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ABSTRACT: This is part one of a two-part SMSG elementary school text for third-grade students. The development of mathematical ideas in the text is grounded in appropriate experiences with things from the physical world and the immediate environment. Chapter topics include: (1) sets of points; (2) addition and subtraction; (3) describing points and numbers; and (4) arrays and multiplication. (MP)
MATHEMATICS
FOR THE
ELEMENTARY SCHOOL
BOOK 3
PART 1

SCHOOL MATHEMATICS STUDY GROUP

YALE UNIVERSITY PRESS
Mathematics for the Elementary School

Book 3

Student's Text, Part I.

REVISED EDITION

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## Student's Text, Book 3

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IV - 3. The Basic Multiplication Facts ......................... 218 - 220
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Points and Curves

1. Mark five points below.
   Name them with the first five letters of the alphabet.

2. Mark a point on each curve.
   Name each point with a different letter of the alphabet.

3. Put the letter P on the picture of the straight curve from M to R.
Line Segments

1. Here is a picture of a line segment.

   Write a name for this line segment. 

2. Draw a line segment with F and G as endpoints.

3. Write two names for the line segment above.

   ____  ____
4. Here are some line segments that have point $F$ as an endpoint.

One line segment is named below.

Name four other line segments.

- $AF$

5. Draw two line segments that have point $W$ as an endpoint.

Name these line segments $WX$ and $WY$.

Draw two more line segments that have $W$ as an endpoint.

Name these line segments $WO$ and $WP$.

Can you draw more line segments with $W$ as an endpoint? Yes No
6. Below are two points, \( A \) and \( B \).
Draw line segment \( \overline{AB} \).

How many line segments can you draw that have the two endpoints \( A \) and \( B \)?

7. Here is line segment \( \overline{MN} \).
Mark two points on \( \overline{MN} \). Name them \( O \) and \( T \).

\( \overline{MO} \) is one subset of \( \overline{MN} \).
Name five other line segments that are subsets of line segment \( \overline{MN} \).

\( \overline{MO} \)
Congruence of Line Segments

1. Look at the segments below.

Do you think \( AB \) is congruent to \( CD \)?
Yes \hspace{1cm} No

Compare \( AB \), \( CD \), \( EF \) and show below what you find. Make a ring around the right answer.

\( AB \) is congruent to \( CD \).
Yes \hspace{1cm} No

\( AB \) is congruent to \( EF \).
Yes \hspace{1cm} No

\( CD \) is congruent to \( EF \).
Yes \hspace{1cm} No
Congruence of Line Segments

\[ \overline{AB} \text{ is congruent to } \] 

\[ \overline{IK} \text{ is congruent to } \]

\[ \overline{FG} \text{ is congruent to } \] 

\[ \] 

\[ \text{is congruent to } \] 

\[ \text{is congruent to } \]
Congruence of Line Segments

4. \( \overline{AB} \) is congruent to \( \overline{MQ} \) is congruent to \( \overline{\_\_\_\_} \), and \( \overline{\_\_\_\_} \).

\( \overline{MQ} \) is congruent to \( \overline{\_\_\_\_} \), and \( \overline{\_\_\_\_} \).
Review
1. Find the points E, C, A, B, D, and F named on the page. Draw \( \overline{AB} \).

Draw \( \overline{CD} \). Is \( \overline{AB} \) a subset of \( \overline{CD} \)? Yes No

Draw \( \overline{EF} \). The line segment \( \overline{CD} \) is a subset of ________.

Draw \( \overrightarrow{EF} \). Is \( \overrightarrow{EF} \) a subset of \( \overrightarrow{EF} \)? Yes No

Is \( \overrightarrow{EF} \) a subset of \( \overrightarrow{EF} \)? Yes No

Can you show all of \( \overrightarrow{EF} \)? Yes No

Some other names for \( \overrightarrow{EF} \) are \( \overrightarrow{CA} \), \( \overrightarrow{AE} \), and \( \overrightarrow{DF} \).

Write at least six other names below.
Lines

2. The point $R$ is named below.
   Draw five different lines through point $R$.
   Mark and name another point on each line.

   $\cdot R$

   Name the lines you have drawn.

   Can many more lines be drawn through $R$?  Yes  No

3. Mark two points below. Name them $Q$ and $Z$.
   Draw $QZ$.

   Can you draw a different line through $Q$ and $Z$?  Yes  No
1. Here is a picture of ray $YZ$:

Name two points on $YZ$. 

Name the endpoint of ray $YZ$. 

Is the endpoint named first? Yes No

Name a line segment in the picture. 

Does $YZ$ go on from $YZ$ in one direction only? Yes No

2. Here is a picture of a line.

Name four rays on this line. 

Are the endpoints named first? Yes No

Is $RT$ another name for $TR$? Yes No
3. Here is another line.

Y

A

X

How many rays on the line can have A as an endpoint?

Name three line segments on the line that have A as an endpoint.

4. Draw a ray. Name it $\overrightarrow{AB}$.

Is $\overrightarrow{AB}$ a subset of $\overrightarrow{AB}$? Yes No

Is $\overrightarrow{BA}$ another name for $\overrightarrow{AB}$? Yes No
5. Mark the letter T as shown to complete each sentence correctly.

<table>
<thead>
<tr>
<th>A line segment has</th>
<th>A ray has</th>
<th>A line has</th>
</tr>
</thead>
<tbody>
<tr>
<td>one endpoint</td>
<td>one endpoint</td>
<td>one endpoint</td>
</tr>
<tr>
<td>two endpoints</td>
<td>two endpoints</td>
<td>two endpoints</td>
</tr>
<tr>
<td>no endpoints</td>
<td>no endpoints</td>
<td>no endpoints</td>
</tr>
</tbody>
</table>

6. The point Q is marked below.

Draw five different rays above, each with endpoint Q.
1. Here are four rays.
   The rays are named \( \overrightarrow{AF} \), \( \overrightarrow{AD} \), \( \overrightarrow{KQ} \), and \( \overrightarrow{KR} \).
   These rays form two angles.

   Name the two angles. __________  __________

   Give two other names for \( \angle FAD \) and \( \angle QKR \). __________  __________

   The vertex of \( \angle FAD \) is point A.
   Name the vertex of the other angle. __________

   Mark a point C between K and R on ray \( \overrightarrow{KR} \).
   Now write two new names for \( \angle QKR \). __________  __________

2. Here is another angle.

   Name this angle. __________
   Name its vertex. __________
3. Name the vertex and the rays:

- Triangle ABC: vertex ____, rays _____
- Triangle XYZ: vertex ____, rays _____
- Triangle AKN: vertex ____, rays _____
- Triangle DEF: vertex ____, rays _____
4. Write two names for each angle.

5. Below is a picture of \( \angle BAC \).

Mark another point on \( \overrightarrow{AB} \). Name it \( D \).
Mark another point on \( \overrightarrow{AC} \) and name it \( E \).

- Is \( \overrightarrow{AB} \) the same ray as \( \overrightarrow{AD}? \) Yes No
- Is \( \overrightarrow{AC} \) the same ray as \( \overrightarrow{AE}? \) Yes No
- Is \( \angle BAC \) the same angle as \( \angle EAD? \) Yes No
- Is \( \overrightarrow{BD} \) a subset of \( \overrightarrow{AB}? \) Yes No
Congruence of Angles

1. Is \( \angle ABC \) congruent to \( \angle DEF? \)
   - Yes
   - No

2. Is \( \angle GHI \) congruent to \( \angle JKL? \)
   - Yes
   - No

3. Is \( \angle PQR \) congruent to \( \angle MNO? \)
   - Yes
   - No
4. Is $\angle ACD$ congruent to $\angle BER$?
   Yes  No

5. $\angle \underline{\quad}$ is congruent to $\angle \underline{\quad}$
   $\angle \underline{\quad}$ is congruent to $\angle \underline{\quad}$
Right Angles and Congruence

1. The points F, L, and O lie on a line.
   Make a tracing of one angle.
   Test to see if the angles are congruent.

   Are $\angle MLO$ and $\angle MLF$ congruent angles? Yes No
   Are $\angle MLO$ and $\angle MLF$ right angles? Yes No

2. Test $\angle PQR$ and $\angle PQK$ to see if they are congruent.

   Are $\angle PQR$ and $\angle PQK$ congruent angles? Yes No
   Do the points K, Q, and R lie on a line? Yes No
   Are $\angle PQR$ and $\angle PQK$ right angles? Yes No
Right Angles and Congruence

3: Test \( \angle TYS \) and \( \angle TYU \) to see if they are congruent.

- Are \( \angle TYS \) and \( \angle TYU \) congruent angles? Yes No
- Do the points S, Y, and U lie on a line? Yes No
- Are \( \angle TYS \) and \( \angle TYU \) right angles? Yes No

4. Here are three pairs of angles; the pairs are called A, B, and C.

- Set B is one set of congruent angles.
- Which other set looks like a pair of congruent angles?
- Tell by looking which pair of angles could be right angles.
- Tell by testing which other pair of angles are congruent.
- Tell by testing which pair of angles are right angles.
Forming a Right Angle

5. Here is one way to form a right angle.

Step 1--Think about folding the sheet along $\overline{AB}$.
Step 2--Crease $\overline{AB}$ to show the line segment $\overline{AB}$.
Step 3--Think about folding the paper along $\overline{CD}$ so that endpoint $B$ fits exactly on $A$.
Step 4--Crease $\overline{CD}$ to show the line segment $\overline{CD}$.

Step 1

Step 2

Step 3

Step 4

Look at some of the curves and points we now have.
Segment $\overline{CA}$ is part of the ray _______ with endpoint $C$.
Ray $\overrightarrow{CA}$ and ray $\overrightarrow{CD}$ form a right angle.
The vertex of the right angle is ________
Name the right angle. ________________
Right Angles

6. We can use our right angle to draw other right angles.
   Below is ray $\overrightarrow{AB}$ with endpoint $A$.
   Place the vertex of your right angle on point $A$.
   Place one edge of your right angle along $\overrightarrow{AB}$.
   Draw along the other edge.
   Name this ray. __________

   Name this right angle. __________
   Draw another right angle using $\overrightarrow{AB}$ and its endpoint $A$.
   Name this angle. __________
   What kind of curve did you form with the two rays you drew? _____
7. Test these angles to find the right angles:

\[ \angle A \text{ and } \angle B \text{ are right angles.} \]

\[ \angle C \text{ is congruent to } \angle D. \]

8. Use your angle to test if \( \angle RST \) and \( \angle WXY \) are right angles.

\[ \text{Is } \angle RST \text{ congruent to } \angle WXY? \quad \begin{align*}
\text{Yes} & \quad \text{No}
\end{align*} \]

Do you think a right angle is always congruent to another right angle? \quad \begin{align*}
\text{Yes} & \quad \text{No}
\end{align*}
Review
Closed Curves

Mark an X on each closed curve.
Simple Closed Curves

1. Mark an $\text{X}$ on each simple closed curve.

2. Draw a closed curve which is not simple.

Mark a point where this curve crosses itself.
Color a simple closed curve that is a subset of your curve.
Simple Closed Curves

3.

Is the curve a simple closed curve?  Yes  No

Look at points  A,  B,  C,  D,  E.

Write names of points which are inside the curve.  __________

Write names of points which are outside the curve.  __________
1. Here are pictures of different polygons. Use your pencil to connect each polygon with its name.

Triangle

Name three line segments on the triangle.  ___  ___  ___

Name each vertex of the triangle.  ___  ___  ___

Name the sides of the quadrilateral.  ___  ___  ___  ___

Name each vertex of the quadrilateral.  ___  ___  ___  ___

2. Two quadrilaterals are shown below. Connect them with their special names.

Square

Rectangle
Review

29
Congruence of Polygons

1. These simple closed curves are unions of line segments.

These kinds of curves are called ____________

Can any of these polygons fit on each other exactly? Yes ____________ No ____________
Do you think polygons can be congruent when they do not have the same number of sides? Yes ____________ No ____________

2. Two quadrilaterals are shown here.
Make a tracing of one curve.
Test to see if the sides and angles of the tracing fit exactly on the sides and angles of the other curve.

Do the sides fit exactly? Yes ____________ No ____________
Do the angles fit exactly? Yes ____________ No ____________
Are the curves congruent? Yes ____________ No ____________
Congruence of Polygons

3. These triangles are named \( \triangle XYZ \) and \( \triangle ABC \).

Do you think the triangles are congruent?

Yes  No

Make a tracing of \( \triangle XYZ \).

Mark the points \( X, Y, Z \) on the tracing.

Can you fit the tracing of \( \triangle XYZ \) on \( \triangle ABC \) without turning it?

Yes  No

If you turn the tracing, can it fit on \( \triangle ABC \)?

Yes  No

Line segment \( XY \) is congruent to ______.

Line segment \( YZ \) is congruent to ______.

Line segment \( XZ \) is congruent to ______.

Is \( \triangle XYZ \) congruent to \( \triangle ABC \)?

Yes  No
4. Here are two rectangles. We will call one rectangle $ABCD$.

Make a tracing of $ABCD$.
Test to see if the tracing fits exactly on $EFGH$.
Do the line segments fit exactly? Yes No
Do you need to test the angles for congruence? Yes No
Is $ABCD$ congruent to $EFGH$? Yes No

5. Put a cross in the two congruent figures in each row.
Inside, On, and Outside

1. A polygon with three sides is called a triangle.

- Name a point inside the triangle.
- Name a point on the triangle.
- Name a point outside the triangle.

2. Polygons with four sides are called quadrilaterals.

- Write 1 in the rectangle that is not a square.
- Write 2 inside the square.
- Write 3 just outside each quadrilateral.
- Mark X on each rectangle.
Interior and Exterior

1. Mark a point $J$ in the interior of this curve.
   Mark a point $C$ on the curve.
   Mark a point $D$ in the exterior of the curve.

2. Here is a triangle.
   Color the triangle, but not its interior.
   Color the interior using another color.
3. Name two points in the interior of this figure. 
Name two points in the exterior of this figure.

Without crossing the figure, can you draw a curve
from A to B? Yes No
from A to C? Yes No
from A to D? Yes No
from B to C? Yes No
from B to D? Yes No
from C to D? Yes No

Can any curve in a plane pass from the interior of a simple closed curve to its exterior without crossing the curve? Yes No
Regions

1. Here is a rectangle.

Color the curve.
Color the interior using a different color.
When we think of a curve and its interior, we call the figure a region.

2. Below are several regions and names for regions.
Regions will be shaded in this book.
Pair each region with its correct name.

Quadrilateral region
Circular region
Triangular region
Regions

3. Draw a triangle.

- Color the triangle yellow.
- Color the interior of the triangle red.

The region shown is a triangular region.

4. Draw $\overline{AD}$, $\overline{DB}$, $\overline{CB}$, and $\overline{AC}$.

Underline the correct names for the figure you drew.

