4.4 Matching Equations and Graphs

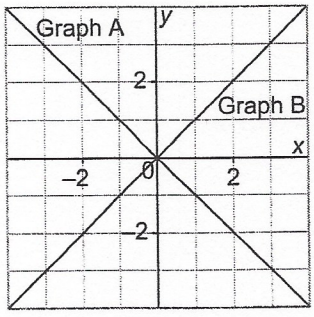
FOCUS **Match equations and graphs of linear relations.**

Example 1 Matching Equations with Graphs

Match each graph on the grid with its equation.

$y = x$

$y = -x$



Solution

Substitute $x = -1$, $x = 0$, and $x = 1$ in each equation.

$y = x$

x	y
−1	−1
0	0
1	1

We chose to use x-values of −1, 0, and 1 because they're often easy to substitute.

Points (−1, −1), (0, 0), and (1, 1) lie on Graph B.

So, $y = x$ matches Graph B.

$y = -x$

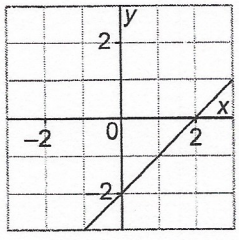
x	y
−1	1
0	0
1	−1

Points (−1, 1), (0, 0), and (1, −1) lie on Graph A.

So, $y = -x$ matches Graph A.

Check

1. Which equation describes the graph at the right?



$y = x + 2$

x	y = x + 2
0	y = 0 + 2 = ____
1	y = ____ + 2 = ____
2	y = ____ + 2 = ____

$y = x - 2$

x	y = x − 2
0	y = ____ − 2 = ____
1	y = ____ = ____
2	y = ____ = ____

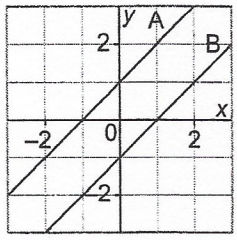
Points (_____), (_____), and (_____) do not lie on the graph.

Points (_____), (_____), and (_____) lie on the graph.

So, the equation $y =$ _____ describes the graph.

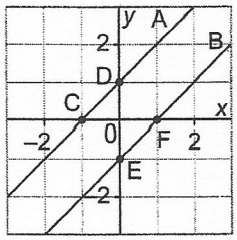
Example 2 | Identifying a Graph Given Its Equation

Which graph on this grid has the equation $y = x - 1$?



Solution

Pick 2 points on each graph and check if their coordinates satisfy the equation.



Since C does not work, we do not have to check for D.

For Graph A, use: C(−1, 0) and D(0, 1)
Check if C(−1, 0) satisfies the equation $y = x - 1$.
Substitute $x = -1$ and $y = 0$ in $y = x - 1$
Left side: $y = 0$ Right side: $x - 1 = (-1) - 1$
$= -2$

The left side does not equal the right side.
So, Graph A does not have equation $y = x - 1$.

Verify that the other graph does match the equation.
For Graph B, use: E(0, −1) and F(1, 0)
Check if E(0, −1) satisfies the equation $y = x - 1$.
Substitute $x = 0$ and $y = -1$ in $y = x - 1$
Left side: $y = -1$ Right side: $x - 1 = 0 - 1$
$= -1$

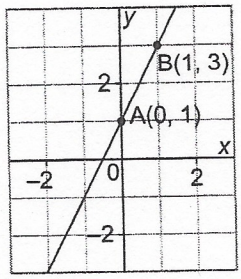
The left side does equal the right side.
So, E(0, −1) lies on the line represented by $y = x - 1$.

Check if F(1, 0) satisfies the equation $y = x - 1$.
Substitute $x = 1$ and $y = 0$ in $y = x - 1$
Left side: $y = 0$ Right side: $x - 1 = 1 - 1$
$= 0$

The left side does equal the right side.
So, F(1, 0) lies on the line represented by $y = x - 1$.
So, Graph B has equation $y = x - 1$.

