CHAPTER 6

1 Identify Factors, Primes, and Composites

Goal **Identify the factors of prime and composite numbers.**

1. List all the factors of each number.

a) 16
1, 2, 4, 8, 16

b) 45
1, 3, 5, 9, 15, 45

c) 31
1, 31

d) 22
1, 2, 11, 22

e) 18
1, 2, 3, 6, 9, 18

f) 60
1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

2. Which numbers are prime and which are composite? Show your work.

a) 41
Prime because the factors of 41 are 1 and 41.

b) 15
Composite because the factors of 15 are 1, 3, 5, and 15.

c) 21
Composite because the factors of 21 are 1, 3, 7, and 21.

d) 12
Composite because the factors of 12 are 1, 2, 3, 4, 6, and 12.

e) 19
Prime because the factors of 19 are 1 and 19.

f) 25
Composite because the factors of 25 are 1, 5, and 25.

At-Home Help

A **factor** is a whole number that divides another whole number without a remainder.

For example, 2 is a factor of 8 because 2 divides 8 without a remainder.

$8 \div 2 = 4$
The factors of 8 are 1, 2, 4, and 8.

A **prime number** is a number that has only two different factors: 1 and itself.

For example, 2 is a prime number because it has only two factors: 1 and 2.

A **composite number** is a number that has more than two different factors.

For example, 4 is a composite number because it has more than two factors: 1, 2, and 4.

The numbers 0 and 1 are neither prime nor composite.

CHAPTER 6

2 Identifying Multiples

Goal **Solve problems by identifying multiples of whole numbers.**

1. List five multiples of each number.

a) 4

Suggested answer: 8, 12, 16, 20, and 24

b) 10

Suggested answer: 20, 30, 40, 50, and 60

c) 22

Suggested answer: 44, 66, 88, 110, and 132

d) 9

Suggested answer: 18, 27, 36, 45, and 54

e) 11

Suggested answer: 22, 33, 44, 55, and 66

f) 40

Suggested answer: 80, 120, 160, 200, and 240

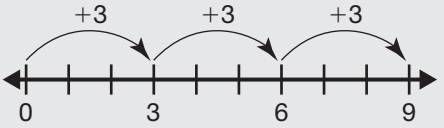
At-Home Help

A **multiple** is a number that is the product of two factors.

For example, 8 is a multiple of 2 because $2 \times 4 = 8$.

To find the multiples of a number, use skip counting or multiplication.

For example:



or $3 \times 1 = 3$
$3 \times 2 = 6$
$3 \times 3 = 9$
$3 \times 4 = 12$
and so on.

The multiples of 3 are 3, 6, 9, 12, ….

2. Sergio has 30 gifts numbered from 1 to 30. There is a kite in each gift with a number that is a multiple of 4. There is a baseball cap in each gift with a number that is a multiple of 6.

a) Which gifts have a kite?

Suggested answer: The multiples of 4 are 4, 8, 12, 16, 20, 24, 28, ….
So gifts with numbers 4, 8, 12, 16, 20, 24, and 28 have a kite.

b) Which gifts have a baseball cap?

Suggested answer: The multiples of 6 are 6, 12, 18, 24, 30, ….
So gifts with numbers 6, 12, 18, 24, and 30 have a baseball cap.

c) Which gifts have both a kite and a baseball cap?

Suggested answer: The multiples 12 and 24 are in the answers for parts a) and b).
So gifts with numbers 12 and 24 have both a kite and a baseball cap.

