SRHS - Math I

Finding the Equation of a Line Given Two Points - Notes

- When asked to write the equation of a line given two points, our primary approach is to use the:

  point – slope equation of a line: $y - y_1 = m(x - x_1)$

  To write the equation of a line using this equation, we need the slope of the line and a point. Sometimes we are given this information, and sometimes we have to do a bit of work first. Here are several scenarios...

  - Given one point and the slope we just substitute into the equation...

    Given slope $m = 5$ and point $(2,3)$ find an equation of the line:

    $y - y_1 = m(x - x_1) \Rightarrow \boxed{y - 3 = 5(x - 2)}$

  - Given two points, we use the points to find the slope and then use one of the points (either one will work so choose the simplest) and substitute into the equation...

    Given points $(1,6)$ and $(-2,13)$ find an equation of the line:

    $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{13-6}{-2-1} = -\frac{7}{3}$

    $y - y_1 = m(x - x_1) \Rightarrow \boxed{y - 6 = -\frac{7}{3}(x-1)}$ or $\boxed{y - 13 = -\frac{7}{3}(x+2)}$

  - Given a point and a line parallel or perpendicular, we 'borrow' the slope from the other line. Remember than parallel lines have the same slope and perpendicular lines have slopes that are negative reciprocals of each other...

    Find the equation of a line through point $(5,6)$ and parallel to $y = \frac{2}{3}x - 11$. $y - y_1 = m(x - x_1) \Rightarrow \boxed{y - 6 = \frac{2}{3}(x-5)}$

- Other things to remember...
  - When asked to write the equation of a line, pay careful attention to which form you are asked for: point-slope, slope-intercept, or if the problem doesn't specify, you decide which is easier.
  - Sometimes when given two points, one of them might actually be the y-intercept – that's the case when the x-coordinate of the point is zero. You can do the problem the same way as above, or if you are more comfortable with it, use the slope-intercept form instead.
  - When asked to write an equation in slope-intercept form, you can begin with point-slope as in the examples above, and distribute to convert to slope intercept form

    $y - 3 = 5(x-2) \Rightarrow y - 3 = 5x - 10$ (+3 to both sides)

    $\boxed{y = 5x - 7}$

2020 - Review #4 Name_____

SRHS Math 1

Date_____ Period____

Write the point-slope form of the equation of the line through the given point with the given slope.

1) through: $(-4, 3)$, slope $= \frac{1}{2}$

2) through: $(2, -1)$, slope $= \frac{3}{2}$

Write the point-slope form of the equation of the line described.

3) through: $(-2, -4)$, parallel to $y = 3x - 1$

4) through: $(2, -3)$, parallel to $y = -\frac{1}{7}x$

Write the point-slope form of the equation of the line through the given points.

5) through: $(3, 4)$ and $(2, 1)$

6) through: $(-3, -3)$ and $(0, 4)$

7) through: $(3, 1)$ and $(-4, 3)$

8) through: $(-2, -1)$ and $(-1, -4)$

Write the slope-intercept form of the equation of the line through the given points.

9) through: $(-1, -2)$ and $(0, -5)$

10) through: $(2, 2)$ and $(1, -1)$