Make It Real Learning

States by the Numbers

place value
rounding
estimation
fractions
percents

North Dakota

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Introduction

"When am I ever going to use this?" It is a question that has plagued teachers and learners for decades. Now, with the help of Make It Real Learning Company, you can answer the question.

States by the Numbers is a real-data math adventure across the United States. Learn about your favorite state or states by delving into place values, rounding, estimation, fractions and percentages.

There are 50 workbooks in the series – one for each state. The data in each workbook is taken directly from the Census Bureau's 2008 Statistical Abstract of the United States.

Each workbook includes basic instruction and 80 practice problems. Additionally, the "What's the big idea?" pages give learners the opportunity to reflect on the things they've learned. Throughout the workbook series, we have consistently sought to address the content and process standards of the National Council of Teachers of Mathematics.

There are multiple ways to use the activities in a teaching environment. Since the activities teach both mathematics and social studies, many teachers and families enjoy using the workbooks to reinforce mathematics across the curriculum. Although the activities may be effectively used in a formal teaching setting, they are designed specifically for the independent learner.

We hope you enjoy the activities! We continue to increase the number of workbooks in the Make It Real Learning workbook series. Please visit www.MakeItRealLearning.com for the most current list of activities. Thanks!

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Place Value

There are many different numbering systems. The most common numbering system is the base-10 system. The ten digits used in this system are 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. All numbers may be created using these digits.

Although the numbers 368 and 836 both have the digits 3, 6, and 8, the numbers have different values because of the placement of the digits.

368 means 300 + 60 + 8 but 836 means 800 + 30 + 6. For the number 368, there are 3 hundreds, 6 tens, and 8 ones. We say that 3 is in the hundreds place, 6 is in the tens place, and 8 is in the ones place.

100 hundreds	10 tens	1 ones
3	6	8

Try It #1
For 836, which digit is in the hundreds place? Which digit is in the tens place? Which digit is in the ones place?

See solution at bottom of page.

The same idea may be used for larger numbers. For example, the number 134,657 may be written in expanded form as 100,000 + 30,000 + 4000 + 600 + 50 + 7.

100,000 hundred thousands	10,000 ten thousands	1000 thousands	100 hundreds	10 tens	1 ones
1	3	4	6	5	7

1 is in the hundred thousands place, 3 is in the ten thousands place, 4 is in the thousands place, 6 is in the hundreds place, 5 is in the tens place, and 7 is in the ones place.

- Try It #1 Solution: *8 is in the hundreds place, 3 is in the tens place and 6 is in the ones place.*

Try It #2
Write the number 245,671 in expanded form.

See solution at the bottom of the page.

We can add columns to a place value table, like the one shown earlier, by adding a zero to the number in the previous column.

1,000,000 millions	100,000 hundred thousands	10,000 ten thousands	1000 thousands	100 hundreds	10 tens	1 ones

Try It #3
The estimated population of the United States on May 5, 2009, was 306,358,814 (Source: www.census.gov). Write out this number in words. Then identify the digit in the hundred millions place and the digit in the one millions place.

See solution at the bottom of the page.

Try It #4
The Census Bureau predicts that the population of the United States will be 363,584,435 on July 1, 2030. (Source: www.census.gov). In what place values is the digit 3?

See solution at the bottom of the page.

The skill of finding place values will be helpful to you when rounding large numbers. We will teach that in the next section.

- Try It #2 Solution: $200,000 + 40,000 + 5000 + 600 + 70 + 1$
- Try It #3 Solution: *Three hundred six million, three hundred fifty eight thousand, eight hundred fourteen. The number in the hundred millions place is 3 and the number in the one millions place is 6.*
- Try It #4 Solution: *Hundred millions, millions, and tens*

Place Value Practice

1. The population of North Dakota is projected to be 636,623 in 2010. What is the digit in the thousands place?

2. Between April 1, 2000, and July 1, 2006, the population of North Dakota changed by -6,333 people. (A negative change means the population went down.) What is the digit in the hundreds place?

