Remote Learning Packet

NB: Please keep all work produced this week. Details regarding how to turn in this work will be forthcoming.

April 20 - 24, 2020

Course: Math Fundamentals

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Weekly Plan:

Monday, April 20
☐ Read Pages 1-2
☐ Page 12 (Packet) 1-30 all

Tuesday, April 21
☐ Read Pages 3-4
☐ Section 11.4 pg. 379 1-25 odd

Wednesday, April 22
☐ Read Pages 5-7
☐ Section 11.5 pg. 381 3-21 odd

Thursday, April 23
☐ Read Pages 8-9
☐ Section 11.6 pg. 384 1-21 odd

Friday, April 24
☐ Read Pages 10-11
☐ Section 11. 5 23-37 odd
☐ Section 11.6 22-27 all, 29-35 odd

Statement of Academic Honesty

I affirm that the work completed from the packet is mine and that I completed it independently.

I affirm that, to the best of my knowledge, my child completed this work independently

Student Signature

Parent Signature

Monday, April 20

Review of adding and subtracting negative numbers. Read pages 1-2 in the packet and then complete all of the exercises on page 12 of the packet on a separate sheet of paper. Then correct in pen as normal. There are a lot of problems, but they should be quick; all you need to do is add or subtract. Don't worry about the number of problems!

Tuesday, April 21

Today we move on from addition and subtraction to multiplication with negative numbers. Read pages 3-4 of the packet and Section 11.4 in the book, then complete the exercises on a separate piece of paper. Correct with pen per usual.

Wednesday, April 22

Finish up multiplication of negative numbers. Read pages 5-7 in the packet AND Section 11.5 in the book.The book's explanation is slightly different, so please read both the packet and the book. Complete the exercises on a separate piece of paper, then correct with a pen.

Thursday, April 23

Now that we've covered multiplication of negative numbers we are ready to move to its inverse operation, division. Read pages 8-9 in the packet and Section 11.6 in the book, then complete the exercises on a separate sheet of paper, correcting with a pen.

Friday, April 24

Review of what we have covered this week. Before we move on, it is important to solidify operations in the negative numbers. Read pages 10-11 in the packet and complete the exercises. Notice that the exercises come from two separate sections in the book today. Make sure to label the sections clearly as you complete the exercises on a separate piece of paper and correct with a pen.

Answer Key

Monday:

1. 535 + 737 = 1272
2. –352 + 456 = 104
3. –611 + (–665) = –1276
4. –496 – (–413) = –83
5. 391 + (–630) = –239
6. –680 + (–992) = –1672
7. –794 + (–670) = –1464
8. 877 – (–749) = 1626
9. 464 – 276 = 188
10. 50 – 45 = 5
11. 911 – (–198) = 1109
12. 502 – 923 = –421
13. 944 + 333 = 1277
14. –663 + 678 = 15
15. –915 + 149 = –766
16. –424 – 776 = –1200
17. –823 + 936 = 113
18. 525 – (–442) = 967
19. –709 + (–869) = –1578
20. –915 + (–138) = –1053
21. 724 – 339 = 385
22. 55 – 758 = –703
23. 273 – 771 = –498
24. –461 – (–413) = –48
25. –182 – (–242) = 60
26. 247 – 0 = 247
27. 809 + (–115) = 694
28. –960 + 361 = –599
29. –747 + (–573) = –1320
30. –294 – 156 = –450

Tuesday-Thursday:

The answers are in the back of the textbook

Friday:

Section 11.5
In the back of the book
Section 11.6
22. A. -24 B. -6
23. A. 2 b. 18
24. 96
25. -32
26. 3
27. -6
29-35 odd are in the back of the textbook

1 11.2 and 11.3 Review

1.1 Addition Review

Today we're focusing on practicing addition and subtraction with negative numbers.

Ex.

$$-25 + 22$$

There are a couple of ways we can think about this problem:

1. Since addition is commutative, we can rewrite the equation:

   $$(-25) + 22 = 22 + (-25)$$

   We know that addition of a *negative* number becomes subtraction of a *positive* number, so we can write:

   $$22 - 25 = -3$$

2. In addition, we can think about the absolute values of each number:

   $$|-25| = 25,\ |22| = 22$$

   Since the absolute value of the negative number is greater than the absolute value of the positive number, we know the answer is going to be negative. Thus,

   $$-25 + 22 = -3$$

What if we change the equation slightly?

Ex.

$$-22 + -25$$

In this case both of the integers are negative, so the answer is also going to be negative. We know that

$$22 + 25 = 47$$

so

$$(-22) + (-25) = -47$$

1.2 Subtraction Review

Now that we have reviewed addition, lets switch to subtraction.

