

Spark of Math

| x | 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 |

Teacher Book



Third Edition
2023

Spark of Math

BOOK 4

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Unit 1

Working with 6-Digit Numbers



Vocabulary

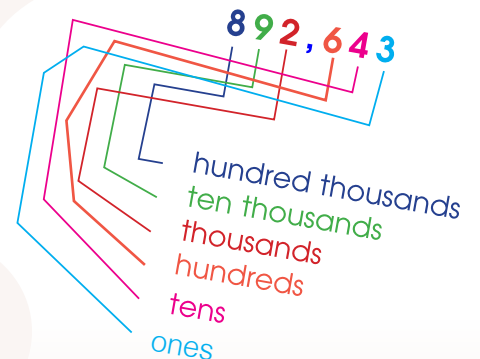


- 6-Digits
- Hundred thousands (100 thousands)
- Ten thousands (10 thousands)
- Thousands
- Thousands family
- Ones family
- Standard form
- Word form
- Expanded form
- Place value
- Greater than
- Less than
- Equal to
- Ascending order
- Descending order
- Regrouping
- Rounding
- Add
- Addend
- Sum
- Subtract
- Minuend
- Subtrahend
- Difference

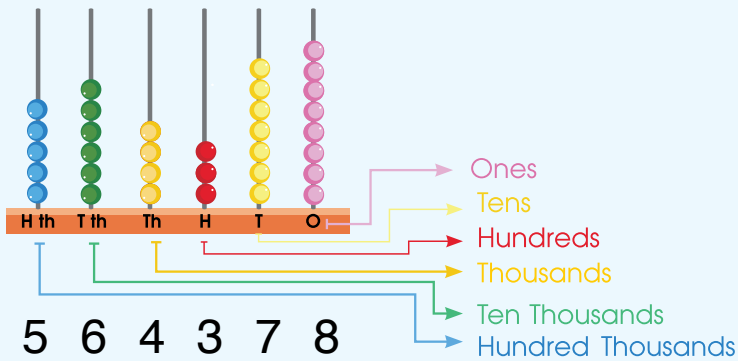


Objectives

- Read and write numbers up to 6-digits.
- Extend 6-digit numbers into expanded form.
- Determine place and value of numbers up to 6-digits.
- Compare 6-digit numbers.
- 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) 6-Digit Numbers



- **Standard Form:** 564,378
- **Word Form:** Five hundred sixty four thousand, and three hundred seventy eight.
- **Expanded Form:** $500,000 + 60,000 + 4,000 + 300 + 70 + 8$
Thousands Family
Ones Family

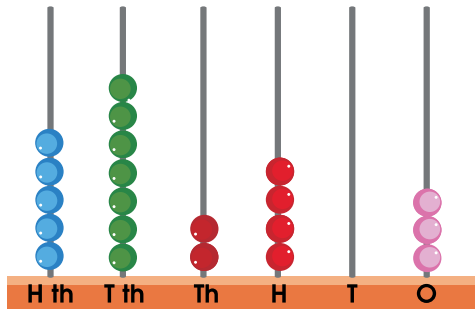
Note the following:

- Each number is called a 'digit'. The number 564,378 has 6-digits.
- Every 'Family' of numbers is divided into 3 digits by a comma.
- Each number increases ten times with each shift to the left. (Add a "0" with each move to the left).

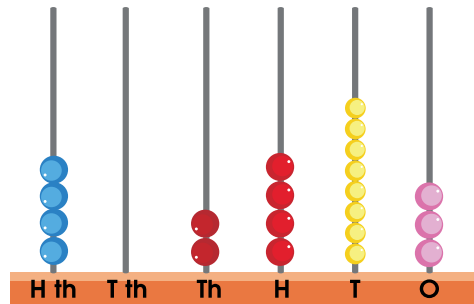
| Position | Value | | | |
|----------|----------------|---------|----------------------|--------------------|
| 5 | 100- Thousands | 500,000 | $(5 \times 100,000)$ | } Thousands Family |
| 6 | 10- Thousands | 60,000 | $(6 \times 10,000)$ | |
| 4 | Thousands | 4,000 | $(4 \times 1,000)$ | |
| 3 | Hundreds | 300 | (3×100) | } Ones Family |
| 7 | Tens | 70 | (7×10) | |
| 8 | Ones | 8 | (8×1) | |



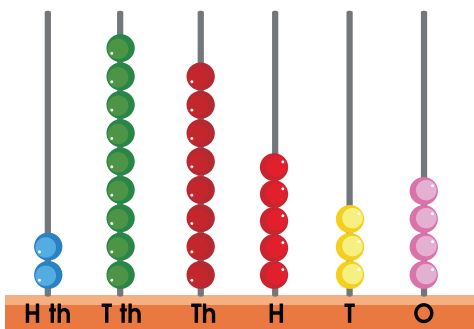
Count the beads and write the number.



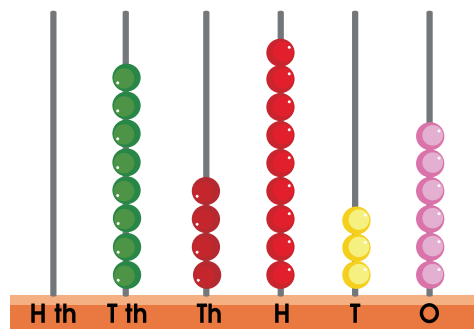
572,403



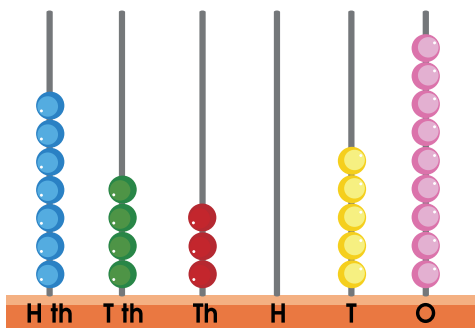
402,483



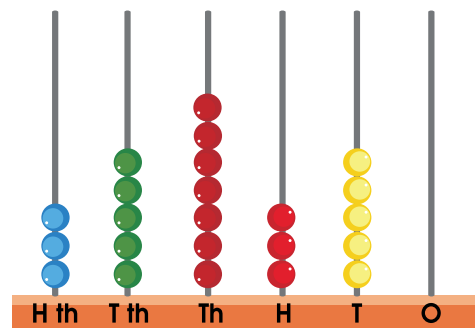
298,534



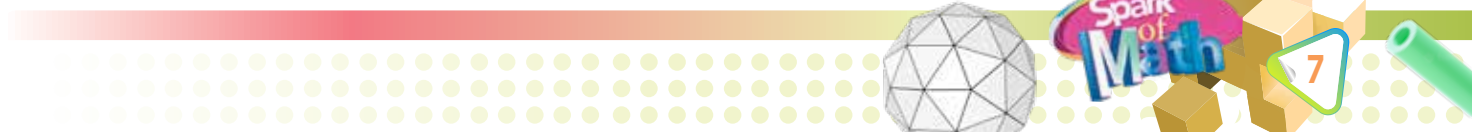
84,936



743,059



357,350



Write the correct number in the blanks.

473,986 473 thousand, and 986

340,642 340 thousand, and 642

19,548 19 thousand, and 548

761,398 761 thousand, and 398

Match the following sentences to their corresponding numbers.

Five hundred twenty six thousand and eight hundred thirty seven

Two hundred ninety one thousand and six hundred twenty four

Eight hundred fifty thousand and nine hundred two

Sixty eight thousand and one hundred two

One hundred sixty eight thousand and three hundred fifty

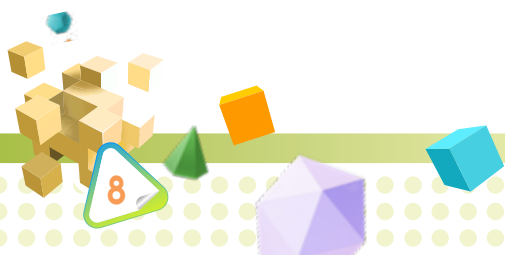
291,624

68,102

168,350

850,902

526,837



Write each number in word form.

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

19,305 Nineteen thousand and three hundred five

284,000 Two hundred eighty four thousand

738 Seven hundred thirty eight

Write the value of the digit in the place named.

| | | | |
|------------------------|---------------------------|----------------------------|----------------------------|
| 397,523 (thousands) | 103,482 (10-thousands) | 987,125 (tens) | 361,590 (100-thousands) |
| 7,000 | 0 | 20 | 300,000 |
| 623,041 (ones) | 734,642 (hundreds) | 256,788 (100-thousands) | 529,763 (10-thousands) |
| 1 | 600 | 200,000 | 20,000 |

Find the correct answers.

Circle the number that has a 4 in the 10-thousands place.

578,879 643,201 982,884 986,109

Circle the number that has a 6 in the tens place.

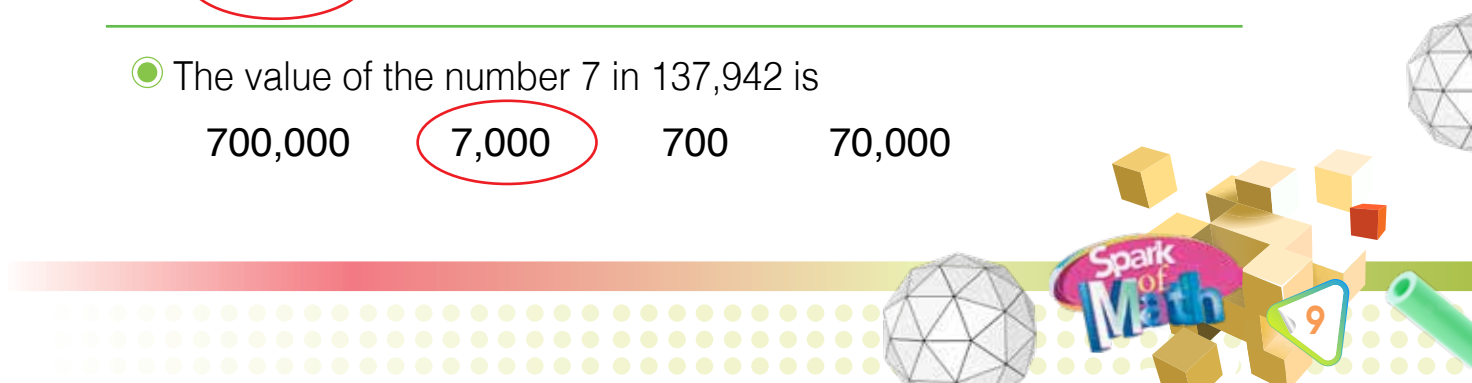
197,356 961,798 646,646 723,463

Circle the number with a 2 in the 100-thousands place.

273,109 763,281 874,139 342,558

Circle the value of the number 7 in 137,942 is

700,000 7,000 700 70,000



Write each number in expanded form.

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

$765,080 = 700,000 + 60,000 + 5,000 + 000 + 80$

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

$108,942 = 100,000 + 00,000 + 8,000 + 900 + 40 + 2$

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

Look at the following digits: 6, 7, 0, 5, 3, 4.

- Write the greatest number possible using all the digits above.

$765,430$

- Write the smallest number possible using all the digits above.

$34,567$ $034,567$

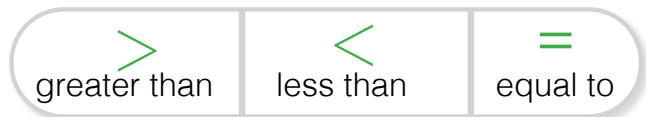
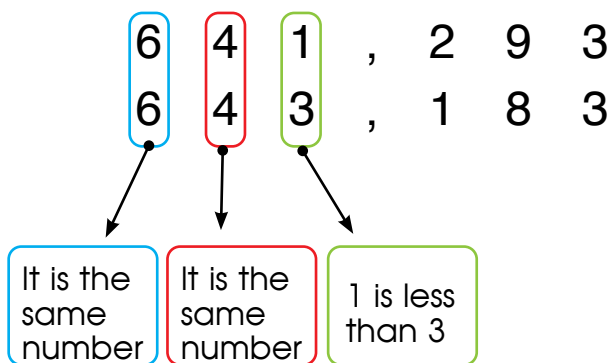
- Choose one of the numbers and write its expanded form.

Seven hundred sixty five thousand, and four hundred thirty ...



(1-2) Comparing Numbers

- To Compare the numbers 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 100-thousands and 10-thousands digits are the same. Therefore, look at the thousands place. Since 1 thousand is smaller than 3 thousand, 641,293 is less than 643,183



$$641,293 < 643,183$$

641,293 is **Less** than 643,183



Compare each pair of numbers. Use these symbols:

$>$
Greater than

$<$
Less than

$=$
Equal to

1

469,295

$>$

449,876

2

534,672

$>$

354,672

3

67,867

$<$

96,759

4

341,555

$>$

41,555

5

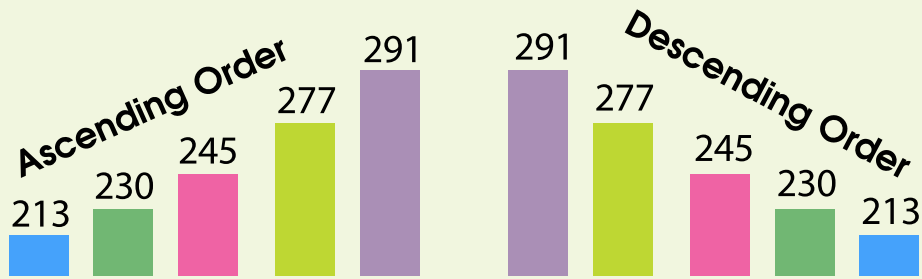
676,871

$=$

676,871



Ordering numbers in ascending and descending order.



Ascending Order:

Is to write the numbers from the smallest to the greatest.

213 230 245 277 291

Descending Order:

Is to write the numbers from the greatest to the smallest.

291 277 245 230 213

Look at the following numbers. Analyze, compare and answer the following questions.

156,083

508,631

306,815

183,650

The biggest number is 508,631

The smallest number is 156,083

The ascending order is

156,083 183,650 306,815 508,631.....

Write the value of number 5 in each number according to its position.

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

306,815 5 183,650 50



Look at the following numbers. Analyze, compare and answer the following questions.

787,736

247,624

63,478

456,832

The biggest number is 787,736

The smallest number is 63,478

The descending order is

787,736 456,832 247,624 63,478

Write the value of number 7 in each number according to its position.

789,136 700,000 247,624 7,000

63,47 7 456,872 70



(1-3) Rounding Numbers

We round numbers up to estimate the closest number of a possible answer.

Example: how many students are there in your school? You may not know the exact number of students, but you can estimate a close answer.



How can I round
276,341 to the
nearest 10-thousands?

- **Step 1:** find the place that I am rounding to.
- **Step 2:** look at the digit to the right of this place.
- **Step 3:** if the digit is less than 5, leave the digit in the rounding place as it is.
If the digit is 5 or greater add 1 to the digit in the rounding place.
- **Step 4:** change the digits to the right of the rounding place to zeros.

$+1$
276,341
280,000

Round the numbers to the underlined place value.

- 6,302 \longrightarrow 6,000
- 1,018 \longrightarrow 1,000
- 22,356 \longrightarrow 22,400
- 537,924 \longrightarrow 540,000
- 400,400 \longrightarrow 0,000



● Round the numbers to the nearest place value given.