(1) a simple closed curve
(2) a polygon
(3) a triangle
(4) a quadrilateral
(5) a quadrilateral region
Right Triangles

Here are triangle ABR and line segment BD.

Are \( \angle BDA \) and \( \angle BDR \) congruent?  
Yes  No

Are \( \angle BDA \) and \( \angle BDR \) right angles?  
Yes  No

Name two right triangles.  

Are these right triangles congruent?  
Yes  No
Isosceles Triangles

1. Is \(HM\) congruent to \(MT\)? Yes No

   How many congruent sides does \(\triangle HMT\) have? ______

   Is \(\triangle HMT\) an isosceles triangle? Yes No

2. Make a tracing of \(\triangle HMT\).
   Fold it so that the tracings of \(MH\) and \(MT\) fit on each other.

   Is \(\angle MHT\) congruent to \(\angle MTH\)? Yes No

   How many congruent angles does \(\triangle HMT\) have? ______

3. An isosceles triangle has ______ congruent sides and ______ congruent angles.
Equilateral Triangles

Mark off \( RS \) on the edge of a sheet of paper.

Is your copy of \( RS \) congruent to \( RT \)?

Yes No

Is \( \triangle RST \) an isosceles triangle?

Yes No

Is your copy of \( RS \) also congruent to \( ST \)?

Yes No

Are the three sides of this triangle congruent?

Yes No

The special kind of isosceles triangle with all three sides congruent is called an **equilateral triangle**.

Is an equilateral triangle always an isosceles triangle?

Yes No
1. Figure ABCD is a square.
   Draw AC.
   Name the two triangles you see. __________ __________
   Is \( \triangle ACD \) an isosceles triangle? Yes No
   Name its congruent sides. __________ and __________
   Is \( \triangle ACD \) a right triangle? Yes No
   Is \( \triangle ACD \) an isosceles right triangle? Yes No
   Is \( \triangle ACD \) an equilateral triangle? Yes No
   Do you think \( \triangle ACD \) and \( \triangle ACB \) are congruent? Yes No
2. Look at quadrilateral $ABCD$.

Draw $\overline{AC}$.

Is $\triangle ACD$ isosceles?  
Yes  
No

Is $\triangle ACD$ a right triangle?  
Yes  
No

Is $\triangle ACD$ equilateral?  
Yes  
No

Is $\triangle ACB$ equilateral?  
Yes  
No

Are $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, and $\overline{DA}$ congruent?  
Yes  
No

Is $ABCD$ a square?  
Yes  
No
3. Look at quadrilateral $ABCD$.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is $\angle ADC$ a right angle?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is $\angle ABC$ a right angle?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

4. Draw $AC$ above.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is $\triangle ADC$ a right triangle?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is $\triangle ADC$ isosceles?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is $\triangle ADC$ congruent to $\triangle ABC$?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Subsets

GIRL  APPLE  GREEN  BANANA  
BLUE  GRAPE  BABY  PURPLE  
GRASS  BOOK  PLATE  BLACK  

Set A

1. The words in the box that begin with _a_ are a subset of Set A. List the members of this subset. ___________________________

2. The words that begin with _b_ are also a subset of Set A. List the members of this subset. ___________________________

3. Ring the words that begin with _p_. How many members in this subset? ___________________________

4. Describe the subset whose members are words that begin with _z_. ___________________________

5. Ring the words that begin with _gr_. How many members in this subset? ___________________________
   List the members. ___________________________
Union of Sets

1. How many members are in Set A? 
2. How many members are in Set B? 
3. Think of joining Set A and Set B. 
   When we join two sets we have a new set called the union of the two sets. 
   Draw a picture for the union of sets A and B.

4. How many members are in the union of sets A and B? 
5. Write an equation for the two sets and their union.
Union of Sets

Set X

Set Y

Set Z

6. How many members are in Set X? ______
7. How many members are in Set Y? ______
8. Draw a picture for the union of sets X and Y.
9. Write an equation for X and Y and their union.
10. How many members are in Set Z? ______
11. Draw a picture for the union of sets Y and Z.
12. Write an equation for Y and Z and their union.
Removing a Subset

1. Look at these pictures.

How many members are in Set A? ______

2. How many members are in the subset being removed? ______

3. Draw a picture of the set that would be left when Subset B is removed from Set A.

4. How many members are in the set remaining when Subset B is removed from Set A? ______

5. Write an equation which describes the set remaining. ______

6. Look at these pictures. Ring a subset in each picture and write an equation for the set remaining.

<table>
<thead>
<tr>
<th>Jane</th>
<th>Bob</th>
<th>Sally</th>
<th>Mary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe</td>
<td>Ann</td>
<td>Bill</td>
<td>Charles</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H</td>
</tr>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Union of Sets

1. Set \( A = \{\text{lamb, pig, dog}\} \)
   Set \( B = \{\text{cow, cat}\} \)
   Ring the set that is the union of sets \( A \) and \( B \).
   \( \{\text{lamb, horse, pig, dog, cat}\} \)
   \( \{\text{lamb, pig, dog, cat, goat}\} \)
   \( \{\text{lamb, pig, dog, cat, cow}\} \)
   \( \{\text{cow, cat, lamb, dog, fish}\} \)

2. Set \( C = \{\text{book, pencil, eraser, crayon}\} \)
   Set \( D = \{\text{clip, tape, ruler}\} \)
   Ring the set that is the union of sets \( C \) and \( D \).
   \( \{\text{crayon, ruler, pencil, eraser, tape}\} \)
   \( \{\text{clip, ruler, book, crayon, pencil, eraser, tape}\} \)
   \( \{\text{tape, ruler, book, pencil, eraser, crayon, chalk}\} \)

3. Set \( E = \{\text{rubber, tin, doll}\} \)
   Set \( F = \{\text{ball, kite, bat, car}\} \)
   Set \( G \) is the union of sets \( E \) and \( F \).
   Ring set \( G \).
   \( \{\text{rubber, tin, ball, car, doll, car, kite}\} \)
   \( \{\text{car, rubber, tin, doll, ball, kite, cap}\} \)
   \( \{\text{kite, doll, ball, rubber, tin, car, bat}\} \)
Removing a Subset

1. Set $R = \{\text{dress, hat, sock, shoe, coat}\}$
   - Set $T$ is a subset of Set $R$.
   - Set $T = \{\text{shoe, sock}\}$
   - Ring the set remaining when Set $T$ is removed from Set $R$.
     - $\{\text{sock, shoe}\}$
     - $\{\text{coat, hat, dress}\}$
     - $\{\text{hat, shoe, coat}\}$

2. Set $V = \{\text{doll, wagon, ball, house, crayon}\}$
   - Set $W = \{\text{ball, crayon}\}$
   - Ring the set remaining when Set $W$ is removed from Set $V$.
     - $\{\text{house, dog, cat, ball}\}$
     - $\{\text{crayon, ball}\}$
     - $\{\text{wagon, doll, house}\}$

3. Set $F = \{0, 1, 2, 3, 4, 5, 6\}$
   - Set $G = \{6, 4, 2, 0\}$
   - Ring the set remaining when Set $G$ is removed from Set $F$.
     - $\{3\}$
     - $\{2, 3, 4, 7\}$
     - $\{5, 1, 3\}$

4. Set $H = \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$
   - Set $K$ is the set of numbers less than 5.
   - List the members of Set $K$.
   - Ring the set remaining when Set $K$ is removed from Set $H$.
     - $\{5, 6, 7, 8\}$
     - $\{6, 7, 8\}$
     - $\{0, 1, 2, 3, 4\}$
5. Set \( P = \{11, 12, 13, 14, 15\} \)
   
   Set \( X \) is the set of numbers less than 12 in set \( P \).
   
   List the members of Set \( X \).
   
   Ring the set remaining when Set \( X \) is removed from Set \( P \).
   
   \{12, 13, 14, 15\} \quad \{13, 14, 15\} \quad \{14, 15\}

6. Set \( M = \{20, 21, 22, 23, 24, 25\} \)
   
   Set \( H \) is the set of numbers greater than 23 in set \( M \).
   
   List the members of Set \( H \).
   
   Ring the set remaining when Set \( H \) is removed from Set \( M \).
   
   \{20, 21, 22, 23\} \quad \{24, 25\} \quad \{20, 21, 22\}
1. Use the picture to answer these questions.

   How many cars are on Main Street but not on Oak Avenue? ______
   Color each of these cars red.

   How many cars are on Oak Avenue but not on Main Street? ______
   Color each of these cars green.

   How many cars are on Main Street and on Oak Avenue at the same time? ______
   Color each of these cars blue.

   Total number of cars in the picture: ______

   Total number of cars on Main Street: ______

   Total number of cars on Oak Avenue: ______

   Number of cars in the intersection of Main Street and Oak Avenue: ______

   Explain each of these sentences in relation to the picture:
   \[ 4 + 3 + 2 = 9 \]

   \[ 6 + 5 = 11, \quad \text{and} \quad 11 - 2 = 9. \]
2. Here is a picture of a set of girls:

How many girls are in each of these subsets:

- The set of girls with bows and jump-ropes.
- The set of girls with bows but without jump-ropes.
- The set of girls with jump-ropes but without bows.

Are each two of these three sets disjoint?

Write an equation for the number of girls all together using the numbers of girls in the three subsets:

Draw a ring around each of these sets:

- The set of girls with bows. This set has _______ members.
- The set of girls with jump-ropes. This set has _______ members.

Are these two sets disjoint? _______

How many members are in the intersection of these two sets? _______

Write an equation for the picture. ________________________________
3. Here are some sets:

Are sets A and B disjoint sets? ______
How can you tell? ______________________

How many members are there in set A? ______
How many members are there in set B? ______
How many members are there in the intersection of set A and set B? ______
How many members are there in the union of set A and set B? ______

4. Here are some more sets:

How many members in Set Y? ______
How many members in the intersection of sets Y and Z? ______
There are 12 members in the union of sets Y and Z.
How many members in set Z? ______
Comparing Sets

1) There are more squares than □'s.
   Show by pairing that your answer is correct.

2) There are as many △'s as □'s.
   Show by pairing that your answer is correct.

3) Is the set of △'s equivalent to the set of □'s?
   How do you know?

4) How many members in the set of △'s?

5) How many members in the set of □'s?

6) How does the number line help you remember that:
   (a) 11 is greater than 10?
   (b) 8 is less than 10?
Comparing Numbers

Write either < or > between each pair of numerals:

Remember:

7 < 9 is read "7 is less than 9"
9 > 5 is read "9 is greater than 5"

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<tr>
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<th>15</th>
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<tbody>
<tr>
<td>15</td>
<td>19</td>
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<td>62</td>
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<td>99</td>
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</table>
Using the Number Line

The set of whole numbers greater than 17 but less than 21 is 
\( \{18, 19, 20\} \).

1. The set of whole numbers greater than 29 but less than 32 is 
\( \{} \).

2. The set of whole numbers greater than 36 but less than 41 is 
\( \{} \).

3. The set of whole numbers greater than 52 but less than 55 is 
\( \{} \).

4. The set of whole numbers greater than 92 but less than 88 is 
\( \} \).
Intersection of Sets of Numbers

1. Set A is the set of whole numbers greater than 12 but less than 18.
   Set B is the set of whole numbers greater than 9 but less than 16.
   The members in the intersection of sets A and B are: Set A = {13, 14, 15, 16, 17} 
   Set B = {10, 11, 12, 13, 14, 15}

2. Set R is the set of whole numbers greater than 50 but less than 54.
   Set T is the set of whole numbers greater than 48 but less than 53.
   The members in the intersection of sets R and T are: Set R = { } 
   Set T = { } 

3. Set F is the set of whole numbers greater than 47 but less than 53.
   Set G is the set of whole numbers greater than 50 but less than 57.
   The members in the intersection of sets F and G are: Set F = { } 
   Set G = { } 

4. Set X is the set of whole numbers greater than 79 but less than 85.
   Set Y is the set of whole numbers greater than 82 but less than 90.
   The members in the intersection of sets X and Y are: Set X = { } 
   Set Y = { }
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</tbody>
</table>
Relating Subtraction to Addition

Fill in the blank. Then write the associated addition fact.

Example: \[10 - 4 = \_
\]
\[6 + 4 = 10\]

1. \[13 - 7 = \_
\]
6. \[15 - 8 = \_
\]

2. \[11 - 6 = \_
\]
7. \[14 - 9 = \_
\]

3. \[16 - 8 = \_
\]
8. \[12 - 5 = \_
\]

4. \[14 - 6 = \_
\]
9. \[13 - 8 = \_
\]

5. \[17 - 9 = \_
\]
10. \[16 - 7 = \_
\]
Relating Addition to Subtraction

Complete. Then rewrite each addition fact as a subtraction fact.

9 + ____ = 17

17 - 8 = 9

1. 4 + ____ = 12

7. 6 + ____ = 14

2. 7 + ____ = 13

8. 9 + ____ = 15

3. 7 + ____ = 11

9. 6 + ____ = 11

4. 8 + ____ = 15

10. 5 + ____ = 14

5. 5 + ____ = 12

11. 4 + ____ = 13

6. 3 + ____ = 12

12. 9 + ____ = 18
Miscellaneous Exercises

Addition and Related Subtraction

10
4 + 6 = 
6 + 4 = 
10 - 6 = 
10 - 4 = 

10
27 + 8 = 
8 + = 
10 - = 
10 - = 

10
3 + 7 = 
7 + = 
10 - 3 = 
10 - = 

10
9 + 1 = 
1 + = 
10 - 1 = 
10 - = 

9
7 + 2 = 
2 + = 
9 - 2 = 
9 - = 

9
5 + = 
4 + = 
9 - = 
9 - = 
### Partitions of a Set of Ten Things

Write an equation for each row.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>10 = 1 + ___</td>
<td>10 = 1 + ___</td>
</tr>
<tr>
<td>10 = 2 + ___</td>
<td>10 = 2 + ___</td>
</tr>
<tr>
<td>10 = 3 + ___</td>
<td>10 = 3 + ___</td>
</tr>
<tr>
<td>10 = 4 + ___</td>
<td>10 = 4 + ___</td>
</tr>
<tr>
<td>10 = 5 + ___</td>
<td>10 = 5 + ___</td>
</tr>
</tbody>
</table>

Write an equation for each row.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2 + 3 + 5 = 10</td>
<td>3 + 5 + 1 = 10</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>
Using a Ten in Addition and Subtraction

Join some of the members of the second set to the first set to make a group of ten.

\[ 6 + 8 = 10 + 4 \]

\[ 5 + 9 = \quad \]

FINISH:

\[ 9 + 1 + 4 = 14 \]
\[ 8 + 2 + 4 = 14 \]
\[ 7 + 3 + 4 = 14 \]
\[ 6 + \_ + \_ = 14 \]
\[ \_ + 5 + \_ = 14 \]
\[ 4 + \_ + 4 = 14 \]
\[ 3 + \_ + \_ = 14 \]
\[ 2 + \_ + \_ = 14 \]
\[ 1 + \_ + \_ = 14 \]

\[ 7 + 7 = \]
Using a Ten in Addition and Subtraction

Think of the sum of the two numbers as 10 and some ones.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>6 + 7 = 10 + 3</td>
<td>9 + 5 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 + 4 = 10 + 1</td>
<td>8 + 6 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 + 6 = 10 +</td>
<td>5 + 6 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 + 5 = 10 +</td>
<td>4 + 8 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 + 2 =</td>
<td>8 + 8 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 + 4 =</td>
<td>7 + 5 =</td>
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<td></td>
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<tr>
<td>5 + 9 =</td>
<td>8 + 3 =</td>
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<tr>
<td>6 + 8 =</td>
<td>7 + 6 =</td>
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<tr>
<td>9 + 4 =</td>
<td>9 + 3 =</td>
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<tr>
<td>5 + 8 =</td>
<td>4 + 7 =</td>
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<td></td>
</tr>
<tr>
<td>6 + 5 =</td>
<td>9 + 9 =</td>
<td></td>
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</tr>
<tr>
<td>8 + 9 =</td>
<td>7 + 7 =</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pairs of Numbers

Complete this chart.

