Which is better?

Alex and Morgan were asked to simplify $\left(\frac{5}{12}\right)\left(\frac{4}{25}\right)$

Alex's "multiply numerators and denominators first" way

First I multiplied the numerator of the first fraction times the numerator of the second fraction, and the denominator of the first fraction times the denominator of the second fraction.

Then I simplified the resulting fraction by dividing the numerator and denominator by 10.
Then I simplified the last fraction by dividing the numerator and denominator by 2. I got 1/15, which can't be simplified any more.

$$\left(\frac{5}{12}\right)\left(\frac{4}{25}\right)$$

$$\frac{5\cdot 4}{12\cdot 25}=\frac{20}{300}$$

$$\frac{2}{30}$$

$$\frac{1}{15}$$

Morgan's "eliminate common factors first" way

$$\left(\frac{5}{12}\right)\left(\frac{4}{25}\right)$$

$$\left(\frac{\cancel{5}^{1}}{12}\right)\left(\frac{4}{\cancel{25}_{5}}\right)$$

$$\left(\frac{1}{\cancel{12}_{3}}\right)\left(\frac{\cancel{4}^{1}}{25}\right)$$

$$\left(\frac{1}{3}\right)\left(\frac{1}{5}\right)$$

$$\frac{1}{15}$$

First I eliminated common factors in the numerators and denominators. I eliminated a common factor of 5 from 5 and 25, and a common factor of 4 from 4 and 12. This left me with the problem 1/3 times 1/5.

Then I multiplied the remaining factors in the numerator and the denominator. I got 1/15.

*** 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?**
*** Even though Alex and Morgan did different first steps, why did they both get the same answer?**
*** Which way is easier, Alex's way or Morgan's way?**

Which is better?

Alex and Morgan were asked to simplify $\left(\frac{5}{12}\right)\left(\frac{4}{25}\right)$

Alex's "multiply numerators and denominators first" way

Morgan's "eliminate common factors first" way

$\left(\frac{4}{\ }\right)$ $\left(\frac{4}{\ }\right)$

First I multiplied the numerator of the first fraction times the nume… the second… and the denominato… first fraction … the denomina… th… re… divi… and d… 10.

First I eliminated common factors in the numerators and denominato… I … or of 5 25, and a ctor of 4 12. This … n … d

When multiplying fractions, eliminating common factors in the numerators and denominators can make the problem easier.

Before you start solving a problem, you can look at the problem first and try to see which way will be easier.

dend… got 1/… be r…

*** How did Alex simplify t… :**
*** How did Morgan simplif… ession**
*** What are some similariti… differences … Alex's and M… n's ways?**
*** Even though Alex and M… gan did different… eps, why did they both get the same answer?**
*** Which way is easier, Alex's way or Morgan's …?**

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 What are some similarities and differences between Alex's and Morgan's *ways*?

3 Even though Alex and Morgan did different first steps, why did they both get the same answer?

4 Which way is easier, Alex's way or Morgan's way?

How do they differ?

Alex was asked to simplify $6 \div 2$, and Morgan was asked to simplify $6 \cdot \frac{1}{2}$

Alex's "division" way		Morgan's "multiplication by a reciprocal" way
	$6 \div 2$	$6 \cdot \frac{1}{2}$
	↓	↓
	3	$\frac{6}{1} \cdot \frac{1}{2}$
		↓
		$\frac{6}{2}$
		↓
		3

I did 6 divided by 2.

It is 3.

I did 6 times ½.

I rewrote 6 as an improper fraction, which is 6/1.

I multiplied the numerator times the numerator and the denominator times the denominator.

I simplified the answer. It is 3.

*** How did Alex simplify his expression?**
*** How did Morgan simplify her expression?**
*** What are some similarities and differences between Alex's and Morgan's ways?**
*** What is the relationship between 2 and 1/2?**
*** What can you conclude about how multiplication and division are related from this problem?**

How do they differ?

Alex was asked to simplify $6 \div 2$, and Morgan was asked to simplify $6 \cdot \frac{1}{2}$

Alex's "division" way

Morgan's "multiplication by a reciprocal" way

I did 6 divided by 2.

It is 3.

I did 6 times ½.

as an raction, 6/1.

Hey Alex, what did comparing these two examples help us to see?

Dividing by a number and multiplying by its reciprocal are equivalent.