526,873
(the nearest ten)

526,870

54,385
(the nearest thousand)

54,000

642,977
(the nearest 10-thousand)

640,000

297,156
(the nearest 100-thousand)

300,000

2,975
(the nearest hundred)

3,000

878,045
(the nearest thousand)

878,000

● Match each number to its nearest 100-thousands place.

745,678

268,048

234,996

107,838

356,780

566,409

100,000

200,000

300,000

400,000

600,000

700,000

● 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



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

| | <u>Length</u> |
|---------------------|---------------|
| — Amazon River | 6,992 km |
| — Nile River | 6,853 km |
| — Yangtze River | 6,300 km |
| — Mississippi River | 6,275 km |
| — Yenissei River | 5,539 km |



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

Round to the nearest hundreds

Round to the nearest thousands

.....7,000.....

.....7,000.....

.....6,900.....

.....7,000.....

.....6,300.....

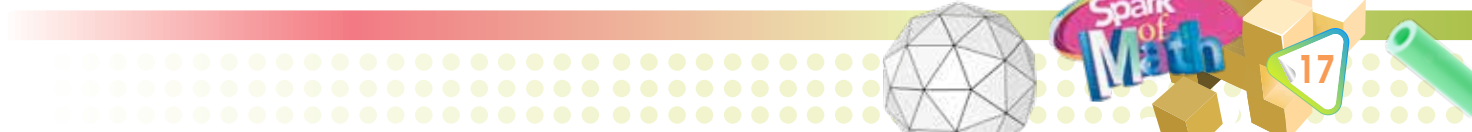
.....6,000.....

.....6,300.....

.....6,000.....

.....5,500.....

.....6,000.....



➊ (1-4) Addition of 6-Digit Numbers

Add the ones

$$\begin{array}{r} \boxed{1} \\ 674,683 \\ + 294,348 \\ \hline 1 \end{array}$$

Add the tens

$$\begin{array}{r} \boxed{1} \boxed{1} \\ 674,683 \\ + 294,348 \\ \hline 31 \end{array}$$

Add the hundreds

$$\begin{array}{r} \boxed{1} \boxed{1} \boxed{1} \\ 674,683 \\ + 294,348 \\ \hline ,031 \end{array}$$

Add the thousands

$$\begin{array}{r} \boxed{1} \boxed{1} \boxed{1} \\ 674,683 \\ + 294,348 \\ \hline 9,031 \end{array}$$

Add the 10- thousands

$$\begin{array}{r} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \\ 674,683 \\ + 294,348 \\ \hline 69,031 \end{array}$$

Add the 100- thousands

$$\begin{array}{r} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \\ 674,683 \leftarrow \text{addend} \\ + 294,348 \leftarrow \text{addend} \\ \hline 969,031 \leftarrow \text{sum} \end{array}$$

➋ Add.

$$\begin{array}{r} 827,353 \\ + 42,646 \\ \hline \end{array}$$

869,999

$$\begin{array}{r} 878,065 \\ + 139,863 \\ \hline \end{array}$$

917,928

$$\begin{array}{r} 535,142 \\ + 313,534 \\ \hline \end{array}$$

848,676

$$\begin{array}{r} 1,473 \\ + 6,239 \\ \hline \end{array}$$

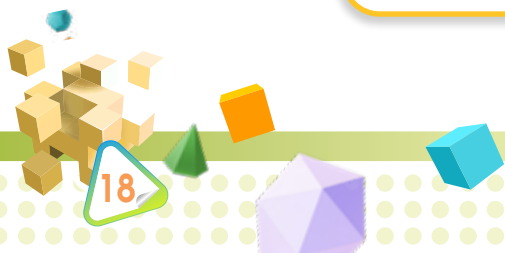
7,712

$$\begin{array}{r} 877,546 \\ + 125,982 \\ \hline \end{array}$$

903,528

$$\begin{array}{r} 365,479 \\ + 41,078 \\ \hline \end{array}$$

406,557



● Add.

$678,362 + 279,340 =$

$$\begin{array}{r} \\ 678,362 \\ + 279,340 \\ \hline 957,702 \end{array}$$

$362,682 + 38,298 =$

$$\begin{array}{r} 362,682 \\ + 38,298 \\ \hline 400,980 \end{array}$$

$36,934 + 246,208 =$

$$\begin{array}{r} 246,208 \\ + 36,934 \\ \hline 283,142 \end{array}$$

$141,680 + 124 =$

$$\begin{array}{r} 141,680 \\ + 124 \\ \hline 141,804 \end{array}$$

$567,778 + 1,002 =$

$$\begin{array}{r} 567,778 \\ + 1,002 \\ \hline 568,780 \end{array}$$

$432,872 + 425,298 =$

$$\begin{array}{r} 432,872 \\ + 425,298 \\ \hline 858,170 \end{array}$$

● Add and circle the answer that is closer to your sum.

Show your work

1

$375,895 + 37,564 =$

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

$$\begin{array}{r} 375,895 \\ + 37,564 \\ \hline 413,459 \end{array}$$

2

$95,568 + 265,348 =$

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

$$\begin{array}{r} 265,348 \\ + 95,568 \\ \hline 360,916 \end{array}$$

3

$786,578 + 43,876 =$

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

$$\begin{array}{r} 786,578 \\ + 43,876 \\ \hline 830,454 \end{array}$$

4

$135,588 + 784,456 =$

- a) 900,000 b) 950,000 c) 920,000

$$\begin{array}{r} 135,588 \\ + 784,456 \\ \hline 920,044 \end{array}$$



 **Add.**

$$\begin{array}{r} 533,050 \\ 724,366 \\ +967,891 \\ \hline \end{array}$$

2,225,307

$$\begin{array}{r} 398,823 \\ 455,841 \\ +168,919 \\ \hline \end{array}$$

1,023,583

$$\begin{array}{r} 508,890 \\ 935,846 \\ +938,019 \\ \hline \end{array}$$

2,382,755

Your Work

- Find the suitable place value to round the following numbers, then sum.

$$610,283 + 947 + 35,718 =$$

$$\begin{array}{r} 646,948 \\ + 647,000 \\ \hline 1,293,948 \end{array}$$

- Find two 6-digit numbers that when adding them together the total sum is 487,210.

200,000



287,210



— (1-5) Subtraction of 6-Digit Numbers

Subtract the ones

$$\begin{array}{r} 702,714 \\ - 349,673 \\ \hline 1 \end{array}$$

Subtract the tens

$$\begin{array}{r} \boxed{6} \boxed{11} \\ 702,714 \\ - 349,673 \\ \hline 41 \end{array}$$

Subtract the hundreds

$$\begin{array}{r} \boxed{6} \boxed{11} \\ 702,714 \\ - 349,673 \\ \hline 041 \end{array}$$

Subtract the thousands

$$\begin{array}{r} \boxed{6} \boxed{9} \boxed{12} \boxed{6} \boxed{11} \\ 702,714 \\ - 349,673 \\ \hline 3,041 \end{array}$$

Subtract the 10-thousands

$$\begin{array}{r} \boxed{6} \boxed{9} \boxed{12} \boxed{6} \boxed{11} \\ 702,714 \\ - 349,673 \\ \hline 53,041 \end{array}$$

Subtract the 100-thousands

$$\begin{array}{r} \boxed{6} \boxed{9} \boxed{12} \boxed{6} \boxed{11} \\ 702,714 \\ - 349,673 \\ \hline 353,041 \end{array}$$

$$\begin{array}{r} \boxed{6} \boxed{9} \boxed{12} \boxed{6} \boxed{11} \\ 702,714 \leftarrow \text{Minuend} \\ - 349,673 \leftarrow \text{Subtrahend} \\ \hline 353,041 \leftarrow \text{Difference} \end{array}$$

Note that $34-20=14$, and $20+14=34$

so to check your answer:

Inverse operation

$$\begin{array}{r} \boxed{1} \boxed{1} \quad \boxed{1} \\ 349,673 \\ + 353,041 \\ \hline 702,714 \end{array}$$



○ Subtract.

$$\begin{array}{r} 873,983 \\ - 645,827 \\ \hline \end{array}$$

228,156

$$\begin{array}{r} 632,883 \\ - 525,986 \\ \hline \end{array}$$

106,897

$$\begin{array}{r} 951,210 \\ - 411,392 \\ \hline \end{array}$$

539,818

$$\begin{array}{r} 750,553 \\ - 45,467 \\ \hline \end{array}$$

705,086

$$\begin{array}{r} 429,720 \\ - 421,912 \\ \hline \end{array}$$

7,808

$$\begin{array}{r} 762,334 \\ - 3,574 \\ \hline \end{array}$$

758,760

○ Subtract, then check.

$$\begin{array}{r} 490,672 \\ - 354,361 \\ \hline \end{array}$$

136,311

○ Subtract.

$$783,587 - 488,873 = 294,714$$

$$363,742 - 98,134 = 265,608$$



Find the sum or the difference.

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

$$\begin{array}{r} 48,985 \\ - 23,897 \\ \hline 25,088 \end{array}$$

$$\begin{array}{r} 9,716 \\ - 4,948 \\ \hline 4,768 \end{array}$$

$$\begin{array}{r} 942,146 \\ - 401,264 \\ \hline 540,882 \end{array}$$

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

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

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

$$\begin{array}{r} 167,583 \\ - 78,367 \\ \hline 89,216 \end{array}$$

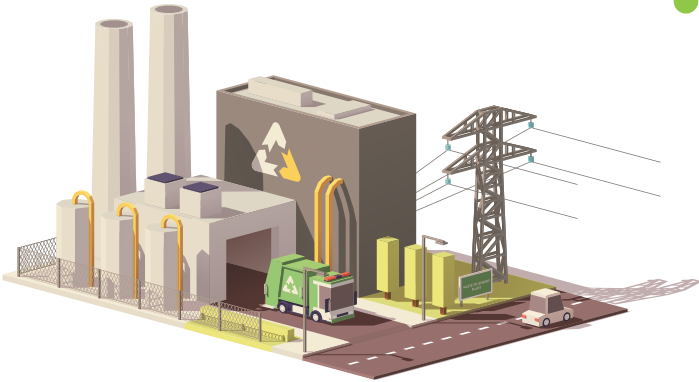
What two numbers have the difference of 112,346?

$$\begin{array}{r} 886,512 \\ - 774,166 \\ \hline 112,346 \end{array}$$

$$\begin{array}{r} 998,858 \\ - 886,512 \\ \hline 112,346 \end{array}$$



(1-6) Problem Solving



- 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 is the total of all materials together that Al Bireh was able to collect at the end of the year.

| Material | Kilograms to be recycled |
|--------------|--------------------------|
| Plastic | 78,975 |
| Glass | 187,951 |
| Paper | 56,162 |
| Total | ? 323,088 |



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

$$\begin{array}{r}
 36,086 \\
 - 15,347 \\
 \hline
 20,739 \text{ jds}
 \end{array}$$





- 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?

$$\begin{array}{r} 11,478 \\ - 1,259 \\ \hline 10,219 \end{array}$$

- 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 pass the 76,950 - meter mark, and Emad crossed the finish line.

$$\begin{array}{r} 100,000 \\ - 67,800 \\ \hline 32,200 \end{array}$$

Anas

$$\begin{array}{r} 100,000 \\ - 67,800 \\ \hline \end{array}$$

Ayman



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

Ayman



23,987 JOD

- Samir wants to buy a new car and has a budget of 23,200 JOD? He likes two cars, one white that costs 23,187 JOD and one blue for 23,987 JOD.



23,187 JOD

Which car will Samir buy?

Why do you think he chose that car over the other one?

| | white | blue |
|--|----------------|----------------|
| | 23,200 | 23,200 |
| | <u>-23,187</u> | <u>-23,987</u> |
| | 13 | 787 |

The white car because it fits the budget

- A school library has 21,486 books. They received a donation of 1,543 books. How many books are now in the library approximately?

$$\begin{array}{r} 21,486 \\ + 1,543 \\ \hline 23,029 \end{array}$$



- a) 24,000 **b) 23,000** c) 23,500

Show Your Turn

- Form two 6-digit numbers without repeating digits in each one using (0, 8, 1, 7, 3, 5).

1 875,310 and 130,758

2 Write each number in word form.
 ...eight hundred seventy five.....one hundred thirty thousand and.....
 ...thousand and three hundred ten..... seven hundred fifty eight.....

3 What is the value of 8 in each number?
 (800,000) (8)

4 Which number is the greatest?
875,310

5 Write one of the numbers in expanded form.
800,000 + 70,000 + 5,000 + 300 + 10

- Round out the numbers in the table below.

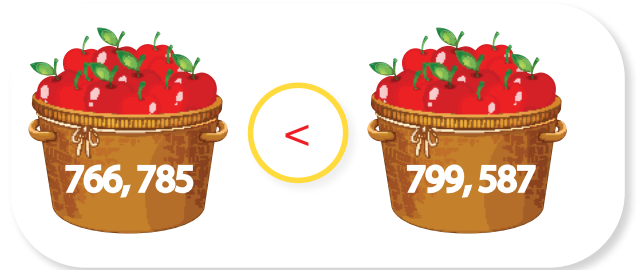
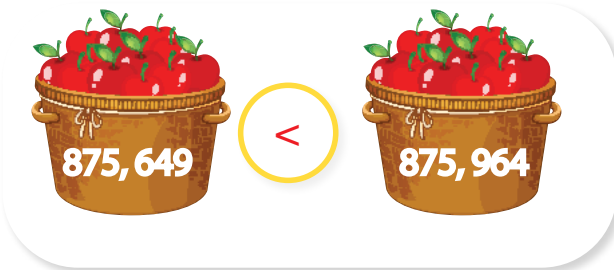
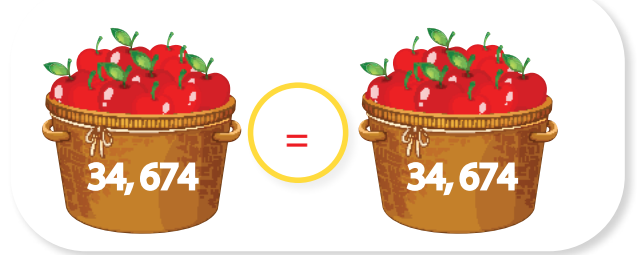
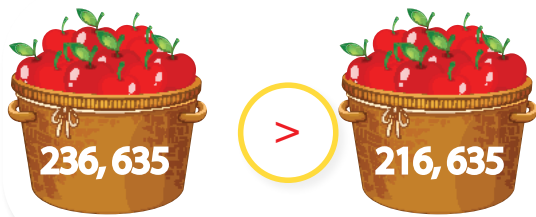
| Number | Round to the nearest thousands | Round to the nearest hundreds |
|----------------------|--------------------------------|-------------------------------|
| <u>7</u> 4 3 , 8 3 2 | 744,000 | 743,800 |
| <u>3</u> 0 8 , 1 7 6 | 308,000 | 308,200 |
| <u>8</u> 3 9 , 8 5 0 | 840,000 | 839,900 |

- Write the value of the underlined number.

651,683 = 650,000 364,477 = 400,000
 310,972 = 311,000 431,543 = 431,540



Use the symbols $>$, $<$, $=$.



Arrange in ascending order.

532,736

987,418

73,677

522,948

73,677

532,736

987,418

5,229,487

Rearrange in expanded form.

1 $40,000 + 9 + 700,000 + 0 + 2,000 + 50 = 742,059$
 $700,000 + 40,000 + 2,000 + 50 + 9 + 0$

2 $2,000 + 30 + 90,000 + 500,000 + 500 + 7 = 592,537$

$500,000 + 90,000 + 2,000 + 500 + 30 + 7 = 592,537$



Write in expanded form.

