UNIT 2

Operations

- **Lesson 1 Adding Whole Numbers** reviews how to add two or more multi-digit whole numbers to find the sum.
- **Lesson 2 Subtracting Whole Numbers** reviews how to subtract multi-digit whole numbers to find the difference.
- **Lesson 3 Multiplying Whole Numbers** reviews how to use a model or vertical multiplication to find the product of two whole numbers.
- **Lesson 4 Dividing Whole Numbers** reviews how to use place-value blocks or vertical division to find the quotient of two whole numbers.

LESSON 1

Adding Whole Numbers

4.NBT.4

***Vertical* means "arranged up and down."**

The numbers you add are called addends. The result is called the sum.

The commutative property is true for addition. You can change the order of the addends, and the sum stays the same.

1 + 4 = 5
4 + 1 = 5

The associative property is true for addition. You can group addends in any way, and the sum stays the same.

(1 + 4) + 5 = 5 + 5 = 10
1 + (4 + 5) = 1 + 9 = 10
(1 + 5) + 4 = 6 + 4 = 10

To add multi-digit whole numbers, use a vertical format.

What is the sum of 624 and 793?

First, estimate the sum: 600 + 800 = 1,400

Next, write the addends in a column. **Align,** or line up, the digits in the same places.

```
 624
+793
```

Add the digits in each column, starting on the right. Add the ones: 4 ones + 3 ones = 7 ones

```
 624
+793
   7
```

Add the tens: 2 tens + 9 tens = 11 tens. When the sum is 10 or more, regroup: 11 tens = 1 hundred 1 ten. Write the 1 ten in the sum. Write the 1 hundred above the hundreds column.

```
  1
 624
+793
  17
```

Add the hundreds: 1 hundred + 6 hundreds + 7 hundreds = 14 hundreds. Regroup: 14 hundreds = 1 thousand 4 hundreds. Write the hundreds in the sum. Write the 1 thousand above the thousands column.

```
  1
 624
+793
 417
```

Add the thousands: 1 + 0 + 0 = 1. Write the thousands digit in the sum.

```
 11
 624
+793
1,417
```

Compare your answer to your estimated sum: 1,417 is close to 1,400, so the answer is reasonable.

You can use the same process to find the sum of three or more numbers.

Find the sum of 381 + 93 + 890.

Write all of the addends in a column. Be sure to correctly align units. Start on the right. Add each column. Regroup as necessary.

```
 12
 381
  93
+890
```

The sum is 1,364.

Read each problem. Circle the letter of the best answer.

SAMPLE What is the sum of 7,895 + 146?

A 7,041 **B** 7,941 **C** 8,041 **D** 9,355

The correct answer is C. One addend has four places and the other has three places. Write the numbers vertically, but be careful to align the numbers on the right, so the ones will be added to ones, the tens to tens, and so on. Then add each column of digits. Regroup as necessary.

```
  1 11
 7,895
+  146
 8,041
```

1 Add 126 + 573.

A 689 **C** 789
B 699 **D** 799

2
```
  1,492
+3,156
```

A 3,648 **C** 4,648
B 4,548 **D** 4,658

3 Find the sum of 4,707 + 865.

A 4,562 **C** 5,562
B 4,572 **D** 5,572

4 What is 367 + 1,654?

A 1,021 **C** 2,011
B 1,921 **D** 2,021

5
```
  16,524
+31,748
```

A 47,262 **C** 48,272
B 48,262 **D** 49,272

6 Solve:

6,874 + 10,197 = □

A 16,071 **C** 17,061
B 16,961 **D** 17,071

7 What is the sum of 125 + 362 + 312?

A 789 **C** 800
B 799 **D** 809

8 What is 3,994 + 875 + 2,406?

A 6,275 **C** 7,265
B 7,176 **D** 7,275

9
```
  5,138
    206
 17,245
+ 1,413
```

A 23,902 **C** 24,002
B 23,992 **D** 24,003

Read each problem. Write your answer.

SAMPLE Sheila added 2,638 and 794 for a sum of 3,322. Sam added the same numbers and got 3,432. Who is wrong and what mistake did that person make?