*** H**
*** H Morgan**
*** What are some si organ's ways?**
*** What is the relatio**
*** What can you con t how n and e related from this problem?**

1a How did Alex simplify his expression?

1b How did Morgan simplify her expression?

2 What are some similarities and differences between Alex's and Morgan's ways?

3 What is the relationship between 2 and $\frac{1}{2}$?

4 What can you conclude about how multiplication and division are related from this problem?

How do they differ?

Alex was asked to simplify $5 \cdot 2$, and Morgan was asked to simplify $5 \div \frac{1}{2}$

Alex's "multiply" way		Morgan's "division by a reciprocal" way
	$5 \cdot 2$	
I multiplied 5 times 2.	↓	I did 5 divided by ½.
	10	
It is 10.		
		I wrote the division as multiplication by the reciprocal, because dividing is the same as multiplying by the reciprocal.
		I rewrote 5 as an improper fraction.
		I multiplied the numerator times the numerator and the denominator times the denominator.
		I simplified my answer. It is 10.

*** How did Alex simplify the expression?**
*** How did Morgan simplify the expression?**
*** What are some similarities and differences between Alex's and Morgan's problems?**
*** What is the relationship between 2 and 1/2?**
*** From this example, what can you conclude about how the operations of multiplication and division are related?**

How do they differ?

Alex was asked to simplify $5 \cdot 2$, and Morgan was asked to simplify $5 \div \frac{1}{2}$

Alex's "multiply" way

Morgan's "division by a reciprocal" way

I multiplied 5 times 2.

It is 10.

I did 5 divided by ½.

I wrot ion as y the ause same as y the

erator and

Hey Morgan, what did comparing these two examples help us to see?

Multiplying by a number and dividing by its reciprocal are equivalent.

*** How mplify**
*** How and Morgan simp**
*** What are some similar n's problems?**
*** What is the relationshi and**
*** From this example, wh you conclu ow the ope of multiplication and division are related?**

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 What are some similarities and differences between Alex's and Morgan's *problems*?

3 What is the relationship between 2 and $\frac{1}{2}$?

4 From this example, what can you conclude about how the operations of multiplication and division are related?

How do they differ?

Alex and Morgan were asked to simplify $\frac{3}{5} \div \frac{6}{7}$

Alex's "divide" way	Morgan's "multiply by the reciprocal" way
$\frac{3}{5} \div \frac{6}{7}$	$\frac{3}{5} \div \frac{6}{7}$
$\frac{\frac{3}{5}}{\frac{6}{7}}$	$\frac{3}{5} \cdot \frac{7}{6}$
$\frac{\frac{3}{5} \cdot \frac{7}{6}}{\frac{6}{7} \cdot \frac{7}{6}}$	$\frac{21}{30}$
$\frac{21}{30}$	$\frac{7}{10}$
$\frac{7}{10}$	

First I rewrote the division expression.

Then I multiplied the numerator and the denominator by the reciprocal of the denominator.

I simplified the expression.

First I rewrote the expression as multiplication by the reciprocal.

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?**
*** Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this expression?**

How do they differ?

Alex and Morgan were asked to simplify $\frac{3}{5} \div \frac{6}{7}$

Alex's "divide" way

Morgan's "multiply by the reciprocal" way

$\frac{3}{5} \div \frac{6}{7}$

First I rewrote the division expression.

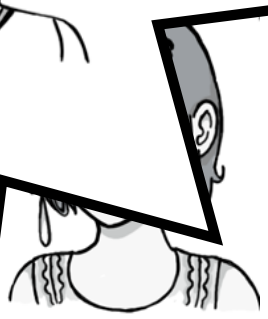
ewrote the sion as

Then I multi the numer the d

I sim exp

Hey Alex, what did we learn from comparing these two ways?

Dividing is equivalent to multiplying by the reciprocal.



*** 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?**
*** Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this expression?**

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 What are some similarities and differences between Alex's and Morgan's ways?

3 Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this expression?

Which is correct?

Alex and Morgan were asked to simplify $\frac{5+3}{5}$

Alex's "cancel terms" way	Morgan's "add terms" way
$\frac{5+3}{5}$	$\frac{5+3}{5}$
↓	↓
$\frac{\cancel{5}+3}{\cancel{5}}$	$\frac{8}{5}$
↓	
3	

First I canceled out the 5's, because there is one in the numerator and one in the denominator.

