Spark of Math

Answer Key

Book 4

Dar
GHAD AL AJYAL
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Spark of Math

Answer Key
Book 4

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Contents

Unit 1

Working with Numbers up to Six Digits

Vocabulary

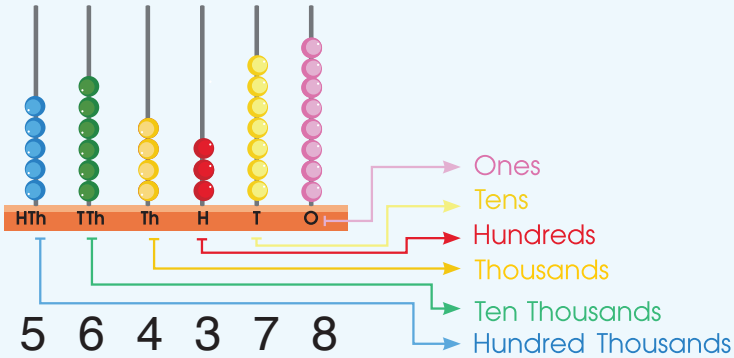
- hundred thousands (100 thousands)
- ten thousands (10 thousands)
- thousands
- standard form
- word form
- expanded form
- place value
- greater than
- less than
- equal to
- ascending order
- descending order
- add
- addend
- sum
- subtract
- minuend
- subtrahend
- difference

Objectives

Upon completion of this unit, you will be able to:

- Read and write down numbers up to 6 digits.
- Extend numbers up to 6 digits into expanded form.
- Determine the place value of numbers up to 6 digits.
- Compare numbers up to 6 digits.
- Order numbers in an ascending and descending order.
- Round numbers to a specific place value.
- Add numbers up to 6 digits.
- Subtract numbers up to 6 digits.

(1-1) Numbers up to Six Digits

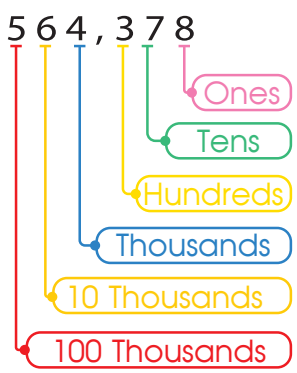


• Standard Form:	564,378
• Word Form:	Five hundred, sixty-four thousand, three hundred and seventy-eight
• Expanded Form:	500,000 + 60,000 + 4,000 + 300 + 70 + 8

Group Group

Note the following:

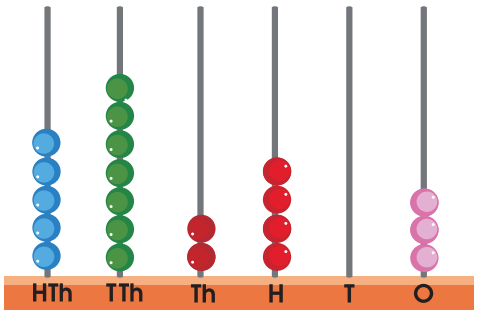
- Each part of a number is called a 'digit'. The number 564,378 has 6 digits.
- For every three digits, a comma separates each group of numbers.
- Moving a number left increases its value tenfold. Each leftward shift adds a "0" to the number.



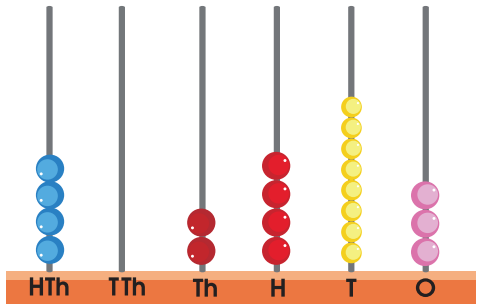
Place Value

Ones	8	(8×1)	
Tens	70	(7×10)	Group
Hundreds	300	(3×100)	
Thousands	4,000	(4×1000)	
10 Thousands	60,000	(6×10,000)	Group
100 Thousands	500,000	(5×100,000)	

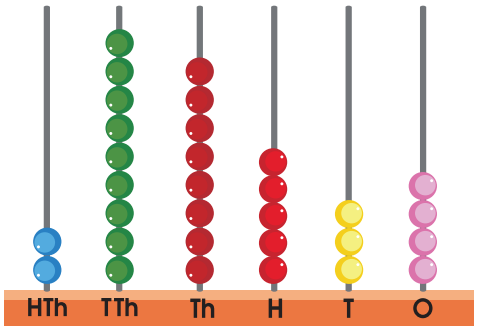
1. Count the beads on each abacus and write down the number.



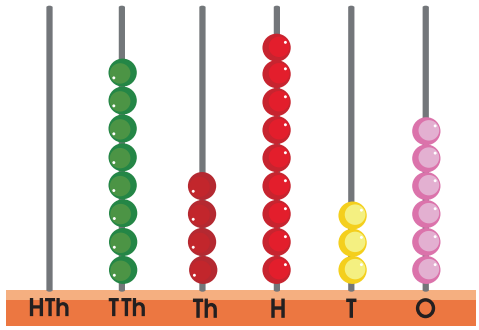
572,403



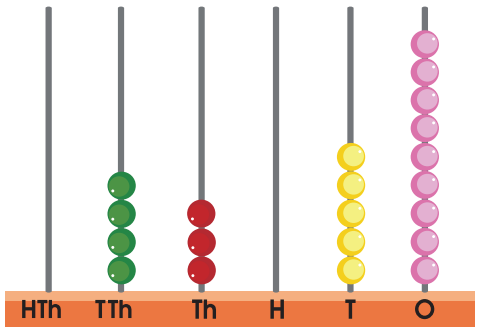
402,483



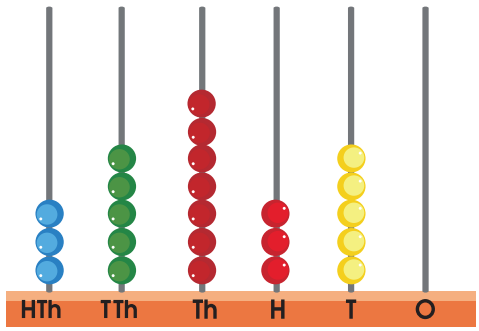
298,534



84,936

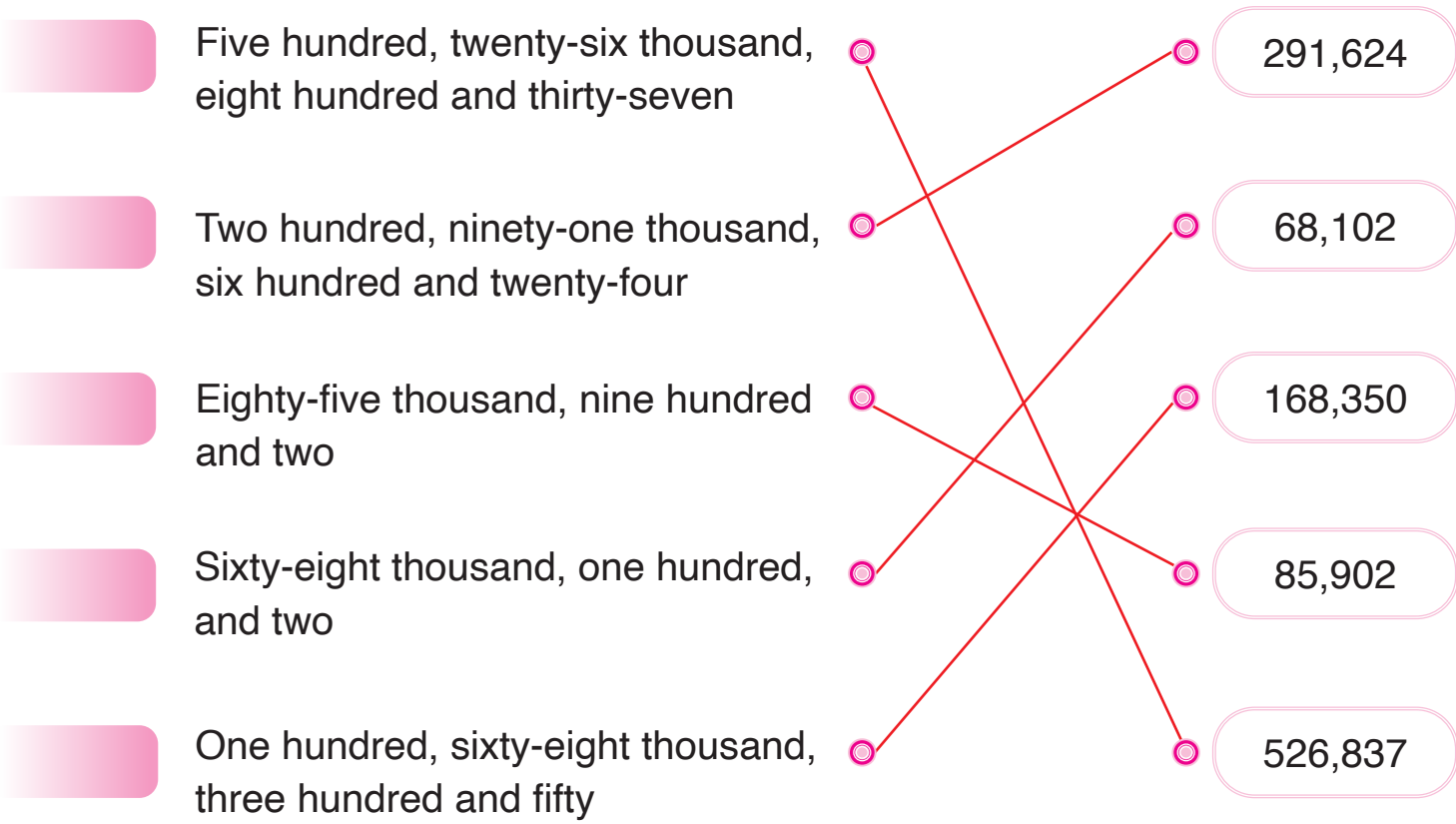


43,059



357,350

2. Match.



3. Write down the numbers in digits.

A Seventy-three thousand, nine hundred and eighty-six 73,986

B Three hundred, forty thousand, six hundred and forty-two 340,642

C Nineteen thousand, five hundred and forty-eight 19,548

D Seven hundred, sixty-one thousand, three hundred and ninety-eight

761,398

4. Write down each number in word form.

763,268 Seven hundred, sixty-three thousand, two hundred and sixty-eight

19,305 Nineteen thousand, three hundred and five

284,000 Two hundred and eighty-four thousand

738 Seven hundred and thirty-eight

5. Write down the value of the digit according to the specified place value.

397,523 (Thousands)	13,482 (10 Thousands)	87,125 (Tens)	361,590 (100 Thousands)
7,000	10000	20	300000

23,041 (Ones)	734,642 (Hundreds)	256,788 (100 Thousands)	529,763 (10 Thousands)
1	600	200000	20000

6. Circle the correct answers.

A The number that has a 4 in the 10-thousand place is:

578,879 43,201 982,884 86,109

B The number that has a 6 in the tens place is:

97,356 961,798 64,646 723,463

C The number that has 2 in the 100-thousand place is:

273,109 723,281 824,139 342,558

D The value of the digit 7 in 137,942 is:

700,000 7,000 700 70,000

7. Write down each number in expanded form.

A 468,375 = 400,000 + 60,000 + 8,000 + 300 + 70 + 5

B 65,080 = 60,000 + 5,000 + 000 + 80 + 0

C 45,125 = 40,000 + 5,000 + 100 + 20 + 5

D 108,942 = 100,000 + 0000 + 8,000 + 900 + 40 + 2

E 64,765 = 60,000 + 4,000 + 700 + 60 + 5

8. Use the digits 6, 7, 0, 5, 3, and 4 to answer the following questions:

A Write down the greatest possible number using all the digits above.

765,430

B Write down the smallest possible number using all the digits above.

34,567

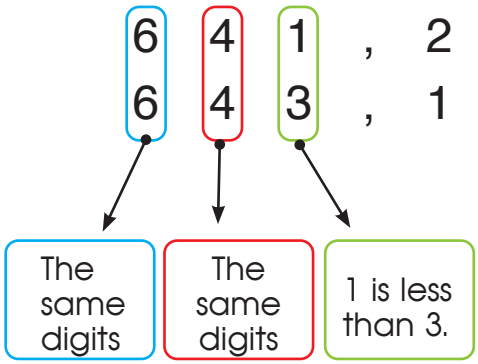
C Choose one of the numbers and write down its expanded form.

