# Leaps and Bounds Toward Math Understanding

Student Resource Sampler: Number Topics 1 and 2, Draft Material



## With Leaps and Bounds, mathematics intervention is as easy as 1, 2, 3!



For more information and full Table of Contents, visit www.nelson.com/leapsandbounds Leaps and Bounds 7/8 covers all math strands. This sampler includes Topics 1 and 2 from the Number strand.

#### Strand: Number

Use the Diagnostic Tool in the Teacher's Resource to determine the most appropriate pathway for each student for each topic.

Representing Large Whole Numbers	Pathway 1: Using Decimals for Large Whole Numbers Pathway 2: Representing Millions and Billions Pathway 3: Representing Six-Digit Numbers	Open-ended Guided Open-ended Guided Open-ended Guided	1 3 6 8 12 13
Whole Number Operations	Pathway 1: Order of Operations Pathway 2: Dividing Whole Numbers Pathway 3: Multiplying Whole Numbers	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> </ul>	16 17 20 22 26 28
Representing and Comparing Decimals	Pathway 1: Decimals with Many Places Pathway 2: Comparing Decimals Pathway 3: Representing Decimal Thousandths Pathway 4: Multiplying and Dividing by 10s	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> </ul>	32 34 37 39 43 45 49
Decimal Operations	Pathway 1: Dividing Whole Numbers by Decimals Pathway 2: Dividing Decimals by Whole Numbers Pathway 3: Multiplying with Decimals Pathway 4: Adding and Subtracting Decimals	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> </ul>	56 58 62 64 68 70 74 76
Relating Situations to Operations	Pathway 1: Recognizing Division Situations Pathway 2: Recognizing Multiplication Situations Pathway 3: Recognizing Subtraction Situations	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Open-ended</li> <li>Guided</li> <li>Guided</li> </ul>	80 82 85 87 90 92

iii

Comparing Fractions	Pathway 1: Fractions and Mixed Numbers Pathway 2: Proper Fractions Pathway 3: Equivalent Fractions	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Guided</li> </ul>	96 98 102 104 108 110
Fraction Operations	Pathway 1: Repeated Addition of Fractions Pathway 2: Adding and Subtracting Mixed Numbers Pathway 3: Subtracting Fractions Pathway 4: Adding Fractions	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> </ul>	114 116 120 122 126 128 132 134
Rates, Percents, and Ratios	Pathway 1: Using Rates Pathway 2: Using Percents Pathway 3: Using Ratios	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> </ul>	138 140 144 146 150 152
Multiplicative Relationships	Pathway 1: Divisibility Rules Pathway 2: Prime Numbers and Perfect Squares Pathway 3: Factors and Multiples	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Guided</li> </ul>	156 158 162 164 167 169
Integers	Pathway 1: Subtracting Integers Pathway 2: Adding Integers Pathway 3: Representing and Comparing Integers	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Guided</li> </ul>	173 175 179 181 185 187

#### Strand: Patterns and Algebra

Use the Diagnostic Tool in the Teacher's Resource to determine the most appropriate pathway for each student for each topic.

	Pathway 1: Linear Relations		190 102
Patterns	Pathway 2: Representing Patterns Pathway 3: Exploring Simple Patterns	<ul> <li>Open-ended</li> <li>Guided</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> </ul>	192 196 198 202 204
Algebra	Pathway 1: Solving Problems Using Equations Pathway 2: Solving Simple Equations Pathway 3: Using Variables	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Guided</li> <li>Guided</li> </ul>	208 210 214 216 220 222

#### Strand: Geometry

Use the Diagnostic Tool in the Teacher's Resource to determine the most appropriate pathway for each student for each topic.

3-D Shapes	Pathway 1: Using Isometric Drawings Pathway 2: Using Different Views Pathway 3: Using Nets	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> </ul>	226 228 232 234 238
2-D Shapes	Pathway 1: Similar Shapes Pathway 2: Congruent Shapes Pathway 3: Sorting and Classifying Polygons	<ul> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Open-ended</li> <li>Guided</li> </ul>	239 243 245 249 251 255 257
Geometric Drawings	Pathway 1: Bisecting Angles and Line Segments Pathway 2: Drawing Circles Pathway 3: Drawing Lines and Polygons Pathway 4: Drawing Triangles	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> </ul>	261 263 268 270 274 276 280
Location	Pathway 1: Plotting Points in 4 Quadrants Pathway 2: Plotting Points on a Grid	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Open-ended</li> <li>Guided</li> </ul>	286 288 292 294

Transformations	Pathway 1: Transformations in Designs Pathway 2: Performing Dilatations Pathway 3: Combining Transformations Pathway 4:	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Guided</li> </ul>	298 299 303 304 308 310
	Pathway 4:	Guided     Open-ended	310 314
	Single Transformations	Guided	316

#### Strand: Measurement

Use the Diagnostic Tool in the Teacher's Resource to determine the most appropriate pathway for each student for each topic.

