Math-8 Algebra 2

math.mnrt.net ***Equation of Line - Practice Exam*** **Feb. 17, 2014**

Name: _____

Score: _____ out of **135** points. Percent: _____. Grade: _____.

- Partial credit is given. Clearly written well reasoned solutions make it easier for the grader to appreciate what you know. Messy or poorly reasoned solutions have the opposite effect.
- You have 45 minutes and there are 11 questions. So you have an average of 4.1 minutes per question. You have time to double check your work.
- A lot of space follows each question. That does not necessarily mean the solution is long.
- Answers must be completely simplified: fractions in lowest terms, all arithmetic performed.
- Advice. First pass: skip problems you cannot do easily. Second pass: work problems you skipped on first pass.
- This exam consists of 7 pages. Keep turning pages until you know you have reached the end.

1. (11 points) Find the slope of the line through the points $(3, -5), (-7, 9)$.

Solution:

$$m = \frac{9+5}{-7-3}$$
$$= \frac{-7}{5}.$$

2. (6 points) At what point do the lines $x = 8$ and $y = -2$ intersect?

Solution: $(8, -2)$.

3. (6 points) Are the lines $y = \frac{1}{5}x - 221$ and $y = \frac{-1}{5}x + 63$ parallel?

Solution: No. By inspection the slopes are $\frac{1}{5} \neq \frac{-1}{5}$.

4. (6 points) Are the lines $y = \frac{2}{11}x - 635$ and $y = \frac{2}{11}x + 113$ parallel?

Solution: Yes. By inspection the slopes are identical and equal to $\frac{2}{11}$.

5. Consider the equation $y = \frac{-2}{7}x - \frac{3}{5}$.

(a) (5 points) What the slope?

Solution: By inspection the slope is $\frac{-2}{7}$.

(b) (5 points) What is the y-intercept?

Solution: By inspection the y-intercept is $\frac{-3}{5}$. (Work shown in part (a) above.)

(c) (5 points) What the x-intercept?

Solution: Since the second coordinate of every point on the x-axis is zero, set $y = 0$ and solve for x.

$$0 = \frac{-2}{7}x - \frac{3}{5}$$
$$0 = -10x - 21$$
$$\therefore x = \frac{-21}{10}.$$

6. For the equation $2x + 5y = 19$,

(a) (9 points) What is the slope?

Solution:

$$\begin{aligned} 2x + 5y &= 19 \\ 5y &= -2x + 19 \\ y &= -\frac{2}{5}x + \frac{19}{5} \end{aligned}$$

Therefore, slope is $\frac{-2}{5}$.

(b) (9 points) What is the y-intercept?

Solution: The y-intercept is $\frac{19}{5}$. (Work shown in part (a) above.)

7. (19 points) Write the equation of the line that is parallel to $2x + 3y = 1$ and goes through the point $(-2, 7)$. Answer in standard form.

Solution: Use $y - y_1 = m(x - x_1)$.

$$\begin{aligned} 2x + 3y &= 1 \\ 3y &= -2x + 1 \\ y &= \frac{-2}{3}x + \frac{1}{3}, \\ \implies m &= \frac{-2}{3}. \end{aligned}$$

Then,

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - 7 &= \frac{-2}{3}(x + 2). \\ \therefore 2x + 3y &= 17. \end{aligned}$$

8. (19 points) Write the equation of the line through the points $(-2, 3)$ and $(5, -10)$. Answer in standard form.

Solution: Use $y - y_1 = m(x - x_1)$.

$$m = \frac{-10 - 3}{5 + 2} = \frac{-13}{7}.$$

Then,

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - 3 &= \frac{-13}{7}(x + 2). \\ \therefore 13x + 7y &= -5. \end{aligned}$$

9. (10 points)
Find the number a that would make the line $y = ax + 5$ parallel to the line $2x - 3y = 1$.

Solution:

$$\begin{aligned} 2x - 3y &= 1 \\ y &= \frac{2}{3}x - \frac{1}{3}. \end{aligned}$$

If the lines must be parallel, then $a = \frac{2}{3}$.

10. (15 points) Let ℓ_1 be the line $y = -\frac{3}{4}x + \frac{3}{2}$ and ℓ_2 be the line $y = \frac{-5}{3}x - \frac{1}{3}$. At what point (if any) do the lines ℓ_1 and ℓ_2 intersect?

Solution: Let (x, y) be the point of intersection. Then,

$$\begin{aligned} \frac{-3}{4}x + \frac{3}{2} &= \frac{-5}{3}x - \frac{1}{3} \\ -9y + 18 &= -20x - 4 \\ 11x &= -22 \\ x &= -2. \end{aligned}$$

Then,

$$\begin{aligned} y &= \left(\frac{-3}{4}\right)(-2) + \frac{3}{2} \\ y &= 3. \end{aligned}$$

Therefore, the point at which the lines intersect is $(-2, 3)$.

11. (10 points) At what point does the equation of the line through the points $(-1, 5)$ and $(21, 36)$ intersect the y-axis?

Solution: Use $y - y_1 = m(x - x_1)$.

$$m = \frac{36-5}{21+1} = \frac{31}{22}$$

Then,

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - 5 &= \frac{31}{22}(x + 1) \\ 22y - 110 &= 31x + 31 \\ 22y &= 31x + 141 \\ y &= \frac{31}{22}x + \frac{141}{22}. \end{aligned}$$

Therefore, the line intersects the y-axis at the point $\left(0, \frac{141}{22}\right)$.