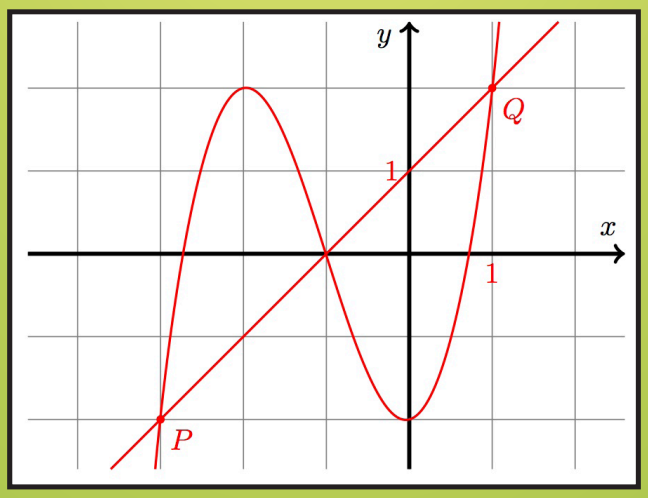
GRAB A PENCIL™

SECANT LINES

WORKSHEET

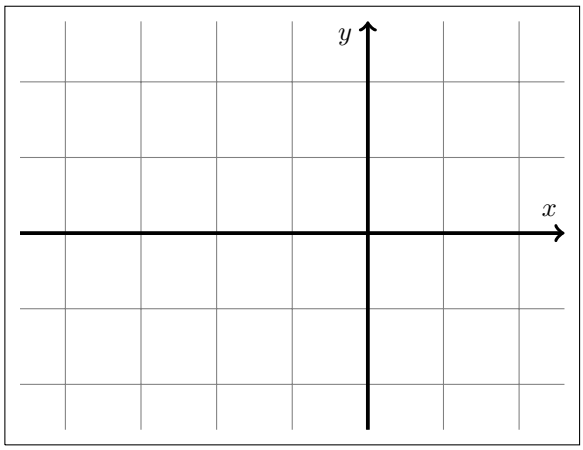
This worksheet asks the student to graph a secant line, find the equation of a secant line, find the average velocity of a particle over a time interval, and to rank the slopes of secant lines.



Secant Lines

Name:

Graph the function $f(x) = x^3 + 3x^2 - 2$ on the set of axes below.

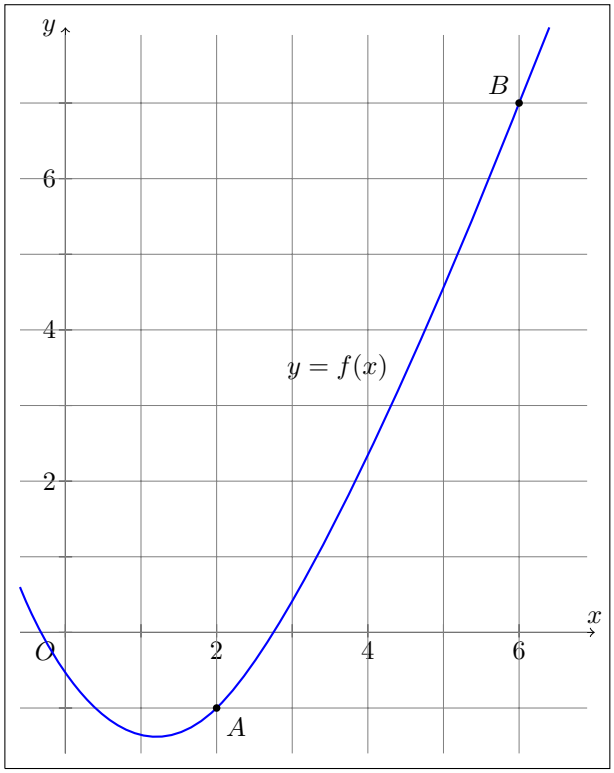


Draw a dot at the point on the curve with an x-coordinate of -3 and label it point P.

Draw a dot at the point on the curve with an x-coordinate of 1 and label it point Q.

Draw the secant line connecting points P and Q.

Find the equation of the secant line connecting points P and Q.



The graph of a function $f(x)$ is shown to the left. Find the equation of the secant line connecting points A and B.

The position s as a function of time t for a particle moving in one dimension is given by $s(t) = 5e^{4t+1}$, where time is in seconds and position is in meters. Calculate the average velocity of the particle over the time interval $[2, 4]$.

Four functions are given below.