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

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

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

Add or subtract the following numbers.

$$\begin{array}{r} 243,118 \\ + 612,741 \\ \hline \end{array}$$

855,859

$$\begin{array}{r} 854,167 \\ - 481,959 \\ \hline \end{array}$$

372,208

$$\begin{array}{r} 141,321 \\ + 311,606 \\ \hline \end{array}$$

452,927

$$\begin{array}{r} 614,012 \\ - 489,361 \\ \hline \end{array}$$

124,651

Subtract, then check your answers.

$$\begin{array}{r} 975,672 \\ - 589,862 \\ \hline \end{array}$$

358,810

Check your answer:



975,672

$$\begin{array}{r} 507,607 \\ - 21,649 \\ \hline \end{array}$$

485,958

Check your answer:



507,607



Find the mistakes then correct them.

$$\begin{array}{r} 658,389 \\ + 2,567 \\ \hline \end{array}$$

$$\begin{array}{r} 658,389 \\ + 2,567 \\ \hline \end{array}$$

660,956

$$\begin{array}{r} 834,899 \\ - 368,709 \\ \hline \end{array}$$

$$\begin{array}{r} 834,899 \\ - 368,709 \\ \hline \end{array}$$

534,190

466,190

Unit 2

Multiplication and Division





Vocabulary

- Multiplication
- Repeated addition
- Factor
- Product
- Factor Tree
- Multiple of a number
- Division
- Dividend
- Divisor
- Quotient
- Remainder



Objectives

- Multiply numbers of 3-digits by 1-digit using different methods.
- Solve multiplication and division problems in given contexts.
- Identify multiples and factors.
- Use patterns to multiply digits that are multiples of 10.
- Divide numbers of 3-digits by 1-digit.

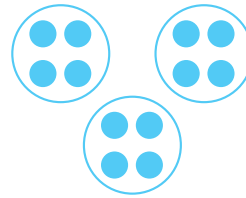


⊙ — (2-1) Multiplication

Multiplication is repeated addition.

$$3 \times 4 = 4 + 4 + 4 = 12$$

(3 times 4)



(3 groups of 4)

6 (Factor) ▶ Find the 6-row

× 7 (Factor) ▶ Find the 7-column

42 (Product) ▶ The product is where the 6-row and the 7-column meet.

| x | 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 |

⊙ Find the patterns.

$$8 \times 1 = 8$$

$$8 \times 10 = 80$$

$$8 \times 100 = 800$$

$$8 \times 1,000 = 8,000$$

What pattern do you notice?

What about 8×20 ?



⊙ Multiply.

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

24

$$\begin{array}{r} 9 \\ \times 3 \\ \hline \end{array}$$

27

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

36

$$\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$$

35

$$\begin{array}{r} 10 \\ \times 2 \\ \hline \end{array}$$

20

$$\begin{array}{r} 30 \\ \times 3 \\ \hline \end{array}$$

90

$$\begin{array}{r} 200 \\ \times 4 \\ \hline \end{array}$$

800



Example.

Step 1



$$\begin{array}{r} 34 \\ \times 2 \\ \hline \end{array}$$

Step 2



Arrange digits in columns according to place value

$$\begin{array}{r} 34 \\ \times 2 \\ \hline \end{array}$$

Step 3



Multiply 2 by 4 ones
($2 \times 4 = 8$)

$$\begin{array}{r} 34 \\ \times 2 \\ \hline \textcircled{8} \end{array}$$

Step 4



Multiply 2 by 3 tens
($2 \times 30 = 60$)

$$\begin{array}{r} 34 \\ \times 2 \\ \hline \textcircled{6}8 \end{array}$$

Multiply.

$$\begin{array}{r} 69 \\ \times 1 \\ \hline \end{array}$$

69

$$\begin{array}{r} 22 \\ \times 2 \\ \hline \end{array}$$

44

$$\begin{array}{r} 11 \\ \times 5 \\ \hline \end{array}$$

55

$$\begin{array}{r} 31 \\ \times 3 \\ \hline \end{array}$$

93

$$\begin{array}{r} 10 \\ \times 4 \\ \hline \end{array}$$

40

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

46

$$\begin{array}{r} 21 \\ \times 4 \\ \hline \end{array}$$

84

$$\begin{array}{r} 20 \\ \times 3 \\ \hline \end{array}$$

60



① (2-2) Multiplication of 2-Digits by 1-Digit (with regrouping)

$$\begin{array}{r} \textcircled{1} \\ 43 \\ \times 6 \\ \hline 8 \end{array} \quad (6 \times 3 = 18)$$

$$\begin{array}{r} \textcircled{1} \\ 43 \\ \times 6 \\ \hline 258 \end{array} \quad \begin{array}{l} (40 \times 6 = 240) \\ (240 + 10 = 250) \end{array}$$

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

$$\begin{array}{r} \textcircled{6} \\ 57 \\ \times 9 \\ \hline 3 \end{array} \quad (9 \times 7 = 63) \\ \text{regroup 6}$$

$$\begin{array}{r} \textcircled{6} \\ 57 \\ \times 9 \\ \hline 513 \end{array} \quad \begin{array}{l} (9 \times 50 = 450) \\ 450 + 60 = 510 \end{array}$$

$$\begin{array}{r} 57 \\ \times 9 \\ \hline 513 \end{array}$$

① Find the product.

$$\begin{array}{r} 30 \\ \times 8 \end{array}$$

240

$$\begin{array}{r} 58 \\ \times 3 \end{array}$$

174

$$\begin{array}{r} 54 \\ \times 4 \end{array}$$

216

$$\begin{array}{r} 72 \\ \times 6 \end{array}$$

432

$$\begin{array}{r} 93 \\ \times 6 \end{array}$$

558

$$\begin{array}{r} 80 \\ \times 6 \end{array}$$

480



Multiplication of 3-Digits by 1-Digit

$$\begin{array}{r} ^3 \\ 538 \\ \times 4 \\ \hline 2 \end{array}$$

Multiply 4
by 8 ones
($4 \times 8 = 32$)
Regroup

$$\begin{array}{r} ^1 ^3 \\ 538 \\ \times 4 \\ \hline 52 \end{array}$$

Multiply 4 by 3
tens
($4 \times 3 = 12$ tens)
Add 1
($12 + 3 = 15$ tens)
Regroup 1

$$\begin{array}{r} ^1 ^3 \\ 538 \\ \times 4 \\ \hline 2152 \end{array}$$

Multiply 4 by 5 hundreds
($4 \times 5 = 20$ hundreds)
($20 + 1 = 21$ hundreds)
Regroup

$$\begin{array}{r} 538 \\ \times 4 \\ \hline 2152 \end{array}$$

Practice.

$$\begin{array}{r} 273 \\ \times 5 \\ \hline \end{array}$$

1,365

$$\begin{array}{r} 234 \\ \times 8 \\ \hline \end{array}$$

1,872

$$\begin{array}{r} 580 \\ \times 2 \\ \hline \end{array}$$

1,160

$$\begin{array}{r} 300 \\ \times 4 \\ \hline \end{array}$$

1,200

$$\begin{array}{r} 732 \\ \times 9 \\ \hline \end{array}$$

6,588

$$\begin{array}{r} 801 \\ \times 4 \\ \hline \end{array}$$

3,204

Find the missing numbers.

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

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

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

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

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

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

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

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



⊙ — (2-3) Multiplication of 2-Digits by 2-Digits

1 First, multiply 3×54
 $(3 \times 4 = 12)$ regroup 1
 $(3 \times 5 = 15 \text{ tens})(15 + 1 = 16 \text{ ten})$
 so, $3 \times 54 = 162$

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

1 Then, multiply 20×54 , and
 put the result underneath
 162 .
 so, $20 \times 54 = 1080$

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

Finally, add the partial products

1

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

1

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

1

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

⊙ Multiply.

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

$$\begin{array}{r} 41 \\ \times 33 \\ \hline 123 \\ + 1230 \\ \hline 1,353 \end{array}$$

$$\begin{array}{r} 89 \\ \times 54 \\ \hline 356 \\ + 4450 \\ \hline 4,806 \end{array}$$

$$\begin{array}{r} 73 \\ \times 40 \\ \hline 00 \\ + 2920 \\ \hline 2,920 \end{array}$$

$$\begin{array}{r} 79 \\ \times 81 \\ \hline 79 \\ + 6,320 \\ \hline 6,399 \end{array}$$

$$\begin{array}{r} 86 \\ \times 62 \\ \hline 172 \\ + 5160 \\ \hline 5,332 \end{array}$$

Partial Product method.

Find $\begin{array}{r} 41 \\ \times 23 \\ \hline \end{array}$

- **Step 1:** multiply one digit at a time to get the product.
- **Step 2:** list all the partial products.
- **Step 3:** add them all together.

$$\begin{array}{r} 41 \\ \times 23 \\ \hline 3 \\ 120 \\ \hline 20 \\ 800 \\ \hline 943 \end{array}$$

$\left. \begin{array}{l} 3 \times 1 = 3 \\ 3 \times 40 = 120 \end{array} \right\}$ Multiply by **ones**
 $\left. \begin{array}{l} 20 \times 1 = 20 \\ 20 \times 40 = 800 \end{array} \right\}$ Multiply by **tens**
 Add the **partial products** to get the answer

Find the product.

| | | | |
|--|--|--|--|
| $\begin{array}{r} 65 \\ \times 34 \\ \hline \end{array}$ | $\begin{array}{r} 26 \\ \times 37 \\ \hline \end{array}$ | $\begin{array}{r} 52 \\ \times 64 \\ \hline \end{array}$ | $\begin{array}{r} 53 \\ \times 72 \\ \hline \end{array}$ |
| $\begin{array}{r} \boxed{2}\boxed{0} \quad 4 \times 5 \\ \boxed{2}\boxed{4}\boxed{0} \quad 4 \times 60 \\ \boxed{1}\boxed{5}\boxed{0} \quad 30 \times 5 \\ + \boxed{1}\boxed{8}\boxed{0}\boxed{0} \quad 30 \times 60 \\ \hline 2210 \end{array}$ | $\begin{array}{r} \boxed{4}\boxed{2} \quad 7 \times 6 \\ \boxed{1}\boxed{4}\boxed{0} \quad 7 \times 20 \\ \boxed{1}\boxed{8}\boxed{0} \quad 30 \times 6 \\ + \boxed{6}\boxed{0}\boxed{0} \quad 30 \times 20 \\ \hline 962 \end{array}$ | $\begin{array}{r} \boxed{8} \quad 4 \times 2 \\ \boxed{2}\boxed{0}\boxed{0} \quad 4 \times 50 \\ \boxed{1}\boxed{2}\boxed{0} \quad 60 \times 2 \\ + \boxed{3}\boxed{0}\boxed{0}\boxed{0} \quad 60 \times 50 \\ \hline 3,328 \end{array}$ | $\begin{array}{r} \boxed{6} \quad 2 \times 3 \\ \boxed{1}\boxed{0}\boxed{0} \quad 2 \times 50 \\ \boxed{2}\boxed{1}\boxed{0} \quad 70 \times 3 \\ + \boxed{3}\boxed{5}\boxed{0}\boxed{0} \quad 70 \times 50 \\ \hline 3,816 \end{array}$ |

Your Work

Choose one of the numbers below and multiply.

$657 \times 98 =$

$64,386$

$537 \times 35 =$

$18,795$

$245 \times 29 =$

$7,105$

$943 \times 48 =$

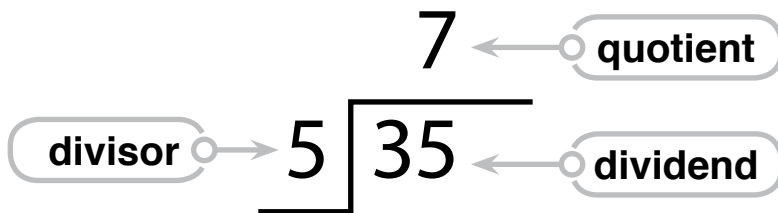
$45,264$

— (2-4) Division

Division is the opposite of multiplication.

- since $3 \times 6 = 18$ then $18 \div 3 = 6$ and $18 \div 6 = 3$
- since $4 \times 7 = 28$ then $28 \div 4 = 7$ and $28 \div 7 = 4$

| 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 |



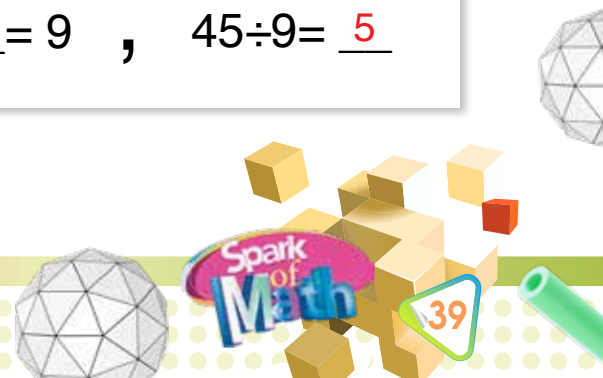
- Using the multiplication table, find the number 35 in the -5row, the quotient is the number at the beginning of the column.

- Find the missing numbers.

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

$$7 \times \underline{6} = 42 \quad , \quad \underline{6} \times 7 = 42 \quad , \quad 42 \div 7 = \underline{6} \quad , \quad \underline{42} \div 6 = 7$$

$$\underline{5} \times 9 = 45 \quad , \quad 9 \times \underline{5} = 45 \quad , \quad 45 \div \underline{5} = 9 \quad , \quad 45 \div 9 = \underline{5}$$



Use the multiplication table to find the answer.

$$\begin{array}{r} 9 \\ 3 \overline{) 27} \end{array}$$

Inverse Operation

$$3 \times 9 = 27$$

$$\begin{array}{r} 4 \\ 8 \overline{) 32} \end{array}$$

$$8 \times 4 = 32$$

$$\begin{array}{r} 6 \\ 4 \overline{) 24} \end{array}$$

$$4 \times 6 = 24$$

$$\begin{array}{r} 9 \\ 7 \overline{) 63} \end{array}$$

$$7 \times 9 = 63$$

$$\begin{array}{r} 8 \\ 9 \overline{) 72} \end{array}$$

$$9 \times 8 = 72$$

$$\begin{array}{r} 05 \\ 7 \overline{) 39} \\ - 35 \\ \hline 4 \end{array} \leftarrow \text{remainder}$$

Number 7 goes into 39 five times

$$39 \div 7 = 5 \text{ r}4$$

$$\begin{array}{r} 06 \\ 4 \overline{) 26} \\ - 24 \\ \hline 2 \end{array} \leftarrow \text{remainder}$$

Number 26 can't be divided by 4 evenly (not a multiple of 4)

4 goes into 26 six times

$$26 \div 4 = 6 \text{ r}2$$



○ **Divide.**

$$\begin{array}{r} 06 \\ 3 \overline{) 20} \\ \underline{0} \\ 20 \\ - 18 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 09 \\ 4 \overline{) 37} \\ \underline{0} \\ 37 \\ - 36 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 09 \\ 6 \overline{) 54} \\ \underline{0} \\ 54 \\ - 54 \\ \hline 00 \end{array}$$

$$\begin{array}{r} 03 \\ 7 \overline{) 22} \\ \underline{0} \\ 22 \\ - 21 \\ \hline 01 \end{array}$$

$$\begin{array}{r} 06 \\ 8 \overline{) 52} \\ \underline{0} \\ 52 \\ - 48 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 09 \\ 9 \overline{) 81} \\ \underline{0} \\ 81 \\ - 81 \\ \hline 00 \end{array}$$

Your Work

○ How many sevens into 45?