765,430→ Seven hundred, sixty-five thousand, four hundred and thirty

(1-2) Comparing Numbers

- **To compare 641,293 and 643,183, line up the numbers according to their place value, then start comparing them from the left.**

- **In this case, the digits in the 100-thousand and 10-thousand places are the same. Therefore, look at the thousands place. Since 1 thousand is smaller than 3 thousand, 641,293 is less than 643,183.**



>	<	=
greater than	less than	equal to

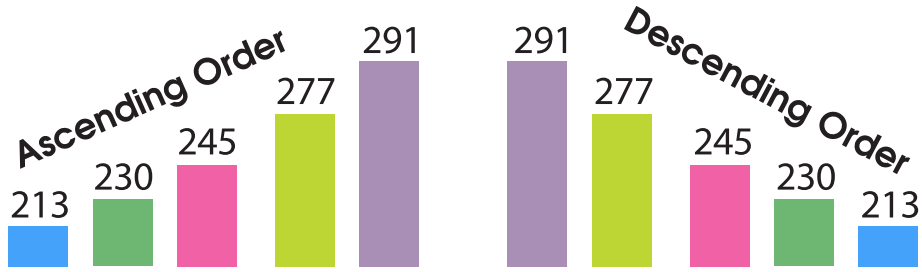
So,
641,293 < 643,183

641,293 is **less** than 643,183.

1. Write down the correct sign (>, <, or =).

A	69,295	>	49,876
B	534,672	>	354,672
C	67,867	<	96,759
D	341,555	>	41,555
E	76,871	=	76,871

Ascending and Descending Order



Ascending Order:

It is to write down the numbers from the smallest to the greatest.

213 230 245 277 291

Descending Order:

It is to write down the numbers from the greatest to the smallest.

291 277 245 230 213

1. Use these numbers to answer the following questions:

156,083	508,631	36,815	83,650

A The greatest number is: 508,631

B The smallest number is: 36,815

C The ascending order is:

36,815 83,650 156,083 508,631

D Write down the value of the digit 5 in each number according to its place.

156,083 50,000 508,631 500,000

36,815 5 83,650 50

2. Use these numbers to answer the following questions:

789,736	47,624	63,487	456,872

A The greatest number is: 786,736

B The smallest number is: 47,624

C The descending order is is:

789,736 456,872 63,487 47,624

D Write down the value of the digit 7 in each number according to its place.

7̲89,736 700,000 47̲,624 7,000

63,487̲ 7 456,87̲2 70

(1-3) Rounding Numbers

When you round a number, you bring it closer to its nearest value. It means cutting down on the number of significant digits while keeping the starting number's general size.

Example: To round 276,341 to the nearest 10 thousand, follow these steps:

Step 1 Identify the place value to which you are rounding.

Step 2 Examine the digit immediately to the right of this place value.

Step 3 If the digit is less than 5, leave the digit in the rounding place unchanged. If the digit is 5 or greater, add 1 to the digit in the rounding place.

Step 4 Change all the digits to the right of the rounding place to zeros.

1. Round each number to the underlined place value.

A 6,302 → 6,000

B 1,018 → 1,000

C 22,356 → 22,400

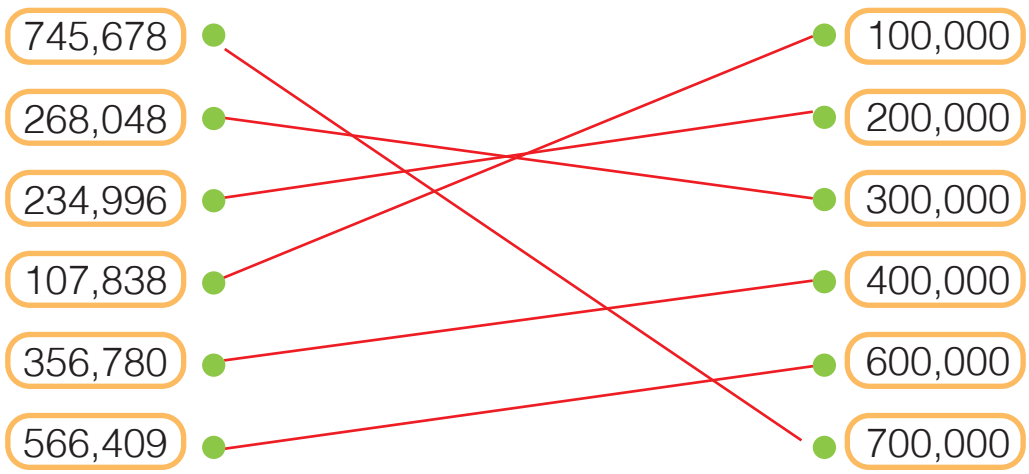
D 537,924 → 540,000

E 400,400 → 400,000

2. Round the numbers to the specified place value.

526,873 (The Nearest Ten)	54,385 (The Nearest Thousand)	642,977 (The Nearest 10 Thousand)
526,870	54,000	640,000
297,156 (The Nearest 100 Thousand)	2,975 (The Nearest Hundred)	878,045 (The Nearest Thousand)
300,000	3,000	878,000

3. Match each number to its nearest hundred thousand.



4. Round 330,648 to:

- The nearest **100,000**. 300,000
- The nearest **10,000**. 30,000
- The nearest **1000**. 1,000
- The nearest **100**. 600
- The nearest **10**. 50

5. Raneem is investigating the 5 longest rivers in the world. She searched on Wikipedia and made the following list:

River	Length
Nile River	6,650 km
Amazon River	6,400 km
Yangtze River	6,300 km
Mississippi River	6,270 km
Yenisei River	5,500 km

Raneem wants to simplify the lengths without changing the order of the list; what should she do?

Round to the nearest hundred.	Round to the nearest thousand.
6,700	7,000
6,400	6,000
6,300	6,000
6,300	6,000
5,500	6,000

She should round to the nearest hundreds.

(1-4) Addition

When performing addition, it's important to arrange the numbers according to their place value. Remember that if the sum is 10 or more, write down the ones digit and carry over the tens digit to the next column.

Add the ones.

```
   1
674,683
+294,348
      1
```

Add the tens.

```
  11
674,683
+294,348
     31
```

Add the hundreds.

```
  111
674,683  ← addend
+294,348 ← addend
,031     ← sum
```

Add the thousands.

```
  111
674,683
+294,348
 9,031
```

Add the 10 thousands.

```
 1 111
674,683
+294,348
 69,031
```

Add the 100 thousands.

```
 1 111
674,683
+294,348
969,031
```

1. Add.

```
 827,353
+ 42,646
 869,999
```

```
  11 1
 878,065
+ 39,863
 917,928
```

```
 535,142
+313,534
 848,676
```

```
  11
 1,473
+ 6,239
   7,712
```

```
 1111
877,546
+ 25,982
 903,528
```

```
 1  11
365,479
+ 41,078
 406,557
```

To find the horizontal addition, arrange the numbers vertically according to their place value, then add.

2. Add.

678,362 + 279,340 =	362,682 + 38,298 =	36,934 + 246,208 =
1 1 1 678,362 + 279,340 957,702	1 1 1 1 362,682 + 38,298 400,980	1 1 1 36,934 + 246,208 283,142
141,680 + 124 =	**567,778 + 1,002 =**	**432,872 + 425,298 =**
1 141,680 + 124 141,804	1 567,778 + 1,002 568,780	1 1 1 432,872 + 425,298 858,170

3. Circle the answer that is the closest to each sum, and then explain.

A **375,895 + 37,564 =**

a) 450,000 b) 420,000 c) 400,000

375,895
+ 37,564
413,459

B **75,568 + 265,348 =**

a) 300,000 b) 350,000 c) 400,000

1 1 1
1 75,568
+ 265,348
340,916

C **786,578 + 43,876 =**

a) 800,000 b) 880,000 c) 900,000

1 1 1 1 1
786,578
+ 43,876
830,454

D **135,588 + 784,456 =**

a) 900,000 b) 950,000 c) 800,000

1 1 1 1 1
135,588
+ 784,456
920,044

4. Add.

111 2	222 1	2111
533,050	398,823	508,890
24,366	55,841	35,846
+ 67,891	+ 168,919	+ 38,019
625,307	623,583	582,755

Your Work

A **Round each number to the nearest hundred, then find their sum.**

610,283 + 947 + 35,718 =
610,300 + 900 + 35,700 = 646,900

Students' own answers

B **Find two 6-digit numbers with the sum 487,210.**

e.g., 200,000 + 287,210 = 487,210

(1-5) Subtraction

When performing subtraction, it's important to arrange the numbers according to their place value. Remember that when the digit in the minuend is smaller than the corresponding digit in the subtrahend, you need to borrow from the next higher place value and adjust accordingly.

Subtract the ones.	Subtract the tens.	Subtract the hundreds.
702,714 - 349,673 1	6 11 702,714 - 349,673 41	6 11 702,714 - 349,673 ,041
Subtract the thousands.	**Subtract the 10 thousands.**	**Subtract the 100 thousands.**
6 9 12 6 11 702,714 - 349,673 3,041	6 9 12 6 11 702,714 - 349,673 53,041	6 9 12 6 11 702,714 - 349,673 353,041

702,714 ← minuend

- 349,673 ← subtrahend

353,041 ← difference

To check your answer, reverse the subtraction operation with addition.

1 1 1
349,673
+ 353,041
702,714

1. Subtract.

6 13 7 13 873,983 - 645,827 228,156	11 17 17 2 1 7 7 13 632,883 - 525,986 106,897	10 11 10 4 0 1 0 10 951,210 - 411,392 539,818
14 4 10 4 4 13 750,553 - 45,467 705,086	8 17 1 10 429,720 - 421,912 7,808	11 12 5 1 2 13 762,334 - 3,574 758,760

2. Subtract, then check.

8 10 490,672 - 354,361 136,311	1 136,311 + 354,361 490,672

To find the horizontal subtraction, arrange the numbers vertically according to their place value, then subtract.

3. Subtract.

A 783,587- 488,873 =

17 12
6 7 2 15
783,587
- 488,873
294,714

B 363,742 - 98,134 =

15
2 5 13 3 12
363,742
- 98,134
265,608

4. Add or subtract.

$$\begin{array}{r} {\scriptstyle 1\ 1\ \ \ } \\ 8{,}289 \\ +\ \ 7{,}146 \\ \hline 15{,}435 \end{array}$$

$$\begin{array}{r} {\scriptstyle \ \ 17\ } \\ {\scriptstyle 8\not{7}15\ } \\ 48{,}\not{9}\not{8}5 \\ -\ \ 23{,}897 \\ \hline 25{,}088 \end{array}$$

$$\begin{array}{r} {\scriptstyle 16\ 10\ \ } \\ {\scriptstyle 8\ \not{6}\not{0}16\ } \\ \not{9}{,}7\not{1}\not{6} \\ -\ \ 4{,}948 \\ \hline 4{,}768 \end{array}$$

$$\begin{array}{r} {\scriptstyle \ \ 10\ \ } \\ {\scriptstyle 1\not{0}14\ } \\ 942{,}\not{1}\not{4}6 \\ -\ \ 401{,}264 \\ \hline 540{,}882 \end{array}$$

$$\begin{array}{r} {\scriptstyle \ \ 1\ \ } \\ 457{,}653 \\ +\ \ 137{,}246 \\ \hline 594{,}899 \end{array}$$

$$\begin{array}{r} {\scriptstyle 1\ 1\ \ \ 1\ } \\ 57{,}638 \\ +\ \ 28{,}419 \\ \hline 86{,}057 \end{array}$$

$$\begin{array}{r} {\scriptstyle 1\ 1\ \ 1\ } \\ 29{,}834 \\ +\ \ 13{,}975 \\ \hline 43{,}809 \end{array}$$

$$\begin{array}{r} {\scriptstyle \ \ 15\ \ \ \ \ } \\ {\scriptstyle 6\not{5}17\ \ 7\,13\ } \\ \not{1}6\not{7}{,}5\not{8}\not{3} \\ -\ \ 78{,}367 \\ \hline 89{,}216 \end{array}$$

Your Work

1. Find two 6-digit numbers with a difference of 112,346.

Students' own answers

e.g., 886,512 - 774,166 = 112,346

(1-6) Problem Solving

1. **Al Bireh is a recycling center where people can take plastic, glass, and paper to be recycled. Look at the table below and find out how many kilograms the total of all materials together that Al Bireh was able to collect at the end of the year is.**

78,975 + 187,951 + 56,162 = 323,088

Material	Kilograms for Recycling
Plastic	78,975
Glass	187,951
Paper	56,162
Total	323,088

2. **Mariam has a bank account with a total of 36,086 JD. She withdrew 15,347 JD to pay for a new car. How much money does she have now in her bank account?**

36,086 - 15,347 = 20,739 JD

3. A school has 11,478 students. If there are 1,259 students in the fourth grade, approximately how many students are in the other grades? 11,478 - 1,259 = 10,219

4. Anas, Ayman, and Emad traveled to Japan to participate in a marathon.
The total distance of the marathon was 100,000 meters. Anas got tired and stopped running at the 67,800-meter mark. Ayman wasn't able to continue past the 76,950-meter mark, and Emad crossed the finish line.

