Name:_____ Date:_____ Sections 8-8 & 8-9

8-8 Writing Linear Equations & 8-9 Prediction Equations

Slopes of *parallel lines* (lie in a plane and will never intersect) – are the same

Slopes of *perpendicular lines* (intersect to form four right angles) – are opposite reciprocals $\frac{-1}{2} \rightarrow 2$

Ex. 1: Write an equation in slope-intercept form of the line that satisfies the given conditions.

A. Parallel to y = 3x + 4; passes through (-2,1)

$m = 3 \quad (-2,1)$

$y = mx + b$

$1 = 3(-2) + b$

$1 = -6 + b$

$+6 \quad +6$

$7 = b$

$\boxed{y = 3x + 7}$

B. Parallel to -2x + 5y = -5; passes through (6,3)

$-2x + 5y = -5$

$+2x \quad +2x$

$\frac{5y}{5} = \frac{2x}{5} - \frac{5}{5}$

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

$m = \frac{2}{5} \quad (6,3)$

$3 = \frac{2}{5}(6) + b$

$3 = \frac{12}{5} + b$

$-\frac{12}{5} \quad -\frac{12}{5}$

$b = \frac{15}{5} - \frac{12}{5}$

$b = \frac{3}{5}$

$\boxed{y = \frac{2}{5}x + \frac{3}{5}}$

C. Perpendicular to y = -4x – 2; passes through (-2,5)

$m = -4 \rightarrow m = \frac{1}{4} \quad (-2,5)$

$5 = \frac{1}{4}(-2) + b$

$5 = -\frac{1}{2} + b$

$+\frac{1}{2} \quad +\frac{1}{2}$

$\frac{11}{2} = b$

$\boxed{y = \frac{1}{4}x + \frac{11}{2}}$

D. Perpendicular to -3x + 5y =20; passes through (-3,0)

$-3x + 5y = 20$

$+3x \quad +3x$

$\frac{5y}{5} = \frac{3x}{5} + \frac{20}{5}$

$y = \frac{3}{5}x + 4$

$m = \frac{3}{5} \rightarrow m = \frac{-5}{3}$

$(-3,0)$

$0 = -\frac{5}{3}(-3) + b$

$0 = 5 + b$

$-5 \quad -5$

$b = -5$

$\boxed{y = \frac{-5}{3}x - 5}$

Scatter plot – the relationship between a set of data with two variables, graphed as ordered pairs on a coordinate plane

Line of fit – (on a scatter plot) a line drawn that is very close to most of the data points which "best fits" the data; also called "line of best fit"

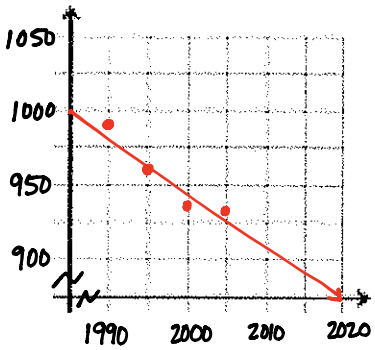
Ex. 2: The table shows the amount of land in U.S. farms from 1990 to 2005.

A. Graph the data. Draw a line that is near most of the data points.

B. Use the line of fit to predict the amount of land in the year 2015.

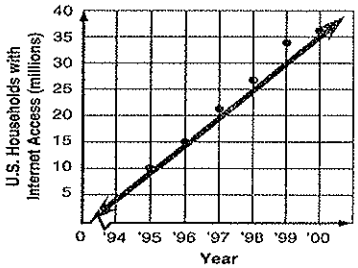
about 875 million acres

Year (x)	Land (million acres) (y)
1990	987
1995	963
2000	945
2005	933



Ex. 3: The scatter plot shows the number of U.S. households (millions) with Internet access.

A. Write an equation in slope-intercept form for the line of fit that is drawn.



$(95,10) \quad (96,15)$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{15-10}{96-95} = \frac{5}{1} = 5$

$y = mx + b$

$10 = 5(1995) + b$

$10 = 9975 + b$

$b = -9965$

$\boxed{y = 5x - 9965}$

B. Predict the number of U.S. households that will have Internet in the year 2020.

$x = 2020 \quad y = ?$

$y = 5x - 9965$

$y = 5(2020) - 9965$

$y = 10100 - 9965$

$y = 135$

$\boxed{\text{approximately 135 million households}}$

HW: GPA p. 456 (3-7); Equations for Parallel and Perpendicular Lines Worksheet