Answer _____

Set up the numbers vertically and add the digits in the same places, starting on the right. Whenever the sum of a column is 10 or more, regroup. Remember to add the regrouped number in that column. Sheila forgot to add the regrouped numbers.

```
  1 11
 2,638
+  794
 3,432
```

10 Add 429 + 583. Show your work.

Answer _____

11 What is the missing digit in this problem? Explain how you know.

```
 6,735
+ 3,3□8
10,133
```

_____

_____

12 Abel added 3,286 + 891 and got 12,196. What mistake did he make?

_____

_____

13 Find the sum of 8,039 + 657 + 23,462. Show your work.

Answer _____

14 Explain when and how to regroup in addition.

_____

_____

_____

Read each problem. Write your answer to each part.

15 Devora added 1,213 + 89 + 692 and got a sum of 1,984.

Part A Is Devora's answer reasonable? Use estimation to explain why it is or is not.

Part B Is Devora's answer correct? Find the sum and show your work.

Answer _____

16 Jason added 728 + 681 + 4,632. His work and the sum he found are shown below.

$$\begin{array}{r} {\scriptstyle 1\ \ 1} \\ 728 \\ 681 \\ +4{,}632 \\ \hline 5{,}941 \end{array}$$

Check Jason's addition in each column.

Part A What mistake did Jason make?

Part B Find the correct sum. Show your work.

Answer _____

LESSON 2

Subtracting Whole Numbers

4.NBT.4

The result of a subtraction problem is called the difference.

Unlike addition, subtraction is *not* commutative. You cannot change the order of the numbers without changing the result.

$12 - 3 = 9$
$3 - 12 \neq 9$

Regrouping in subtraction is sometimes called "borrowing."

Addition and subtraction are inverse operations. You can use addition to check your subtraction.

$10 - 6 = 4$ because $4 + 6 = 10$

To subtract whole numbers, use a vertical format.

What is 649 − 263?

First, estimate the difference: 650 − 260 = 390

Next, write the number you are subtracting below the number you are subtracting from. Be careful to correctly align digits in the same places.

$$\begin{array}{r} 649 \\ -263 \end{array}$$

Subtract each column, starting on the right.
Subtract the ones: 9 ones − 3 ones = 6 ones

$$\begin{array}{r} 649 \\ -263 \\ \hline 6 \end{array}$$

Subtract the tens. Since 4 tens < 6 tens, you must regroup. Regroup 6 hundreds as 5 hundreds 10 tens. Add the 10 tens to the 4 tens to make 14 tens. Then subtract: 14 tens − 6 tens = 8 tens

$$\begin{array}{r} {\scriptstyle 5\ 14} \\ \not{6}\not{4}9 \\ -263 \\ \hline 86 \end{array}$$

Subtract the hundreds: 5 hundreds − 2 hundreds = 3 hundreds

$$\begin{array}{r} {\scriptstyle 5\ 14} \\ \not{6}\not{4}9 \\ -263 \\ \hline 386 \end{array}$$

Compare your answer to your estimated difference: 386 is close to 390, so the answer is reasonable.

You can use the same process to subtract across zeros.

Find the difference of 700 − 532.

The only way to "borrow" 10 from the tens digit in 700 is to first "borrow" 100 from the hundreds digit. Regroup 7 hundreds as 6 hundreds 10 tens. Regroup the 10 tens as 9 tens 10 ones.

First subtract ones.	Subtract tens.	Subtract hundreds.
$\begin{array}{r} {\scriptstyle 9} \\ 6\not{7}\not{0}{\scriptstyle 10} \\ \not{7}\not{0}\not{0} \\ -532 \\ \hline 8 \end{array}$	$\begin{array}{r} {\scriptstyle 9} \\ 6\not{7}\not{0}{\scriptstyle 10} \\ \not{7}\not{0}\not{0} \\ -532 \\ \hline 68 \end{array}$	$\begin{array}{r} {\scriptstyle 9} \\ 6\not{7}\not{0}{\scriptstyle 10} \\ \not{7}\not{0}\not{0} \\ -532 \\ \hline 168 \end{array}$

You can use addition to check your answer: 532 + 168 = 700

Read each problem. Circle the letter of the best answer.

SAMPLE What is 5,807 − 3,634?

