

Chicago Problem Solvers

Sponsored by the Polk Bros Foundation

A Chicago Challenge:

How do we increase student math progress?

A Response: Common Core will make the difference.

What's the problem?

- ❖ *Common Core standards are new.*
- ❖ *They seem very different.*
- ❖ *We need to help everyone figure out what they mean and how they can help our children make greater math progress.*

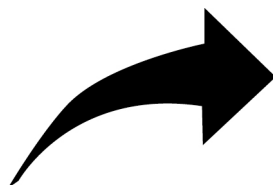
What shall we do?

Collaborate!

- ☐ Resource Coordinators
- ☐ Parents
- ☐ Students
- ☐ Teachers
- ☐ School Administrators

Educate!

Working together we shall solve the problem.



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Plan Strategically to educate and involve parents.

Action	When	Who
Organize parent workshops on ways to help students solve math problems		
Organize weekly math resource for parents to help students learn		
Each month give parents recommended websites		
Organize student-parent activities		
Set up a parent math activity resource lending library		
Organize parent learning programs—in which they learn more math		

Example: Parent Workshop Plan—Common Core Math

1. **Focus:** Common Core Math with Common Sense—How parents can help students strengthen their core—essential math for their grade.
2. **Date and Time:** TBA
3. **Location:** The School
4. **Outcomes—What will the workshop result in?**
Parents will gain:
 - Information about how Common Core standards are organized—that each grade cycle has a set of learning priorities
 - Information about the math programs the school uses—how they are organized
 - Practical activities to help their children strengthen math knowledge such as times-tables
 - Recommendations of ways to ask teachers to provide examples of solved math problems—with the steps—so they can help their children solve problems.
 - Increased “connectivity” with the school.
5. **Who will present?**
Classroom teacher(s) **Students!**
6. **Who will facilitate?** Resource Coordinator and Principal
7. **How will we invite parents?**
School newsletter Special flyer
Students write notes to parents Phone calls, email, text messages
8. **What we will emphasize in the invitation:**
 - That the session will be practical
 - That they will get resources to help their child practice math at home
 - That there will be a nutritional feature—healthy food with calorie counting activity
9. **How we will remind parents about the workshop?**
 - Students write notes to parents
 - Phone calls, email, text messages
10. **Activities: What will participants do?**
 - Participate in math activities using practical (inexpensive) materials
 - Use the materials that they will take with them
 - Use the healthy food with a math activity such as calculating calories
11. **Materials: What will they receive?**
 - Time-tables and other math fact pages
 - Math activity resources—game, activity guides, list of Internet sources,
 - Math vocabulary list (English-Spanish)
 - Calorie counting guides (<http://fnic.nal.usda.gov/dietary-guidance/interactive-tools/calculators-and-counters>). If you cannot use Internet at session, print out a few pages including lists of calories for foods and make a table to list and add calories for one serving of foods.
 - Examples of problems that are solved so they can use them with their child’s homework (Teachers need to provide for workshop and on ongoing basis as they work on different content.)
12. **Follow up: How we will follow up on the session**
 - Send home weekly Math activity page—solved problems
 - Schedule grade level/cycle workshop
 - Student-written notes—here is what we’re learning in math this week

Strategy, Activity, and Resource Collector

Use these pages to collect items you'll include in your plans.

Strategy/Activity/Resource	How I'll Use It

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The Common Core Change:

Greater Thinking

More Learning

What is the Common Core Math Difference?

Less is more! Each grade includes core math that students will have more time to learn because the curriculum is not crowded.

How the Math Grows from Grade to Grade

The Common Core Standards Shift as Students Develop.
Each level supports the next.

K	1 - 2
☐ Counting and Cardinality ☐ Operations and Algebraic Thinking ☐ Measurement and Data ☐ Geometry	☐ Operations and Algebraic Thinking ☐ Number and Operations in Base 10 ☐ Measurement and Data ☐ Geometry

3 - 4 - 5
☐ Operations and Algebraic Thinking ☐ Number and Operations in Base Ten ☐ Number and Operations—Fractions ☐ Measurement and Data ☐ Geometry

6 - 7 - 8
☐ Ratios and Proportional Relationships ☐ The Number System ☐ Expressions and Equations ☐ Geometry ☐ Statistics and Probability

High School
☐ Number and Quantity ☐ Functions ☐ Modeling ☐ Geometry ☐ Statistics and Probability

The standards build level by level to college and careers.