CHAPTER 6

3 Calculating Coin Values

Goal **Use the relationship between coin values to simplify calculations.**

1. Zak has 24 quarters in his coin collection. Sketch an array of these coins to calculate 24 × 25.

Suggested answer:
24 x 25 = 600

2. Calculate the value of each number of coins.

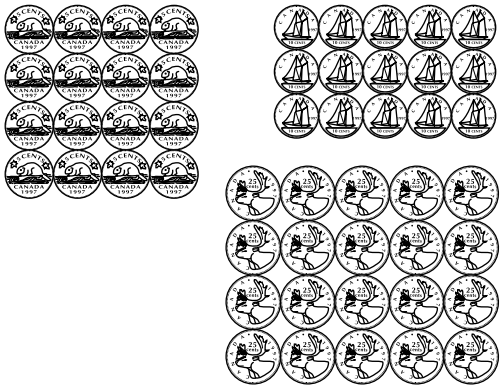
a) 80 nickels 80 x 5 = 400¢ or $4.00

b) 80 quarters 80 x 25 = 2000¢ or $20.00

c) 50 dimes 50 x 10 = 500¢ or $5.00

3. **a)** Ramona has 16 nickels, 15 dimes, and 20 quarters. Show one way to arrange each of these coins to calculate the total value of Ramona's coins.

Suggested answer:



b) Calculate the value for each coin arrangement in part **a)**. (using answer above):

nickels 4 x 20 = 80

dimes 3 x 50 = 150

quarters 5 x 100 = 500

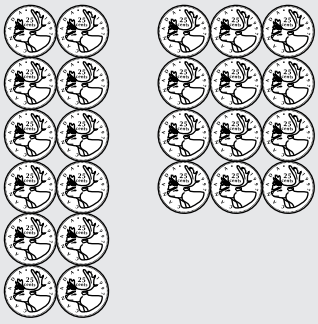
Total: 730¢ or $7.30

At-Home Help

Multiplication can be used to calculate the value of coins.

For example, to calculate the value of 12 quarters, multiply 12 × 25. Use an array to make the multiplication easier.

For example, two possible arrays for 12 quarters are



In the first array, the value of each row is 50¢, so the multiplication can be done as 6 × 50 = 300.

In the second array, the value of each column is 100¢, so the multiplication can be done as 3 × 100 = 300. Both arrays show that 12 × 25 = 300¢.

CHAPTER 6

4 Multiplying by Hundreds

Goal **Use multiplication facts and regrouping to multiply by hundreds.**

1. Calculate.

a) $100 \times 40 =$ 4000

b) $70 \times 200 =$ 14 000

c) $30 \times 500 =$ 15 000

d) $800 \times 600 =$ 480 000

e) $700 \times 900 =$ 630 000

f) $6000 \times 60 =$ 360 000

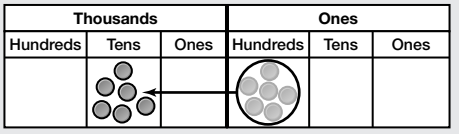
At-Home Help

To multiply hundreds, you can use regrouping and number facts.

For example, to multiply 200 by 300, you can multiply $200 \times 3 \times 100$.

You can use the number fact $2 \times 3 = 6$ to calculate $200 \times 3 = 600$.

Then, to multiply 600 by 100, regroup to a different place value.



$600 \times 100 = 60\,000$
So $200 \times 300 = 60\,000$

2. Jake's class baked 20 batches of cookies. Each batch contained 200 cookies. How many cookies did Jake's class bake? Show your work.

20 x 200 = 4000
4000 cookies

3. Marlie needs to fill 400 cups with juice. Each cup holds 200 mL. How much juice does she need? Show your work.

200 x 400 = 80 000
Marlie needs 80 000 mL or 80 L of juice.

CHAPTER 6

5 Estimating Products

Goal **Estimate to check the reasonableness of a calculation.**

1. Check if each answer is reasonable. Use estimation.

a) $64 \times 36 = 3204$

Not reasonable because 60 x 30 = 1800 and 70 x 40 = 2800. 3204 is not between 1800 and 2800.

b) $122 \times 38 = 4636$

Reasonable because 100 x 40 = 4000.

c) $44 \times 1045 = 66\ 980$

Not reasonable because 40 x 1000 = 40 000 and 50 x 1100 = 55 000. 66 980 is not between 40 000 and 55 000.

d) $78 \times 2196 = 171\ 288$

Reasonable because 80 x 2000 = 160 000.

