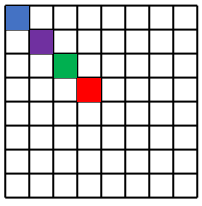
7th Grade Assignment – Week #26

Individual Work

- *Very Important!! A Circle's Ratio*
  If possible, do this before Thursday's group meeting.
  Follow the directions given on **Ratios, Part II - Sheet #5, Problem #7**
- Try your best with the *Seventh Grade Math Tricks* – **Sheet #5**, which is found at the bottom of this document. Refer to the *Math Tricks* at the back of the workbook, as needed. (Answers are found in the document "G7 - Group Answers (non-workbook) – Q4".)
- Do as much as you can with these problems:
  - **Ratios, Part II – Sheet #3:** Problems #2-6
  - **Ratios, Part II – Sheet #4:** Problems #2-4
- Announcement: This will be the end of our work with this unit. Next week we will begin the Rates unit in the workbook.

Group Assignments: Work on the below problems on Tuesday or Thursday, as desired.

- **Square Roots!** See how far you can get with the **Square Root Algorithm – Sheet #1 Start with problem #3!**
- **Many Grandchildren**. I have 6 children – all of them 5 years apart. Each of them has 4 children – all 3 years apart. My youngest child is the same age as my oldest grandchild. Each of my children had their first child when they were four years older than I was when I had my first child. Everyone in my family is born in the summer. How old am I now (which is the spring) if my second youngest child's second oldest child is 15 years old, and how old is my youngest grandchild?
- **Cutting a Chessboard**. How can this chessboard be cut into four congruent (same size and same shape) pieces, such that each piece contains exactly one of the colored squares?



Seventh Grade Math Tricks Sheet #5

Elapsed time:
Number correct:
Number completed:

Do each problem in your head using the easiest math trick. If necessary, leave your answer as a decimal instead of a fraction.

1) 0.39÷10000

2) 103·105

3) 104^2

4) 12·51

5) 1200÷25

6) 13·99

7) 71·69

8) 1400÷4

9) 15% of $34

10) 18÷24

11) 198·202

12) 2100÷3500

13) 213–197

14) 22·45

15) 225·4

16) 25·11

17) 25·32

18) 2700÷45

19) 28·5

20) 32·38

21) 350·160

22) 15% of $140

23) 4·999

24) 4500÷900

25) 45000÷25

26) 460·15

27) 49·600

28) 520^2

29) 6300÷5

30) 6388÷9999

31) 1.8÷4

32) 72000÷60

33) 800·350

34) 81·89

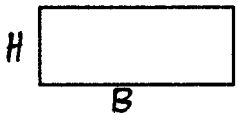
35) 94·11

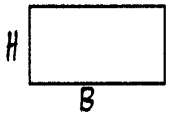
36) 850^2

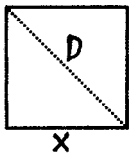
Ratios, Part II – Sheet #3

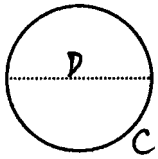
1) A triangle has a base equal to 3.7cm and a height equal to 2.4cm. Give the four ways to write the ratio of these dimensions. (Give your answers as exact, perhaps repeating, decimals.)

2) With each figure below give your best guess (don't measure!) of what the ratio is of the two labeled dimensions. Give your answers in whole number form.

a) 

b) 

c) A square 

d) A circle 

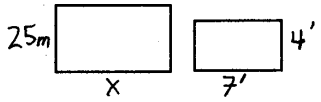
3) A rectangle's base is 22cm and its height is 8cm.

a) Give the ratio of base to height in decimal form.

b) Give the two thoughts associated with the above ratio.

4) The ratio of baseballs to golf balls is 7 to 5. If the combined number is 420, then how many are baseballs and how many are golf balls?

5) Find X given that the two rectangles are similar.



6) The ratio of Henry's money to Jeff's money is 7 to 4. How much does Henry have if Jeff has $25?

Mental Math

7) $41 \cdot 16 =$

8) $49 \cdot 18 =$

9) $81 \cdot 12 =$

10) $102 \cdot 98 =$

11) $160 \cdot 55 =$

12) $6000 \div 120 =$

13) $315 \cdot 4 =$

14) $770 \cdot 11 =$

Review

15) 30 is 50% of what number?

16) 140 is 25% of what number?

17) 36 to 48 is what percentage increase?

18) 48 to 36 is what percentage decrease?

19) What is 50 decreased by 20% and then that result increased by 20%?