Common Core Focuses on Habits of Thinking

Think clearly.

Make sense of the problem, then solve it persistently!

That's Math Practice Standard 1—a good habit for everyone solving any problem.

Be careful and clear—check your work! That's what standard 6 requires—
“attend to precision.” Use the correct words, make sure you have completed the
solution and checked your answer.

These are the Common Core

STANDARDS FOR MATHEMATICAL PRACTICE

that students apply when they learn and use math.

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Standards 1 and 2 are part of solving every math problem—and can be applied any time students have to solve any problem.

Each Grade is Clearly Organized, and the Standards tell you what students need to learn and what it means with clear examples.

Third Grade Operations and Algebraic Thinking—Common Core

Represent and solve problems involving multiplication and division.

3.OA.1. Interpret products of whole numbers,

e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7 .

3.OA.2. Interpret whole-number quotients of whole numbers,

e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.

For example, describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.

3.OA.3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities,

e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

3.OA.4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers.

For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = _ \div 3$, $6 \times 6 = ?$

Understand properties of multiplication and the relationship between multiplication and division.

3.OA.5. Apply properties of operations as strategies to multiply and divide.

Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)

3.OA.6. Understand division as an unknown-factor problem.

For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.

Multiply and divide within 100.

3.OA.7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division

(e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Solve problems involving four operations; identify and explain arithmetic patterns

3.OA.8. Solve two-step word problems using the four operations.

Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

3.OA.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.

For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.

The test will be different.

It will ask students to solve problems with those math habits—figure out the problem, then solve it persistently—and carefully.

Tests during the school year will help teachers—it won't be one end of year final test/

There will be assessments during the year to check students' progress so they can meet the standards.

There will be opportunities during the school year for teachers to figure out what their students need to work on to meet the standards.

There will be assessments that schools use during the school year to figure out:
What do students know?
What can they do?

These are formative assessments—designed to help teachers identify what they need to do to help students succeed in math.

Then once each year in spring there will be one final test, a summative test.

The following pages include some examples of the kinds of questions that will be on the PARCC test.

PARCC is the group that is preparing the tests.

PARCC standards for

Partnership to
Assess
Readiness for
College and
Careers

Some of the PARCC questions are basic arithmetic.

3rd grade PARCC SAMPLE PARCCONLINE.ORG

Patricia needs to read for 120 minutes each week.
She read for 26 minutes on Monday.
She read for 39 minutes on Tuesday.
She read for 38 minutes on Thursday.
How many more minutes does Patricia need to read this week?

4th grade PARCC SAMPLE PARCCONLINE.ORG

Complete the subtraction problem.

$$\begin{array}{r} 7263 \\ - 2792 \\ \hline \end{array}$$

These questions are designed to figure out if the student has the arithmetic skills needed to solve a problem.

Some PARCC Questions ask students to figure out a situation.

7th grade PARCC SAMPLE PARCCONLINE.ORG

On Friday, three friends shared how much they read during the week.
Suzanne read the first 100 pages from a 320-page book in the last 4 days.
Jasmine read the first 54 pages from a 260-page book in the last 3 days.
Felicia read the first 160 pages from a 480-page book in the last 5 days.

Part A

A person's average reading rate can be defined as the number of pages read divided by the number of days. Place the three friends' reading rates in order from greatest to least.

Greatest pages per day _____

Middle _____

Least pages per day _____

Some PARCC questions have more than one part.

These are called Tasks—they are realistic problems that students need to take time to work on.

Here's the next part of that seventh grade problem.

If the three friends continue to read everyday at their rates, who will finish reading her book.

First _____

Second _____

Third _____

Some PARCC Tasks have a few parts.

Do you know how to round numbers? That's what this task is designed to find out.

Here is another example of a PARCC sample task that asks students to take several steps. Students need to know how to round numbers to complete it.

If they don't know how to do that, the teacher will figure that out from the assessments earlier in the year. Then the teacher can make sure they do know how to round numbers.

It's important to know how to do that!

4th Grade Sample Item

A. Baseball stadiums have different numbers of seats. Number the boxes from one to three to show from least to greatest number of seats.

San Francisco Giants' Stadium: 41,915 seats	Washington Nationals' Stadium: 41,888 seats	San Diego Padres' stadium: 42, 445 seats
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B. Compare these statements from two students.

Jeff said, "I get the same number when I round all three numbers of seats in these stadiums."

Sara said, "When I round them, I get the same number for two of the stadiums but a *different* number for the other stadium."

