St. Louis Community College

Adult Learning Academy
Pre-Algebra Workbook

UNIT 3: DECIMAL NUMBERS

LEARNING OBJECTIVES

1. **Conceptualizing Decimals:**
   - ☐ Write and describe decimal numbers to ten-thousandths
   - ☐ Order and compare decimal numbers
   - ☐ Plot decimal numbers on a number line
   - ☐ Round decimal numbers to the correct place value

2. **Operations with Decimal Numbers:**
   - ☐ Add multi-digit decimal numbers, including carrying
   - ☐ Subtract multi-digit decimal numbers, including borrowing
   - ☐ Multiply multi-digit decimal numbers
   - ☐ Divide multi-digit decimal numbers
   - ☐ Multiply and divide decimal numbers by powers of ten
   - ☐ Follow order of operations rules when performing calculations with decimal numbers

3. **Conversions with Fractions:**
   - ☐ Convert Decimals to Fractions
   - ☐ Convert Fractions to Decimals

4. **Word Problems:**
   - ☐ Solve basic word problems using decimal number arithmetic, including those involving area and perimeter, and applications to the transportation industry

Topic	Website	Videos	Exercises
Conceptualizing Decimals	www.khanacademy.org	Decimal Place Value	Understanding dec. place value
		Decimal Place Value 2	Decimals on the number line 1
		Comparing Decimals	Decimals on the number line 2
		Decimals on a Number Line	Converting Decimals to Frac. 1
		Points on a Number line	
		Decimals and Fractions	
Adding and Subt. Decimals	www.khanacademy.org	Adding Decimals	Adding Decimals 2
		Subtracting Decimals	Adding Decimals 0.5
		Subtracting Decimals Word Problem	Subtracting Decimals 0.5
			Subtracting Decimals
			Add/Sub Decimals Word Probs.
Multiplying Decimals	www.khanacademy.org	Multiplying Decimals	Multiplying Decimals
		Multiplying Decimals 3	Understanding Moving the decimal
		Multiplying a Decimal by a power of 10	
		Dividing a Decimal by a power of 10	
Dividing Decimals	www.khanacademy.org	Dividing Decimals	Dividing Decimals 0.5
		Dividing Decimals 2.1	Dividing Decimals 1
			Dividing Decimals 2
Converting Fractions to Dec	www.khanacademy.org	Converting Fractions to Decimals	Worksheet: Color the circles

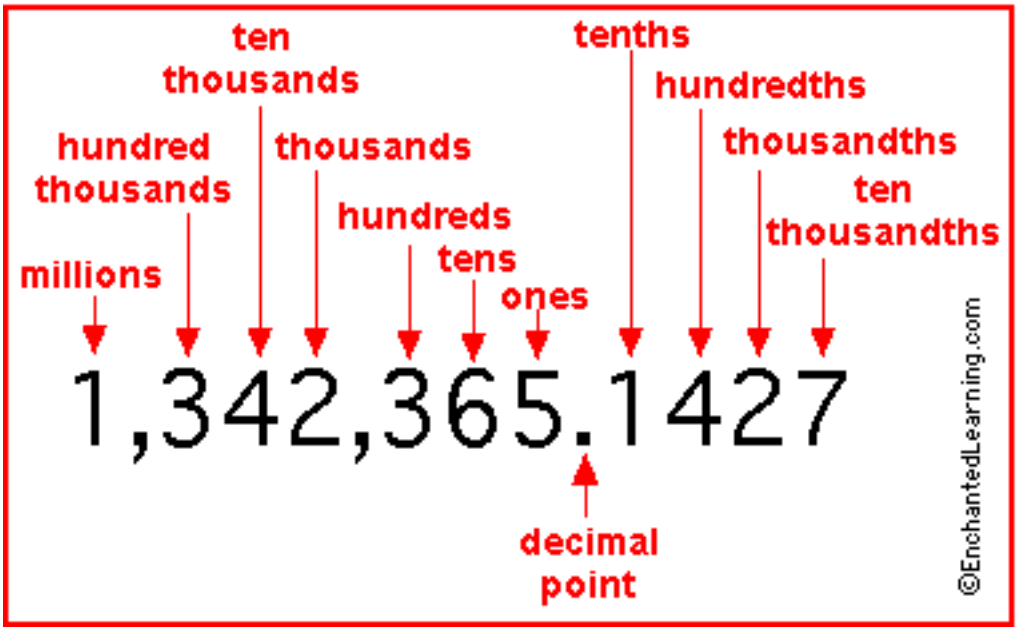
Topic	Website	Videos	Exercises
		Converting Fractions to Decimals ex 1	
		Converting Fractions to Decimals ex 2	
Rounding Decimals	www.khanacademy.org	Rounding Decimals	Rounding numbers
		Estimation with Decimals	Estimation with Decimals
Review of Unit 3	www.stlcc.edu	Blackboard Powerpoint	"Unit 3 Review Flashcards"
Compass Practice	http://www.hostos.cuny.edu/oaa/compass/pre-alg_prac3.htm		Decimals

