GreatHearts Irving

Remote Learning Packet

Please submit scans of written work in Google Classroom at the end of the week.

Week 8: May 18-22, 2020

Course: Math Fundamentals

Teacher(s): Miss Schweizer rose.schweizer@greatheartsirving.org

Weekly Plan:

Monday, May 18

- [ ] Read Pages 1-3
- [ ] Extra Practice pg. 451 53-65 odd, 89-107 odd

Tuesday, May 19

- [ ] Read Pages 4-5
- [ ] Section 7.7 pg. 232 Written Exercises 1-27 odd

Wednesday, May 20

- [ ] Read Pages 6-8
- [ ] Extra Practice pg. 457 78-80 all
- [ ] Extra Practice pg. 459 60-65 all

Thursday, May 21

- [ ] Read Pages 9-10
- [ ] Extra Practice pg. 460 37-61 odd
- [ ] Watch Video on GC

Friday, May 22

- [ ] Attend office hours
- [ ] Catch-up or review the week's work

Statement of Academic Honesty

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

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Student Signature

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

____

Parent Signature

Monday, May 18
Review day over operations with decimals. Read pages 1-3 in the packet and then complete the exercises in the textbook. The exercises are in the back of the book in the "Extra Practice: Chapter 3" section. Make sure to show all your work, including addition, subtraction, multiplication, and division. When you have completed the exercises, correct your work with a pen and try to fix any mistakes.

Tuesday, May 19
Review of ratios and proportions. Read pages 4-5 in the packet and complete the exercises in the book. Make sure to show all your work. When you have completed the exercises, correct your work with a pen and try to fix any mistakes.

Wednesday, May 20
Now that we have reviewed proportions, let's practice solving word problems using proportions and equations. Read pages 6-8 in the packet and complete the exercises in the book. While you do not need to copy down the entire problem, write the important information on your paper. Make sure to label your variable and create an equation for each problem. Your answers should be in complete sentences. When you have completed the exercises, correct your work with a pen and try to fix any mistakes.

Thursday, May 21
Another way we use proportions is with percentages. Read pages 9-10 in the packet, watch the video on Google Classroom, and complete the exercises in the book. Don't forget to copy down the original problem! Show all your work and when you have completed the exercises, correct your work with a pen and try to fix any mistakes.

Friday, May 22
Take advantage of today to catch up with any work, making sure you have corrected your answers and fixed any mistakes. If possible, attend office hours at 9:30 am, this is the last one! The link is on Google Classroom.

Answer Key:
Monday, Tuesday, Thursday: The answers are in the back of the book.

Wednesday: pg. 457 **78**. $52 **79.** 1hour and 2.5 minutes **80.** $1.95
Pg. 459 **60.** 94 blocks **61**. 5 hours **62**. 106 cm by 99 cm **63**. Lot: $11,250, House: $78,750
64. Loser: 731 votes, Winner: 853 votes **65.** To work: 31 min., Home: 24 min.

1 Decimals

Whole numbers are familiar and easy to work with, but only form part of the number line. We have two ways of writing the numbers in between two whole numbers: fractions and decimals. Today we are focusing on decimals.

1.1 The Decimal System

Recall that the word decimal comes from the Latin word 'decem'. The number system that we use is base 10, which means that each place value is based off a power of 10. We have the $10^0 = 1$ place, $10^1 = 10$ place, $10^2 = 100$ place, and so on. This continues with numbers smaller than 1: $\frac{1}{10^1} = 0.1$ place, $\frac{1}{10^2} = 0.01$ place, and so on. We write out values based on their relationship to powers of ten.

What kind of numerals do we use to write numbers? (Roman, Greek, ...)

Since our number system is base 10, multiplying and dividing by powers of 10 is simple. Look at the following example.

Ex.

$$23 \cdot 10^3$$

$$23 \cdot 1000$$

$$23,000$$

Since the exponent on the 10 was a 3, we add 3 zeros to our original number. Now let's look at one with a decimal.

Ex.

$$0.23 \cdot 10^3$$

$$0.23 \cdot 1000$$

$$230$$

Notice how the decimal moved 3 places to the right since the number is getting larger.

Let's look at an example with division.

Ex.

$$570 \div 10$$

$$57.0$$

The number is getting smaller by one power of 10, so the deciaml moves one time to the left.

Ex.

$$570 \div 10^4$$
$$570 \div 10000$$
$$0.0570$$

The decimal moves 4 times to the left since it is divided by the 4th power of 10.

1.2 Adding and Subtracting Decimals

Adding and subtracting decimals is the same as adding and subtracting any other number. In order to add or subtract, you need to make sure the place values are lined up. What do we have to mark the place values? *The decimal point.* The most important rule when adding or subtracting is to **line up the decimal points**.