Check

1. Show that this graph has equation $y = 2x + 1$.
Use the points labelled on the graph.

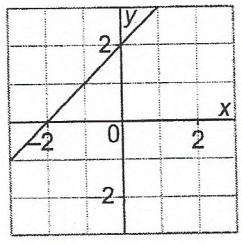


For A(0, 1): Substitute $x = 0$ and $y = 1$ in $y = 2x + 1$.
Left side: $y =$ _____ Right side: $2x + 1 =$ _____
$=$ _____
$=$ _____

For B(1, 3): Substitute $x =$ _____ and $y =$ _____ in $y = 2x + 1$.
Left side: $y =$ _____ Right side: $2x + 1 =$ _____
$=$ _____
$=$ _____

Practice

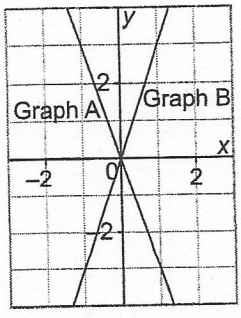
1. Show that the equation $y = x + 2$ matches the graph.
Fill in the table of values.



x	$y = x + 2$
-2	$y = -2 + 2 =$ ___
-1	$y =$ ___ $+ 2 =$ ___
0	$y =$ ___ $=$ ___

From the table:
Points (_____), (_____), and (_____) lie on the graph.
So, $y = x + 2$ matches the graph.

2. Match each equation with a graph.
$y = 3x$ $y = -3x$



Fill in the tables of values.

x	$y = 3x$
-1	$y = 3($___$) =$ ___
0	$y = 3($___$) =$ ___
1	$y = 3($___$) =$ ___

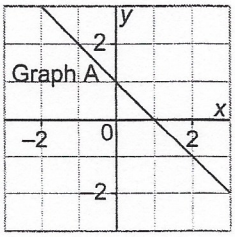
x	$y = -3x$
-1	$y = -3($___$) =$ ___
0	$y =$ ___$($___$) =$ ___
1	$y =$ _____ $=$ ___

From the tables:
$y = 3x$ has points (_____), (_____), and (_____).
These points lie on Graph _____.
So, $y = 3x$ matches Graph _____.

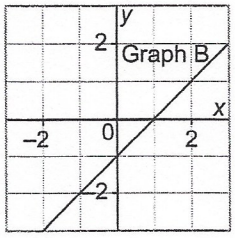
$y = -3x$ has points (_____), (_____), and (_____).
These points lie on Graph _____.
So, $y = -3x$ matches Graph _____.

3. Match each equation with a graph.

$y = 1 - x$



$y = x - 1$



Fill in the tables of values.

x	$y = 1 - x$
-1	$y = 1 - (\_\_\_) = \_\_\_$
0	$y = 1 - \_\_\_ = \_\_\_$
1	$y = 1 - \_\_\_ = \_\_\_$

x	$y = x - 1$
-1	$y = \_\_\_\_\_ = \_\_\_$
0	$y = \_\_\_\_\_ = \_\_\_$
1	$y = \_\_\_\_\_ = \_\_\_$

From the tables:

$y = 1 - x$ has points (_____), (_____), and (_____).

These points lie on Graph _____.

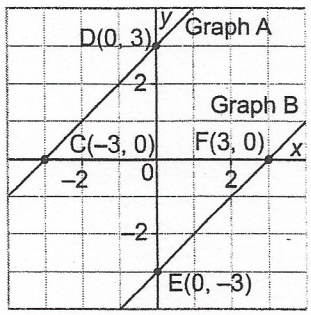
So, $y = 1 - x$ matches Graph _____.

$y = x - 1$ has points (_____), (_____), and (_____).

These points lie on Graph _____.

So, $y = x - 1$ matches Graph _____.

4. Which graph has equation $y = x - 3$?



For C(−3, 0):

Left side: $y =$ _____ Right side: $x - 3 =$ _____

$=$ _____

The left side _____ equal the right side.

For E(0, −3):

Left side: $y =$ _____ Right side: $x - 3 =$ _____

$=$ _____

The left side _____ the right side.

For F(3, 0):

Left side: $y =$ _____ Right side: $x - 3 =$ _____

$=$ _____

So, Graph ____ has equation $y = x - 3$.