A 1,173 **B** 2,173 **C** 2,263 **D** 2,273

The correct answer is B. To find the difference, write the number being subtracted below the number you are subtracting from, aligning digits in the same places. Starting on the right, subtract in each column. Regroup as necessary.

$$\begin{array}{r} {}^{7}{}^{10} \\ 5,\not{8}\not{0}7 \\ -3,634 \\ \hline 2,173 \end{array}$$

1 Subtract 496 − 183.

A 213 **C** 313

B 223 **D** 323

2

$$\begin{array}{r} 3,369 \\ -2,274 \\ \hline \end{array}$$

A 1,025 **C** 1,095

B 1,085 **D** 1,195

3 Find the difference.

6,748 − 865 = □

A 4,883 **C** 5,933

B 5,883 **D** 5,983

4 Solve:

$$\begin{array}{r} 2,573 \\ -1,648 \\ \hline \end{array}$$

A 925 **C** 935

B 926 **D** 1,935

5 What is 504 − 396?

A 108 **C** 208

B 118 **D** 218

6 Subtract:

6,805 − 797 = □

A 5,008 **C** 6,008

B 5,108 **D** 6,118

7

$$\begin{array}{r} 3,007 \\ -1,488 \\ \hline \end{array}$$

A 1,519 **C** 1,619

B 1,529 **D** 2,619

8 Find the difference.

$$\begin{array}{r} 8,200 \\ -5,639 \\ \hline \end{array}$$

A 2,561 **C** 2,661

B 2,571 **D** 3,661

Read each problem. Write your answer.

SAMPLE To subtract 8,258 − 762, which places do you need to regroup? Explain.

Answer _____

If the digit you are subtracting is larger than the digit you are subtracting from, you need to regroup the next place to the left. In the tens place, 6 is greater than 5. So you need to regroup the hundreds as 1 hundred 10 tens, so you will have 15 tens. In the hundreds, 7 is greater than 1 hundred. So you will also need to regroup the thousands as 7 thousands 10 hundreds to make 11 hundreds.

9 Subtract 509 − 423. Show your work.

Answer _____

10 What is the missing digit in this problem? Explain how you know.

$$\begin{array}{r} 3,048 \\ -\ 1,\square 25 \\ \hline 1,423 \end{array}$$

_____

_____

11 Subtract 716 from 6,438. Show your work.

Answer _____

12 Find the difference of 8,024 − 979. Show your work.

Answer _____

13 How can you check your answer to problem 12?

_____

_____

Read each problem. Write your answer to each part.

14 Alan subtracted 3,318 − 1,506 and found the difference to be 2,812.

Part A Is Alan's answer reasonable? Explain why or why not.

_____

_____

Part B Find the difference. Show your work.

Answer _____

15 Meena subtracted 2,002 − 1,683. Her work and the difference she found are shown below.

$$\begin{array}{r} {}^{1}\,{}^{10}\,{}^{9}\,{}^{12} \\ 2,\not{0}\not{0}\not{2} \\ -\,1,683 \\ \hline 419 \end{array}$$

Part A What mistake did Meena make?

_____

_____

_____

_____

Check Meena's subtraction and regrouping in each column.

Part B Find the correct difference. Show your work.

Answer _____

LESSON 3

Multiplying Whole Numbers

4.NBT.5

An array is a model using rows and columns. When they are connected, the array is an area model.

The commutative property is true for multiplication. Changing the order of the numbers does not change the product.

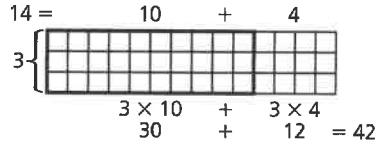
3 × 14 = 42
is the same as
14 × 3 = 42

In multiplication the numbers you multiply are called factors. The result is called the product.

A model can help you picture multiplication.

Use an array to model 3 × 14.

Remember that 14 is the same as 10 + 4. So 3 × 14 is the same as multiplying 3 × (10 + 4). Draw a model like this:



Multiply the tens: 3 × 10 = 30

Multiply the ones: 3 × 4 = 12

Add the products: 30 + 12 = 42

A faster way to multiply is with vertical multiplication.

Multiply 18 × 32.