○ How many fives into 36?

$$\begin{array}{r} 06 \\ 7 \overline{) 45} \\ \underline{0} \\ 45 \\ - 42 \\ \hline 03 \end{array}$$

7 goes into 45 six times

$$\begin{array}{r} 07 \\ 5 \overline{) 36} \\ \underline{0} \\ 36 \\ - 35 \\ \hline 01 \end{array}$$

7.5

5 goes into 36 seven times



⊙ (2-5) Division up to 3-Digits by 1-Digit

Steps to long division to find $856 \div 4$

First find
 $8 \div 4$

$$\begin{array}{r} 2 \\ 4 \overline{) 856} \\ \underline{8} \\ 0 \end{array}$$

Multiply $2 \times 4 = 8$
Subtract $8 - 8 = 0$
Bring down 5

$$\begin{array}{r} 2 \\ 4 \overline{) 856} \\ \underline{- 8} \\ 05 \end{array}$$

Divide $5 \div 4 = 1$
Multiply $1 \times 4 = 4$
Subtract $5 - 4 = 1$
Bring down 6

$$\begin{array}{r} 21 \\ 4 \overline{) 856} \\ \underline{- 8} \\ 05 \\ \underline{- 4} \\ 16 \end{array}$$

Divide $16 \div 4 = 4$
Multiply $4 \times 4 = 16$
Subtract $16 - 16 = 0$

$$\begin{array}{r} 214 \\ 4 \overline{) 856} \\ \underline{- 8} \\ 05 \\ \underline{- 4} \\ 16 \\ \underline{- 16} \\ 0 \end{array}$$

The answer is 214 with no remainder

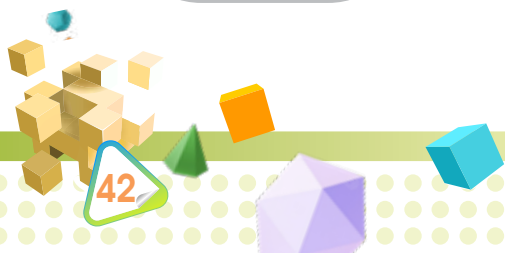
⊙ Divide.

$$\begin{array}{r} 302r2 \\ 3 \overline{) 908} \\ \underline{9} \\ 00 \\ \underline{- 00} \\ 008 \\ \underline{- 6} \\ 2 \end{array}$$

$$\begin{array}{r} 112 \\ 6 \overline{) 674} \\ \underline{6} \\ 07 \\ \underline{6} \\ 14 \\ \underline{12} \\ 02 \end{array}$$

$$\begin{array}{r} 116 \\ 7 \overline{) 816} \\ \underline{7} \\ 11 \\ \underline{7} \\ 46 \\ \underline{42} \\ 04 \end{array}$$

$$\begin{array}{r} 087 \\ 9 \overline{) 785} \\ \underline{0} \\ 78 \\ \underline{72} \\ 065 \\ \underline{63} \\ 002 \end{array}$$



Division with zeros pattern.

When there are zeros at the right of the dividend, you can simply divide the non-zero digits and then add the zeros.

Example:

$$900 \div 3 = 300$$



$$9 \div 3 = 3 \longrightarrow 900 \div 3 = 300$$

$$8000 \div 2 = \boxed{}$$

$$8 \div 2 = 4 \longrightarrow 8000 \div 2 = 4000$$

Divide.

$$160 \div 4 = 40$$

$$12,000 \div 3 = 4,000$$

$$630,000 \div 7 = 90,000$$

$$25,000 \div 5 = 5,000$$

Challenge: Can you find the pattern?

$$100 \div 5 = 20$$

$$1,000 \div 50 = 100 \div 50 = 2 \quad / \quad 20$$

$$10,000 \div 500 = 1000 \div 500 = 2 \quad / \quad 20$$

$$100,000 \div 5,000 = 1,000 \div 5,000 = 2 \quad / \quad 20$$

The pattern is that you can take away the zeros if they are at the end of the divisors and dividend.



● Fill in the missing numbers.

$$\begin{array}{r}
 18 \\
 5 \overline{) 92} \\
 \underline{- 5} \\
 42 \\
 \underline{- 40} \\
 R \ 2
 \end{array}$$

$$\begin{array}{r}
 25 \\
 2 \overline{) 51} \\
 \underline{- 4} \\
 11 \\
 \underline{- 10} \\
 R \ 1
 \end{array}$$

$$\begin{array}{r}
 11 \\
 3 \overline{) 33} \\
 \underline{- 3} \\
 03 \\
 \underline{- 0} \\
 R \ 0
 \end{array}$$

$$\begin{array}{r}
 10 \\
 9 \overline{) 92} \\
 \underline{- 9} \\
 02 \\
 \underline{- 00} \\
 R \ 2
 \end{array}$$

Your Work

● Divide: $26000 \div 2 =$

● Write a 3-digit number that can be divided by the number 6 with NO remainder, and then finish the long division.

$$\begin{array}{r}
 056 \\
 6 \overline{) 336} \\
 \underline{0} \\
 33 \\
 \underline{30} \\
 036 \\
 \underline{36} \\
 00
 \end{array}$$

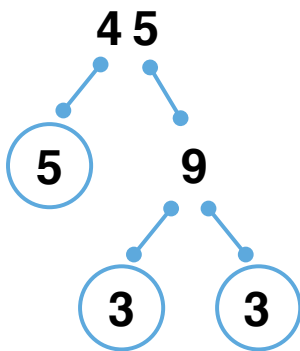
$$336 \div 6 = 56$$



2-6 Understanding Factors and Multiples

Factors are numbers that you can multiply to get a product. We can visually represent them in a diagram called a Factor Tree.

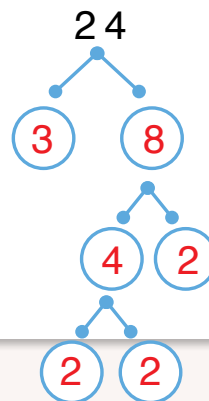
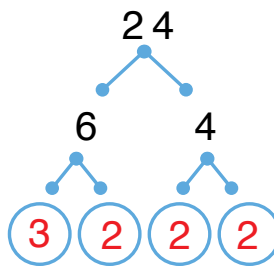
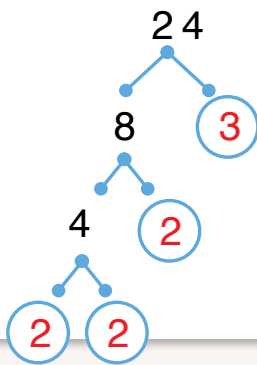
Example:



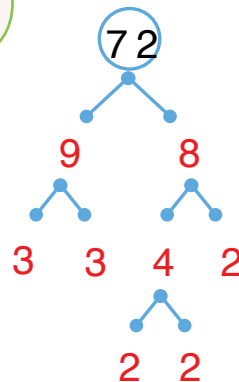
The factors of 45 are:
 $5 \times 3 \times 3$

If you multiply
 $5 \times 3 \times 3$ you get 45.

The factors of 24 are:



Factor Tree of 72 are:



The factors of 72 are:
 $2 \times 2 \times 2 \times 3 \times 3$



The multiple of a number is the product from multiplying a number with a whole number.

Therefore, the multiple of a number is a skip counting number. To find the first five multiples of 7:

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

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

- Circle the numbers that are multiples of 7.

1 7 14 17 21 27 35

- Circle the numbers that are multiples of 8.

38 40 45 49 64 72 81

- Find five multiples of 6.

12, 24, 30, 36

- Are multiples of 4 always even? Explain.

yes, because all multiples of 4 can be divided by 2 with no remainder.

- Are multiples of 3 always odd? Explain.

No., multiples of 3 are only odd when they multiplied by an odd remainder.



(2-7) Problem Solving



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

$$23 \times 3 = 69$$

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

$$20 \times 12 = 240$$



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

$$126 \div 3 = 42$$



- 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 amount of books?

$$63 \div 9 = 7$$



Show Your Turn

Multiply.

$$\begin{array}{r} 29 \\ \times 8 \\ \hline \end{array}$$

232

$$\begin{array}{r} 34 \\ \times 5 \\ \hline \end{array}$$

170

$$\begin{array}{r} 427 \\ \times 6 \\ \hline \end{array}$$

2,562

$$\begin{array}{r} 408 \\ \times 3 \\ \hline \end{array}$$

1,224

$$\begin{array}{r} 69 \\ \times 40 \\ \hline \end{array}$$

2,760

$$\begin{array}{r} 87 \\ \times 27 \\ \hline \end{array}$$

2,349

$$\begin{array}{r} 61 \\ \times 31 \\ \hline \end{array}$$

1,891

$$\begin{array}{r} 72 \\ \times 68 \\ \hline \end{array}$$

4,896

Solve.

$7^3 =$

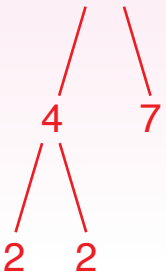
$7 \times 7 \times 7 = 49 \times 7 = 343$

$9^2 =$

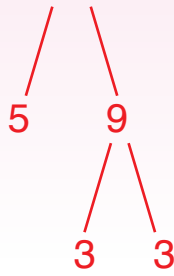
$9 \times 9 = 81$

Find the factors of each number.

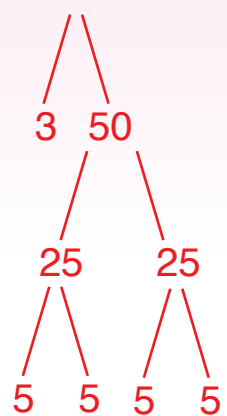
28



45



150



Write the missing number in the .

$$\begin{array}{r} \boxed{4}9\text{ r } \boxed{2} \\ 6 \overline{) 296} \\ \underline{-29} \\ 5\boxed{6} \\ \underline{-54} \\ 2 \end{array}$$

$$\begin{array}{r} \boxed{5}\boxed{0}\text{ r } 8 \\ 9 \overline{) 458} \\ \underline{-45} \\ 0\boxed{8} \\ \underline{-00} \\ 8 \end{array}$$

$$\begin{array}{r} 3\boxed{9}\text{ r } \boxed{3} \\ 4 \overline{) 159} \\ \underline{12} \\ 39 \\ \underline{-36} \\ 3 \end{array}$$

$$\begin{array}{r} \boxed{8}\boxed{1}\text{ r } \boxed{6} \\ 8 \overline{) 654} \\ \underline{64} \\ 1\boxed{4} \\ \underline{-8} \\ 6 \end{array}$$

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

$$540 \times 6 = 3,240$$

Unit 3



Fractions



Vocabulary



- Fractions
- Numerator
- Denominator
- Equivalent fractions
- Simple fraction
- Simplest form
- Reciprocal
- Inversion



Objectives

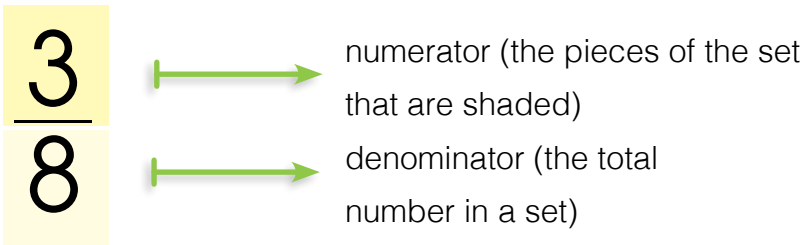


- Identify the numerator and denominator of a fraction.
- Represent a fraction as part of a whole or part of a set.
- Identify simple and compound fractions.
- Determine whether two fractions are equivalent.
- Compare fractions.

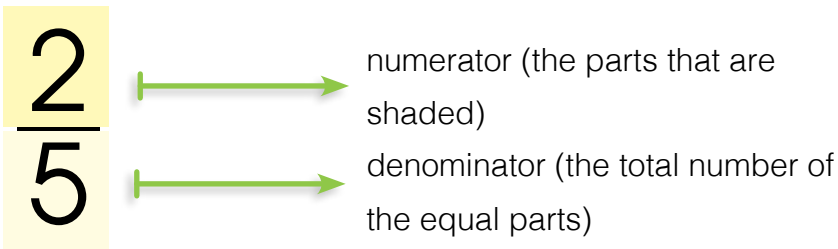
(3-1) Equivalent Fractions

What is a fraction?

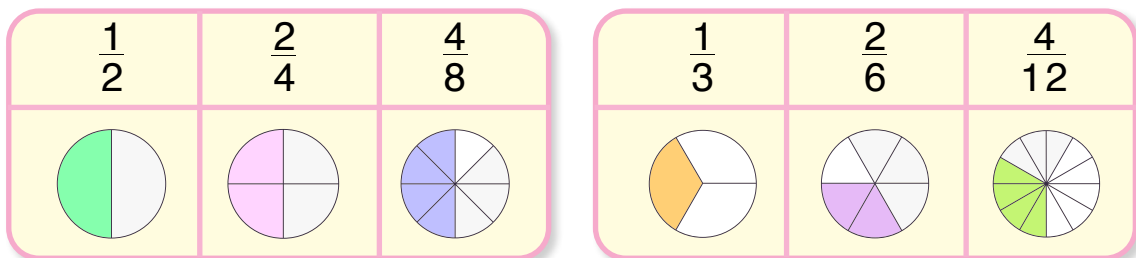
- A fraction is a part of a set.



- A fraction is a part of a whole.



- Equivalent fractions** means that the fractions are equal in value.



- To find the equivalent fractions:

$$\frac{1}{2} \xrightarrow{\times 2} \frac{2}{4}$$

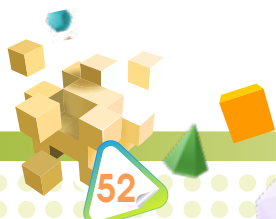
Multiply the numerator and the denominator by the same number.

We say $\frac{1}{2}$ is in its
simplest form

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

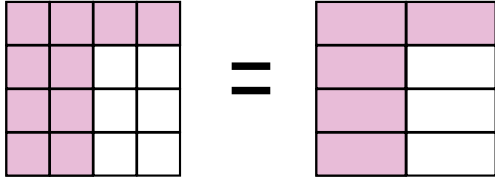
Divide the numerator and the denominator by the same number.

We say $\frac{1}{3}$ is in its
simplest form

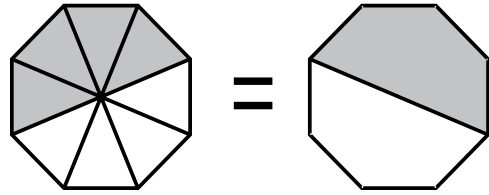


- Find the equivalent fraction and shade the graph accordingly.

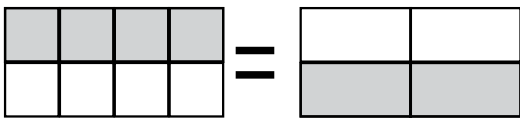
$$\frac{10}{16} = \frac{5}{8}$$



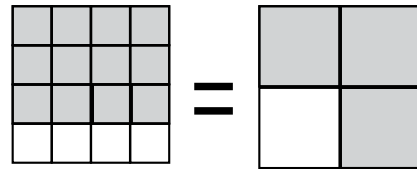
$$\frac{4}{8} = \frac{1}{2}$$



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



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



- Find the equivalent fractions.

