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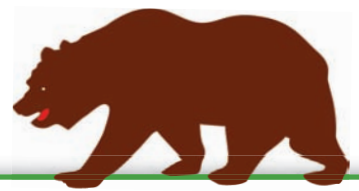
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Topic Titles

- Topic **1** Numeration
- Topic **2** Addition and Subtraction Number Sense
- Topic **3** Reviewing Multiplication of Whole Numbers
- Topic **4** Division of Whole Numbers
- Topic **5** Variables and Expressions
- Topic **6** Multiplying Decimals
- Topic **7** Dividing Decimals
- Topic **8** Shapes
- Topic **9** Factors and Multiples
- Topic **10** Fractions, Mixed Numbers, and Decimals
- Topic **11** Adding and Subtracting Fractions and Mixed Numbers
- Topic **12** Multiplying and Dividing Fractions and Mixed Numbers
- Topic **13** Length, Perimeter, and Area
- Topic **14** Solids
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- Topic **20** Constructions

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Measurement and Geometry

Statistics, Data Analysis,
and Probability

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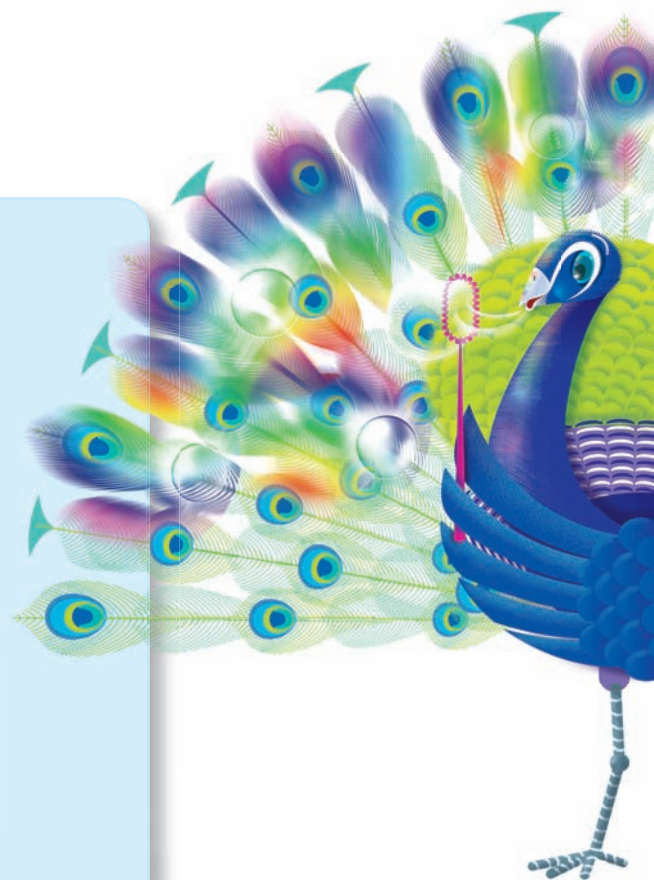
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Problem-Solving Handbook

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Everybody can
be a good
problem solver!

Don't
give up!

There's almost always
more than one way to
solve a problem!

Don't trust
key words.

Pictures help me
understand!
Explaining helps me
understand!

Problem-Solving Process

Read and Understand

- ❓ **What am I trying to find?**
 - Tell what the question is asking.
- ❓ **What do I know?**
 - Tell the problem in my own words.
 - Identify key facts and details.

Plan and Solve

- ❓ **What strategy or strategies should I try?**
- ❓ **Can I show the problem?**
 - Try drawing a picture.
 - Try making a list, table, or graph.
 - Try acting it out or using objects.
- ❓ **How will I solve the problem?**
- ❓ **What is the answer?**
 - Tell the answer in a complete sentence.

Strategies

- Show What You Know
- Draw a Picture
- Make an Organized List
- Make a Table
- Make a Graph
- Act It Out/ Use Objects
- Look for a Pattern
- Try, Check, Revise
- Write an Equation
- Use Reasoning
- Work Backward
- Solve a Simpler Problem

Look Back and Check

- ❓ **Did I check my work?**
 - Compare my work to the information in the problem.
 - Be sure all calculations are correct.
- ❓ **Is my answer reasonable?**
 - Estimate to see if my answer makes sense.
 - Make sure the question was answered.

Using Bar Diagrams

Use a bar diagram to show how what you know and what you want to find are related. Then choose an operation to solve the problem.