20) On Mike's bike trip, he always rode at a speed of 12mph. On the first day he rode for a total of 6 hours.

a) How far did he cycle on the first day?

b) If he rode for ⅔ as long on the second day, then how long did he ride for, and how far did he go?

c) Circle the correct answer. This means that if he rides for ⅔ as long, then he goes
⅔ *as far*,
$^3/_2$ *as far*?

d) If he rode for $^4/_3$ as long on the third day as on the first day, then how long did he ride for, and how far did he go?

e) Circle the correct answer. This means that if he rides for $^4/_3$ as long, then he goes
$^4/_3$ *as far*,
¾ *as far*?

f) What does the following statement mean?
Time and distance are *directly proportional*.

21) Given that the strings on Mike's violin are 28.5cm long, and that the "A" string has a frequency of 440hz…

a) Mike plays the note E (which is the fifth above A) on the A string by pressing down at ⅔ of the string's length. How far from the end of the string (i.e. from the bridge) is he pressing down when playing this E note? (Give answer in cm.)

b) What is the frequency of this E note?

c) The note C has a frequency of 550hz. What is the ratio of the frequencies of note C to note A?

d) In order to play the note C on the A string, what is the ratio of the length of the whole string to the length of the vibrating portion of the string?

e) In order to play the note C on the A string, how far from the end of the string (i.e. from the bridge) must Mike press down?

f) What does the following statement mean?
With any string instrument, the length of the string, and the frequency (i.e. pitch) of the note, are *inversely proportional*.

The Wonder of 7!

22) Convert each fraction into a repeating decimal. Look for patterns.

a) $^1/_7$

b) $^2/_7$

c) $^3/_7$

d) $^4/_7$

e) $^5/_7$

f) $^6/_7$

23) Look for patterns!

a) $142{,}857 \cdot 1 =$

b) $142{,}857 \cdot 2 =$

c) $142{,}857 \cdot 3 =$

d) $142{,}857 \cdot 4 =$

e) $142{,}857 \cdot 5 =$

f) $142{,}857 \cdot 6 =$

g) $142{,}857 \cdot 7 =$

24) Add.

a) $14 + 28 + 57 =$

b) $142 + 857 =$

Ratios, Part II – Sheet #4

1) Convert to a repeating decimal.

a) $\frac{9}{13}$

b) $\frac{13}{9}$

2) Bill weighs 75kg and Jeff weighs 60kg. If Bill sits 2.8m out from the fulcrum of a seesaw, then how far out does Jeff need to sit for the seesaw to balance?

3) A cat weighs 12 pounds and a dog weighs 32 pounds. Give the four ways to express the ratio of these weights.

4) Cathy is training for a bike race. Each day she times how long it takes to go a distance of 2.7 miles up a hill. On Monday it took her exactly 15 minutes. She calculated that her average speed was therefore 10.8mph. On Tuesday she covered that same distance in just $^4/_5$ of the time that it took on Monday. On Wednesday it took her $^7/_6$ as long as it did on Monday.

a) How long did it take her on Tuesday?

b) What was her average speed on Tuesday?

c) How long did it take her on Wednesday?

d) What was her average speed on Wednesday?

5) Jen is training for a bike race. Each day she sees how far she can cycle up a hill in 9 minutes. On Monday she went 1.2 miles up the hill, and calculated that her average speed was exactly 8mph. On Tuesday she was tired and only went $^5/_6$ as far as she did on Monday. But on Wednesday she went $^9/_8$ as far as she did on Monday.

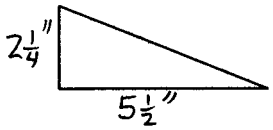
a) How far did she cycle on Tuesday?

b) What was her average speed on Tuesday?

c) How far did she cycle on Wednesday?

d) What was her average speed on Wednesday?

6) With the below triangle…



a) Give the ratio of base to height in whole number form.

b) Give the three thoughts associated with the above ratio.

c) Give the ratio of base to height in decimal form.

d) Give the two thoughts associated with the above ratio.

e) Give the ratio of height to base in decimal form.

f) Give the two thoughts associated with the above ratio.

7) **A Square's Ratio.**

In the space below, carefully construct a square with a compass and straight edge that has fairly long sides. Measure, as accurately as possible, the length of the side (X) and the length of the diagonal (D). Using long division, calculate the ratio of the diagonal to the side (D:X), and also the ratio of the side to the diagonal (X:D), both in decimal form. (Go to three significant figures with your division.)

a) D:X ≈

b) X:D ≈

Ratios, Part II – Sheet #5

1) A farm has only buffalo and giraffes. There are 12 buffalo and 16 giraffes.

a) Give the ratio of buffalo to giraffes in whole number form.

b) Give the three thoughts associated with the above ratio.

c) Give the ratio of buffalo to giraffes in decimal form.

d) Give the two thoughts associated with the above ratio.