	Dathway 1.		
	Area of Circles	Open-ended	320
	Bathway 2	> Guided	322
	Circumforance of Circles	Open-ended	326
		> Guided	327
Perimeter and Area	Area of Composite Shapes	Open-ended	331
	Ared of Composite Shapes	-> Guided	333
	Area of Parallelearame and Triangles	Open-ended	337
	Area of Faranelograms and mangles	-> Guided	339
	Area and Derimeter of Destangles	Open-ended	343
	Area and Fernineler of Reclangles	-> Guided	345
	Pathway 1:	Open-ended	349
Volume and	Volume of Prisms: Using a Formula	Guided	351
	Pathway 2:	Open-ended	355
Surface Area	Pathway 3: Volume of Rectangular Prisms	Guided	357
		Open-ended	361
		Guided	363
	Pathway 1:		367
	Sums of Angles in Shapes		368
	Pathway 2:	Open-ended	372
Aligies	Constructing Angles		373
	Pathway 3:	Open-ended	377
	Measuring Angles		379
	Pathway 1:		202
Matria Unita	Renaming a Unit		202
	Pathway 2:		204 200
	Selecting a Unit		300
	-	Guiaea	340

#### Strand: Data and Probability

Use the Diagnostic Tool in the Teacher's Resource to determine the most appropriate pathway for each student for each topic.

Displaying Data	Pathway 1: Using Circle Graphs and Line Graphs Pathway 2: Bias and Sampling Pathway 3: Interpreting Graphs	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Guided</li> </ul>	394 396 400 401 405 407
Summarizing Data	Pathway 1: Effects of Changing Data Pathway 2: Using Mean, Median, and Mode Pathway 3: Calculating the Mean	<ul> <li>→ Open-ended</li> <li>→ Guided</li> <li>→ Open-ended</li> <li>→ Guided</li> <li>→ Open-ended</li> <li>→ Guided</li> </ul>	411 413 417 418 422 423
Probability	Pathway 1: Probability: Independent Events Pathway 2: Theoretical Probability Pathway 3: Experimental Probability	<ul> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Open-ended</li> <li>Guided</li> <li>Guided</li> </ul>	427 429 434 436 440 441

## **Using Decimals for Large Whole Numbers**

Pathway 1 OPEN-ENDED

A popular TV show had about 12.3 million viewers in one night.



12.3 million is between 12 million and 13 million.



The place value chart below shows that 12.3 million, written in **standard form**, is the whole number 12 300 000.

To explain why you can write a whole number using a decimal, you can think of 1 million as 1 unit.

- The **12** in **12** 300 000 is 12 million, so it is 12 units.
- The **3** in 12 **3**00 000 is 3 tenths of 1 million, or 0.3 units.

	Billions	;	ſ	Villions	6	Th	nousan	ds		Ones	
н	Т	0	Н	Т	0	н	Т	0	Н	Т	0
				1	2	3	0	0	0	0	0

#### Part A

- Find 3 numbers that are written as a decimal number of millions.
  - Tell what each number describes.
  - Write each number in standard form.
  - Explain how you know you are right.

Decimal number of millions	What it describes	Standard form	How you know

standard form the usual way we see and write a number

You will need

- Internet access, or Millions and Billions (BLM 1)
- Place Value Charts (to Billions) (BLM 2)

- Find 2 numbers greater than 1 million that are written in standard form.
  - Tell what each number describes.
  - Estimate the decimal form of each using units of 1 million.

Standard form	What it describes	Estimate in decimal number of millions
<		

#### Part B

• Repeat Part A for 3 numbers written as a decimal number of billions.

Decimal number of billions	What it describes	Standard form	How you know
<			

• Repeat for 2 numbers greater than 1 billion written in standard form.

Standard form	What it describes	Estimate in decimal number of billions

#### Part C

• Write all 10 numbers from Parts A and B in order from least to greatest. Explain your thinking.



## **Using Decimals for Large Whole Numbers**

Pathway 1 GUIDED

You will need

(BLM 1)

Place Value Charts

(to Billions) (BLM 2) • Internet access or Millions and Billions

Recently, a gold and diamond smartphone case had a price of \$3.2 million.



3.2 million is a number between 3 million and 4 million.



• You can see from the place value chart below that 3.2 million written in **standard form** is the whole number 3 200 000.

To explain why you can write a whole number using a decimal, you can think of one million as one unit.

- The 3 in **3** 200 000 is 3 million, so it is 3 units.
- The 2 in 3 200 000 is 2 tenths of 1 million, or 0.2 units.

