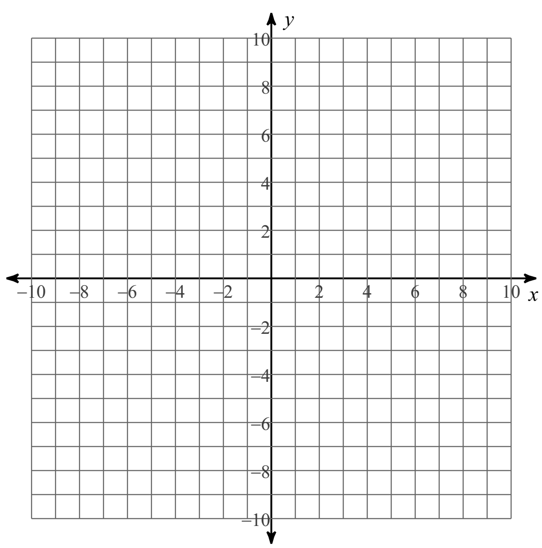
9) $y = -\frac{1}{2}x + 2$

$y = -\frac{3}{2}x - 2$



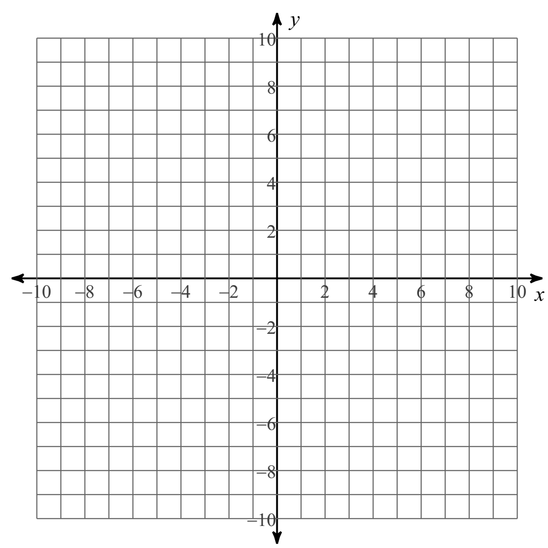
10) $x - 2y = -6$

$x + y = 6$



11) $x + 2y = -2$

$x - 8y = 48$



SOLVING LINEAR SYSTEMS ALGEBRAICALLY

Read the 6.1 example "Solving Systems of Linear Equations Using the Substitution Method" in the Chapter 6 Summary.

12) Solve the system of equations using the substitution method.

$y = -8x - 20$

$y = -2x - 8$

Systems of equations may have one unique solution, like problems 8 – 11 and 12. Systems that have one (or many) solutions are called CONSISTENT systems.

13) Look at the y-intercepts in problems 8 – 11 and 12. How do they compare?

14) Look at the slopes in problems 8 – 11 and 12. How do they compare?

15) How would you describe the graph of consistent systems with one solution?

16) How would you describe the algebraic solution of systems with one solution?

Here is another CONSISTENT system of equations:

17) We can use the substitution method to solve this system of equations.
$y = -3x + 3$
$-6x - 2y = -6$
Because y is equal to $-3x + 3$, we can substitute $-3x + 3$ for y in the second equation:
$-6x - 2(-3x + 3) = -6$
We now have an equation in terms of x only!
Solve this equation for x.

Systems of equations with many solutions are also called CONSISTENT systems.