MoSTEMWINs

This product is 100% funded by the MoSTEMWINs $19.7 million grant from the U.S. Department of Labor Employment and Training Administration. The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

Unless otherwise noted this MoSTEMWINs material by St. Louis Community College is licensed under a Creative Commons Attribution 4.0 International License.

Place Value Chart including Decimals



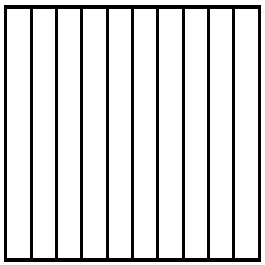
Song:
Happy Birthday

You must line up the decimal point,
You must line up the decimal point,
To ADD or SUBTRACT,
You must line up the decimal point!

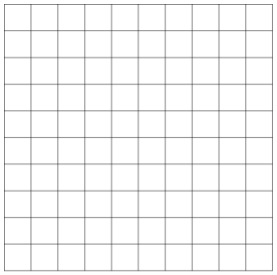
Shade the decimal numbers in the grids below. Compare the values of the numbers within each column.

A. Are these numbers the same or different? If different, which number is the biggest? Smallest?

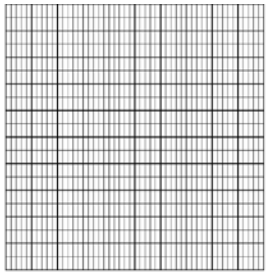
.6



.60

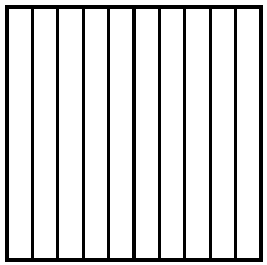


.600

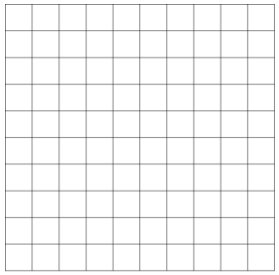


B. Are these numbers the same or different? If different, which number is the biggest? Smallest?

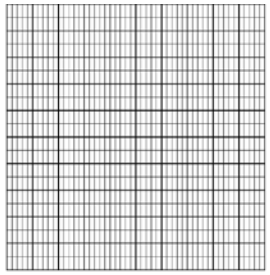
.4



.04

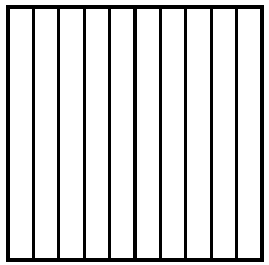


.004

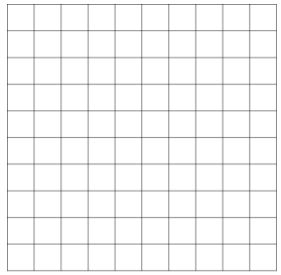


C. Are these numbers the same or different? If different, which number is the biggest? Smallest?

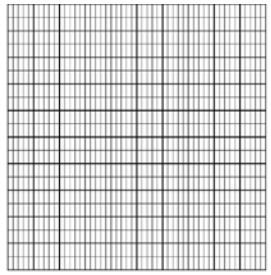
.3



.25



.205



Match the words with the correct numbers:

_____ 1. Fifty-six hundredths	A. .056
_____ 2. Fifty-six thousandths	B. 56,000
_____ 3. Fifty-six thousand	C. .56
_____ 4. Fifty and six hundredths	D. 5.06
_____ 5. Five hundred six thousandths	E. 50.06
_____ 6. Five and six hundredths	F. .506

7. Which number in the list above is the SMALLEST? _____

8. Which number is exactly the same as .56000? _____

9. Add together .56 + .506. What is the sum? _____

10. What is .56 - .506? The difference is _____

Grew or shrunk?	Grew or shrunk?
1. $20 \times .1 =$ _____	6. $20 \div .1 =$ _____
2. $20 \times .5 =$ _____	7. $20 \div .5 =$ _____
3. $20 \times .75 =$ _____	8. $20 \div .75 =$ _____
4. $20 \times 1.0 =$ _____	9. $20 \div 1.0 =$ _____
5. $20 \times 1.25 =$ _____	10. $20 \div 1.25 =$ _____