					1	0			-			
( I	Billions	6	ſ	Villions	s /	∫Th	iousan	ds	Ones			
н	Т	0	н	Т	0	Н	Т	0	н	Т	0	
					3	2	0	0	0	0	0	

1

• You can write some very large numbers using a billions unit instead of a millions unit.

For example, 4 650 000 000 is 4.65 billion. The 6 in 4 **6**50 000 000 is 0.6, or  $\frac{6}{10}$  of the billions unit. The 5 in 4 6**5**0 000 000 is 0.05, or  $\frac{5}{100}$  of the billions unit. So, the 65 in 4 **65**0 000 000 is 0.65 units.

1	1
10	100

	Billions	3		Villion	5	Th	iousan	ds	Ones			
н	Т	0	Н	Ť	0	н	Т	0	Н	Т	0	
		4	6	5	0	0	0	0	0	0	0	

- Remember
- You can write large whole numbers in decimal form to focus on the digits that matter most. Reading this form is usually quicker than counting all the zeros.

• What is 3.28 million written in standard form? How do you know?

standard form the usual way we see and write a number

3

## Try These

1. Show each number in standard form on the place value chart.

<b>a)</b> 4.5 million		Billions	3	1	Villions	S	Th	ousan	ds		Ones	
	Н	Т	0	н	Т	0	н	Т	0	Н	Т	0
<b>b)</b> 12.0 million	I	Billions	6	ſ	Villions	6	Th	ousan	ds		Ones	
	Н	Т	0	н	Т	0	н	Т	0	Н	Т	0
c) 4 13 billion												
	ł	Billions	6	1	Villions	S	Th	ousan	ds		Ones	
	Н	Т	0	н	Т	0	н	Т	0	Н	Т	0
d) 0.5 billion												
<b>u</b> ) 0.5 billion		Billions	5	1	Villions	S	Th	ousan	ds		Ones	
	Н	Т	0	н	Т	0	н	Т	0	Н	Т	0

- 2. Write each number in standard form.
  - a) 7.12 billion
  - **b)** 7.8 million \_\_\_\_\_
  - **c)** 13.24 million \_\_\_\_\_
  - d) 12.23 billion \_\_\_\_\_
- **3.** Write each number using a decimal number of millions or billions, whichever makes more sense to you.

<b>a)</b> 12 345 000	
<b>b)</b> 500 000	
<b>c)</b> 1 200 000 000	
<b>d)</b> 314 120 000 000	

4.	Use >	> or <	to mo	ake ec	ich st	ateme	nt true	Э.				
	<b>a)</b> 4.	1 millio	on	3.2	4 mill	ion						
	<b>b)</b> 5.	3 millio	on	0.9	billio	n						
	<b>c)</b> 1.	23 bill	ion	9.0	) billic	on						
	<b>d)</b> 0.	01 bill	ion	12	.4 mil	lion						
5.	In wh	ich nu	mber	is the	digit {	5 wort	h the r	nost?	How	do yo	u knov	N?
	4.	5 billic	n	5	5.1 mi	llion		<b>5</b> .4 b	oillion			
6.	Fill in	the bl	anks.	Use t	ne plo	ice va	lue ch	art to	help y	/OU.		
	<b>a)</b> 4.	2 millio	on =		t	housa	nd					
	<b>b)</b> 0.	6 millio	on =		t	housa	nd					
	<b>c)</b> 2.	13 bill	ion =	2130								
		Billions	6	ľ	Aillion	s	Th	ousan	ds		Ones	
	н	Т	0	Н	Т	0	н	Т	0	Н	Т	0

7. Of the 7.0 billion people who live in the world, about 1.3 billion live in China. Find at least 3 more real-world numbers that are expressed as decimal millions or billions. Tell what each number describes.



**8.** Why are people more likely to write 3 100 000 as 3.1 million than to write 3100 as 3.1 thousand?

n the me

In the media, large whole numbers are often written using decimals.

## **Representing Millions and Billions**

About 111 million people watched the Super Bowl on TV.

111 million can be written in standard form as 111 000 000.

	Billions	6	I	Millions	6	Th	nousan	ds		Ones	
н	Т	0	н	Т	0	н	Т	0	Н	Т	0
			1	1	1	0	0	0	0	0	0

• Why does it make sense that the number of viewers was about 111 million and not about 111 billion?

#### Part A

- Write 5 numbers that are close to 111 million.
  - Write each number in standard form.
  - Include the digits 3, 5, 7, and 9 once in each number.
     You can use other digits as well.
  - Include numbers that are greater than 111 million and numbers that are less than 111 million.

standard form the usual way we see and write a number

• Tell how you would read each number.



