

Expectation

The following assignment will help you to demonstrate your ability to model and solve problems involving the intersection of two straight lines.

Assessment

Still Learning...	Almost There...	Got It!

Complete each of the following questions on lined paper. Any graphing that you choose to do, by hand, is to be done neatly on grid paper. Be sure to exercise good, mathematical communication (rubric overleaf).

Part A: Knowledge & Understanding

1. Solve the following system of equations using a method of your choice—graphing (by hand), substitution, or elimination. Be sure to provide a 'check'.

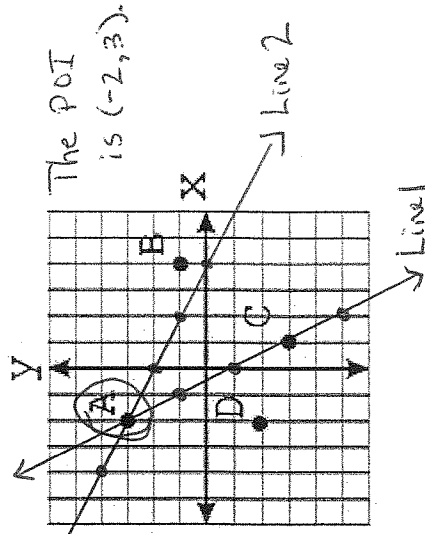
$$y = \frac{1}{2}x - 5 \quad (1), \quad 3x + 2y = -2 \quad (2)$$

2. Suppose the equation $2x + 7y - 14 = 0$ is written in the form $y = mx + b$. What is the slope?

3. Draw the following lines, on the grid provided, and circle the point whose ordered pair is a solution.

One line has a slope of -2 and the y-intercept is -1 . (Line 1)

The other line has a slope of $-\frac{1}{2}$ and the y-intercept is 2 . (Line 2)



#2. $2x + 7y - 14 = 0$

$$\frac{7y}{7} = \frac{-2x - 14}{7}$$

$$y = -\frac{2}{7}x - 2$$

From the slope-intercept form, the slope is $m = -\frac{2}{7}$.

#1). Substitution:

$$y = \frac{1}{2}x - 5 \quad (1)$$

$$3x + 2y = -2 \quad (2)$$

Put (1) in (2)

$$3x + 2\left(\frac{1}{2}x - 5\right) = -2$$

$$4x = -2 + 10$$

$$4x = 8$$

$$x = 2$$

Set $x = 2$ in (1) and solve for y .

$$y = \frac{1}{2}(2) - 5$$

$$y = 1 - 5$$

$$y = -4$$

Check $(x, y) = (2, -4)$ in (2):

LS	RS
$3x + 2y$	-2
$= 3(2) + 2(-4)$	
$= 6 - 8$	
$= -2$	

∴ LS = RS $(2, -4)$ is the solution.

Elimination:

$$y = \frac{1}{2}x - 5 \quad (1) \rightarrow 5 = \frac{1}{2}x - y \quad (3)$$

$$3x + 2y = -2 \quad (2) \quad -2 = 3x + 2y \quad (2)$$

$$5 = \frac{1}{2}x - y \quad \times 2 \rightarrow 10 = x - 2y \quad (4)$$

$$\begin{array}{r} -2 = 3x + 2y \quad (2) \\ \hline \end{array}$$

$$8 = 4x \quad (4) + (2)$$

$$2 = x$$

From here, continue with...

Part B-Application

- Ben's company manufactures skateboards. The production costs are given by $C = 0.2x + 20$, where x is the number of skateboards manufactured. The revenue is given by $R = 0.35x$. How many skateboards must the company sell to break even?
- Cailan plans to invest \$14 000 into two types of bonds. One bond yields 8% interest each year and has almost no risk. The other bond yields 12% interest each year but he risks losing his initial investment. He needs to earn \$1400 each year to consider the investment successful. How much should he invest in each bond?

Communication Rubric

Level 1	Level 2	Level 3	Level 4
-Uses key terms, symbols, conventions and uses them ... -Expresses (e.g., clarity and level of language) and organizes mathematical ... with limited effectiveness	-Uses key terms, symbols, conventions and uses them ... -Expresses (e.g., clarity and level of language) and organizes mathematical ... with some effectiveness	-Uses key terms, symbols, conventions and uses them ... -Expresses (e.g., clarity and level of language) and organizes mathematical ... with considerable effectiveness	-Uses key terms, symbols, conventions and uses them ... -Expresses (e.g., clarity and level of language) and organizes mathematical ... with a high degree of effectiveness

#1. To break-even, set $0.2x + 20$ equal to $0.35x$ (i.e., Cost = Revenue) and solve for x (the # of skateboards).

$$0.2x + 20 = 0.35x$$

$$20 = 0.35x - 0.20x$$

$$20 = 0.15x$$

$$\frac{20}{0.15} = \frac{0.15x}{0.15}$$

$$133.\bar{3} = x$$

∴ To break-even, Ben must sell 134 skateboards.

#2. Let x (dollars) be the amount Cailan invests at 8%; y (dollars), the amount at 12%.

$$x + y = 14\,000 \quad (1) \rightarrow y = 14\,000 - x \quad (3)$$

$$0.08x + 0.12y = 1400 \quad (2)$$

Set $y = 14\,000 - x$ in (2).

$$0.08x + 0.12(14\,000 - x) = 1400$$

$$0.08x + 1680 - 0.12x = 1400$$

$$-0.04x = 1400 - 1680$$

$$\frac{-0.04x}{-0.04} = \frac{-280}{-0.04}$$

$$x = 7000$$

$$x = 7000$$

Set $x = 7000$ in (3):

$$y = 14\,000 - 7000$$

$$= 7000$$

∴ Cailan invests \$7000 at 8%
and \$7000 at 12%.

$$\therefore (x, y) = (7000, 7000)$$