## Series F – Reading and Understanding Whole Numbers

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Looking at whole numbers – read and write numbers to 100,000

We read and write numbers in the order that we say them.

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>7</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

six thousand  
seven hundred 
fifteen

1 Express the following in numerals:

a) four thousand three hundred sixty two
b) three hundred twenty four
c) eight thousand nine hundred three
d) four thousand eight hundred forty one
e) seven hundred three
f) five thousand four hundred two

2 Write the following in words:

a) 5816
b) 915
c) 8466
d) 254
e) 7615
f) 2598

3 Match the numerals with the words:

4639 six thousand seven hundred ninety
2709 one thousand three
8341 four thousand six hundred thirty nine
1003 two thousand seven hundred nine
6790 eight thousand three hundred forty one
Looking at whole numbers – read and write numbers to 100 000

We read and write large numbers in groups of three.

321 4321 54 321

We work from right to left and we put a gap between each group of numbers.

4 These numbers have been grouped incorrectly. Re-group the numbers and read the new numbers out loud to a partner. Ask them to check your grouping. Are you correct?

a 56 78
b 65 89
c 856 21
d 33333
e 10 0000
f 4514 2

5 Convert the following abbreviations into numerals:

a $60 K
b 4000 metres
b $66 K
d 3000 grams

Did you know?

The abbreviation K comes from the Greek word *khilioi*, and it means thousand. It is used in many job advertisements and in measurement. A salary of 70 K is $70 000, and 1000 grams is 1 kilogram.

When else do we use the term kilo or K?

6 Are the following statements true or false?

<table>
<thead>
<tr>
<th></th>
<th>True / False</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>$36 K = $3600</td>
</tr>
<tr>
<td>b</td>
<td>Seventy four thousand three hundred two = 74 320</td>
</tr>
<tr>
<td>c</td>
<td>Seventy four thousand thirty nine = 74 039</td>
</tr>
<tr>
<td>d</td>
<td>$51 K = $51 000</td>
</tr>
<tr>
<td>e</td>
<td>Ninety nine thousand eight hundred five = 99 805</td>
</tr>
<tr>
<td>f</td>
<td>Fifty one thousand sixty = 5560</td>
</tr>
</tbody>
</table>
Looking at whole numbers – order numbers to 100 000

When ordering numbers, we need to pay close attention to the position and value of each digit.

Which is the largest?  6093  3069  3960  6039

1  Circle the larger number:

   a  8434 / 8340   b  5492 / 5692   c  17 015 / 17 150
   d  9840 / 8999   e  4815 / 4518   f  25 194 / 25 941
   g  768 / 7068   h  87 158 / 87 155

2  Insert > (greater than) or < (less than) to make each statement true.

   a  6482 □ 6681   b  9452 □ 9360
   c  84 945 □ 85 105   d  1999 □ 2009
   e  1469 □ 1649   f  75 136 □ 73 156
   g  94 054 □ 91 504   h  7819 □ 7815

3  Arrange the following numbers in ascending order:

   46 827, 68 457, 15 468, 25 015, 98 652, 12 698

   __________, __________, __________, __________, __________, __________

4  Arrange the following numbers in descending order:

   36 817, 48 453, 15 468, 25 013, 89 632, 12 898

   __________, __________, __________, __________, __________, __________
5 Look at each set of numbers and list some that come in between. Write them in order.

a 23560  
   
   
   
   37682

b 23692  
   
   
   
   25692

c 10420  
   
   
   
   80682

6 Write a number that is:

a More than 5678

b Close to 56018

c A little less than 78931

d Almost double 4000

e Between 34612 and 38901

f Less than half of 88000

g Now write 2 more problems for a partner to answer:

7 Here are the heights of 5 students. Place them on the number line. Find your height and that of two partners and add these to the partial number line.