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

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

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

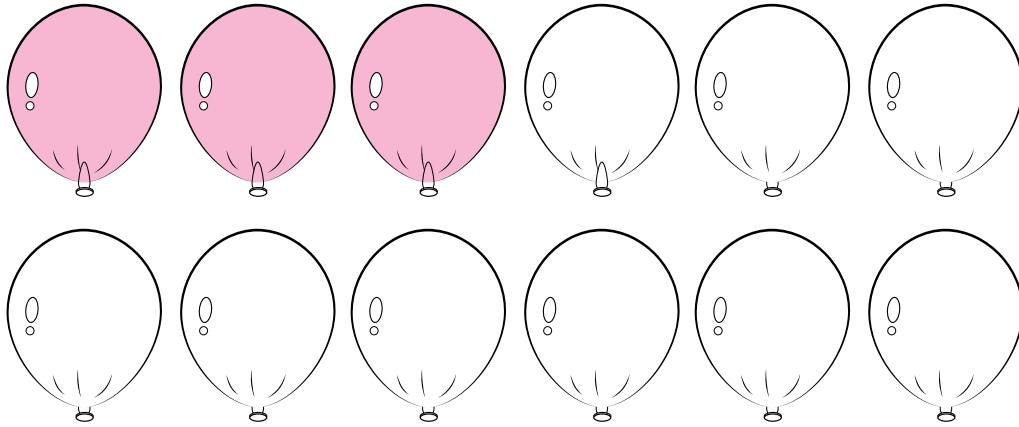
$$\frac{9}{12} = \frac{3}{4}$$

$$\frac{10}{12} = \frac{5}{6}$$

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

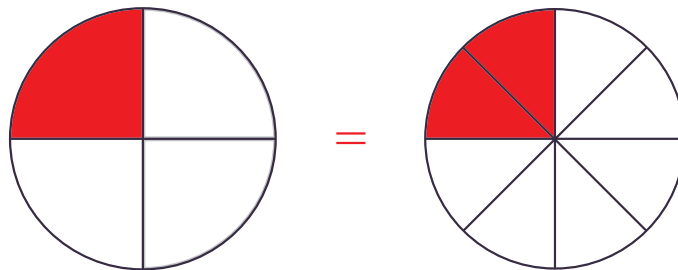
Look at the balloons and color the $\frac{1}{4}$ in red.

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

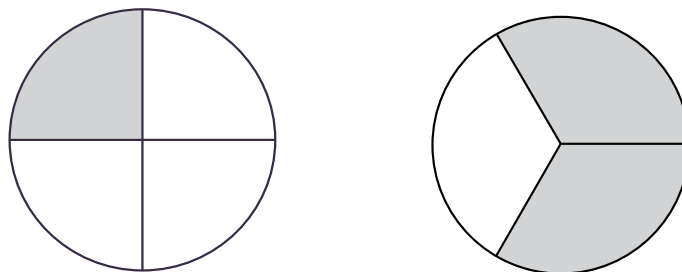


Draw a model of two equivalent fractions, and another for two non-equivalent fractions.

The equivalent fractions

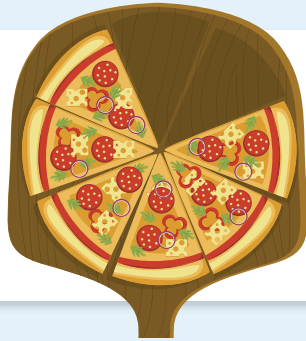


The non-equivalent fractions

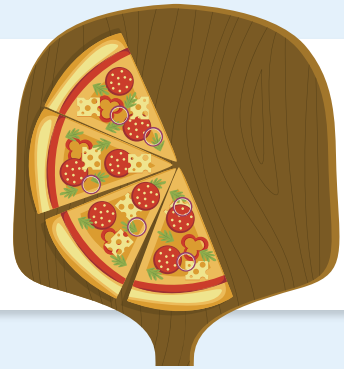


(3-2) Comparing Fractions

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.

To compare fractions with like denominators, just look at the numerators.

Compare using ($<$, $>$, $=$).

$$\frac{3}{4} > \frac{1}{4}$$

$$\frac{5}{8} < \frac{7}{8}$$

$$\frac{2}{5} > \frac{1}{5}$$

$$\frac{4}{6} < \frac{5}{6}$$

$$\frac{7}{9} > \frac{4}{9}$$

$$\frac{3}{7} < \frac{5}{7}$$

$$\frac{6}{11} > \frac{5}{11}$$

$$\frac{7}{10} < \frac{8}{10}$$

$$\frac{3}{15} < \frac{8}{15}$$

$$\frac{12}{12} > \frac{9}{12}$$

$$\frac{6}{11} > \frac{5}{11}$$

$$\frac{5}{7} = \frac{5}{7}$$

Comparing fractions with different denominators.

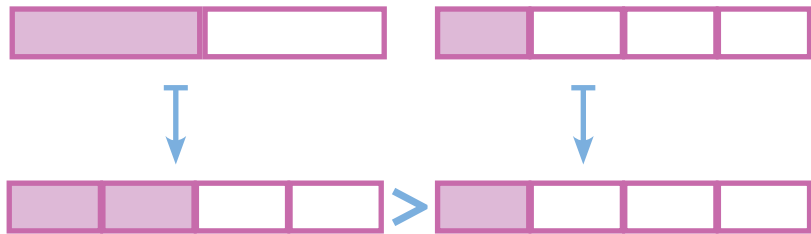
$$\frac{1}{2} \square \frac{1}{4}$$



Therefore,

$$\frac{2}{4} \square > \frac{1}{4}$$

$$\frac{1}{2} \times \frac{2}{2} = \frac{2}{4} \text{ using equivalent fractions}$$



To compare fractions with different denominators you must use the equivalent fraction to get like denominators.

Compare the fractions using $>$, $<$ or $=$.

$$\frac{1}{3} < \frac{7}{9}$$

$$\frac{1}{2} < \frac{3}{4}$$

$$\frac{4}{16} < \frac{4}{8}$$

$$\frac{2}{9} < \frac{2}{3}$$

$$\frac{1}{2} > \frac{2}{6}$$

$$\frac{31}{42} > \frac{26}{42}$$

$$\frac{3}{5} > \frac{6}{10}$$

$$\frac{1}{6} < \frac{3}{6}$$

$$\frac{1}{8} < \frac{3}{4}$$



● Arrange $\frac{1}{2}, \frac{1}{3}, \frac{5}{6}$ in ascending order.

You need to find the equivalent fractions.

Place these fractions in ascending order:

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

↓ ↓ ↓

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

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

● Arrange in descending order.

$$\frac{1}{2}, \frac{7}{16}, \frac{3}{4}, \frac{5}{8} \longrightarrow \frac{10}{16} < \frac{8}{16} < \frac{7}{16} < \frac{12}{16}$$

↓ ↓ ↓ ↓

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

$$\frac{3}{4}, \frac{7}{12}, \frac{2}{3}, \frac{1}{2} \longrightarrow \frac{9}{12} < \frac{8}{12} < \frac{7}{12} < \frac{6}{12}$$

↓ ↓ ↓ ↓

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



3-3 Adding and Subtracting Fractions

The sum:

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

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

The difference:

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

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

To add or subtract fractions with the SAME denominator, just add up the numerators, and the denominators will stay the same.

Add the following fractions.

1

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

2

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

3

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

4

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

5

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

6

$$\frac{9}{18} + \frac{3}{18} = \frac{13}{18}$$

7

$$\frac{4}{35} + \frac{3}{35} = \frac{31}{35}$$

8

$$\frac{4}{12} + \frac{7}{12} = \frac{15}{12}$$



● Subtract the following fractions.

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

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

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

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

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

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

$$\frac{14}{18} - \frac{3}{18} = \frac{11}{18}$$

$$\frac{10}{12} - \frac{3}{12} = \frac{7}{12}$$

● Find.

$$\frac{7}{16} + \frac{12}{16} = \frac{19}{16}$$

$$\frac{7}{35} + \frac{7}{35} = \frac{14}{35}$$

$$\frac{9}{40} + \frac{7}{40} = \frac{16}{40}$$

$$\frac{7}{18} - \frac{3}{18} = \frac{4}{18}$$

$$\frac{16}{20} - \frac{5}{20} = \frac{11}{20}$$

$$\frac{11}{24} - \frac{4}{24} = \frac{7}{24}$$

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

Example.

$$\frac{3}{3} = 1$$



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

$$\frac{1}{4} + \left(\frac{3}{4}\right) = 1$$

$$\frac{3}{7} + \left(\frac{4}{7}\right) = 1$$

$$\frac{2}{5} + \left(\frac{3}{5}\right) = 1$$

$$\frac{10}{11} + \left(\frac{1}{11}\right) = 1$$

$$\frac{15}{20} + \left(\frac{5}{20}\right) = 1$$

- Draw your model to show the resulting fraction.

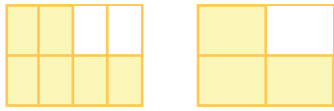
$$\frac{8}{10} + \frac{1}{10} = \frac{9}{10}$$

$$\frac{8}{10} + \frac{1}{10} = \frac{9}{10}$$

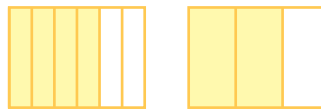


Show Your Turn

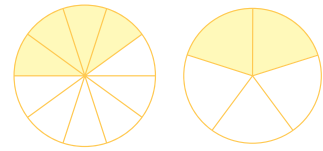
● Shade the graph according to the equivalent fraction.



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



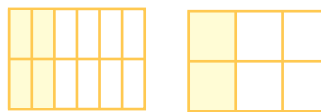
$$\frac{4}{6} = \frac{1}{3}$$



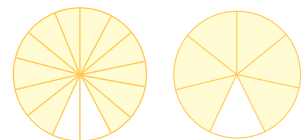
$$\frac{4}{10} = \frac{2}{5}$$



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



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



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

● Compare the fractions and write the correct symbol in the box ($>$, $<$ or $=$).

$$\frac{1}{7} < \frac{3}{14}$$

$$\frac{3}{8} > \frac{2}{4}$$

$$\frac{4}{16} < \frac{4}{8}$$

$$\frac{2}{9} > \frac{1}{18}$$

$$\frac{1}{3} > \frac{4}{15}$$

$$\frac{1}{12} < \frac{2}{6}$$

$$\frac{1}{3} < \frac{2}{3}$$

$$\frac{1}{10} < \frac{3}{10}$$

$$\frac{2}{5} < \frac{2}{3}$$

● Add or subtract.

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

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

$$\frac{9}{18} - \frac{4}{18} = \frac{9}{18} - \frac{8}{18} = \frac{1}{18}$$

$$\frac{3}{6} + \frac{1}{6} = \frac{4}{6} + \frac{1}{6} = \frac{5}{6}$$

$$\frac{5}{24} - \frac{3}{24} = \frac{20}{24} - \frac{3}{24} = \frac{17}{24}$$

$$\frac{7}{36} + \frac{5}{36} = \frac{7}{36} + \frac{2}{36} = \frac{27}{36}$$

$$\frac{8}{24} + \frac{6}{24} = \frac{8}{24} + \frac{12}{24} = \frac{20}{24}$$

$$\frac{5}{30} + \frac{4}{30} = \frac{10}{30} + \frac{4}{30} = \frac{14}{30}$$

$$\frac{23}{24} - \frac{9}{24} = \frac{23}{48} - \frac{18}{48} = \frac{5}{48}$$

$$\frac{11}{22} - \frac{5}{22} = \frac{11}{22} - \frac{10}{22} = \frac{1}{22}$$



Which of these sets of fractions are arranged in ascending order?

• $\frac{1}{7}, \frac{5}{7}, \frac{3}{7}$

• $\frac{2}{4}, \frac{2}{2}, \frac{2}{8}$

• $\frac{4}{10}, \frac{5}{10}, \frac{3}{10}$

• $\frac{1}{18}, \frac{3}{18}, \frac{4}{18}, \frac{5}{18}$

Circle the greatest fraction.

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

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

Circle the equivalent fraction.

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

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

Arrange in descending order.

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

$\frac{9}{12}, \frac{24}{32}, \frac{2}{4}, \frac{5}{20}$



Unit 4



Measurement



Vocabulary

- Length measuring units:
- Kilometer (km)
- Meter (m)
- Decimeter (dm)
- Centimeter (cm)
- Millimeter (mm)
- Perimeter
- Area
- Compound shapes



Objectives

- Convert length measurement units.
- Calculate the perimeter of a polygon.
- Calculate the perimeter of a square, a rectangle and compound shapes.
- Use area and perimeter to solve problems.



(4-1) Length Measuring Units

Kilometer (km)

is a length unit used to measure very large lengths; such as lands, streets and distance between cities and countries.

Meter (m)

is used to measure large lengths, such as rooms, heights and playgrounds.

Centimeter (cm)

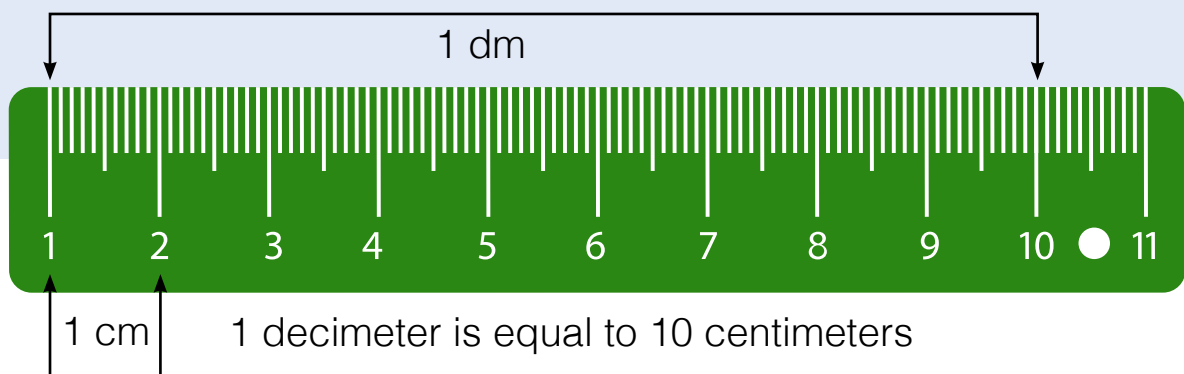
is used to measure small lengths, such as paper, book, bag and toys.

Millimeter (mm)

is used to measure very small lengths, such as insects, paper clips and rubber.

Decimeter (dm)

is a length unit that is a tenth of a meter. Therefore, $10 \text{ dm} = 1 \text{ meter}$ and is ten times a centimeter. Therefore, $10 \text{ cm} = 1 \text{ dm}$.



• $1 \text{ km} = 1000 \text{ m}$

• $1 \text{ m} = 10 \text{ dm}$

• $1 \text{ m} = 100 \text{ cm}$

• $1 \text{ m} = 1000 \text{ mm}$



● Circle the suitable unit of length.



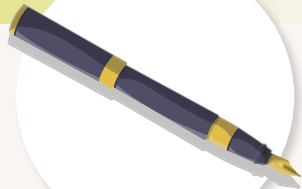
The length of a car
3km, 3m



The length of an ant
5m, 5mm



The length of a book
1dm, 1mm



The length of a pen
15m, 15cm



The length of a glass
1dm, 1km

● Complete the blank.