I got 3.

I added the terms in the numerator. This is my answer.

* How did Alex simplify the expression?
* How did Morgan simplify the expression?
* Whose answer is correct, Alex's or Morgan's? How do you know?
* What are some similarities and differences between Alex's and Morgan's ways?
* In thinking about the similarities and differences between Alex's and Morgan's ways, what conclusions can you draw about how to simplify this type of expression?

Which is correct?

Alex and Morgan were asked to simplify $\frac{5+3}{5}$

Alex's "cancel terms" way

Morgan's "add terms" way

$\frac{5+3}{5}$ $\frac{5+3}{5}$

First I canceled out the 5's, because there is one in the numerator and one in the deno

I got 3.

added the terms n the numerator. This is my answer.

Hey Morgan, what did we learn from comparing these right and wrong ways?

You can "cancel" common factors in the numerator and denominator of a fraction, but you cannot "cancel" terms that are being added or subtracted in the numerator or denominator of a fraction in the same way.

*** How did Alex simplify the expressi**
*** How did Morgan simplify the expre n?**
*** Whose answer is correct, Alex's or Morgan's? How do know?**
*** What are some similarities and differences between Al 's and Morgan's ways?**
*** In thinking about the similarities and differences between Alex's and Morgan's ways, what conclusions can you draw about how to simplify this type of expression?**

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 Whose answer is correct, Alex's or Morgan's? How do you know?

3 What are some similarities and differences between Alex's and Morgan's ways?

4 In thinking about the similarities and differences between Alex's and Morgan's ways, what conclusions can you draw about how to simplify this type of expression?

Why does it work?

Alex and Morgan were asked to find the value of the expression $5+3+7$

Alex's way	Morgan's way
$5+3+7$	$5+3+7$
$(5+3)+7$	$5+(3+7)$
$8+7$	$5+10$
15	15

I can't add three numbers together at the same time; I have to pick two to start with. So I added the first two numbers together.

5 plus 3 is 8, and then I added 8 plus 7.

My answer is 15.

I can't add three numbers together at the same time; I have to pick two to start with. So I added the last two numbers together.

3 plus 7 is 10, and then I added 5 plus 10.

My answer is 15.

*** How did Alex find the value of the expression? How did Morgan find the value of the expression?**

*** What are some similarities and differences between Alex's and Morgan's *ways*?**

*** Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this type of expression?**

Why does it work?

Alex and Morgan were asked to find the value of the expression $5+3+7$

Alex's way

Morgan's way

I can't add three numbers together at the same time; I have to pick two to start with. I added the first two numbers.

5 plus 3 is 8, then I added 7.

My answer

Hey Alex, what did comparing these two examples help us to see?

't add three bers together he same time; I ick two to o ber.

10, and d 5

er is 15.

Addition is associative—terms that are being added together can be grouped and added in any order with the same result.

* How did Alex find the value of t n? n of the expression?
* What are some similarities and d s betwe d Morga ?
* Can you state a general rule that bes what yo arned from d ring Alex's and Morgan's ways of simplifying this type of expressio ?

1a How did Alex find the value of the expression?

1b How did Morgan find the value of the expression?

2 What are some similarities and differences between Alex's and Morgan's *ways*?

3 Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this type of expression?

Why does it work?

Alex and Morgan were asked to simplify the expression $7-5-1$

Alex's way

$7-5-1$

$\downarrow$

$7+(-5)+(-1)$

$\downarrow$

$[7+(-5)]+(-1)$

$\downarrow$

$[2]+(-1)$

$\downarrow$

1

First I rewrote the subtraction as addition of the opposite.

I decided to add together the first two terms first. I added 7 plus -5.

I got 2. Then I added 2 plus -1.

I got 1.

Morgan's way

$7-5-1$

$\downarrow$

$7+(-5)+(-1)$

$\downarrow$

$7+[(-5)+(-1)]$

$\downarrow$

$7+(-6)$

$\downarrow$

1

First I rewrote the subtraction as addition of the opposite.

I decided to add together the second two numbers first. I added -5 plus -1.

I got -6. Than I added 7 plus -6.

I got 1.

*** 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?**
*** Would Alex's or Morgan's ways have worked if they had not rewritten subtraction as addition of the opposite?**
*** In thinking about the similarities and differences between Alex's and Morgan's ways, what conclusions can you draw about how to simplify this type of expression?**

Why does it work?