<table>
<thead>
<tr>
<th>Number First number</th>
<th>Pair Second number</th>
<th>Operation</th>
<th>Whole number sum or difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>4</td>
<td>+</td>
<td>11</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>-</td>
<td>Not any</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td></td>
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<tr>
<td>16</td>
<td>8</td>
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<tr>
<td>5</td>
<td>9</td>
<td></td>
<td>14</td>
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<td>9</td>
<td>5</td>
<td></td>
<td>4</td>
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<tr>
<td>5</td>
<td>9</td>
<td></td>
<td>Not any</td>
</tr>
<tr>
<td>6</td>
<td>+</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>
Miscellaneous Exercises

Write two addends for each sum. Then change the order of the addends. Use numbers less than 40.

11
9.2
2.9
8.3
3.8

12
13
14

15
16
17
18
Miscellaneous Exercises

The sum of two numbers is named in each larger box. Below each sum is one of the addends. Name the other addend. The first one is done for you:

\[
\begin{array}{ccc}
12 & 11 & 13 \\
5 & 3 & 6 \\
7 & 9 & 9 \\
4 & 7 & 7 \\
\end{array}
\]

\[
\begin{array}{ccc}
14 & 15 & 12 \\
9 & 6 & 10 \\
8 & 7 & 9 \\
4 & 9 & 7 \\
\end{array}
\]
Miscellaneous Exercises

Finish each equation.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>8 + 7 =</td>
<td>8 + 8 =</td>
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<td>16 - 8 =</td>
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<td>9 + 5 =</td>
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<td>15 + 9 =</td>
<td>14 - 5 =</td>
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<tr>
<td>9 + 8 =</td>
<td>6 + 8 =</td>
</tr>
<tr>
<td>17 + 8 =</td>
<td>14 - 8 =</td>
</tr>
<tr>
<td>7 + 9 =</td>
<td>8 + 6 =</td>
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<td>14 - 6 =</td>
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<td>5 + 9 =</td>
</tr>
<tr>
<td>8 + 13 =</td>
<td>9 + 14 =</td>
</tr>
<tr>
<td>+ 7 = 12</td>
<td>+ 9 = 17</td>
</tr>
<tr>
<td>+ 5 = 12</td>
<td>+ 8 = 17</td>
</tr>
</tbody>
</table>
Miscellaneous Exercises

Fill in the blanks so that in each row the sum of the first two numbers is the third number and in each column the sum of the first two numbers is the third number.

\[
\begin{array}{ccc}
(4) & 2 & 6 \\
0 & 3 & 3 \\
4 & 5 & 9 \\
\end{array}
\quad
\begin{array}{ccc}
3 & 4 & 7 \\
6 & \_ & \_ \\
7 & 10 & \_ \\
\end{array}
\]

\[
\begin{array}{ccc}
5 & \_ & \_ \\
2 & 4 & \_ \\
5 & 12 & \_ \\
\end{array}
\quad
\begin{array}{ccc}
4 & 4 & \_ \\
4 & 5 & \_ \\
8 & 13 & \_ \\
\end{array}
\]

\[
\begin{array}{ccc}
3 & 8 & \_ \\
2 & \_ & 11 \\
6 & 11 & \_ \\
\end{array}
\quad
\begin{array}{ccc}
4 & 7 & \_ \\
2 & \_ & 14 \\
8 & 14 & \_ \\
\end{array}
\]
Miscellaneous Exercises

Fill in the charts by finding the sum of pairs of numbers.

\[
\begin{array}{cccc}
2 & 7 & 6 & 8 \\
5 & 7 & & \\
9 & 11 & & \\
3 & & 9 & \\
4 & & & \\
\end{array}
\]

\[
\begin{array}{cccc}
7 & 5 & 9 & 8 \\
6 & & & \\
0 & & & \\
8 & & & \\
5 & & & \\
\end{array}
\]

\[
\begin{array}{cccc}
4 & 6 & 7 & 9 \\
5 & & & \\
1 & & & \\
6 & & & \\
7 & & & \\
\end{array}
\]

\[
\begin{array}{cccc}
8 & 6 & 9 & 5 \\
8 & & & \\
5 & & & \\
7 & & & \\
6 & & & \\
\end{array}
\]
Miscellaneous Exercises

Make these sentences true by using =, <, or >.

1. $7 + 6 \quad ____ \quad 6 + 7$
2. $5 + 8 \quad ____ \quad 5 + 9$
3. $9 + 3 \quad ____ \quad 2 + 9$
4. $6 + 3 \quad ____ \quad 9 + 1$
5. $6 + 5 \quad ____ \quad 5 + 6$
6. $2 + 9 \quad ____ \quad 9 + 2$
7. $7 + 3 \quad ____ \quad 4 + 7$
8. $6 + 6 \quad ____ \quad 6 + 5$
9. $2 + 7 \quad ____ \quad 3 + 7$
10. $4 + 8 \quad ____ \quad 8 + 4$
11. $6 + 2 \quad ____ \quad 2 + 6$
12. $2 + 9 \quad ____ \quad 8 + 3$
13. $5 + 8 \quad ____ \quad 8 + 5$
14. $4 + 8 \quad ____ \quad 6 + 5$
15. $3 + 9 \quad ____ \quad 9 + 3$
16. $6 + 4 \quad ____ \quad 7 + 3$

Make these true by using + and —.

1. $4 \quad ____ \quad 2 \quad > \quad 7 \quad ____ \quad 5$
2. $9 \quad ____ \quad 7 \quad < \quad 8 \quad ____ \quad 4$
3. $8 \quad ____ \quad 2 \quad < \quad 7 \quad ____ \quad 2$
4. $7 \quad ____ \quad 7 \quad > \quad 8 \quad ____ \quad 2$
5. $8 \quad ____ \quad 9 \quad < \quad 9 \quad ____ \quad 9$
6. $9 \quad ____ \quad 4 \quad > \quad 7 \quad ____ \quad 6$
7. $14 \quad ____ \quad 3 \quad > \quad 8 \quad ____ \quad 4$
8. $9 \quad ____ \quad 8 \quad < \quad 6 \quad ____ \quad 4$
9. $17 \quad ____ \quad 2 \quad > \quad 8 \quad ____ \quad 4$
10. $21 \quad ____ \quad 6 \quad < \quad 9 \quad ____ \quad 8$
11. $28 \quad ____ \quad 4 \quad > \quad 15 \quad ____ \quad 8$
12. $34 \quad ____ \quad 7 \quad < \quad 25 \quad ____ \quad 15$
13. $79 \quad ____ \quad 24 \quad > \quad 149 \quad ____ \quad 57$
14. $56 \quad ____ \quad 29 \quad < \quad 12 \quad ____ \quad 14$
15. $89 \quad ____ \quad 45 \quad > \quad 134 \quad ____ \quad 51$
16. $201 \quad ____ \quad 98 \quad > \quad 300 \quad ____ \quad 56$
Miscellaneous Exercises

Fill in the blanks with the correct numerals.
Begin at the left and go clockwise.

\[
\begin{align*}
7 + (9) & = 16 \\
8 & = 9 \\
+8 & = 7 \\
5+ & = 15 \\
8 & = 3 \\
5-6 & = \\
4 & = 11 \\
2 & = 7 \\
8 & = \\
6 & = 12 \\
8 & = 9 \\
6 & = \\
5 & = 13 \\
5 & = 7 \\
1 & = 73 \\
& = 79
\end{align*}
\]
Miscellaneous Exercises

Fill in the second ring.

Given addend plus other addend equals the sum named in the third ring. Example: \[2 + n = 13\]

\[n = ?\]
Miscellaneous Exercises

1. Find the sum by adding the number named in the center ring to a number named in the second ring. Write the sum in the outer ring.

2. Find the difference by subtracting a number named in the second ring from the number named in the center ring. For example: $13 - 5 = 8$
Tens and Ones

Fill in the blanks.

____ tens, ____ ones.

or

____ tens, ____ ones

or

____ tens, ____ ones

or

____ tens, ____ ones
### Hundreds, Tens, and Ones

Complete each of these.

<table>
<thead>
<tr>
<th>1 one hundred</th>
<th>10 tens</th>
<th>1 ten</th>
<th>10 ones</th>
</tr>
</thead>
</table>

186: ____ hundred, ____ tens, and ____ ones

342: ____ hundreds, ____ tens, and ____ ones

203: ____ hundreds, ____ tens, and ____ ones

230: ____ hundreds, ____ tens, and ____ ones

6: 6 hundreds, 2 tens, and 5 ones

4: 4 hundreds, 9 tens, and 6 ones

7: 7 hundreds, 0 tens, and 4 ones

5: 5 hundreds, 4 tens, and 1 one
### Hundreds, Tens, and Ones

<p>| | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[124 = 100 + 20 + 4\]

### Fill in the blanks:

\[
\begin{align*}
563 &= 500 + 60 + 9 \\
247 &= \\
486 &= \\
625 &= \\
\_\_\_\_ &= 700 + 40 + 1 \\
\_\_\_\_ &= 500 + 90 + 8 \\
\_\_\_\_ &= 400 + 60 \\
\_\_\_\_ &= 800 + 2
\end{align*}
\]
Hundreds, Tens, and Ones

Fill the blanks.

\[
\begin{align*}
847 &= 800 + 40 + 7 \\
235 &= \\
670 &= \\
569 &= \\
999 &= \\
419 &= \\
\_\_\_\_ &= .700 + 4 \\
\_\_\_\_ &= 20 + 100 + 8 \\
\_\_\_\_ &= 6 + 30 + 800 \\
\_\_\_\_ &= 200 + 80 \\
\_\_\_\_ &= 5 + 600 \\
603 &= \\
476 &= \\
875 &= \\
570 &= \\
409 &= \\
888 &= \\
\_\_\_\_ &= 800 + 10 \\
\_\_\_\_ &= 200 + 30 + 5 \\
\_\_\_\_ &= 4 + 600 \\
\_\_\_\_ &= 80 + 900 \\
\_\_\_\_ &= 5 + 200
\end{align*}
\]
Place Value

An abacus can help us represent a number.

1. The number ______ is represented on this abacus.
   ______ = 5 hundreds + 3 tens + 8 ones, or
   ______ = 500 + 30 + 8.

2. Show 472 on this abacus.
   472 = ______ + ______

3. Show 817 on this abacus.
   817 = ______ + ______ + ______
200 + 50 + 12 = 263.

A set of ten _____________ can be shown as one _____________.

400 + 130 = 530

A set of ten _____________ can be shown as one _____________.
3. 

\[ 200 + 40 + 2 = 242 \]

Show one set of ten as a set of ten ones.
Write the new name.

4. 

\[ 500 + 30 + 1 = 531 \]

Show one hundred as a set of ten tens.
Write the new name.

5. 

\[ 700 + 80 + 0 = 780 \]

Show one set of ten as a set of ten ones.
Write the new name.
### Different Ways of Thinking About a Number

<table>
<thead>
<tr>
<th>Number</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 75 = ____ tens + ____ ones = ____ tens + ____ ones
- 68 = ____ tens + ____ ones
  or ____ tens + ____ ones
- 94 = ____ tens + ____ ones
  or ____ tens + ____ ones
- 39 = ____ tens + ____ ones
  or ____ tens + ____ ones
- 62 = ____ tens + ____ ones
  or ____ tens + ____ ones
- 49 = ____ tens + ____ ones
  or ____ tens + ____ ones
- 57 = ____ tens + ____ ones
  or ____ tens + ____ ones
- 84 = ____ tens + ____ ones
  or ____ tens + ____ ones
- 71 = ____ tens + ____ one
  or ____ tens + ____ ones
- 96 = ____ tens + ____ ones
  or ____ tens + ____ ones
- 74 = ____ tens + ____ ones
  or ____ tens + ____ ones
Naming a Number in Different Ways

Complete the following sentences.

\[ 357 = \text{3 hundreds } + \underline{4} \text{ tens } + 7 \text{ ones,} \]
\[ \text{or 3 hundreds } + 4 \text{ tens } + \underline{\text{__}} \text{ ones,} \]
\[ \text{or 2 hundreds } + \underline{\text{__}} \text{ tens } + 17 \text{ ones.} \]

\[ 268 = \underline{\text{__}} \text{ hundreds } + 6 \text{ tens } + 8 \text{ ones,} \]
\[ \text{or 2 hundreds } + 5 \text{ tens } + \underline{\text{__}} \text{ ones,} \]
\[ \text{or 1 hundred } + \underline{\text{__}} \text{ tens } + 18 \text{ ones.} \]

\[ 569 = \underline{\text{__}} \text{ tens } + 9 \text{ ones,} \]
\[ \text{or 4 hundreds } + \underline{\text{__}} \text{ tens } + 9 \text{ ones,} \]
\[ \text{or \underline{__} hundreds } + 15 \text{ tens } + 19 \text{ ones.} \]

Write 426 in three other ways.

Write 752 in three other ways.
Renaming a Number

Match the expanded form with the standard form. For example,

(A) \(100 + 40 + 3 = 143\), so A is placed in the blank beside 143.

