Finding an Equation of a Line

Write an equation for the line with slope m = -3 that contains the point (3, 1)

1) Substitute m = -3 into y = mx + b:

$$y = -3x + b$$

2) Now substitute the point (3, 1) into the equation and solve for b.

x=3 and y=1 so . . .

$$1 = -3(3) + b$$

$$1 = -9 + b$$

$$1 + 9 = -9 + b + 9$$

$$b = 10$$

3) Last, put b into the equation: y = 2x + 10

Finding an Equation of a Line

Write an equation for the line containing the points (1, 3) and (-2, -3).

1) Find the slope:

$$\begin{array}{r} 1 \quad 3 \\ -\ -2 \quad -3 \\ \hline 3 \quad 6 \\ \text{run} \quad \text{rise} \end{array} \qquad m = \frac{6}{3} = 2$$

2) Now substitute the slope and the x- and y- coordinates of either point into the equation $y = mx+b$ and solve for b:

$3 = 2(1) + b$ or $-3 = 2(-2) + b$

$3 = 2 + b$ $-3 = -4 + b$

$b = 1$ $b = 1$

3) Write the equation: $\boxed{y = 2x + 1}$

Finding an Equation of a Line

A wholesale poster company sells 20 posters for $12 and 30 posters for $15. Find an equation for cost (y) in terms of the number of posters sold (x).

1) Find the slope. The points are (20, 12) and (30, 15):

$$m = \frac{15 - 12}{30 - 20} = \frac{3}{10} = \$.30 \text{ per poster}$$

2) Now substitute the slope and the x- and y-coordinates of either point into y = mx+b and solve for b:

$$12 = (.30)(20) + b$$

$$12 = 6 + b$$

$$b = \$6$$

3) Write the equation: $\boxed{y = \$0.30x + \$6}$

Fitting an Equation to Data

Sometimes the data does not exactly match a linear equation. However, we can use a linear model to predict or estimate many situations. The process is called ***linear regression***.

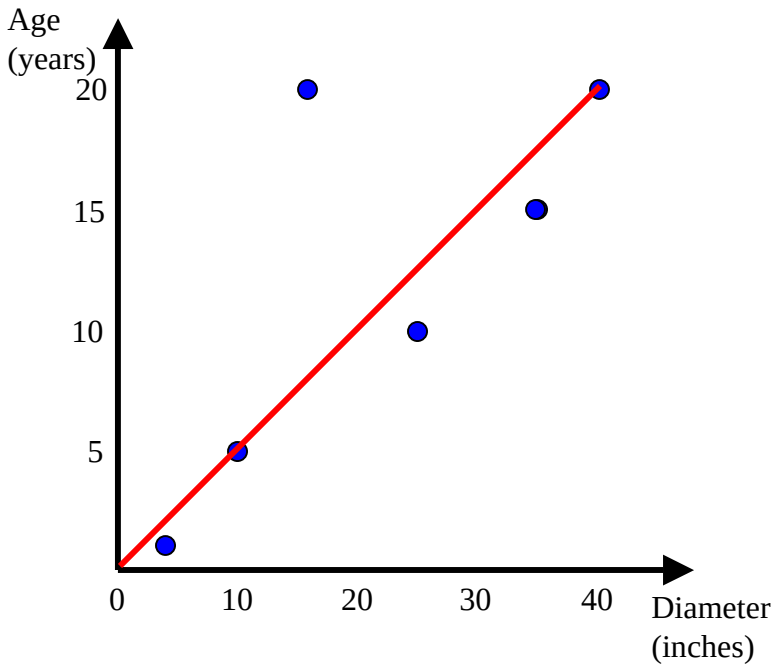
Here is the procedure:

1) Plot the data.
2) Draw the ***line of best fit***.
3) Pick two points ***from the line of best fit***.
4) Calculate the slope.
5) Calculate the y-intercept.
6) Write the equation for your linear model.

Fitting an Equation to Data

The table below shows the measured diameter of tree trunks (d, in inches) and the age of the tree (y, in years). Graph the ordered pairs (d, y) and use them to make a linear model. Estimate how old a tree will be when its diameter is 100 inches.

Diameter	4	10	40	35	25	35	20
Age	1	5	20	15	10	15	20



Use (10, 5) and (40, 20)

m = (20-5)/(40-10) = (1/2)

y-intercept = (0, 0)

y = (1/2) d

When a tree's diameter is 100 inches, the tree will be approximately 50 years old.