OBSERVATIONS:

11. When you multiply a number by a fraction < 1, it _____

12. When you divide a number by a fraction < 1, it _____

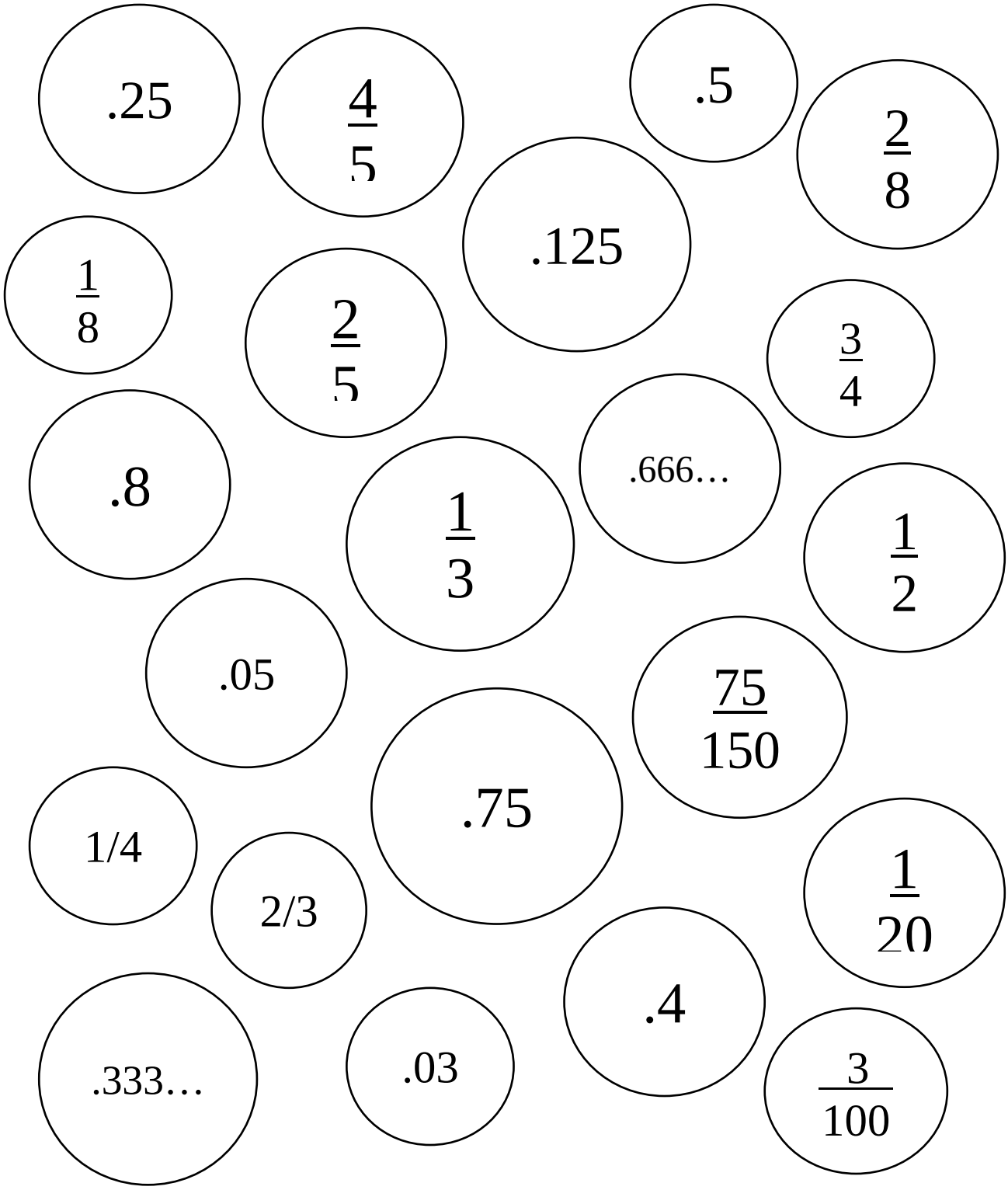
13. When you multiply a number by 1, it _____

14. When you divide a number by 1, it _____

15. When you multiply a number by a fraction > 1, it _____

16. When you divide a number by a fraction > 1, it _____

Color all equivalent fractions and decimals the same color.