<table>
<thead>
<tr>
<th>Name</th>
<th>Height (cm)</th>
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</thead>
<tbody>
<tr>
<td>Sarah</td>
<td>174</td>
</tr>
<tr>
<td>Huy</td>
<td>152</td>
</tr>
<tr>
<td>Jack</td>
<td>148</td>
</tr>
<tr>
<td>Emma</td>
<td>167</td>
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<tr>
<td>Nikita</td>
<td>121</td>
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</tbody>
</table>
Looking at whole numbers – represent and compare numbers

1 Use the following digits to make:

```
1  7  3  6  4
```

- **a** The highest number
- **b** The lowest odd number
- **c** The lowest number
- **d** The amount of money you would like to win
- **e** The highest even number

2 Use the digits 5 2 6 3 8 to make different 3 digit numbers.

3 Use the numbers you have made in Question 2 to make the statements true:

- **a** is greater than
- **b** is less than
- **c** is close to
- **d** is about double
Looking at whole numbers – represent and compare numbers

This table shows the population of 10 regional centres. Use the information to answer the following questions:

<table>
<thead>
<tr>
<th>Name</th>
<th>Population 1996</th>
<th>Population 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainsalot</td>
<td>92 273</td>
<td>98 981</td>
</tr>
<tr>
<td>Funkytown</td>
<td>59 936</td>
<td>68 715</td>
</tr>
<tr>
<td>Point Lonely</td>
<td>24 945</td>
<td>45 299</td>
</tr>
<tr>
<td>Dullsville</td>
<td>15 906</td>
<td>24 640</td>
</tr>
<tr>
<td>Nirvana</td>
<td>67 701</td>
<td>68 443</td>
</tr>
<tr>
<td>Dodgy Meadows</td>
<td>70 324</td>
<td>79 975</td>
</tr>
<tr>
<td>Braggersville</td>
<td>90 382</td>
<td>95 194</td>
</tr>
<tr>
<td>Letsgo</td>
<td>15 906</td>
<td>11 368</td>
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<tr>
<td>Notsoniceton</td>
<td>42 848</td>
<td>44 451</td>
</tr>
<tr>
<td>Mt Hero</td>
<td>21 751</td>
<td>20 525</td>
</tr>
</tbody>
</table>

a The population of the mystery place in 2001 is less than it was in 1996. It has decreased by approximately 1 000 people. The place is _______________________.

b You have gone back in time to 1997. You live in a city that has a population of more than 55 000 but less than 60 000. You live in _______________________.

c It is now 2001. You have decided to move to a larger centre. This centre has a 4 in the ones place and a zero in the thousands place. You move to _______________________.

d In 2001 you decided to go on a holiday. You only visited centres that had a population of between 40 000 and 99 000. Which towns did you visit?

____________________________________________________________________________________
____________________________________________________________________________________


e Many regional centres showed growth between 1996 and 2001. List the ones that grew by more than 5 000 residents.

____________________________________________________________________________________


f Your family moved here in 1996 and since then, the population has nearly doubled. Where did you move to?

____________________________________________________________________________________
It’s holiday time!

Getting ready

Your family has just won the dream trip of a lifetime! You have won an all expenses paid trip to 5 towns or cities of your choice. That’s right, anywhere in the world with everything paid for.

What to do

Your job is to plan the trip, following these guidelines:

1. Your dad hates big cities so one place must have a population of 10 000 or less.
2. Your mum wants to shop. Big time.
3. Your grandma has always wanted to see New York.
4. You get to choose the other two places.

Record your selections in the left column of the table below:

<table>
<thead>
<tr>
<th>Place</th>
<th>Population</th>
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<tbody>
<tr>
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</table>

What to do next

Use an atlas or the internet to help you research the population of your 5 towns or cities, then use the information to answer the following:

a. Order your towns from smallest population to largest:

   ____________________________
   ____________________________
   ____________________________
   ____________________________
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b. Choose two of your destinations and write their populations in words:

   ____________________________
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   ______________
The new place is right!

