

Decimal Place Values

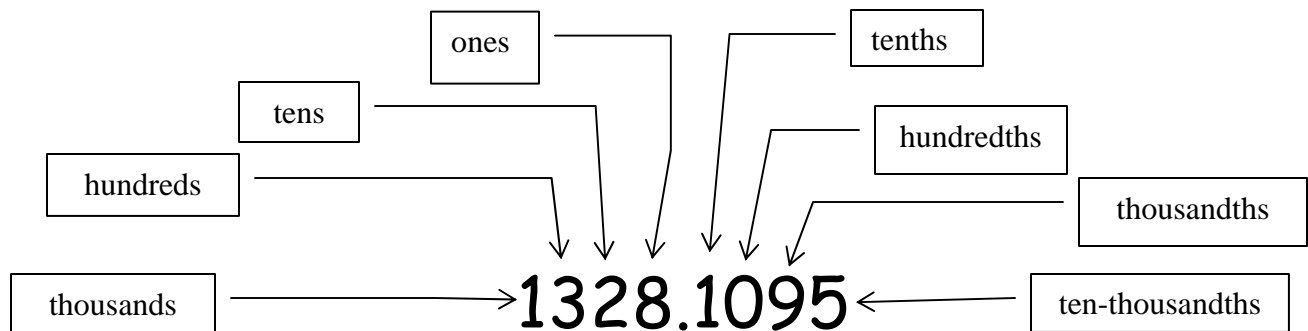
The decimal point separates the whole numbers from the fractional part of a number.

1328.1095

In a whole number the decimal point is all the way to the right, even if it is not shown in a problem.

25 = 25.

The place values of the number 1328.1095 are shown below:



In word problems you will be asked to translate numbers from English. The word "and" is where the decimal point will go.

Write the following numbers:

Fifty-eight = 58

One-hundred twenty-five thousandths = .125

One hundred and twenty-five thousandths = 100.025

Eleven and three hundredths = 11.03

Six thousand forty and nine tenths = 6,040.9

In the number 2039.876, what digit is in the tenths place?	8
In the number 2039.876, what digit is in the ones place?	9
In the number 2039.876, what digit is in the tens place?	3
In the number 2039.876, what digit is in the thousandths place?	6

Exercise 1 (answer key starts on page 19)

- 1) In the number 78.9, what digit (number) is in the tenths place? _____
- 2) In the number 78.9, what digit (number) is in the ones place? _____
- 3) In the number 78.9, what digit (number) is in the tens place? _____
- 4) In the number 6174.903, what digit is in the thousands place? _____
- 5) In the number 6174.903, what digit is in the thousandths place? _____
- 6) In the number 6174.903, what digit is in the hundredths place? _____
- 7) In the number 6174.903, what digit is in the tenths place? _____
- 8) In the number 6174.903, what digit is in the ones place? _____
- 9) In the number 6174.903, what digit is in the tens place? _____
- 10) In the number 6174.903, what digit is in the hundreds place? _____

Exercise 2

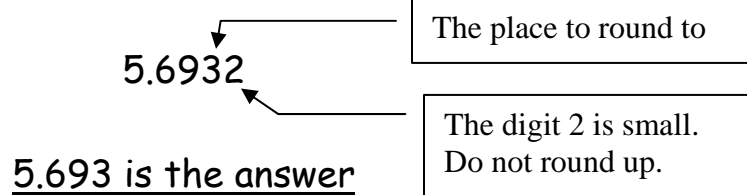
Directions: translate the following numbers from English into decimal numbers

1. Twenty-nine _____
2. Eighty-one hundredths _____
3. Nine thousand thirty-four *and* seven tenths _____
4. One *and* four thousandths _____
5. One hundred *and* sixty-two thousandths _____
6. Forty-five hundredths _____
7. Four thousand three hundred twenty-one ten-thousandths _____
8. One hundred twenty *and* five tenths _____
9. Seventeen thousandths _____
10. One *and* seven tenths _____

