

AP Calculus AB
Chapter 1, Prerequisites for Calculus

Lesson 1.1 Notes (Lines)

Increments: net change

$$\Delta y = y_2 - y_1 \text{ (rise)}$$

$$\Delta x = x_2 - x_1 \text{ (run)}$$

Slope: $m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

Parallel Lines: have the same slope

Perpendicular Lines: have slopes that are opposite reciprocals

Equations of Lines

Point-slope Equation: $y = m(x - x_1) + y_1$

Slope-Intercept Equation: $y = mx + b$

Standard Equation: $Ax + By = C$

Vertical Lines: $x = a$

Horizontal Lines: $y = b$

Regression Analysis: the process of finding a curve (equation) to fit data points

↳ This is usually done with the help of a graphing calculator.

↳ To find a linear regression equation, go through the following steps on your calculator.

1. STAT → EDIT → ENTER (At this point, you should see L₁, L₂, and L₃ on your screen.)
2. To clear each list of current data, make sure the list is highlighted in black, then press CLEAR → ENTER.
3. Under L₁, enter your x-values one at a time. Press ENTER after each value.
4. Under L₂, enter your y-values one at a time. Press ENTER after each value.
5. Press STAT, press the right arrow once so that CALC is highlighted, press 4 (for a linear regression), and then press ENTER.

L. 1.1 Homework (Due on the 1st day of school)

Assignment 1: #1, 2, 6, 8, 12, 14, 20, 24, 26, 27, 29, 32, 34, 36, 28, 41, 43

Most of the problems listed have been taken from the textbook we will be using this year and pasted below. Please answer these questions on notebook paper. This assignment will be due the 1st day of school along with assignment two!

AP Calculus AB

Assignment 1: #1, 2, 6, 8, 12, 14, 20, 24, 26, 27, 29, 32, 34, 36, 28, 41, 43

Age (months)	Weight (pounds)
19	22
21	23
24	25
27	28
29	31
31	28
34	32
38	34
43	39

1. For the table above, answer the following on a piece of paper:

- Find the linear regression equation for the data.
- Find the slope of the regression line. What does the slope represent?
- Superimpose the graph of the linear regression equation on a scatter plot of the data.

↳ To do this,

- Press $2^{nd} \rightarrow Y= \rightarrow ENTER$. (At this point, you should see the words ON and OFF right underneath Plot1.
This is the menu for graphing a scatter plot.)
- Press ENTER while the cursor is blinking on the word ON. This should turn on a scatter plot of the data you just entered in L_1 and L_2 .
- Press $Y=$ again and enter your linear regression equation from part (a) into Y_1 .
- Now you need to change your viewing window. Press WINDOW, and change your numbers to 0, 44, 1, 0, 40, 1, 1.
- Press GRAPH, and you should see both your scatter plot and the regression equation.

(d) Use the regression equation to predict the approximate weight of a 30-month-old girl.

In Exercises 1–4, find the coordinate increments from A to B .

2. $A(-3, 2)$, $B(-1, -2)$

In Exercises 5–8, let L be the line determined by points A and B .

(a) Plot A and B .

(b) Find the slope of L .

(c) Draw the graph of L .

6. $A(-2, -1)$, $B(1, -2)$

8. $A(1, 2)$, $B(1, -3)$

In Exercises 9–12, write an equation for (a) the vertical line and (b) the horizontal line through the point P .

12. $P(-\pi, 0)$

In Exercises 13–16, write the point-slope equation for the line through the point P with slope m .

14. $P(-1, 1), m = -1$

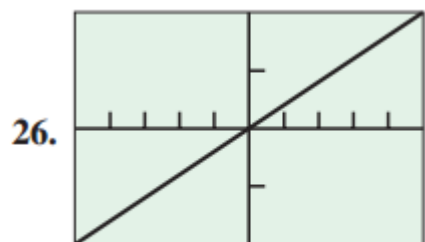
In Exercises 17–20, write the slope-intercept equation for the line with slope m and y -intercept b .

20. $m = 1/3, b = -1$

In Exercises 21–24, write a general linear equation for the line through the two points.

24. $(-2, 1), (2, -2)$

In Exercises 25 and 26, the line contains the origin and the point in the upper right corner of the grapher screen. Write an equation for the line.



$[-5, 5]$ by $[-2, 2]$

In Exercises 27–30, find the (a) slope and (b) y -intercept, and (c) graph the line.

27. $3x + 4y = 12$

29. $\frac{x}{3} + \frac{y}{4} = 1$

In Exercises 31–34, write an equation for the line through P that is (a) parallel to L , and (b) perpendicular to L .

32. $P(-2, 2), L: 2x + y = 4$

34. $P(-1, 1/2), L: y = 3$

In Exercises 35 and 36, a table of values is given for the linear function $f(x) = mx + b$. Determine m and b .

	x	$f(x)$
36.	2	-1
	4	-4
	6	-7

In Exercises 37 and 38, find the value of x or y for which the line through A and B has the given slope m .

38. $A(-8, -2)$, $B(x, 2)$, $m = 2$

41. *Parallel and Perpendicular Lines* For what value of k

are the two lines $2x + ky = 3$ and $x + y = 1$ **(a)** parallel? **(b)** perpendicular?

43. *Pressure under Water* The pressure p experienced by a diver under water is related to the diver's depth d by an equation of the form $p = kd + 1$ (k a constant). When $d = 0$ meters, the pressure is 1 atmosphere. The pressure at 100 meters is 10.94 atmospheres.

Find the pressure at 50 meters.