A 100 + 40 + 3
B 500 + 70 + 12
C 600 + 160 + 4
D 900 + 20 + 2
E 300 + 00 + 7
F 600 + 110 + 6
G 100 + 30 + 13
H 200 + 10 + 17
I 400 + 90 + 1
J 600 + 10 + 15
K 500 + 80 + 2
L 700 + 00 + 16
M 700 + 60 + 4
N 200 + 100 + 7
O 500 + 120 + 5
P 800 + 120 + 2

764
491
716
227
143
922

582 B
625
307

85
91
Thousands

1. The number ______ is represented on this abacus.

\[
\begin{align*}
\text{Thousands} + \text{Hundreds} + \text{Tens} + \text{Ones} &= 6 \text{ thousands} + 2 \text{ hundreds} + 4 \text{ tens} + 7 \text{ ones} \\
\end{align*}
\]

\[
\begin{align*}
\text{Thousands} + \text{Hundreds} + \text{Tens} + \text{Ones} &= 6000 + 200 + 40 + 7 \\
\end{align*}
\]

2. Show 3465 on this abacus.

\[
\begin{align*}
3465 &= \text{______ thousands} + \text{______ hundreds} + \text{______ tens} + \text{______ ones} \\
3465 &= \text{______} + \text{______} + \text{______} + \text{______} \\
\end{align*}
\]
Renaming Numbers

1. \[4000 + 200 + 40 + 3 = \]

2. \[6000 + 300 + 30 + 7 = \]

3. \[\underline{} + \underline{} + \underline{} + \underline{} = \]

4. \[\underline{} + \underline{} + \underline{} + \underline{} = \]

5. \[\underline{} + \underline{} + \underline{} + \underline{} = \]

6. \[\underline{} + \underline{} + \underline{} + \underline{} = \]
Thousands

Complete each of these:

____ ones = 1 ten
____ tens = 1 hundred
____ hundreds = 1 thousand

2748 = ____ thousands + ____ hundreds + ____ tens + ____ ones
5619 = ____ thousands + ____ hundreds + ____ ten + ____ ones
7546 = ____ thousands + ____ hundreds + ____ tens + ____ ones

____ = 5 thousands + 3 hundreds + 8 tens + 0 ones
____ = 3 thousands + 0 hundreds + 7 tens + 4 ones
____ = 9 thousands + 2 hundreds + 0 tens + 6 ones

6324 = 6000 + 300 + 20 + 4
5289 = ____ + ____ + ____ + ____
9165 = ____ + ____ + ____ + ____

____ = 2000 + 900 + 10 + 2
____ = 7000 + 500 + 3
____ = 4000 + 80 + 7

88

94
Naming a Number in Different Ways

1. Show 6549 on the abacus with 6 thousands, 5 hundreds, 4 tens and 9 ones.

```
  6 5 4 9
```

2. Show 6549 with only 5 thousands.

```
  5 5 4 9
```

3. Show 6549 with only 3 tens.

```
  6 5 4 9
```

4. Show 6549 with only 4 hundreds.

```
  6 5 4 9
```

Naming a Number in Different Ways

1. Here are some ways to name 3547.

- 3547 ones
- 35 hundreds + 4 tens + 7 ones
- 3 thousands + 5 hundreds + 4 tens + 7 ones
- 354 tens + 7 ones
- 3000 + 500 + 40 + 7
- 3500 + 40 + 7

2. Show some ways to name 2356.

3. Show some ways to name 4253.
Names for Numbers

1. From the list below check (✓) all the ways of naming 6529.
   a) 6,529 ones
   b) 652 tens + nine ones
   c) 6000 + 500 + 10 + 9
   d) 6000 + 1500 + 20 + 9
   e) 5000 + 1500 + 20 + 9
   f) 65 hundreds + 20 + 9
   g) 6000 + 400 + 20 + 9
   h) 6000 + 500 + 20 + 19

2. Answer Yes or No.
   a) 5,324 is 53 tens and 24 ones.  
   b) 7381 = 600 + 120 + 8.  
   c) 32 hundreds + 2 tens + 16 ones = 3236.  
   d) 537 = 400 + 13 + 7.  

3. The number 2,538 can be named in many ways. Write some of them.
   2,538:
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
Using the Number Line

The set of whole numbers greater than 28 but less than 33 is \{29, 30, 31, 32\}.

1. The set of whole numbers greater than 67 but less than 73 is \{}.

2. The set of whole numbers greater than 198 but less than 204 is \{}.

3. The set of whole numbers greater than 789 but less than 800 is \{}.

4. The set of whole numbers greater than 993 but less than 1002 is \{}.
Comparing Numbers

Write < or > between each pair of numerals.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>129</td>
<td>156</td>
<td>391</td>
<td>450</td>
<td>376</td>
<td>285</td>
</tr>
<tr>
<td>175</td>
<td>200</td>
<td>402</td>
<td>343</td>
<td>491</td>
<td>176</td>
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<tr>
<td>235</td>
<td>167</td>
<td>156</td>
<td>380</td>
<td>207</td>
<td>377</td>
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<tr>
<td>253</td>
<td>350</td>
<td>287</td>
<td>459</td>
<td>176</td>
<td>253</td>
</tr>
</tbody>
</table>

<p>| | | | | | |</p>
<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>1500</td>
<td>3520</td>
<td>2001</td>
<td>3427</td>
<td>3548</td>
</tr>
<tr>
<td>2000</td>
<td>1000</td>
<td>756</td>
<td>1156</td>
<td>2763</td>
<td>3276</td>
</tr>
<tr>
<td>3500</td>
<td>2500</td>
<td>2356</td>
<td>2556</td>
<td>4051</td>
<td>4027</td>
</tr>
<tr>
<td>4000</td>
<td>500</td>
<td>3702</td>
<td>3046</td>
<td>1776</td>
<td>1492</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers:

Compute:

<table>
<thead>
<tr>
<th>52 + 37</th>
<th>.83 + ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 + 42</td>
<td>43 + 55</td>
</tr>
<tr>
<td>72 + 13</td>
<td>14 + 44</td>
</tr>
</tbody>
</table>

94

100
### The Sum of Two Numbers

**Compute:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$67 + 32$</td>
<td>$45 + 56$</td>
</tr>
<tr>
<td>$74 + 15$</td>
<td>$58 + 31$</td>
</tr>
<tr>
<td>$46 + 53$</td>
<td>$36 + 32$</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

\[
\begin{array}{cc}
362 + 507 & 450 + 249 \\
743 + 253 & 804 + 194 \\
512 + 466 & 277 + 702 \\
96 + 2 & 12
\end{array}
\]
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>127 + 651</th>
<th>504 + 265</th>
</tr>
</thead>
<tbody>
<tr>
<td>1645 + 8253</td>
<td>7064 + 1825</td>
</tr>
<tr>
<td>8403 + 1596</td>
<td>3754 + 5005</td>
</tr>
</tbody>
</table>

97

103
The Sum of Two Numbers

Mary has a bouquet with 36 flowers. If Jill gives her a bouquet having 28 flowers, how many flowers will Mary have? We may write:

\[ 36 + 28 = \]

A. Think of 36 as:

\[ (30 + 6) \]

B. Think of 28 as:

\[ (20 + 8) \]

C. Join the tens:

\[ (30 + 20) \]

D. Join the ones:

\[ (6 + 8) \]

Do you see that we have another set of ten when we join the ones?

Make a ring around a set of ten.

\[ 6 + 8 = 10 + \]

\[ (30 + 20) + (10 + 4) = \]

98
E. Join the new set of ten to the other sets of ten.

These are the ones.

$$(30 + 20 + 10) + 4 = 60 + 4 = 64$$

F. You can write:

$$36 + 28$$
$$36 = 30 + 6$$
$$28 = 20 + 8$$

$$\frac{50 + 14}{64} = \frac{50 + 10 + 4}{64} = 64$$
<p>| | | |</p>
<table>
<thead>
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</thead>
<tbody>
<tr>
<td>1)</td>
<td>27 + 35</td>
<td>13)</td>
</tr>
<tr>
<td>2)</td>
<td>57 + 26</td>
<td>14)</td>
</tr>
<tr>
<td>3)</td>
<td>54 + 25</td>
<td>15)</td>
</tr>
<tr>
<td>4)</td>
<td>73 + 27</td>
<td>16)</td>
</tr>
<tr>
<td>5)</td>
<td>41 + 14</td>
<td>17)</td>
</tr>
<tr>
<td>6)</td>
<td>43 + 26</td>
<td>18)</td>
</tr>
<tr>
<td>7)</td>
<td>35 + 40</td>
<td>19)</td>
</tr>
<tr>
<td>8)</td>
<td>26 + 38</td>
<td>20)</td>
</tr>
<tr>
<td>9)</td>
<td>37 + 48</td>
<td>21)</td>
</tr>
<tr>
<td>10)</td>
<td>74 + 13</td>
<td>22)</td>
</tr>
<tr>
<td>11)</td>
<td>29 + 8</td>
<td>23)</td>
</tr>
<tr>
<td>12)</td>
<td>25 + 18</td>
<td>24)</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>63 + 29</th>
<th>58 + 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>54 + 27</td>
<td>49 + 28</td>
</tr>
<tr>
<td>65 + 29</td>
<td>23 + 47</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>76 + 18</th>
<th>67 + 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>58 + 7</td>
<td>59 + 38</td>
</tr>
<tr>
<td>35 + 46</td>
<td>47 + 9</td>
</tr>
</tbody>
</table>

102
The Sum of Two Numbers

Compute:

1) \( 99 + 37 = \) _____

2) \( 46 + 28 = \) _____

3) \( 37 + 55 = \) _____

4) \( 14 + 78 = \) _____

5) \( 25 + 69 = \) _____

6) \( 38 + 47 = \) _____

7) \( 65 + 26 = \) _____

8) \( 47 + 37 = \) _____

9) \( 63 + 19 = \) _____

10) \( 54 + 37 = \) _____

11) \( 63 + 28 = \) _____

12) \( 15 + 75 = \) _____

13) \( 39 + 59 = \) _____

14) \( 28 + 69 = \) _____

15) \( 47 + 39 = \) _____

16) \( 29 + 28 = \) _____

103

109
The Sum of Two Numbers

Ann has 237 stamps in her stamp collection.

Her grandmother gave her 126 more stamps.

How many stamps does Ann have now?

We write: \(237 + 126\)

Think of 237 as:

\[
\begin{array}{c}
\fbox{200} \\
\fbox{30} \\
\fbox{7}
\end{array}
\]

Think of 126 as:

\[
\begin{array}{c}
\fbox{100} \\
\fbox{20} \\
\fbox{6}
\end{array}
\]

Join the hundreds, then the tens, and then the ones.

\[
\begin{array}{c}
\fbox{300} \\
\fbox{50} \\
\fbox{13}
\end{array}
\]

Think of 13 as 10 + 3.

So, \(237 + 126 = 300 + 50 + 13\)

\[= 300 + 60 + 3\]

\[= 363\]

We can write:

\[
\begin{array}{c}
\fbox{200} + 30 + 7 \\
+ \fbox{100} + 20 + 6
\end{array}
\]

\[= \fbox{300} + 50 + 13 = \fbox{300} + 60 + 3 = \fbox{363}\]

Ann has 363 stamps.
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>345</th>
<th>538</th>
</tr>
</thead>
<tbody>
<tr>
<td>+249</td>
<td>+237</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>816</th>
<th>248</th>
</tr>
</thead>
<tbody>
<tr>
<td>+185</td>
<td>+125</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>347</th>
<th>723</th>
</tr>
</thead>
<tbody>
<tr>
<td>+226</td>
<td>+158</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>707</th>
<th>349</th>
</tr>
</thead>
<tbody>
<tr>
<td>+105</td>
<td>+233</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>248</th>
<th>394</th>
</tr>
</thead>
<tbody>
<tr>
<td>+129</td>
<td>+283</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>369</th>
<th>348</th>
</tr>
</thead>
<tbody>
<tr>
<td>+128</td>
<td>+161</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>764</th>
<th>586</th>
</tr>
</thead>
<tbody>
<tr>
<td>+29</td>
<td>+123</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>459</th>
<th>340</th>
</tr>
</thead>
<tbody>
<tr>
<td>+26</td>
<td>+360</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>204 + 567</th>
<th>348 + 236</th>
</tr>
</thead>
<tbody>
<tr>
<td>753 + 239</td>
<td>546 + 329</td>
</tr>
<tr>
<td>728 + 267</td>
<td>806 + 187</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>437 + 243</th>
<th>461 + 279</th>
</tr>
</thead>
<tbody>
<tr>
<td>537 + 256</td>
<td>825 + 137</td>
</tr>
<tr>
<td>347 + 268</td>
<td>158 + 629</td>
</tr>
</tbody>
</table>

108
The Sum of Two Numbers

Compute:

1) \(532 + 149\)
2) \(304 + 177\)
3) \(348 + 29\)
4) \(502 + 378\)
5) \(37 + 156\)
6) \(848 + 129\)
7) \(325 + 39\)
8) \(207 + 308\)
9) \(206 + 385\)
10) \(81 + 19\)
11) \(469 + 317\)
12) \(36 + 407\)
13) \(409 + 217\)
14) \(268 + 206\)
15) \(74 + 16\)
16) \(67 + 208\)
17) \(146 + 726\)
18) \(848 + 108\)
19) \(37 + 207\)
20) \(475 + 206\)
21) \(671 + 329\)
22) \(106 + 87\)
23) \(164 + 206\)
24) \(129 + 69\)
Ed's parents took him to visit a park. They drove 269 miles the first day. The second day they went 317 miles.
How far did they travel in 2 days?

2. Ed saw 14 different car license plates.
The next day he saw 9.
He claims he saw 24 in 2 days.
Did he? How do you know?

3. On Monday 406 cars went into the park.
On Tuesday 375 more came in.
How many visited the park on Monday and Tuesday?

4. There were 14 bears and 8 deer along the road Ed saw them.
How many animals did he see?

5. Ed ate $6.38 worth of food.
His share of the motel bill was $3.38.
What did his trip cost his father?
Finding the Sum of Two Numbers

Ann had 237 stamps in her collection.
Her grandmother gave her 191 more stamps.
How many stamps does Ann have now?