At-Home Help

To check the reasonableness of a calculation, estimate the answer using one or more mental math strategies.

For example: To check if $57 \times 52 = 2964$ is reasonable, use rounding or a range.

$60 \times 50 = 3000$
The product 2964 is reasonable.

or $50 \times 50 = 2500$
$60 \times 60 = 3600$
The answer should be between 2500 and 3600. The product 2964 is reasonable.

2. **a)** Nirmala rides her bicycle 56 days during the school year. Each of those days, she rides 540 m. Calculate the distance she rides during the school year.

56 x 540 m = 30 240 m

b) Show that your answer is reasonable. Use estimation.

Suggested answer:
I know that 60 x 500 = 30 000
30 000 is close to 30 240.
So my answer is reasonable.

CHAPTER 6

6 Multiplying by Two-Digit Numbers

Goal **Use pencil and paper to multiply a whole number by a two-digit number.**

1. Calculate.

a) 34 × 123

```
   1
 1 2 3
x  3 4
-------
 4 9 2
3 6 9 0
-------
4 1 8 2
```

b) 58 × 256

```
   1 4
   2 5 6
 x   5 8
---------
 2 0 4 8
1 2 8 0 0
---------
1 4 8 4 8
```

c) 81 × 3699

```
   5 7 7
   3 6 9 9
 x     8 1
---------
   3 6 9 9
2 9 5 9 2 0
-----------
2 9 9 6 1 9
```

d) 77 × 6908

```
     6   5
   6 9 0 8
 x     7 7
---------
 4 8 3 5 6
4 8 3 5 6 0
-----------
5 3 1 9 1 6
```

At-Home Help

To multiply a whole number by a two-digit number, you can use regrouping or partial products.

For example:

```
   6 6 5
   1 7 7 6
×      1 9
-----------
1 5 9 8 4
1 7 7 6 0
-----------
3 3 7 4 4
```

or

	1000 +	700 +	70 +	6	
10 +	10 000	7000	700	60	17 760
9	9000	6300	630	54	15 984

19 000 + 13 300 + 1330 + 114 = 33 744

2. Rose delivers newspapers in a seniors' residence. She delivers 23 papers on each floor. There are 12 floors in the building. She makes deliveries 15 times per month.

a) Do you think Rose delivers more than 3000 newspapers in a month? Explain how you know.

Suggested answer:
I round all the numbers in the problem to the nearest ten.
20 x 10 = 200 and 200 x 20 = 4000
Since 4000 is greater than 3000, I think Rose delivers more than 3000 newspapers.

b) Calculate the number of newspapers Rose delivers in a month. Show your work.

4140 newspapers

```
  2 3
x 1 2
-----
  4 6
2 3 0
-----
2 7 6
```

```
   3 3
   2 7 6
 x   1 5
---------
 1 3 8 0
2 7 6 0
-------
4 1 4 0
```

CHAPTER 6

7

Dividing by 1000 and 10 000

Goal **Use mental math to divide whole numbers by 1000 and 10 000.**

1. Calculate. Use mental math.

a) 19 000 ÷ 1000 = 19

b) 36 000 ÷ 1000 = 36

c) 2 080 000 ÷ 10 000 = 208

d) 1 620 000 ÷ 1000 = 1620

e) 805 000 ÷ 1000 = 805

f) 40 000 ÷ 1000 = 40

g) 90 000 ÷ 10 000 = 9

h) 6000 ÷ 1000 = 6

At-Home Help

To multiply a whole number by 1000, move all digits to the left three places. You can see the pattern by multiplying by 10, 100, or 1000.

For example,

$3 \times 10 = 30$ $13 \times 1000 = 13\,000$

$3 \times 100 = 300$ $130 \times 1000 = 130\,000$

$3 \times 1000 = 3000$ $1300 \times 1000 = 1\,300\,000$

To divide a whole number by 1000, move all digits to the right three places.