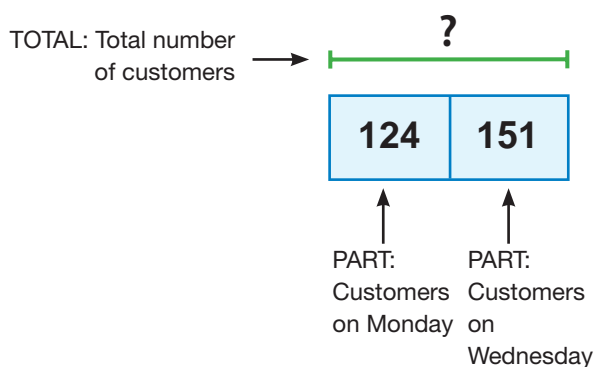
Problem 1

Carrie helps at the family flower store in the summer. She keeps a record of how many customers come into the store. How many customers came into the store on Monday and Wednesday?

Customers

Days	Customers
Monday	124
Tuesday	163
Wednesday	151
Thursday	206
Friday	259

Bar Diagram



$$124 + 151 = ?$$



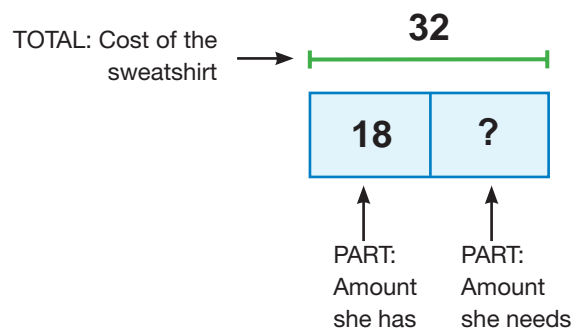
I can add to find the total.

Problem 2

Kim is saving to buy a sweatshirt for the college her brother attends. She has \$18. How much more money does she need to buy the sweatshirt?



Bar Diagram



$$32 - 18 = ?$$



I can subtract to find the missing part.

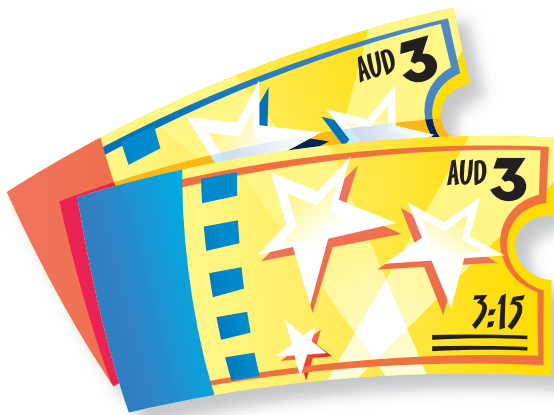


Pictures help me understand!

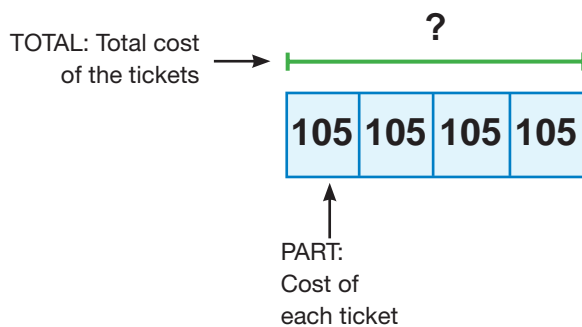
Don't trust key words!

Problem 3

Season tickets to the community theater cost only \$105 each no matter what age you are. What is the cost of tickets for four people?



Bar Diagram



$$4 \times 105 = ?$$



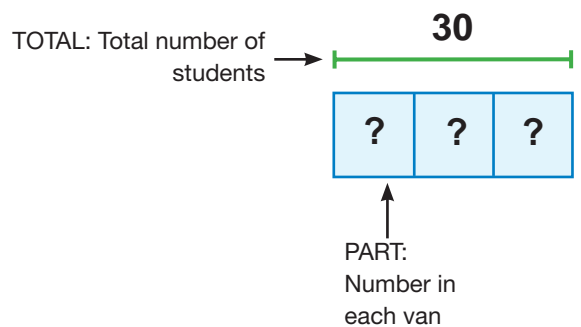
I can multiply because the parts are equal.

Problem 4

Thirty students traveled in 3 vans to the zoo. The same numbers of students were in each van. How many students were in each van?



Bar Diagram



$$30 \div 3 = ?$$



I can divide to find how many are in each part.

Problem-Solving Strategies

Strategy

Example

When I Use It

Draw a Picture

The race was 5 kilometers. Markers were at the starting line and the finish line. Markers showed each kilometer of the race. Find the number of markers used.



Try drawing a picture when it helps you visualize the problem or when the relationships such as joining or separating are involved.

Make a Table

Phil and Marcy spent all day Saturday at the fair. Phil rode 3 rides each half hour and Marcy rode 2 rides each half hour. How many rides had Marcy ridden when Phil rode 24 rides?

Rides for Phil	3	6	9	12	15	18	21	24
Rides for Marcy	2	4	6	8	10	12	14	16

Try making a table when:

- there are 2 or more quantities,
- amounts change using a pattern.