Add or subtract.

1. 987.2+81.34+11.364

2. 10-9.42

1.3 Multiplying Decimals

Unlike adding and subtracting decimals, **when multiplying, you do NOT need to line up the decimal points**. Multiply the numbers like you would normally, and only worry about the decimal point at the very end.

Ex.

$$\begin{array}{r} 2\,3.\,4 \\ \text{x}\ \ 0.\,4\,4 \\ \hline 9\,3\,6 \\ 9\,\ 3\,6\,0 \\ \hline 10.\,2\,9\,6 \end{array}$$

Notice how the decimals are not lined up when we multiply. Then we perform the multiplication like normal. It is only at the very end that the decimal returns. Since there is a total of 3 digits (or place values) after the decimals in the factors, there also must be 3 after the decimal in the answer.

1.4 Dividing decimals

When multiplying decimals, we were able to multiply just as previously and only worry about the decimal at the very end. Dividing decimals is similar, except **we worry about the decimal at the very beginning**. We know how to divide by whole numbers, so we can rewrite the problem to use what we know.

Ex.

1. $$43.464 \div 1.2$$
   $$(43.464 \cdot 10) \div (1.2 \cdot 10)$$
   $$434.64 \div 12$$

   Since we want to divide by a whole number, we multiply by 10 to make the divisor, the second number, a whole number.

2. Now we can use long division with a whole number on the outside. The decimal in the answer goes directly above the decimal in 434.64, the quotient. When we divide, we get

   $$434.64 \div 12 = 36.22$$

Remember, **the divisor must be a whole number**. The decimal on the *outside* of the long division symbol must be moved all the way to the right. However many times you move it on one number, you must do the same thing to the other number to keep it balanced.

2 Ratios and Proportions

What is a **ratio**?

What is a **proportion**?

Notice the relationship between a ratio and a proportion. Ratios tell us the relationship between two separate things in the same unit, and proportions tell us that two ratios are equal.

2.1 Solving Proportions

Proportions look very similar to equivalent fractions and are often worked with the same way. Since we know that the two ratios are equal, we can use this knowledge to find the missing information.

Ex.

$$\frac{15}{45} = \frac{1}{n}$$

Since the two ratios are equal, we notice in the numerators that $15 \div 15 = 1$.

$$\frac{15 \div 15}{45 \div 15} = \frac{1}{3}$$

Just like with equivalent fractions, whatever we do to the numerator, we also need to do to the denominator. Now we can see that

$$\frac{15}{45} = \frac{1}{3}$$

so n=3.

Solve the following proportions.

1. $\frac{n}{5} = \frac{3}{15}$
2. $\frac{3}{2} = \frac{x}{120}$

2.2 Cross-Multiplying

When solving proportions we have another tool: cross-multiplying. This also comes from the fact that a proportion is like equivalent fraction. Look at the following example:

Ex.

$$\frac{2}{30} = \frac{x}{12}$$

In this proportion there isn't a whole number to multiply and divide by. Instead, let's rewrite the proportion using 30x12 as the common denominator.

$$\frac{2 \times 12}{30 \times 12} = \frac{x \times 30}{12 \times 30}$$

Now the denominators are equal, so the numerators must also be equal. This gives us

$$2 \times 12 = x \times 30$$

$$24 = 30x$$

$$x = \frac{24}{30}$$

$$x = \frac{4}{5}$$

We can get the same relationship by **cross-multiplying** the original proportion.

$$\frac{2}{30} = \frac{\text{x}}{12}$$

$$2 \times 12 = x \times 30$$

In order to solve any proportion we can always cross-multiply.

If $\frac{a}{b} = \frac{c}{d}$, *then* $ad = bc$.

Solve the following proportions using cross-multiplication.

1. $\frac{y}{12} = \frac{13}{14}$
2. $\frac{2}{x} = \frac{14}{13}$

3 Solving Word Problems

When solving word problems the most important part is identifying and organizing information. What information do you have? What information do you need? Without knowing the answers to these questions, you cannot solve the problem. We can use proportions and equations to help organize this information.

3.1 Proportions

Proportions are very helpful when you are trying to find the ratio or relationship between two types of things.

Ex. A horse eats 8lb of grain and 12lb of hay. If the amount of grain is increased by 2lb, how much hay should by given to the horse if the ratio of grain to hay is to remain the same?