Alex and Morgan were asked to simplify the expression $7-5-1$

Alex's way

Morgan's way

First I rewrote the subtraction as addition of the opposit

I decid
together
terms first.
plus -5.

2 plu

I got 1.

Hey Morgan, what did comparing these two examples help us to see?

st I rewrote the
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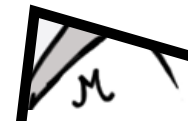
plus -1.

ed

To use the associative property, subtraction in an expression must be rewritten as addition of the opposite. Once you rewrite subtraction as addition of the opposite, you can group the terms together in any order and evaluate.



* How did Alex simplify the exp ow di plify th ion?
* What are some similarities and ences betwe and Morga ys?
* Would Alex's or Morgan's way ave worked if th not rewritten su action as addition of the opposite?
* In thinking about the similarities and differences be en Alex's and Morgan's ways, what conclusions can you draw about how to simplify this type of expression?

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 What are some similarities and differences between Alex's and Morgan's *ways*?

3 Would Alex's or Morgan's ways have worked if they had not rewritten subtraction as addition of the opposite?

4 In thinking about the similarities and differences between Alex's and Morgan's ways, what conclusions can you draw about how to simplify this type of expression?

Which is correct?

Alex and Morgan were asked to simplify $5-7-3$

Alex's "subtract 3 from 7 first" way

$5-7-3$

↓

$5-4$

↓

1

First I subtracted 7 minus 3.

Then I subtracted 5 minus 4.

Morgan's "rewrite the expression using addition first" way

$5-7-3$

↓

$5+(-7)+(-3)$

↓

$5+(-10)$

↓

-5

First I rewrote the expression using addition.

Then I added the negative terms together. I added -7 plus -3, and I got -10.

Last, I added 5 plus -10, and I got -5.

*** 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?**
*** Whose answer is correct, and how do you know?**
*** For the person who got the wrong answer, why did he or she get the wrong answer?**
*** Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this expression?**

Which is correct?

Alex and Morgan were asked to simplify $5 - 7 - 3$

Alex's "subtract 3 from 7 first" way

Morgan's "rewrite the expression using addition first" way

$7 - 3$

$5 - 7$

First I subtracted minus 3.

Then I su minus 4.

st I rewrote the pression using dition.

the ms I added and I

d I got

Hey Alex, what did we learn from comparing those two examples?

When subtracting, you must subtract from left to right. If you subtract in a different order, you might get a different answer. In this way, subtracting is different from adding (even adding negative numbers), because for adding you can apply the associative property and perform the addition in any order you choose and still get the same answer.

* How did Alex simplify the exp
* How did Morgan simplify the e
* What are some similarities and s betw d Mor s?
* Whose answer is correct, and h you know?
* For the person who got the wro answer, why did she get the wrong answer?
* Can you state a general rule that describes what you ve learned from comparing Alex's and Morgan's ways of simplifying this expression?

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 What are some similarities and differences between Alex's and Morgan's *ways*?

