Linear functions and the meaning of slope

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Practice problems

1. Find the equation of the line that passes through the points $(-1, 4)$ and $(2, 10)$.
2. A function is defined by $f(x) = -\frac{1}{2}x + 3$. Find the average rate of change between $x = 0$ and $x = 4$.
3. A line has a slope of 3 and passes through the point $(4, -2)$. What is the y-intercept of this line?

Solutions

1. Find the equation of the line that passes through the points $(-1, 4)$ and $(2, 10)$.

   - Calculate the slope $m = \frac{10-4}{2-(-1)} = \frac{6}{3} = 2$.
   - Substitute $m = 2$ and the point $(2, 10)$ into $y = mx + c$.
   - $10 = 2(2) + c \implies 10 = 4 + c \implies c = 6$.
   - Write the final equation.

   Answer: $y = 2x + 6$

2. A function is defined by $f(x) = -\frac{1}{2}x + 3$. Find the average rate of change between $x = 0$ and $x = 4$.

   - Find $f(0) = -\frac{1}{2}(0) + 3 = 3$.
   - Find $f(4) = -\frac{1}{2}(4) + 3 = -2 + 3 = 1$.
   - Calculate the average rate of change: $\frac{f(4)-f(0)}{4-0} = \frac{1-3}{4} = \frac{-2}{4} = -\frac{1}{2}$.

   Answer: $-\frac{1}{2}$

3. A line has a slope of 3 and passes through the point $(4, -2)$. What is the y-intercept of this line?

   - Start with the equation $y = mx + c$.
   - Substitute $m = 3$, $x = 4$, and $y = -2$.
   - $-2 = 3(4) + c$.
   - $-2 = 12 + c$.
   - Subtract 12 from both sides to find $c = -14$.

   Answer: -14