1. We know the ratio of grain to hay: 8lb grain to 12lb hay
2. We want to know the ratio of: 8lb+2lb grain to x lb hay
3. The ratios have to be the same, so we can write a proportion

$$\frac{8}{12} = \frac{10}{x}$$

4. Now we can solve the proportion to get our answer: x=15 lbs of hay

Notice how in the proportion our numerators are both the pounds of grain and the denominators are both the pounds of hay.

$$\frac{8}{12} = \frac{10}{\text{x}}$$

The ratios are equal *in the same order.* Grain must be first in both ratios or grain must be second in both ratios. The position has to be the same in both for the ratios to be equal.

Ex. In a contest 1 out of every 5 people received an award. If 17 awards were given, how many people participated in the contest?

1. We know 1 award: 5 people
2. We want to know 17 awards: n people
3. The ratios must be equal, so we have the proportion

$$\frac{1}{5} = \frac{17}{n}$$

4. We can solve the proportion and see n=85 people.

The number of awards is in the numerator and the number of people is in the denominator.

Write a proportion for the following word problem.

An Indian Tiger is 90 cm long and 45 cm high. About how long would another tiger be if it is 48 cm high?

3.2 Equations

When you are not finding the ratio between two types of things, try translating the word problem directly into an equation.

1. Translate the word problem into an equation using a variable for the unknown
2. Solve the equation

Notice how solving the equation is the second step. Once you have translated the word problem into an equation, *then* you can try to solve it.

Ex. Janet can average 13 mi/h on her bicycle. At that rate, how long will it take her to ride 27 miles?

1. We know that rate $\times$ time= distance. In this problem the rate is 13 mi/h and the distance is 27 miles. We want to know the time, so let's say t=time. This gives us

$$13 \times t = 27$$

2. Now that we have organized our information in an equation we can solve it for the variable.

$$t = \frac{27}{13}$$

Ex. Sam types 15 words/min faster than Kim. If Sam types 75 words/min, how fast does Kim type?

1. We want to know how fast Kim types: k= Kim's speed.

   We know that Sam's speed is k+15. We also know Sam's speed is 75 word/min. If we put that information together, we have

$$k + 15 = 75$$

2. Now we can solve our equation: k= 60 words/min.

Write an equation for the following word problem.

A rectangle has a perimeter of 34 cm and a length of 5 cm. How wide is the rectangle? (Use the fact that $p = 2l + 2w$)

4 Percents

Similarly to our word 'Decimal' which comes from the Latin word *decem*, our word 'Percent' comes from the Latin *per centum*, meaning out of one hundred. Percentage gives us a way of comparing different ratios by using the denominator 100. Since percentages are always out of 100, it gives us a basis for comparisons.

4.1 Computing with Percents

Since percents are away of comparing ratios, one way to find a percentage is using a proportion.

Ex. What percent of 30 is 27?

We have a ratio here, 27 of 30 or $\frac{27}{30}$. If we want to change this into a percent, we want the denominator to be 100. This gives us the proportion

$$\frac{27}{30} = \frac{x}{100}$$

Now we can solve the proportion to find that x= 90%.

Notice that the ratios are $\frac{part}{whole}$. In a percent, 100 is the whole.

Another way to solve percentages is to translate the words into a mathematical equation.

Ex. What is 68% of 145?

What is – x=

68% of 145 – $\frac{68}{100} \times 145$

$$x = \frac{68}{100} \times 145$$
$$x = 98.6$$

We can think of this relationship as: **percent**$\times$ **whole = part**.

Note that we could rearrange this equation into a proportion:

$$x \div 145 = \frac{68}{100} \times 145 \div 145$$
$$\frac{x}{145} = \frac{68}{100}$$

4.2 Percent of Increase or Decrease

Often times we use percentages to find out how much something has changed. We have two ways of measuring how much something has changed: the **amount of change** and the **percent of change**. Like any other percentage, the percent of change is related to the ratio $\frac{part}{whole}$. In this case the whole is the original amount before the change, and the part is the amount that changed. Now we have the relationship:

$$percent\ of\ change = \frac{amount\ of\ change}{original\ amount}$$

Ex. What is the percent increase or decrease from 1000 to 2500?

- Since the second number is larger, it will be a percent of **increase**.
- Original amount = 1000
- Amount of change: 2500-1000=1500

$$p = \frac{1500}{1000}$$

Ex. Fido's weight decreased by 5% last month. If he weighed 30lb on the first of the month, what did he weigh at the end of the month?

- Percent of change= 5%
- Original amount= 30 lb
- Amount of change= a

$$0.05 = \frac{a}{30}$$
$$0.05 \cdot 30 = \frac{a}{30} \cdot 30$$
$$1.5 = a$$

- New weight: $30 - 1.5 = 28.5$

So Fido will weigh 28.5 lb at the end of the month. Since Fido's weight **decreased**, we know that his final weight is *less* so we need to subtract.