3. Between April 1, 2000, and July 1, 2006, there were 49,881 births in North Dakota. If there had been twenty thousand fewer births, what number would be in the ten thousands place?

4. The percentage of adults in North Dakota in 2006 who were high school graduates was 89%. If you switch the order of the digits in this number, what number is in the ones place?

5. In 2005, there average cost per day for a hospital stay in North Dakota was 898 dollars. If you double this number, what digit is in the hundreds place?

6. The total land area of North Dakota is 68,976 square miles and the total water area is 1,724 square miles. Find the number in the thousands place for the combined total of the land and water areas.

7. The total land area of North Dakota is 68,976 square miles and the total water area is 1,724 square miles. Find the number in the hundreds place for the difference of the land and water areas.

8. In 2003, the average annual pay for an adult working in North Dakota was $27,628. The average annual pay nationally was $37,765. Find the difference between the average pay nationally and the average pay in North Dakota. Then determine the digit in the thousands place. (Note: If the difference ends up being negative, that means that the average annual pay in the state is below the national average.)

9. In 2005, the average annual pay for an adult working in North Dakota was $29,956. If the 2010 pay is $6500 more than the 2005 pay, what number will be in the thousands place?

10. The term *per capita* means *per person*. The personal income per capita in North Dakota in 2000 was $25,104. This number is calculated by adding up all of the money earned by people working in the state and dividing it by the total number of the people living in the states. Write this number in expanded form.

11. The personal income per capita is different in each state. When the personal incomes per capita were ranked from highest to lowest in 2000, North Dakota ranked number 38. What is the digit in the ones place?

12. When the personal incomes per capita were ranked from highest to lowest in 2006, North Dakota ranked number 38. What is the digit in the tens place?

13. In 2006, the average number of acres on a farm in North Dakota was 1,300 acres. What is the place value furthest to the right that contains the number 0?

14. In 2006, North Dakota had 30,000 farms. If the number of farms today is 3,000 farms less than this, what digit is in the thousands place?

15. In 2000, the number of existing homes in North Dakota that were sold was 11,000 homes. Suppose that the number of homes sold in 2010 will be half has many as the homes sold in 2000. What is the digit in the ten thousands place for the projected number of homes sold in 2010?

16. The amount of energy consumed in North Dakota in 2003 was 395 trillion BTU. (The acronym BTU means British Thermal Unit. A BTU is defined as the amount of heat required to raise the temperature of one pound of water from 60 degrees Fahrenheit to 61 degrees Fahrenheit.) Write 395 in expanded form.

17. The number of home sales in North Dakota in 2000 was 11,000. What is the digit in the ten thousands place?

18. The number of children in North Dakota who enrolled in Prekindergarten to Grade 8 was 67,000 children in 2004. In what place value is the rightmost 7 in 67,000?

19. The number of children in North Dakota who enrolled in Grade 9 to Grade 12 in 2004 was 33,000. Write this number in expanded form.

20. In the 2004 Presidential Election, 313,000 people in North Dakota voted. If the order of the digits in this number is reversed, what is the number in the one's place?

Place Value - What's the big idea?

(Use this page to explain what you've learned.)

Rounding

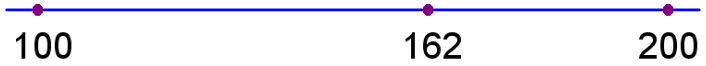
The estimated population of the United States on May 5, 2009, was 306,358,814 (Source: www.census.gov). This number is read *three hundred six million, three hundred fifty-eight thousand, eight hundred fourteen*. Just saying this number requires us to use eleven words! Oftentimes, we prefer to work a number that is close to the number we have but is easier to use. For example, 300,000,000 (three hundred million) is close to 306,358,814 but can be said in three words instead of eleven.

Rounding is a common process we use to make large numbers simpler and easier to work with. With a good understanding of place values, the rounding process is easy to learn.

The amount of money it takes to feed a family of four each week in the United States is approximately 162 dollars (Source: www.census.gov). The actual amount of money your family spends may be more or less than this. For our first example, we will round 162 to the nearest ten. In our answer, every digit after the tens place will need to be a zero. We create a number line with 160, 162, and 170.