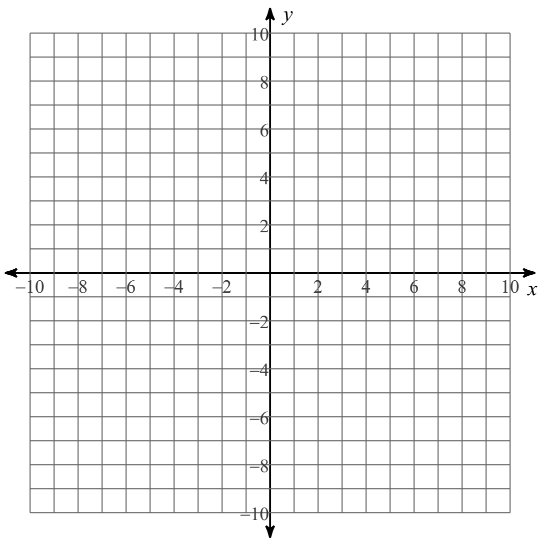
18) Rewrite the second equation in slope-intercept form.

19) Look at the y-intercepts and the slopes. How do they compare?

20) Graphically, these two linear equations would produce the same exact line!
How would you describe the algebraic solution of consistent systems with infinitely many solutions?

Solve the system by graphing.

21) $3x + 4y = -12$
$3x + 4y = 32$



22) Both linear equations in Problem 21 have been rewritten in slope-intercept form. Solve the system using the substitution method.

$y = -\frac{3}{4}x - 3$

$y = -\frac{3}{4}x + 8$

Systems of equations may have no solution, like problems 21 and 22. Systems that have no solution are called INCONSISTENT systems.

23) Look at the y-intercepts in problems 21 and 22. How do they compare?

24) Look at the slopes in problems 21 and 22. How do they compare?

25) How does a "no solution" situation present itself graphically?

26) How does a "no solution" situation present itself algebraically?

Use the substitution method to determine the solutions for each of the systems of linear equations.

27) $y = -2x - 5$
$y = 6x - 29$

28) $y = -2x + 4$
$-11x - 9y = -29$

29) $6x + y = -1$
$-5x - 3y = 16$

30) $-3x - 30y = 2$
$x + 10y = 5$

31) $\frac{1}{2}x + \frac{1}{4}y = 6$
$y = 4$

32) $0.4x + 0.3y = 1$
$0.1y = 0.2x$

The Outdoor Club at school is going on a hiking trip and is making trail mix as part of the food that they will take. The trail mix is made up of peanuts and dried fruits such as raisins, dried cherries, and banana chips. The peanuts cost $4.50 per pound and the dried fruits cost $3.25 per pound. The group can spend $15 on the trail mix.

33) Write an equation in standard form that relates the amount (in pounds) of peanuts and dried fruits that can be bought for $15. Let x represent the pounds of peanuts and y represent the pounds of dried fruits.

34) The group agreed to have one and a half times as much dried fruits as peanuts in the trail mix. Write an equation in terms of x and y to represent this situation. Let x represent the pounds of peanuts and y represent the pounds of dried fruits.

35) Will two pounds of peanuts and three pounds of dried fruits satisfy both of your equations?

36) We can use the substitution method to solve this system of equations.
Because y is equal to $1.5x$, we can substitute $1.5x$ for y in the first equation:
$4.5x + 3.25y = 15$
$4.5x + 3.25(1.5x) = 15$
We now have an equation in terms of x only!
Solve this equation for x.

37) Now that you have the x-value of the solution, find the corresponding y-value.

38) What is the solution to the linear system? Interpret the solution of the linear system in terms of the problem situation.

Another community group, Nature Lovers, joins the Outdoor Club at the campsite. Nature Lovers has rented six tents and 24 sleeping bags for $186. The Outdoor Club rented from the same place and paid $236 for eight tents and 30 sleeping bags. Each tent costs the same, and each sleeping bag costs the same.

39) For each group, write an equation in standard form for this problem situation. Let x represent the cost of one tent and y represent the cost of one sleeping bag.

40) Write the equation for the Nature Lovers in slope-intercept form. (Express any fractions as decimals.)

41) Use the subsitution method to solve the linear system. Begin by substituting your expression (from problem 40) into the equation for the Outdoor Club and solve the resulting equation for x.

42) Now find the value for y.

43) What is the solution to the linear system? Interpret the solution of the linear system in terms of the problem situation.