We write: \( 237 + 191 \)

\[ \begin{align*}
\text{Think of 237 as:} & \quad \text{Think of 191 as:} \\
\text{Join the hundreds, then the tens, and then the ones.} & \\
\text{Think of 12 'tens as 100 + 20.} & \\
\text{So,} \quad 237 + 191 & = 300 + 120 + 8 \\
& = 300 + 100 + 20 + 8 \\
& = 400 + 20 + 8 \\
& = 428
\end{align*} \]

We can write:
\[ \begin{array}{c}
237 = 200 + 30 + 7 \\
191 = 100 + 90 + 1 \\
\hline
300 + 120 + 8 \\
400 + 20 + 8 = 428
\end{array} \]

Ann has 428 stamps.
<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>300 + 120 + 8</td>
<td>600 + 190 + 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>400 + 70 + 8 = 478</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>500 + 50 + 7</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>+   +   =</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>100 + 140 + 6</td>
<td></td>
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<td></td>
<td>+   +   =</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>5</td>
<td>200 + 100 + 8</td>
<td></td>
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<tr>
<td></td>
<td>+   +   =</td>
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</tr>
<tr>
<td>6</td>
<td>800 + 130 + 3</td>
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<tr>
<td></td>
<td>+   +   =</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>600 + 160 + 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+   +   =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>100 + 100 + 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+   +   =</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>9</td>
<td>800 + 190 + 9</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>+   +   =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Math Table:**

**Title:** Renaming Ten Tens

**Row 1:**

1. 300 + 120 + 8 = 478
2. 500 + 50 + 7
3. 100 + 140 + 6
4. 700 + 150 + 0
5. 200 + 100 + 8
6. 800 + 190 + 2
7. 800 + 130 + 3
8. 600 + 160 + 6
9. 100 + 100 + 5
10. 800 + 190 + 9

**Instructions:**

- Rename the numbers using ten tens in each column.
- Add the numbers provided in each column.
- The sum should be the number in the rightmost column.
## Renaming Ten Tens

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>396</td>
<td>765</td>
<td></td>
</tr>
<tr>
<td>+283</td>
<td>+173</td>
<td></td>
</tr>
<tr>
<td>493</td>
<td>398</td>
<td></td>
</tr>
<tr>
<td>+215</td>
<td>+261</td>
<td></td>
</tr>
<tr>
<td>613</td>
<td>384</td>
<td></td>
</tr>
<tr>
<td>+196</td>
<td>+263</td>
<td></td>
</tr>
<tr>
<td>794</td>
<td>342</td>
<td></td>
</tr>
<tr>
<td>+173</td>
<td>+166</td>
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</tbody>
</table>

II3

II9
## Renaming Ten Tens

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$783 + 643$</td>
<td></td>
<td>$495 + 192$</td>
<td></td>
</tr>
<tr>
<td>$496 + 213$</td>
<td></td>
<td>$384 + 571$</td>
<td></td>
</tr>
<tr>
<td>$764 + 142$</td>
<td></td>
<td>$135 + 284$</td>
<td></td>
</tr>
<tr>
<td>$431 + 176$</td>
<td></td>
<td>$327 + 292$</td>
<td></td>
</tr>
</tbody>
</table>

114
Renaming Ten Tens

Compute the sum.

<table>
<thead>
<tr>
<th>395 + 282</th>
<th>784 + 192</th>
</tr>
</thead>
<tbody>
<tr>
<td>651 + 263</td>
<td>493 + 276</td>
</tr>
<tr>
<td>364 + 273</td>
<td>487 + 161</td>
</tr>
<tr>
<td>276 + 550</td>
<td>386 + 253</td>
</tr>
</tbody>
</table>
Uncle Jim's Farm

1. Uncle Jim lives 170 miles from Boys' Town.
   Boys' Town is 268 miles from White City.
   Uncle Jim drove to White City by way of Boys' Town.
   How many miles did he travel?

2. Jane visited the farm.
   She saw 76 cows along the highway.
   Uncle Jim has many horses.
   She counted 52.
   Did she see more than 100 animals?

3. On the farm are 784 hens.
   There are 20 roosters.
   How many chickens does Uncle Jim have?

4. Last year Uncle Jim made $475 in wheat.
   The corn crop was worth $450.
   How much money did he make on grain?

5. The hired man put 170 bales of hay in the barn.
   He did the same thing the next week.
   How many bales of hay did he store?
Renaming the Sum

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1) 93 - 48</td>
<td>8) 21 - 17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>93 = 80 + 13</td>
<td>21 = ___ + ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) 47 - 19</td>
<td>9) 36 - 18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47 = ___ + ___</td>
<td>36 = ___ + ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) 54 - 28</td>
<td>10) 95 - 27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54 = ___ + ___</td>
<td>95 = ___ + ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) 63 - 27</td>
<td>11) 71 - 38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63 = ___ + ___</td>
<td>71 = ___ + ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) 97 - 19</td>
<td>12) 65 - 48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>97 = ___ + ___</td>
<td>65 = ___ + ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) 55 - 26</td>
<td>13) 44 - 19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55 = ___ + ___</td>
<td>44 = ___ + ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) 74 - 56</td>
<td>14) 52 - 39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>74 = ___ + ___</td>
<td>52 = ___ + ___</td>
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</tr>
</tbody>
</table>
Computing the Difference Between Two Numbers

<table>
<thead>
<tr>
<th>75 - 28 = ___</th>
<th>68 - 29 = ___</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 = 60 + 15</td>
<td>68</td>
</tr>
<tr>
<td>-28 = (20 + 8)</td>
<td>-29</td>
</tr>
<tr>
<td>_______________</td>
<td>______________</td>
</tr>
<tr>
<td>40 + 7 = 47</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>84 - 16 = ___</th>
<th>46 - 27 = ___</th>
</tr>
</thead>
<tbody>
<tr>
<td>84</td>
<td>46</td>
</tr>
<tr>
<td>-16</td>
<td>-27</td>
</tr>
<tr>
<td>_______________</td>
<td>______________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>53 - 24 = ___</th>
<th>35 - 17 = ___</th>
</tr>
</thead>
<tbody>
<tr>
<td>-53</td>
<td>35</td>
</tr>
<tr>
<td>-24</td>
<td>-17</td>
</tr>
<tr>
<td>_______________</td>
<td>______________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>92 - 65 = ___</th>
<th>62 - 48 = ___</th>
</tr>
</thead>
<tbody>
<tr>
<td>92</td>
<td>62</td>
</tr>
<tr>
<td>-65</td>
<td>-48</td>
</tr>
<tr>
<td>_______________</td>
<td>______________</td>
</tr>
<tr>
<td></td>
<td>92 - 85 = _______</td>
</tr>
<tr>
<td>-----</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>56 - 39 = _______</td>
</tr>
<tr>
<td></td>
<td>25 - 17 = _______</td>
</tr>
</tbody>
</table>
## Computing the Difference

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>75 - 39</td>
<td>53 - 34</td>
<td>64 - 18</td>
<td>63 - 17</td>
</tr>
<tr>
<td>53</td>
<td>19</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>82 - 24</td>
<td>81 - 27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>54</td>
<td></td>
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</tbody>
</table>
## Finding the Difference Between Two Numbers

<p>| | | | |</p>
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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>46</td>
<td>19</td>
<td>43</td>
<td>25</td>
</tr>
<tr>
<td>92</td>
<td>47</td>
<td>62</td>
<td>44</td>
</tr>
<tr>
<td>53</td>
<td>26</td>
<td>51</td>
<td>26</td>
</tr>
<tr>
<td>84</td>
<td>35</td>
<td>67</td>
<td>39</td>
</tr>
<tr>
<td>74</td>
<td>39</td>
<td>45</td>
<td>16</td>
</tr>
<tr>
<td>82</td>
<td>25</td>
<td>52</td>
<td>19</td>
</tr>
</tbody>
</table>
1) Bill invited 35 children to his party. Yesterday his mother bought a package of balloons. There were 18 balloons in the package. Bill wants to give each child a balloon. How many more balloons does he need?

2) There are 50 candles in a box. Bill is 8 years old. How many candles will not be used?

3) Bill received 29 gifts. How many children did not bring a gift?

4) John brought Bill a box of marbles. Bill had 56 marbles. Now he has 94. How many marbles were in the box?

5) There were 19 boys at the party. How many girls were there?
Finding the Difference Between Two Numbers

Wayne has 385 stamps. He put 152 of them in a stamp book. How many more does he have to put in the stamp book?

We write: $385 - 152 = \underline{\quad}$

Think of 385 as: $300 + 80 + 5$

We want to remove 152.

Think of 152 as $100 + 50 + 2$

Think of removing 152 by ringing 1 set of one hundred, 5 sets of ten, and 2 sets of one.

Write the number of members in the set that is left.

$hundreds, \quad tens, \quad ones.$

We can write this: $\underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$

$= 300 + 80 + 5$

$- (100 + 50 + 2)$

$200 + 30 + 3 = \underline{\quad}$

Wayne has ______ more stamps to put in his book.
Computing the Difference Between Two Numbers

<table>
<thead>
<tr>
<th>534 - 123 = _____</th>
<th>758 - 325 = _____</th>
</tr>
</thead>
<tbody>
<tr>
<td>947 - 314 = _____</td>
<td>862 - 531 = _____</td>
</tr>
<tr>
<td>428 - 216 = _____</td>
<td>753 - 443 = _____</td>
</tr>
<tr>
<td>698 - 264 = _____</td>
<td>589 - 263 = _____</td>
</tr>
</tbody>
</table>

124

130
The Difference Between Two Numbers

Compute:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>384 - 162 =</td>
<td>765 - 334 =</td>
</tr>
<tr>
<td>987 - 234 =</td>
<td>905 - 704 =</td>
</tr>
<tr>
<td>879 - 235 =</td>
<td>548 - 275 =</td>
</tr>
<tr>
<td>374 - 152 =</td>
<td>384 - 163 =</td>
</tr>
</tbody>
</table>
### Renaming the Sum

1) \( 448 - 129 \)
   \[ 448 = 400 + 30 + 18 \]

2) \( 572 - 227 \)
   \[ 572 = \_\_\_ + \_\_\_ + \_\_\_ \]

3) \( 740 - 235 \)
   \[ 740 = \_\_\_ + \_\_\_ + \_\_\_ \]

4) \( 571 - 329 \)
   \[ 571 = \_\_\_ + \_\_\_ + \_\_\_ \]

5) \( 884 - 366 \)
   \[ 884 = \_\_\_ + \_\_\_ + \_\_\_ \]

6) \( 793 - 458 \)
   \[ 793 = \_\_\_ + \_\_\_ + \_\_\_ \]

7) \( 366 - 138 \)
   \[ 366 = \_\_\_ + \_\_\_ + \_\_\_ \]

8) \( 857 - 248 \)
   \[ 857 = \_\_\_ + \_\_\_ + \_\_\_ \]
**Computing Differences**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>672</td>
<td>- 235</td>
<td></td>
<td></td>
</tr>
<tr>
<td>591</td>
<td>- 347</td>
<td></td>
<td></td>
</tr>
<tr>
<td>894</td>
<td>- 488</td>
<td></td>
<td></td>
</tr>
<tr>
<td>750</td>
<td>- 237</td>
<td></td>
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</tbody>
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127

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133
Computing the Difference Between Two Numbers:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>348 - 129</td>
<td>532 - 318</td>
</tr>
<tr>
<td>761 - 356</td>
<td></td>
</tr>
<tr>
<td>974 - 538</td>
<td></td>
</tr>
<tr>
<td>883 - 647</td>
<td>128</td>
</tr>
</tbody>
</table>
Finding Differences

Find the difference between each pair of numbers.

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<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>391</td>
<td></td>
<td>269</td>
</tr>
<tr>
<td>2</td>
<td>994</td>
<td></td>
<td>267</td>
</tr>
<tr>
<td>3</td>
<td>792</td>
<td></td>
<td>269</td>
</tr>
<tr>
<td>4</td>
<td>545</td>
<td></td>
<td>237</td>
</tr>
<tr>
<td>5</td>
<td>434</td>
<td></td>
<td>329</td>
</tr>
<tr>
<td>6</td>
<td>289</td>
<td></td>
<td>168</td>
</tr>
<tr>
<td>7</td>
<td>678</td>
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<td>339</td>
</tr>
<tr>
<td>8</td>
<td>387</td>
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<td>178</td>
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<td>9</td>
<td>963</td>
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<tr>
<td>10</td>
<td>852</td>
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<td>548</td>
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</tbody>
</table>

129
### Renaming the Sum

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>327 - 184.</td>
<td>327 = 200 + 120 + 7</td>
</tr>
<tr>
<td>2)</td>
<td>809 - 582.</td>
<td>809 = ___ + ___ + ___</td>
</tr>
<tr>
<td>3)</td>
<td>548 - 296.</td>
<td>548 = ___ + ___ + ___</td>
</tr>
<tr>
<td>4)</td>
<td>739 - 546.</td>
<td>739 = ___ + ___ + ___</td>
</tr>
<tr>
<td>5)</td>
<td>610 - 250.</td>
<td>610 = ___ + ___ + ___</td>
</tr>
<tr>
<td>6)</td>
<td>768 - 473.</td>
<td>768 = ___ + ___ + ___</td>
</tr>
<tr>
<td>7)</td>
<td>346 - 173.</td>
<td>346 = ___ + ___ + ___</td>
</tr>
<tr>
<td>8)</td>
<td>218 - 192.</td>
<td>218 = ___ + ___ + ___</td>
</tr>
</tbody>
</table>
Finding Differences
Find the difference between each pair of numbers.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>349 and 184</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>200 + 140 + 9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 + 80 + 4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100 + 60 + 5 =</td>
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<tr>
<td>2</td>
<td>901 and 290</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>847 and 283</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>638 and 293</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>427 and 295</td>
<td>10</td>
</tr>
</tbody>
</table>
Computing the Difference

<table>
<thead>
<tr>
<th>615 - 283</th>
</tr>
</thead>
<tbody>
<tr>
<td>719 - 237</td>
</tr>
<tr>
<td>476 - 285</td>
</tr>
<tr>
<td>827 - 265</td>
</tr>
</tbody>
</table>
Computing the Difference

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>514</td>
<td>123</td>
</tr>
<tr>
<td>947</td>
<td>254</td>
</tr>
<tr>
<td>428</td>
<td>286</td>
</tr>
<tr>
<td>618</td>
<td>264</td>
</tr>
<tr>
<td>728</td>
<td>375</td>
</tr>
</tbody>
</table>
Computing the Difference

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>871</td>
<td>390</td>
</tr>
<tr>
<td>708</td>
<td>345</td>
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<tr>
<td>557</td>
<td>273</td>
</tr>
<tr>
<td>469</td>
<td>283</td>
</tr>
<tr>
<td>673</td>
<td>280</td>
</tr>
</tbody>
</table>
What must be renamed?

1) $347 - 128$  
   $100$  
   $10$  
   $1$

2) $814 - 381$  
   $100$  
   $10$  
   $1$

3) $73 - 48$  
   $100$  
   $10$  
   $1$

4) $132 - 29$  
   $100$  
   $10$  
   $1$

5) $49 - 27$  
   $100$  
   $10$  
   $1$

6) $205 - 91$  
   $100$  
   $10$  
   $1$

7) $981 - 257$  
   $100$  
   $10$  
   $1$

8) $604 - 391$  
   $100$  
   $10$  
   $1$

9) $876 - 59$  
   $100$  
   $10$  
   $1$

10) $603 - 291$  
    $100$  
    $10$  
    $1$

11) $540 - 239$  
    $100$  
    $10$  
    $1$

12) $809 - 397$  
    $100$  
    $10$  
    $1$
Some Problems to Solve

1. 969 children go to our school. There are 175 in the first grade. How many are not in the first grade?

2. The third grade gave $3.30 to the Red Cross. This was $.50 more than the sixth grade collected. How much did the sixth grade give?