Notice that 160 and 170 are the numbers ending in 0 that are closest to 162. Since 162 is closer to 160 than 170, 162 rounded to the nearest ten is 160.

Suppose that we wanted to round 162 to the nearest hundred. In our answer, every digit after the hundreds place will need to be a zero. We create a number line with 100, 162, and 200.



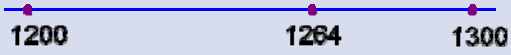
Notice that 100 and 200 are the numbers ending in 00 that are closest to 162. Since 162 is closer to 200 than 100, 162 rounded to the nearest hundred is 200.

Try It #1

According to the U.S. National Weather Service, there were 1264 tornados in the United States in 2005. Use a number line to round 1264 to the nearest hundred.

See solution at bottom of page.

- Try It #1 Solution: 1300



Can we round 1264 to the nearest thousand without using a number line? Sure. First, we make every digit after the thousands place a 0. That gives us 1000. We then find the first number greater than 1264 with three zeros at the end: 2000. Is 1264 closer to 1000 or closer to 2000? Since 1500 is the number that is exactly halfway between 1000 and 2000 and 1264 is less than 1500, 1264 is closer to 1000.

Try It #2

Round the US population of 306,358,814 to the nearest million.

See solution at bottom of page.

When asked to round a number that lies exactly halfway between the two choices for the rounded number, we round up. For example, if asked to round 1500 to the nearest thousand, we round up to 2000. The number that is exactly halfway between the two choices for a rounded number will always end with a 5 followed by an appropriate number zeros. For example, the number exactly halfway between 3000 and 4000 is 3500. The number exactly halfway between 40 and 50 is 45.

Try It #3

There were 650 people injured by tornados in the United States in 1995. Round 650 to the nearest hundred.

See solution at bottom of page.

Try It #4

The United States contains 3,537,438 square miles of land. Round this number to the nearest million square miles.

See solution at bottom of page.

- Try It #2 Solution: *306,000,000*
- Try It #3 Solution: *700 tornados*
- Try It #4 Solution: *4,000,000 square miles*

Rounding Practice

1. The population of North Dakota is projected to be 636,623 in 2010. Round this number to the nearest thousand.

2. Between April 1, 2000, and July 1, 2006, the population of North Dakota changed by -6,333 people. (A negative change means the population went down.) Round this number to the nearest hundred.

3. Between April 1, 2000, and July 1, 2006, there were 49,881 births in North Dakota. We round this number to 0 . To what place value did we round the number?

4. The number of hospitals in North Dakota in 2000 was 42. Switch the order of the digits and round this number to the nearest ten.

5. In 2005, the average cost per day for a hospital stay in North Dakota was 898 dollars. We round this number to 900. What is the smallest place value to which you can round and get this number?

6. The total land area of North Dakota is 68,976 square miles and the total water area is 1,724 square miles. Round each number to the nearest thousand. Then use your answers to predict the difference in the land and water areas.

7. The total land area of North Dakota is 68,976 square miles and the total water area is 1,724 square miles. Round each number to the nearest hundred. Then use your answers to predict the combined total of land and water areas.

8. In 2003, the average annual pay for an adult working in North Dakota was $27,628. Round this number to the ten thousands place.

9. In 2005, the average annual pay for an adult working in North Dakota was $29,956. Round this number to the nearest hundred. Then add 5,100 to predict the 2011 average annual pay.

10. The term *per capita* means *per person*. The personal income per capita in North Dakota in 2000 was $25,104. This number is calculated by adding up all of the money earned by people working in the state and dividing it by the total number of the people living in the states. We round this number to 25,100. To what place value did we round this number? (If rounding to two different place values results in the same number, choose the smaller place value as your answer.)

11. The personal income per capita is different in each state. When the personal incomes per capita were ranked from highest to lowest in 2000, North Dakota ranked number 38. Round this number to the nearest ten. Then multiply the rounded number by itself.

12. When the personal incomes per capita were ranked from highest to lowest in 2006, North Dakota ranked number 32. Round this number to the nearest ten. Then triple the rounded number.