Who was closer to the finish line, Anas or Ayman?

100,000 - 67,800 = 32,200 m / 100,000 - 76,950 = 23,050

23,050 < 32,200

5. Samir wants to buy a new car and has a budget of 23,200 JD. He likes two cars: one white, which costs 23,187 JD, and one blue, which costs 23,987 JD.
Which car will Samir buy?
Why do you think he will choose that car over the other one? 23,187 < 23,200

23,187 JD

23,987 JD

Show Your Turn

1. Use the digits 0, 8, 1, 7, 3, and 5 to answer the following questions:

A Write down two 6-digit numbers without repeated digits.

875,310 578,130

B What is the place value of 8 in each number?

800,000 8,000

C Which number is the greatest?

875,310

D Write down one of the numbers in expanded form.

875,310 → 800,000 + 70,000 + 5,000 + 300 + 10 + 0

2. Round out the numbers in the table below.

Number	Round to the nearest thousand.	Round to the nearest hundred.
743,832	744,000	743,800
308,176	308,000	308,200
39,850	40,000	39,900

3. Write down the value of each underlined digit.

A 6<u>5</u>1,683 = 50,000

B <u>3</u>64,477 = 300,000

C 10,9<u>7</u>2 = 900

D 1,54<u>3</u> = 40

4. Arrange in ascending order.

532,736	987,418	73,677	522,948

73,677 / 522,948 / 532,736 / 987,418

5. Put each expanded form in the correct order, then find the sum.

A 40,000 + 9 + 700,000 + 2,000 + 50 =

700,000 + 40,000 + 2,000 + 50 + 9 = 742,059

B 2,000 + 30 + 90,000 + 500,000 + 500 + 7 =

500,000 + 90,000 + 2000 + 500 + 30 + 7 = 592,537

6. Write down each number in expanded form.

A 789,344 = 700,000 + 80,000 + 9,000 + 300 + 40 + 4

B 98,665 = 90,000 + 8,000 + 600 + 60 + 5

C 654,909 = 600,000 + 50,000 + 4,000 + 900 + 00 + 9

Unit 2

Multiplication and Division

Vocabulary

- multiplication
- repeated addition
- multiplicand
- multiplier
- product
- division
- dividend
- divisor
- quotient
- remainder
- factors
- factor tree
- prime factors
- multiples of a number

Objectives

Upon completion of this unit, you will be able to:

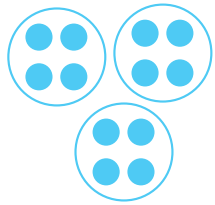
- Multiply 2-digit numbers by 1-digit numbers without regrouping.
- Multiply 2-digit numbers by 1-digit numbers with regrouping.
- Multiply 3-digit numbers by 1-digit numbers.
- Multiply 2-digit numbers by 2-digit numbers.
- Apply the partial products' method.
- Utilize the multiplication table to find multiplication and division answers.
- Divide up to 3-digit numbers by 1-digit numbers.
- Solve division patterns with zeros.
- Solve multiplication and division problems in given contexts.
- Identify factors and multiples.

(2-1) Multiplication

Multiplication is a repeated addition. For example, 3 multiplied by 4 means adding 3 groups of 4 together.

3 × 4 = 4 + 4 + 4 = 12

(3 times 4 equals 12.)



(3 Groups of 4)

The Multiplication Table

You can learn multiplication facts by practicing with the multiplication table.

(multiplicand)	Locate the 6th row.
(multiplier)	Locate the 7th column.
(product)	The product is where the 6th row and the 7th column meet.

$$\begin{array}{r} 6 \\ \times 7 \\ \hline 42 \end{array}$$

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

1. Multiply.

4 × 6 = 24	9 × 3 = 27	6 × 6 = 36	7 × 5 = 35	10 × 2 = 20	8 × 4 = 32	5 × 8 = 40

Multiplication of 2-Digit Numbers by 1-Digit Numbers (without Regrouping)

$34 \times 2 =$

Step 1

Arrange digits in columns according to the place value.

$$\begin{array}{r} 3\ 4 \\ \times\ \ 2 \\ \hline \end{array}$$

Step 2

Multiply the ones digit of 34 (which is 4) by 2.
(2 x 4 = 8)

Write down 8.

$$\begin{array}{r} 3\ 4 \\ \times\ \ 2 \\ \hline 8 \end{array}$$

Step 3

Multiply the tens digit of 34 (which is 3) by 2.
(2 x 3 = 6)

Write down 6.

So, $34 \times 2 = 68$.

$$\begin{array}{r} 3\ 4 \\ \times\ \ 2 \\ \hline 6\ 8 \end{array}$$

1. Multiply.

$$\begin{array}{r} 69 \\ \times\ \ 1 \\ \hline 69 \end{array} \qquad \begin{array}{r} 22 \\ \times\ \ 2 \\ \hline 44 \end{array} \qquad \begin{array}{r} 11 \\ \times\ \ 5 \\ \hline 55 \end{array} \qquad \begin{array}{r} 31 \\ \times\ \ 3 \\ \hline 93 \end{array}$$

$$\begin{array}{r} 10 \\ \times\ \ 4 \\ \hline 40 \end{array} \qquad \begin{array}{r} 23 \\ \times\ \ 2 \\ \hline 46 \end{array} \qquad \begin{array}{r} 21 \\ \times\ \ 4 \\ \hline 84 \end{array} \qquad \begin{array}{r} 20 \\ \times\ \ 3 \\ \hline 60 \end{array}$$

(2-2) Multiplication of 2-Digit Numbers by 1-Digit Numbers (with Regrouping)

43 × 6 =

Step 1

Arrange digits in columns according to the place value.

$$\begin{array}{r} 43 \\ \times\ 6 \\ \hline \end{array}$$

Step 2

Multiply the ones digit of 43 (which is 3) by 6.
(6 × 3 = 18)
Write down 8 and carry over 1 to the tens place.

$$\begin{array}{r} \overset{1}{} \\ 43 \\ \times\ 6 \\ \hline 8 \end{array}$$

Step 3

Multiply the tens digit of 43 (which is 4) by 6, and add the carried-over 1.
(6 × 4 = 24
24 + 1 = 25)
Write down 25.
So, 43 × 6 = 258.

$$\begin{array}{r} \overset{1}{} \\ 43 \\ \times\ 6 \\ \hline 258 \end{array}$$

1. Multiply.

$$\begin{array}{r} \overset{5}{} \\ 37 \\ \times\ 8 \\ \hline 296 \end{array}$$

$$\begin{array}{r} \overset{2}{} \\ 58 \\ \times\ 3 \\ \hline 174 \end{array}$$

$$\begin{array}{r} \overset{1}{} \\ 54 \\ \times\ 4 \\ \hline 216 \end{array}$$

$$\begin{array}{r} \overset{1}{} \\ 72 \\ \times\ 6 \\ \hline 432 \end{array}$$

$$\begin{array}{r} \overset{1}{} \\ 93 \\ \times\ 6 \\ \hline 558 \end{array}$$

$$\begin{array}{r} \overset{2}{} \\ 85 \\ \times\ 5 \\ \hline 425 \end{array}$$

(2-3) Multiplication of 3-Digit Numbers by 1-Digit Numbers

538 × 4 =

Step 1

Arrange digits in columns according to the place value.

```
 5 3 8
×    4
-------
```

Step 2

Multiply the ones digit of 538 (which is 8) by 4.
(8 × 4 = 32)
Write down 2 and carry over 3 to the tens place.

```
   (3)
 5 3 8
×    4
-------
       2
```

Step 3

Multiply the tens digit of 538 (which is 3) by 4, and add the carried-over 3.
(3 × 4 = 12
12 + 3 = 15)
Write down 5 and carry over 1 to the hundreds place.

```
  (1)(3)
 5 3 8
×    4
-------
    5 2
```

Step 4

Multiply the hundreds digit of 538 (which is 5) by 4, and add the carried-over 1.
(5 × 4 = 20
20 + 1 = 21)
Write down 21.

```
  (1)(3)
 5 3 8
×    4
-------
 2 1 5 2
```

So, 538 × 4 = 2152.

1. Multiply.

```
  3 1
  2 7 3
×     5
-------
 1 3 6 5
```

```
  2 3
  2 3 4
×     8
-------
 1 8 7 2
```

```
  1
  5 8 0
×     2
-------
 1 1 6 0
```

```
    3 0 0
×       4
---------
 1 2 0 0
```

```
  2 1
  7 3 2
×     9
-------
 6 5 8 8
```

```
    8 0 1
×       4
---------
 3 2 0 4
```

2. Fill in the missing numbers.

$$\begin{array}{r} 19 \\ \times\ \boxed{7} \\ \hline 133 \end{array}$$

$$\begin{array}{r} 44 \\ \times\ \boxed{4} \\ \hline 176 \end{array}$$

$$\begin{array}{r} 32 \\ \times\ \boxed{6} \\ \hline 192 \end{array}$$

$$\begin{array}{r} 40 \\ \times\ \boxed{5} \\ \hline 200 \end{array}$$

$$\begin{array}{r} \boxed{3}5 \\ \times\ \ 6 \\ \hline 210 \end{array}$$

$$\begin{array}{r} \boxed{5}2 \\ \times\ \ 4 \\ \hline 208 \end{array}$$

$$\begin{array}{r} 2\boxed{9} \\ \times\ \ 4 \\ \hline 116 \end{array}$$

$$\begin{array}{r} 2\boxed{0} \\ \times\ \ 9 \\ \hline 180 \end{array}$$

(2-4) Multiplication of 2-Digit Numbers by 2-Digit Numbers

$54 \times 23 =$

Step 1

Arrange digits in columns according to the place value.

$$\begin{array}{r} 54 \\ \times\ 23 \\ \hline \end{array}$$

Step 2

Multiply the ones digit of 54 (which is 4) by 3.
$(3 \times 4 = 12)$
Write down 2 and carry over 1 to the tens place.

$$\begin{array}{r} \overset{1}{} \\ 54 \\ \times\ 23 \\ \hline 2 \end{array}$$

Step 3

Multiply the tens digit of 54 (which is 5) by 3, and add the carried-over 1.
$(3 \times 5 = 15$
$15 + 1 = 16)$
Write down 16.

$$\begin{array}{r} \overset{1}{} \\ 54 \\ \times\ 23 \\ \hline 162 \end{array}$$

Step 4

Write down a 0 because the 2 is in the tens place.
Multiply the ones digit of 54 (which is 4) by 2.
$(2 \times 4 = 8)$
Write down 8.

$$\begin{array}{r} \overset{1}{} \\ 54 \\ \times\ 23 \\ \hline 162 \\ 80 \end{array}$$

Step 5

Multiply the tens digit of 54 (which is 5) by 2.
$(2 \times 5 = 10)$
Write down 10.

$$\begin{array}{r} \overset{1}{} \\ 54 \\ \times\ 23 \\ \hline 162 \\ 1080 \end{array}$$

Step 6

Add the partial products.

$$\begin{array}{r} \boxed{1} \\ 162 \\ +1080 \\ \hline 1242 \end{array}$$

$$\begin{array}{r} \overset{1}{} \\ 54 \\ \times\ 23 \\ \hline 162 \\ +\ 1080 \\ \hline 1242 \end{array}$$

So, $54 \times 23 = 1242$

1. Multiply.

$$\begin{array}{r} 43 \\ \times\ 21 \\ \hline 43 \\ +\ 860 \\ \hline 903 \end{array}$$

$$\begin{array}{r} 41 \\ \times\ 33 \\ \hline 123 \\ +1230 \\ \hline 1353 \end{array}$$

$$\begin{array}{r} \overset{4}{\cancel{3}} \\ 89 \\ \times\ 54 \\ \hline 356 \\ +4450 \\ \hline 4806 \end{array}$$

The Partial Products' Method

Find

$$\begin{array}{r} 54 \\ \times\ 23 \\ \hline \end{array}$$

Step 1 Multiply each digit, considering its place value, one at a time to get the partial products.

Step 2 List all the partial products.