For example,

$9000 \div 10 = 900$ $98\,000 \div 1000 = 98$

$9000 \div 100 = 90$ $980\,000 \div 1000 = 980$

$9000 \div 1000 = 9$ $9\,800\,000 \div 1000 = 9800$

2. Leo's binoculars can magnify an object 1000 times.

a) How tall would an object be if the image in the binoculars is 44 000 mm tall?

44 000 ÷ 1000 = 44

The object would be 44 mm tall.

b) How tall would the image in the binoculars be if the object is 5 mm tall?

5 x 1000 = 5000

The image would be 5000 mm tall.

CHAPTER 6

8 Dividing by Tens and Hundreds

Goal **Use renaming and a division fact to divide by tens and hundreds.**

1. Calculate. Use multiplication to check each answer.

a) 3000 ÷ 50 = 60

Check:
60 x 50 = 3000

b) 14 000 ÷ 200 = 70

Check:
70 x 200 = 14 000

c) 45 000 ÷ 300 = 150

Check:
150 x 300 = 45 000

d) 200 000 ÷ 400 = 500

Check:
500 x 400 = 200 000

At-Home Help

To divide a whole number by tens or hundreds, you can use renaming.

For example: To divide 60 000 by 200, rename both numbers as hundreds.

60 000 = 6 ten thousands
= 60 thousands
= 600 hundreds

200 = 2 hundreds

60 000 ÷ 200 is the same as 600 hundreds ÷ 2 hundreds.

600 ÷ 2 = 300
So 60 000 ÷ 200 = 300

Check the answer using multiplication.
300 × 200 = 60 000

2. **a)** Kyle and his brother Joe have 24 000 family photos. They saved 600 photos on CD each month. How many months did it take to save the photos?

24 000 ÷ 600 = 40
It took 40 months.

b) Use multiplication to check your answer.

40 x 600 = 24 000

CHAPTER 6

9 Estimating Quotients

Goal **Use multiplication and rounding to check the reasonableness of a quotient.**

You will need a calculator.

1. Check if each answer is reasonable. Use estimation and multiplication.

a) 2170 ÷ 31 = 70

Reasonable. Round 31 to nearest ten.

30 x 70 = 2100, which is close to 2170.

b) 6888 ÷ 28 = 194

Not reasonable because 28 x 100 = 2800 and

28 x 200 = 5600. 6888 is not between 2800 and 5600.

c) $58\overline{)7656}$ 132

Reasonable. Round 58 and 132 to nearest ten.

60 x 130 = 7800, which is close to 7656.

d) $72\overline{)8280}$ 256

Not reasonable because 72 x 200 = 14 400. 8280 is less

than 14 400 so the quotient should be less than 200.

2. Choose the best estimate for each quotient.

a) 874 ÷ 26 = 30 10 20 30 40

b) 657 ÷ 55 = 10 10 20 30 40

c) 834 ÷ 44 = 20 10 20 30 40

3. The Grade 6 students in Pedro's school are hoping to raise $4000 to buy food for homeless people. There are 84 Grade 6 students in Pedro's school.

a) Calculate the amount of money each student is hoping to raise. Use a calculator.
$4000 ÷ 84 = $47.62

b) Show that your answer is reasonable. Use estimation and multiplication.
Suggested answer: Round 84 and 47.62 to the nearest ten.
50 x 80 = 4000 So my answer is reasonable.

At-Home Help

A **quotient** is the answer to a division question.

For example, 90 is the quotient of 6300 ÷ 70.

6300 ÷ 70 = 90

To check if a quotient is reasonable, you can use rounding and multiplication.

For example,
check if 4500 ÷ 24 = 267
is reasonable. If it is reasonable,
4500 should be between 200 × 24
and 300 × 24.
200 × 24 = 4800
300 × 24 = 7200

4500 is not between 4800 and 7200. The quotient should be less than 200. So a quotient of 267 is not reasonable.