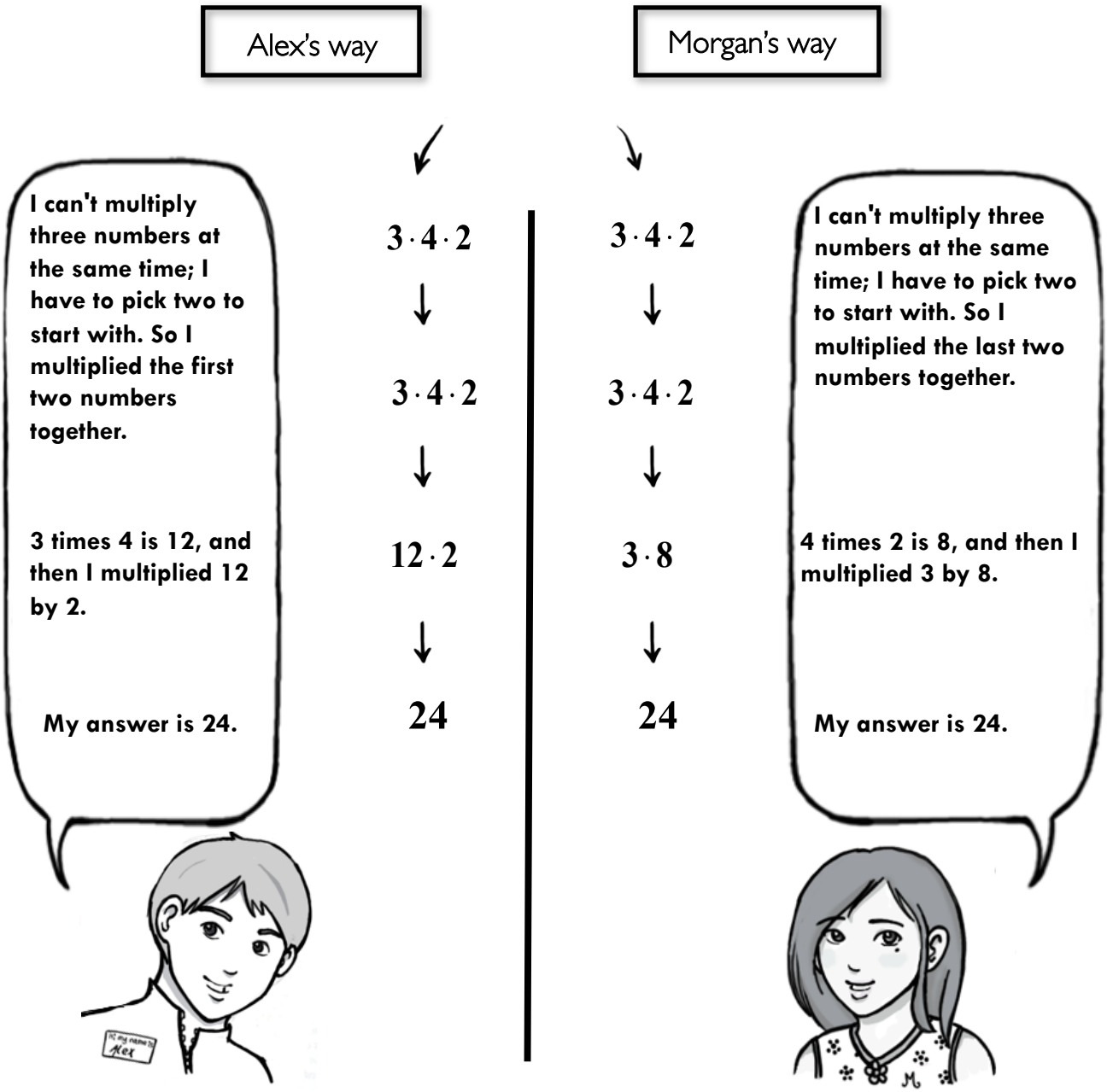
3 Whose answer is correct, and how do you know?

4 For the person who got the wrong answer, why did he or she get the wrong answer?

5 Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this expression?

Why does it work?

Alex and Morgan were asked to find the value of the expression $3 \cdot 4 \cdot 2$



* 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*?
* Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this type of expression?

Why does it work?

Alex and Morgan were asked to find the value of the expression $3 \cdot 4 \cdot 2$

Alex's way

Morgan's way

I can't multiply three numbers at the same time; I have to start with multiplying two numbers together.

I can't multiply three numbers at the same time; I have to start with two

st two

er.

Hey Morgan, what did comparing these two examples help us to see?

Multiplication is associative: you can multiply the terms in any order you choose and still get the same answer.

* H… Alex sim…
* How did Morgan …
* What are some sim… …Morgan's *ways*?
* Can you state a ge… that a… you … from comparing Alex's and Morgan's ways of …ying this ty… …ession?

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 What are some similarities and differences between Alex's and Morgan's *ways*?

3 Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this type of expression?

Which is correct?

Alex and Morgan were asked to simplify $8 \div 4 \div 2$

Alex's "divide from left to right" way		Morgan's "'group' the second two terms first" way
	$8 \div 4 \div 2$	$8 \div 4 \div 2$
	↓	↓
I decided to simplify this expression from left to right, by grouping the first two terms first.	$(8 \div 4) \div 2$	$8 \div (4 \div 2)$
So I did 8 divided by 4, and I got 2.	↓	↓
	$2 \div 2$	$8 \div 2$
Then I did 2 divided by 2, and I got 1.	↓	↓
	1	4
		I decided to simplify this expression by grouping the second two terms first.
		So I did 4 divided by 2, and I got 2.
		Then I divided 8 by 2, and I got 4.