Can Jeff and Sara both be correct?

Explain how you know

C. When rounded to the nearest hundred, the number of seats in Aces Baseball Stadium is 9,100.

What is the greatest number of seats that could be in this stadium?

Explain how you know.

REAL MATH

Some of the PARCC programs are realistic situations.

This is an example of a PARCC task that asks students to think a lot about a situation.

Buses, vans, and cars (grade 4)

◀ About the task CCSSM Alignment Part a Scoring ▶

Three classes at Lakeview School are going on a field trip. The table shows the number of people in each class, including the teacher.

They can choose to use buses, vans, and cars.

	Total number of people
Mrs. Ruiz's Class	23
Mr. Yang's Class	25
Mrs. Evans' Class	24



Buses have 20 seats



Vans have 16 seats



Cars have 5 seats

Which three combinations can be used to take all three classes on the field trip?

- ☐ 1 bus and 4 vans
- ☐ 1 bus and 8 cars
- ☐ 3 vans and 11 cars
- ☐ 2 buses and 3 vans and 4 cars
- ☐ 1 bus and 1 van and 6 cars

Submit Answer

Common Core Community School Connections

Math Progress Resources for Resource Coordinators

Coaching Math Learners at Home and in Extended Day Programs

What can we do to help our students get the Common Core math habits?

Give them opportunities to practice using math facts.

Ask students to think before they answer a math question.

MATH COACH GUIDE

Here are some ways to help students master math.

KNOW WHAT: Math Facts

- ☐ Post math words and symbols with pictures/examples
- ☐ "Practice Pack"—students make their own facts on small pieces of paper, match them with words and examples.
- ☐ "Math Fact of the Day"
- ☐ Fact "Bingo"

KNOW HOW: Math Skills and Strategies

- ☐ Model different ways to solve same problem
- ☐ Work a problem out step by step
- ☐ Student models problem solving
- ☐ Learning "partner"
- ☐ Work in groups
- ☐ Post example
- ☐ Post a path—steps to follow
- ☐ "Math Smart Pack"—practice with cards that hold numbers and symbols.
- ☐ Draw the problem
- ☐ Start with simpler problem, build in more challenges.

Send a note to parents:

Make More Math Progress

- Practice math with your child. For example, use flashcards you make to review math facts.
- Play math fact matching games.
- Solve real-life math problems with your child. For example, make a shopping list and estimate what the cost will be.

Ask teachers to give you math samples—problems solved showing the steps. The next page is an example of a note to teachers.

Example of a note to teachers asking for help with math problem solving examples.

Dear Teacher:

When you send students with math homework, please give us an example of how to solve the problems your students need to work on. A step-by-step guide would be great--it will help us reinforce the strategies you teach the students to use.

If you want us to help with any math skills, whether for homework or to help students who need to work on skills you taught earlier in the school year, please send a solution guide. We will use the example to coach students who need help.

Thank you.

Sincerely,

Your Community School Partner

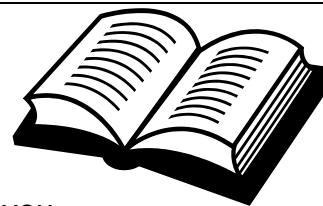
Keep Parents Informed of Practical Ways to Support Learning

Sample Newsletter More newsletters are available at <http://teacher.depaul.edu>

Guide Your Child to Make More Learning Progress

We are introducing higher Common Core standards for reading and math. They ask students to think more as they learn more. The following activities will help your students think more about what they are learning.

How to Increase Your Child's Reading Success



Read aloud to your child. Listen to your child read aloud to you.

Ask these questions about a story:

Who are the people in the story?

What happens? Why?

What do you think will happen next?

After your child reads the story, ask more questions—"What did you like?" "Who made a choice? Why?" Then ask your child to draw and write about the story—tell the important characters and events. Your child could write the sequel!

Make More Math Progress

Times Tables

Students need to know the times tables. Work with one number each day, from 2-12, for 11 days. Practice with lists or cards—put the multiplication on one side, the answer on the other. Then mix up the cards and ask your child to tell the answer.

Then ask your child: What would you put into a booklet about times tables? How would you explain them?

Measurement

Use a ruler or tape measure to measure things at home. Your child can measure rooms, furniture, and other objects. First, ask your child to estimate the length and width. Then check the estimate—measure the object to see how big it really is.

Then ask your child: Explain how to estimate and check your estimate with measurement.