Step 3 Add all the partial products together.

$$\begin{array}{rl} 54 & \\ \times\ 23 & \\ \hline 12 & \rightarrow 3 \times 4 = 12 \\ 150 & \rightarrow 3 \times 50 = 150 \\ +\ 80 & \rightarrow 20 \times 4 = 80 \\ 1000 & \rightarrow 20 \times 50 = 1000 \\ \hline 1242 & \end{array}$$

1. Multiply using the partial products' method.

$$\begin{array}{rl} 65 & \\ \times 34 & \\ \hline 20 & 4 \times 5 \\ 240 & 4 \times 60 \\ 150 & 30 \times 5 \\ +\ 1800 & 30 \times 60 \\ \hline 2210 & \end{array} \qquad \begin{array}{rl} 26 & \\ \times 37 & \\ \hline 42 & 7 \times 6 \\ 140 & 7 \times 20 \\ 180 & 30 \times 6 \\ +\ 600 & 30 \times 20 \\ \hline 962 & \end{array}$$

$$\begin{array}{rl} 52 & \\ \times 64 & \\ \hline 8 & 4 \times 2 \\ 200 & 4 \times 50 \\ 120 & 60 \times 2 \\ +\ 3000 & 60 \times 50 \\ \hline 3328 & \end{array} \qquad \begin{array}{rl} 53 & \\ \times 72 & \\ \hline 6 & 2 \times 3 \\ 100 & 2 \times 50 \\ 210 & 70 \times 3 \\ +\ 3500 & 70 \times 50 \\ \hline 3816 & \end{array}$$

Your Work

Students' own answers

1. Choose one of the numbers below and multiply.

657 × 98	537 × 35	245 × 29	943 × 48

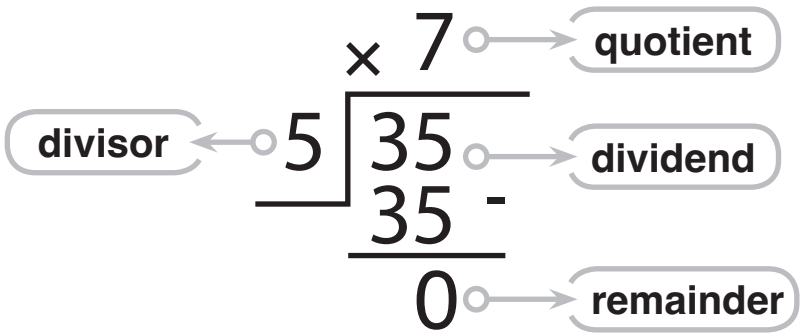
e.g., 245 x 29 = 7,105

(2-5) Division

Division is the opposite of multiplication.

- Since 3 × 6 = 18, then 18 ÷ 3 = 6 and 18 ÷ 6 = 3.
- Since 4 × 7 = 28, then 28 ÷ 4 = 7 and 28 ÷ 7 = 4.

The Multiplication Table



x	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

You can use the multiplication table to find the division problem's quotient and divisor.

1. On the multiplication table, locate the dividend, which is 35.
2. The divisor is the heading of the row where 35 is located, which is 5.
3. The quotient is the heading of the column where 35 is located, which is 7.

1. Fill in the missing numbers.

A $3 \times 6 = 18$, $3 \times 6 = 18$, $18 \div 3 = 6$, $18 \div 3 = 6$

B $7 \times \_6\_ = 42$, $\_7\_ \times 6 = 42$, $42 \div 7 = \_6\_$, $\_42\_ \div 7 = 6$

C $\_5\_ \times 9 = 45$, $5 \times \_9\_ = 45$, $45 \div \_5\_ = 9$, $45 \div 5 = \_9\_$

2. Use the multiplication table to find the answers, then write down the inverse operation.

$3 \overline{)27}$ x 9	Inverse Operation →	3 × 9 = 27
$8 \overline{)32}$ x 4		8 × 4 = 32
$4 \overline{)24}$ x 6		4 × 6 = 24
$7 \overline{)63}$ x 9		7 × 9 = 63
$9 \overline{)72}$ x 8		9 × 8 = 72

Divisibility

A number is divisible by another number if the remainder of the division is 0. If the remainder is not 0, then the number is not divisible.

39 ÷ 7 =

Step 1

39 is not divisible by 7 exactly; find out how many times 7 can fit into 39 without exceeding it.
7 × 5 = 35 and 7 × 6 = 42.
7 fits into 39 approximately five times, as 35 is the largest number that can fit into 39 without exceeding it.
Write down 5 as a quotient.

$7 \overline{)39}$ x 5

Step 2

Multiply the divisor (7) by the quotient digit (5), which equals 35.
Write down 35.

```
   x5
 7)39
 -35
```

Step 3

Subtract 35 from 39, which leaves a remainder of 4. So, 39 ÷ 7 = 5 r4.

```
   x5
 7)39
 -35
  4   ← remainder
```

1. Divide.

```
   x6
 3)20
 -18
   2
```

```
   x9
 4)37
 -36
   1
```

```
   x9
 6)54
 -54
   0
```

```
   x3
 7)22
 -21
   1
```

```
   x6
 8)52
 -48
   4
```

```
   x9
 9)81
 -81
   0
```

Your Work

A How many times can 7 fit into 45? 6

B How many times can 5 fit into 36? 7

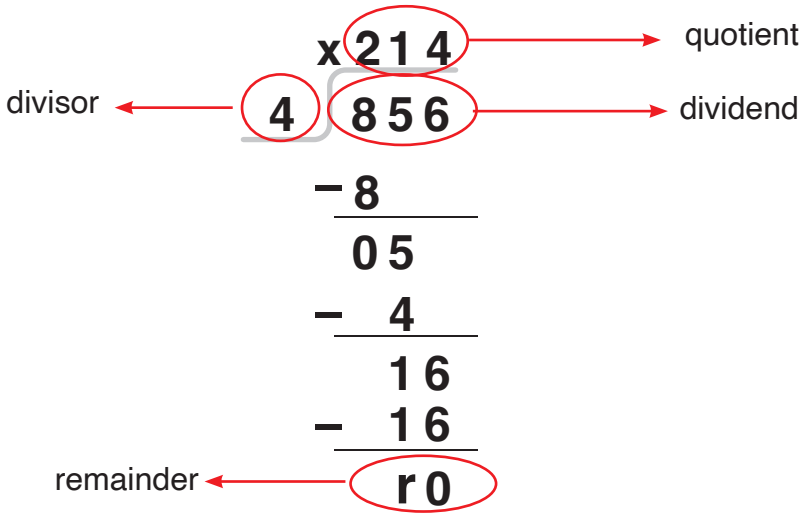
A

```
   x 6
 7)45
 -42
   3
```

B

```
   x 7
 5)36
 -35
   1
```

(2-6) Division up to 3-Digit Numbers by 1-Digit Numbers



Step 1 Look at the first digit of 856, which is 8. 8 divided by 4 is 2. Write down 2 above the division bracket.

Step 2 Multiply 2 by 4, which equals 8. Subtract 8 from 8, leaving a remainder of 0. Bring down the next digit, 5.

Step 3 Now, divide 5 by 4. It goes 1 time. Write down 1 above the division bracket.

Step 4 Multiply 1 by 4, which equals 4. Subtract 4 from 5, leaving a remainder of 1.

Step 5 Bring down the last digit, 6, making it 16.

Step 6 Divide 16 by 4. It goes 4 times. Write down 4 above the division bracket.

Step 7 Multiply 4 by 4, which equals 16. Subtract 16 from 16, leaving a remainder of 0.

The quotient is 214, with no remainder. Therefore, 856 ÷ 4 = 214.

1. Fill in the missing numbers.

	x	1	8
5	9	2	
-	5		
	4	2	
-	4	0	
	r	2	

	x	2	5
2	5	1	
-	4		
	1	1	
-	1	0	
	r	1	

Division Patterns with Zeros

When there are zeros at the end of the dividend, you can simplify the division by following these steps:

Step 1 Identify the non-zero digits. In this example, the non-zero digits are 9 and 3.

900 ÷ 3 = 300

Step 2 Divide the non-zero digits. Divide 9 by 3.
(9 ÷ 3 = 3)

Step 3 Add the zeros. Since 900 has two zeros, add them to the result of the division of non-zero digits.
(9 ÷ 3 = 300)

1. Divide.

160 ÷ 4 = 40

12,000 ÷ 3 = 4,000

630,000 ÷ 7 = 90,000

25,000 ÷ 5 = 5,000

2. Divide.

```
  X302
3 908
  - 9
    00
  - 00
    08
  -  6
     r 2
```

```
  X112
6 674
  - 6
    07
  - 6
    14
  - 12
     r 2
```

```
  X116
7 816
  - 7
    11
  - 7
    46
  - 42
     r 4
```

```
  X87
9 785
  - 72
    65
  - 63
     2
```

Your Work

1. Divide. 26000 ÷ 2 = 13,000

2. Write down a 3-digit number that can be divided by 6 with no remainder, and then complete the long division.

```
    x  56
  ------
6 | 336
  - 30
  ----
    36
  - 36
  ----
     0
```

3. Divide, then identify the pattern.

A 100 ÷ 5 = 20

B 1,000 ÷ 50 = 20

C 10,000 ÷ 500 = 20

D 100,000 ÷ 5,000 = 20

The pattern is to remove the zeros from the end of both the divisor and the dividend.

(2-7) Understanding Factors and Multiples

Factors

Factors are numbers that you can multiply to get a product. We can visually represent them in a diagram known as a factor tree.

Step 1 Write down 45 at the top of the factor tree.

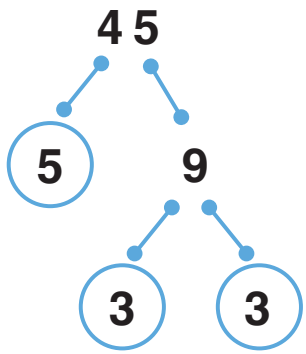
Step 2 Think of two numbers that multiply together to give 45. In this example, 5 × 9 = 45.

Step 3 Break down 9 further into 3 × 3.

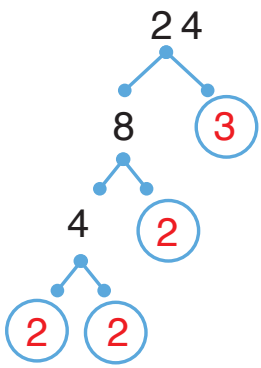
Step 4 Write down down all the prime factors. A prime factor has only two factors: 1 and itself. The prime factors of 45 are 5, 3, and 3.

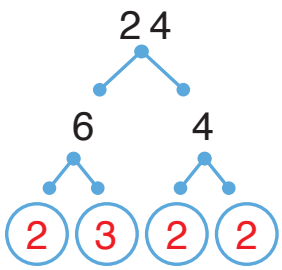
Step 5 Check by multiplying the prime factors. (5 × 3 × 3 = 45)

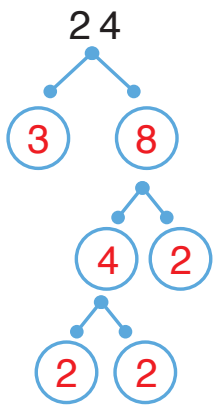
The Factor Tree



1. Complete the factor trees for the number 24.







Multiples

A multiple of a number is the result of multiplying that number by a whole number. Therefore, multiples of a number follow a pattern of skip counting.

To find the first five multiples of 7, multiply 7 by each whole number from 1 to 5.

$1 \times 7 = 7$ $2 \times 7 = 14$ $3 \times 7 = 21$ $4 \times 7 = 28$ $5 \times 7 = 35$

The first five multiples of 7 are 7, 14, 21, 28, and 35.

1. Circle the numbers that are multiples of 4.

1 (4) (8) 14 (16) 21 (24)

2. Circle the numbers that are multiples of 8.

38 (40) 45 49 (64) (72) 81

3. Find five multiples of 6.

6,12,18, 24, 30

Your Work

1. Are multiples of 4 always even? Explain.

Yes, multiples of 4 are always even because they result from multiplying an even number by any integer.

2. Are multiples of 3 always odd? Explain.

No, multiples of 3 can be either odd or even since multiplying 3 by odd or even numbers gives different results.

(2-8) Problem Solving

1. Joud has 23 apples in a basket. Aya has 3 times more apples than Joud. How many apples does Aya have?

   23 x 3 = 69

2. Zein planted 20 rows of cabbage in her yard. In each row, there are 12 plants. How many cabbage plants has she planted?

   20 x 12 = 240

3. Ruba bought 126 handbags to sell at her stores. She owns 3 stores. How many bags will each store get equally?

   126 ÷ 3 = 42

4. Omar wants to pack 63 books in 9 boxes. How many books should he put inside each box so that each one has the same number of books?