* How did Alex simplify the expression?
* How did Morgan simplify the expression?
* Which answer is correct, Alex's or Morgan's? How do you know?
* What are some similarities and differences between Alex's and Morgan's ways?
* In thinking about the similarities and differences between Alex's and Morgan's ways, what conclusions can you draw about how to simplify this type of expression?

Which is correct?

Alex and Morgan were asked to simplify $8 \div 4 \div 2$

Alex's "divide from left to right" way

Morgan's "'group' the second two terms first" way

I decided to simplify this expression from left to right, by grouping the first two terms firs

So I did 8 ÷ 4, and I go

I decided to simplify this expression by grouping the second two terms firs

ded by

Hey Alex, what did we learn from comparing those two examples?

When simplifying expressions with division, you must perform the division from left to right. If you divide in a different order, you might get a different answer. In this way, dividing is different from multiplying, because for multiplying, you can multiply the terms in any order and still get the same result.

*** lex s**
*** How did Morga**
*** Which answer is**
*** What are some s nd d**
*** In thinking about milarities a**
conclusions can y raw about hov

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Morgan's ways?
ces betwee s and Morgan's ways, what
plify this type o xpression?

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 Which answer is correct, Alex's or Morgan's? How do you know?

3 What are some similarities and differences between Alex's and Morgan's *ways*?

4 In thinking about the similarities and differences between Alex's and Morgan's ways, what conclusions can you draw about how to simplify this type of expression?

Which is correct?

Alex and Morgan were asked to simplify $3-5$

Alex's way	Morgan's way
$3-5$	$3-5$
$\downarrow$	$\downarrow$
$3+-5$	$5-3$
$\downarrow$	$\downarrow$
$-5+3$	2
$\downarrow$	
-2	

I rewrote the subtraction (minus 5) as addition of the opposite or additive inverse (plus the opposite of 5).

Then I rearranged the terms. It's okay for me to do that because of the commutative property.

I added -5 plus 3 and I got -2.

First I rearranged the terms. It's okay for me to do that because of the commutative property.

I got 2.

*** How did Alex simplify the expression?**
*** How did Morgan simplify the expression?**
*** Which answer is correct, Alex's or Morgan's? How do you know?**
*** What are some similarities and differences between Alex's and Morgan's *ways*?**
*** Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this type of expression?**

Which is correct?

Alex and Morgan were asked to simplify $3-5$

Alex's way

Morgan's way

I rewrote the
(minus 5) as
the opposite o
inverse (plus t
opposite of 5).

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okay for me
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Hey Morgan, what did we learn from comparing these right and wrong ways?

Subtraction is not commutative. If you want to rearrange the order of terms (by using the commutative property) to simplify an expression with subtraction, you'll need to rewrite the subtraction as addition of the opposite. Subtraction is not commutative, but addition (including addition of negative numbers) is.

* How
* How did Morgan simp
* Which answer is corre
* What are some similari
* Can you state a genera

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you
difference
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an's *ways*?
e that describes
ou have learne
om comparing Alex's and
Morgan's ways of simplifying this type of
ssion?

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 Which answer is correct, Alex's or Morgan's? How do you know?

3 What are some similarities and differences between Alex's and Morgan's *ways*?

4 Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this type of expression?

How do they differ?

Alex was asked to simplify 5 – 3, and Morgan was asked to simplify 3 – 5

Alex's way	Morgan's way
I subtracted 5 minus 3.	I subtracted 3 minus 5.
$5 - 3$	$3 - 5$
$\downarrow$	$\downarrow$
2	-2
My answer is 2.	My answer is -2.

*** Did Alex correctly subtract 5 – 3? Did Morgan correctly subtract 3 – 5?**

*** What are some similarities and differences between Alex's and Morgan's *problems*?**

*** In thinking about the similarities and differences between Alex's and Morgan's ways, what conclusions can you draw about how to simplify these types of expressions?**

How do they differ?

Alex was asked to simplify 5 – 3, and Morgan was asked to simplify 3 – 5

Alex's way

Morgan's way

I subtracted 5 minus 3.

My answer i

I subtracted 3 minus 5.

swer is -2.

Hey Alex, what did comparing these two examples help us to see?

Changing the order in which positive integers are subtracted does change the answer. In other words, subtraction is not commutative.

* In think
conclu

ays, what

1a Did Alex correctly subtract 5-3?