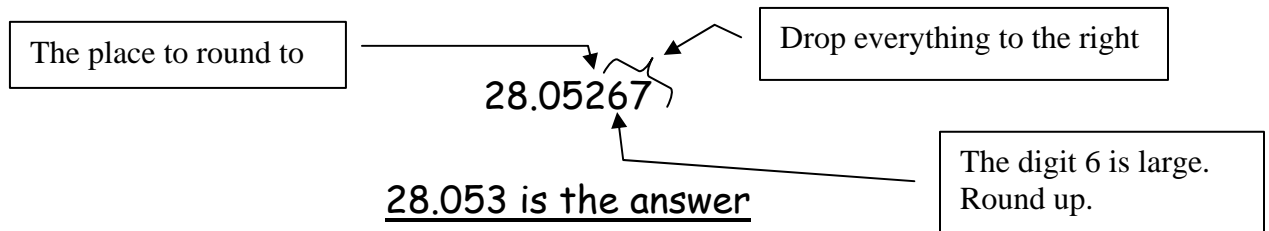
Rounding Decimal Numbers

When rounding decimal numbers, first look at the number place you are asked to round to. Then look at the digit (number) just to its right. If that digit is smaller than 5 (0, 1, 2, 3, or 4), then do not round up. If the digit is 5 or larger (5, 6, 7, 8, 9), then round up.

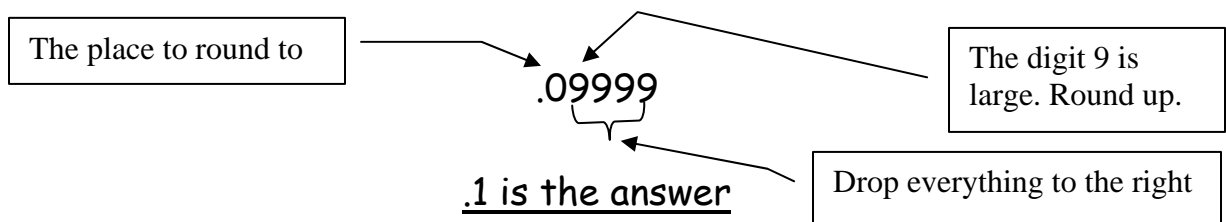
Round 5.6932 to the nearest thousandth



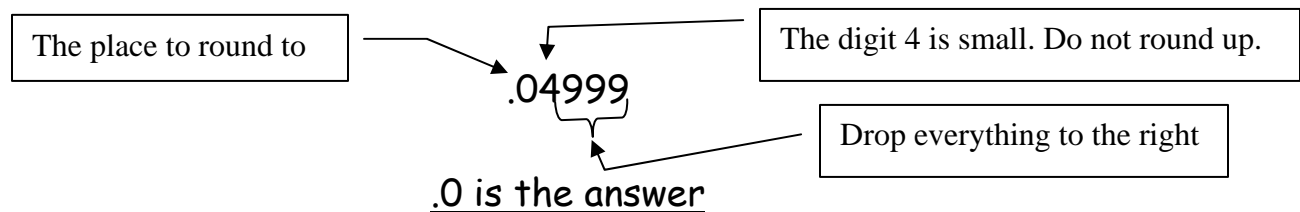
Round 28.05267 to the nearest thousandth