$a(x) = 2x^2$

$b(x) = 0.5x^2$

$c(x) = x^2$

$d(x) = -x^2$

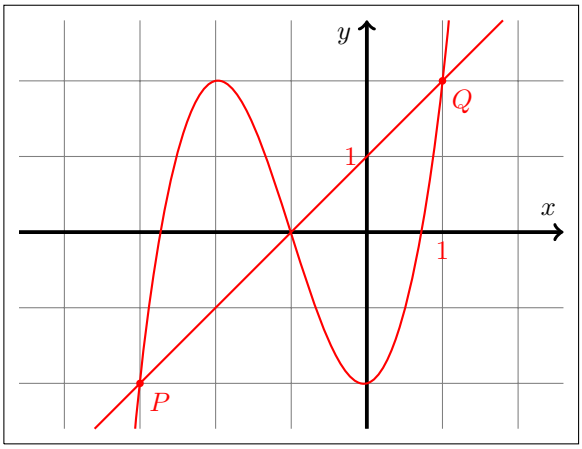
Rank the four functions according to the slopes of the secant lines from $x = 1$ to $x = 5$, from least to greatest.

Use the space below to show your work.

Secant Lines

Answer Key

Graph the function $f(x) = x^3 + 3x^2 - 2$ on the set of axes below.



Draw a dot at the point on the curve with an x-coordinate of -3 and label it point P.

Draw a dot at the point on the curve with an x-coordinate of 1 and label it point Q.

Draw the secant line connecting points P and Q.

Find the equation of the secant line connecting points P and Q.

$P(-3, -2)$ and $Q(1, 2)$

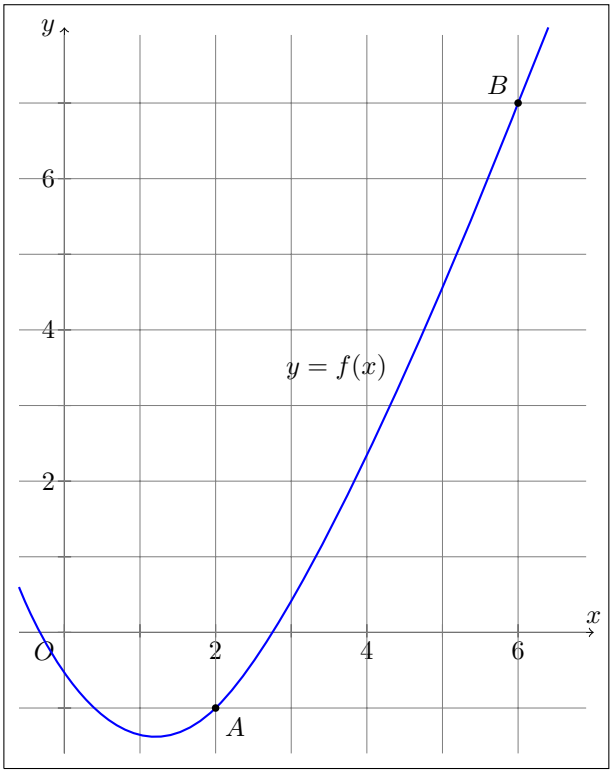
$$m = \frac{2-(-2)}{1-(-3)} = \frac{4}{4} = 1$$

$y = x + b$

$2 = 1 + b$

$b = 1$

$y = x + 1$



The graph of a function $f(x)$ is shown to the left. Find the equation of the secant line connecting points A and B.

$A(2, -1)$ and $B(6, 7)$

$$m = \frac{7-(-1)}{6-2} = \frac{8}{4} = 2$$

$y = 2x + b$

$-1 = 2(2) + b$

$b = -1 - 4 = -5$

$y = 2x - 5$

The position s as a function of time t for a particle moving in one dimension is given by $s(t) = 5e^{4t+1}$, where time is in seconds and position is in meters. Calculate the average velocity of the particle over the time interval $[2, 4]$.

$s(2) = 5e^{4(2)+1} = 5e^9$

$s(4) = 5e^{4(4)+1} = 5e^{17}$

$$\text{average velocity} = \frac{s(4) - s(2)}{4 - 2} = \frac{5e^{17} - 5e^9}{4 - 2} = 6.04 \times 10^7 \text{ m/s}$$

Four functions are given below.

$a(x) = 2x^2$

$b(x) = 0.5x^2$

$c(x) = x^2$

$d(x) = -x^2$

Rank the four functions according to the slopes of the secant lines from $x = 1$ to $x = 5$, from least to greatest.

$d < b < c < a$

Use the space below to show your work.

$$\text{slope} = \frac{a(5) - a(1)}{5 - 1} = \frac{2(5)^2 - 2(1)^2}{5 - 1} = 12$$

$$\text{slope} = \frac{b(5) - b(1)}{5 - 1} = \frac{0.5(5)^2 - 0.5(1)^2}{5 - 1} = 3$$

$$\text{slope} = \frac{c(5) - c(1)}{5 - 1} = \frac{(5)^2 - (1)^2}{5 - 1} = 6$$

$$\text{slope} = \frac{d(5) - d(1)}{5 - 1} = \frac{-(5)^2 - (-(1)^2)}{5 - 1} = -6$$