Activity Resources

These are samples of resources available at Teacher.depaul.edu

This section includes a list of Internet sites students can use to practice skills and solve problems.

Show You Know Math Number Facts

I know my numbers from to .

Directions:

Tell students which numbers to write on the chart or writes them for the students.

Then students write those numbers and draw circles to show them.

This activity reinforces geometry shape knowledge.

Number	Draw circles to show how many this number means.

Write a sentence using one or two of those numbers.

Finish these Charts to Show you Know Math Patterns! Then make your own!

CCSS Math Practice Standard 8. Look for and express regularity in repeated reasoning.

number	operation	number	=	result
6	x	2	=	12
6	/	2	=	3
6	x	3	=	18
6	/	3	=	2
			=	
			=	

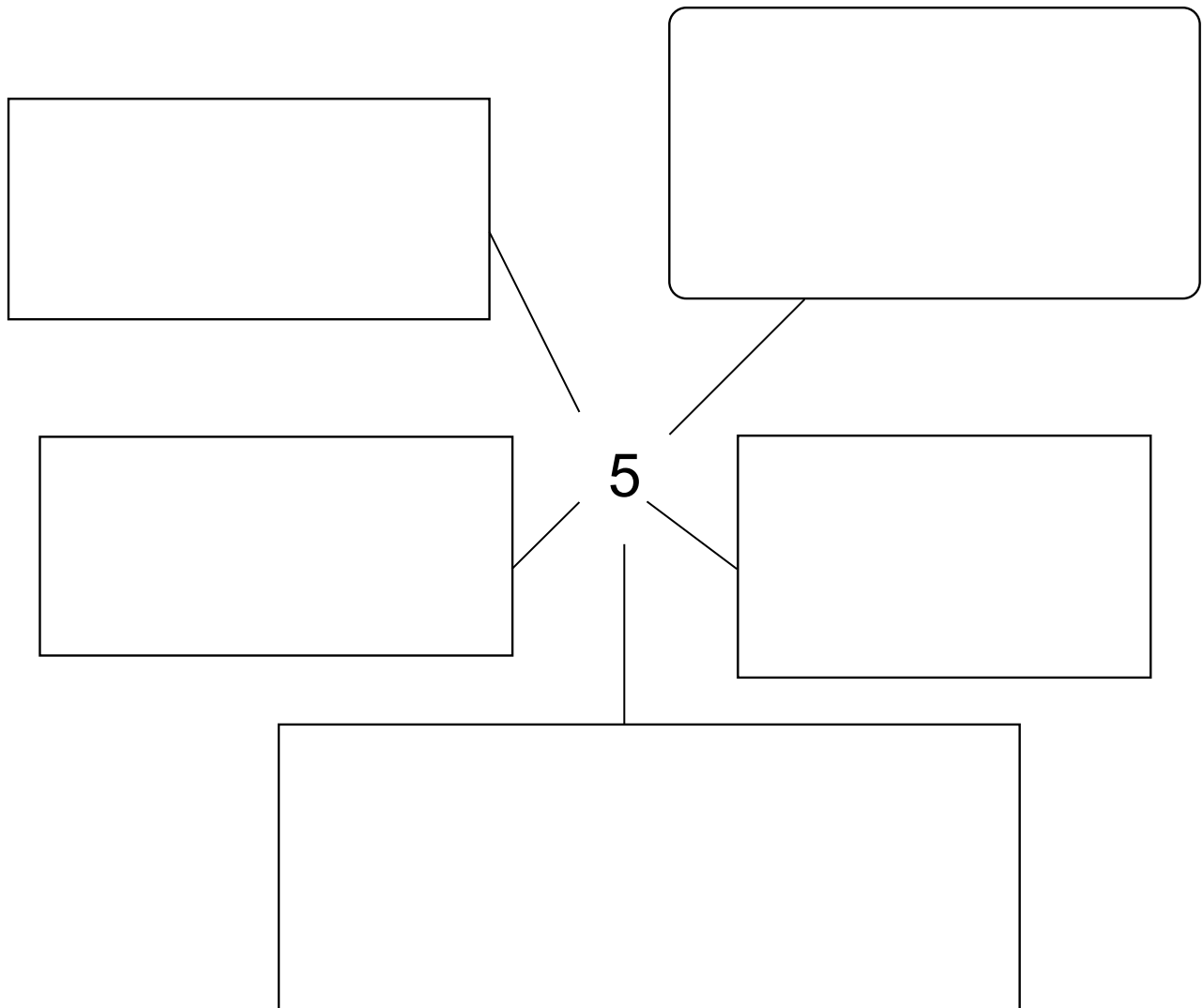
Chart Algebra

number	operation	number	=	result
a		b	=	c
5			=	8
25			=	100

Apply math facts and operations.