13. In 2006, the average number of acres on a farm in North Dakota was 1,300 acres. Round this number to the nearest hundred. Then subtract 100 to predict the average farm size if each farm was reduced by 100 acres.

14. In 2006, North Dakota had 30,000 farms. Round this number to the nearest ten thousand.

15. In 2000, the number of existing homes that were sold was 11,000 homes. We round this number to 10,000. To what place value did we round this number?

16. The amount of energy from natural gas consumed in North Dakota in 2003 was 59 trillion BTU. (The acronym BTU means British Thermal Unit. A BTU is defined as the amount of heat required to raise the temperature of one pound of water from 60 degrees Fahrenheit to 61 degrees Fahrenheit.) Write the number 59 in expanded form. Then round the number to the nearest ten.

17. The amount of energy from nuclear electric power consumed in North Dakota in 2003 was 0 trillion BTU. (For some states, this amount will be 0.) Write 0 in expanded form. Then round the number to the nearest hundred.

18. The number of children in North Dakota who enrolled in Prekindergarten to Grade 8 was 67,000 children in 2004. Round this number to the nearest ten thousand.

19. The number of children in North Dakota who enrolled in Grade 9 to Grade 12 was 33,000 youth in 2004. Round this number to the nearest hundred thousand.

20. In the 2004 Presidential Election, 313,000 people in North Dakota voted. Round this number to the nearest million.

Rounding - What's the big idea?

(Use this page to explain what you've learned.)

Estimation

People who learn how to do mental math quickly can often figure out answers to their questions more rapidly than those who cannot. One technique that will help you do mental math quickly is estimation. It can be used with addition, subtraction, multiplication and division.

For example, there were 1819 tornados in the United States in 2004 and 1032 tornados in 2006, according to the U.S. National Weather Service. Approximately how many more tornados were there in 2004 than in 2006? To come up with a quick estimate, we round both numbers to the nearest hundred and subtract them mentally. The number 1819 rounds to 1800 and the number 1032 rounds to 1000.

$$1800 - 1000 = 800$$

There were approximately 800 more tornados in 2004 than in 2006. (The exact answer is 787.)

Try It #1

In 2003, tornados in the United States caused 1263 million dollars of damage to homes, cars, and other property. In 2006, tornados caused 752 million dollars of property damage. Approximately how much more property damage was there in 2003 than in 2006?

See solution at bottom of page.

When asked to find the product of two numbers, we can also estimate. For example, if we are asked to multiply together 23 and 47, we first round each number to the nearest 10. The number 23 rounds to 20 and the number 47 rounds to 50. We need to find 20×50. Since $2 \times 5 = 10$, the product of 20 and 50 is 1000. Our estimate for the product of 23 and 47 is 1000. (The exact value of 23×47 is 1081.)

Try It #2

Minimum wage is the least amount of money a business can pay a worker for each hour of work. In July 2008, minimum wage was 6.55 dollars per hour. Round the wage to the nearest dollar. Then estimate the amount of money a person would earn by working 12 hours at minimum wage.

See solution at bottom of page.

- Try It #1 Solution: $1300 - 800 = 500$ million dollars
- Try It #2 Solutions: *Rounded wage is 7 dollars. Estimated earnings are 84 dollars.*

The amount of money it takes to feed a family of four each week in the United States is approximately 162 dollars (Source: www.census.gov). If we have 4000 dollars available to spend on food, approximately how many weeks of food will that money buy? We need to divide the 4000 dollars by 162 dollars per week to figure out how many weeks of food we can buy. That is, we need to find $4000 \div 162$. To create our estimate, we round 162 to 160 and calculate the result.

$$\frac{4000}{160} = \frac{4 \times 10 \times 10 \times 10}{4 \times 4 \times 10}$$

Notice that by factoring the numerator and denominator of the fraction we are able to see how to cancel out some of the factors.

$$\begin{aligned}\frac{4000}{160} &= \frac{\cancel{4} \times 10 \times 10 \times \cancel{10}}{4 \times \cancel{4} \times \cancel{10}} \\ &= \frac{10 \times 10}{4} \\ &= \frac{(2 \times 5) \times (2 \times 5)}{2 \times 2} \\ &= \frac{\cancel{2} \times 5 \times \cancel{2} \times 5}{\cancel{2} \times \cancel{2}} \\ &= 5 \times 5 \\ &= 25\end{aligned}$$

We estimate that 4000 dollars will buy 25 weeks of food. (The calculated value for $4000 \div 162$ is approximately 24.69 weeks.)