The aim of this game is to order as many numbers on a game board as possible. You’ll play the game in a group of 3 or 4. You’ll need a pencil and the game show boards below.

1. Decide who will be the game show host and who will be the contestants.
2. The host calls a number between the values specified at the top of the board. Start with Game 1.
3. Without showing the host, the contestants choose where they will put the number on their own board. The numbers must be placed in order going up from the lowest number. Once a number is placed, it cannot be moved.
4. The host calls another number. If the contestants can place it on their board, they do so.
5. After the host has called 8 numbers, the person with the most numbers on the board wins. They score a point.
6. Play 3 games. The person with the highest score after 3 games wins.
7. You can play again and choose your own number ranges. You will need to draw your own boards.
Place value of whole numbers – expanded notation

When we write numbers using expanded notation, we identify and name the value of each digit.

\[ 4231 = 4000 + 200 + 30 + 1 \]

1 Express the numbers in expanded notation:

- a 8246
- b 468
- c 761
- d 1645
- e 971
- f 7385
- g 1978

2 Express the expanded notation in numerals:

- a \[ 600 + 80 + 7 = \]
- b \[ 3000 + 700 + 40 + 5 = \]
- c \[ 800 + 30 + 4 = \]
- d \[ 200 + 60 + 9 = \]
- e \[ 2000 + 800 + 40 + 6 = \]
- f \[ 7000 + 900 + 20 + 5 = \]
- g \[ 200 + 40 + 5 = \]
- h \[ 9000 + 800 + 30 + 2 = \]

3 Answer the following questions.

- a Tim says 4329 in expanded notation is written as \[ 4000 + 3000 + 29 \]. Is he correct? __________
- b Now he says that 5847 is written as \[ 5000 + 800 + 40 + 7 \]. Is he correct this time? __________
- c Look carefully at the number 8953. Why don’t we expand it as \[ 8 + 9 + 5 + 3 \]?

- d What is the point of a zero in the middle of 7049? It has no value so why not just leave it out?

____________________________________________________________________________________

____________________________________________________________________________________

Reading and Understanding Whole Numbers

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Place value of whole numbers – expanded notation

Play expanded notation memory with a partner. Make a copy of this page, cut out the cards, mix them up and place them face down. Take turns turning over two cards at a time. Each time you make a match, you keep the set. The person with the most cards wins.

<table>
<thead>
<tr>
<th>32 831</th>
<th>12 300</th>
<th>3588</th>
</tr>
</thead>
<tbody>
<tr>
<td>9219</td>
<td>5912</td>
<td>88 307</td>
</tr>
<tr>
<td>12 890</td>
<td>15 502</td>
<td>2389</td>
</tr>
<tr>
<td>30 000 +</td>
<td>10 000 +</td>
<td>3000 +</td>
</tr>
<tr>
<td>2000 +</td>
<td>2000 +</td>
<td>500 +</td>
</tr>
<tr>
<td>800 +</td>
<td>300</td>
<td>80 +</td>
</tr>
<tr>
<td>30 +</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9000 +</td>
<td>5 thousands,</td>
<td>80 000 +</td>
</tr>
<tr>
<td>200 +</td>
<td>9 hundreds,</td>
<td>8000 +</td>
</tr>
<tr>
<td>10 +</td>
<td>1 ten</td>
<td>300 +</td>
</tr>
<tr>
<td>9</td>
<td>and 2 ones</td>
<td>7</td>
</tr>
<tr>
<td>10 000 +</td>
<td>10 000 +</td>
<td>2 thousands,</td>
</tr>
<tr>
<td>2000 +</td>
<td>5000 +</td>
<td>3 hundreds,</td>
</tr>
<tr>
<td>800 +</td>
<td>500 +</td>
<td>8 tens</td>
</tr>
<tr>
<td>90</td>
<td>2</td>
<td>and 9 ones</td>
</tr>
</tbody>
</table>
Fill in the place value chart for each number. The first one has been done for you.