CHAPTER 6

10 Dividing by Two-Digit Numbers

Goal **Divide a four-digit number by a two-digit number.**

1. Calculate. Show your work. Check your answers using multiplication.

a) 1088 ÷ 16

```
      68
16)1088
    960
    128
    128
      0
```

Check:

```
   4
   68
 x 16
 408
 680
1088
```

c) 63)4473

```
     71
63)4473
   4410
     63
     63
      0
```

Check:

```
   71
 x 63
  213
4260
4473
```

b) 2278 ÷ 34

```
      67
34)2278
   2040
    238
    238
      0
```

Check:

```
   2
   67
 x 34
 268
2010
2278
```

d) 81)7533

```
     93
81)7533
   7290
    243
    243
      0
```

Check:

```
   2
   93
 x 81
  93
7440
7533
```

2. Jamal's class ordered 28 sets of coloured pencils for art projects during the school year. They ordered 1820 pencils altogether.

a) How many coloured pencils are in a set?

65 pencils

```
      65
28)1820
   1680
    140
    140
      0
```

b) Use estimation to check if your answer is reasonable.

Suggested answer: 70 x 30 = 2100
2100 is close to 1820. So my answer of 65 is reasonable.

At-Home Help

To divide a four-digit number by a two-digit number, use estimation and multiplication.

For example: To divide 2365 by 43, round 43 to the nearest ten.

43 is close to 40. Use 40 to estimate.

40 × 50 = 2000 is low.

40 × 60 = 2400 is high but very close.

```
     55
43)2365
  2150   ⟶ 43 × 50 = 2150
   215
   215   ⟶ 43 × 5 = 215
     0
```

To check if a quotient is reasonable, use multiplication or estimation.

For example:

```
    55
  × 43
   165
2200
2365
```

Estimate: 60 × 40 = 2400

CHAPTER 6

11 Communicate About Creating and Solving Problems

Goal **Create and explain how to solve multiplication and division problems.**

Kiki's family has an energy-efficient washing machine. The machine uses 4620 L of water a year to wash all the laundry. The family washes 7 loads of laundry a month.

1. a) Create a multiplication or division problem using the information about Kiki's family.

Suggested answer: How many litres of water does the washing machine use for each load?

b) Explain the solution to your problem in part **a)**. Use the Communication Checklist.

(using answer above):
Understand the Problem
I need to determine the number of litres of water for each load.

Make a Plan
This problem will take more than one step and more than one operation to solve. First I need to multiply 7 by 12 to estimate the number of loads washed in one year. Then I need to divide 4620 by the product to estimate the number of litres used for each load.

Carry Out the Plan
total loads in a year: $7 \times 12 = 84$ loads
number of litres used for each load: 55 L

$$\begin{array}{r} 55 \\ 84\overline{)4620} \\ \underline{4200} \\ 420 \\ \underline{420} \\ 0 \end{array}$$

Look Back
I'll use multiplication to check my answer.

$$\begin{array}{r} 55 \\ \times\ 84 \\ \hline 220 \\ \underline{4400} \\ 4620 \end{array}$$

The product I get is the same as the total number of litres in the problem. So my answer is reasonable.

At-Home Help

To create a problem, read the information given. Think about how the situation could be about multiplying or dividing. Then create your question.

To explain how to solve a multiplication or division problem, use the problem-solving model.

- Understand the Problem
- Make a Plan
- Carry Out the Plan
- Look Back

Communication Checklist

- ☑ Did you show all the steps?
- ☑ Did you check your answers?
- ☑ Did you show the right amount of detail?

CHAPTER 6

12 Order of Operations

Goal **Determine whether the value of an expression changes when the order of calculating changes.**

You will need a calculator.

1. Determine the value of each number statement. Using a calculator, enter each number and operation from left to right.

a) $16 + 12 - 8 =$ 20

b) $9 \times 11 \div 3 =$ 33

c) $16 \div 4 \times 2 + 5 =$ 13

d) $22 - 9 + 12 - 8 =$ 17

2. **a)** Sonya entered a contest to win a trip to Mexico. She had to answer this skill-testing question:
$18 \div 2 + 3 \times 7$
Show how Sonya could get an answer of 30.

