Learning from Comparison in Algebra

Main WEP page

Which is correct?

Alex and Morgan were asked to solve $45y + 90 = 60y$

Alex's "combine like terms" way

Morgan's "combine like terms" way

$45y + 90 = 60y$	$45y + 90 = 60y$
$135y = 60y$	$90 = 15y$
$75y = 0$	$6 = y$
$y = 0$	

Alex: I first combined like terms on the left side of the equation.

Then I subtracted both sides by 60*y*.

Then I divided both sides by 75 to get the answer.

Morgan: First I subtracted 45*y* on either side; 60*y* – 45*y* is 15*y*.

Then I divided both sides by 15 to get the answer.

*** How did Alex solve the equation?**
*** How did Morgan solve the equation?**
*** Why did Alex combine the terms on the left as a first step?**
*** Why did Morgan subtract 45y as a first step?**
*** Which way is correct, Alex's or Morgan's way? How do you know?**
*** Can you state a general rule about combining like terms that describes what you have learned from comparing Alex's and Morgan's ways of solving this type of problem?**

3.2.2

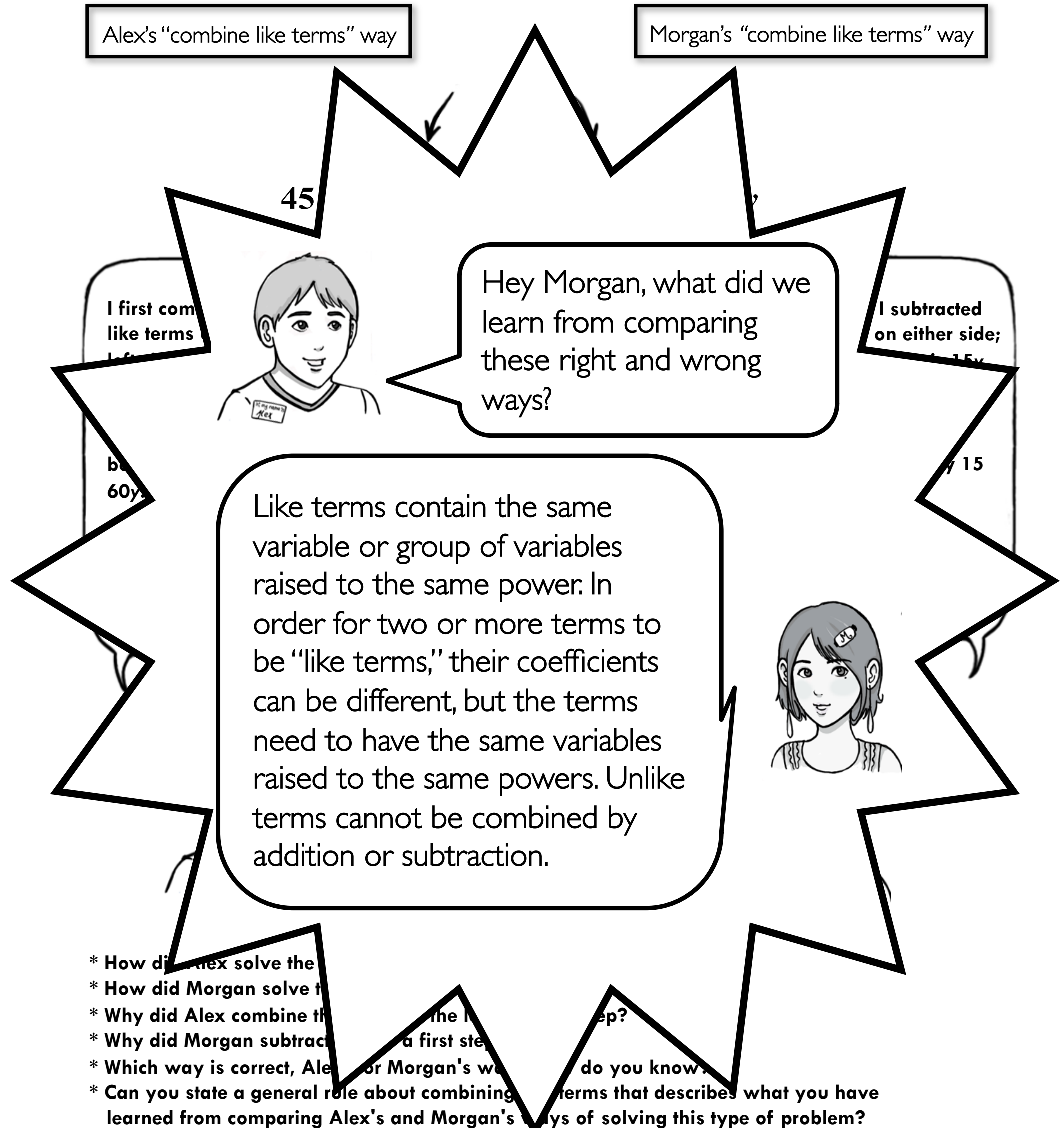
Take-away page

Which is correct?