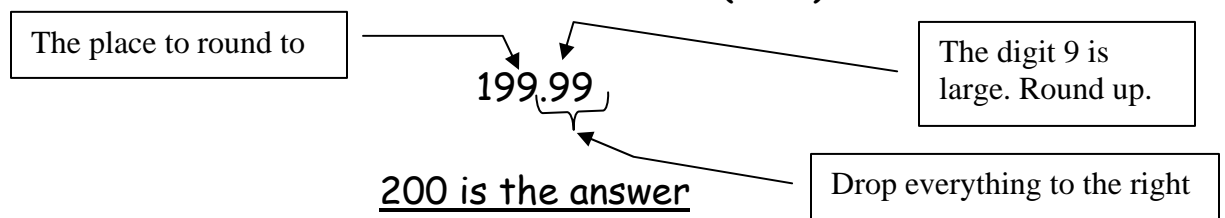
Round .09999 to the nearest tenth



Round .04999 to the nearest tenth



Round 199.99 to the nearest whole (ones) number



Exercise 3

Directions: Round the following decimal numbers to the place indicated

- 1) .1325 to thousandths _____
- 2) .0091 to thousandths _____
- 3) .0196 to thousandths _____
- 4) 5.1234 to thousandths _____
- 5) 6.6666 to thousandths _____
- 6) 40.61884 to thousandths _____
- 7) 1.99999 to thousandths _____
- 8) .1325 to hundredths _____
- 9) .0091 to hundredths _____
- 10) .3333 to hundredths _____
- 11) 5.567 to hundredths _____
- 12) 48.001 to hundredths _____
- 13) 7.987 to tenths _____
- 14) .666 to tenths _____
- 15) 1.32 to tenths _____
- 16) 99.99 to tenths _____
- 17) .5 to whole (ones) number _____
- 18) 11.99 to whole (ones) number _____
- 19) 499 to the nearest hundred _____
- 20) 999 to the nearest thousand _____

Decimal/Fraction Conversion

Changing fractions and mixed numbers to decimal numbers simply by dividing the denominator (bottom number) into the numerator (top number).

$$\frac{1}{2} \Rightarrow 2 \overline{)1.0} \begin{array}{r} .5 \\ 10 \\ \hline \end{array} \quad \frac{1}{2} = 0.5$$

$$\frac{1}{3} \Rightarrow 3 \overline{)1.000} \begin{array}{r} .333 \\ 9 \\ \hline 10 \\ 9 \\ \hline 10 \\ 9 \\ \hline \end{array}$$

$$\frac{1}{3} = 0.333$$

Rounded to the nearest thousandth or Use repeating dash over the first $3 = .\overline{3}$

$$4\frac{3}{5} \Rightarrow 5 \overline{)3.0} \begin{array}{r} .6 \\ 30 \\ \hline \end{array}$$

$$4\frac{3}{5} = 4.6$$

The whole number in front of the fraction will also be in front of the decimal.

Changing decimal numbers into fractions and mixed numbers is as easy as saying the number as a fraction then writing it down. Remember to reduce and simplify.

$$.2 = \text{"two tenths"} = \frac{2}{10} = \frac{1}{5}$$

$$.37 = \text{"thirty-seven hundredths"} = \frac{37}{100}$$

$$.420 = \text{"four hundred twenty thousandths"} = \frac{420}{1000} = \frac{21}{50}$$

$$18.32 = \text{"eighteen and thirty-two hundredths"} = 18\frac{32}{100} = 18\frac{8}{25}$$

Exercise 4

Directions: Change the following fractions and mixed numbers to decimal numbers. Round answers to the nearest thousandth, if necessary.

1) $\frac{1}{8}$

5) $\frac{3}{4}$

9) $\frac{5}{8}$

2) $\frac{2}{7}$

6) $\frac{5}{10}$

10) $\frac{2}{3}$

3) $2\frac{1}{6}$

7) $13\frac{7}{8}$

11) $5\frac{1}{16}$

4) $\frac{3}{16}$

8) $8\frac{10}{15}$

12) $136\frac{3}{5}$

Exercise 5

Directions: Change the following decimal numbers to fractions or mixed numbers. Reduce answers, if possible.