(to Billions) (BLM 2)

You will need

Place Value Charts



#### Pathway 2 OPEN-ENDED

• Explain how you know each number is close to 111 million.

#### Part B

• Write 5 numbers that are close to 278 billion. Include numbers that are less than and greater than 278 billion.

• Tell how you would read each number.

#### Part C

• Write all 10 numbers from Parts A and B in order from least to greatest. Explain your thinking.



## **Representing Millions and Billions**

Pathway 2 GUIDED

When Kai was born, the population of Toronto was 2 503 281.



The number 2 503 281 is in standard form.

The spaces in the standard form of the number separate the billions, millions, thousands, and ones **periods**.

	Billions	5	ſ	Villions	Illions Thousa T O H T			ds Ones				
Н	Т	0	н	Т	0	н	Т	0	н	Т	0	
					2	5	0	3	2	8	1	

You can use the periods and the place value chart to read, interpret, and rename large numbers.

- You can read 2 503 281 as 2 million 503 thousand 281.
- You can estimate that 2 503 281 is about halfway between 2 million and 3 million.
- You can rename 2 503 281 as 2 million + 503 thousand + 281.
- You can also rename 2 503 281 in other ways.
   1 million = 1000 thousand
   So, 2 503 281 = 2000 thousand + 503 thousand + 281
   = 2503 thousand + 281
- Use a place value chart to help you read 250 000 003 281.

## **Try These**

1. What is the same and what is different in how you would read 2 500 030 and 2 005 300?

same: \_\_\_\_\_

different: \_\_\_\_\_

You will need

- Place Value Charts (to Billions) (BLM 2)
- Millions and Billions (BLM 1)

standard form the usual way we see and write a number

#### period

a group of 3 place value columns based on hundreds, tens, and ones of the same unit

- 2. Write each number in standard form on a place value chart.
  - a) 22 million 312 thousand 21

	Billions H T O		1	Villion	S	Th	iousan	ds	Ones			
н	Т	0	н	Т	0	н	Т	0	н	Т	0	

#### b) 3 million 8 thousand 12

	Billions H T O		1	Villions	5	Th	iousan	ds	Ones			
н	Т	0	н	Т	0	н	Т	0	н	Т	0	

#### c) 17 billion 12 million 34 thousand

	Billions	6	1	Villion	S	Th	iousan	ds	Ones			
н	Т	0	н	Т	0	н	Т	0	н	Т	0	

#### d) 100 billion 32 thousand

Billions		Millions		Thousands			Ones				
н	Т	0	н	Т	0	н	Т	0	н	Т	0

#### 3. Circle the greater number in each pair.

- a) 89 hundred thousand + 21 2 billion
- **b)** 153 million + 32 thousand 1 billion
- c) 110 million 312 thousand
- d) 42 million 42 hundred thousand
- 4. Estimate. Use a place value chart to help you.
  - **a)** 4 128 756 is about \_\_\_\_\_ million.
  - **b)** 4 128 756 is about \_\_\_\_\_\_ thousand.
  - c) 1 834 567 109 is about \_\_\_\_\_ billion.
  - d) 1 834 567 109 is about \_\_\_\_\_ million.

5.	Write a number in standard form for each description.	
	a) 1 hundred thousand more than 2 348 172	
	b) 3 million more than 152 417	
	c) 1 billion more than 3 425 617	
	d) 2 million more than 8 413 465	
6.	. How many digits are in a number that begins with each phra	se?
	a) 42 million	
	<b>b)</b> 250 million	
	<b>c)</b> 20 billion	
	d) 300 thousand	
7.	In which number is the digit 5 worth the most? How do you k	now?
	<b>5</b> 3 143 200 <b>15</b> 3 787 <b>5</b> 203 412 111	
_		
8.	Use > or < to make each statement true. <b>a)</b> 4 000 003 $1 000 000 003$	
	<b>b)</b> 3 045 020 3 450 200	
	<b>c)</b> 2 781 235 2 781 532	
	d) 4 528 134 528 478	
	Explain your answer to part d):	
9.	Fill in the blanks.	
	<b>a)</b> 4 million = thousand	
	4 million = hundred thousand	Being able to write
	<b>b)</b> 2 billion = million	numbers in different ways can be helpful
	2 billion = bundred million	when you perform calculations.

10

- **10.** Use < or > to make each statement true.
  - a) 30 million 40 hundred thousand
  - b) 25 million 260 hundred thousand
  - c) 8 billion 9000 million
  - d) 2 billion 200 million

Explain your answer to part d): \_\_\_\_\_

 The world population on February 28, 2011, was 7 090 669 275. On the same day, the population of China was 1 319 175 336. Describe 2 other real-world values that would likely be expressed in billions or millions.