1b Did Morgan correctly subtract 3-5?

2 What are some similarities and differences between Alex's and Morgan's *problems*?

3 In thinking about the similarities and differences between Alex's and Morgan's ways, what conclusions can you draw about how to simplify these types of expressions?

Why does it work?

Alex and Morgan were asked to simplify the expression $2(3+5)$

Alex's "order of operations" way

$2(3+5)$

↓

$2(8)$

↓

16

First I added 3 plus 5, and I got 8.

Then I multiplied 8 times 2. I got 16.

Morgan's "distributive property" way

$2(3+5)$

↓

$2\cdot 3+2\cdot 5$

↓

$6+10$

↓

16

First I distributed the 2, so I got 2 times 3 plus 2 times 5.

I multiplied 2 times 3 and got 6, and 2 times 5 and got 10.

Then I added 6 plus 10. I got 16.

*** How did Alex simplify the expression?**
*** How did Morgan simplify the expression?**
*** What are some differences between Alex's and Morgan's *ways*?**
*** Morgan's way doesn't follow the order of operations. Is this OK?**

Why does it work?

Alex and Morgan were asked to simplify the expression $2(3+5)$

Alex's "order of operations" way

Morgan's "distributive property" way

First I adde
5, and I got

ributed the
t 2 times 3
mes 5.

Th
time

3
imes

Hey Morgan, what did comparing these two examples help us to see?

In order to multiply a term by an expression in parentheses, you can either (1) simplify the expression in parentheses first or (2) use the distributive property first. Both ways are OK and yield the same answer.

*** H Alex sim**
*** How did Morgan**
*** What are some di ve**
*** Morgan's way do w the o tions.**

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 What are some differences between Alex's and Morgan's *ways*?

3 Morgan's way doesn't follow the order of operations. Is this OK?

Which is correct?

Alex and Morgan were asked to simplify $2(x+5)$ by applying the distributive property

Alex's "distribute over both terms in the parentheses" way	Morgan's "remove the parentheses" way
$2(x+5)$	$2(x+5)$
↓	↓
$2(x)+2(5)$	$2x+5$
↓	
$2x+10$	

I multiplied 2 times *x* and 2 times 5.

2 times *x* is 2*x*, and 2 times 5 is 10. So I got 2*x* + 10.

To distribute the 2, I multiplied 2 times *x* to get 2*x* and then removed the parentheses.

*** Describe Alex's way to a new student in your class.**
*** Describe Morgan's way to a new student in your class.**
*** What are some similarities and differences between Alex's and Morgan's ways?**
*** Which answer is correct, Alex's or Morgan's? How do you know?**

Which is correct?

Alex and Morgan were asked to simplify $2(x+5)$ by applying the distributive property

Alex's "distribute over both terms in the parentheses" way

Morgan's "remove the parentheses" way

Hey Alex, what did we learn from comparing these right and wrong ways?

I multipli
***x* and 2 tim**

2 ti
got 2*x* +

ne 2,
2
get 2*x*
oved

When using the distributive property, don't forget to distribute to each of the terms in the parentheses. If you only distribute to some terms and not others, you can get an incorrect result.

*** Describe Alex's way t en**
*** Describe Morgan's wa w stude ss.**
*** What are some similar nd differen en Alex's an gan's ways?**
*** Which answer is corre Alex's or Morgan w do you know?**

2.5.2

1 Describe Alex's way to a new student in your class.

2 Describe Morgan's way to a new student in your class.

3 What are some similarities and differences between Alex's and Morgan's *ways*?

4 Which answer is correct, Alex's or Morgan's? How do you know?

Which is correct?

Alex and Morgan were asked to simplify $3(2x)$

Alex's "distribute over the parentheses" way

$3(2x)$

↓

$3(2) \cdot 3(x)$

↓

$6 \cdot 3x$

↓

$18x$

I distributed the 3 over the terms in the parentheses.

I multiplied 3 times 2 and 3 times x.

I got 18x.

Morgan's "multiply only" way

$3(2x)$

↓

$6x$

I multiplied 3 times 2 and got 6. I multiplied that by x and I got 6x.

* **Describe Alex's way to a new student in your class.**
* **Describe Morgan's way to a new student in your class.**
* **What are some similarities and differences between Alex's and Morgan's ways?**
* **Which answer is correct, Alex's or Morgan's? How do you know?**

Which is correct?

