[10-01-06-RT8]

Straight line

■ Three equivalent equations of a straight line.

Point slope form. $y - y_1 = m(x - x_1)$

Slope intercept form. $y = m\,x + b$

Standard form. $a\,x + b\,y + c = 0$

In the above, x_1 and y_1 are the coordinates of a specific point. m, a, b, c are constants, a and b not btoh zero. x and y are variables.

■ What is each equation good for?

Point slope form. Use this when either (1) you are given two points and asked for the line through them or (2) you are given a point and a slope and asked for the line. An equation in point slope form allows you to determine the slope by inspection. The constant in the position of m is the slope.

Slope intercept. Use this when you are given the slope and y-intercept and asked for the line. An equation in slope intercept form allows you to determine both the slope and the y-intercept by inspection. The constant in the position of m is the slope and the constant in the position of b is the y-intercept.

Standard form. Use this when you are looking for the intersection of lines and need to set up simultaneous equations. Typically, exams and textbooks ask for your final response to "Write the equation of the line . . ." in this form.

■ Degenerate equations of a straight line

$x = a$, a constant. This is the equation of a straight line parallel to the y-axis through the number a on the x-axis. The slope of this line is undefined.

$y = a$, a constant. This is the equation of a straight line parallel to the x-axis through the number a on the y-axis. The slope of this line is zero.

■ Useful facts.

1. Lines are parallel if and only if their slopes are equal.
2. Lines are perpendicular if and only if the product of their slopes is equal to -1.