- 12. Decide whether you agree or disagree. Explain your thinking.
  - a) Any number greater than 1 billion is more than 900 million.
  - **b)** Any number greater than 1 million is less than 1 billion.
  - c) Any number of billions is always greater than any number of millions.

11

## **Representing Six-Digit Numbers**

A car company had to recall about 750 thousand cars to have the transmissions checked.

## You will need

OPEN-ENDED

Pathway 3

 Place Value Charts (to Hundred Thousands) (BLM 3)

750 thousand written in **standard form** is 750 000.

Hundred thousands	Ten thousands	Ten busands Thousands Hundreds		Tens	Ones	
7	5	0	0	0	0	

- Write 5 numbers that are close to 750 thousand.
  - Write each number in standard form.
  - Use the digits 3, 5, 7, and 9 at least once in each number.
  - Include numbers greater than 750 000 and less than 750 000.
- Suppose 100 fewer cars than 750 000 were recalled. List 5 numbers that are close to that number. Use any digits.
- Write all 10 numbers above in order from least to greatest. Explain your thinking.

standard form the usual way we see and write a number

## **Representing Six-Digit Numbers**

Pathway 3 GUIDED

You will need

 Place Value Charts (to Hundred

Thousands) (BLM 3)

In 2006, the population of Edmonton was 730 372.



The number 730 372 is in standard form.

The space in the standard form of the number separates the thousands part of the number from the part that includes the hundreds, tens, and ones.

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
7	3	0	3	7	2

You can use the 2 parts of the number to read, interpret, and rename large numbers.

- You can read 730 372 as 730 thousand 372.
- You can estimate 730 372 as about 730 thousand.
- You can rename 730 372 as 730 thousand + 372.
- Use the place value chart to help you read the number 503 020.

## **Try These**

1. What is the same and what is different in how you would read 402 030 and 420 030?

same: \_\_\_\_\_

different:

standard form the usual way we see and write a number

- 2. Write each number in standard form on a place value chart.
  - a) 300 thousand 78

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones

b) 420 thousand 10

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
<b>x</b>					

#### c) 10 thousand 312

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones

- **3.** Circle the number in each pair that has more digits when written in standard form.
  - a) 58 hundred 22 thousand
  - b) 20 ten thousand 80 thousand
  - c) 6 hundred thousand 50 hundred
- **4.** Estimate. Use a place value chart to help you.
  - a) 562 103 is about \_\_\_\_\_ hundred thousand.
  - b) 493 127 is about \_\_\_\_\_ hundred thousand.
  - c) 213 856 is about \_\_\_\_\_ thousand.
  - d) 478 100 is about \_\_\_\_\_ thousand.
- 5. Write a number in standard form for each description.
  - a) 100 000 more than 203 652
  - b) 10 000 less than 243 652
  - c) 8000 more than 483 622
  - d) 5000 less than 453 000

	<b>5</b> 03 207	9 <b>5</b> 3 218	
7.	Use > or < to make each sta a) 202 020 92 999 b) 410 014 140 410 Suppose the name for a whole	tement true. <b>c)</b> 882 135 885 1 <b>d)</b> 711 234 79 92	34 29 orde:
0.	twenty thirty thousa	nd hundred four	two
9.	How many \$100 bills is each	amount?	
	<b>b)</b> \$530 400 is	\$100 bills.	1001
	<b>c)</b> \$300 000 is	₋ \$100 bills.	
10.	d) \$904 900 is Describe 2 or more real-world numbers in the hundred thous or money situations.	\$100 bills. situations that might involvands. Consider population	/e s
			FYI Being able to understand large numbers is useful, since large numbe appear frequently it the media

15

## **Order of Operations**

Mathematicians have created rules for the order of operations so that everyone gets the same answer to an expression.



#### **Create Expression 1**

- Choose 6 numbers and put operation signs between the numbers. Include 3 different signs.
  - Insert a pair of brackets around 2 or 3 of the numbers.
  - Calculate the value of your expression. Estimate if the answer is not a whole number.
  - Show or describe the order you used to calculate the value of the expression.

#### **Create Expression 2**

- Move brackets in Expression 1 so that the value is much greater. Calculate the value of your expression.
  - Show or describe the order you used to calculate it.

#### expression

a series of numbers linked by operation sign, sometimes including brackets

#### Remember

• BEDMAS is a way to remember the order for calculating an expression: Brackets, Division and Multiplication, Addition and Subtraction e.g.,  $3 + 2 \times 5 \div (4 - 2)$  $= 3 + 2 \times 5 \div 2$  $= 3 + 10 \div 2$ = 3 + 5= 8

#### **Create Expression 3**

- Rearrange the operation signs *and* move the brackets in Expression 1 so that the value is less. Calculate.
  - Show or describe the order you used to calculate it.