- 23 cm = 230 mm ($23 \times 10 = 230$)
- 4m = 400 cm ($4 \times 100 = 400$)
- 11 dm = 1100 mm ($11 \times 100 = 1100$)
- 7km = 7000 m ($7 \times 1000 = 7000$)

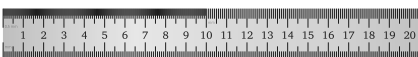
● Complete.



The length of the lollipop is 5 cm.



The length of the pencil is 10 dm.



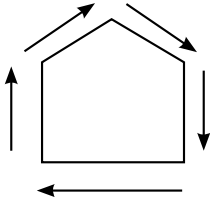
The length of the candy is 20 mm.



4-2 Measuring Perimeter

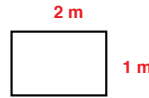
Presenting a Perimeter

A perimeter is the distance around a figure.



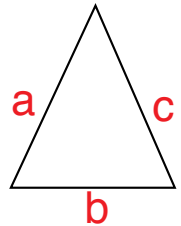
Calculating a Perimeter

To find the perimeter add the length of each side together.



$$P = 1 + 1 + 2 + 2 = 6 \text{ m}$$

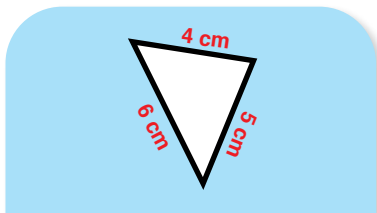
Formula



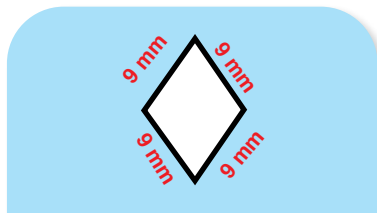
$$P = a + b + c$$

- A perimeter is measured in units of lengths such as centimeters, meters, kilometers, etc.

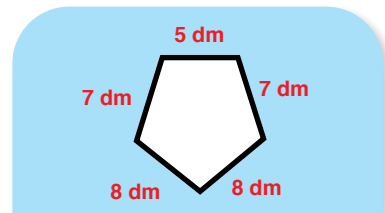
Find the perimeter of each shape.



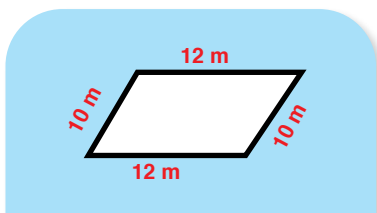
$$4 + 5 + 6 = 15 \text{ cm}$$



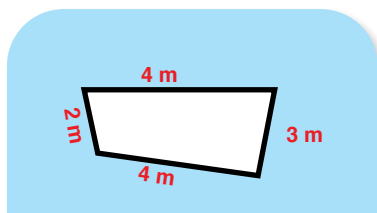
$$9 + 9 + 9 + 9 = 36 \text{ mm}$$



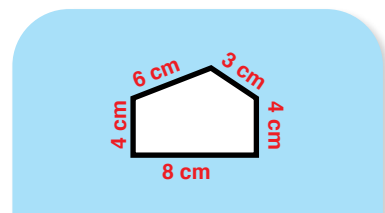
$$5 + 7 + 8 + 8 + 7 = 35 \text{ dm}$$



$$10 + 10 + 12 + 12 = 44 \text{ m}$$

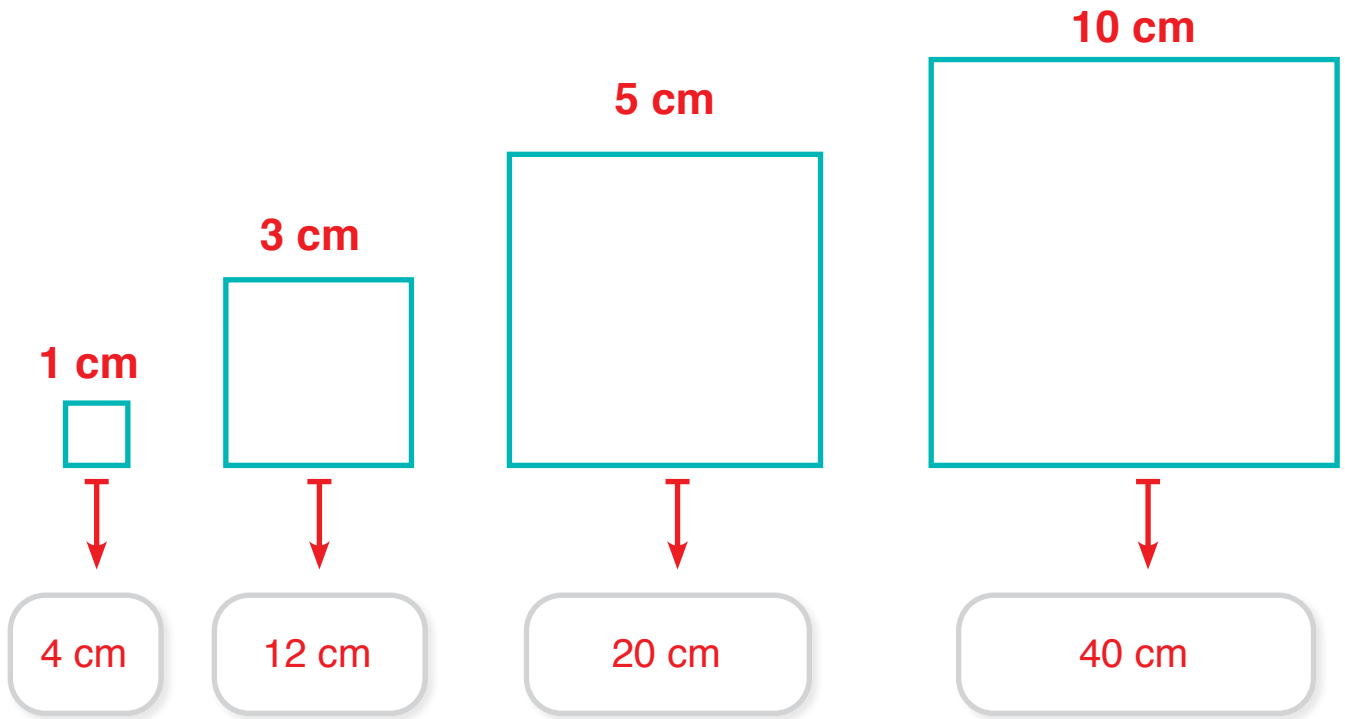


$$2 + 4 + 4 + 3 = 13 \text{ m}$$

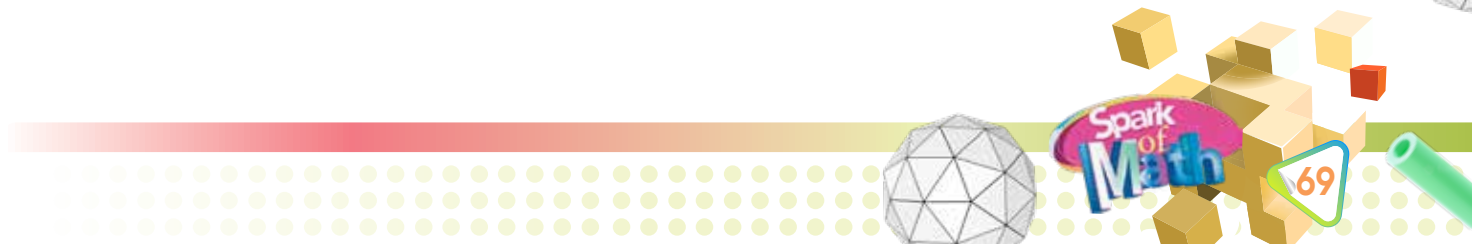
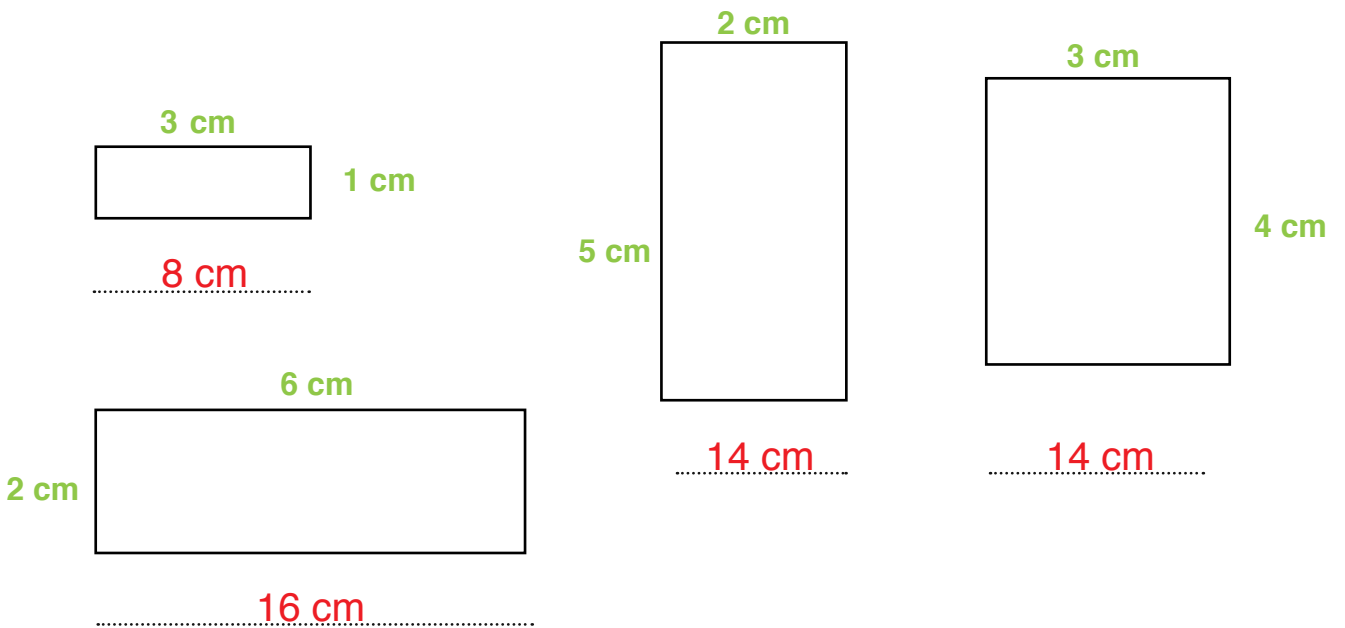


$$4 + 6 + 3 + 8 + 4 = 25 \text{ cm}$$

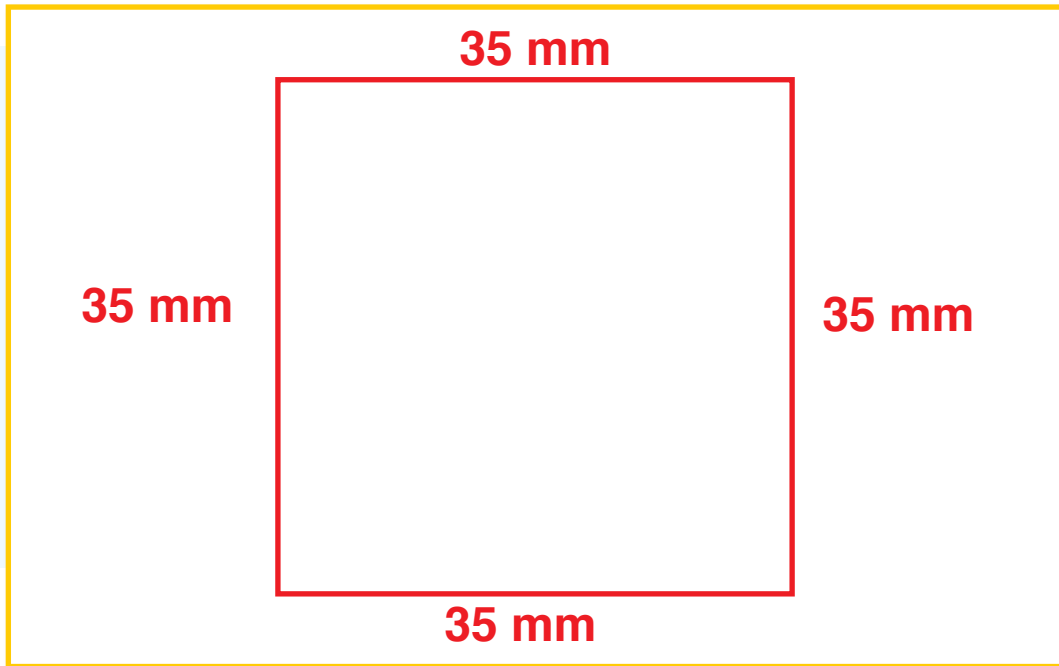
Find the perimeter of each square.



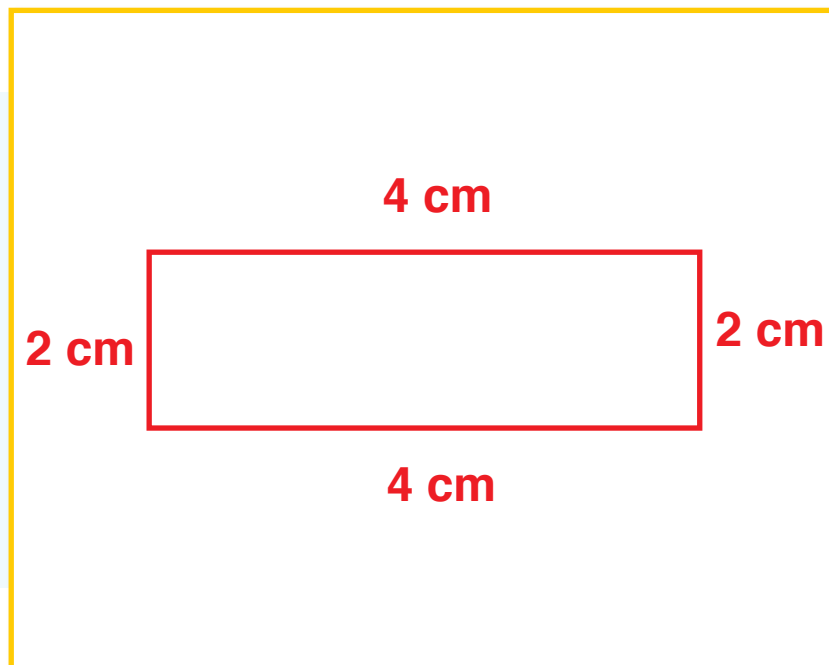
Find the perimeter of each rectangle.



⦿ Draw a square that has a perimeter of 140 mm.

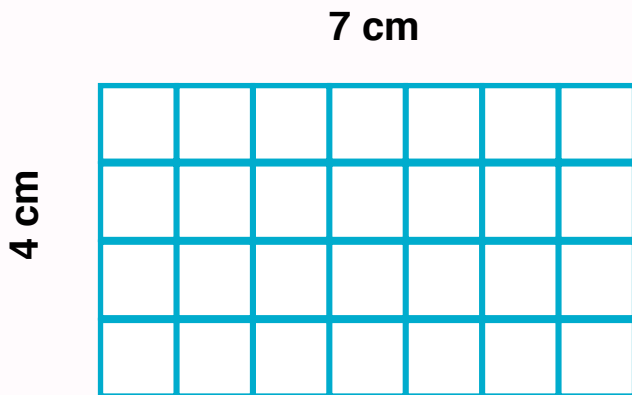


⦿ Draw a rectangle that has a perimeter of 12 cm.

