
3. A square and an equilateral triangle are pictured below.


If the square and the triangle have the same perimeter, what is the value of $x$ ?
a 2
b 4
C 9


## Learning Goals

1. To understand that parallel lines have slopes that are the same, different $y$-intercepts.
2. To understand that perpendicular lines have slopes that are negative reciprocals, different $y$-intercepts.
5.5 - Parallel and Perpendicular Line

Parallel lines are those which run along side forever in either direction but never intersect. These lines have the same steepness and thus the same slope.


Example One
Determine the equation of a line parallel to the line $x-2 y=4$ and has a $y$-intercept of 8 .

Hint: To solve the above equation:

1. Put equation in $y=m x+b$ format.
2. Take the slope from the equation in step one above and the $y$-intercept from the question.
3. 


2.

$$
m=\frac{1}{2}
$$

$$
b=8 \text { (given) }
$$

$$
y=\frac{1}{2} x+8
$$

Perpendicular lines have the property that their slopes are negative reciprocals of one another. A reciprocal of a fraction is obtained by switching the numerator and denominator.


## Example Two

Determine the negative reciprocal of the following:
a) $\frac{3}{2}-\frac{2}{3}$
b) $\frac{-9}{2} \quad \frac{2}{9}$
c) $-\frac{4}{1} \frac{1}{4}$
d) $\frac{1}{5}-\frac{5}{1}$

Example Three
Determine the equation of a line perpendicular to $y=\frac{3}{2} x+7$ that has a $y$-intercept of 6 .

$$
\text { 1. } y=m x+b
$$

2. $m=\frac{-2}{3}$

$$
b=6
$$

3. $y=\frac{-2}{3} x+6$

Example Four
Determine the equation of a line that passes through the point $(-3,6)$ and is parallel to the line $y=-6 x+2$.

1. Solve for slope ( $m$ ).

$$
m=-6 \text { (given) }
$$

2. Solve for $y$-intercept (b)

$$
\begin{aligned}
& y=m x+b \\
& b=-6(-3)+b \\
& \left.b_{\pi}=18\right)+b \\
& b=-12
\end{aligned}
$$

3. State eq by plugging in " $m$ " $r$ " $b$ ".

$$
y=-6 x-12
$$

Complete: p. 302-304 \#2, 3, 8-10, 15a.

\#2 Parallel | Perpendicular |  |
| :---: | :---: |
| $a, f, g$ | $c, h$ |
| $b, e$ |  |