## **Order of Operations**

Bathway GUIDED

Kevin will win a prize if he answers a skill-testing question correctly. He thought about 2 ways to calculate the **expression**  $32 - 4 \times 6$ . When he tried it both ways he got different answers.

So that everyone gets the same answer, mathematicians have created rules for the order of operations called **BEDMAS**. Kevin must use these rules to calculate.



• You can use the order of operations to calculate  $32 - 12 \div (2 + 2) + 8 \times 2$ .

**B**EDMAS: Do calculations inside **B**rackets first. So, calculate (2 + 2) first.  $32 - 12 \div (2 + 2) + 8 \times 2 = 32 - 12 \div 4 + 8 \times 2$ 

BEDMAS: Divide and Multiply in order from left to right. So, calculate  $12 \div 4$  and then  $8 \times 2$  before adding or subtracting.  $32 - 12 \div 4 + 8 \times 2 = 32 - 3 + 16$ 

BEDMAS: Add and Subtract in order from left to right. So, calculate 32 - 3 before adding 16. 32 - 3 + 16 = 29 + 16= 45

- Calculate 32 – 4  $\times$  6. Show or describe how you used the order of operations to calculate.

## **Try These**

1. Use BEDMAS to decide which calculation you would do first in each expression. Circle it.

a) 53 - 8 × (4 + 9) × 2	d) $53 - 8 \times 4 + 9 \times 2$

- **b)**  $(53-8) \times 4 + (9 \times 2)$  **e)**  $53-8+4+9 \times 2$
- **c)**  $53 (8 \times 4) + 9 \div 2$  **f)**  $53 8 \times (4 + 9 \times 2)$

expression a series of numbers linked by operation sign, sometimes including brackets

2. Show or describe how to calculate each expression below. What is different about the calculations?

 $5 \times 6 + 8$   $5 \times (6 + 8)$ 

- **3.** For the expression  $75 + (4 \times 2) (3 \times 8)$ , Ry multiplied  $4 \times 2$  first. Hu multiplied  $3 \times 8$  first. How can they both be right?
- **4.** Katrina said that  $4 + 8 \times 9$  is equal to 108. Do you agree? Explain your thinking.

- Remember
- BEDMAS is a way to remember the order for calculating an expression: Brackets, Division and Multiplication, Addition and Subtraction
- It does not matter if the Division comes before or after the Multiplication—you always calculate from left to right.
- It does not matter if the Subtraction comes before or after the Addition you always calculate from left to right.

- 5. Calculate. Show your work.
  - a) 4 + 6  $\times$  8 30  $\div$  2

**d)**  $36 \div (5 + 4) \times 3$ 

**b)**  $4 + (6 \times 8 - 30) \div 2$ 

**e)**  $36 \times 3 \div (5 + 4)$ 

**c)**  $(4 + 6) \times 8 - 30 \div 2$ 

**f)**  $36 - (5 + 4) \times 3$ 

Divide by 5.

- **6.** Why are the answers to Questions 5b) and c) different, even though the numbers and operations are the same?
- 7. Start with the number 10. Complete the 3 operations below in different orders. There are 6 possible orders.

Write all the possible answers you can get. Show or describe how you got each answer.

Multiply by 4.



- 8. Insert brackets so that each expression is equal to 5.
  - **a)** 40 ÷ 3 + 5

Add 5.

- **b)**  $4 \times 30 + 5 \div 17 + 8$
- **c)**  $64 \div 15 + 1 + 1$
- **9.** To calculate  $5 \times 8 \div 5 + 8$ , you go from left to right.
  - a) Create 2 other expressions that would work this way. Include 3 different operations in each.
  - b) How did you create your expressions?
- **10.** Do you think it is possible to add brackets to an expression without changing the answer? Explain using an example.

FYI

Knowing the order of operations is useful when there is no problem situation to help you decide which calculations in an expression are supposed to be done first, second, and so on.

## **Dividing Whole Numbers**



There are 350 to 450 students in Leah's school.

There are 1200 to 1300 students in her brother Zack's school.

#### Part A: Grouping Students

• Choose a number of students for each school.

Leah's school: \_\_\_\_\_

- Zack's school: \_\_\_\_\_
- 7 teachers supervise equal-sized groups of students.
   Estimate the number of students that each teacher supervises.
   Explain each estimate.

Leah's school: about \_\_\_\_\_ students per teacher

#### Remember

• You can use division to figure out how a total can be divided into equal groups.

Zack's school: about \_\_\_\_\_\_ students per teacher

#### Part B: Forming Teams

• Use the number of students from Part A for Leah's or Zack's school. Then choose a team size of 5, 6, 8, 12, or 15.

number of students: \_\_\_\_\_ team size: \_\_\_\_\_

• Estimate the number of teams that can be formed. Explain your estimate.