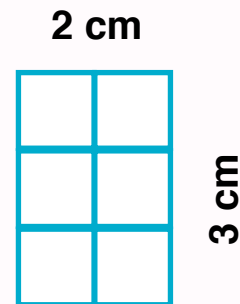


(4-3) Measuring Area

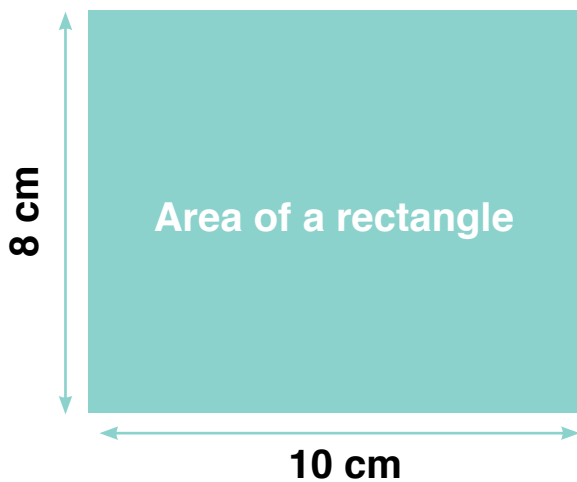
An area is the measurement of a surface. The unit of an area is measured in units of length squared, for example cm^2 , m^2



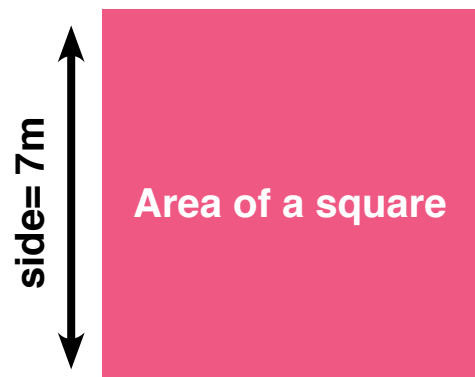
The area of this rectangle is
 $28 \text{ cm}^2 = 7 \text{ cm} \times 4 \text{ cm}$



The area of this rectangle is
 $6 \text{ cm}^2 = 2 \text{ cm} \times 3 \text{ cm}$



To find the area of a rectangle, use the formula $\text{area} = \text{length} \times \text{width}$. This formula is often written as
 $A = L \times W$
 $L = 10 \text{ cm}$
 $W = 8 \text{ cm}$
 $10 \text{ cm} \times 8 \text{ cm} = 80 \text{ cm}^2$

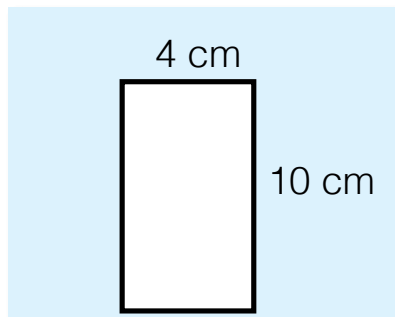


The area of a square equals any of its two sides multiplied together.

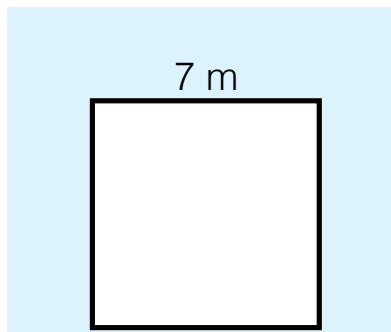
$$\begin{aligned} A &= S \times S \\ A &= 7 \times 7 \\ A &= 49 \text{ cm}^2 \end{aligned}$$



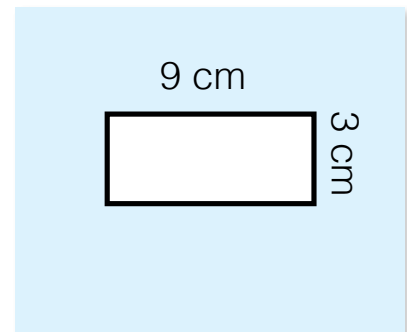
Find the area of the following squares and rectangles.



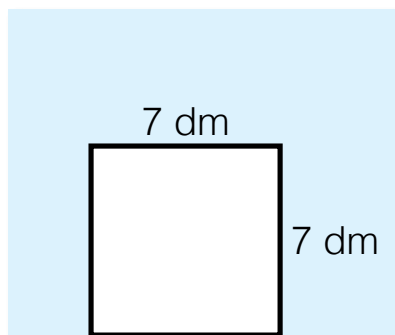
Area = 40 cm²



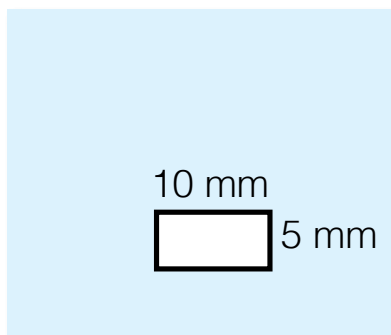
Area = 49 m²



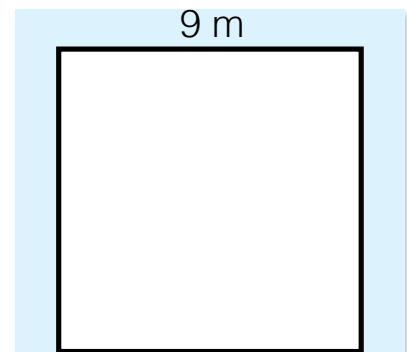
Area = 27 cm²



Area = 49 dm²



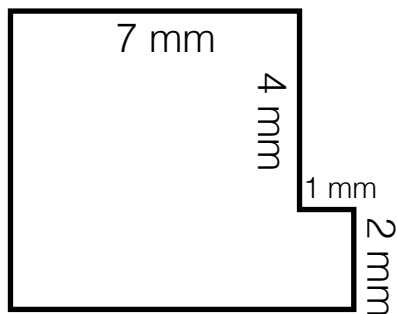
Area = 50 mm²



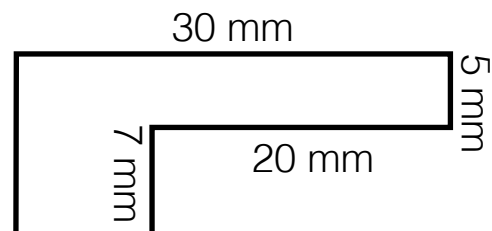
Area = 81 m²

Your Work

Find the area.



Area = 30 square (mm²)



Area = 220 square (mm²)



Show Your Turn

Convert to the units shown.

20 m = ...200... cm

67 m = ...670... cm

13 m = ...1300... mm

22 m = ...22... mm

49 m = ...490... cm

89 m = ...890... cm

17 cm = ...170... mm

31 m = ...310... cm

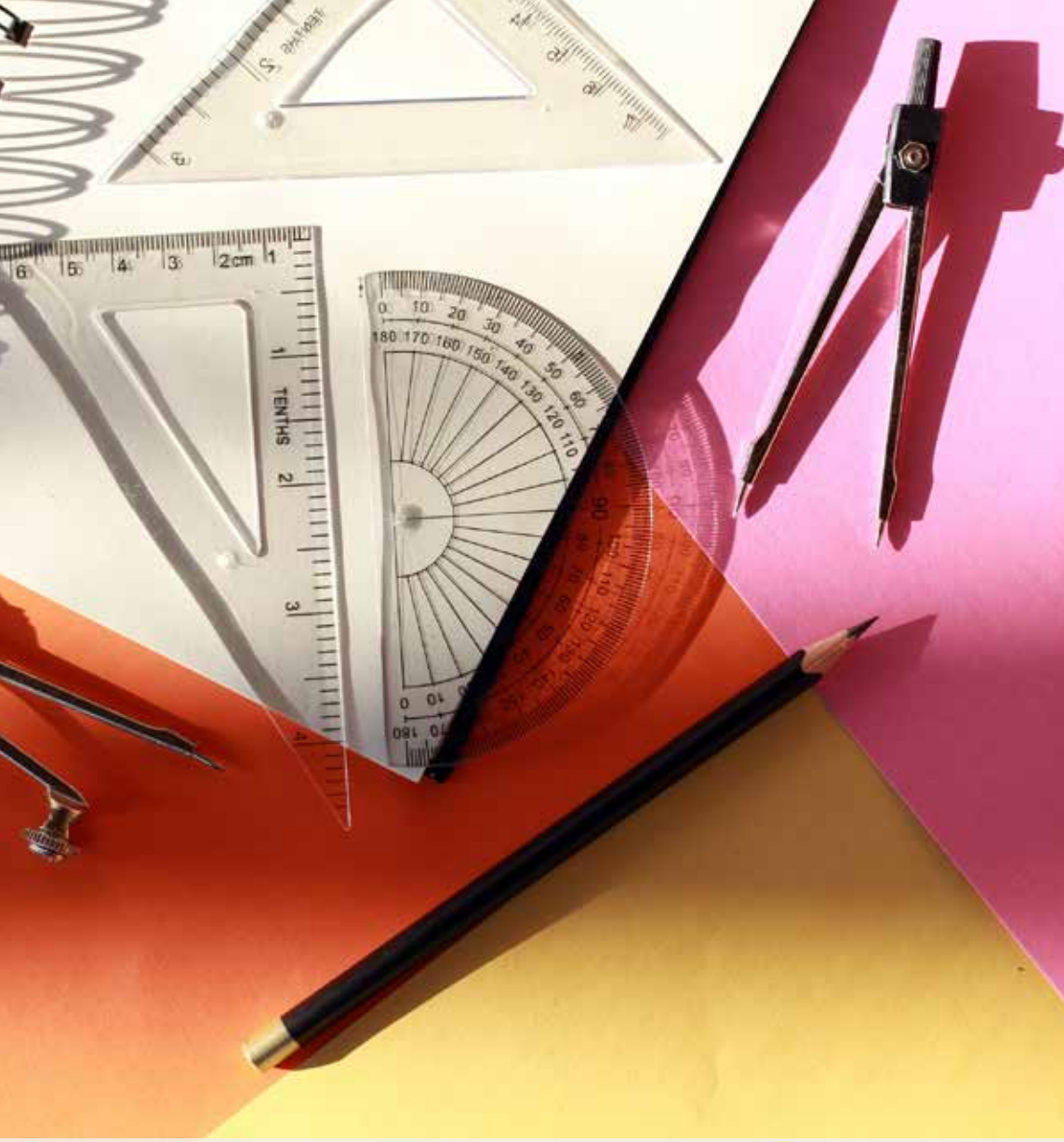
- Akram needs to put a photo in a frame with 15 cm length and 9 cm width. What is the length of the frame?
15 cm



- A square field has a perimeter of 320 meters. Find out how many meters each side is.
Perimeter = 320 m, S = ?

$$320 \div 4 = 80 \text{ m}$$





Unit 5

Geometry and Graphs



Vocabulary



- Point
- Line segment
- Protractor
- Right angle
- Straight angle
- Perpendicular
- Pictograph
- Axis
- Horizontal
- Line
- Ray
- Acute angle
- Obtuse angle
- Intersecting
- Parallel
- Bar chart
- Vertical


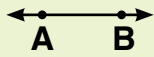
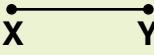
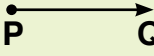


Objectives

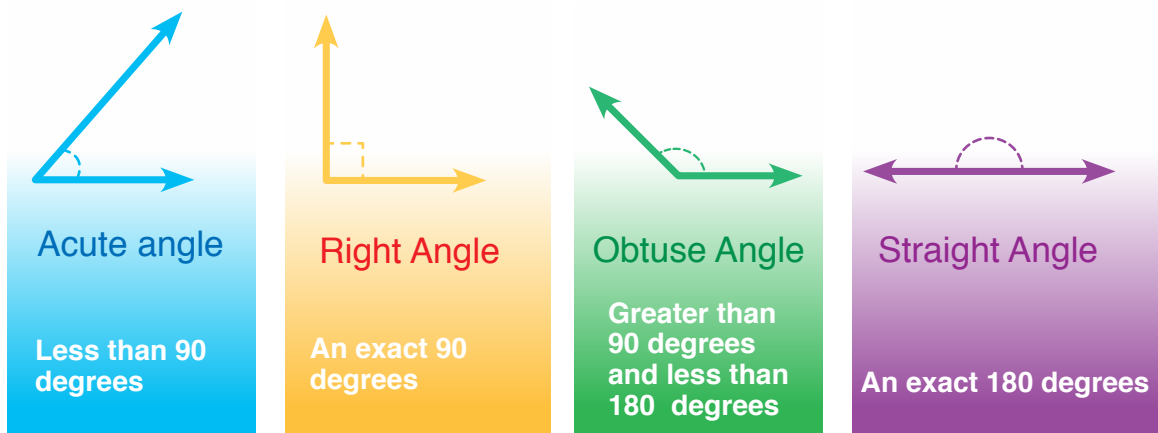


- Identify intersecting, perpendicular and parallel lines.
- Identify and estimate acute, right and obtuse angles.
- Use a protractor to measure the degree of different angles.
- Interpret information from pictographs and bar graphs.
- Make their own bar graph.

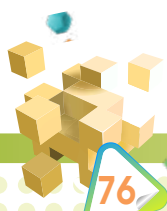
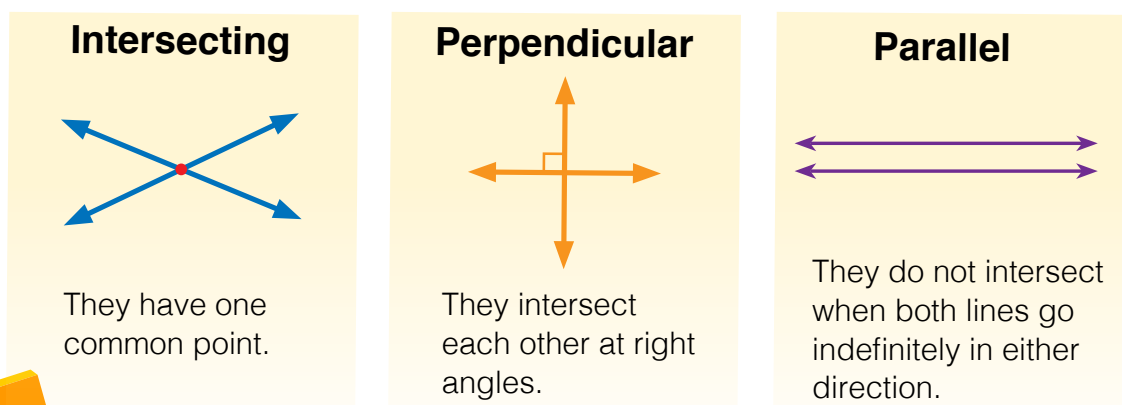
5-1 Points and Lines

| | Description | Figure | Symbol |
|---------------------|--|---|--|
| Point | 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. |  | \overleftrightarrow{AB} or \overleftrightarrow{BA} |
| Line segment | A line segment is a part of a line that contacts every point on the line between its end points. |  | \overline{XY} or \overline{YX} |
| Ray | A ray is a part of a line with a single end point that goes on in one direction. |  | \overrightarrow{PQ} |

When rays intersect, they form angles.



There are three types of lines.



Match each term with the picture it represents.