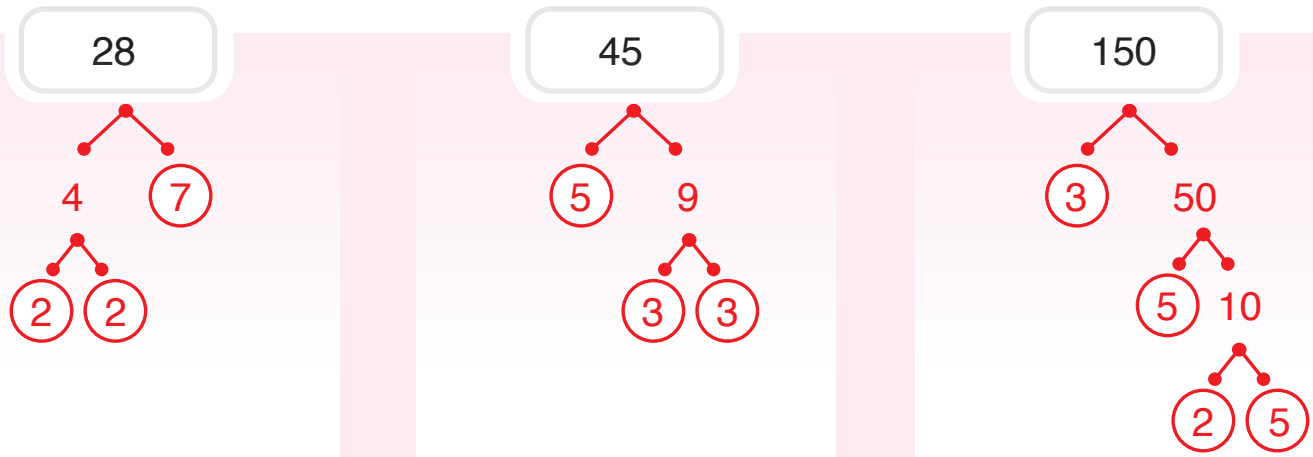
   63 ÷ 9 = 7

Show Your Turn

1. Multiply.

7 29 × 8 232	2 34 × 5 170	14 427 × 6 2562	2 408 × 3 1224
3 69 × 40 0 +2760 2760	1 ~~4~~ 87 × 27 609 +1740 2349	61 × 31 61 +1830 1891	1 ~~1~~ 72 × 68 576 +4320 4896

2. Find the factors of each number.

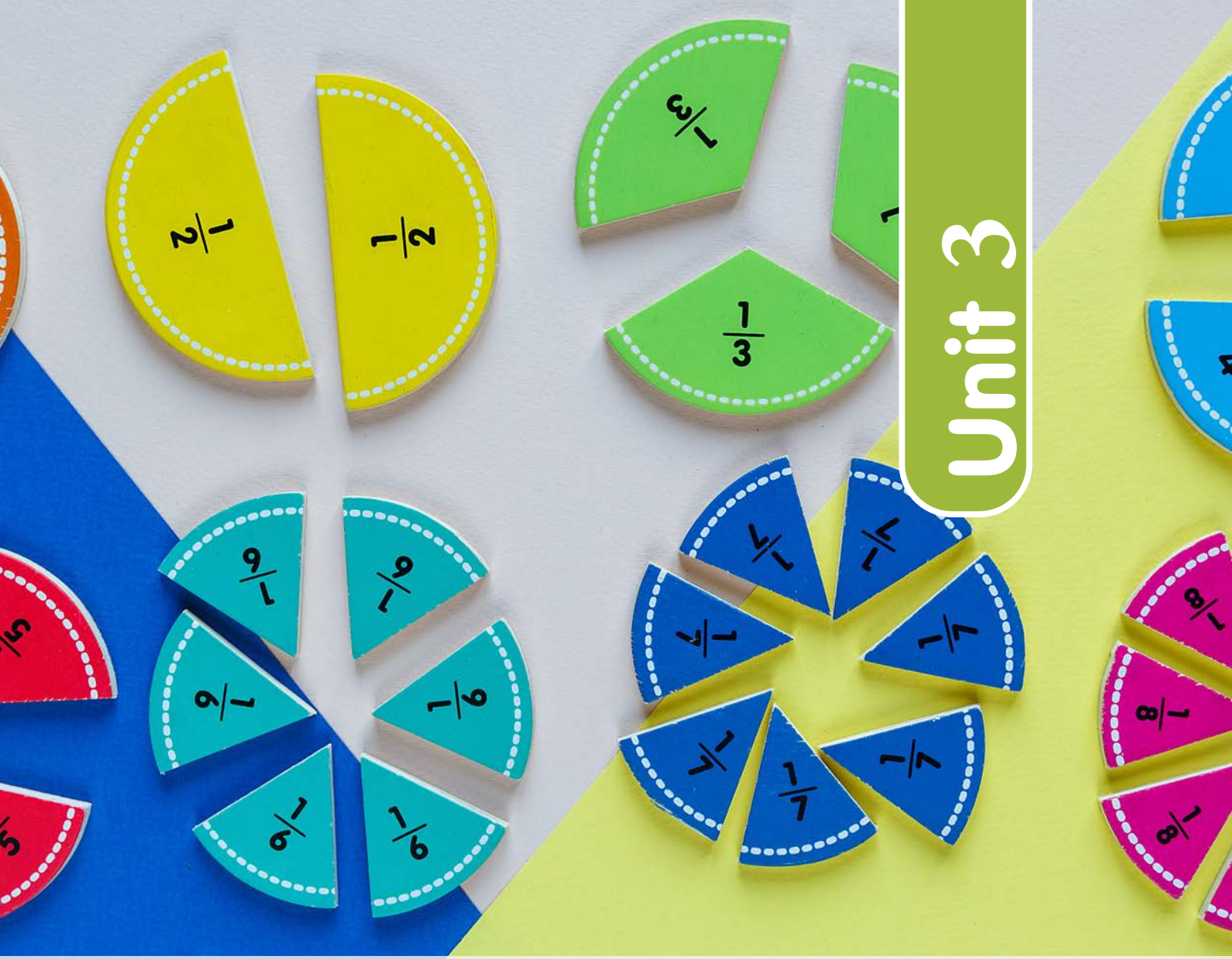


3. Fill in the missing numbers.

x 4 9 6) 2 9 6 - 2 4 5 6 - 5 4 r 2	x 5 0 9) 4 5 8 - 4 5 0 8 - 0 r 8
x 3 9 4) 1 5 9 - 1 2 3 9 - 3 6 r 3	x 8 1 8) 6 5 4 - 6 4 1 4 - 8 r 6

4. Sammy earns 540 JD each month. How much money will he have in 6 months?

540 x 6 = 3,240



Unit 3

Fractions

Vocabulary

- fractions
- numerator
- denominator
- equivalent fractions
- simple fraction
- simplest form

Objectives

Upon completion of this unit, you will be able to:

- Identify the numerator and denominator of a fraction.
- Represent the fraction as part of a whole or part of a set.
- Identify simple fractions.
- Determine whether two fractions are equivalent.
- Compare fractions.
- Add or subtract fractions.

(3-1) Equivalent Fractions

A fraction is a part of a whole when we divide the whole into equal parts.

$\frac{2}{5}$

$\frac{2}{5}$ → numerator (parts shaded of the whole)

$\frac{2}{5}$ → denominator (total parts of the whole)

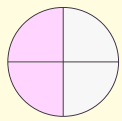
A fraction can also be a part of a set.

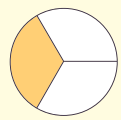
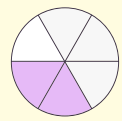
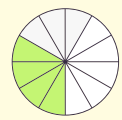
$\frac{3}{8}$

$\frac{3}{8}$ → numerator (parts shaded of the set)

$\frac{3}{8}$ → denominator (total parts of the set)

Equivalent fractions are fractions that have the same value even though they look different.

$\frac{1}{2}$	$\frac{2}{4}$	$\frac{4}{8}$
		

$\frac{1}{3}$	$\frac{2}{6}$	$\frac{4}{12}$
		

- To find the equivalent fractions:

A $\frac{1}{2} \overset{\times 2}{=} \frac{2}{4}$ ($\times 2$ above and below)

Multiply the numerator and the denominator by the same number.

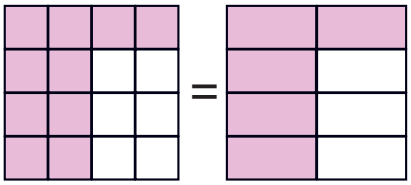
B $\frac{4}{12} \overset{\div 2}{=} \frac{2}{6} \overset{\div 2}{=} \frac{1}{3}$ ($\div 2$ above and below)

Divide the numerator and the denominator by the same number.

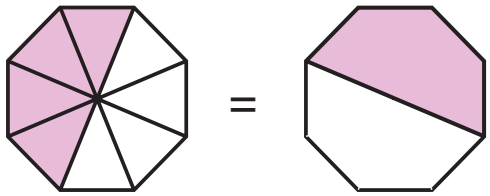
Note that $\frac{1}{2}$ and $\frac{1}{3}$ are in their simplest forms. A fraction is in its simplest form when the numerator and the denominator cannot be divided by any number other than 1.

1. Find the equivalent fractions and shade each shape accordingly.

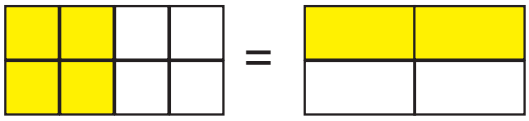
$\frac{10}{16} = \frac{5}{8}$



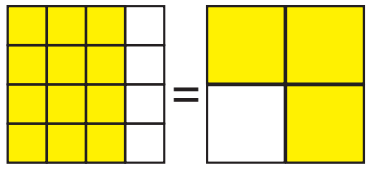
$\frac{4}{8} = \frac{\boxed{1}}{2}$



$\frac{4}{8} = \frac{2}{\boxed{4}}$



$\frac{12}{16} = \frac{3}{\boxed{4}}$



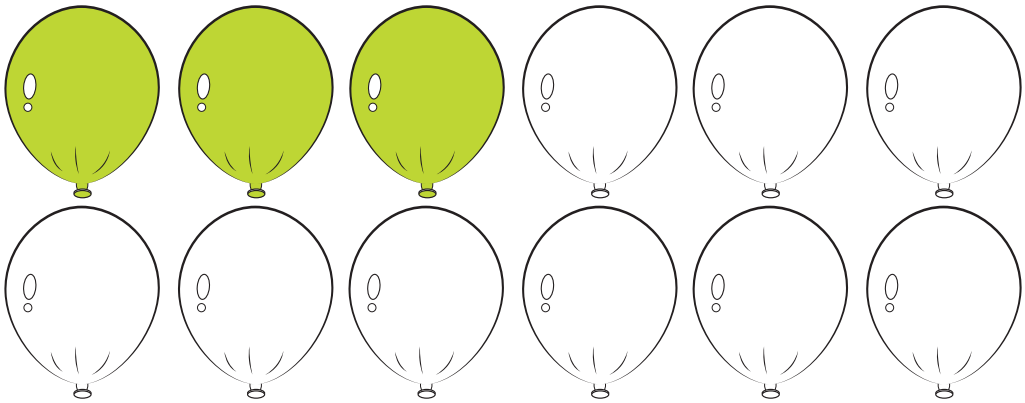
2. Complete the equivalent fractions.

$\frac{1}{2} = \frac{3}{6}$ $\frac{1}{4} = \frac{2}{8}$ $\frac{2}{3} = \frac{4}{6}$

$\frac{9}{12} = \frac{3}{4}$ $\frac{10}{12} = \frac{5}{6}$ $\frac{3}{6} = \frac{1}{2}$

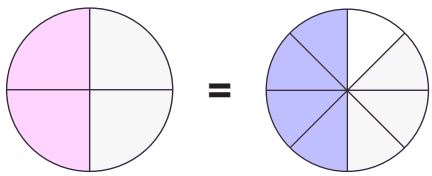
3. Look at the balloons, and color $\frac{1}{4}$ of them red.

How many should you color? 3 ($\frac{1}{4} = \frac{3}{12}$)

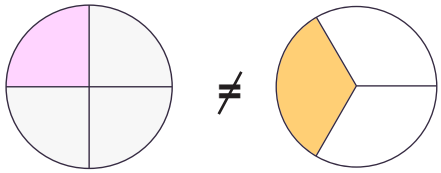


4. Draw a model of two equivalent fractions and another of two non-equivalent fractions.

Equivalent Fractions



Non-equivalent Fractions

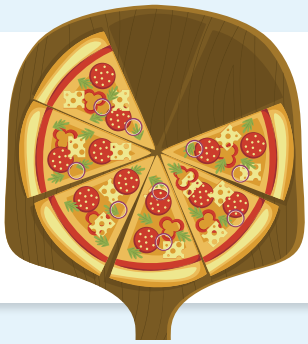


(3-2) Comparing Fractions

Comparing Fractions with Like Denominators

To compare fractions with like denominators, simply compare the numerators.

Marwa ate $\frac{2}{8}$ of a pizza.



Sarah ate $\frac{4}{8}$ of a pizza.

Who ate the most slices?