<table>
<thead>
<tr>
<th></th>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>465</td>
<td></td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>b</td>
<td>8972</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>798</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>4507</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>3041</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Write the number shown on each abacus.

a
b
c
d
e
f
g
h
Write the next 3 numbers in each sequence. The first sequence has been done for you.

a 4600  b 768  c 3590  d 9128

What is the value of the 5 in these numbers?

<table>
<thead>
<tr>
<th></th>
<th>a 6157</th>
<th>b 9544</th>
<th>c 5749</th>
</tr>
</thead>
<tbody>
<tr>
<td>d</td>
<td>4546</td>
<td>e 785</td>
<td>f 2359</td>
</tr>
</tbody>
</table>

4

Complete the cross number puzzle. Make sure you include the zeros in the right places.

Across
1. four thousand two hundred seven
4. seven thousand ninety four
6. two thousand five hundred sixty
8. one thousand forty seven
10. nine thousand forty three

Down
1. four thousand eighty six
2. seven hundred
3. two hundred four
4. seven thousand fifty
5. nine thousand two hundred seven
6. two thousand one hundred thirty
7. six thousand four hundred thirty
9. sixty

I have $6 055. Without the zero I only have $655!
Look at the number 123 456

1 is worth 100 000 or one hundred thousand
2 is worth 20 000 or two ten thousands
3 is worth 3 000 or three thousands
4 is worth 400 or four hundreds
5 is worth 50 or five tens
6 is worth 6 or six ones

When we write large numbers we put a space after every three numbers. This is because our brains prefer small chunks of information. We chunk from right to left.

1 Write the number shown in each row of this place value chart. The first one has been done for you.

<table>
<thead>
<tr>
<th>Hundred thousands</th>
<th>Ten thousands</th>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 168</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4</td>
<td>9</td>
<td>4</td>
<td></td>
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<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>5</td>
<td>4</td>
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<tr>
<td>4</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>2</td>
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<tr>
<td>2</td>
<td>5</td>
<td>7</td>
<td>7</td>
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<td>8</td>
<td>1</td>
<td>9</td>
<td>1</td>
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<td>3</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td></td>
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</tbody>
</table>

2 Identify the value of the digit in bold. The first one has been done for you.

a 49 157 9000  b 9544  c 85 749

d 47 849  e 12 468  f 4688

g 134  h 94 115  i 94 913

3 True or False?

a In the number 67 923, the 7 has the value of 7000.

b In the number 89 471, the 8 has the value of 80 000.

c In the number 70 532, the zero holds the value of the thousands place.
I have 5 digits.
Every digit is an odd number and every digit in the number is different.
The greatest digit is in the ones place and the smallest digit is in the ten thousands place.
Both the thousands digit and the tens digit are greater than the hundreds digit.
So far, I could be 2 numbers. I am the greater of these.
I am ______________

I have 5 digits.
If you add a one to me I have 6 digits.
What number am I?
I am ______________

I am one half of ten thousand plus one.
What number am I?
I am ______________

I have 5 digits.
I have a 6 in the ten thousands place and my digit in the ones place is the smallest even number.
My middle digit is one more than the ones digit.
My thousands digit is double my ones digit and my tens digit is double my thousands digit.
What number am I?
I am ______________

Write a problem for a partner to solve:
In this game, the objective is to guess a secret 4 digit number. You play with a partner.

You’ll need to rule up a page with headings like this:

<table>
<thead>
<tr>
<th>Number Guess</th>
<th>Number of Correct Digits</th>
<th>Digits in the Correct Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>5738</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

What strategies can you use to reduce the number of guesses you need to make?

1. Player 1 writes a secret 4 digit number on a scrap of paper.
2. Player 2 writes their guess in the Number Guess column.
3. Player 1 writes down how many correct digits there are, and how many are in the right column.
4. Player 2 uses that information for guess number 2.
5. The game continues until the secret number is revealed.
6. Swap roles.