1) .25

5) .16

9) .07

2) .2

6) .625

10) .1875

3) 3.8

7) 16.31

11) 42.325

4) .75

8) 3.35

12) 7.37

Exercise 6

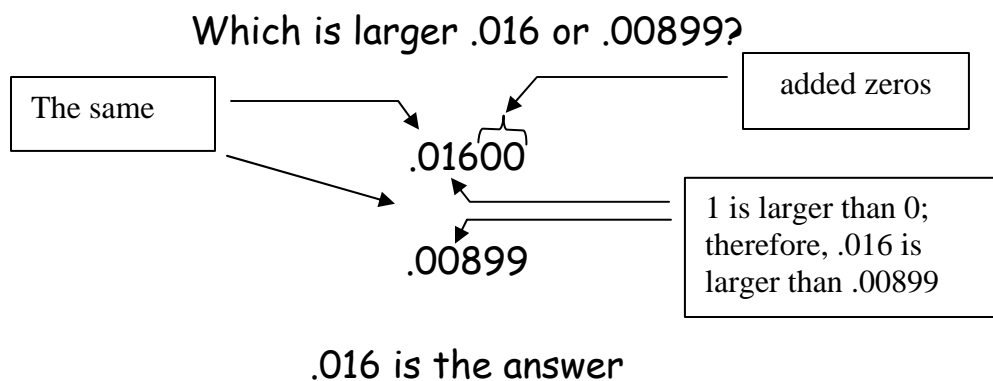
Directions: Fill in the chart below with equivalent fractions and decimal numbers. Reduce fraction answers, if possible. Round decimal answers to the nearest hundredth, if necessary.

Fraction	Decimal
$\frac{1}{2}$	1)
$\frac{4}{9}$	2)
$3\frac{1}{4}$	3)
$20\frac{1}{16}$	4)
$68\frac{2}{5}$	5)

Fraction	Decimal
6)	.005
7)	.02
8)	.8
9)	7.15
10)	59.125

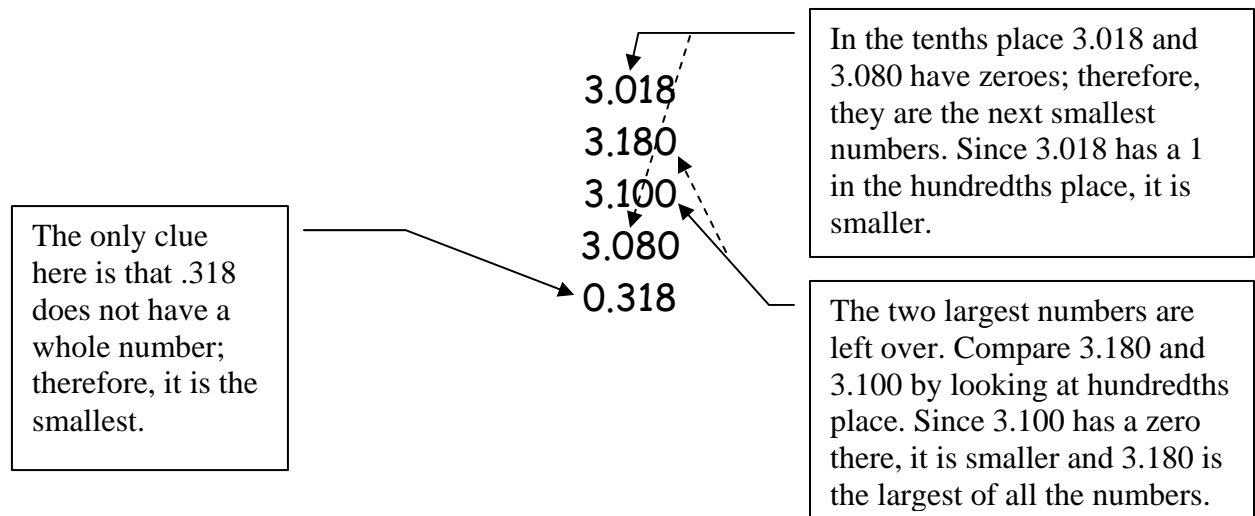
Arranging decimal numbers by size

When comparing decimal numbers and arranging them in order it is usually easiest to line up the numbers vertically with the decimal points in a vertical line. If a number doesn't have a decimal point, place the decimal at the end. You may fill in blanks with zeroes to make the columns easier to line up.