$\frac{2}{8}$ $\frac{4}{8}$ → **Sarah ate the most.**

1. Write down the correct sign (>, <, or =).

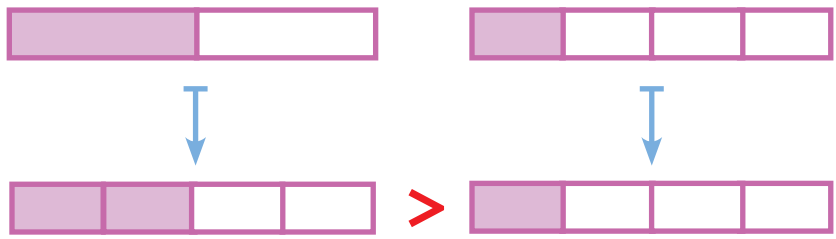
$\frac{3}{4} > \frac{1}{4}$	$\frac{5}{8} < \frac{7}{8}$	$\frac{2}{5} > \frac{1}{5}$
$\frac{7}{9} > \frac{4}{9}$	$\frac{3}{7} < \frac{5}{7}$	$\frac{6}{11} > \frac{5}{11}$
$\frac{3}{15} < \frac{8}{15}$	$\frac{12}{12} > \frac{9}{12}$	$\frac{6}{14} > \frac{4}{14}$

Comparing Fractions with Unlike Denominators

To compare fractions with unlike denominators, we first make them similar by finding equivalent fractions with the same denominator.

$\frac{1}{2} \square \frac{1}{4} \longmapsto \frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$ using equivalent fractions.

Therefore, $\frac{2}{4} \boxed{>} \frac{1}{4}$



1. Write down the correct sign (>, <, or =).

$\frac{3\times1}{3\times3} < \frac{7}{9}$	$\frac{2\times1}{2\times2} < \frac{3}{4}$	$\frac{4}{16} < \frac{4\times2}{8\times2}$
$\frac{2}{9} < \frac{2\times3}{3\times3}$	$\frac{3\times1}{3\times2} > \frac{2}{6}$	$\frac{31}{42} > \frac{13\times2}{21\times2}$
$\frac{2\times3}{2\times5} = \frac{6}{10}$	$\frac{1}{6} < \frac{1\times2}{3\times2}$	$\frac{1}{8} < \frac{3\times2}{4\times2}$

Ascending and Descending Order

To arrange $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{5}{6}$ in ascending order, find the equivalent fractions.

First, put these fractions in ascending order based on their numerators.

$\frac{1}{2}, \frac{1}{3}, \frac{5}{6}$

$\downarrow \quad \downarrow \quad \downarrow$

$\frac{3}{6}, \frac{2}{6}, \frac{5}{6}$

Then, match the largest denominator, which is 6. Find equivalent fractions for the other two fractions, so they also have 6 as their denominator.

Since $\frac{2}{6} < \frac{3}{6} < \frac{5}{6}$, the ascending order is $\frac{1}{3}$, $\frac{1}{2}$, then $\frac{5}{6}$.

1. Arrange in descending order.

A $\frac{1}{2} \xrightarrow{\times 8} \frac{8}{16}$, $\frac{7}{16}$, $\frac{3}{4} \xrightarrow{\times 4} \frac{12}{16}$, $\frac{5}{8} \xrightarrow{\times 2} \frac{10}{16}$

$\frac{12}{16} > \frac{10}{16} > \frac{8}{16} > \frac{7}{16}$

$\frac{3}{4} > \frac{5}{8} > \frac{1}{2} > \frac{7}{16}$

B $\frac{3}{4} \xrightarrow{\times 3} \frac{9}{12}$, $\frac{7}{12}$, $\frac{2}{3} \xrightarrow{\times 4} \frac{8}{12}$, $\frac{1}{2} \xrightarrow{\times 6} \frac{6}{12}$

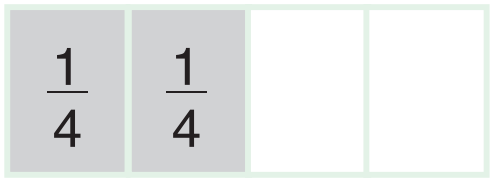
$\frac{9}{12} > \frac{8}{12} > \frac{7}{12} > \frac{6}{12}$

$\frac{3}{4} > \frac{2}{3} > \frac{7}{12} > \frac{1}{2}$

(3-3) Adding and Subtracting Fractions

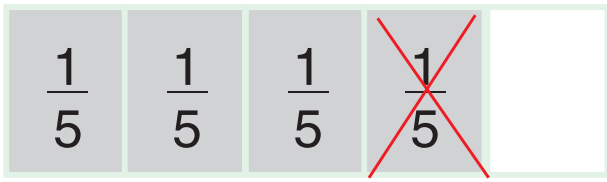
When we add or subtract fractions with the same denominators, we simply add or subtract the numerators while keeping the denominators unchanged.

The sum:



$$\frac{1}{4}+\frac{1}{4}=\frac{1+1}{4}=\frac{2}{4}$$

The difference:



$$\frac{4}{5}-\frac{1}{5}=\frac{4-1}{5}=\frac{3}{5}$$

1. Add.

A $\frac{3}{8}+\frac{1}{8}=\frac{4}{8}$

B $\frac{4}{10}+\frac{4}{10}=\frac{8}{10}$

C $\frac{3}{7}+\frac{2}{7}=\frac{5}{7}$

D $\frac{4}{25}+\frac{2}{25}=\frac{6}{25}$

E $\frac{4}{13}+\frac{3}{13}=\frac{7}{13}$

F $\frac{9}{18}+\frac{3}{18}=\frac{12}{18}$

2. Subtract.

$\frac{5}{6} - \frac{3}{6} = \frac{2}{6}$

$\frac{4}{9} - \frac{1}{9} = \frac{3}{9}$

$\frac{3}{12} - \frac{2}{12} = \frac{1}{12}$

$\frac{5}{9} - \frac{3}{9} = \frac{2}{9}$

$\frac{3}{4} - \frac{2}{4} = \frac{1}{4}$

$\frac{4}{5} - \frac{3}{5} = \frac{1}{5}$

3. Fill in the missing numbers.

$\frac{7}{16} + \frac{12}{16} = \frac{19}{16}$	$\frac{7}{35} + \frac{7}{35} = \frac{14}{35}$	$\frac{9}{40} + \frac{7}{40} = \frac{16}{40}$
$\frac{7}{18} - \frac{3}{18} = \frac{4}{18}$	$\frac{16}{20} - \frac{5}{20} = \frac{11}{20}$	$\frac{11}{24} - \frac{4}{24} = \frac{7}{24}$

When the numerator and the denominator of a fraction are equal, the fraction's value is always 1.

4. Look at the fractions below and find out how many parts are needed to have 1.

A $\frac{1}{4} + \frac{3}{4} = 1$

B $\frac{10}{11} + \frac{1}{11} = 1$

C $\frac{3}{7} + \frac{4}{7} = 1$

D $\frac{15}{20} + \frac{5}{20} = 1$

E $\frac{2}{5} + \frac{3}{5} = 1$

Show Your Turn

1. Shade each shape according to the equivalent fraction.

$\frac{6}{8} = \frac{3}{4}$

$\frac{4}{6} = \frac{2}{3}$

$\frac{4}{10} = \frac{2}{5}$

$\frac{6}{16} = \frac{3}{8}$

$\frac{4}{12} = \frac{2}{6}$

$\frac{12}{14} = \frac{6}{7}$

2. Write down the correct sign (>, <, or =).

$\frac{2x1}{2x7} < \frac{3}{14}$ $\quad \frac{3}{8} < \frac{2x2}{4x2}$ $\quad \frac{4}{16} < \frac{4x2}{8x2}$

$\frac{2x2}{2x9} > \frac{1}{18}$ $\quad \frac{5x1}{5x3} > \frac{4}{15}$ $\quad \frac{1}{12} < \frac{2x2}{6x2}$

$\frac{1}{3} < \frac{2}{3}$ $\quad \frac{1}{10} < \frac{3}{10}$ $\quad \frac{3x2}{3x5} < \frac{2x5}{3x5}$

3. Add or subtract.

$\frac{6}{16} + \frac{1}{16} = \frac{7}{16}$

$\frac{14}{10} + \frac{3}{10} = \frac{17}{10}$

$\frac{9}{18} - \frac{4}{18} = \frac{5}{18}$

$\frac{3}{6} + \frac{1}{6} = \frac{4}{6}$

$\frac{5}{24} - \frac{3}{24} = \frac{2}{24}$

$\frac{7}{36} + \frac{5}{36} = \frac{12}{36}$

4. Circle the greatest fraction in each set.

A $(\frac{3}{16}, \frac{3}{4}, \frac{1}{2})$

B $(\frac{5}{32}, \frac{5}{8}, \frac{5}{6})$

5. Circle the set that has equivalent fractions.

A $(\frac{4}{7}, \frac{13}{14})$

B $(\frac{12}{32}, \frac{3}{8})$

6. Arrange in descending order.

$8\frac{1}{4}, 7\frac{1}{4}, 7\frac{6}{9}, 8\frac{1}{2}$

$(\frac{33}{4}, \frac{29}{4}, \frac{69}{9}, \frac{17}{2})$

$(\frac{297}{36}, \frac{261}{36}, \frac{276}{36}, \frac{306}{36})$

$\frac{306}{36} > \frac{297}{36} > \frac{276}{36} > \frac{261}{36}$

$8\frac{1}{2} > 8\frac{1}{4} > 7\frac{6}{9} > 7\frac{1}{4}$

Unit 4

Measurement

Vocabulary

- length measurement units
- kilometer (km)
- meter (m)
- decimeter (dm)
- centimeter (cm)
- millimeter (mm)
- perimeter
- area
- length
- width
- side

Objectives

Upon completion of this unit, you will be able to:

- Convert between various length measurement units.
- Calculate the perimeter of a polygon.
- Calculate the area of a square or a rectangle.
- Use area and perimeter measurement units to solve problems.

(4-1) Length Measurement Units

Different metric units measure various lengths and distances accurately.

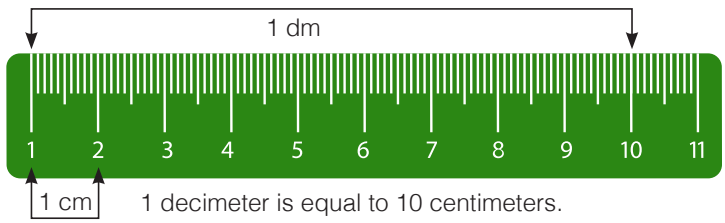
Kilometer (km)
It is used to measure very large lengths, such as lands, streets, and distances between cities and countries.

Meter (m)
It is used to measure large lengths, such as rooms, heights, and playgrounds.

Centimeter (cm)
It is used to measure small lengths, such as papers, books, bags, and toys.

Millimeter (mm)
It is used to measure very small lengths, such as insects, paper clips, and rubbers.

Decimeter (dm)
It is a unit of length that is a tenth of a meter. Therefore, 10 dm equals 1 meter, which is ten times the length of a centimeter, meaning that 10 cm equals 1 dm.



1 decimeter is equal to 10 centimeters.

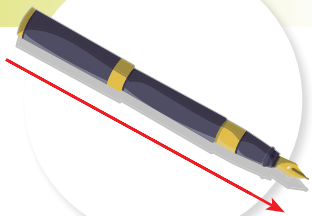
- **1 km = 1000 m**
- **1 m = 10 dm**
- **1 m = 100 cm**
- **1 m = 1000 mm**
- **1 dm = 10 cm**
- **1 cm = 10 mm**
- **1 dm = 100 mm**

1. Circle the suitable unit of length for each picture.

The length of a car:
3 km , (3 m)

The length of an ant:
5 m , (5 mm)

The length of a book:
(2 dm), 2 mm



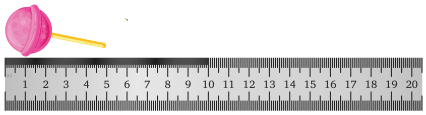
The length of a pen:
15 m , (15 cm)

The length of a glass:
(1 dm), 1 km

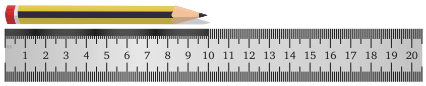
2. Convert.

4 m = 400 cm (4 x 100 = 400)	23 cm = 230 mm (23 x 10 = 230)
7 km = 7000 m (7 x 1000 = 7000)	11 dm = 1100 mm (11 x 100 = 1100)

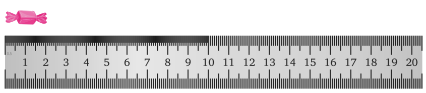
3. Complete.



The length of the lollipop is 5 cm.



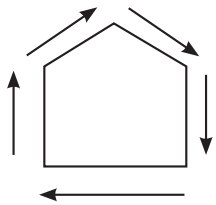
The length of the pencil is 1 dm.



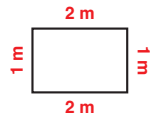
The length of the candy is 20 mm.

(4-2) Measuring Perimeter

A perimeter is the distance around a shape. A perimeter is measured in units of length, such as centimeters, meters, kilometers, etc.