First, estimate the product: 20 × 30 = 600

Next, multiply by the ones. Regroup where you need to.
8 × 32 = (8 × 30) + (8 × 2) = 240 + 16 = 256

$$\begin{array}{r} {}^{1} \\ 32 \\ \times 18 \\ \hline 256 \end{array}$$

Write a placeholder 0 in the ones place of the next partial product.
Then, multiply by the tens digit: 10 × 32 = 320

$$\begin{array}{r} 32 \\ \times 18 \\ \hline 256 \\ 320 \end{array}$$

Finally, add the partial products: 256 + 320 = 576
The product of 18 × 32 is 576.

$$\begin{array}{r} 32 \\ \times 18 \\ \hline 256 \\ 320 \\ \hline 576 \end{array}$$

This product is close to the estimate, so it is reasonable.

Read each problem. Circle the letter of the best answer.

SAMPLE Multiply 6 × 3,427.

A 18,562 **B** 20,522 **C** 20,462 **D** 20,562

The correct answer is D. To find the product, write one factor below the other, aligning the same places. Starting on the right, multiply the bottom factor times each digit in the top factor. Regroup as necessary. Remember to add the regrouped number at the top *after* multiplying that place.

$$\begin{array}{r} {\scriptstyle 2\ 14} \\ 3{,}427 \\ \times\ 6 \\ \hline 20{,}562 \end{array}$$

1 Multiply:

$$\begin{array}{r} 372 \\ \times\ 3 \\ \hline \end{array}$$

A 916 **C** 1,046
B 1,016 **D** 1,116

2

$$\begin{array}{r} 564 \\ \times\ 4 \\ \hline \end{array}$$

A 2,056 **C** 2,256
B 2,246 **D** 2,264

3 Find the product.

$8 \times 709 = \square$

A 5,602 **C** 5,752
B 5,672 **D** 6,372

4 Solve:

$$\begin{array}{r} 458 \\ \times\ 7 \\ \hline \end{array}$$

A 2,806 **C** 3,206
B 3,156 **D** 3,213

5 What is the product of 4 × 1,261?

A 4,044 **C** 5,044
B 4,844 **D** 5,084

6 Multiply:

$$\begin{array}{r} 3{,}785 \\ \times\ 6 \\ \hline \end{array}$$

A 18,680 **C** 22,710
B 22,210 **D** 22,810

7 Solve 9 × 6,243.

A 54,187 **C** 56,167
B 54,887 **D** 56,187

8 Find the product.

$$\begin{array}{r} 7{,}987 \\ \times\ 8 \\ \hline \end{array}$$

A 56,896 **C** 63,846
B 63,296 **D** 63,896

Read each problem. Write your answer.

SAMPLE Find 76 × 52.

Answer _____

To find the product, write one factor below the other factor. Starting on the right, multiply each digit of the bottom factor times the top factor. Regroup as needed. Multiply by the ones: 6 × 52 = 312. Then multiply by the tens: 70 × 52 = 3,640. Add the partial products: 312 + 3,640 = 3,952. The product is 3,952.

$$\begin{array}{r} 52 \\ \times 76 \\ \hline 312 \\ +3{,}640 \\ \hline 3{,}952 \end{array}$$

9 Multiply 13 × 32. Show your work.

Answer _____

10 Find 63 × 58. Show your work.

Answer _____

11 Without multiplying, tell which has the greater product: 3 × 495 or 4 × 387? Explain how you know.

_____

_____

12 Explain when and how you regroup in multiplication.

_____

_____

_____

_____

Read each problem. Write your answer to each part.

13 Sophie multiplied 7 × 5,898 and found the product to be 41,186.

Part A Is Sophie's answer reasonable? Explain why it is or is not.

What does 5,898 round to? What is the estimated product?

Part B Find the product. Show your work.

Answer _____

14 Thomas multiplied 52 × 48. His work and the product he found are shown below.

$$\begin{array}{r} 48 \\ \times 52 \\ \hline 96 \\ 240 \\ \hline 336 \end{array}$$

Part A What mistake did Thomas make?

Part B Find the correct product. Show your work.

Answer _____

LESSON 4

Dividing Whole Numbers

4.NBT.6

The dividend is the number being divided. The divisor is the number doing the dividing. The quotient is the result.

Estimate the quotient first to know where to start the quotient.

A compatible number for 492 is 480, and 480 ÷ 8 is 60. So the quotient should start in the tens place.

Divide from left to right. If the digit in a place is not large enough to divide, regroup and divide the next place to the right.