Arrange from the smallest to the largest:

3.018 3.18 3.1 3.08 .318



from smallest to largest, they are:

.318 3.018 3.08 3.1 3.18

Exercise 7

Directions: arrange these numbers from largest to smallest:

- 1) 2.62 2.061 2.612 0.66 6.21

- 2) 14.01 140.1 1.401 14.1 14.11

- 3) .0067 .007 .00618 .00701 .006

- 4) .1 .01 1 1.1 .019

- 5) 5.1 5 5.01 5.09 5.91

Exercise 8

Directions: arrange these numbers from smallest to largest:

1) 7.8 8.7 8.2 7.96 8.014

2) 0.15 .01 .1 .0101 .001

3) 94 93.999 93.909 93.99901 94.0001

4) 16.83 16.38 16.3 16.8 16

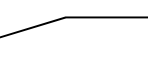
5) 3.49 3.489 3.4899 3.48999 3.48989

Adding and Subtracting Decimal Numbers

When adding and subtracting decimal numbers, line up the decimal point of all the numbers. If a number does not show a decimal point, place one to the right of the whole number. You may add zeroes to keep the columns lined up.


Add 13.6 and 42.18

$$\begin{array}{r} 13.60 \\ + 42.18 \\ \hline 55.78 \end{array}$$

 Add a zero

Add 1347 and .0005

$$\begin{array}{r} 1347.0000 \\ + .0005 \\ \hline 1347.0005 \end{array}$$

 Add zeroes

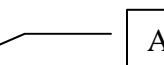
Subtract 14.69 from 113.06

$$\begin{array}{r} 113.06 \\ - 14.69 \\ \hline 98.37 \end{array}$$

The wording here can be confusing. Notice how “subtract 14.69 from 113.06” means $113.06 - 14.69$

146 - 3.198

$$\begin{array}{r} 146.000 \\ - 3.198 \\ \hline 142.802 \end{array}$$

 Add zeroes

Exercise 9

Directions: add or subtract the following

1)

$$\begin{array}{r} 8.7 \\ + 5.4 \\ \hline \end{array}$$

2) $74.906 + .01 + 42 =$

3) $8416 + .28 + 1.489 =$

4)

$$\begin{array}{r} 38.64 \\ - 8.87 \\ \hline \end{array}$$

5) $462 - 31.2 =$

6) $16.001 - 12.984 =$

7) $.1 + 1.9 + 13 =$

8) $20 - 14.8 - .018 =$

9) $6 + 132.89 =$

10) $346.8912 - 29.98764$

11)

$$\begin{array}{r} 11.00001 \\ - 1.11234 \\ \hline \end{array}$$

12)

$$\begin{array}{r} 1234. \\ - .1234 \\ \hline \end{array}$$

13) $124.8 + 3.79 - 118.965$

14) Subtract 6.8 from 14.2

15) Subtract 38.97 from 59

16) Add .001 to 87

17) Add 5000 to .0186

18)

$$\begin{array}{r} .40 \\ 3.80 \\ 26.91 \\ + 587.89 \\ \hline \end{array}$$

19)

$$\begin{array}{r} 143.012 \\ + 98.764 \\ \hline \end{array}$$

20) Subtract .001 from .01

Multiplying Decimal Numbers

When multiplying decimal numbers, set up the problem like regular multiplication. When you get your answer, add up the total number of digits to the right of the decimals in both the numbers you are multiplying and place the decimal in your answer that many places from the right end.

$$\begin{array}{r} .02 \times .008 \\ \times .02 \\ \hline .00016 \end{array}$$

three digits

two digits

five digits

.00016 is the answer

$$\begin{array}{r} 20 \times .8 \\ \times .8 \\ \hline 16.0 \end{array}$$

16.0 is the answer

When multiplying three numbers together, multiply any two to get an answer; then multiply that answer by the third number.

$$\begin{array}{r} 1.02 \times .3 \\ \times .3 \\ \hline .306 \\ .306 \\ \times 46 \\ \hline 1836 \\ 1224 \\ \hline 14.076 \end{array}$$

two digits

one digit

three digits

.3 × 1.02 × 46

14.076 is the answer

Exercise 10

Directions: Multiply the following

1) 1.67×3.2 2) $84.78 \times .612$ 3) $98.47 \times .7$ 4)

$$\begin{array}{r} .8842 \\ \times .002 \\ \hline \end{array}$$

5)

$$\begin{array}{r} 5.76 \\ \times .25 \\ \hline \end{array}$$

6)

$$\begin{array}{r} 8.04 \\ \times .004 \\ \hline \end{array}$$

7)