Try It #3

Given that it takes 162 to feed a family of four for a week in the United States, estimate how many weeks of food $2400 will buy?

See solution at bottom of page.

- Try It #3 Solution: $\frac{2400}{160} = \frac{80 \times 30}{80 \times 2} = 15$ weeks

Estimation Practice

1. In 2003, North Dakota used 121 trillion BTUs of energy from petroleum and 59 trillion BTUs from natural gas. Round each of these values to the nearest 10 trillion BTUs. Then estimate the total amount of energy used from petroleum and natural gas in 2003 in North Dakota.

2. The number of square kilometers of land area in North Dakota is 178,647. The number of square kilometers of water area is 4,465. Round each of these values to the nearest thousand square kilometers. Then estimate the total area of land and water in the state.

3. In the 2004 presidential election, 111,000 votes were cast for the Democratic candidate and 197,000 votes were cast for the Republican candidate in North Dakota. Round each of these values to the nearest hundred thousand. Then estimate the total number of people in North Dakota who voted for the two candidates.

4. The average annual pay in North Dakota in 2004 was 28,987 dollars and in 2005 was 29,956. Round each of the values to the nearest thousand dollars. Then estimate the amount of money earned in 2004 and 2005 combined.

5. In 2003, people living in North Dakota consumed 18 trillion BTUs of energy from hydroelectric power (water) and 121 trillion BTUs of energy from petroleum (oil). Round each of the values to the nearest hundred trillion BTUs. Then estimate the total amount of energy from hydroelectric power and from petroleum consumed in North Dakota in 2003.

6. In 2006, there were 636,000 people living in North Dakota. In 2000, there were 642,000 people living in North Dakota. Round each of the populations to the nearest hundred thousand and use mental math to estimate the change in the population between 2000 and 2006.

7. Between April 1, 2000, and July 1, 2006, there were 49,881 births and 36,748 deaths in North Dakota. Round each of the values to nearest hundred thousand and use mental math to estimate the difference in births and deaths.

8. In 2000, the average cost per day for a stay in a hospital in North Dakota was 747 dollars. In 2005, the average cost per day was 898 dollars. Round each of the values to the nearest hundred and use mental math to determine the change in the average cost per day.

9. In 1990, 77 percent of adults living in North Dakota were high school graduates. In 2006, the number was 89 percent. Round each value to the nearest ten percent and use mental math to estimate the change in the percent of adults who were high school graduates.

10. In 2000, there were 175,000 votes cast for the Republican candidate and 95,000 votes cast for the Democratic candidate in North Dakota in the presidential election. Round each value to the nearest hundred thousand and estimate the difference in the number of votes for each candidate.

11. There are 68,976 square miles of land in North Dakota. There are approximately 2.6 square kilometers in a square mile. Round the number of square miles of land to the nearest thousand square miles then estimate the number of square kilometers of land.

12. There are 1,724 square miles of water in North Dakota. There are approximately 2.6 square kilometers in a square mile. Round the number of square miles of water to the nearest thousand square miles then estimate the number of square kilometers of water.

13. In 2000, there were 31,000 farms in North Dakota. The average number of acres of land on each farm was 1,279. Round the number of farms to the nearest ten thousand and the number of acres per farm to the nearest ten. Then estimate the number of acres of farm land in North Dakota by multiplying the number of farms by the number of acres per farm.

14. In 2006, there were 30,000 farms in North Dakota. The average number of acres of land on each farm was 1,300. Round the number of farms to the nearest ten thousand and the number of acres per farm to the nearest ten. Then estimate the number of acres of farm land in North Dakota.

