Sect 4.2 - Adding and Subtracting Decimals

Objective a: Adding and subtracting decimals.

In the first section of this chapter, we saw how to write decimals as fractions and vice-versa. Although we will not normally do an addition of decimals problems this way, we can convert the decimals into fractions and add the fractions. We can then rewrite our answer as a decimal.

Simplify:

Ex. 1 $0.03 + 0.06 + 0.2 + 0.5$

Solution:

Write a zero after the two and five on the last two numbers: $0.03 + 0.06 + 0.20 + 0.50$. Since there are two digits to the right of the decimal, we can rewrite each number over 1 followed by two zeros:

$0.03 + 0.06 + 0.20 + 0.50 = \frac{3}{100} + \frac{6}{100} + \frac{20}{100} + \frac{50}{100}$

Since the denominators are the same, add the numerators:

$= \frac{79}{100}$. But since the denominators has two zeros after the one, then 79 will occupy the first two places to the right of the decimal point.

$= 0.79$

When we add fractions with the same denominator, we add only the numerators; the denominator remains the same. Because of this fact, when we add decimals, we only need align the place values of the digits and combine each column just like regular addition. The decimal point does not change because the denominator does not change when adding like fractions. The same holds true for subtraction. Thus, to add or to subtract decimals, we will align the place values in columns and add each column. To estimate the answer, round each decimal to nearest whole number and perform the operation.

Simplify the following. Then estimate the answer:

Ex. 2 Find the total of 8.62, 53.95, and 12.

Solution:

Align the place values of the numbers and combine the columns. Since 12 is a whole number, it will be equal to 12.00:

1	2 + 5 + 0 = 7, write down 7.
18.62	6 + 9 + 0 = 15, write down 5, carry the 1.
53.95	***1*** + 8 + 3 + 2 = 14, write down 4, carry the 1.
+ 12.*00*	***1*** + 5 + 1 = 7, write down 7.
74.57	*Estimate: ≈ 9 + 54 + 12 = 75.*

Ex. 3 Find the sum of 432.51, 892.1, 16.08, 301.2 and 84.

Solution:

	Estimate:
21	
432.51	*433*
892.1*0*	*892*
16.08	*16*
301.*20*	*301*
+ 84.*00*	*+ 84*
1725.89	*1726*

Ex. 4 Find the difference of 483.632 and 79.7.

Solution:

$7^{1}2.^{1}6$

4 ~~8 3. 6~~ 3 2

– 7 9. 7 0 0

4 0 3. 9 3 2

Estimate:

≈ 484 – 80 = 404.

Ex. 5 84.267 less than 243.9.

Solution:

9

$1^{1}3^{1}3.\ 8^{\cancel{1}}\cancel{0}^{1}0$

~~2 4 3~~. *~~9 0 0~~*

– 8 4. 2 6 7

1 5 9. 6 3 3

Estimate: 244 – 84 = 160.

Ex. 6 8 subtract 1.3625.

Solution:

9 9 9

$7.^{\cancel{1}}\cancel{0}^{\cancel{1}}\cancel{0}^{\cancel{1}}\cancel{0}^{1}0$

~~8.~~ *~~0 0 0 0~~*

– 1. 3 6 2 5

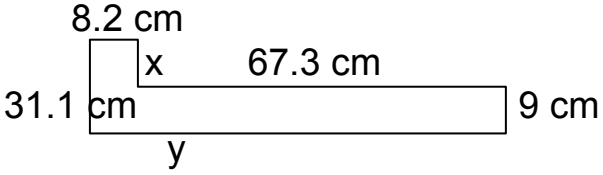
6. 6 3 7 5

Estimate: 8 – 1 = 7.

Objective b: Applications of Addition and Subtraction of Decimals.