$$\begin{array}{r} 8.45 \\ \times .36 \\ \hline \end{array}$$

8)

$$\begin{array}{r} 4.095 \\ \times .006 \\ \hline \end{array}$$

9)

$$\begin{array}{r} 11.4 \\ \times 18 \\ \hline \end{array}$$

10)

$$\begin{array}{r} 36 \\ \times 1.1 \\ \hline \end{array}$$

11)

$$\begin{array}{r} .001 \\ \times .001 \\ \hline \end{array}$$

12)

$$\begin{array}{r} 8.88 \\ \times .88 \\ \hline \end{array}$$

13)

$$\begin{array}{r} 12.34 \\ \times 43.21 \\ \hline \end{array}$$

14)

$$.1 \times .1 \times .1$$

15)

$$2.7 \times 8.3 \times .0014$$

Dividing Decimal Numbers

Here are the three ways you will see division problems; they all mean the same thing:

$$\begin{array}{r} 46.58 \\ 2.1 \end{array}$$

$$2.1 \overline{)46.58}$$

$$46.58 \div 2.1$$

When dividing decimal numbers, move the decimal point in the divisor (number you're dividing by) to the right end of the divisor. Then move the decimal point in the dividend (the number you're dividing into) the same number of places to the right as you moved it in the divisor.

$$\begin{array}{r} \\ 2.1 \overline{)46.58} \end{array}$$

$$\begin{array}{r} \\ .100 \overline{)8.100} \end{array}$$

$$\begin{array}{r} \\ 4 \overline{)6.1} \end{array}$$

$$\begin{array}{r} \\ .8 \overline{)11.0} \end{array}$$

Once you have placed the decimal point correctly in your **quotient** (answer), divide like you would in whole numbers.

$$\begin{array}{r} 23 \\ .2 \overline{)4.6} \\ \underline{4} \\ 6 \\ \underline{6} \\ 0 \end{array}$$

$$\begin{array}{r} 20. \\ .26 \overline{)5.20} \\ \underline{52} \\ 0 \end{array}$$

$$\begin{array}{r} 9.4117 \\ 1.7 \overline{)16.00000} \\ \underline{153} \\ 70 \\ \underline{68} \\ 20 \\ \underline{17} \\ 30 \\ \underline{17} \\ 130 \\ \underline{119} \\ 11 \end{array}$$

Rounded to hundredth	
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$$\begin{array}{r} 9.4117 \\ 1.7 \overline{)16.00000} = 9.41 \end{array} \quad \begin{array}{r} .173 \\ 15 \overline{)2.600} = .17 \end{array}$$

$$\begin{array}{r} 15 \\ \underline{15} \\ 110 \\ \underline{105} \\ 50 \\ \underline{45} \\ 5 \end{array}$$

Exercise 11

Directions: Divide. Round answers to hundredths, if necessary

1) $.3 \overline{)69}$

2) $.82 \overline{)16.4}$

3) $.002 \overline{)4}$

4) $1.4 \overline{)280}$

5) $25 \overline{)4}$

6) $37 \overline{)1.68}$

7) $.66 \overline{)15.18}$

8) $1.87 \overline{)3.96}$

9) $329 \overline{)2.303}$

10) $.64 \overline{).14208}$

11) $20 \overline{).1}$

12) $.3 \overline{)85}$

13) $5.86 \overline{)250}$

14) $.789 \overline{)315.6}$

15) $2.8 \overline{)7.006}$

Word Problems using Decimal Numbers

Definitions: Sum - the answer from adding numbers
 Difference - the answer from subtracting numbers
 Product - the answer from multiplying numbers
 Quotient - the answer from dividing numbers

In solving word problems, try to understand the whole situation being described. Some numbers may not even be involved in answering the question. Sometimes you will have to do extra steps to get the numbers you need to solve the problem.