3. The baseball team played 162 games. They lost 91 of them. How many did they win?

4. Joe is reading a book. The book has 302 pages. He has read 150 pages. How many pages are left to read?
<table>
<thead>
<tr>
<th>Problem Solving</th>
</tr>
</thead>
</table>
| **Jerry** had ____ blocks.  
He found ____ blocks.  
**How many** blocks does 
Jerry have now?  
| **Beth** had ____ apples.  
She gave ____ apples to Bill.  
**How many** apples does 
**Jerry** have now?  
| **Sue** needs ____ bags.  
She has ____ bags.  
**How many more** bags does 
Sue need?  
| **Mother** had ____ cookies.  
**Father** took ____ of them.  
**How many** cookies **Mother** have now?  
| **Sue** needs ____ bags.  
**Mother** has ____ cookies.  
|
Problem Solving

Judy and Susan were playing house. Judy brought out 9 toy plates. Susan brought out 15 toy cups. How many more cups than plates did the girls have?

Draw pictures to help solve the problem.

There were ____ more cups than plates.

Bob and Kim went to the store to buy some candy. Bob got 12 pieces of candy. Kim got 18 pieces of candy. Find how many more pieces of candy Kim had than Bob had.

Kim had ____ more pieces of candy.
Solving Problems

1. Jan and Mark were going to play garage.
   Jan had 12 toy trucks.
   Mark had 21 toy cars.
   How many more cars than trucks were there?

   __________
   There were _______ more cars than trucks.

2. Bill and Glenn were going to the store.
   Bill had 33 cents.
   Glenn had 18 cents.
   How many fewer cents did Glenn have than Bill had?

   __________
   Glenn had ______ fewer cents than Bill had.

3. Susan's mother has 2 dozen pencils.
   Susan has 9 pencils.
   How many more pencils does Susan's
   mother have than Susan has?

   __________
   Susan's mother has _____ more pencils.
4. Jack ate 12 pancakes.
   Father ate 9 pancakes.
   Father ate how many fewer pancakes than Jack?

   Father ate ______ fewer pancakes.

5. Sally and Beth have 22 books.
   Bob and Jim have 17 books.
   How many more books do the girls have than have the boys?

   The girls have ______ more books.

6. Twenty-five crows were sitting on a fence.
   Forty-one cows were in the field.
   How many fewer crows than cows were there?

   There were ______ fewer crows than cows.
7. Tom caught 21 fish.
   Father and Mother each caught 8 fish.
   Find how many more fish Tom caught than his parents caught.

   Tom caught _____ more fish than his parents caught.

8. There were 43 elm and 28 oak trees in the park.
   How many more elm trees than oak trees were in the park?

   There were _____ more elm trees than oak trees.
Solving Problems

Find the answer and write the answer sentence.

1. Miss Brown had 78 sheets of red paper and 29 sheets of blue paper. Find how many fewer sheets of blue paper than red paper Miss Brown had.

2. Miss Brown asked Judy to get the paint brushes. Judy got 32 wide brushes and 19 narrow brushes. How many more wide brushes than narrow brushes did she get?

3. The first box of colored chalk had 43 pieces. The second box of chalk had 28 pieces. How many more pieces were in the first box than in the second box?
4. Miss Brown said that she had 63 pairs of scissors and that Miss Stone had only 38 pairs of scissors. How many fewer pairs of scissors did Miss Stone have than Miss Brown had?

5. In the A parking lot there were 247 cars.
   In the B parking lot there were 173 cars.
   Find how many more cars were in the A lot than in the B lot.

6. There were 97 sport cars in the A lot.
   There were 129 standard cars in the A lot.
   How many fewer sport cars than standard cars were there in the A lot?

7. There were 67 sport cars in the B lot.
   There were 96 standard cars in the B lot.
   Find how many more standard cars than sport cars were in the B lot.
8. All together there were 150 station wagons in lots A and B. There were 31 trucks parked there. How many more station wagons than trucks were there in the lots?
Problem Solving

Write the equation that will help solve the problem.
Put the ( ) where they belong in your equations.

1. Judy had 6 records
   She bought 3 more records.
   On the way home she broke 2 records.
   How many records does Judy have now?

\[ n = (6 + 3) - 2 \]
\[ n = 9 - 2 \]
\[ n = 7 \]

2. Jim had 2 shirts and his mother bought 3 new shirts for him.
   His grandmother sent a new shirt for his birthday.
   Now how many shirts does Jim have?

3. Beth borrowed 6 crayons from Susan.
   That afternoon she returned 4 crayons to Susan.
   Then she borrowed 3 crayons from Jerry.
   How many borrowed crayons does Beth have?

4. Mrs. White had only 4 eggs so she bought a dozen eggs.
   How many eggs did she have after she put 6 eggs into a cake?
5. 14 cars were in the parking lot.
   6 cars came to park and 4 cars drove away.
   How many cars were in the parking lot then?

6. Mr. Black planted 4 oak trees.
   Next he planted 3 maple trees.
   Last of all he planted 5 elm trees.
   How many trees did he plant?

7. Mother made 8 red aprons and 5 blue aprons.
   She gave 4 blue aprons away.
   How many aprons does she have now?

8. Sally had 12 cents.
   She gave 5 cents to Bill.
   Later Father gave 3 cents to Sally.
   How many cents does Sally have now?
Solving Problems

Write an equation and complete the answer sentence.

1. The popcorn man had 75 bags of popcorn to sell. At the end of the day he had 17 bags left. How many were sold?


bags of popcorn were sold.

2. Bill and Bob counted cars as they walked home. Bill counted 67 cars and Bob counted 86 cars. How many cars did they both count?


They counted cars.

3. In a spelling contest Jim's team made 32 points. Henry's team made 17 points. By how many points did Jim's team win?


Jim's team won by points.

4. Sue picked flowers for her teacher. She picked 49 daisies and a dozen tulips. How many flowers did she pick?


Sue picked flowers for her teacher.

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Solving Problems

Write an equation and complete the answer sentence.

1. William has 14 pencils. If his mother gives him 12 more, how many pencils will he have?

William will have _______ pencils.

2. James is 21 years old. He is 13 years older than his brother. How old is his brother?

His brother is _______ years old.

3. John's teacher has 25 pieces of chalk. If she gives John 8 pieces, how many will she have?

She will have _______ pieces of chalk.

4. If Pete spends 25¢ on oranges and 31¢ on bananas, how much will he have spent on fruit?

He will have spent _______ on fruit.
The Carpenters' dog Miter just had 10 puppies. Their other dog, Fido, had 6 puppies a month ago. How many puppies did both dogs have?

Mr. Barton is 40 years old. Mr. Hill is 19 years old. How much older than Mr. Hill is Mr. Barton?

If Mr. Jackson catches 14 fish and his wife catches 15 fish, how many fish do they catch in all?

If Mickey hit 54 home runs, he hit 20 more than Dave. How many home runs did Dave hit?

They catch ______ fish. How many fish did they catch in all?

Both dogs had ______ puppies. How many puppies did both dogs have?
9. Tim had 13 pears. Jeff gave him 4 apples. How many pieces of fruit does Tim have now?

Tim has ________ pieces of fruit.

10. A football club has 30 members. Only 14 members played in their big game. How many members did not play?

_______ members did not play.

11. Roger is 18 years old. He has a brother named Max. If the sum of Roger’s and Max’s ages is 32, how old is Max?

Max is ________ years old.

12. Timothy needs 98¢. He has 25¢ now. How much will he have to earn before he has 98¢?

He must earn ________.
13. Bill had 50 marbles. He gave Jerome 14 of them. How many marbles does Bill have now?

Bill has _____ marbles.

14. Mr. Singer has 40 chickens. He bought a chicken house that can hold 90 chickens. How many more chickens will he need to fill his chicken house?

He will need _____ chickens.

15. Patty had some jelly beans. Kim gave her 16 more and now she has 34. How many did she have at first?

She had _____ jelly beans.

16. There were 43 trees on one street. On another street there were 56 trees. How many trees were there on both streets?

There were _____ trees on both streets.
Solving Problems

Write an equation and an answer sentence.

1. Mary's sister was 15 years old. Mary was 5 years younger than her sister. How old was Mary?

\[ \text{Age of Mary} = 15 - 5 = 10 \text{ years old} \]

2. The boys in Mrs. Jones' class wanted to play baseball. They needed 18 members for two teams. There were only 11 boys on the field. How many more boys were needed before the game could begin?

\[ \text{Number of additional boys} = 18 - 11 = 7 \]

3. Carol had to walk 9 blocks to school. Jane had to walk 13 blocks. Which girl had to walk farther? How many more blocks did she have to walk?

\[ \text{Jane walked} = 13 - 9 = 4 \text{ more blocks} \]
4. Alice's new baby sister weighed only 7 pounds. Alice weighed 35 pounds. How many more pounds did Alice weigh than her baby sister?

5. Susie baked 2 dozen cookies. She needed 3 dozen for the class party. How many more cookies did she have to bake?

6. There were 34 children in the class. Nineteen of these were boys. How many girls were in the class?
7. Sixty-two children had parts in a play. There were 80 parts to be filled. How many more children were needed?

8. George and Jerry rode their bikes 22 blocks from Jerry's house to the store. On the way home George stopped at his house which was only 7 blocks from the store. How many more blocks did Jerry have to ride to get home?

9. Linda has earned 25 cents. She wants to buy a tea set that costs 59 cents. How much more money does she need?
Overlapping Sets

1. Here are three circles A, B, C.

(a) Find a point that is inside all three circles. Mark that point with a dot.

(b) Now find a point that is inside circles B and C but outside circle A. Mark this point with a small X.

(c) Now find a point that is inside circle B but outside circles A and C. Mark this point with a small o.

(d) Now find a point that is outside all of the circles. Mark this point with a small box.

2. Here are two circles.

(a) Put five dots in the region that is inside both circles.

(b) Put three dots inside circle A but outside circle B.

(c) Put four dots inside circle B but outside circle A.

How many dots are in circle A? _______

How many dots are in circle B? _______

How many dots are in the picture all together? _______

How many dots are both in circle A and in circle B? _______
3. Can you put 3 dots in this picture so that there are exactly 2 dots in circle A and 2 dots in circle B?

4. What is the smallest number of dots you can put in this picture and still have five dots in circle A and four dots in circle B?

5. It is rainy today, so each pupil in Miss Black's class has brought either a raincoat or an umbrella. Six raincoats and seven umbrellas are hanging in the cloak-room. Two pupils brought both an umbrella and a raincoat. How many pupils are in Miss Black's class?

6. Mr. Adams has nine birds in his pet shop. Five of them are brightly colored and five of them have good singing voices. I would like to buy a brightly colored bird with a good singing voice. Do you think Mr. Adams has one? Why?
7. The Smiths and the Joneses are next door neighbors. The Smiths have 5 children, 3 of whom are girls. There are 6 boys in the two families. The Joneses have 4 children. How many of the Jones children are girls?

Here are the two houses. Put in X's for boys and 0's for girls. This will help you find the answer.

![Joneses House](image)

![Smiths House](image)

8. Here are three circles A, B, and C. Can you put in three dots so that:

- circle A will have one dot in it?
- circle B will have two dots in it?
- circle C will have three dots in it?
Star Sequences

1. \[1 + 2 = \underline{\quad} \]
   \[1 + 2 + 3 = \underline{\quad} \]
   \[1 + 2 + 3 + 4 = \underline{\quad} \]
   \[1 + 2 + 3 + 4 + 5 = \underline{\quad} \]

2. \[9 + 8 = \underline{\quad} \]
   \[9 + 8 - 7 = \underline{\quad} \]
   \[9 + 8 - 7 - 6 = \underline{\quad} \]
   \[9 + 8 - 7 - 6 + 5 = \underline{\quad} \]
   \[9 + 8 - 7 - 6 + 5 + 4 = \underline{\quad} \]
   \[9 + 8 - 7 - 6 + 5 + 4 - 3 = \underline{\quad} \]
   \[9 + 8 - 7 - 6 + 5 + 4 - 3 - 2 = \underline{\quad} \]

3. \[8 + 7 = \underline{\quad} \]
   \[8 + 7 - 3 = \underline{\quad} \]
   \[8 + 7 - 3 + 1 = \underline{\quad} \]
   \[8 + 7 - 3 + 1 - 9 = \underline{\quad} \]

4. \[7 + 8 - 6 - 7 = \underline{\quad} \]
   Let's change the order of the numbers:
   \[7 - 7 + 8 - 6 = \underline{\quad} \]
   Is the answer the same? \[\underline{\quad} \]
5. Let's try that again.
   \[9 + 6 + 4 = \square\]

Now change the order of the numbers.
   \[6 + 4 + 9 = \square\]

Is the answer the same? ______

Which order do you like better? ______

Why? ______________________________________

6. \[7 + 9 + 3 + 1 = \square\]

Can you change the order of the numbers so that the addition is easier? ______

How? ______________________________________

7. \[8 + 5 - 7 - 4 = \square\]

8. \[3 + 9 + 7 - 1 = \square\]

9. \[3 + 8 + 4 + 3 = \square\]

10. There are 2 planets closer to the sun than the earth. There are 6 planets farther from the sun than the earth. How many planets are there all together? (Do not forget the earth; it is a planet too!) __________________________
11. Last year Mr. Frank had these trees in his yard:
   4 maples
   5 oaks
   7 elms
   3 birches

During the winter a storm knocked down 2 birches and this summer the Dutch elm disease killed 4 of the elms. How many trees does Mr. Frank have now? __________

12. Each day a jet airplane flies from New York to Chicago and then from Chicago to San Francisco. One day 30 passengers rode all the way from New York to San Francisco, 80 passengers rode only as far as Chicago, and 70 passengers got on at Chicago and rode to San Francisco.

How many people rode on the plane that day? __________

How many people were on the plane between New York and Chicago? __________

How many people were on the plane between Chicago and San Francisco? __________
Sums

1. Here is a set of numbers:
   3, 2, 9, 6
   Find a subset of these numbers whose sum is 8. Cross out the numbers you have chosen and write them into this equation:
   _____ + _____ = 8.
   The sum of the numbers left over should be 12. Write them in:
   _____ + _____ = 12.

2. Do this one the same way. Cross out the numbers as you put them into the equations. Use each number only once.
   1, 7, 5, 8
   _____ + _____ = 6
   _____ + _____ = 15

3. Now do this one:
   8, 4, 3, 9, 4
   _____ + _____ = 17
   _____ + _____ + _____ = 11
   Can you find a subset of three numbers that add up to 17, leaving a subset of two numbers that add up to 11?
   _____ + _____ + _____ = 17
   _____ + _____ = 11
4. This time write in your own plus signs.

7, 8, 2, 6, 1

Find another way to do this one:

5. Now do these the same way:

(a) 5, 4, 8, 3

(b) 9, 8, 3, 6

(c) 6, 5, 8, 4, 7

(d) 9, 8, 7, 6, 2

6. Look back at Problem 5. How many ways can you find to do each of those examples.

(a) ________

(b) ________

(c) ________

(d) ________

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7. Here are some with three equations to fill in. Remember to use each number only once.