Line



Line segment



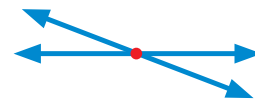
Ray



Parallel lines



Intersecting lines



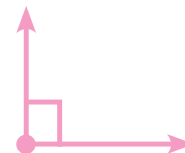
Right angle



Acute angle



Obtuse angle



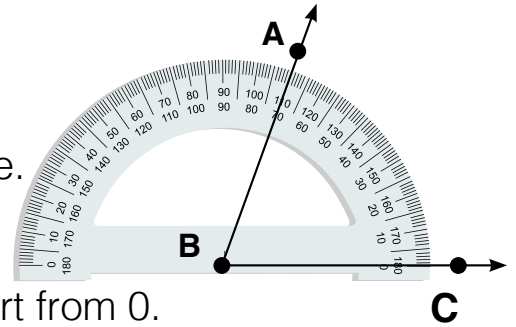
5-2 Measuring Angles

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.

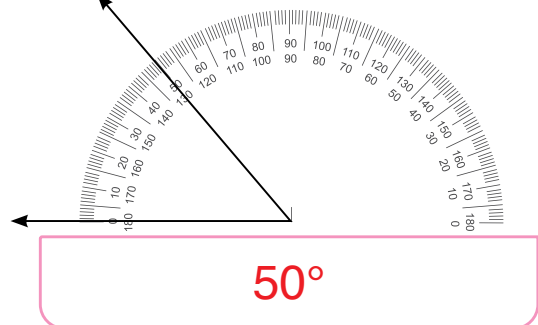
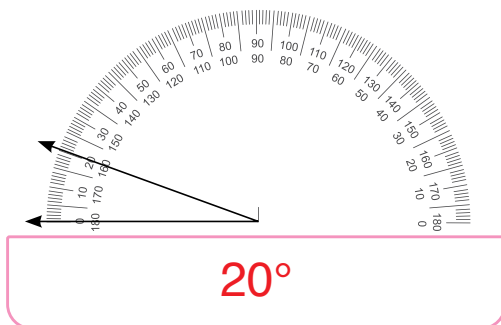
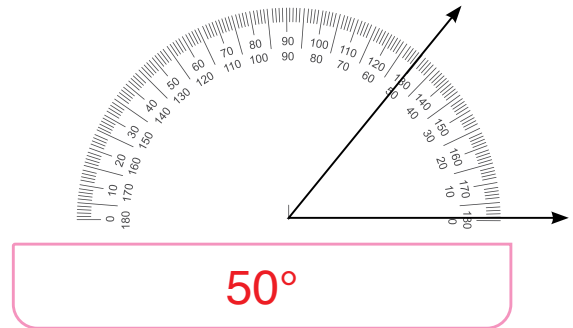
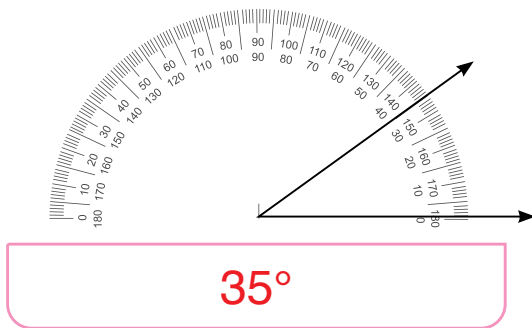
Step 2 Place the 0 mark on one side of the angle.

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

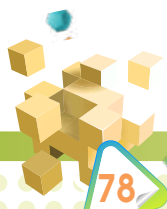
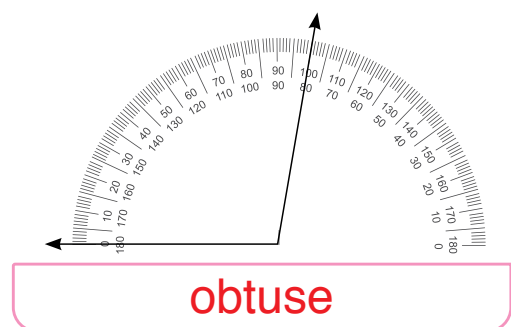
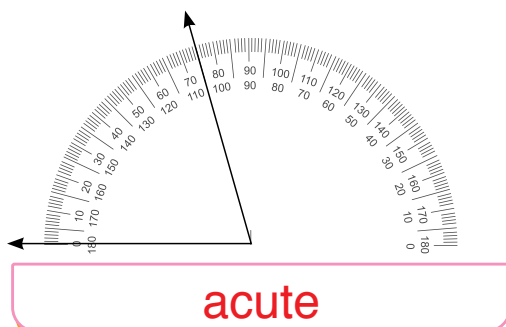


The measure of the angle is 70° .

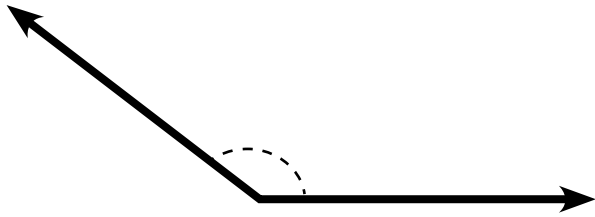
Measure the degree of each angle.



Measure & Write whether the angles are acute or obtuse.



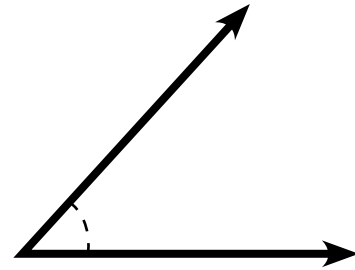
Choose the best estimation for the measure of each angle.



30° approx

90° approx

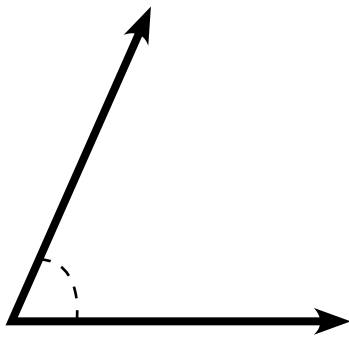
150° approx



25° approx

80° approx

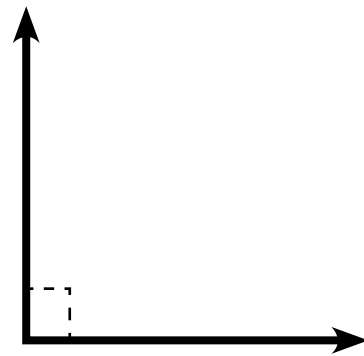
130° approx



30° approx

65° approx

70° approx



85° approx

90° approx

95° approx

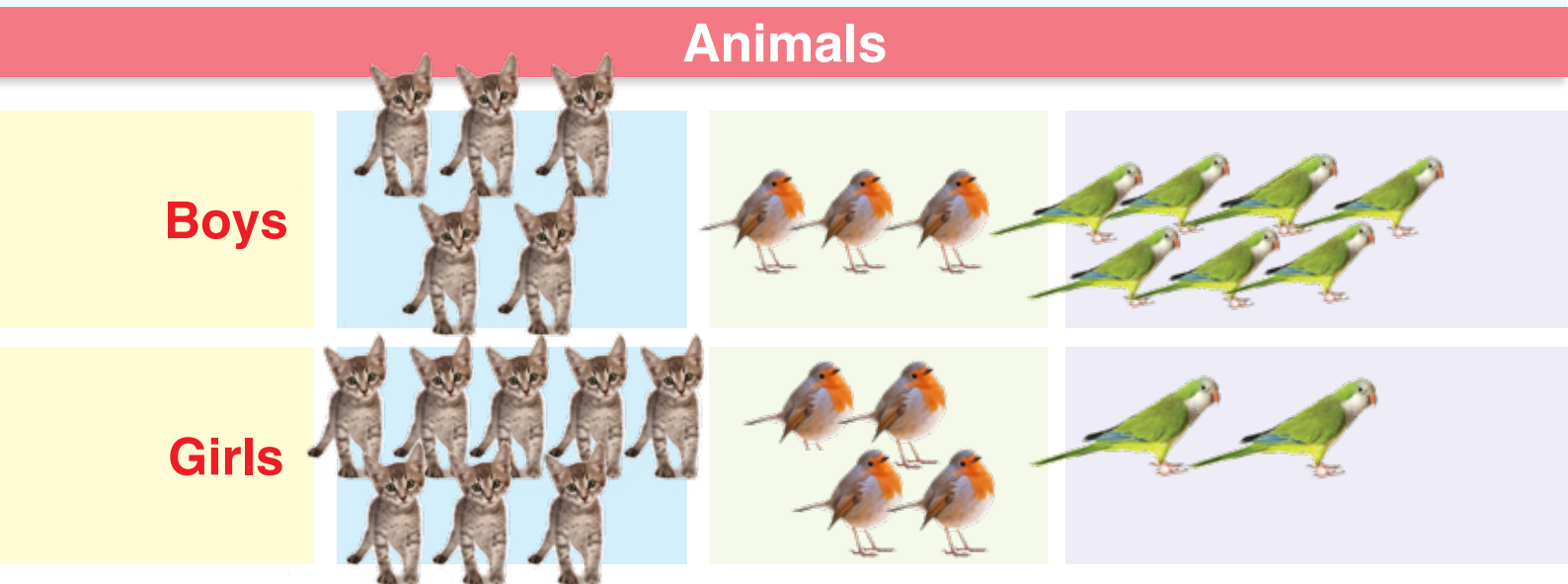


(5-3) Pictographs



A Pictograph is a way of showing data using images. It makes the data easy to read.

The following table shows the amount and type of animals that a group of children in the fourth grade have.



Circle the information you can deduce from the picture graph.

- ▶ Girls have more cats than boys.
- ▶ Boys have less birds than girls.
- ▶ Girls have two parrots.

Yes

No

Yes

No

Yes

No

- What is the total of cats? 13
- What is the total of birds? 7
- What is the total of parrots? 9
- How many boys are there in the class? 15
- What another question can you answer by looking at the picture graph?

● Question:

How many girls?

● Answer:

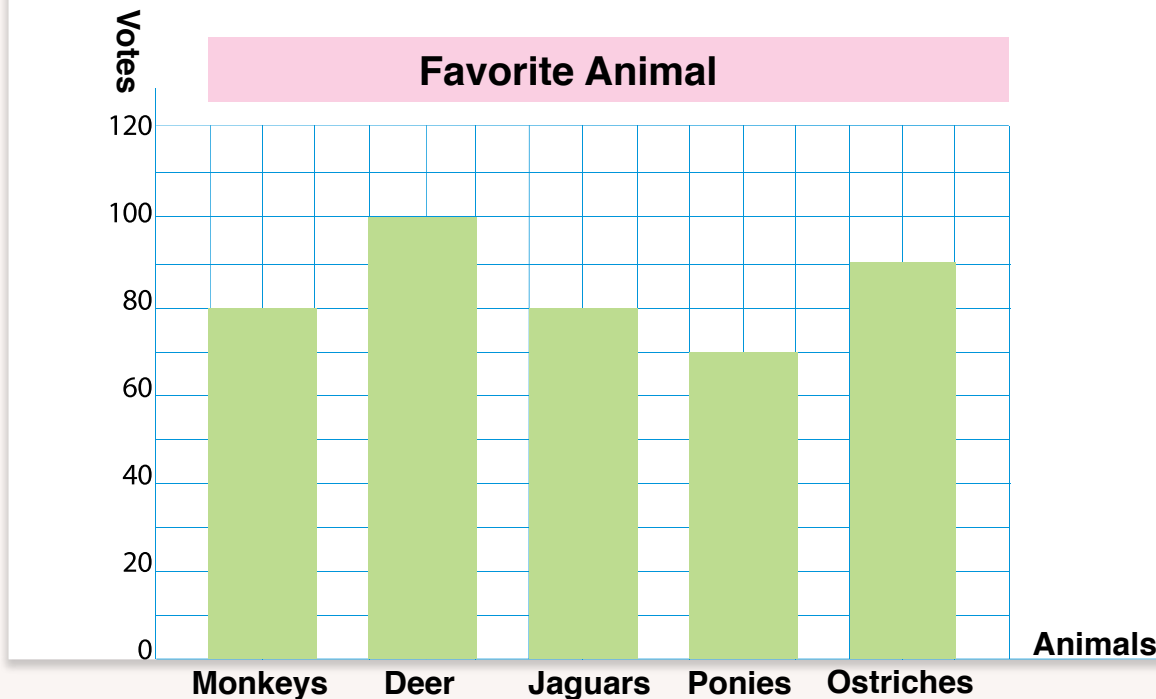
14



(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**.

The fourth grade students did a survey about the animal that they liked the most during their visit to the Ghamadan Zoo in Amman. Observe their results.








Note, then explain how to draw.

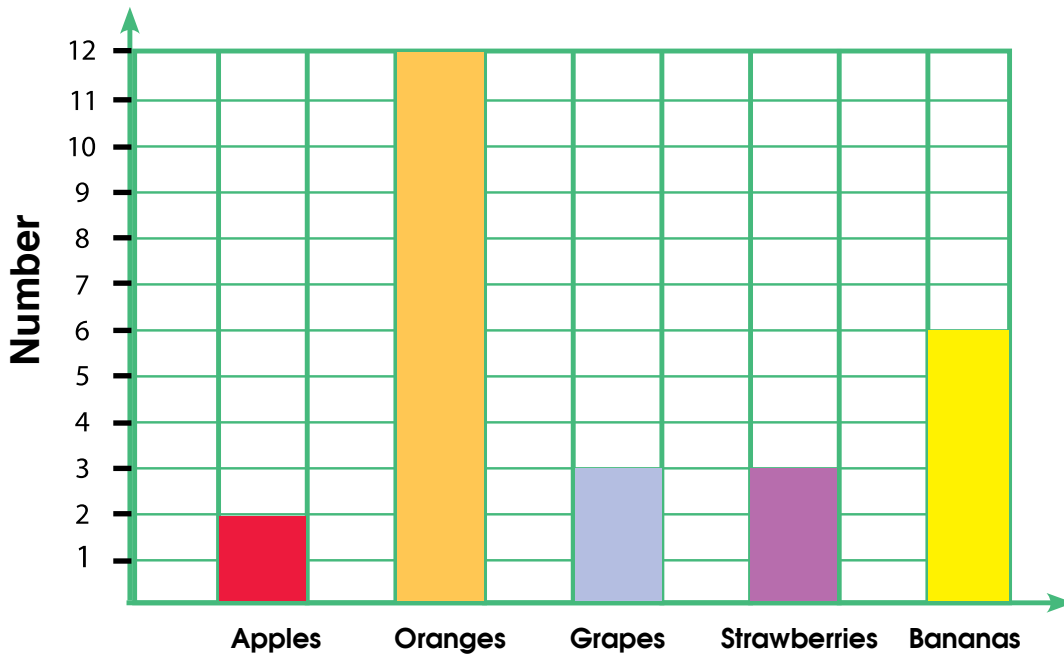
- How to draw a bar graph for the table above?
- Fill in the table.

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



Use the data from the tally chart to complete the bar graph.

| Favorite Fruit | Number of Students |
|----------------|--|
| Apples |  |
| Oranges |  |
| Grapes |  |
| Strawberries |  |
| Bananas |  |



Answer the following questions about the bar graph.

Which is the favorite fruit for most students?

Oranges

Which is the favorite fruit with the least votes?

Apples

How many students like oranges more than grapes?

$$12 - 3 = 9$$

How many students are there in total?

12



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

| Activities | Number of students |
|------------------|--------------------|
| ● Reading | 3 |
| ● Playing sports | 5 |
| ● Watching TV | 8 |
| ● Drawing | 4 |

- What is the best activity for most students?

Sports

- What is the least activity for most students?

Reading

- What is the total of the students?

20

- How many students like watching TV?

8

- How many students like drawing?

4