• Determine the number of teams. Show your work. Check that your answer is correct, and show how you checked.

#### Part C: Forming Different Teams

• Repeat Part B, using a different number of students and team size.

number of students: \_\_\_\_\_

team size: \_

• Estimate the number of teams. Explain your estimate.

#### Remember

- When solving a division story problem that has a remainder, you can do what makes sense to you with the leftover amount.
- You can use base ten blocks to model and solve a division problem.



• Determine the number of teams. Show your work. Check that your answer is correct and show how you checked.

## **Dividing Whole Numbers**

Parents were making 291 sandwiches for a special lunch at school. They wanted equal numbers of ham, chicken, and veggie sandwiches, and they wanted 8 sandwiches on each plate.

#### How many sandwiches of each type are needed?

• You can estimate the number of each type of sandwich.

Since 3  $\times$  100 = 300 and there are 291 sandwiches, there will be just less than 100 of each type.

- To get an exact **quotient** for 291  $\div$  3, you can use base ten blocks.
  - Model 291 with base ten blocks, and draw 3 sharing boxes.



So, regroup the 2 hundreds using 20 tens.

Share as many of the 29 tens as possible so each box has the same number.

Record the division.



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Regroup the 2 tens that were left over using 20 ones.
 Share the 21 ones among the 3 boxes.
 Record the division.



3)291





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• You can also calculate 291  $\div$  3 using reasoning.

If there were 300 sandwiches, there would be 100 of each type. There are 9 fewer sandwiches than that, so there would be 3 fewer than 100, or 97 sandwiches of each type.

#### How many plates are needed?

• You can estimate the number of plates.

$$291 \div 8$$
 is about  $320 \div 8 = 40$ .

• To get an exact quotient for  $291 \div 8$ , you can 8)291create groups of 8 until no sandwiches are left. -240

<u>- 240</u> 30 plates of 8 51 <u>- 48</u> <u>+6 plates of 8</u> 3 36 plates of 8

36

8)240 + 40 + 8 + 3

30 + 5 + 1 + 0 R3

8)291

36 plates are needed, which is about 40. The 3 leftover sandwiches could go on a 37th plate.

• You can also calculate 291 ÷ 8 by breaking 291 into parts that are multiples of 8 and then dividing each part by 8.

291 = 240 + 40 + 8 + 3

 $30 \times 8 = 240$ , so 30 plates for 240 sandwiches

- $5 \times 8 = 40$ , so 5 plates for 40 sandwiches
- $1 \times 8 = 8$ , so 1 plate for 8 sandwiches

That is 36 plates and 3 leftover sandwiches.

### **Try These**

**1. a)** Match each division to an estimate. One estimate has no match.

279 itoms in groups of 0	about 45
	about 25
417 items in groups of 4	about 20
638 items in groups of 3	00001 30
512 itoms in groups of 11	about 210
	about 100
311 items in groups of 5	about 60

**b)** For the estimate in part a) that has no match, write a possible division statement.

\_\_\_\_\_ items in groups of \_\_\_\_\_ is about \_\_\_\_\_.

23

- 2. Show or explain how to use each block model to divide.
- a) Divide 500 into groups of 50. **b)** Divide 611 into 4 equal groups. 0 c) Divide 400 into groups of 5. 3. Estimate each quotient. a) 415 ÷ 8 is about \_\_\_\_\_. c) 5132 ÷ 7 is about \_\_\_\_\_. **b)** 3021÷7 is about \_\_\_\_\_. **d)** 5702÷6 is about \_\_\_\_\_. **4.** a) Create a problem that could be solved using  $415 \div 8$ . **b)** Create a different problem that could be solved using  $5132 \div 7$ . 5. a) To calculate  $645 \div 3$ , you could break 645 into 600 + 30 + 15 or 500 + 100 + 45. Why would it be better to use 600 + 30 + 15? b) Show a way to break 718 into parts for each calculation. 718 ÷ 7 \_\_\_\_\_ 718 ÷ 9 \_\_\_\_\_

- 6. Calculate. Show your work.
- **a)** 318 ÷ 2 = \_\_\_\_\_ **c)** 362 ÷ 4 = \_\_\_\_\_ **b)** 814 ÷ 3 = \_\_\_\_\_ **d)** 248 ÷ 8 = \_\_\_\_\_ 7. Each calculation below involves a three-digit number greater FYI than 500 divided by a one-digit number. Fill in the blanks to make The strategies you each equation true. use for dividing whole numbers can also be used for dividing = 83 a) ÷ b) = 58 decimals. 8. To calculate  $4020 \div 20$ , you can calculate  $402 \div 2$  and get the same quotient. Why does this work? 9.  $405 \div 3$  is close to  $406 \div 3$  but  $405 \div 3$  is not close to  $405 \div 4$ . Why? **10.** Do you agree with Tanis? Explain your thinking. If you know how to multiply, you can divide.