If the annual rainfall for a town near Santa Fe was 12.3 inches in 1960, 13.2 inches in 1961, and 11.5 in 1962, what was the total rainfall for the three years?

$$\begin{array}{r} 12.3 \\ 13.2 \\ + 11.5 \\ \hline 37.0 \end{array}$$

"Total" means to add 37.0 inches is the answer

What is the difference between David's salary of \$523.86 per month and Robert's monthly salary, which is \$318.90?

$$\begin{array}{r} 523.86 \\ - 318.90 \\ \hline 204.96 \end{array}$$

"Difference" means to subtract \$204.96 is the answer

If you have a car that used 19.2 gallons of gas to go 285 miles, how many miles per gallon (mpg) did the car get? (round your answer to the nearest tenth.)

$$\text{mpg} = \frac{\text{miles}}{\text{gallon}} = \frac{285 \text{ miles}}{19.2 \text{ gallon}}; \text{ so divide } 19.2 \text{ into } 285$$
$$\begin{array}{r} 14.84 \\ 19.2 \overline{)285.000} \end{array}$$

14.8 mpg is the answer

You need to order three hinges for each of 15 doors. Each hinge costs \$.75. How much will the hinges cost?

The total number of hinges is $3 \times 15 = 45$

Multiply $45 \times .75 = 33.75$ \$33.75 is the answer

Exercise 12

- 1) During five days, you drive 15.4 miles, 24.2 miles, 10.4 miles, 18.7 miles, and 7.5 miles. How many miles did you drive during those five days?
- 2) If you are given 3 checks, one for \$36.98, another for \$17.27, and a third for \$260, how much is the total of all 3 checks?
- 3) If a car gets 42.1 mpg on the highway, how many gallons of fuel will it use by traveling 340 highway miles? (round answer to tenths)
- 4) If you need to cut 5 pieces of glass from a 14 feet length, how long should each piece be?
- 5) If you purchase a TV and pay \$40 down and \$32.60 a month for 8 months, what was the purchase price of the TV?
- 6) If the revenues from the extra $\frac{1}{4}$ % sales tax amounted to \$48,136.47 in 1983 and is to be divided equally among 7 different departments within the city of Albuquerque, how much will each department receive? (round to the nearest cent)
- 7) If the total precipitation (rainfall and snow) for the year at a mountain town is expected to be 37.9 inches and it has already rained 26.82 inches, how many more inches of precipitation are expected?

Decimals Practice Test

Change to decimals. (round to hundredths)

1) $\frac{2}{5}$

2) $\frac{1}{6}$

3) $\frac{3}{8}$

4) $5\frac{1}{2}$

Change to fractions (reduce, if possible)

5) .25

6) .66

7) 2.4

8) 42.875

Add

9) $\begin{array}{r} 3.7 \\ + 8.9 \\ \hline \end{array}$

10) $\begin{array}{r} 75.006 \\ 2.3 \\ 15.863 \\ + 246.9 \\ \hline \end{array}$

11) $8.1 + 268 + 49.64$

Subtract

12) $\begin{array}{r} 3.16 \\ - 1.87 \\ \hline \end{array}$

13) $162.8 - 46.96$

14) Subtract 1.97 from 15.1

Multiply

15) $\begin{array}{r} 5.82 \\ \times .78 \\ \hline \end{array}$

16) $\begin{array}{r} .165 \\ \times 74 \\ \hline \end{array}$

17) $.01 \times .167 \times .9$

Divide (round answers to hundredths)

18) $.7 \overline{) .49}$

19) $8.5 \overline{) .17}$

20) $.172 \overline{) 2}$

21) Arrange from largest to smallest

.808, .81, .8019, .807 .8

22) Arrange from smallest to largest

1.62, 1.6, 1.06, 1.16, 1.66

23) Subtract four and three-tenths from eleven and eighty-one hundredths.

24) If you ran 5.3 miles on Monday, 3.9 miles on Wednesday, and 4.7 miles on Friday, how many miles did you run, total, for the three days?

25) If you divided \$63.65 evenly among five children, how much would each child get?

26) If you bought 12.6 gallons of gasoline at \$1.20 per gallon, how much did the gasoline cost?