Ex.

$$22 - (-25)$$

In this case, we are subtracting a negative number. Recall that *subtracting* a negative number is the same as *adding* a positive number. We can rewrite the expression as:

$$22 + 25 = 47$$

Another example:

Ex.

$$-22 - 25$$

We have to read this question carefully. We are subtracting *positive* 25 from *negative* 22. In this case, it might be helpful to rewrite the subtraction as addition. Recall that subtraction of a positive number is the same as addition of a negative number. we can write:

$$-22 - 25 = -22 + (-25)$$

Now we are merely adding two negative numbers, just like we did in the second example.

$$-22 - 25 = -47$$

Last example:

Ex.

$$-25 - (-22)$$

Again, we know that subtraction of a negative number is addition of a positive number, so we can rewrite the expression:

$$-25 + 22$$

This is the first example we did, so

$$-25 - (-22) = -3$$

Notice how the examples were the same questions, just written in different ways. The expressions represented the same values, even though some used the operation of addition and some used subtraction. There are many ways to change between adding and subtracting integers to represent the same value.

2 Multiplication with a Negative Number

2.1 Multiplication in General

What is multiplication? Well, if you have 3, 15 times, in order to find the total you can add 3 together 15 times: 3+3+3+3+3+3+3+3+3+3+3+3+3+3+3=45. Or, since you have 3, 15 *times*, you can multiply: 3(15)=45. So multiplication is really just repeated addition.

2.2 Multiplication in Particular

Now, lets bring our knowledge of multiplication to negative numbers. We know that *adding* a negative number is really just *subtracting* a positive number.

$$0 + (-9) = 0 - 9$$

If multiplication is repeated addition, multiplication of a *negative* number is really just repeated subtraction. Let's see how this works:

Ex.

$$(-9) \times 4$$

$$-9 + -9 + -9 + -9$$

$$-9 - 9 - 9 - 9$$

$$= -36$$

Since we are repeatedly adding a negative number, or repeatedly subtracting, the answer is a negative number. Let's look at another example:

Ex.

$$7 \times (-6)$$

Now, since multiplication is **commutative**, we can rewrite the expression:

$$(-6) \times 7$$

$$-6 + -6 + -6 + -6 + -6 + -6 + -6$$

$$-6 - 6 - 6 - 6 - 6 - 6 - 6$$

$$= -42$$

From these examples we can see that:

The product of a positive and a negative integer is a negative integer.

Ex.

$$-8 \times 12 = -96$$

2.3 Patterns

Another way to convince yourself that this is true is to look at the patterns of multiplication. Examine the following pattern:

$$(3)(4) = 12$$
$$(3)(3) = 9$$
$$(3)(2) = 6$$
$$(3)(1) = 3$$
$$(3)(0) = 0$$

1. What pattern do you see as 3 is multiplied by smaller and smaller numbers?

2. What do you think will happen with the next entry in the pattern, (3)(-1)?

If this pattern continues logically, decreasing by 3 each time, then the next entry must be (3)(-1)=-3. Since math is inherently logical, this is exactly what happens!

3 Products with Several Negative Factors

3.1 One Negative Factor

Consider the following examples:

Ex.

$$4 \times (-1) = -4$$

Ex.

$$(-1) \times 45 = -45$$

From these examples we can see that a positive number times -1 equals its **opposite**. Why does this happen? Well, the -1 tells us to go in the opposite direction of the number. Remember, positive and negative numbers are opposites. Instead of repeated addition, multiplication of a negative number is repeated subtraction.

3.2 Two Negative Factors

What happens if you are multiplying two negative numbers together? Let's work through the following example:

Ex.

$$(-45) \times (-1)$$

We previously stated that a number times (-1) is the opposite of the number, which would mean that $(-45) \times (-1) = 45$, the opposite of -45. We know that multiplying by a negative number is repeated subtraction. So if we subtract (-45):

$$0 - (-45) = 0 + 45$$

Which gives us our answer, 45.

Let's try this with numbers other than (-1):

Ex.

$$(-5) \times (-6)$$

Now, we are multplying (-5) times a negative number. We know that multiplication of a negative number is repeated subtraction, so we are going to *subtract* (-5) six times, starting at zero.

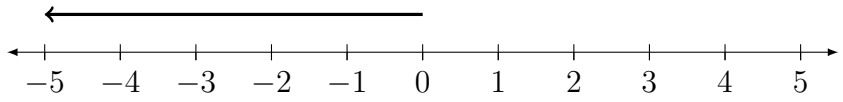
$$0 - (-5) - (-5) - (-5) - (-5) - (-5) - (-5)$$

But what happens when you subtract a negative number? It turns into addition! So we can rewrite the problem as:

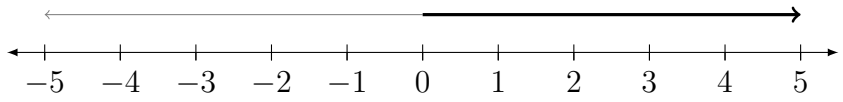
$$0 + 5 + 5 + 5 + 5 + 5 + 5$$

$$= 30$$

How did we start with two negatives and end up with a positive number? Well one negative number tells us to move to the left of zero, into the negatives.



The second negative number tells us to move in the opposite direction that we started with. Since we started towards the *left* of zero, in the negatives, we end up to the *right* of zero, in the positives.



