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Learning Outcomes

- Identify the place value of a digit used for rounding
- Round a whole number to a specific place value

In 2013, the U.S. Census Bureau reported the population of the state of New York as 19,651,127 people. It might be enough to say that the population is approximately 20 million. The word *approximately* means that 20 million is not the exact population, but is close to the exact value.

The process of approximating a number is called rounding. Numbers are rounded to a specific place value depending on how much accuracy is needed. Saying that the population of New York is approximately 20 million means we rounded to the millions place. The place value to which we round to depends on how we need to use the number.

Using the number line can help you visualize and understand the rounding process. Look at the number line below. Suppose we want to round the number 76 to the nearest ten. Is 76 closer to 70 or 80 on the number line?

We can see that 76 is closer to 80 than to 70. So 76 rounded to the nearest ten is 80.

Now consider the number 72. Find 72 on the number line.

We can see that 72 is closer to 70, so 72 rounded to the nearest ten is 70.

How do we round 75 to the nearest ten?

Find 75 on the number line.

The number 75 is exactly midway between 70 and 80 .

So that everyone rounds the same way in cases like this, mathematicians have agreed to round to the higher number, 80 . So, 75 rounded to the nearest ten is 80 .

Now that we have looked at this process on the number line, we can introduce a more general procedure. To round a number to a specific place, look at the number to the right of that place. If the number is less than 5 , round down. If it is greater than or equal to 5 , round up.

So, for example, to round 76 to the nearest ten, we look at the digit in the ones place.

The digit in the ones place is a 6 . Because 6 is greater than or equal to 5 , we increase the digit in the tens place by one. So the 7 in the tens place becomes an 8 . Now, replace any digits to the right of the 8 with zeros. So, 76 rounds to 80 .

Let's look again at rounding 72 to the nearest 10 . Again, we look to the ones place.

The digit in the ones place is 2 . Because 2 is less than 5 , we keep the digit in the tens place the same and replace the digits to the right of it with zero. So 72 rounded to the nearest ten is 70 .

Round a whole number to a specific place value

1. Locate the given place value. All digits to the left of that place value do not change.
2. Underline the digit to the right of the given place value.
3. Determine if this digit is greater than or equal to 5 .
 - Yes—add 1 to the digit in the given place value.
 - No—do not change the digit in the given place value.
4. Replace all digits to the right of the given place value with zeros.

TIP

If the digit to the right of your given place value is 5 or above, give your given place value a shove.

If the digit to the right of your given place value is 4 or less, let your given place value rest.

example

Round 843 to the nearest ten.

Solution

Locate the tens place.	
Underline the digit to the right of the tens place.	
Since 3 is less than 5 , do not change the digit in the tens place.	
Replace all digits to the right of the tens place with zeros.	
Rounding 843 to the nearest ten gives 840 .	

try it



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Example

Round each number to the nearest hundred:

1. $23,658$

2. $3,978$

Show Solution

1.	
Locate the hundreds place.	<div>hundreds place</div> <div>↓</div> <div>23,658</div>
The digit to the right of the hundreds place is 5 . Underline the digit to the right of the hundreds place.	
Since 5 is greater than or equal to 5 , round up by adding 1 to the digit in the hundreds place. Then replace all digits to the right of the hundreds place with zeros.	So 23,658 rounded to the nearest hundred is 23,700.

2.	
Locate the hundreds place.	<div> <div>hundreds</div> <div>↓</div> <div>3,978</div> </div>
Underline the digit to the right of the hundreds place.	<div> <div>3,97</div> <div>8</div> </div>
<p>The digit to the right of the hundreds place is 7. Since 7 is greater than or equal to 5, round up by adding 1 to the 9. Then replace all digits to the right of the hundreds place with zeros.</p>	<div> <div> <div>3,97</div> <div>8</div> </div> <div> <div>add 1 ($9 + 1 = 10$)</div> <div>Write 0 in the hundreds place.</div> <div>Add 1 to the thousands place.</div> </div> <div> <div>4,000</div> </div> </div> <p>So 3,978 rounded to the nearest hundred is 4,000.</p>

try it



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example

Round each number to the nearest thousand:

1. $147,032$

2. $29,504$

Show Solution

1.	
Locate the thousands place. Underline the digit to the right of the thousands place.	
The digit to the right of the thousands place is 0 . Since 0 is less than 5 , we do not change the digit in the thousands place.	
We then replace all digits to the right of the thousands place with zeros.	So $147,032$ rounded to the nearest thousand is $147,000$.

2.	
Locate the thousands place.	
Underline the digit to the right of the thousands place.	
The digit to the right of the thousands place is 5 . Since 5 is greater than or equal to 5 , round up by adding 1 to the 9 . Then replace all digits to the right of the thousands place with zeros.	So $29,504$ rounded to the nearest thousand is $30,000$.

Notice that in part 2, when we add 1 thousand to the 9 thousands, the total is 10 thousands. We regroup this as 1 ten thousand and 0 thousands. We add the 1 ten thousand to the 3 ten thousands and put a 0 in the thousands place.

try it



[See this interactive in the course material.](#)



[See this interactive in the course material.](#)

Watch the video below for more examples of how to round whole numbers to a given place value.



[Video Link](#)

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