## **Multiplying Whole Numbers**



Packages of cookies have 25 to 40 cookies. There are 11 to 50 packages of cookies of each kind.

Suppose you needed to buy many packages of the same kind of cookie.

#### Part A

• Choose a number of cookies for your package.

\_\_\_\_\_ cookies in each package

• Choose a number of packages to buy.

\_\_\_\_\_ packages

- Estimate the total number of cookies. Explain how you estimated.
- Exactly how many cookies would that be? Show your work.

#### Part B

• Repeat Part A but change the number of cookies in each package and change the number of packages.

\_\_\_\_\_ cookies in each package

\_\_\_\_\_ packages

- Estimate the total number of cookies. Explain how you estimated.
- Exactly how many cookies would that be? Show your work.

#### Part C

• Repeat Part A but change the number of cookies in each package and change the number of packages again.

\_\_\_\_\_ cookies in each package

\_\_\_\_\_ packages

- Estimate the total number of cookies. Explain how you estimated.
- Exactly how many cookies would that be? Show your work.



## **Multiplying Whole Numbers**

A group of kangaroos is called a mob. How can you figure out the number of kangaroos in 13 mobs, if each mob has 52 kangaroos?

You might estimate first.

13 groups of 52 is more than  $10 \times 50 = 500$ .

• You can calculate the exact **product** by multiplying  $13 \times 52$ , using a base ten block model.

Build a rectangle with the length as the number of kangaroos and the width as the number of mobs.

Each row represents 1 mob of 52 kangaroos.

The 13 rows represent 13 mobs of 52, which is  $13 \times 52$ .

} 13 rows of 52					
	Ø	Ø			
	đ	۵			
J	Ø.	đ			

Count the hundreds, tens, and ones, and then add them. 500 + 150 + 20 + 6 = 676, so there are 676 kangaroos.

 You can also sketch the rectangle model above to show the 4 parts and then use it to calculate the product of  $13 \times 50$ . Label the sketch with the tens and ones parts of each number along the top and along the left side.



Determine the area of each part of the rectangle.



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500 + 20 + 150 + 6 = 676, so there are 676 kangaroos.



#### You will need

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base ten blocks

product

the result when you multiply

- You can also multiply 13  $\times$  52 by calculating in parts.

$$13 \times 52 = 10 \times 52 + 3 \times 52 \quad \text{or} \quad 52 \\ = 520 + 156 & \times 13 \\ = 676 & 156 \\ + 520 \\ 676 \end{array}$$

## **Try These**

1. Match each grouping to the best estimate. One estimate has no match.

15 mobs of 72 kanagroos	about 1200
	about 500
31 mobs of 39 kangaroos	about 1000
16 mobs of 78 kangaroos	
21 mobs of 98 kangaroos	about 4000
12 mobs of U2 kanagroos	about 1200
	about 2100

- 2. Model each multiplication.
  - a) 12 groups of 38

b) 37 groups of 25



29

- **3.** Estimate each product.
  - **a)** 17 × 28 is about \_\_\_\_\_.
  - **b)**  $35 \times 49$  is about \_\_\_\_\_.
  - c)  $15 \times 32$  is about \_\_\_\_\_.
  - **d)**  $26 \times 41$  is about \_\_\_\_\_.
- **4.** a) Create a problem situation that could be solved using  $17 \times 28$ .

**b)** Create a problem situation that could be solved using  $15 \times 32$ .

5. Why might you break 24 into 20 + 4 to calculate  $24 \times 48$ ?

**6.** Each calculation is a two-digit number multiplied by a two-digit number. Fill in the blanks to make each statement true.



7. One student multiplied 32  $\times$  46 and wrote the product 1212. Is the calculation correct? Explain your thinking.



8.	a)	Choose 2 two-digit	numbers and	multiply them.
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		× =	
	b)	Increase the greater number by 1 and decrease the smaller number by 1. Predict whether the product will increase or decrease. Explain your prediction.	
	C)	Calculate the product for part b). $\square \square \times \square \square = \_$	
		Was your prediction correct?	
9.	Yo is	u multiply 2 different two-digit numbers and the answer	
	a)	What numbers could you have multiplied?	
	b)	Explain how you decided which numbers would work.	
10.	Ex  3 d	blain why the product of 2 two-digit numbers could have only igits or 4 digits.	FYI It is useful to have different strategies to multiply whole numbers. This makes it easier later when you are multiplying decimals.

31



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