Circle the larger number:

1. .507 or .51

2. .05 or .052

3. Write a number between 7.5 and 8.0:

4. Write a number between 7.5 and 7.6:

5. Write .07 as a fraction:

6. Write ½ as a decimal:

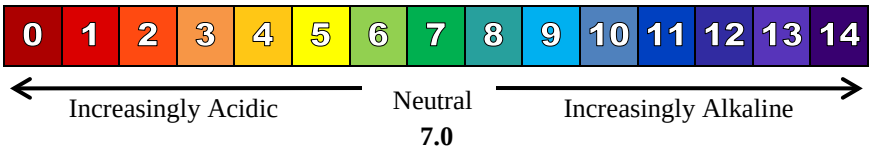
7. Add .99 + .1

8. Subtract .02 - .001

9. Multiply 3.5 x .1

10. Divide 3.5 ÷ .05

1. pH is a scale from 0 – 14 measuring the hydrogen ion concentration of a solution. A pH of 7.0 is neutral. A pH less than 7.0 is acidic. A pH greater than 7.0 is basic (alkaline).



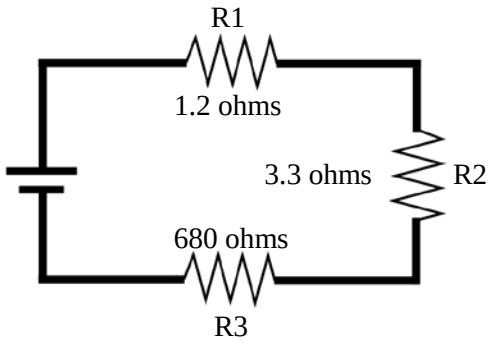
Rank the following from most acidic to most alkaline (from lowest to highest pH). Then indicate which solutions are acids, which are bases (alkaline), and which are neutral.

Solution	pH
Human blood	7.365
Battery acid	1
Tap water	7.67
7-up soda	3.2
Pepsi	2.1
Surge soda	3.02
Coca Cola	2.15
Mountain Dew	3.22
Dr. Pepper	2.89
Diet Dr. Pepper	3.26
English Mountain Bottled Water	7.66
Fine Bottled Water	7.8
Pure Water	7.0
Ketchup	8.5
Urine	6.00
Milk	6.6
Wine	3.5
Toothpaste	9.9

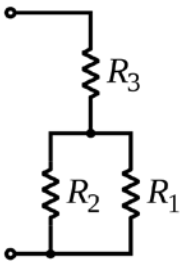
Ranked List

(Lowest) a. _____
b. _____
c. _____
d. _____
e. _____
f. _____
g. _____
h. _____
i. _____
j. _____
k. _____
l. _____
m. _____
n. _____
o. _____
p. _____
q. _____
(Highest) r. _____

2. In a series circuit, total resistance is equal to the sum of individual resistances, measured in ohms. Find the total resistance in the diagram below by adding R1 + R2 + R3.



3. In this series circuit, R1 is 25.9 ohms. R2 is 4.75 ohms. The total resistance is 120 ohms. What is the resistance of R3?



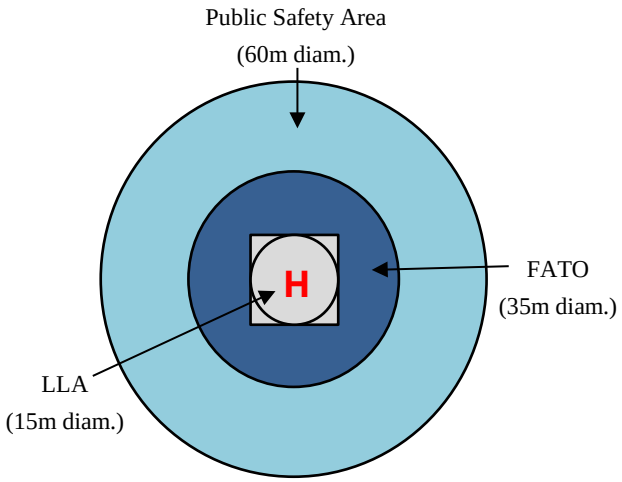
---

4. A computer can download a file in 3.29 seconds. How long would it take to download 4 similar-size files?

5. A computer took 82.25 seconds to download files at the same rate of 3.29 seconds each. How many files were downloaded?