15. The population density of a state is the total number of people in the state divided by the total square miles of land in the state. A state with a high population density is more crowded than a state with a lower population density. In 2006, the population density of North Dakota was 9 people per square mile. There are 68,976 square miles of land in North Dakota. Round the land area to the nearest thousand square miles. Then estimate the 2006 population of the state by multiplying the population density by the land area.

16. In 2006, there were 636,000 people living in North Dakota. In 2000, there were 642,000 people living in North Dakota. Round each of the populations to the nearest hundred thousand and use division to estimate how many times larger the 2006 population was than the 2000 population. (If the number is less than 1, the 2006 population is less than the 2000 population.)

17. Between April 1, 2000, and July 1, 2006, there were 49,881 births and 36,748 deaths in North Dakota. Round each of the values to nearest ten thousand and use division to estimate how many times more births there were than deaths. (If the number is less than 1, there were more deaths than births.)

18. In 2000, the average cost per day for a stay in a hospital in North Dakota was 747 dollars. In 2005, the average cost per day was 898 dollars. Round each of the values to the nearest hundred and use division to estimate how many times greater the 2005 cost was than the 2000 cost.

19. In 1990, 77 percent of adults living in North Dakota were high school graduates. In 2006, the number was 89 percent. Round each value to the nearest ten percent and use division to estimate how many times larger the percent of high school graduates was in 2006 than in 1990.

20. In 1990, there were 13,000 people unemployed in North Dakota. In 2000, there were 10,000 people unemployed in the state. Round each value to the nearest ten thousand and use division to estimate how many times more people were unemployed in 1990 than in 2000. (If the number of times is less than 1, that means that the number of people unemployed in 1990 was greater than the number of people unemployed in 2000.)

Estimation - What's the big idea?

(Use this page to explain what you've learned.)

Understanding Fractions and Percents

Fractions are often created by dividing one value by another. For example, when we divide 4 by 5 we get the fraction $\frac{4}{5}$. When we divide 9 by 12, we get the fraction $\frac{9}{12}$. One of the difficulties many people have with fractions is that it is hard to tell if one fraction is bigger than another. For example, which is bigger $\frac{5}{8}$ or $\frac{3}{5}$? It is hard to tell from the fraction itself. When we divide the numbers using a calculator, we see that $\frac{5}{8} = 0.625$ and $\frac{3}{5} = 0.6$. Since 0.625 is bigger than 0.6, $\frac{5}{8}$ is bigger than $\frac{3}{5}$.

In 2003, the amount of energy consumed in the United States was 98,605 trillion BTUs. (BTU stands for British Thermal Unit.) Of this energy, 7959 trillion BTUs came from nuclear power sources. The fraction $\frac{7959}{98,605}$ compares the amount of energy from nuclear power sources to the total amount of energy from all sources. We can find the decimal form of this fraction by using a calculator to divide 7959 by 98,605. This gives us approximately 0.0807.

The decimal 0.0807 is the same as $\frac{8.07}{100}$ or 8.07%. The symbol "%" is called the *percent* sign and means *per hundred.* It means that for every 100 BTUs of energy consumed in the United States, approximately 8 of them came from nuclear power.

It is easy to convert a decimal into a percent. We know that $1 = \frac{100}{100} = 100\%$. This means that 1 is the same as 100%. Since multiplying a number by 1 doesn't change the value of the number, multiplying a number by 100% won't change the value of a number either. We use this fact to convert decimals into percents.

Try It #1
Write 0.549 as a percent.

See solution at bottom of page.

- Try It #1 Solution: $0.549 = \frac{54.9}{100} = 54.9\%$

Many data are reported as percents. For example, 28% of the adults in the United States had a college degree in 2006. We can write 28% as $\frac{28}{100}$. This means that 28 out of every 100 adults had a college degree.