CCSS Math Practice Standard 2. Reason abstractly and quantitatively.

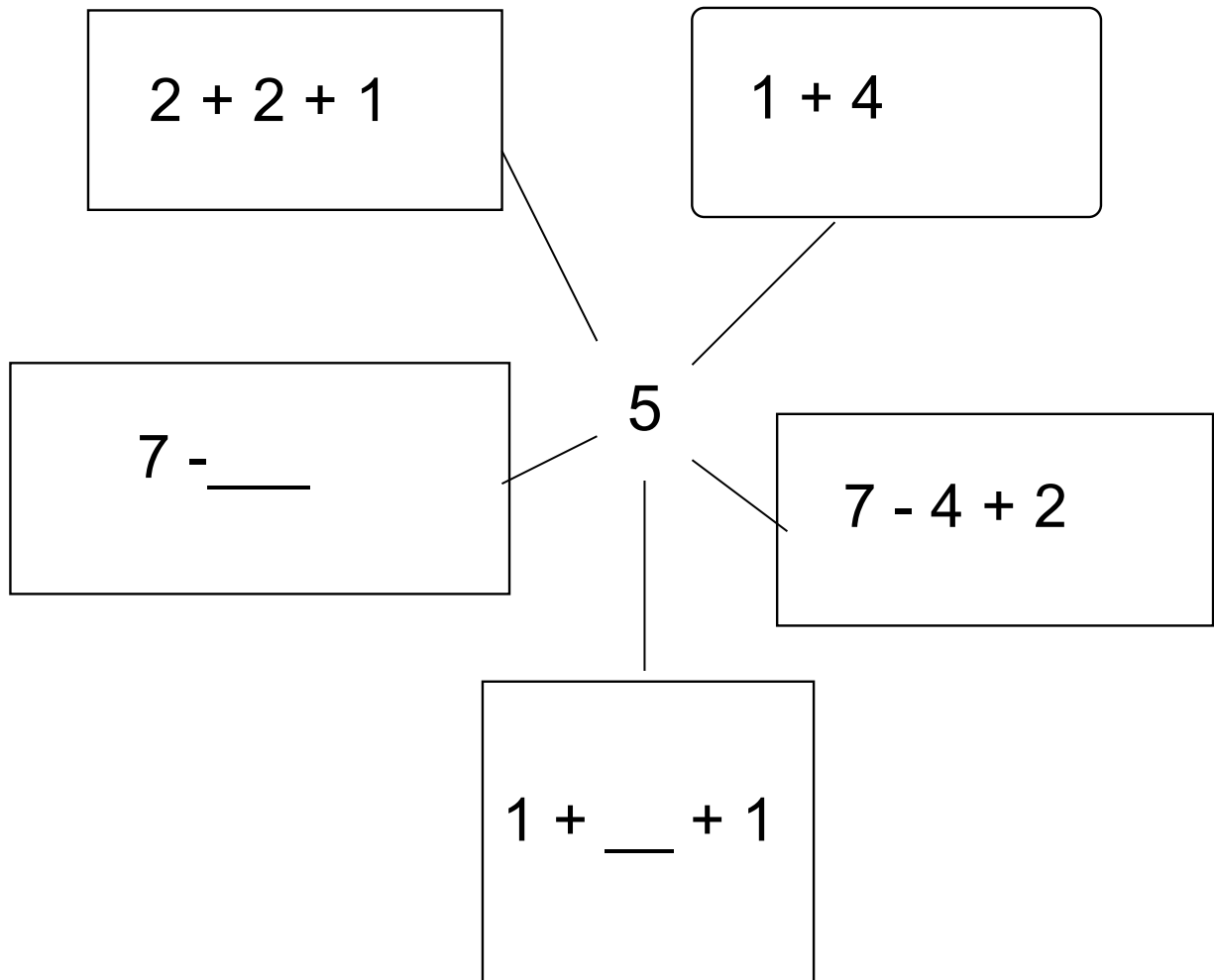
Task: Use the math you know to show five different ways to make equations that result in 5. It could be fraction equations or multi-step addition or...