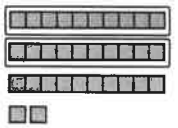
Multiplication and division are inverse operations. Use multiplication to check division.

8 × 62 = 496

Place-value blocks can help you picture division.

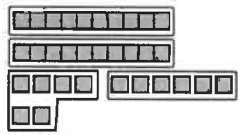
What is 32 ÷ 2?

Divide the tens.



3 tens ÷ 2 = 1 ten

Regroup 1 ten as 10 ones.
Divide the ones.



12 ones ÷ 2 = 6 ones

So 32 ÷ 2 = 1 ten + 6 ones = 16.

A faster way to divide is with vertical division.

What is the quotient of 496 ÷ 8?

4 hundreds cannot be divided by 8.
So, move one place to the right and divide the tens: 49 tens ÷ 8 = 6

$$8\overline{)496}\quad 6$$

Multiply: 6 × 8 = 48
Then subtract: 49 − 48 = 1
That is 1 ten to be regrouped as ones.

$$\begin{array}{r} 6 \\ 8\overline{)496} \\ -48 \\ \hline 1 \end{array}$$

Bring down the 6 from the dividend.
Then divide the ones: 16 ÷ 8 = 2

$$\begin{array}{r} 6 \\ 8\overline{)496} \\ -48\downarrow \\ \hline 16 \end{array}$$

Multiply: 2 × 8 = 16
Then subtract: 16 − 16 = 0

So the quotient of 496 ÷ 8 is 62.

$$\begin{array}{r} 62 \\ 8\overline{)496} \\ -48 \\ \hline 16 \\ -16 \\ \hline 0 \end{array}$$

Read each problem. Circle the letter of the best answer.

SAMPLE Divide: $4\overline{)968}$

A 192 **B** 240 **C** 242 **D** 247

The correct answer is C. To find the quotient, divide the dividend from left to right by the divisor. Divide the hundreds, multiply, and subtract. Regroup and divide the tens. Multiply and subtract. Then divide the ones.

$$\begin{array}{r} 242 \\ 4\overline{)968} \\ -8 \\ \hline 16 \\ -16 \\ \hline 08 \\ -\ 8 \\ \hline 0 \end{array}$$

1 $3\overline{)72}$

A 14 **C** 24

B 23 **D** 26

2 Find 92 ÷ 4.

A 16 **C** 26

B 23 **D** 28

3 Solve: $7\overline{)98}$

A 12 **C** 14

B 13 **D** 16

4 Divide 369 ÷ 3.

A 123 **C** 133

B 132 **D** 142

5 Divide: $5\overline{)355}$

A 70 **C** 701

B 71 **D** 710

6 Find the quotient.

$594 \div 9 = \square$

A 64 **C** 67

B 66 **D** 76

7 $2\overline{)6{,}284}$

A 2,957 **C** 3,042

B 3,032 **D** 3,142

8 What is 6,712 ÷ 8?

A 751 **C** 842

B 839 **D** 1,139

Read each problem. Write your answer.

SAMPLE Find the quotient of 5,154 ÷ 6.

Answer _____

Set up the problem vertically, and find the first place you can divide by 6. You cannot divide 5 thousands by 6, so look at dividing 51 hundreds by 6: 51 ÷ 6 = 8. Multiply and subtract. Bring down the digit in the next place and divide. Repeat the division until you have a remainder of 0.

$$\begin{array}{r} 859 \\ 6\overline{)5{,}154} \\ -48 \\ \hline 35 \\ -30 \\ \hline 54 \\ -54 \\ \hline 0 \end{array}$$

9 Solve 301 ÷ 7. Show your work.

Answer _____

10 Find 1,568 ÷ 8. Show your work.

Answer _____

11 What is 5,127 ÷ 3? Show your work.

Answer _____

12 Without finding the quotients, tell which has the greater quotient: 2,686 ÷ 3 or 5,610 ÷ 7? Explain.

_____

_____

13 Why does the quotient 36 ÷ 3 have two digits, but the quotient 36 ÷ 6 has only one digit? Explain.

_____

_____

_____

Read the problem. Write your answer to each part.