Alex and Morgan were asked to simplify $3(2x)$

Alex's "distribute over the parentheses" way

Morgan's "multiply only" way

$(2x)$ $3(2$

I distributed
over the ter
the parenthe

d 3 times 2
. I multiplied
and I got 6x.

I
and

Hey Morgan, what did we learn from comparing these right and wrong ways?

When terms inside parentheses are multiplied together, a term outside the parentheses should not be "distributed" to each term inside. Remember that the official name for the distributive property is the "distributive property of multiplication over addition," and it's only appropriate for terms inside the parentheses that are added together.

*** Describe Alex's wo ew stude lass.**
*** Describe Morgan's to a new stu our class.**
*** What are some similarities and differe etween Alex's and Morgan's ways?**
*** Which answer is correct, Alex's or Morga s? How do you know?**

1 Describe Alex's way to a new student in your class.

2 Describe Morgan's way to a new student in your class.

3 What are some similarities and differences between Alex's and Morgan's *ways*?

4 Which answer is correct, Alex's or Morgan's? How do you know?

Which is correct?

Alex and Morgan were asked to simplify $|-5|+|30|$

Alex's "add first" way	Morgan's "take absolute values first" way
I added -5 plus 30.	$\|-5\|+\|30\|$
I got $\|25\|$.	$\|25\|$
It is 25.	25

Morgan's "take absolute values first" way	
$\|-5\|+\|30\|$	
$5+30$	**I took the absolute value of each number first. I got 5 plus 30.**
35	**I added them together, and I got 35.**

*** How did Alex simplify the expression?**
*** How did Morgan simplify the expression?**
*** Whose answer is correct, Alex's or Morgan's? How do you know?**
*** What are some similarities and differences between Alex's and Morgan's ways?**
*** Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways?**

Which is correct?

Alex and Morgan were asked to simplify $|-5|+|30|$

Alex's "add first" way

Morgan's "take absolute values first" way

I added -5 [illegible] 30.

It is 25.

Hey Morgan, what did we learn from comparing these right and wrong ways?

expression

$|a|+|b|$ is only equal to $|a+b|$ if a and b are 0 or positive numbers.

If either a or b is negative, then $|a|+|b| \neq |a+b|$.

*** How did Alex simplify t[illegible].**
*** How did Morgan simpli[illegible]ession[illegible]**
*** Whose answer is correct[illegible]s or Morgan[illegible]o you know?**
*** What are some similaritie[illegible]nd differences [illegible]n Alex's and Mor[illegible]n's ways?**
*** Can you state a general rule that describes w[illegible]you have learned from comparing Alex's and Morgan's ways?**

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 Whose answer is correct, Alex's or Morgan's? How do you know?

3 What are some similarities and differences between Alex's and Morgan's ways?

4 Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways?

Which is correct?

Alex and Morgan were asked to simplify $-5-(-2)$

Alex's "rewrite subtraction as addition of the opposite" way	Morgan's "subtract" way
$-5-(-2)$	$-5-(-2)$
↓	↓
$-5+2$	-7
↓	
-3	

I rewrote the expression as -5 plus 2.

I got -3.

I got -7.

*** How did Alex simplify the expression?**
*** How did Morgan simplify the expression?**
*** Whose answer is correct, Alex's or Morgan's? How do you know?**
*** What are some similarities and differences between Alex's and Morgan's ways?**
*** Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this expression?**

Which is correct?

Alex and Morgan were asked to simplify $-5-(-2)$

Alex's "rewrite subtraction as addition of the opposite" way

Morgan's "subtract" way

I rewr
expressi
plus 2.

I go

Hey Alex, what did we learn from comparing these right and wrong ways?

Subtracting the opposite of a number is not the same as subtracting the number itself. You may rewrite subtraction of the opposite as addition.

*** How did Alex simplify the expression?**
*** How did Morgan simplify the expression?**
*** Whose answer is correct, Alex's or Morgan's? How do you know?**
*** What are some similarities and differences between Alex's and Morgan's ways?**
*** Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this expression?**

1a How did Alex simplify the expression?

1b How did Morgan simplify the expression?

2 Whose answer is correct, Alex's or Morgan's? How do you know?

3 What are some similarities and differences between Alex's and Morgan's ways?

4 Can you state a general rule that describes what you have learned from comparing Alex's and Morgan's ways of simplifying this expression?