2) A recipe calls for 4½ cups of water and 2¾ cups of flour.

a) What is the ratio of flour to water?

b) If the recipe needs to be enlarged, how much water is needed for 7 cups of flour?

3) **The four ratios of a square.**

a) Give the approximate ratio of *the side (X) to the diagonal (D)* of a square in whole number form, and write down the three thoughts associated with it.

b) Give the approximate ratio of *the diagonal to the side* of a square in whole number form, and write down the three thoughts associated with it.

c) Give the approximate ratio of *the side to the diagonal* of a square in decimal form, and write down the two thoughts associated with it.

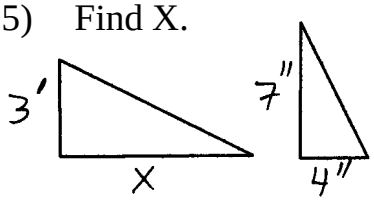
d) Give the approximate ratio of *the diagonal to the side* of a square in decimal form, and write down the two thoughts associated with it.

4) Use one of the four ratios of a square (given above) to answer these questions.

a) What is the length of the diagonal of a square that has a side of length 15m?

b) What is the length of the side of a square that has a diagonal of length 9m?

5) Find X.



6) The ratio of men to women at Bill's college is 7 to 4.

a) If there are 658 men, then how many women are there?

b) If there are 1600 women, then how many men are there?

7) **A Circle's Ratio.**

Find a fairly large, nearly perfect circle (e.g. a bicycle wheel). Measure, as accurately as possible, the length of the circumference (C) and the length of the diameter (D). Using long division, calculate the ratio of the diameter to the circumference (D:C), and also the ratio of the circumference to the diameter (C:D), both in decimal form. (Go to three significant figures with your division.)

a) D:C ≈

b) C:D ≈

$\sqrt{\ }$ Algorithm – Sheet #1

1) State the two laws of repeating decimals.

2) Convert each fraction into an exact decimal.

a) $\frac{19}{54}$

b) $\frac{19}{125}$

c) $\frac{19}{26}$

3) Calculate.

a) $\sqrt{36}$

b) $\sqrt{3600}$

c) $\sqrt{360000}$

d) $\sqrt{36000000}$

e) $\sqrt{144}$

f) $\sqrt{14400}$

g) $\sqrt{1440000}$

h) $\sqrt{144000000}$

i) $\sqrt{490000}$

j) $\sqrt{900}$

k) $\sqrt{250000}$

l) $\sqrt{40000}$

m) $\sqrt{4000000}$

4) Look at the previous problems in order to answer the following questions. (Assume that all square roots work out to whole numbers.)

a) If a number has 3 digits, then its square root will have _____ digits.

b) If a number has 4 digits, then its square root will have _____ digits.

c) If a number has 5 digits, then its square root will have _____ digits.

d) If a number has 6 digits, then its square root will have _____ digits.

e) If a number has 7 digits, then its square root will have _____ digits.

f) If a number has 8 digits, then its square root will have _____ digits.

g) If a number has 25 digits, then its square root will have _____ digits.

h) If a number has 26 digits, then its square root will have _____ digits.

5) Considering the previous answers, give a general law that states how many digits the answer for any square root problem will have.

6) Calculate.

a) 20^2

b) 90^2

c) 400^2

d) 300^2

e) 7000^2

f) 1100^2

g) 80000^2

h) 634^2

7) If a number has 3 digits, then squaring it will give a number with _____ digits.

8) Considering the above answer, give a general law that states how many digits the answer for squaring a number will have.

The Trial and Error Method.

This method for calculating square roots is quite easy to understand but not very efficient. We simply *guess* what the answer might be, and then *check* how good our guess was by squaring it and seeing if it was too big or too small.

Example: Find $\sqrt{2209}$.

Solution: We might first guess that the answer is 50, so we check that by squaring 50, which is 2500, and since 2500 is greater than 2209, we know that $\sqrt{2209}$ must be less than 50. Our next guess may be 42, so we check it by squaring 42, which is 1764, telling us $\sqrt{2209}$ must be greater than 42. Similarly, we might try 45 (which turns out to be too small) and 48 (which is too big), until we finally narrow the answer down to 47, which is exactly correct since 47^2 is equal to 2209.

Also, if we know for sure that the square root works out exactly, then the last digit inside the square root can give us a clue to the answer. For example, with $\sqrt{2209}$, since the last digit inside the square root is 9, we know that the last digit in our answer must be a 3 or a 7. This is because only 3^2 (=$\underline{9}$) and 7^2 (=4$\underline{9}$) end with a digit of 9. Again, this only works if we know for sure that the square root works out evenly.

9) Calculate. (The answers work out exactly.)

a) $\sqrt{1521}$

b) $\sqrt{4624}$

c) $\sqrt{74529}$