What strategies did they use? Try them out if you think they will help you!
In this guessing game there are many clues. Your job is to not only guess the secret number, but to identify which clues are needed and which are true but don’t help solve the problem.

Use the clues and the hundreds chart to help you identify the secret number:

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>6</td>
<td>7</td>
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<td>51</td>
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<td>81</td>
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<td>91</td>
<td>92</td>
<td>93</td>
<td>94</td>
<td>95</td>
<td>96</td>
<td>97</td>
<td>98</td>
<td>99</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

The number is greater than 8.
The number is less than 500.
The number is not a multiple of 5.
The number is a multiple of 6.
The number is even.
Its tens digit is even and is double its ones digit.
The number is in the top half of the hundreds chart.

What is the number?  

Which clues were not needed? Explain:
Round and estimate – round

Rounding makes big numbers easier to work with. We round up if the number is exactly halfway between the 10s or over the halfway mark. We round down if the number is under the halfway mark.

**Rounding to the nearest 10**

27 is over halfway between the 10s, so it rounds up to 30.

![Diagram showing 27 rounded to 30]

22 is under halfway between the 10s, so it rounds down to 20.

![Diagram showing 22 rounded to 20]

35 is exactly halfway between the 10s, so it rounds up to 40.

![Diagram showing 35 rounded to 40]

1. Round the following numbers to the closest hundred. Find the halfway mark first.

   a. ![Number line with 530 marked]

   b. ![Number line with 250 marked]

   c. ![Number line with 680 marked]

   d. ![Number line with 420 marked]
Round and estimate – round

2 Round the following numbers to the closest hundred:

a 235  

b 680  

c 513  

d 450  

e 5164  

f 3748

3 Round the following numbers to the closest thousand:

a 942  

b 4964  

c 2435  

d 9350  

e 5678  

f 2845

4 To find the hidden fact, round the numbers in the clues below and insert the matching letters above the answers. The first clue has been done for you.

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>10</td>
<td>S</td>
<td>400</td>
<td>40 000</td>
<td>20</td>
<td>40</td>
<td>1000</td>
<td>10</td>
</tr>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>70</td>
<td>80</td>
<td>100</td>
<td>7000</td>
<td>100</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>500</td>
<td>200</td>
<td>40</td>
<td>50</td>
<td>900</td>
<td>80</td>
<td>100</td>
<td>1100</td>
<td>1000</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>30 000</td>
<td>900</td>
<td>20</td>
<td>50</td>
<td>1000</td>
<td>S</td>
<td>400</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S 368 rounded to the nearest hundred  
T 1234 rounded to the nearest thousand  
M 27 rounded to the nearest ten  
C 483 rounded to the nearest hundred  
I 43 rounded to the nearest ten  
D 932 rounded to the nearest hundred  
O 7 rounded to the nearest ten  
E 59 rounded to the nearest hundred  
U 17 rounded to the nearest ten  
Q 43230 rounded to the nearest ten thousand  
P 69 rounded to the nearest ten  
N 1146 rounded to the nearest hundred  
R 83 rounded to the nearest ten  
F 6726 rounded to the nearest thousand  
H 199 rounded to the nearest hundred  
L 46 rounded to the nearest ten  
A 27468 rounded to the nearest ten thousand
We use estimating when we want an approximate answer to a calculation. Rounding helps us do this. We round numbers so we can work with them more easily in our heads.

Look at $333 + 521$.
Rounded to the nearest 10, they are 330 and 520.
$330 + 520 = 850$
Therefore $333 + 521$ is approximately 850.