Alex and Morgan were asked to solve $45y + 90 = 60y$

Alex's "combine like terms" way

Morgan's "combine like terms" way



3.2.2

Main WEP page

Which is better?

Alex and Morgan were asked to simplify $16^{\frac{3}{4}}$

Alex's "rewrite the exponent" way	Morgan's "use perfect squares to rewrite the exponent" way
$16^{\frac{3}{4}}$	$16^{\frac{3}{4}}$
$\downarrow$	$\downarrow$
$(16^3)^{\frac{1}{4}}$	$(16^{\frac{1}{4}})^3$
$\downarrow$	$\downarrow$
$(16\cdot16\cdot16)^{\frac{1}{4}}$	$(2)^3$
$\downarrow$	$\downarrow$
$(4096)^{\frac{1}{4}}$	8
$\downarrow$	
8	

Alex:

I rewrote the fractional exponent as 3 times 1/4.

I expanded the expression in the parentheses.

I got 4096. Then I applied the exponent.

This is my answer.

Morgan:

I rewrote the fractional exponent as 1/4 times 3.

I simplified the expression in the parentheses. Since 2^4 is 16, I know that $16^{1/4}$ is 2.

This is my answer.

*** How did Alex simplify the expression?**
*** How did Morgan simplify the expression?**
*** What are some similarities and differences between Alex's and Morgan's ways?**
*** Which strategy do you think is more efficient for this problem? Why?**

Take-away page

Which is better?

Alex and Morgan were asked to simplify $16^{\frac{3}{4}}$

Alex's "rewrite the exponent" way	Morgan's "use perfect squares to rewrite the exponent" way

I rewrote the fractional exp... **I expanded... express... pa...** **I got 4096... applied... expon...** **This is my answ...**

...rewrote the ...onal exponent **...fied the ...in the** **...answer.**

*** How did Alex simplify the e...on?**
*** How did Morgan simplify th... expression?**
*** What are some similarities and differences betw... Alex's and Morgan's ways?**
*** Which strategy do you think is more efficient for ...is problem? Why?**

Why does it work? Main WEP page

Alex and Morgan were asked to simplify the expression

$$3x(5x+2)+4(5x+2)$$

Alex's way		Morgan's way	
	$3x(5x+2)+4(5x+2)$	$3x(5x+2)+4(5x+2)$	
First I expanded the expression using the distributive property.	$15x^2+6x+20x+8$	$(3x+4)(5x+2)$	First I factored the expression.
Then I simplified the expression.	$15x^2+26x+8$	$15x^2+6x+20x+8$	Then I expanded the expression.
		$15x^2+26x+8$	Then I simplified the expression.

