Rounding and Estimating with Large Numbers

We can round numbers to the nearest ten, to the nearest hundred, to the nearest thousand, to the nearest ten thousand, and so on—to *any* place. No matter what place we are rounding to, the ***rules of rounding*** are the same.

Rules of rounding whole numbers

Look at the digit AFTER the place you are rounding to:

- If that digit is 0, 1, 2, 3, or 4, then round DOWN.
- If that digit is 5, 6, 7, 8, or 9, then round UP.
- Change to zeros all the digits *after* the place you are rounding to.
- If rounding up, the digit in the place you are rounding to is increased by 1.

Remember, the squiggly equals sign (" ≈ ") is read "is about," or "is approximately."

To help us, let's draw a line ¦ between the digit we are rounding to and the next smaller one.

Rounding to the nearest TEN:	Rounding to the nearest HUNDRED:	Rounding to the nearest THOUSAND:
2,56¦7 ≈ 2,57¦0	2,**5**¦67 ≈ 2,6¦00	2**3**,¦802 ≈ 24,¦000
395,84¦9 ≈ 395,85¦0	395,**8**¦49 ≈ 395,8¦00	98**0**,¦097 ≈ 980,¦000
Rounding to the nearest TEN THOUSAND:	**Rounding to the nearest HUNDRED THOUSAND:**	
7**2**¦6,451 ≈ 7**3**¦0,000	**8**¦67,300 ≈ 9¦00,000	
9**5**¦3,987 ≈ 9**5**¦0,000	**1**¦26,835 ≈ 1¦00,000	

1. Round the numbers as the dashed line indicates (to the underlined digit).

a. 4**5**¦2,550 ≈	**b.** 8**6**¦,256 ≈	**c.** 77,**5**¦79 ≈
d. 24**5**,¦250 ≈	**e.** **8**¦94,077 ≈	**f.** 38**5**,¦706 ≈
g. **6**¦15,493 ≈	**h.** **5**¦27,009 ≈	**i.** **2**¦52,000 ≈
j. **2**¦6,566 ≈	**k.** 9**4**¦4,032 ≈	**l.** 33**5**,¦700 ≈
m. 48,4**2**¦1 ≈	**n.** 8,**5**¦55 ≈	**o.** 4**0**¦9,239 ≈

A note about the digit 9
If you are rounding up, and the digit that you need to increase by one is a 9, you have to make it a 10. That means that the digit in the next *higher* place will *also* increase by one.

Here is a simpler way to understand it: just look at the *two* (or three or four) digits to the left of your rounding line, and increase that "number" by one:

32**9**,509 ≈ 33**0**,000	**99**8,271 ≈ 1,**00**0,000	639,**99**5 ≈ 640,**00**0
The "29" changes to "30".	The "99" changes to "100".	The "3999" changes to "4000".

2. Round the numbers as the dashed line indicates (to the underlined digit).

a. 10,**9**65 ≈	**b.** 8**9**,506 ≈	**c.** 7**9**7,329 ≈
d. 29**9**,850 ≈	**e.** 254,99**7** ≈	**f.** 599,**9**72 ≈

3. Round the numbers to the underlined place value unit.

a. 233,**5**64 ≈	**b.** 75**2**,493 ≈	**c.** 1**9**2,392 ≈
d. 8**9**5,080 ≈	**e.** **8**55,429 ≈	**f.** 39**9**,477 ≈

4. Round these numbers to the nearest thousand, nearest ten thousand, and nearest hundred thousand.

number	274,302	596,253	709,932	899,430
to the nearest 1,000				
to the nearest 10,000				
to the nearest 100,000				

5. Round the numbers to the nearest hundred. *(Note: The numbers below take into account how many leap years you have likely lived.)*

a. In 5 years, you have likely lived 1,826 days, or about _____ days.

b. In 9 years, you have likely lived 3,287 days, or about _____ days.

c. In 10 years, you have likely lived 3,652 days, or about _____ days.

d. In 20 years, you have likely lived 7,305 days, or about _____ days.

e. In 40 years, you have likely lived _____ days, or about _____ days.

f. A challenge: figure out about how many days your mom, dad, or teacher has lived.

One more "quirky" thing. Let's say you are asked to round 284 to the nearest *thousand*. Notice that 284 does *not* have any thousands! We can say it has zero thousands and write it as 0,284 to show that.

Now, 0,284 ≈ 0,000 or just plain 0. But notice that 0,603 ≈ 1,000: it is rounded up to one thousand.

Similarly, rounded to the nearest ten thousand, 284 ≈ 0. Or look at it this way: 00,284 ≈ 00,000. Of course, the same thing happens if you round it to any bigger place (such as to ten thousands).

6. Round the numbers to the nearest ten thousand.

a. 235 ≈	**b.** 18,299 ≈	**c.** 1,392 ≈

7. Round the numbers to the nearest thousand.

a. 865 ≈	**b.** 182 ≈	**c.** 5,633 ≈

8. Round the numbers to the nearest ten thousand.

a. 56,250 ≈	**b.** 5,392 ≈	**c.** 2,938 ≈
d. 708,344 ≈	**e.** 599 ≈	**f.** 44,800 ≈

9. Use rounded numbers to solve these problems.

a. *Round the numbers to the nearest thousand.*

There are 235,792 people in Purpletown and 187,203 people in Bluetown.

This means there are about _____ people in Purpletown, and about _____ people in Bluetown. The two towns have approximately _____ people in all.

There are about _____ more people in Purpletown than in Bluetown.

b. *Round the numbers to the nearest hundred.*

Last year, there were 2,384 live births in Seagull hospital and 1,094 in Sunshine hospital.

There were about _____ live births in total in those two. Seagull hospital had about _____ more births than Sunshine hospital.

c. *Round the numbers to the nearest hundred.*

The Nile river (in Africa) is 6,695 km long and the Danube river (in Europe) 2,857 km long.

The Nile is about _____ km longer than the Danube.

10. The table lists some tall buildings and their heights.

a. Round the height of each building to the nearest hundred feet.

b. Use the *rounded* numbers. How many copies of Empire State Building would you need to place one on top of another, in order to exceed the height of Burj Khalifa?

c. About how much taller is Burj Khalifa than Taipei 101?

Building	Height	Height (rounded)
Burj Khalifa	2,717 ft	
Shanghai Tower	2,073 ft	
Taipei 101	1,667 ft	
One World Trade Center	1,776 ft	
Petronas Tower 1	1,483 ft	
Empire State Building	1,250 ft	

11. If you travel around the earth one time on the equator, your trip is 24,900 miles long. The Moon lies at an average distance of 238,857 miles from the Earth.

a. Round the two numbers to the nearest thousand in the spaces below:

The trip around the equator is about _____ miles.

The Moon is about _____ miles from the Earth.

b. How many trips around the equator would be a longer distance than the distance from the Earth to the Moon? Solve this with the help of the table below.

Trips Around The Equator	Approximate Distance (miles)
1	
2	*50,000*
3	
4	

Trips Around The Equator	Approximate Distance (miles)
5	
6	*150,000*
7	
8	

Trips Around The Equator	Approximate Distance (miles)
9	
10	
11	
12	

Puzzle Corner

Round each number so that you can solve each problem with mental math.

a. Jake's yearly earnings are $47,807.

That means about $_____.

So, he earns about _____ *monthly*.

b. Jack drove 58,496 miles last year.

That is about _____ miles. This means

he drives about _____ each *month*.