6. A computer downloaded 12 files in 42.03 seconds. How long did each file take to download?

7. To create a safe helipad, there must be three concentric (all with the same center) circles. The innermost circle, the **Landing and Liftoff Area (LLA) must have a diameter of at least 15 meters**. The FATO surface needs to be capable of supporting the helicopter in case of a forced landing. The minimum size of the **FATO area is 35 meters diameter**. A Safety Area surrounding the FATO is an obstacle-free area, including the separation requirements between public areas and the helipad. The **Public Safety Area must have a minimum diameter of 60 meters**.



a. If you were to walk around the edge of each circle, how far would you walk? (Note: This measurement along the edge of a circle is called its circumference. To calculate the circumference of a circle, you can use the formula $C = \pi d$. The number π, pronounced "Pi", can be approximated as 3.14. To find the circumference, multiply π times the diameter of the circle).

b. What is the area of each circle? (Note: The measurement of the inside surface of a circle is called its area. To calculate the area of a circle, you can use the formula $A = \pi r^2$. Again, use 3.14 to approximate the number π. The radius is the measure from the center of the circle to its edge. The radius is half of the diameter. Square the radius by multiplying it by itself. Then multiply that result by π. Area is always measured in "square" units, even for a circle!)

8. How many miles has this car driven? Notice that the 6 on the right has a white background. Write your answer in numbers and in words.

9. The following table offers information about a drinker's weight, number of drinks consumed, and blood alcohol level.

Blood Alcohol Level by Weight

	Number of Drinks Consumed per Hour								
Weight	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
100	.04	.08	.11	.15	.19	.23	.26	.30	.34
120	.03	.06	.09	.12	.16	.19	.22	.25	.28
140	.03	.05	.08	.11	.13	.16	.19	.21	.24
160	.02	.05	.07	.09	.12	.14	.16	.19	.21
180	.02	.04	.06	.08	.11	.13	.15	.17	.19
200	.02	.04	.06	.08	.09	.11	.13	.15	.17
220	.02	.03	.05	.07	.09	.10	.12	.14	.15
240	.02	.03	.05	.06	.08	.09	.11	.13	.14

a. Who has a higher blood alcohol level?

Man #1 – a 140-pound man who has had 4 drinks in the last hour

Man #2 – a 220-pound man who has had 5 drinks in the last hour

b. A blood alcohol level of .08 or higher is considered legally intoxicated. How many drinks in an hour would put YOU at or above the legal limit?

c. How many drinks would a 100-pound man need to give him the same blood alcohol level as a 240-pound man who had 5 drinks in an hour?

Resources

Image used in question 4
Series circuit by Mets501 is licensed under CC BY-SA 3.0; modifications: text added

Image used in question 5
Resistors in series and parallel by Omegatron is licensed under CC BY-SA 3.0

Image used in question 6
Awesome by Jason Carlin is licensed under CC BY-NC-SA 2.0; Cropped from original work.

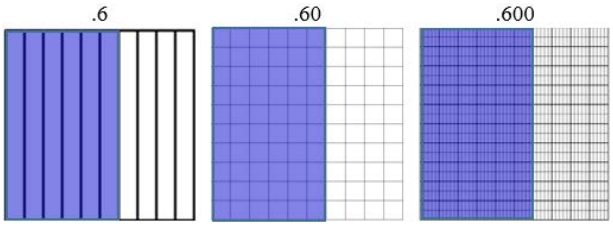
MoSTEMWINs

This product is 100% funded by the MoSTEMWINs $19.7 million grant from the U.S. Department of Labor Employment and Training Administration. The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

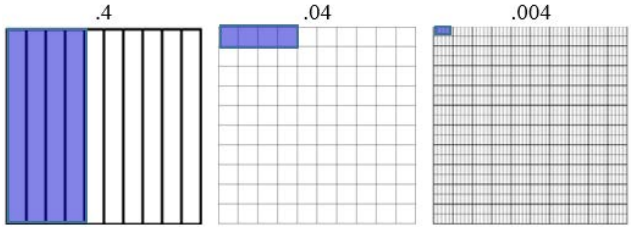
Unless otherwise noted this MoSTEMWINs material by St. Louis Community College is licensed under a Creative Commons Attribution 4.0 International License.