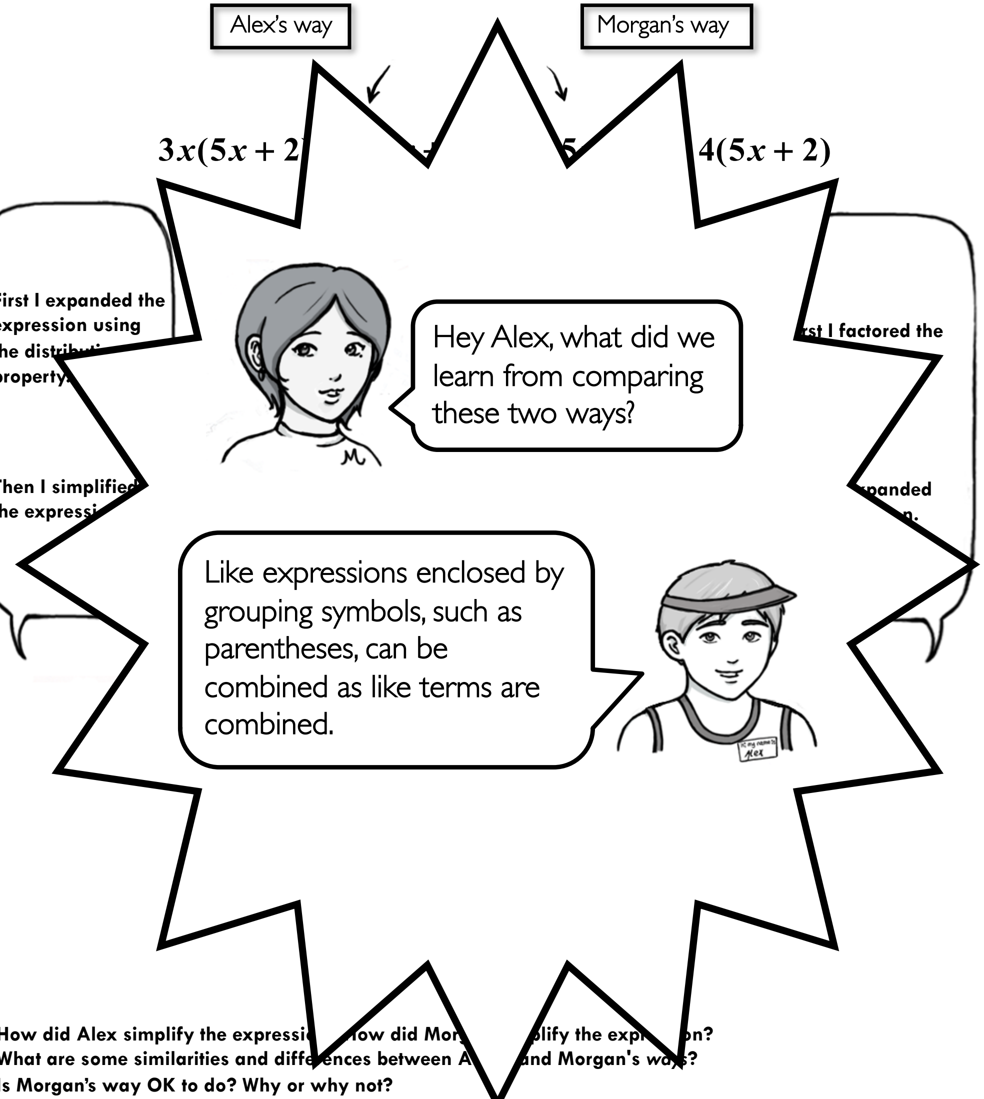
* How did Alex simplify the expression? How did Morgan simplify the expression?
* What are some similarities and differences between Alex's and Morgan's *ways*?
* Is Morgan's way OK to do? Why or why not?

Why does it work? Take-away page

Alex and Morgan were asked to simplify the expression

$$3x(5x+2)+4(5x+2)$$

Alex's way | Morgan's way

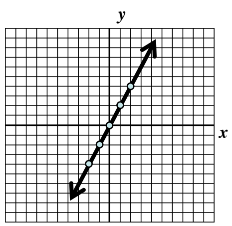


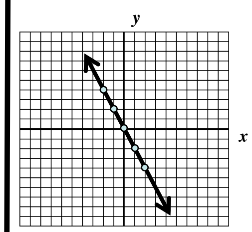
Main WEP page

How do they differ?

Alex was asked to graph the equation $y = 2x$
and Morgan was asked to graph the equation $y = -2x$.

Alex's "graph $y = 2x$" way	Morgan's "graph $y = -2x$" way
I rewrote the equation in $y = mx + b$ form.	I rewrote the equation in $y = mx + b$ form.
$y = 2x$ ↓ $y = mx + b$, $y = 2x + 0$ ↓	$y = -2x$ ↓ $y = mx + b$, $y = -2x + 0$ ↓
I graphed the *y*-intercept, (0,0) and counted up 2, right 1 and down 2, left 1 to plot other points on the line. I connected the points to draw the graph of the line.	I graphed the *y*-intercept, (0,0) and counted down 2, right 1 and up 2, left 1 to plot other points on the line. I connected the points to draw the graph of the line.





*** How did Alex graph the line given by his equation? How did Morgan graph the line given by her equation?**
*** Can you think of another way that Alex and Morgan could have used to find the graphs of their lines?**
*** What are some similarities and differences between Alex's and Morgan's problems?**
*** What are some similarities and differences between Alex's and Morgan's graphs?**
*** How does changing the sign of *m* affect the graph of a line?**

Take-away page

How do they differ?

Alex was asked to graph the equation $y = 2x$
and Morgan was asked to graph the equation $y = -2x$.

Alex's "graph $y = 2x$" way

Morgan's "graph $y = -2x$" way

In the slope-intercept form of a line ($y = mx + b$), the coefficient of *x*, which is *m*, indicates the slope.

Changing the sign of *m* changes the slope, or the steepness, of the line. When a line has a positive slope, its height increases from left to right. When a line has a negative slope, its height decreases from left to right.

*** How did ... graph the ... graph ... given by her equation?**
*** Can you think of another ... to find the graphs of their lines?**
*** What are some similarities ... differences ... Alex's and ... an's problems?**
*** What are some similarities and differences ... n Alex's and Mo... an's graphs?**
*** How does changing the sign of *m* affect the g... n of a line?**