14 Alma divided 3,512 ÷ 8. Her work and the quotient she found are shown below.

$$
\begin{array}{r}
440 \\
8\overline{)3{,}512} \\
-32 \\
\hline
31 \\
-28 \\
\hline
32 \\
-32 \\
\hline
0
\end{array}
$$

Check Alma's division, multiplication, and subtraction for each number in the quotient.

Part A What mistake did Alma make?

_____

_____

_____

Part B Find the correct quotient. Show your work.

Answer _____

REVIEW

Operations

Read each problem. Circle the letter of the best answer.

1 Find the sum of 224 + 573.

A 697 **C** 787

B 778 **D** 797

2 Subtract: $\begin{array}{r} 7{,}965 \\ -3{,}274 \end{array}$

A 4,671 **C** 4,781

B 4,691 **D** 4,791

3 Find the product of 7 × 618.

A 4,226 **C** 4,316

B 4,276 **D** 4,326

4 $3\overline{)936}$

A 231 **C** 312

B 302 **D** 313

5 Add: $\begin{array}{r} 25{,}734 \\ +14{,}328 \end{array}$

A 30,062 **C** 40,052

B 39,062 **D** 40,062

6 $\begin{array}{r} 4{,}036 \\ -\ 845 \end{array}$

A 3,191 **C** 3,291

B 3,201 **D** 4,191

7 Multiply: $\begin{array}{r} 5{,}264 \\ \times 9 \end{array}$

A 45,376 **C** 47,316

B 47,176 **D** 47,376

8 Solve: $8\overline{)584}$

A 63 **C** 74

B 73 **D** 83

9 $\begin{array}{r} 96 \\ \times 87 \end{array}$

A 1,430 **C** 8,312

B 7,952 **D** 8,352

10 Divide 5,488 by 7.

A 641 **C** 784

B 779 **D** 844

Read each problem. Write your answer.

11 Subtract 7,300 − 4,326. Show your work.

Answer _____

12 Find the product of 76 × 94. Show your work.

Answer _____

13 Divide 3,933 ÷ 9. Show your work.

Answer _____

14 How can you use multiplication to check your answer in problem 13?

_____

_____

15 Explain why the quotient 480 ÷ 4 includes three digits, but the quotient 480 ÷ 6 includes only two digits.

_____

_____

_____

Read each problem. Write your answer to each part.

16 Look at this problem.

$$17{,}596 + 453 + 1{,}034 = \square$$

Part A Find the sum. Show your work.

Answer _____

Part B Explain how you can use inverse operations to check your answer to part A.

_____

_____

_____

17 Josie multiplied 58 × 96. Her work and the product she found are shown below.

$$\begin{array}{r} 96 \\ \times 58 \\ \hline 768 \\ 480 \\ \hline 1{,}248 \end{array}$$

Part A What mistake did Josie make?

_____

_____

_____

Part B Find the correct product. Show your work.

Answer _____

LESSON 5

Lines of Symmetry

4.G.3

A figure is symmetric when it can be folded to make matching halves.

Congruent figures are the same shape and the same size. They do *not* have to be in the same position.

A **line of symmetry** is a line that can be drawn through a figure to divide it into **congruent** halves. The halves are congruent because they are mirror images of each other.

Which figure has a line of symmetry?

Figure A can be folded along a vertical, or up and down, line to make matching halves. Figure A has a line of symmetry.

There is no way to draw a line on figure B to divide it into matching halves. Figure B does not have a line of symmetry.

Some figures have more than one line of symmetry. They can be divided in more than one way to make congruent halves.

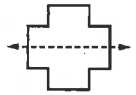
How many lines of symmetry does this figure have?

Horizontal lines go across.

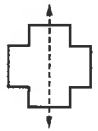
Vertical lines go up and down.

Diagonal lines go at a slant.

This shape can be folded along a horizontal line to make matching halves.



This shape can be folded along a vertical line to make matching halves.

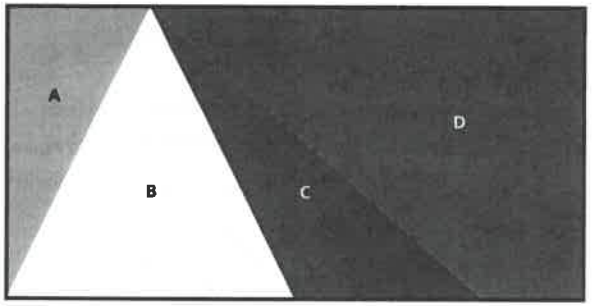


This shape can be folded along diagonal lines to make matching halves.

