Equations of Linear Relations Lesson #4: The General Form Equation Ax + By + C = 0

Review

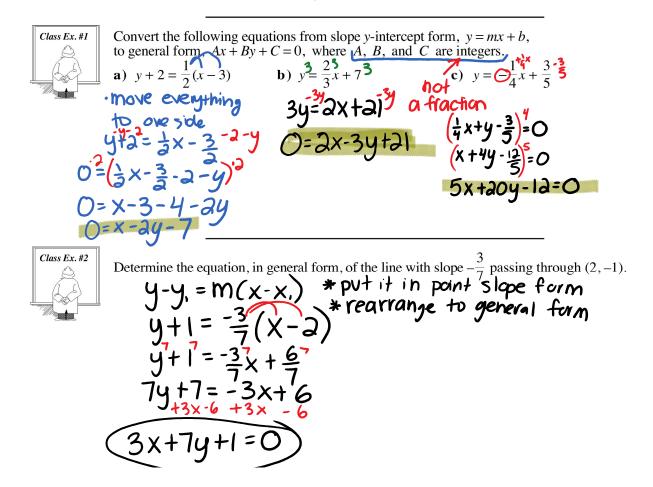
In Lesson #2 and Lesson #3 of this unit we studied two forms of the equation of a straight line. The form of these equations are

- the slope y-intercept form which can also be writen as $\underline{\forall = M \times +}$
- the point-slope form which can also be written as \underline{U} -(

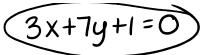
General Form of the Equation of a Line $\rightarrow Ax + By + C = 0$

The **general form** of the equation of a line is an equation where all the terms are collected to the left side of the equation. The right side of the equation is zero. It has the following characteristics:

- It is written as Ax + By + C = 0, where A, B, and C are expressed as **integers** if possible, and A is usually positive.
- It allows us to write equations for oblique lines, horizontal lines, and vertical lines.
- In some texts, the form Ax + By + C = 0 is referred to as **standard form**.



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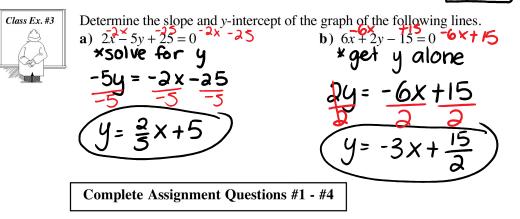
$$y=mx+b$$

 $y-y_{1}=m(x-x_{1})$

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Determining the Slope and y-intercept from Ax + By + C = P

Given the equation of a line in general form, Ax + By + C = 0, the slope and y-intercept can be found by converting the equation into slope y-intercept form, y = mx + b,





The lines 3x - 4y + 8 = 0 and 5x - ky - 6 = 0 have the same y-intercept. Determine the value of k. *put both into y=mxtb 3x - 4y + 8 = 0 -3x - 8 - 3x - 8 -4y = -3x - 8 -5x + 6 -5x + 7 -5x + 7 -5x +**当 ジェン ストン** Which of the following lines is/are perpendicular to the line 4x - 2y + 9 = 0? (\ddagger Class Ex. #5 i) 6x + 3y - 1 = 0 ii) x + 2y - 12 = 0**iii**) 5x + 10y = 0

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Use the following information to answer Class Ex. #6.

A student made the following statements about the line with equation 2y = 5x + 12. **Statement 1:** The line has a slope of 5. **Statement 2:** The line is parallel to 10x - 4y + 13 = 0. **Statement 3:** The line passes through (-2, 1).



Which of the above statement(s) is/are true?

- A. 1 and 2 only
- B. 1 and 3 only
- C. 2 and 3 only
- **D.** some other combination of statements 1, 2, and 3

Complete Assignment Questions #5 - #16

Assignment

1. Convert the following equations to general form (Ax + By + C = 0)where A, B, and C are integers.

a) y-4=7(x-1) **b**) y=-2x+9 **c**) y=mx+b

d)
$$y = -\frac{3}{4}x + 5$$
 e) $y + 8 = -\frac{3}{2}(x - 5)$ **f**) $y = \frac{5}{3}x - \frac{1}{4}$

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2. Find the equation, in general form, of the line through the given point and with the given slope.

a) (6,1), 3 **b)** (-9,-2),
$$\frac{2}{5}$$
 c) (0,0), $\frac{4}{3}$

3. Determine the slope and y-intercept of the graph of the following lines. a) x + y - 11 = 0b) 3x - 2y + 30 = 0c) 3x + 6y - 7 = 0

4. Determine the slope, y-intercept, and x-intercept of the graph of the following lines. a) 2x + y - 6 = 0 b) 5x - 2y + 20 = 0 c) 4x - 5y - 3 = 0

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- 5. Consider the lines x 2y + 1 = 0 and 4x + ky 8 = 0.
 - **a**) Determine the value of *k* if the lines have the same slope.

b) Determine the value of k if the lines have the same y-intercept.