Basically, the two negative numbers cancel each other out. **The product of two negative numbers is a positive number**. Look at the following examples:

Ex.

$$(-11) \times (-12) = 132$$

Ex.

$$(-3) \times 7 \times (-9)$$

$$(-21) \times (-9)$$

$$189$$

Ex

$$(-6) \times 5 \times (-8) \times (-5)$$
$$[(-6) \times 5] \times [(-8) \times (-5)]$$
$$(-30) \times 40$$
$$-120$$

Based on the previous examples, fill in the blank:

1. If the number of negative factors is odd, the product is _____.
2. If the number of negative factors is _____, the product is positive.

3.3 Patterns Part 2

Yesterday we looked at the multiplication pattern for positive 3, today let's look at the multiplication pattern for -3.

$$(-3)(4) = -12$$
$$(-3)(3) = -9$$
$$(-3)(2) = -6$$
$$(-3)(1) = -3$$
$$(-3)(0) = 0$$

1. What pattern do you see as -3 is multiplied by smaller and smaller numbers?

2. What do you think will happen with the next entry in the pattern, (-3)(-1)?

In this case, instead of subtracting 3 each time, 3 is added each time. So for the pattern to continue (-3)(-1) must equal 3.

4 Quotients of Integers

4.1 Related Facts

Consider the following multiplication fact:

$$8 \times 4 = 32$$

Now we know that we can use division to cancel multiplication, so we can use **inverse operations** to rewrite the equation as:

$$8 \times 4 \div 4 = 32 \div 4$$

$$8 = 32 \div 4 = \frac{32}{4}$$

In general, we can rewrite any equation

$$a \times b = c$$

$$a \times b \div b = c \div b$$

$$a = \frac{c}{b}$$

Write two related division facts for the following equations.

1. $11 \times 4 = 44$

2. $16 \times 3 = 48$

4.2 Now with Negatives

This pattern continues with negative numbers as well. If

$$11 \times (-4) = -44$$

then we can rewrite the equation using inverse operations as

$$11 \times (-4) \div (-4) = -44 \div (-4)$$

$$11 = \frac{-44}{-4}$$

Just like with multiplication, we can see that the division of two negative numbers cancels each other out. Additionally, since $11 \times (-4) = (-4) \times 11$, we can rearrange the equation as follows:

$$(-4) \times 11 = -44$$

$$(-4) \times 11 \div 11 = -44 \div 11$$

$$-4 = \frac{-44}{11}$$

Since multiplication and division are related operations, the same rules apply. Fill in the blank:

1. The quotient of two positive or two negative numbers is _____.
2. The quotient of a positive and negative integer is _____.

These rules can be seen in the following examples:

Ex.

$$-32 \div 16 = -2$$

Ex.

$$\frac{-110}{-11} = 10$$

What about $-7 \div 0$? We can rewrite it as $\frac{-7}{0}$ which equals... UNDEFINED! Remember, we can never divide by zero because otherwise we break the rules of math and get all sorts of crazy results. It makes no sense to have 7 out of 0 parts.

5 11.4-11.6 Review

Today is just a review of what you've learned this week to get comfortable with operations with negative numbers.

5.1 11.4 Review

We discussed how since negatives are the **opposites** of positives, instead of repeated addition multiplication is the *opposite*: repeated subtraction.

Ex.

$$-4 \times 4$$
$$-4 + -4 + -4 + -4$$
$$-4 - 4 - 4 - 4$$
$$-16$$

Thus, the product of a positive and a negative integer is _____.

Ex.

$$1.2 \times (-6) = -7.2$$

5.2 11.5 Review

If we have the product of multiple negative numbers, they cancel each other out.

Ex.

$$(-5 \times -4) \times (-2 \times -6)$$
$$20 \times 12$$
$$240$$

Thus, if the number of negative factors is *even*, the product is _____.

On the other hand what does the following example tell us?

Ex.

$$(-5 \times -4) \times (2 \times -6)$$
$$(20) \times (-12)$$
$$-240$$

If the number of negative factors is *odd*, the product is _____.

5.3 11.6 Review

Division of negative numbers follows the same rules as multiplication of negative numbers.

Ex.

$$\frac{-75}{-15} = 5$$

The negative numbers cancel each other out, so the quotient is **positive**.

Ex.

$$(-144) \div 24 = -6$$

There is only one negative number, so the quotient is **negative**.

Adding and Subtracting Integers
Supplementary Exercises

Calculate the following.

1. 535 + 737
2. –352 + 456
3. –611 + (–665)
4. –496 – (–413)
5. 391 + (–630)
6. –680 + (–992)
7. –794 + (–670)
8. 877 – (–749)
9. 464 – 276
10. 50 – 45
11. 911 – (–198)
12. 502 – 923
13. 944 + 333
14. –663 + 678
15. –915 + 149
16. –424 – 776
17. –823 + 936
18. 525 – (–442)
19. –709 + (–869)
20. –915 + (–138)
21. 724 – 339
22. 55 – 758
23. 273 – 771
24. –461 – (–413)
25. –182 – (–242)
26. 247 – 0
27. 809 + (–115)
28. –960 + 361
29. –747 + (–573)
30. –294 – 156

12