This shape has four lines of symmetry.

Read the problem. Write your answer to each part.

11 Samir made this painting using different geometric figures.



Look at each figure in the painting. Count the number of sides. Look at the sizes of the angles.

Part A Name the shape of the entire painting. Name the shapes of the figures in the painting.

Painting _____

Figure A _____

Figure B _____

Figure C _____

Figure D _____

Part B If Samir combined figure B and figure C, what type of figure would he form? Explain.

_____

_____

_____

_____

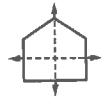
Read each problem. Circle the letter of the best answer.

SAMPLE How many lines of symmetry does the figure here have?

A zero B one C two D three

The correct answer is C. The figure has two lines of symmetry.
A vertical line divides the figure into congruent triangles:
A horizontal line divides the figure in matching halves:

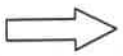
1 Which of the following correctly shows the line or lines of symmetry for the figure?

A 
C 
B 
D 

2 How many lines of symmetry does the figure below have?

A zero C three
B two D four

3 Which of the following figures does ***not*** have a line of symmetry?

A 
C 
B 
D 

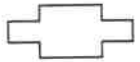
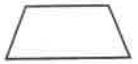
4 How many lines of symmetry does the figure below have?

A zero C two
B one D four

5 Which of the following figures has exactly two lines of symmetry?

A 
C 
B 
D 

6 Which of these figures has the fewest lines of symmetry?

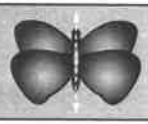
A 
C 
B 
D 

Read each problem. Write your answer.

SAMPLE How many lines of symmetry does this butterfly have?

Answer _____

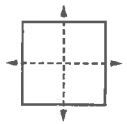
The butterfly has one line of symmetry.
A vertical line of symmetry divides the butterfly into matching halves:



7 This diagram shows a bird's eye view of the Pentagon Building in Washington, D.C. Draw the lines of symmetry on the building. How many lines of symmetry does this figure have?

Answer _____

8 Kara says she drew all the lines of symmetry on this square. Is she correct? Explain.



_____

_____

_____

9 Luke drew these pictures of a star and the moon.


Draw all the lines of symmetry on the star and the moon. How many lines of symmetry does each shape have?

Star _____ **Moon** _____

Read each problem. Write your answer to each part.

10 Look at the letters of the alphabet below.

A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z

Part A Write four letters that have at least one line of symmetry. Explain why they are symmetric.

Which letters look the same left and right? Which letters look the same top and bottom?

Part B Write four letters that do ***not*** have a line of symmetry. Explain why they are not symmetric.

11 Petra wants to cut a shape out of paper. She wants the shape to have eight sides and to be symmetrical.

Part A In the space below, draw a shape that Petra could cut out.

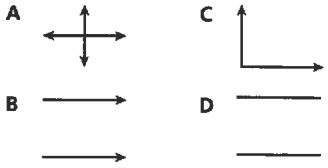
Part B After Petra cuts out the shape, she folds it on the line of symmetry. Explain how Petra knows what the line of symmetry is.

REVIEW

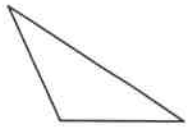
Geometry

Read each problem. Circle the letter of the best answer.

1 Which of the following shows a pair of perpendicular rays?



2 How can you classify this triangle based on its angles?



A obtuse triangle **C** acute triangle
B right triangle **D** straight triangle

3 How many lines of symmetry does this figure have?

A zero **C** two
B one **D** four

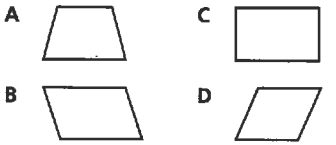
4 Shauna drew an angle that measured 38°. What kind of angle did Shauna draw?

A straight **C** acute
B obtuse **D** right

5 Which of these shows line *QR*?

A Q R **C** R Q
B Q R **D** Q R

6 Which of these is ***not*** a parallelogram?



7 What is the measure of this angle? Use your protractor.

A 40° **C** 130°
B 50° **D** 140°