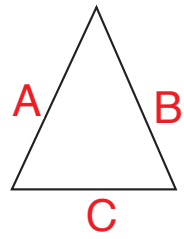


To find the perimeter, add up the lengths of all of the shape's sides.



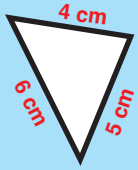
P = 1 + 1 + 2 + 2 = 6 m

Formula:

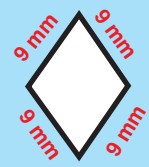


P = A + B + C

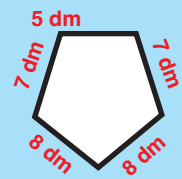
1. Find the perimeter of each shape.



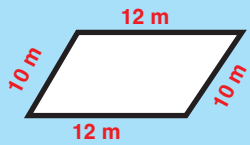
4 + 5 + 6 = 15 cm



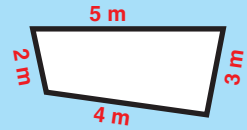
9 + 9 + 9 + 9 = 36 mm



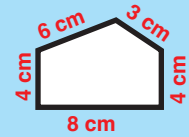
7 + 5 + 7 + 8 + 8 = 35 dm



10 + 12 + 10 + 12 = 44 m

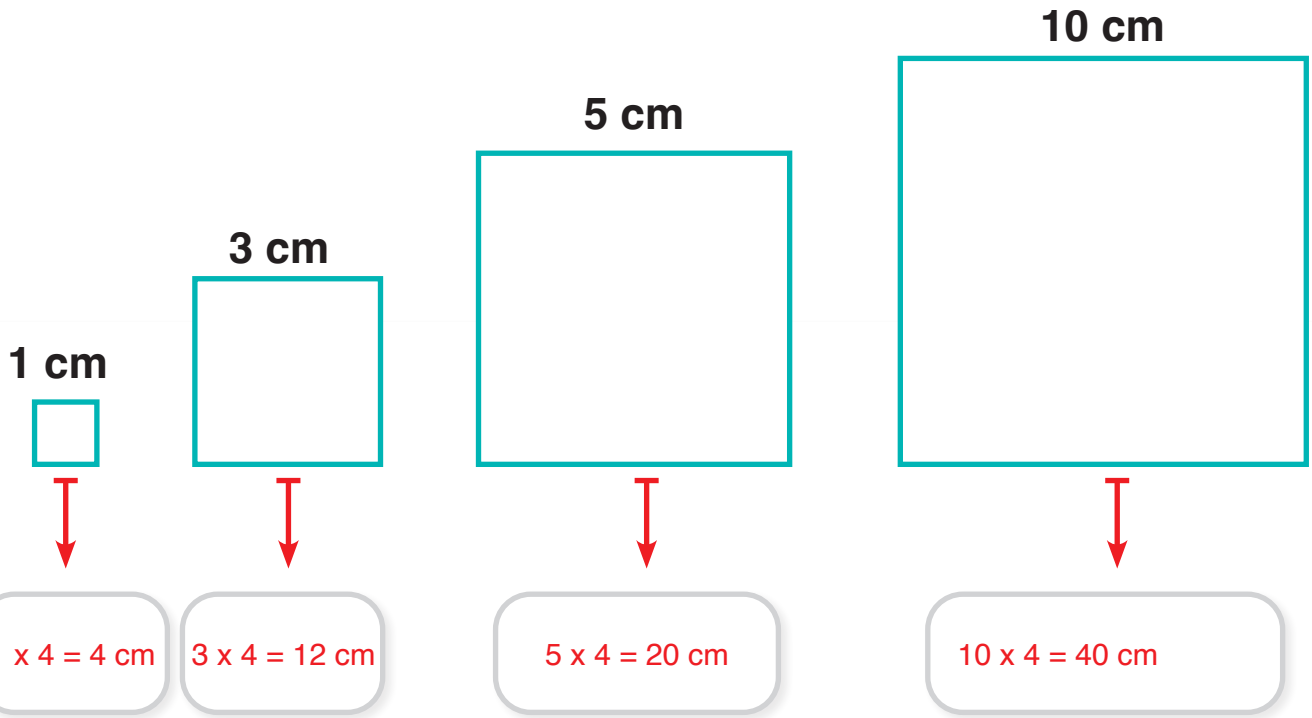


2 + 5 + 3 + 4 = 14 m

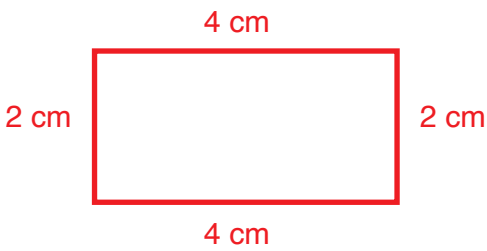


4 + 6 + 3 + 4 + 8 = 25 cm

2. Find the perimeter of each square.

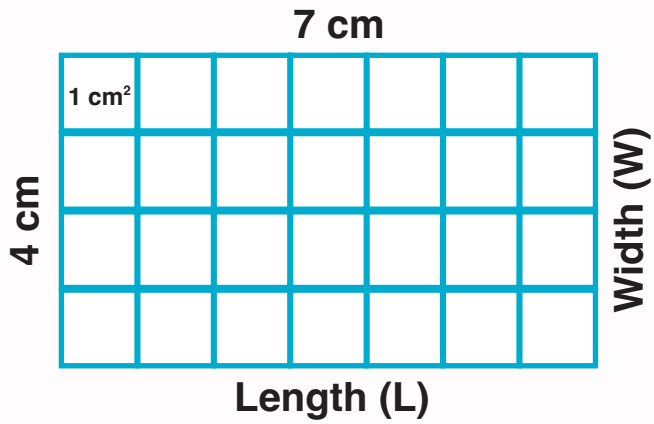


3. Draw a rectangle that has a perimeter of 12 cm.



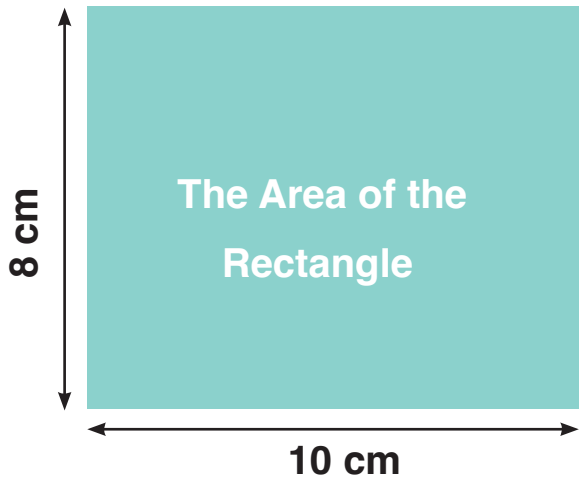
(4-3) Measuring Area

Area is a measurement of a surface. The unit of area is measured in units of length squared, such as cm^2 or m^2.



This rectangle has an area of 28 cm^2.

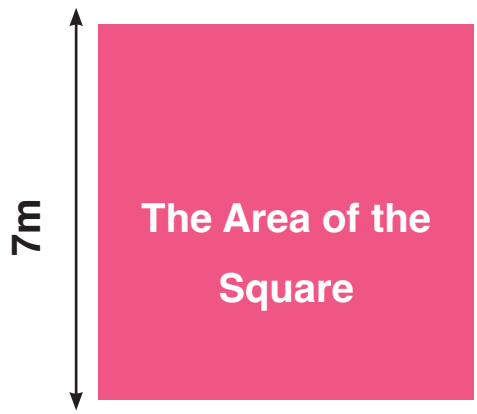
7 cm x 4 cm = 28 cm^2.



To find the area of a rectangle, multiply its length by its width.

Area = Length × Width

$A = L \times W$
$A = 10 \times 8$
$A = 80\ cm^2$

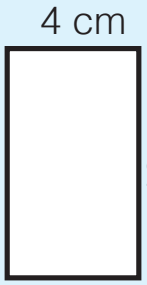


A square has equal sides. To find the area of a square, multiply the length of one side by itself.

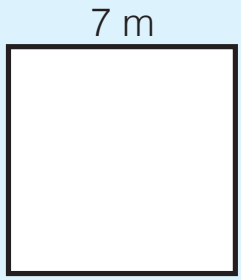
Area = Side × Side

$A = S \times S$
$A = 7 \times 7$
$A = 49\ cm^2$

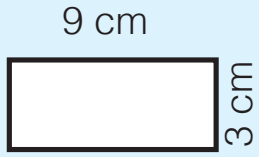
1. Find the area of the following squares and rectangles:



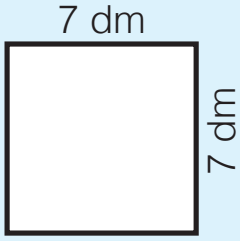
A = 40 cm²



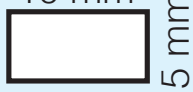
A = 49 m²



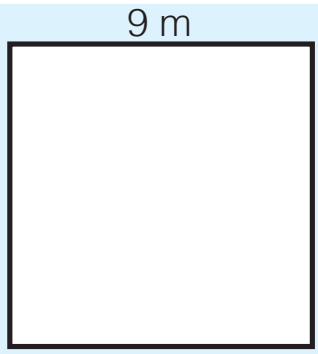
A = 27 cm²



A = 49 dm²



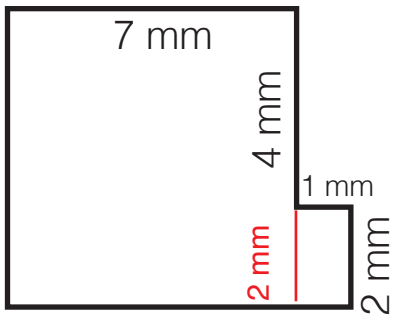
A = 50 mm²



A = 81 m²

Your Work

1. Find the area.

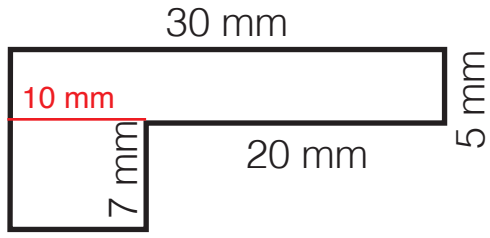


A = 44 mm²

7 x 6 = 42

2 x 1 = 2

42 + 2 = 44



A = 220 mm²

30 x 5 = 150

7 x 10 = 70

150 + 70 = 220

(4-4) Problem Solving

1. Akram needs to put a photo in a frame with a length of 15 cm and a width of 9 cm. What is the perimeter of the frame?

15 + 15 + 9 + 9 = 48 cm

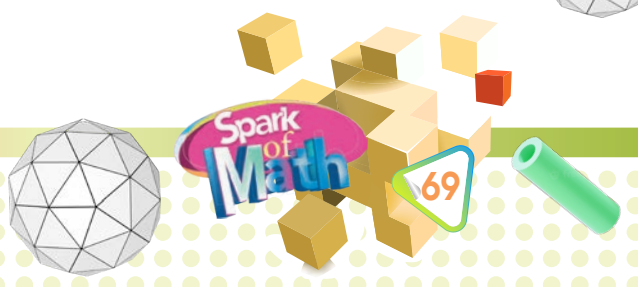
2. A square field has a perimeter of 320 meters. How many meters does each side have?

320 ÷ 4 = 80 m

Show Your Turn

1. Convert.

- 20 m = 2000 cm
- 67 m = 6700 cm
- 13 m = 13000 mm
- 22 m = 22000 mm
- 49 m = 4900 cm
- 89 m = 8900 cm
- 17 cm = 170 mm
- 31 m = 3100 cm



Geometry and Graphs

Vocabulary

- point
- line segment
- line
- ray
- protractor
- right angle
- straight angle
- acute angle
- obtuse angle
- perpendicular
- intersecting
- parallel
- pictograph
- bar graph

Objectives

Upon completion of this unit, you will be able to:

- Identify the types of points and lines.
- Identify intersecting, perpendicular, and parallel lines.
- Identify and estimate acute, right, and obtuse angles.
- Use a protractor to measure the degrees of different angles.
- Interpret information from pictographs and bar graphs.
- Make your own bar graph.

(5-1) Points and Lines

	Description	Figure	Symbol
Point	A point is a geometric element that has zero dimensions.	●	**P** or **Point P**
Line	A line is a collection of points along a straight path with no end points.	A B	$\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$
Line segment	A line segment is a part of a line that intersects each point on the line between its end points.	X Y	$\overline{XY}$ or $\overline{YX}$
Ray	A ray is a part of a line with a single end point that goes in one direction.	P Q	$\overrightarrow{PQ}$

When rays intersect, they form angles.

There are four main types of angles: acute, right, obtuse, and straight.