Look for a Pattern

The house numbers on Forest Road change in a planned way. Describe the pattern. Tell what the next two house numbers should be.

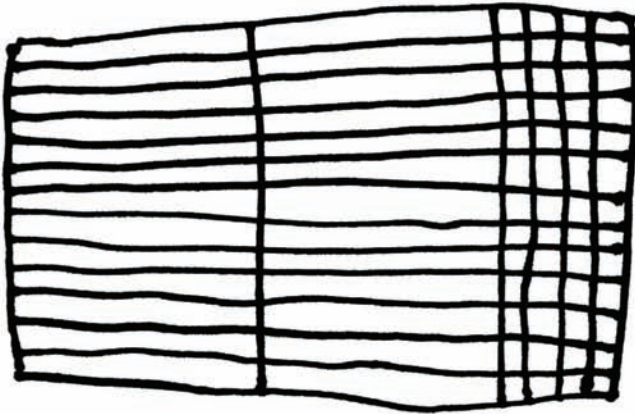


Look for a pattern when something repeats in a predictable way.

Explaining
helps me
understand!

This is another good math explanation.

Writing to Explain Use blocks to show 13×24 .
Draw a picture of what you did with the blocks.






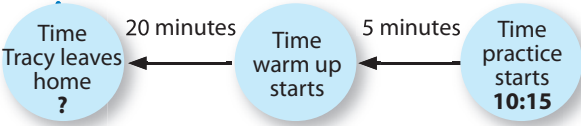
First we made a row of 24 using
2 tens and 4 ones. Then we made
more rows until we had 13 rows.
Then we said 13 rows of 2 tens is
 $13 \times 2 \text{ tens} = 26 \text{ tens}$ or 260.
Then we said 12 rows of 4 ones is
 $13 \times 4 = 52$. Then we added the parts:
 $260 + 52 = 312$ So, $13 \times 24 = 312$.



Everybody can be a good problem solver!

Strategy	Example	When I Use It
<p>Make an Organized List</p>	<p>How many ways can you make change for a quarter using dimes and nickels?</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>1 quarter =</p> <p>1 dime + 1 dime + 1 nickel</p> <p>1 dime + 1 nickel + 1 nickel + 1 nickel</p> <p>1 nickel + 1 nickel + 1 nickel + 1 nickel + 1 nickel</p> </div>	<p>Make an organized list when asked to find combinations of two or more items.</p>
<p>Try, Check, Revise</p>	<p>Suzanne spent \$27, not including tax, on dog supplies. She bought two of one item and one of another item. What did she buy?</p> <p>$\\$8 + \\$8 + \\$15 = \\31</p> <p>$\\$7 + \\$7 + \\$12 = \\26</p> <p>$\\$6 + \\$6 + \\$15 = \\27</p>	<p>Use Try, Check, Revise when quantities are being combined to find a total, but you don't know which quantities.</p> <div style="border: 1px solid black; border-radius: 50%; padding: 10px; margin: 10px 0;"> <p>Dog Supplies Sale!</p> <p>Leash \$8</p> <p>Collar \$6</p> <p>Bowls \$7</p> <p>Medium Beds \$15</p> <p>Toys \$12</p> </div>
<p>Write an Equation</p>	<p>Maria's new CD player can hold 6 discs at a time. If she has 204 CDs, how many times can the player be filled without repeating a CD?</p> <p>Find $204 \div 6 = n$.</p>	<p>Write an equation when the story describes a situation that uses an operation or operations.</p>

Even More Strategies

Strategy	Example	When I Use It
<p>Act It Out</p>	<p>How many ways can 3 students shake each other's hand?</p> 	<p>Think about acting out a problem when the numbers are small and there is action in the problem you can do.</p>
<p>Use Reasoning</p>	<p>Beth collected some shells, rocks, and beach glass.</p> <p>Beth's Collection</p> <p>2 rocks </p> <p>3 times as many shells as rocks </p> <p>12 objects in all</p> <p>How many of each object are in the collection?</p>	<p>Use reasoning when you can use known information to reason out unknown information.</p>
<p>Work Backward</p>	<p>Tracy has band practice at 10:15 A.M. It takes her 20 minutes to get from home to practice and 5 minutes to warm up. What time should she leave home to get to practice on time?</p> 	<p>Try working backward when:</p> <ul style="list-style-type: none"> • you know the end result of a series of steps, • you want to know what happened at the beginning.



I can think about when to use each strategy.

Strategy

Example

When I Use It

Solve a Simpler Problem



Each side of each triangle in the figure at the left is one centimeter. If there are 12 triangles in a row, what is the perimeter of the figure?