(a) 7, 2, 9, 3, 6, 6

_______ = 9
_______ = 11
_______ = 13

(b) 13, 5, 9, 3, 2, 9

_______ = 18
_______ = 15
_______ = 8

(c) 8, 6, 9, 8, 5, 9

_______ = 14
_______ = 15
_______ = 16

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8. Make two equations out of these numbers. Use each number once and only once. If you like, you may put two or more numbers on the right side of the equation.

1, 2, 3, 4, 5, 6, 7

_______ = _______

_______ = _______

9. This time make three equations. Remember to use each number once and only once.

5, 13, 7, 5, 9, 16, 13

_______ = _______

_______ = _______

_______ = _______
1. Here is an array of numbers.

```
<table>
<thead>
<tr>
<th>1</th>
<th>5</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
```

Add the numbers in the rows and put the sums you get in the boxes at the right. The first one is done for you. Now add the numbers in the columns and put the sums in the circles along the bottom.

What is the sum of the numbers in the boxes? _______

What is the sum of the numbers in the circles? _______

Now look back at the array.

What is the sum of the nine numbers in the array? _______

Are the three sums you have just found all the same? _______

Why? _______
2. Here is an array with some numbers missing. Fill in the missing numbers so that the row sums and the column sums are all correct.

\[
\begin{array}{ccc}
0 & 1 & \\
1 & 1 & \\
\end{array}
\]

\[
\begin{array}{c}
1 \\
2 \\
3 \\
\end{array}
\]

3. Now try this one:

\[
\begin{array}{ccc}
7 & 7 & 20 \\
8 & 9 & 20 \\
20 & 20 & 20 \\
\end{array}
\]

\[
\begin{array}{c}
20 \\
20 \\
\end{array}
\]

166

172
4. How many ways are there to do this one?

5. Here is one with four rows and four columns.
6. To do this, one use each of the numbers

1, 2, 3, 4, 5, 6, 7, 8, 9

once and only once.

Now do Problem 5 in such a way that the sums of the diagonal subsets are also to equal to 15.
The array you will find is called a "magic square."

7. Two subsets of an array are called diagonal subsets. In the arrays below the diagonal subsets are shaded:
**Roman Numeral Arithmetic**

In this lesson we are going to learn to do some arithmetic with Roman numerals. You have probably seen Roman numerals on clocks or in books.

Here are the first twelve:

<table>
<thead>
<tr>
<th>1</th>
<th>II</th>
<th>3</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>VI</td>
<td>VII</td>
<td>V</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

This is the way the numerals were written in the early days of Rome:

In later times 4 was sometimes written IV and 9 was sometimes written IX. In this lesson, however, we will write 4 with four I's and 9 with a V and four I's in the manner of the early Romans. This will make the arithmetic easier.

Let's begin by writing some more Roman numerals. The Romans used these letters:

<table>
<thead>
<tr>
<th>I</th>
<th>V</th>
<th>X</th>
<th>L</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>10</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>
They also had some more letters for greater numbers, but we won’t talk about those now. To find out what number a Roman numeral stands for, you just add all the numbers that the letters stand for. For example:

\[ \text{XI} = 10 + 1 = 11 \]

Here are some other examples:

\[ \text{XVI} = 10 + 5 + 1 = 16 \]
\[ \text{XIII} = 10 + 1 + 1 + 1 = 13 \]
\[ \text{CLXXV} = 100 + 50 + 10 + 10 + 5 = 175 \]

1. What numbers do these Roman numerals stand for? Write out the sum as shown above.

\[ \text{VIII} = \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \4170
Now check your work by changing the Roman numerals into your everyday numbers.

3. The early Romans always wrote the letters in order: first the C's, then the L's, then the X's, then the V's, then the I's. Sometimes to do addition you have to rearrange the letters. Try these. The first one is done for you.

\[
\begin{align*}
\text{XII} + \text{VI} &= \text{XVII} \\
\text{XII} + \text{V} &= \text{XV} \\
\text{XXIII} + \text{VI} &= \text{XXIX} \\
\text{LXI} + \text{VII} &= \text{LXVII} \\
\text{CXV} + \text{LI} + \text{X} &= \text{CLXVI}
\end{align*}
\]

4. Now try these. The first one is done for you.

\[
\begin{align*}
\text{CXI} + \text{LVI} &= \text{CLXVII} \\
\text{CXXII} + \text{LVI} &= \text{CDXXVIII} \\
\text{V} + \text{CCXIII} + \text{LI} &= \text{CDXIII} \\
\text{LII} + \text{XXXI} + \text{CV} &= \text{CDLXIX}
\end{align*}
\]
5. So far we have just put together all the letters in the numbers to be added. Sometimes addition is a little more complicated. If, for example, we just put together the letters in this addition example:

\[ \text{III + II} \]

we get IIIII. But the Romans never wrote five I's together. Instead, they wrote V. Here are the rules the Romans used:

1. No numeral ever has more than four I's in it.
2. No numeral ever has more than one V in it.
3. No numeral ever has more than four X's in it.
4. No numeral ever has more than one L in it.
5. No numeral ever has more than four C's in it.

6. The Romans also used these letters:

\begin{align*}
D & \text{ for } 500 \\
M & \text{ for } 1000 \\
\end{align*}

What do you think the Romans' rule for D was?

6. No numeral ever has more than \underline{} D in it.

7. Now use these rules when you do the following addition examples. The first two are done for you.

\begin{align*}
\text{III + II} &= \underline{V} \\
\text{XIII + III} &= \underline{XVI} \\
\text{XXXIII + III} &= \underline{} \\
\text{CII + XI + LII} &= \underline{172} \\
\end{align*}
\[
\begin{align*}
\text{CXII} + \text{XXII} + \text{I} &= \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ • Our numerals 1, 2, 3, 4, . . . are called Arabic numerals. Write these problems in Roman numerals. Then do them in Roman numerals. Check your answer by adding the regular way. The first one is done for you.
27 + 18 = 45
XXVII + XVIII = XXXV
55 + 24 = 79
63 + 14 = 77
107 + 86 = 193
36 + 335 = 371
1247 + 115 = 1362

11. Now try some subtraction. Figure out the rules for yourself.

XXIII - XII = 11
VIII - III = 5
XVII - XVI = 1
X - VII = 3
L - XX = 50

174
180
Describing Points by Numbers.

1.

Mark points A, B, C, D.

Point A has the coordinate 10.
Point B has the coordinate 3.
Point C has the coordinate 17.
Point D has the coordinate 12.

Complete the following:

The length of $\overline{AB}$ is $(10 - 3)$ units or ________ units.
The length of $\overline{BC}$ is (______) units or ________ units.
The length of $\overline{CD}$ is (______) units or ________ units.

The total number of units in $\overline{AB}$, $\overline{BC}$, and $\overline{CD}$ is ________.

The distance from A to D is ________ units.
Mark points A, B, C, D.

Point A has the coordinate 2.
Point B is 3 units to the right of A.
Point C is 5 units to the left of B.
Point D is 11 units to the right of C.

B has the coordinate ________
C has the coordinate ________
D has the coordinate ________

The length of BC is ________ units.
The length of AD is ________ units.
Motion on a Line

1. When George goes home from school he passes a long fence. The picture shows the fence. The dots are the fence posts.

   A
   B

George likes to describe the posts with whole numbers.
He describes post A by the number 4.
He describes post B by the number 5.

Draw a ring around the post he describes with the number 4.
Can George describe all the posts with whole numbers?

Sally does not like the way George describes the posts.
She says the numbers that describe A and B should be 6 and 7.
Put a cross on the post Sally describes by the number 4.
Can Sally describe all the posts by whole numbers?
2. Pretend this number line shows a railroad track.

A train is on the track.
Its ends are at \( L \) and \( M \).
Color red the track where the train is standing.
Point \( L \) is described by the number ________
Point \( M \) is described by the number ________
The length of the train is ________ units.
The train moves 6 units to the right.
Call the new endpoints \( P \) and \( Q \).
Point \( P \) is described by number ________
Point \( Q \) is described by number ________
Color green the track where the train is now.
3. Pretend the number line is a railroad track.

A train is on the track.
Its ends are described by numbers 2 and 9.
Color the track where the train is standing.
A road crosses the track at T.

A car is on the road.
Can the car cross the track? ________

The train moves to the right.
The front of the train is described by the number 13.
The back of the train is described by the number ________
Can the car now cross the track? ________
A train is on the track.

Its ends are at \( L \) and \( M \).

A road crosses the track at a point \( X \).

Point \( X \) is described by the number -51.

Can you imagine the point \( X \)?

The train moves 46 units to the right and stops.

Its ends are described by the numbers _____ and _____.

Has the train crossed the road? _____
Coordinates in a Plane

1. Draw segments joining the following points in order:
   (10, 4)  (10, 6)  (12, 6)  (12, 7)  (11, 7)  (12, 7)  (12, 8)
   (13, 8)  (12, 10) (13, 11) (13, 12) (12, 13) (8, 13) (7, 12)
   (7, 8)   (8, 6)   (8, 4)

What did you find?
Use your ruler to draw the line through the points (6, 1) and (2, 5).

Other points which seem to lie on this line are ( , ), ( , ), ( , ), ( , ), ( , ), and ( , ).
Use your ruler to draw the line through the points (4, 1) and (12, 13).

Some other points which seem to lie on this line are (...), and (...),
also (...), and (...).
4. Draw segments joining the following points in order:

Draw segments joining the following points in order:
(7, 12) (5, 12) (5, 10) (6, 10) (5, 10) (5, 8) (7, 8).

Draw segments joining the following points in order:
(8, 11) (8, 7) (10, 7).

Draw segments joining the following points in order:
(13, 6) (11, 6) (11, 10).

Draw segments joining the following points in order:
(15, 5) (16, 5) (17, 6) (17, 8) (16, 9) (15, 9)
(14, 8) (14, 6) (15, 5).

What did you find?
5. Give numbers describing A, B, C, D.

\[ A(\quad), \quad B(\quad), \quad C(\quad), \quad D(\quad). \]

Draw \( \overrightarrow{AC} \) and \( \overrightarrow{BD} \). Call their point of intersection \( E \).

Give numbers describing \( E \). (  )

The length of \( \overrightarrow{BD} \) is _____ units.

Draw \( \overrightarrow{AD} \) and \( \overrightarrow{BC} \).

Give numbers describing the points where \( \overrightarrow{AD} \) and \( \overrightarrow{BC} \) meet the bottom line. (  ) (  )

Draw \( \overrightarrow{AB} \) and \( \overrightarrow{CD} \). What kind of figure is \( ABCD \)?

Draw \( \overrightarrow{CD} \).

Give numbers describing the point where \( \overrightarrow{CD} \) meets the
bottom line. (  ).

\[ 186 \]

\[ 192 \]
6. Make a figure on the facing page.

Use only segments whose endpoints are described by whole numbers.

Use the numbers to tell how to draw your figure.

See if a classmate can follow your directions without seeing your figure.
Pictures in the Plane

A. Look at the figure on the next page.

The numbers describing A, B, C are
A ( ), B( ), C( )

Move 7 units to the right and .4-- units up from each point.

Call these new points P, Q, R.

The numbers describing P, Q, R are
P( ), Q( ), R( )

Mark P, Q, R.

Draw PQ, QR, and RP.

Make a tracing of ΔABC.

Does this tracing exactly fit on ΔPQR? ______

Do you find ΔABC congruent to ΔPQR? ______

Complete the table below to show congruent sides and angles.

<table>
<thead>
<tr>
<th>AB</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC</td>
<td></td>
</tr>
<tr>
<td>∠ABC</td>
<td>∠RPQ</td>
</tr>
<tr>
<td>∠BCA</td>
<td></td>
</tr>
</tbody>
</table>
Pictures in the Plane.
Pictures in the Plane

1. The pairs of numbers describing A, B, C, D are
   A(2, 12)  B(0, 7)  C(7, 3)  D(5, 9).

   Points P, Q, R, S are found by adding 5 to the first number in each pair.
   The second numbers are not changed.
   The pairs of numbers describing P, Q, R, S are
   P(7, 17), Q(12, 7), R(12, 3), S(5, 14).

   Mark A, B, C, D, P, Q, R, S on the opposite page.

   Draw quadrilateral ABCD.

   Draw quadrilateral PQRS.

   Make a tracing of ABCD.

   Can you fit the tracing on PQRS?

   Is ABCD congruent to PQRS?
Pictures in the Plane

A

B

C

D
2. The pairs of numbers describing A, B, C, D, E are
   A(1, 9)  B(5, 7)  C(2, 2)  D(11, 1)  E(6, 13).

   Points P, Q, R, S, T are found by adding 6 to the first number in each pair and 2 to the second number.

   The pairs of numbers describing P, Q, R, S, T are
   P(  , ), Q(  , ), R(  , ), S(  , ), T(  , ).

   Mark all these points on the opposite page.

   Draw \overline{AB}, \overline{BC}, \overline{CD}, \overline{DE}, \overline{EA}.

   Draw \overline{PQ}, \overline{QR}, \overline{RS}, \overline{ST}, \overline{TP}.

   Make a tracing of ABCDE.

   Can you fit the tracing on PQRST?

   Is ABCDE congruent to PQRST?
Enlarging Segments on the Number Line.

1. Points A, B, C are shown on the number line.

\[ B \quad C \quad A \]

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

The number describing point P is two times the number for A.
The number describing point Q is two times the number for B.
The number describing point R is two times the number for C.

Mark points P, Q, R on the line.

Show below the number describing each point.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>P</th>
<th>Q</th>
<th>R</th>
</tr>
</thead>
</table>

[Blank]

Show below the number of units in each segment.

<table>
<thead>
<tr>
<th>( \overline{AB} )</th>
<th>( \overline{BC} )</th>
<th>( \overline{AC} )</th>
<th>( \overline{PQ} )</th>
<th>( \overline{QR} )</th>
<th>( \overline{PR} )</th>
</tr>
</thead>
</table>

Is \( \overline{PQ} \) twice as long as \( \overline{AB} \)? 
Is \( \overline{QR} \) twice as long as \( \overline{BC} \)? 
Is \( \overline{PR} \) twice as long as \( \overline{AC} \)?
2. Look at the number line.

Color $\overline{AB}$ with a red crayon.

Multiply the numbers describing A and B by 3. These new numbers are ______, ______.

Call the new points P and Q.

Mark P and Q on the line.

Color $\overline{PQ}$ with a blue crayon.

The length of $\overline{PQ}$ is ______ times the length of $\overline{AB}$.

3. Look at the number line.

The number describing P is ______ times the number describing A.

The number describing Q is ______ times the number describing B.

The length of $\overline{PQ}$ is ______ times the length of $\overline{AB}$.

Are the three numbers you wrote in the blanks the same? ______
Enlarging Pictures

A: Look at the figure on page 201.

The coordinates of \( A, B, C \) are 
\( A(\quad), \quad B(\quad), \quad C(\quad) \).

Multiply all the numbers by 2.
Call the new points \( S, T, W \).