3.2 Decimal Place Value Comparison

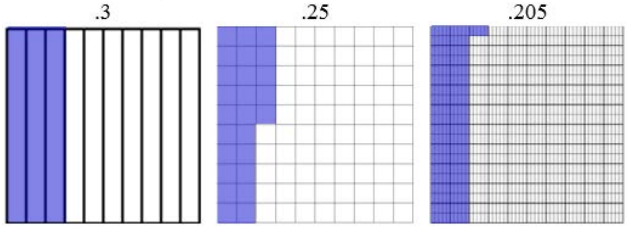
A. Same



B. Different; .4 > .04 > .004



C. Different; .3 > .25 > .205



3.3 Decimal Quiz 1

1. **C**
2. **A**
3. **B**
4. **E**
5. **F**
6. **D**
7. **A; .056**
8. **C; .56**
9. **1.066**
10. **.054**

3.4 Incredible Growing and Shrinking Numbers

1. **Shrunk;** 20 x .1 = **2**
2. **Shrunk;** 20 x .5 = **10**
3. **Shrunk;** 20 x .75 = **15**

3.4 Incredible Growing and Shrinking (cont.)

4. **Same;** 20 x 1.0 = **20**
5. **Grew;** 20 x 1.25 = **25**
6. **Grew;** 20 ÷ .1 = **200**
7. **Grew;** 20 ÷ .5 = **40**
8. **Grew;** 20 ÷ .75 = **$26.\overline{66}$**
9. **Same;** 20 ÷ 1.0 = **20**
10. **Shrunk;** 20 ÷ 1.25 = **16**

3.5 Color Matching Equivalent Decimals & Fractions

$\frac{3}{100} = .03$

$\frac{1}{20} = .05$

$\frac{1}{8} = .125$

$\frac{1}{4} = \frac{2}{8} = .25$

$\frac{1}{3} = .333\ldots$

$\frac{2}{5} = .4$

$\frac{1}{2} = \frac{75}{150} = .5$

$\frac{2}{3} = .666\ldots$

$\frac{3}{4} = .75$

$\frac{4}{5} = .8$

3.6 Decimal Quiz 2

1. **.51**
2. **.052**
3. **7.6, 7.7, 7.8, 7.9, etc.** (*there are an infinite number of possibilities!)*
4. **7.51, 7.52, 7.53, 7.54, etc.** (*there are an infinite number of possibilities!)*
5. $\frac{7}{100}$
6. **.5**
7. **1.09**
8. **.019**
9. **.35**
10. **70**

Hint: You must add up the decimal points to add or subtract ♫

3.7 Career Applications: STEM

1a. Battery Acid 1.0 (acid)
1b. Pepsi 2.1 (acid)
1c. Coca Cola 2.15 (acid)
1d. Dr. Pepper 2.89 (acid)
1e. Surge Soda 3.02 (acid)
1f. 7-Up Soda 3.2 (acid)
1g. Mountain Dew 3.22 (acid)
1h. Diet Dr. Pepper 3.26 (acid)
1i. Wine 3.5 (acid)
1j. Urine 6.0 (acid)
1k. Milk 6.6 (acid)
1l. Pure water 7.0 (neutral)
1m. Blood 7.365 (alkaline)
1n. English Mountain Water 7.66 (alkaline)
1o. Tap water 7.67 (alkaline)
1p. Fine Bottled Water 7.8 (alkaline)
1q. Ketchup 8.5 (alkaline)
1r. Toothpaste 9.9 (alkaline)

2. 1.2 + 3.3 + 680.0 = **684.5 ohms**

3. 25.9 + 4.75 = 30.65
120.00 – 30.65 **= 89.35 ohms**

4. 3.29 x 4 = **13.16 seconds**

5. 82.25 ÷ 3.29 = **25 files**

6. 42.03 ÷ 12 = **3.5025 seconds per file**

7a. LLA: 3.14 x 15 = **47.1 m**
FATO: 3.14 x 35 = **109.9 m**
Safety: 3.14 x 60 = **188.4 m**

7b. LLA: r = 7.5; A = 3.14 x 7.5 x 7.5 = **176.625 m^2**
FATO: r = 17.5; A = 3.14 x 17.5 x 17.5 = **961.625 m^2**
Safety: r = 30; A = 3.14 x 30 x 30 = **2826 m^2**

8. 48,151.1 miles
Forty-eight thousand one hundred fifty-one and six tenths miles

9a. Man #1 with .11 > Man#2 with .09

9b. Determined by your weight; answers will vary

9c. 2 drinks

MoSTEMWINs

This product is 100% funded by the MoSTEMWINs $19.7 million grant from the U.S. Department of Labor Employment and Training Administration. The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

Unless otherwise noted this MoSTEMWINs material by St. Louis Community College is licensed under a Creative Commons Attribution 4.0 International License.