I can look at 1 triangle, then 2 triangles, then 3 triangles.



perimeter = 3 cm



perimeter = 4 cm



perimeter = 5 cm

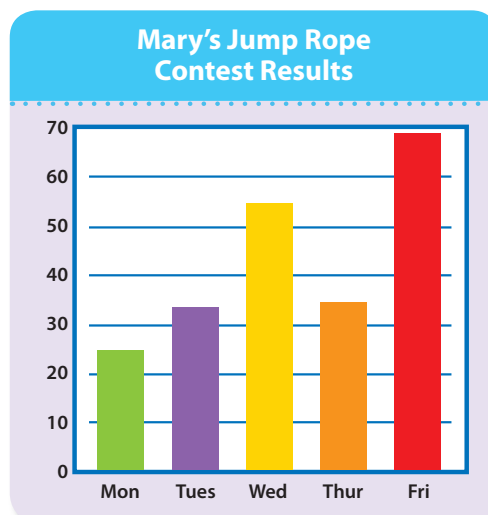
Try solving a simpler problem when you can create a simpler case that is easier to solve.

Make a Graph

Mary was in a jump rope contest. How did her number of jumps change over the five days of the contest?

Make a graph when:

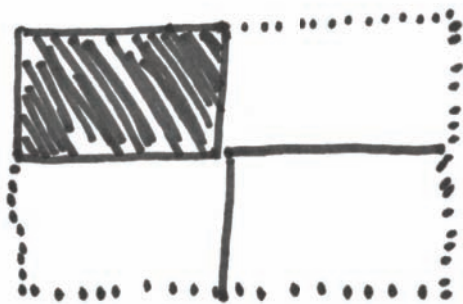
- data for an event are given,
- the question can be answered by reading the graph.



Writing to Explain

Here is a good math explanation.

Writing to Explain What happens to the area of the rectangle if the lengths of its sides are doubled?



$\blacksquare = \frac{1}{4}$ of the whole rectangle

The area of the new rectangle is 4 times the area of the original rectangle.

Tips for Writing Good Math Explanations....

A good explanation should be:

- correct
- simple
- complete
- easy to understand

Math explanations can use:

- words
- pictures
- numbers
- symbols

Problem-Solving Recording Sheet

Name Jane

Teaching Tool

1

Problem-Solving Recording Sheet

Problem:

On June 14, 1777, the Continental Congress approved the design of a national flag. The 1777 flag had 13 stars, one for each colony. Today's flag has 50 stars, one for each state. How many stars were added to the flag since 1777?

Find?

Number of stars added to the flag

Know?

Original flag
13 stars

Today's flag
50 stars

Strategies?

Show the Problem

- Draw a Picture
- Make an Organized List
- Make a Table
- Make a Graph
- Act It Out/Use Objects
- Look for a Pattern
- Try, Check, Revise
- Write an Equation
- Use Reasoning
- Work Backwards
- Solve a Simpler Problem

Show the Problem?

50	
13	?

Solution?

I am comparing the two quantities.

I could add up from 13 to 50. I can also subtract 13 from 50. I'll subtract.

$$\begin{array}{r} 50 \\ - 13 \\ \hline 37 \end{array}$$

Answer?

There were 37 stars added to the flag from 1777 to today.

Check? Reasonable?

$37 + 13 = 50$ so I subtracted correctly.

$50 - 13$ is about $50 - 10 = 40$
40 is close to 37. 37 is reasonable.



Here's a way to organize my problem-solving work

Name Benton

Teaching Tool
1

Problem-Solving Recording Sheet

Problem:
Suppose your teacher told you to open your math book to the facing pages whose pages numbers add to 85. To which two pages would you open your book?

Find?

Two facing page numbers

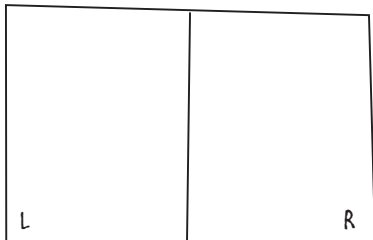
Know?

Two pages.
Facing each other.
Sum is 85.

Strategies?

- Show the Problem
- Draw a Picture
 - Make an Organized List
 - Make a Table
 - Make a Graph
 - Act It Out/Use Objects
 - Look for a Pattern
 - Try, Check, Revise
 - Write an Equation
 - Use Reasoning
 - Work Backwards
 - Solve a Simpler Problem

Show the Problem?



$$L + R = 85$$

L is 1 less than R

Solution?

I'll try some numbers in the middle.

$40 + 41 = 81$, too low

How about 46 and 47?

$46 + 47 = 93$, too high

Ok, now try 42 and 43.

$42 + 43 = 85$.

Answer?

The page numbers are 42 and 43.

Check? Reasonable?

I added correctly.

$42 + 43$ is about $40 + 40 = 80$

80 is close to 85.

42 and 43 is reasonable.