The coordinates of \( S, T, W \) are 
\( S(\quad), \quad T(\quad), \quad W(\quad) \).

Mark the points \( S, T, W \).

Draw \( \triangle STW \).

Draw a ring around each correct answer below.

Is \( ST \) twice as long as \( AB \)? Yes No
Tell how you found out.

Is \( SW \) twice as long as \( AC \)? Yes No
Is \( W \) twice as long as \( CB \)? Yes No

Make a tracing of \( \triangle ABC \).

Is \( \triangle ABC \) congruent to \( \triangle STW \)? Yes No
Is \( \angle TSW \) congruent to \( \angle BAC \)? Yes No

Use the tracing to check.

Name the angle congruent to \( \angle ABC \). 
Name the angle congruent to \( \angle TWS \).
Enlarging Pictures

A

B

C

0  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19

19

18

17

16

15

14

13

12

11

10

9

8

7

6

5

4

3

2

1

0
B. Look at quadrilateral $ABCD$.

Multiply all coordinates of these points by 3.

Call the new points $P$, $Q$, $R$, $S$.

The coordinates of $P$, $Q$, $R$, $S$ are

$P(x, y)$, $Q(x, y)$, $R(x, y)$, $S(x, y)$.

Locate points $P$, $Q$, $R$, $S$.

Draw quadrilateral $PQRS$.

Is $PQ$ three times as long as $AB$? Yes No

Is $QR$ three times as long as $BC$? Yes No

Is $RS$ three times as long as $CD$? Yes No

Is $PS$ three times as long as $AD$? Yes No

Make a tracing of $ABCD$.

Is the angle at $A$ congruent to the angle at $P$? Yes No

Use the tracing to find out.

The angle at $B$ is congruent to the angle at ________.

The angle at $S$ is congruent to the angle at ________.

The angle at $R$ is congruent to the angle at ________.
Make a larger picture of the boat on the facing page.

Multiply all coordinates by 2.
Reading Scale Drawings

1. Look at the figure on the facing page.
   A B C D is a scale drawing of the floor of a room.
   P Q R S shows a table in this room.
   See the scale below the picture.
   Each small segment of this scale shows a one-foot segment in the room.
   Lay off this scale on the edge of a piece of paper.
   Lay it off several times to make a scale at least 20 units long.

2. Use the scale to find the following distances in the room
   (to the nearest foot).
   Length of longer side _______ ft.
   Length of shorter side _______ ft.
   Longer side of table _______ ft.
   Shorter side of table _______ ft.
   Distance matching DB _______ ft.
   Distance from the point matching C to nearest corner of the table _______ ft.
   Distance from the point matching C to farthest corner of the table _______ ft.
Look at the figure on the facing page.

It is part of a map.
See the scale below the map.
Each little segment on this scale stands for one mile.

Find the following distances:

Shortest distance from Madison to Conway is ________ miles.
Shortest distance from Madison to Eaton is ________ miles.
Shortest distance from Madison to Freedom is ________ miles.
Shortest distance between Freedom and Eaton is ________ miles.
Shortest distance from Eaton to Madison to Freedom to Eaton is ________ miles.
Distance from Conway to Eaton to Madison to Freedom is ________ miles.
In the pictures below rearrange the objects to form an array. Write in the blanks the number of rows in your array and the number of objects in each row.

1. by

2. by

3. by

4. by

5. by

6. by

7. by

8. by

9. by

213

218
## The Number of Elements in an Array

<table>
<thead>
<tr>
<th>Draw an array, then fill in the blank.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A 5 by 3 array has ___ elements.</strong></td>
</tr>
<tr>
<td><strong>A 4 by 4 array has ___ elements.</strong></td>
</tr>
<tr>
<td><strong>A 7 by 3 array has ___ elements.</strong></td>
</tr>
<tr>
<td><strong>A 4 by 6 array has ___ elements.</strong></td>
</tr>
<tr>
<td><strong>A 4 by 9 array has ___ elements.</strong></td>
</tr>
<tr>
<td><strong>An 8 by 3 array has ___ elements.</strong></td>
</tr>
<tr>
<td><strong>A 3 by 6 array has ___ elements.</strong></td>
</tr>
<tr>
<td><strong>An 8 by 5 array has ___ elements.</strong></td>
</tr>
</tbody>
</table>
Arrays and Equations

Match the array with the equation that describes it.

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H</td>
<td>I</td>
</tr>
</tbody>
</table>

1) $8 + 8 + 8 + 8 = 32$  
2) $6 \times 4 = 24$  
3) $4 \times 5 = 20$  
4) $3 + 3 + 3 + 3 = 12$  
5) $5 \times 6 = 30$  
6) $5 \times 7 = 35$  
7) $7 \div 7 + 7 = 21$  
8) $5 \times 3 = 15$  
9) $8 \times 2 = 16$
## Multiplication Equations

### Fill in the blanks:

<table>
<thead>
<tr>
<th>Equation</th>
<th>Product</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 🟡🟡🟡🟡🟡🟡🟡🟡</td>
<td></td>
<td></td>
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A Multiplication Table

Write the product for each pair of factors, for example, \(2 \times 6 = 12\), and \(6 \times 2 = 12\).

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218
Zero or One as a Factor

Write the products.

\[ 5 \times 0 = \quad 1 \times 9 = \quad 9 \times 1 = \quad 0 \times 0 = \quad 1 \times 89 = \quad 0 \times 641 = \quad 1 \times \boxed{\phantom{13}} = 13 \]

\[ 0 \times n = \quad \boxed{17} \times 17 = 17 \]

\[ 1,240 \times \boxed{\phantom{0}} = 0 \quad n \times 1 = \boxed{\phantom{1}} \]

How would you complete these equations?

\[ \boxed{2} \times 0 = 2 \]

\[ 0 \times \boxed{7} = 7 \]

If zero is a factor, what is the product? \[ \boxed{\phantom{1}} \]

If one is a factor, what is the product? \[ \boxed{\phantom{1}} \]
Other Factors

1. Start at 0 and count to 18 by 2's.

2. What row in your chart looks like your answer to question 1?
   What column?

3. Start at 0 and count to 18 by 3's.

4. What row in your chart looks like your answer to question 3?
   What column?

5. Start at 0 and count to 18 by 4's.

6. What row in your chart looks like your answer to question 5?
   What column?

7. How can you tell just by looking at a product that it has 5 as a factor?

8. Why is there a row and a column that look like counting from 0 to 18 by 6's?

9. How many products appear in your chart only once? Why?

   220
Prime Numbers and Products of Primes

Suppose you want to arrange a set of objects in an array. You can always make an array with just one row like this:

```
0 0 0 0 0 0 0 0
```
or just one object in each row like this:

```
0
0
0
0
0
0
0
0
```

But can you always make an array with more than one row and more than one object in each row? Let's see. Can you do it with 12 objects? 

If you can, draw the array here:

Can you do it with 9 objects? If you can, draw the array here:

Can you do it with 11 objects? If you can, draw the array here:
Now try it for all the numbers listed below. For each number try to make an array with more than one row and more than one object in each row. If you can do it, draw the array. If you can't do it, put an X in the blank by the number.

2    11
3    12
4    13
5    14
6    15
7    16
8    17
9    18
10   19
20   

222

227
The numbers you have marked with X are called prime numbers. As you go higher, the prime numbers get scarcer, but no matter how high you go there are always more prime numbers farther on. The set of prime numbers forms a mysterious and irregular-looking pattern.

These numbers are called multiples of 2:

2, 4, 6, 8, 10, 12, ...

These numbers are called multiples of 3:

3, 6, 9, 12, 15, 18, 21, ...

Write here the first ten multiples of 5:

What special name do we have for the multiples of 2?

Every number is a multiple of 1, and every number is a multiple of itself.

In the list below put a 1 next to every multiple of 1, put a 2 next to every multiple of 2, put a 3 next to every multiple of 3, and so forth as far as you can go.

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228
How many numbers is 8 a multiple of? _______
What is the smallest number that is a multiple of six numbers? _______
What is the smallest number that is a multiple of exactly five numbers? _______

Write Prime next to each number that is a multiple of no number except itself and 1. Does this check with the prime numbers you found using arrays? _______. If not, go back and check your work.

Do you remember what product means? What is the product of 2 and 5? _______

Every whole number greater than 1 is either a prime number or can be written as a product of prime numbers. Write each of the following numbers as a product of prime numbers. Be careful to use only prime numbers. Some of them are done for you.

18 _______ _______ __________ 20 _______ _______ 
19 _______ _______ __________ 21 _______ _______

(The three dots after 21 show that you could go on and on.)
2 prime
3 prime
4 = 2 × 2
5 prime
6 = 2 × 3
7 prime
8 = 2 × 2 × 2
9
10
11 prime
12_________
13 prime
14
15_________
16
17 prime
18
19 prime
20
21
22_________
23 prime
24
25_________
26
27_________
28
29 prime
30
31 prime

Is this equation correct? _____

2 × 3 × 5 = 30

How many numbers is 30 a multiple of? _____

How many different arrays could you make with 30 objects? _____

How many different arrays could you make with 100 objects? _____
Square and Triangular Arrays.

1. $3 \times 3$ is sometimes called the "square of 3." Can you think why? It can be represented by a square array.

Write the squares of the first six numbers and draw an array for each one.

- $1 \times 1 = \quad$ (square array)
- $2 \times 2 = \quad$ (square array)
- $3 \times 3 = \quad$ (square array)
- $4 \times 4 = \quad$ (square array)
- $5 \times 5 = \quad$ (square array)
- $6 \times 6 = \quad$ (square array)

2. Now do these additions:

- $1 = \quad$
- $1 + 3 = \quad$
- $1 + 3 + 5 = \quad$
- $1 + 3 + 5 + 7 = \quad$
- $1 + 3 + 5 + 7 + 9 = \quad$
- $1 + 3 + 5 + 7 + 9 + 11 = \quad$

3. Compare the answers you got in problems 1 and 2. What do you notice?
4. Here is a dot.

Make a $2 \times 2$ array by putting in more dots. How many more dots did you have to put in? 

Now make it into a $3 \times 3$ array. How many more dots did you need? 

Now make it into a $4 \times 4$ array. How many more dots did you need? 

Now make it into a $5 \times 5$ array. How many more dots did you need? 

Now make it into a $6 \times 6$ array. How many more dots did you need? 

5. Now look back at problems 1 and 2. Can you explain, using what you found out in problem 4, why you got the same answers to both problems 1 and 2? 

6. The numbers 1, 4, 9, 16, 25, 36, ... etc., are called the square numbers. They are the numbers of things in square arrays. There is another set of numbers called the triangle numbers. These are the numbers of things in triangular arrays. Here are the first few triangle numbers with their arrays:
7. Do these additions:
   \[1 = \_
   \]
   \[1 + 2 = \_
   \]
   \[1 + 2 + 3 = \_
   \]
   \[1 + 2 + 3 + 4 = \_
   \]
   \[1 + 2 + 3 + 4 + 5 = \_
   \]
   \[1 + 2 + 3 + 4 + 5 + 6 = \_
   \]
Did you get the triangle numbers? ________

Explain why. _____________________________________________________________

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Here are the first few triangle numbers:

1, 3, 6, 10, 15, 21, 28, ...

Let's add them in pairs.

\[
\begin{align*}
1 + 3 &= \\
3 + 6 &= \\
6 + 10 &= \\
10 + 15 &= \\
15 + 21 &= \\
21 + 28 &= \\
\end{align*}
\]

What numbers did you get? Can you explain why?

Hint: Try to fit two triangular arrays together.
Multiplying and Adding

1. Here are two sets of numbers:

   Set A: 2, 3, 5
   Set B: 4, 6

   Write down all the pairs of numbers you can make taking the first number from Set A and the second from Set B.

   ____________________________
   ____________________________
   ____________________________
   ____________________________
   ____________________________

   We can show the set of number pairs you have just written by means of an array:

   Set B
   4   6
   
   Set A
   2
   3
   5

   Each dot in the array stands for one of the possible number pairs. Compare your list of pairs with the array. Do they check? ________
2. Multiply each pair of numbers in your list and put the product into this array. The product of 6 and 3 has been put in for you to show you where it goes.

\[
\begin{array}{cc}
4 & 6 \\
2 & \\
3 & 18 \\
5 & \\
\end{array}
\]

Set B

Set A

3. Add up the six numbers inside the array and put their sum in this box:

\[
\square
\]

We will come back to this number.

4. Find the sum of the numbers in Set A: \(2 + 3 + 5 = \square\)

And in Set B: \(4 + 6 = \square\)

5. Multiply these two sums together and put the product in this box:

\[
\square
\]

6. Now look at the numbers you have in the two boxes (problems 3 and 5). Are they the same? If they are not, go back and check your work. The two numbers should be the same. To see why, look at this array.

\[
\begin{array}{cc}
4 & 6 \\
2 & \bullet\bullet\bullet\bullet\bullet \\
3 & \bullet\bullet\bullet\bullet\bullet \\
5 & \bullet\bullet\bullet\bullet\bullet \\
\end{array}
\]

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How many dots are there in each of the rectangular pieces of the array?

How many dots are there in the whole array?

Now explain why you got the same number in problems 3 and 5.

7. Fill in this array with the products of the numbers in Set A with those in Set B. One product has been put in for you.

Set A

<table>
<thead>
<tr>
<th>1</th>
<th>5</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Set B

<table>
<thead>
<tr>
<th>1</th>
<th>4</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What is the sum of the numbers inside the array?

Could you have found this out without actually filling in the array? How?

8. What is $13 \times 13$?

Here is a way to find $13 \times 13$ using what we have learned. Fill in this array with the products as before:

<table>
<thead>
<tr>
<th>10</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

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What is the sum of the numbers you put in the array? _____________
Is this sum equal to \(13 \times 13\)? ___________________
Why? _____________________________________________

9. Use arrays to find these products:
   
   \[
   \begin{align*}
   11 \times 11 &= \_\_\_\_\_ \\
   12 \times 12 &= \_\_\_\_\_ \\
   14 \times 14 &= \_\_\_\_\_ \\
   15 \times 15 &= \_\_\_\_\_ \\
   \end{align*}
   \]

10. When we write

   \[
   (2 + 3) \times (4 + 5) = \_\_\_\_\_\_\_\_\_
   \]

   we mean that you must first do the additions inside the parentheses to get
   
   \(5 \times 9\)
   
   and then do the multiplication to get 45.

   When we write

   \[
   (2 \times 3) + (4 \times 5)
   \]

   we mean that you must first do the multiplications inside the parentheses to get
   
   \(6 + 20\)
   
   and then do the addition to get 26.

   Always do what is inside the parentheses first.
Is this equation correct? Do the arithmetic to find out.

\[(2 + 3) \times (2 + 5) = (2 \times 2) + (2 \times 5) + (3 \times 2) + (3 \times 5)\]

Can you make a product array to go with this equation? Explain what the equation says about the array.
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