1. **Complete these steps to see why estimating is handy.**
   a. Use the problem $57 - 38 = \underline{\hspace{2cm}}$. Time how long it takes you or a partner to solve it mentally.

   b. Now round the numbers to the nearest ten and time how long it takes to solve this problem.

   c. Which problem is faster to solve? __________________________

   d. Can you think of an occasion you would use estimation? __________________________

2. **Practise estimating with these problems.** You can use the middle column to jot down your rounded number sentences or just do them in your head. If you want to add some tension to the activity, race against a partner.

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Rounded Sentence</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>$384 + 53$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$22 + 69$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$406 - 89$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$379 + 203$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$93 - 61$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$609 - 498$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$826 + 599$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$221 + 11$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$704 + 341$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$47 + 996$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Round and estimate – estimate

3 Round then estimate to find the best answer to these calculations. Circle the best answer:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>72 − 48 =</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>b</td>
<td>57 + 31 =</td>
<td>90</td>
<td>15</td>
</tr>
<tr>
<td>c</td>
<td>126 − 37 =</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>d</td>
<td>567 − 23 =</td>
<td>500</td>
<td>550</td>
</tr>
<tr>
<td>e</td>
<td>899 + 47 =</td>
<td>850</td>
<td>950</td>
</tr>
<tr>
<td>f</td>
<td>1215 + 134 =</td>
<td>1400</td>
<td>1300</td>
</tr>
<tr>
<td>g</td>
<td>6454 + 207 =</td>
<td>6000</td>
<td>8000</td>
</tr>
</tbody>
</table>

Which one is best?

4 Use estimation to assess whether these statements might be true. Tick the ones you think are true and cross the ones you think are false.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>568 + 311 &gt; 1000</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>899 − 378 &lt; 600</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>245 + 245 &gt; 500</td>
<td></td>
</tr>
</tbody>
</table>

5 Use estimation to answer these word problems:

a Sarah is saving money to go to the fair. In week 1 she saves $13, in week 2 she saves $19 and in week 3 she saves $29. Estimate how much money she has at the end of week 3. 

b The T-shirts that Sarah wants cost roughly $15 each. If she wants to spend half her money on T-shirts, how many can she buy?

c Sarah wants an ear of corn, 3 peaches, and a cup of apple cider. She has budgeted $10 for refreshments. Look at the price list below and estimate whether she can buy what she wants and stay within her budget.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
<td>Price</td>
</tr>
<tr>
<td>Ear of corn</td>
<td>$3.80</td>
</tr>
<tr>
<td>Peaches</td>
<td>3 for $2.00</td>
</tr>
<tr>
<td>Apple cider</td>
<td>$3.00</td>
</tr>
</tbody>
</table>
Round and estimate – calculations

When estimating, we always need to check that our answers are reasonable.

$23 + $59 = $1000. Is this estimation reasonable?

1 Are these estimations reasonable? Explain your thinking.

   a Nicola wants a digital camera that costs $486 and a memory stick that costs $46. She estimates she will spend approximately $1000 on both. Is this estimation reasonable?

   b Shakeb says 91 + 33 is close to 120. Is this estimation sensible?

   c Kylie is crazy about dolphins. She has 4889 pictures of them, 389 stuffed toys, and 481 figurines. She thinks she has about 6000 items altogether. Is this estimation reasonable?

   d Sean made a list of the money he had spent on lunch over the week. He then estimated that he had spent $30 over the week. Is this a reasonable estimate?

   

<table>
<thead>
<tr>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
</tr>
</thead>
<tbody>
<tr>
<td>$4.50</td>
<td>$5.65</td>
<td>$3.85</td>
<td>$6.25</td>
<td>$7.70</td>
</tr>
</tbody>
</table>

2 In these problems, work backwards from an estimated answer to find the possible starting points.

   a Daniel bought 3 pens. He estimated the pens to cost $2, $3 and $1.50. This would make the total estimated cost $6.50. The actual cost was $6.75. What could each of the pens have cost?

   b Hung bought 3 books. He estimated their costs to be $5, $9 and $15. This would make the total estimated cost $29. The actual cost was $33. What could each of the books have cost? Find two possibilities.
When we use a calculator, it is tempting to rely on it and to stop thinking. Estimating helps us develop an idea of what the possible answer should be. If we make an error with the calculator, we then know to try again.

