Heart of Algebra

For Heart of Algebra questions on the SAT Math test , Students will interpret, create, use, represent, and solve problems using linear representations, and make connections between different representations of linear relationships, all from high school algebra courses preparatory for the math aligned with college and career readiness expectations. Knowledge Elements are as follows; Linear equations in one variable, Linear equations in two variables, Linear functions Systems of two linear equations in two variables, linear inequalities in one or two variables. There will be 13-15 questions on the SAT Math Test representing approximately a third of the Math Test.

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Linear Equations/Coordinate Geometry

The slope of a line

The slope of a line is a measure of the steepness of the line; large positive slope value means the line slope upwards and is steep.

To find the slope of a line, we need two points on the line.

1. From two points (x_1, y_1) and (x_2, y_2)

   Slope $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

2. From $y = mx + c$

   m = slope and $c = y$ intercept.

3. The slope between any two points on a line is constant.

The midpoint of a line

Given the two endpoints (x_1, y_1) and (x_2, y_2) the coordinates of the midpoint of the line segment are

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Distance between two points.

The distance between two points (x_1, y_1) and (x_2, y_2) is given by the formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Equation of a line

- **Slope form**
  $y = mx + c$
- **General Form**
  $ax + by = c$
- **Unit slope form**
  $\dfrac{x}{a} + \dfrac{y}{b} = 1$

Parallel Lines

Two non-vertical lines are parallel if their slopes are equal and their *y*-intercept differs.

Perpendicular Lines

Two non-vertical lines are perpendicular if one gradient is negative reciprocal of the other.

1.

What is the slope of the line described by the equation?

$$\frac{1}{x}+\frac{1}{2x}=\frac{5}{y}$$

A) $\frac{3}{10}$

B) 3

C) $\frac{10}{3}$

D) 4

2.

A Line is defined by $6x-5y=-4$ what is the slope of the line?

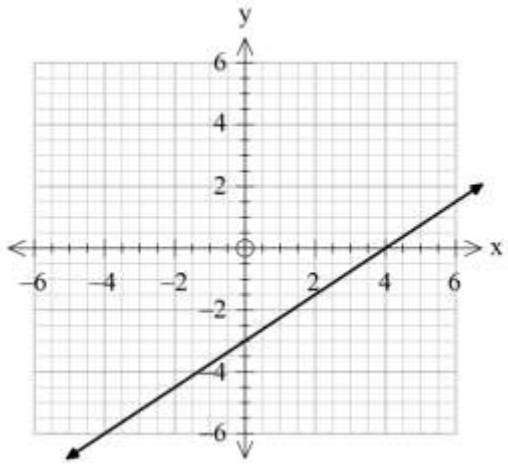
3.

In the xy-plane, the graph of the linear function f contains the points $(0,2)$ and $(8,34)$. Which equation defines f, where $y=f(x)$?

(A) $f(x)=2x+42$
(B) $f(x)=32x+36$
(C) $f(x)=4x+2$
(D) $f(x)=8x+2$

4.

The graph of the linear function f is shown, where $y=f(x)$. which equation defines f?



(A) $f(x)=0.75x+3$
(B) $f(x)=0.75x-3$
(C) $f(x)=1.33x+3$
(D) $f(x)=1.33x-3$

5.

For the Linear function f, the graph of $y=f(x)$ in the xy-plane has a slope of 5 and passes through the point $(0,2)$. which equation defines f?

(A) $f(x)=2x-5$
(B) $f(x)=2x+5$
(C) $f(x)=5x-2$
(D) $f(x)=5x+2$