The Equation of a Line

We learned earlier that we can determine the slope of a line segment if we are given two points along it.

Remember that: If we have the points P(-6,-4) and R(10,4), find the slope of PR.

 m = y2-y1

x2-x1

Using this formula, we can develop different forms for the equation of a line.

Point Slope Form

Use the slope formula to determine the equation of a line that has a slope of 2 and passes through the point (1,3)

Solution: Let (x,y) be any other point on the line.

 m = y2-y1 ⇒ 2 = y-3

x2-x1 x-1

 y-3 = 2(x-1)

 y = 2(x-1) + 3

 y = 2x - 2 + 3

 y = 2x +1

Therefore, a line that has slope m and passes through the point (x1,y1) has the equation:

 y = m(x-x1) + y1

Determine the equation of the following line: Slope 3, passing through point (-2,-4)

Slope and y-Intercept Form

You can also determine the equation of a line if you know its slope and y-intercept.

Determine the equation of a line with slope -2 and y-intercept 3.

Solution: You can use the point slope form for the equation of a line. The slope, m, is -2. The point that corresponds to a y-intercept of 3 is (0,3).

 y = m(x-x1) + y1

 y = -2(x-0) + 3

 y = -2x + 3

Determine the equation of the following line: Slope -3 and y-intercept 7

Determine the equation of the line that passes through the points E(-3,5) and F(2,3). Write the equation in slope y-intercept form.

Calculate the slope of the line:

Use one of the coordinates to write the equation.

Check both of the coordinates to ensure that they satisfy the equation.

Classwork and Homework

1) Determine the slope of the following line segments.

 a) A(3,2) B(12,9) b) L(10,-7) M(-2,8)

2) The coordinates of a point and the slope of the line are given.

 Determine the equation of the line.

 a) A(5,1) m = 2 b) C(-2,3) m = -1

 c) E(-4,-1) m = ½ d) G(5,2) m = 0

3) The coordinates of 2 points are given. Determine the equation

 of the line then check that the coordinates of the points

 satisfy the equation.

a) H(5,2) J(2,6) b) S(2,-6) T(2,2)

 c) x-intercept -2, y-intercept 6

4) Which of the given points lie on the line with the equation

 3x + 2y - 12 = 0

 i) A(2,3) ii) B(6,-3) iii) C(-1,7) iv) D(0,6)

5) A triangle has the vertices A(3,7), B(-6,-2), and C(9,-3).

 Determine the equation of each side of the triangle