Acute Angle

Less than 90°

Right Angle

Exactly 90°

Obtuse Angle

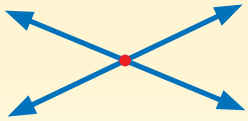
Greater than 90° and less than 180°

Straight Angle

Exactly 180°

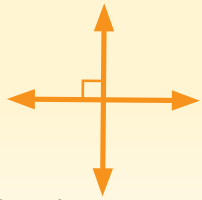
There are three types of lines:

Intersecting



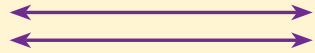
They cross each other at any angle that is not right.

Perpendicular



They intersect at a right angle (°90).

Parallel



They run in the same direction and never intersect.

1. Match.

Line

Line segment

Ray

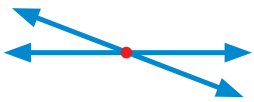
Parallel lines

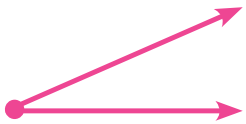
Intersecting lines

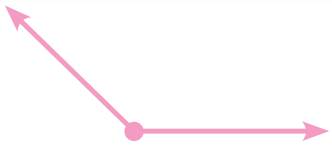
Right angle

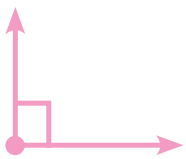
Acute angle

Obtuse angle









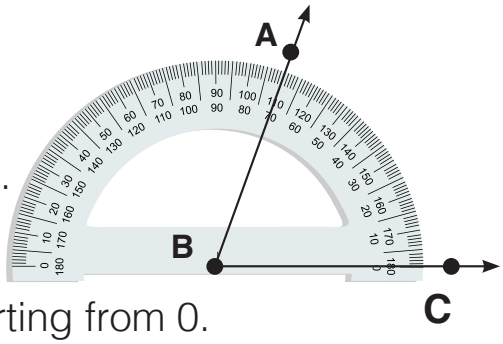
(5-2) Measuring Angles

To measure angles, we need a tool called a "protractor."

Step 1 Place the center point of the protractor on the vertex of the angle.

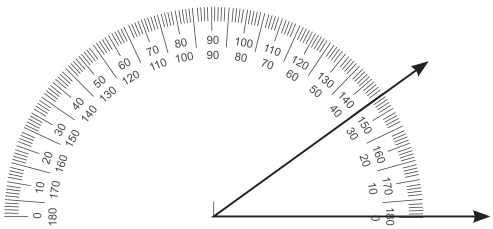
Step 2 Align the 0 mark on one side of the angle.

Step 3 Read the measure of the angle where the other side crosses the protractor, starting from 0.

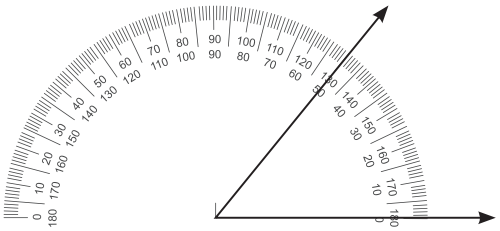


The measure of the angle is 70°.

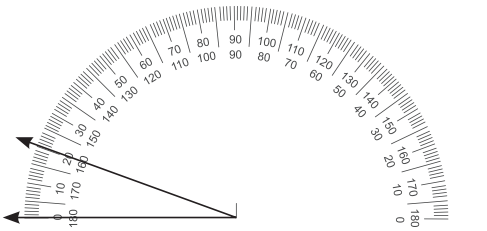
1. Measure the degree of each angle.



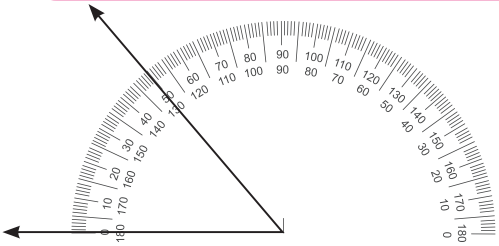
35°



50°

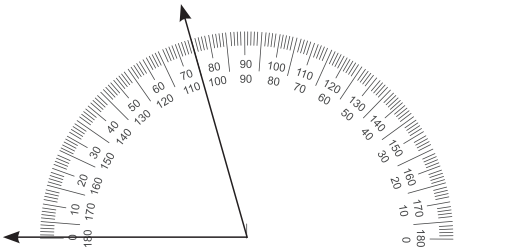


20°

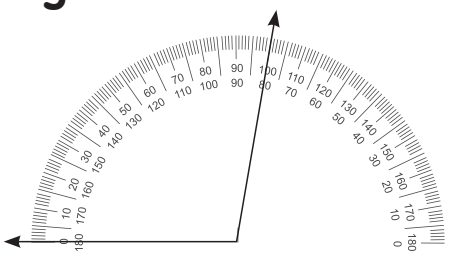


50°

2. Measure and write down whether the angles are acute or obtuse.

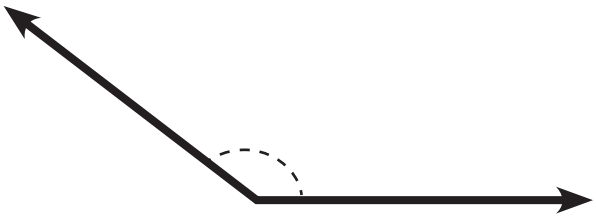


acute



obtuse

3. Choose the best estimation for the measurement of each angle.



30° approx

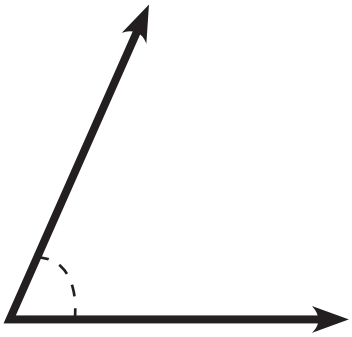
90° approx

150° approx

25° approx

80° approx

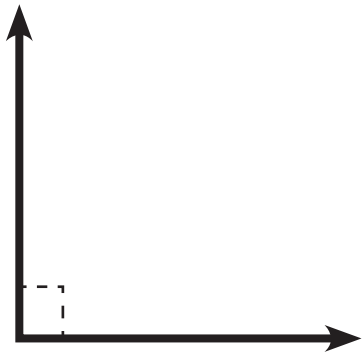
130° approx



30° approx

65° approx

90° approx



85° approx

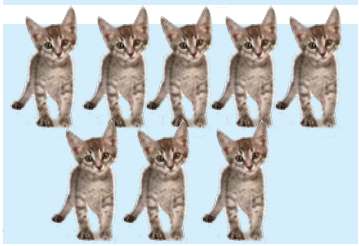
90° approx

95° approx

(5-3) Pictographs

A pictograph is a visual representation of data using images, making it simple to read.

1. Look at the table below that shows the quantity and types of animals owned by a group of fourth-grade children, and answer the following questions:

Group	Animals
Boys	  
Girls	  

A Circle the correct answers.

Girls have more cats than boys.	**Yes**	**No**
Boys have less birds than girls.	**Yes**	**No**
Boys have two parrots.	**Yes**	**No**

B What is the total number of cats? 13

C What is the total number of birds? 7

D What is the total number of parrots? 9

E How many boys are there in the class? 15

F Ask another question based on the picture graph, then provide an answer.

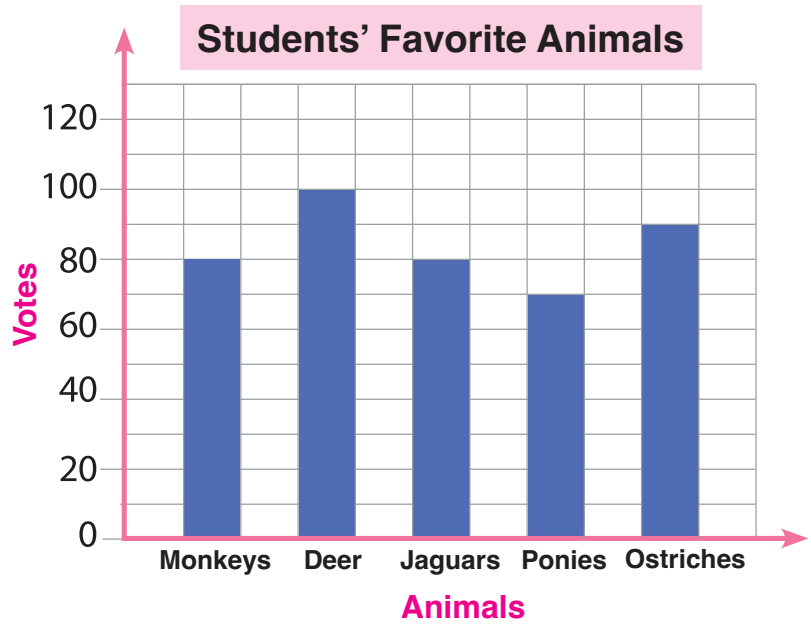
Question: How many girls are there in the class?

Answer: 14

(5-4) Bar Graphs

A bar graph is a visual representation that helps organize information easily. The information is drawn into rectangular bars with heights or lengths proportional to the values that they represent. A bar graph is also called a bar chart.

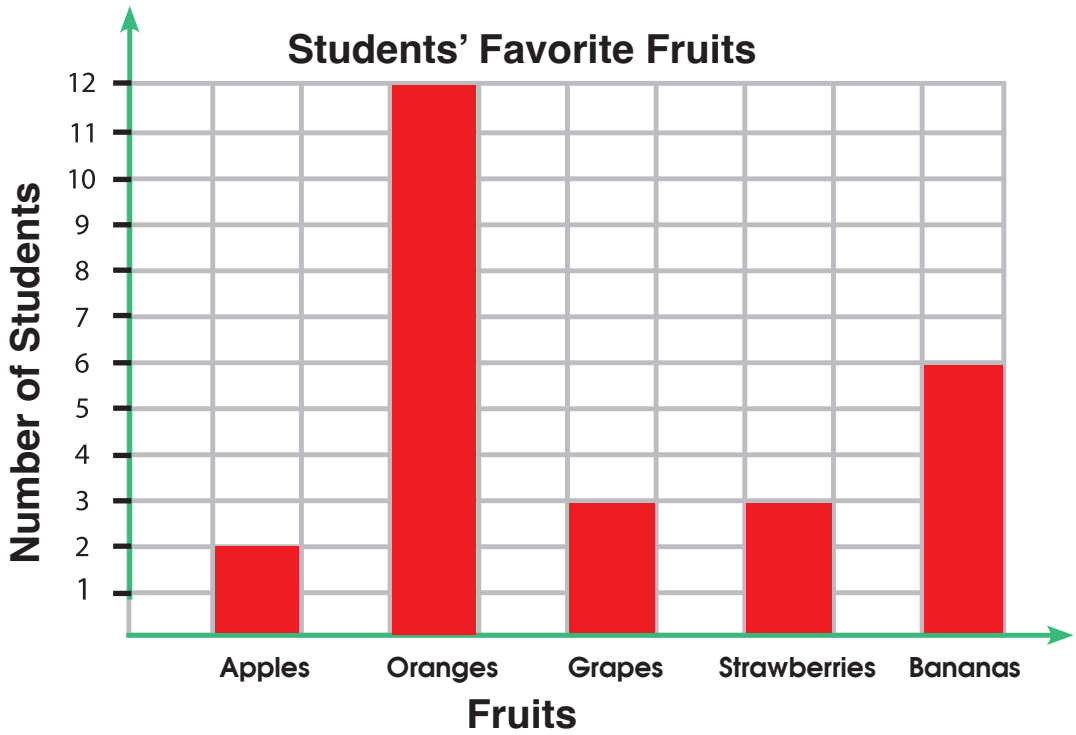
1. The fourth-grade students did a survey about the animals that they liked the most during their visit to the Ghamadan Zoo in Amman. Observe their results, then complete the following table.



Animals	Votes
Monkeys	80
Deer	100
Jaguars	80
Ponies	70
Ostriches	90

2. Use the data in the provided table to complete the bar graph, then answer the following questions:

Fruits	Number of Students
Apples	
Oranges	
Grapes	
Strawberries	
Bananas	



A Which is the favorite fruit for most students?

Oranges

B Which is the favorite fruit with the fewest votes?

Apples

C How many students like oranges more than grapes?

12 - 3 = 9

D How many students are there in total?

26

3. Ali asked his classmates what activities they like to do after school. Note the table, and then answer the questions.

Activities	Number of students
• Reading	3
• Playing sports	5
• Watching TV	8
• Drawing	4

A What is the best activity for most students?

Watching TV

B What is the least favorite activity for most students?

Reading

C What is the total number of students?

20

D How many students like watching TV?

8

E How many students like drawing?

4

Show Your Turn

1. Conduct a survey in your classroom about each student's favorite color. Gather the data in a table, and then draw a bar graph.

Students' own answers

Table

Bar Graph Representation