6. Consider the lines 3x - 5y - 15 = 0 and ax + 2y - 6 = 0.

- **a**) Determine the value of *a*
- Determine the value of *a* if the lines have the same slope. **b**) Determine the value of *a* if the lines have the same . if the lines have the same *x*-intercept.



The equation of the line passing through the orgin with slope $-\frac{1}{2}$ is

- **A.** x + 2y = 0
- **B.** x 2y = 0
- **C.** 2x + y = 0
- **D.** 2x y = 0

8. Match each equation on the left with the correct characteristic of the graph of the equation on the right. Each characteristic may be used once, more than once, or not at all.

	Equation		Characteristic
i)	6x - 2y + 5 = 0	А.	Slope = $-\frac{1}{3}$
ii)	2x - 5y = 0	В.	y-intercept = $-\frac{5}{2}$
iii)	x + 3y + 6 = 0	C.	Passes through (-10, -4)
iv)	x - 4y + 10 = 0	D.	Slope = 0
v)	2x - y - 5 = 0		y-intercept = $\frac{5}{2}$
		F.	Perpendicular to $y = \frac{5}{2}x - 3$
			x-intercept = $\frac{5}{2}$

- 9. The slope of the line with equation 6x + 5y 1 = 0 is
 - **A.** $-\frac{6}{5}$ **B.** $-\frac{5}{6}$ **C.** $\frac{6}{5}$ **D.** $\frac{1}{5}$
- **10.** Which line has a *y*-intercept of 1?

A. x + 5y + 1 = 0 **B.** x + 3y + 3 = 0 **C.** x - 2y + 2 = 0**D.** 2y = 3x + 1

- 11. The slope of a line perpendicular to the line x + 3y + 8 = 0 is
 - **A.** -8 **B.** $-\frac{1}{3}$ **C.** $\frac{1}{3}$ **D.** 3
- 12. The line 2y + 3x + 6 = 0 intersects the y-axis at P. The slope of the line joining P to Q(6, -2) is
 - **A.** $-\frac{5}{6}$ **B.** $\frac{1}{6}$ **C.** $-\frac{1}{6}$ **D.** $-\frac{2}{3}$
- 13. The lines with equations ay = 4x + 9 and y = 5x 7 are perpendicular. The value of a is

A.
$$\frac{4}{5}$$

B. $-\frac{4}{5}$
C. $-\frac{5}{4}$
D. -20

Use the following information to answer the next question.

Consider the following statements about all the lines in the form kx + 4y - 8 = 0, where $k \in R$. **Statement 1:** The lines have the same slope. **Statement 2:** The lines have the same *y*-intercept. **Statement 3:** The lines have the same *x*-intercept.

- 14. Which of the above statement(s) is/are true?
 - **A.** 1, 2, and 3
 - **B.** 1 only
 - C. 2 only
 - **D.** 3 only

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- 15. Line L has equation 5x 3y + 21 = 0. A is the point (-6, -3), B is (3, -2), and C is (-3, 2). Which of these points lie on line L?
 - A. A only
 - **B.** A and B only
 - C. A and C only
 - **D.** B and C only



6. Given that the line joining the points (2, 3) and (8, -q), where $q \in W$, is perpendicular to the line 3x - 2y - 5 = 0, then the value of q is _____.

(Record your answer in the numerical response box from left to right)

Answer Key

		b) $2x + y - 9 = 0$ e) $3x + 2y + 1 = 0$		= 0
2. a)	3x - y - 17 = 0	b) $2x - 5y + 8 = 0$	$\mathbf{c}) 4x - 3y = 0$	
3. a)	slope = -1 , y-int = 11	b) slope = $\frac{3}{2}$,	y-int = 15 c)	slope = $-\frac{1}{2}$, y-int = $\frac{7}{6}$
	slope = -2 , y -int = 6,			
b)	slope = $\frac{5}{2}$, y-int = 10	, $x - int = -4$		
c)	slope = $\frac{4}{5}$, y-int = $-\frac{3}{5}$	$\frac{3}{6}, x - int = \frac{3}{4}$		
5. a)	-8 b) 16	6. a)	$-\frac{6}{5}$ b) $\frac{6}{5}$	
7. A				
) E ii) C 10. C	iii) A iv 11. D		
13. [D 14. C	15. C		