Approximately 6.76% of the area of the United States is water. We know that 6.76% means that for every 100 square miles of area, 6.76 square miles are water. The total land and water area of the United States is 3,794,083 square miles. Approximately how many square miles of water are there in the United States? We multiply 6.76% by 3,794,083 to find the answer to the question.

$$\frac{6.76 \text{ square miles of water}}{100 \text{ square miles of area}} \times 3{,}794{,}083 \text{ square miles of area} = 256{,}480 \text{ square miles of water}$$

There are approximately 256,480 square miles of water area in the United States.

Try It #2

The United States has 3,537,438 square miles of land area and 3,794,083 square miles of total area (water and land). For every 100 square feet of total area, how many square feet are land?

See solution at bottom of page.

Oftentimes we are interested in the percentage change in data over time. For example, there were 5174 thousand homes sold in the United States in 2000. The number of homes sold in 2006 was 6480 thousand. To determine the percentage change in home sales, we first find the difference in the two levels of home sales.

$$6480 - 5174 = 1306$$

The change in home sales between 2000 and 2006 was 1306 thousand homes. To determine the percentage change in home sales over the six-year period, we divide the change by the home sales level for 2000.

$$\frac{1306}{5174} = 0.2524 = 25.24\%$$

Between 2000 and 2006, home sales increased by 25.24% from the level of home sales in 2000.

- Try It #2 Solution: $\frac{3{,}537{,}438}{3{,}794{,}083} = 0.9324 = 93.24\%$. *For every 100 square feet of total area in the United States, 92.24 square feet are land.*

Understanding Fractions and Percents Practice

1. North Dakota has 1,724 square miles of water area and 70,700 square miles of total area (water and land). Write a fraction that compares the water area to the total area.

2. Using the fraction from problem 1, determine what percentage of the total area of North Dakota is water.

3. North Dakota has 68,976 square miles of land area and 70,700 square miles of total area (water and land). Write a fraction that compares the land area to the total area.

4. Using the fraction from problem 3, determine what percentage of the total area of North Dakota is land.

5. Approximately 35.46% of North Dakota voters chose the Democratic candidate in the 2004 election. A total of 313,000 citizens voted. Rounded to the nearest thousand, how many people voted for the Democratic candidate?

6. There were 197,000 citizens in North Dakota who voted for the Republican candidate in the 2004 presidential election. A total of 313,000 citizens voted. Did more than 55% of the voters in North Dakota select the Republican candidate?

7. The amount of energy consumed by people in North Dakota in 2003 that came from petroleum was 121 trillion BTUs. The total amount of energy consumed from all sources was 395 trillion BTUs. Write a fraction that compares the energy consumed that came from petroleum to the total energy consumed.

8. Convert the fraction in problem 7 to a percentage. For every 100 BTUs of energy consumed in North Dakota, how many BTUs came from petroleum? (Round to the nearest BTU.)

9. North Dakota had 30,000 farms in 2006. In that year, there were a total of 2,090,000 farms in the United States. Write a fraction that compares the number of farms in North Dakota to the number of farms in the United States.

10. Convert the fraction in problem 9 to a decimal. For every 1000 farms in the United States, how many are in North Dakota? (Round your answer to the nearest farm.)

11. There were 39,400,000 acres of farmland in North Dakota in 2006. If the amount of farmland decreases by 5%, how many acres of farmland will there be in North Dakota?

12. The projected population of North Dakota in 2020 is 630,112 people. The projected population of the United States in 2020 is 335,804,546. Round each value to the nearest million. Then use the rounded values to create a fraction that compares the North Dakota population to the United States population.

13. In North Dakota, 14.94% of the energy consumed in the state in 2003 came from natural gas. The total amount of energy consumed in the state was 395 trillion BTUs. How many trillion BTUs came from natural gas?

14. The term *per capita* means *per person*. The personal income per capita in North Dakota in 2000 was $25,104. This number is calculated by adding up all of the money earned by people working in the state in 2000 and dividing it by the total number of the people living in the state. In 2006, the personal income per capita was $28,416. By what percent did the personal income per capita change between 2000 and 2006?

15. Labor unions are formed to help protect the rights of workers. In 1983, there were 28,000 people in North Dakota that belonged to labor unions. In 2006, the number of labor union members was 20,000. By what percent did the number of workers in labor unions change between 1983 and 2006?