Solve the following:

Ex. 7 Find the lengths of the sides labeled x and y and then find the perimeter of the figure to the right:



Solution:

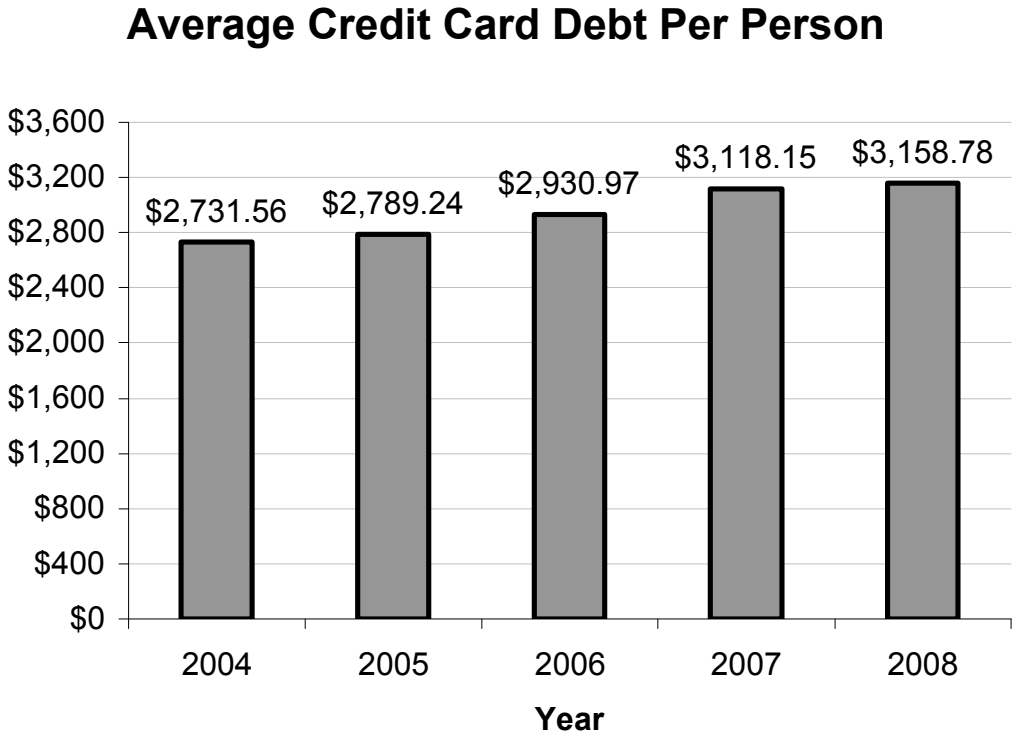
Since the total width of the large end is 31.1 cm and the width of the small end is 9 cm, then x is the difference of 31.1 and 9 cm: x = 31.1 – 9 = 22.1 cm. The total length y is the sum of the lengths of 8.2 cm and 67.3 cm: y = 8.2 + 67.3 = 75.5 cm.

The perimeter is the sum of the lengths of all the sides:

31.1 + 8.2 + 22.1 + 67.3 + 9 + 75.5 = 213.2 cm

The length of x is 22.1 cm, the length of y is 75.5 cm and the perimeter is 213.2 cm.

Ex. 8 The graph below gives the average credit card debt per person for the years 2004 through 2008.



a) How much did the average credit card debt grow from 2005 to 2007?

b) How much did the average credit card debt change from 2004 to 2008?

Solution:

a) We need to subtract \$2,789.24 from \$3,118.15:

$$\begin{array}{r} 3\,1\,1\,8.1\,5 \\ -\,2\,7\,8\,9.2\,4 \\ \hline \end{array} \qquad \begin{array}{r} 2^{1}0^{1}0^{1}7^{1}1 \\ \cancel{3}\,\cancel{1}\,\cancel{1}\,\cancel{8}.1\,5 \\ -\,2\,7\,8\,9.2\,4 \\ \hline 3\,2\,8.9\,1 \end{array}$$

It grew by \$328.91 from 2005 to 2007.

b) We need to subtract \$2,731.56 from \$3,158.78:

$$\begin{array}{r} 3\,1\,5\,8.7\,8 \\ -\,2\,7\,3\,1.5\,6 \\ \hline \end{array} \qquad \begin{array}{r} 2^{1}1 \\ \cancel{3}\,1\,5\,8.7\,8 \\ -\,2\,7\,3\,1.5\,6 \\ \hline 4\,2\,7.2\,2 \end{array}$$

It increased by \$427.22 from 2004 to 2008.