Answer Key

Exercise 1	Exercise 2	Exercise 3
1) 9	1) 29	1) .133
2) 8	2) .81	2) .009
3) 7	3) 9034.7	3) .020
4) 6	4) 1.004	4) 5.123
5) 3	5) 100.062	5) 6.667
6) 0	6) .45	6) 40.619
7) 9	7) .4321	7) 2.000
8) 4	8) 120.5	8) .13
9) 7	9) .017	9) .01
10) 1	10) 1.7	10) .33
		11) 5.57
Exercise 4	Exercise 5	12) 48.00
1) .125	1) $\frac{1}{4}$	13) 8.0
2) .286	2) $\frac{1}{5}$	14) .7
3) 2.167	3) $3\frac{4}{5}$	15) 1.3
4) .188	4) $\frac{3}{4}$	16) 100.0
5) .75	5) $\frac{4}{25}$	17) 1
6) .5	6) $\frac{5}{8}$	18) 12
7) 13.875	7) $16\frac{31}{100}$	19) 500
8) 8.667	8) $3\frac{7}{20}$	20) 1000
9) .625	9) $\frac{7}{100}$	
10) .667	10) $\frac{3}{16}$	
11) 5.063	11) $42\frac{13}{40}$	
12) 136.6	12) $7\frac{37}{100}$	

Exercise 6			
Fraction	Decimal	Fraction	Decimal
$\frac{1}{2}$	1) .5	6) $\frac{1}{200}$.005
$\frac{4}{9}$	2) .44	7) $\frac{1}{50}$.02
$3\frac{1}{4}$	3) 3.25	8) $\frac{4}{5}$.8
$20\frac{1}{16}$	4) 20.06	9) $7\frac{3}{20}$	7.15
$68\frac{2}{5}$	5) 68.4	10) $59\frac{1}{8}$	59.125

Exercise 7	Exercise 8	Exercise 9
1) 6.21, 2.62, 2.612, 2.061, 0.66	1) 7.8, 7.96, 8.014, 8.2, 8.7	1) 14.1
2) 140.1, 14.11, 14.1, 14.01, 1.401	2) .001, .01, .0101, .1, .15	2) 116.916
3) .00701, .007, .0067, .00618, .006	3) 93.909, 93.999, 93.99901, 94, 94.0001	3) 8417.769
4) 1.1, 1, .1, .019, .01	4) 16, 16.3, 16.38, 16.8, 16.83	4) 28.77
5) 5.91, 5.1, 5.09, 5.01, 5	5) 3.489, 3.48989, 3.4899, 3.48999, 3.49	5) 430.8
		6) 3.017
		7) 15
		8) 5.182
		9) 138.89
		10) 316.90356
		11) 9.88767
		12) 1233.8766
		13) 9.625
		14) 7.4
		15) 20.03
		16) 87.001
		17) 5000.0186
		18) 619
		19) 241.776
		20) .009

Exercise 10	Exercise 11	Exercise 12
1) 5.344	1) 2.3	1) 76.2 miles
2) 51.88536	2) 20	2) \$314.25
3) 68.929	3) 2000	3) 8.1 gallons
4) .0017684	4) 200	4) 2.8 feet
5) 1.44	5) .16	5) \$300.80
6) .03216	6) .05	6) \$6876.64
7) 3.042	7) 23	7) 11.08 inches
8) .02457	8) 2.12	
9) 205.2	9) .01	
10) 39.6	10) .22	
11) .000001	11) .01	
12) 7.8144	12) 283.33	
13) 533.2114	13) 42.66	
14) .001	14) 400	
15) .031374	15) 2.50	
Practice Test		
1) .4	13) 115.84	25) \$12.73
2) .17	14) 13.13	26) \$15.12
3) .38	15) 4.5396	
4) 5.5	16) 12.21	
5) $\frac{1}{4}$	17) .001503	
6) $\frac{33}{50}$	18) .70	
7) $2\frac{2}{5}$	19) .02	
8) $42\frac{7}{8}$	20) 11.63	
9) 12.6	21) .81, .808, .807, .8019, .8	
10) 340.069	22) 1.06, 1.16, 1.6, 1.62, 1.66	
11) 325.74	23) 7.51	
12) 1.29	24) 13.9 miles	