16. In 2000, there were 89,000 patients admitted to hospitals in North Dakota. Between 2000 and 2005, this number changed by -2.25%. (A positive percent means the number of patients increased. A negative percent means the number of patients decreased.) How many patients were admitted to hospitals in North Dakota in 2005? (Round your answer to the nearest thousand patients.)

17. The average number of acres of land on a farm in North Dakota was 1,279 in 2000. Between 2000 and 2006, this number changed by 1.64%. (A positive percent means the number of patients increased. A negative percent means the number of patients decreased.) What was the average number of acres of land on a farm in North Dakota in 2006?

18. The average cost per day for a hospital stay in North Dakota in 2005 was $898. If this amount goes up by $100, what is the percentage increase in the cost per day?

19. For every 100 adults living in North Dakota, 29 had a college degree in 2006. If the number of adults in North Dakota with college degrees doubles, what percent of adults will have college degrees?

20. For every 100 adults living in North Dakota, 89 had a high school diploma in 2006 compared to 86 in 2000. What was the percentage change in the number of adults with high school diplomas in North Dakota between 2000 and 2006?

Understanding Fractions and Percents - What's the big idea?

(Use this page to explain what you've learned.)

Answers to Practice Problems

Place Value Practice Answers

1. 6
2. 3
3. 2
4. 8
5. 7
6. 0
7. 2
8. -10137; 0
9. 6
10. 20,000 + 5,000 + 100 + 4
11. 8
12. 3
13. ones place
14. 7
15. 0
16. 300 + 90 + 5
17. 1
18. thousands place
19. 30,000 + 3,000
20. 3

Rounding Practice Answers

1. 637,000
2. (6,300)
3. hundred thousands
4. 20
5. hundreds
6. 67,000
7. 70,700
8. 30,000
9. 35,100
10. hundreds
11. 1600
12. 90
13. 1,200
14. 30,000
15. ten thousands
16. 50 + 9; 60
17. 0; 0
18. 70,000
19. 0
20. 0

Estimation Practice Answers

1. 180 trillion BTUs
2. 183,000 square kilometers of total area
3. 300,000 people voted
4. 58,000 dollars
5. 100 trillion BTUs
6. 0 people
7. 0 more births than deaths
8. 200 dollars
9. 10 percent change
10. 100,000 votes
11. 179,400 square kilometers of land
12. 5,200 square kilometers of water
13. 38,400,000 acres of farmland
14. 39,000,000 acres of farmland
15. 621,000 people
16. 1.00 times larger
17. 1.25 times more births than deaths
18. 1.29 times more expensive
19. 1.13 times larger
20. 1.00 times more people unemployed

Understanding Fractions and Percents Practice Answers

1. 1724/70700
2. 2.44%
3. 68976/70700
4. 97.56%
5. 111,000
6. Yes. 62.9 percent voted Republican.
7. 121/395
8. 31%; 31 BTUs came from petroleum
9. 30,000/2,090,000
10. 0.014; 14 farms
11. 37,430,000
12. 1/336
13. 59 trillion BTUs
14. 13.19%
15. 28.57% decrease
16. 87,000
17. 1,300
18. 11.14%
19. 58%
20. 3.49% increase

About the Author

Frank Wilson earned his B.S. and M.S. degrees in mathematics from Brigham Young University. He spent six years serving as an officer in the United States Air Force before returning to civilian life. He has taught students math at the United States Air Force Academy, Park College, Green River Community College, and Chandler-Gilbert Community College. In addition to teaching, Frank is a popular author and workshop presenter. His college mathematics textbooks (*Finite Mathematics, Finite Mathematics and Applied Calculus, Brief Applied Calculus*, and *Applied Calculus*) are used at colleges and universities across the United States. *Finite Mathematics and Applied Calculus* was selected by the Textbook and Academic Author's Association as the winner of the 2007 TEXTY Textbook Excellence award for mathematics.

Frank lives with his wife and five children in San Tan Valley, Arizona.

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