3 Estimate the answer to these problems. Get a partner to check the reasonableness of your estimations, then use a calculator to solve the problems. You can check the thinking of two students at once.

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a 23 × 5</td>
<td></td>
</tr>
<tr>
<td>b 47 × 6</td>
<td></td>
</tr>
<tr>
<td>c 33 × 8</td>
<td></td>
</tr>
<tr>
<td>d 11 × 19</td>
<td></td>
</tr>
<tr>
<td>e 97 × 3</td>
<td></td>
</tr>
<tr>
<td>f 201 × 4</td>
<td></td>
</tr>
<tr>
<td>g 498 × 3</td>
<td></td>
</tr>
</tbody>
</table>

Breathe in ... breathe out ... breathe in ... breathe out...

4 How many breaths do you take in a day? Not exactly, an estimation will do. You’ll need a clock with a second hand. You may also want to use a calculator. Ask a partner to help you keep track of how many breaths you take in a minute, then multiply as necessary.

a Use this table to help you organise your calculations.

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Number of Breaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>per minute</td>
<td></td>
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<tr>
<td>per hour</td>
<td></td>
</tr>
<tr>
<td>per day</td>
<td></td>
</tr>
</tbody>
</table>

b Can you take it further? How many breaths could you take in a week?

How many minutes in an hour? How many hours in a day?

THINK

c What about in a year?
Round and estimate challenges

Getting ready

Solve these problems using your head, a calculator, a pen and paper. You may work with a partner.

What to do

a You have won $5487 in a competition. The organisers have no coins and have to round off the amount so they can give you your winnings in notes. Would you rather they rounded to the nearest $10, $100 or $1000? Why? How much money would you get in each case?

b I am now 156 000. I have been rounded to the nearest thousand. List at least 5 numbers I could have been.

c I am now 145 200 after being rounded to the nearest hundred. List at least 5 numbers I could have been.

d I am 16 000. What two whole numbers can be multiplied together to make me? How many pairs of numbers can you come up with?
You and a partner will take turns going on 60 second shopping sprees. You’ll need a copy of this page, a timer or a clock with a second hand, the items below and your best estimation skills. You may also want to use a calculator for checking.

1. Cut out the items below.
2. Decide who will be the first shopper and who will be the timer.
3. The timer states a spending limit between the values of $10 and $50.
4. The shopper then has 60 seconds to estimate what they can buy while staying under the limit. The shopper takes the items they want. It is okay to put things back. (If 60 seconds is too hard, make the time limit 2 minutes.)
5. After the time is up, all transactions stop. Add up the purchases, using a calculator if desired.
6. If the shopper has stayed under the limit, they get a point. If they go over the limit, they get nothing.
7. Swap roles. At the end of that round, the person who was closest to their shopping limit gets a bonus point.

Make up some more items for the shopping spree. Or challenge another team to a race.

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseball jersey</td>
<td>$14.98</td>
</tr>
<tr>
<td>Book 3x3x3</td>
<td>$18.98</td>
</tr>
<tr>
<td>Baseball cap</td>
<td>$9.99</td>
</tr>
<tr>
<td>Highlighter</td>
<td>$2.95</td>
</tr>
<tr>
<td>Keychain</td>
<td>$1.95</td>
</tr>
<tr>
<td>Sunglasses</td>
<td>$12</td>
</tr>
<tr>
<td>Weekly newspaper</td>
<td>$3.22</td>
</tr>
<tr>
<td>Tennis ball</td>
<td>$4.99</td>
</tr>
<tr>
<td>Sweater</td>
<td>$29.95</td>
</tr>
<tr>
<td>Bead necklace</td>
<td>$7.95</td>
</tr>
</tbody>
</table>