$18 \div 2 + 3 \times 7$
$= 9 + 21$
$= 30$

b) Drake had to answer this skill-testing question to win a DVD player:
$3 \times 5 - 21 \div 7$
Show how Drake could get an answer of 12.

$3 \times 5 - 21 \div 7$
$= 15 - 3$
$= 12$

c) Tilly said the answer to the skill-testing question $45 \div 3 - 7 \times 2$ is 1. Show how she could have got this answer.

$45 \div 3 - 7 \times 2$
$= 15 - 14$
$= 1$

At-Home Help

In math, a number statement can have only *one* correct answer.

If a number statement has only addition or multiplication, you get only one answer no matter what order you do the operations.

For example:

$8 + 12 + 5$	or	$8 + 12 + 5$
$= 20 + 5$		$= 8 + 17$
$= 25$		$= 25$
$5 \times 4 \times 11$	or	$5 \times 4 \times 11$
$= 20 \times 11$		$= 5 \times 44$
$= 220$		$= 220$

Test Yourself Page 1

Circle the correct answer.

1. What are the factors of 24?

A. 1, 24

B. 1, 2, 4, 6, 12, 24

C. 1, 2, 3, 4, 6, 8, 12, 24

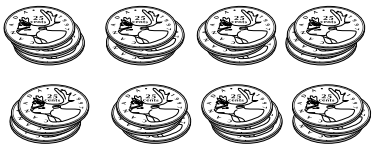
D. 1, 3, 4, 6, 8, 24

2. Which arrangement best represents 16×25?

A. 

B. 

C. 

D. 

3. During a charity event, 8000 packages of candy were sold. Each package had 40 candies. How many candies were sold?

A. 12 000 candies

B. 120 000 candies

C. 32 000 candies

D. 320 000 candies

4. Using estimation, which answer is *not* reasonable?

A. $68 \times 68 = 4624$

B. $82 \times 47 = 3854$

C. $312 \times 96 = 18\,352$

D. $23 \times 1867 = 42\,941$

5. Which product is the correct answer to 2481×14?

A. 21 050

B. 34 734

C. 52 901

D. 68 437

6. Which quotient is incorrect?

A. $3600 \div 30 = 120$

B. $81\,000 \div 900 = 90$

C. $45\,000 \div 50 = 90$

D. $49\,000 \div 70 = 700$

Test Yourself Page 2

7. Using estimation and multiplication, which answer is reasonable?

A. $1998 \div 37 = 54$

B. $4191 \div 33 = 217$

C.
$$\begin{array}{r} 36 \\ 43\overline{)2408} \end{array}$$

D.
$$\begin{array}{r} 67 \\ 68\overline{)3196} \end{array}$$

8. Which quotient is the correct answer to $54\overline{)4698}$?

A. 87

B. 38

C. 69

D. 45

9. Which numbers are multiples of 12?

A. 35, 36, 40, 45

B. 24, 48, 60, 72

C. 30, 40, 50, 60

D. 24, 44, 64, 84

10. What are the answers to $502\,000 \div 1000$ and 14×1000?

A. 5020, 1400

B. 502, 14

C. 502, 14 000

D. 5020, 140

11. Mohammed spends 560 min on the Internet each month. How many hours does he spend on the Internet in a year?

Which explanation is best to solve the problem?

A. First I need to multiply 560 by 60 to determine the number of hours Mohammed spends in a month. There are 12 months in a year. So I need to multiply the product by 12.

B. First I need to multiply 560 by 12 to determine the number of minutes Mohammed spends in a year. There are 60 minutes in each hour. So I need to divide the product by 60.

C. First I need to divide 560 by 12 to determine the number of minutes Mohammed spends in a year. There are 60 minutes in each hour. So I need to divide the quotient by 60.

D. First I need to divide 560 by 60 to determine the number of hours Mohammed spends in a month. There are 12 months in a year. So I need to divide the quotient by 12.