It could get bigger—imagine 50 ways to make a 50...

Cinco Maneras de Hacer un Cinco

Este ejemplo está parcialmente completo. Una vez que los estudiantes aprendan como organizar este tipo de diagrama, ellos pueden hacer su propio--diez maneras de hacer un diez, veinte maneras de hacer un veinte....



Make your own math problem solving game!

Put numbers and symbols on small pieces of paper and set up problems with them.

Include these parts.

Use crayons to help people see the parts.

BLACK = NUMBERS

RED = OPERATION SIGNS

GREEN = REAL

Make it an interesting real-world problem!

MONEY DOLLARS CENTS

INCHES FEET YARDS MILES

OUNCES POUNDS

MINUTES HOURS DAY WEEKS

BLUE = PROPORTION

PERCENTAGE SIGN

DECIMAL POINT

FRACTION LINE

Multiple Choice Question Maker

Question ID:

Put your initials and a number

Question Maker: Write a challenging question here.

?

Write the correct answer and three other possible answers here:

a.	b.
c.	d.

ANSWER GUIDE

After you complete your question:

Write the correct answer and how to figure it out on this part of the page.

Question ID: _____

What's the best answer? _____

Tell how to figure that out.

**Then tear off this part and put it into the answer box.
Leave your question for other students to answer.
They can check their answers with your answer guide.**

Money Choice Challenge: NEW CLOTHES

CCSS Math Practice Standard 1. Make sense of problems and solve them persistently.

You want to buy some new clothes. You just got \$100 for a graduation present.

Get real prices using the newspaper, a catalog, or the Internet.

List the clothes you will buy.

Then figure out the cost.

Figure out what you really will buy.

Clothes I want	Price	Will I buy it?

Surprise! There is a 50% sale at the clothing stores.

How much money do you have left now? \$ _____

What else will you buy? Add that to the chart.

For more money choice challenges, go to <http://teacher.depaul.edu>.

Money Choice Challenge: FOOD

CCSS Math Practice Standard 1. Make sense of problems and solve them persistently.

You have to buy food for your family.

How much will you spend on food each week? \$ _____

Ask your parent what the foods cost or use ads from the newspaper.

Nutrition First—List healthy foods you will buy	Price

Total: \$ _____

For more money choice challenges, go to <http://teacher.depaul.edu>.

Math Problem Solver

The Problem—What will you figure out?

Your Strategy

Solve it here!

Answer:

I can solve a word problem strategically!

Common Core Math Practice Standard 1: Make sense of problems and persevere in solving them.

What is the question asking me to figure out? Tell it in your own words.	
How will I solve it?	
What information do I need to solve it?	

You may complete it by yourself or...

pair and share—work together with another student to solve it

or

pair to compare—solve it yourself then compare your work with another student's

ACTIVE MATH

These activities can be used to respond to students' needs you identify through formative assessment or to provide assessments if the student does the task independently.

Make a math picture glossary. Write the important words of math. Then for each word, draw a picture showing what it means.	Make a Math Step-By-Step Guide. What's that? You write the steps to solve a kind of problem. For example, how to figure out how much money you have after you spend some.	Make a math multiple choice question. Write the question as a situation. Then give a few possible answers.	Make up a math game. To win the game, you need to know math facts. You can play the game as a card game or as a board game. If it's a board game, then the players would get to move ahead when they know a math fact.
Write a Number Diary. What's That? You're a Number (pick any number). Tell what happens to you during a day.	Make a measurement book. Measure anything and record its dimensions. First, estimate its size. Then check your estimate.	Tell what you would buy if you had \$100. Figure out what everything would cost and how much you would have left after you bought things.	Write a page in a math textbook. Explain the math. Then give an example. Then ask a question.
Invent a number game. Write the rules to the game. Then play it.	Make a fraction book. Write about what a fraction is, how people use them, and how people can add and subtract them.	Write about your day and how numbers help you. For example, numbers tell what time it is.	Make a sports scores graph. Then explain what your graph tells about the way the teams are playing this season.
Make a Math Number Connector. What's that? You take one number and put it in the center of a page. Then write the number combinations that would make that number. For example, what are five ways to make a five?	Write a letter to someone who is having difficulty with math. Explain what that person could do to figure out how to use the math	Make a math diary— what numbers are part of your day?	Make a math test prep guide— what will you include?

Online Math Resources for Students

Useful Online Resources Available at No Cost

Math Practice Resources and Games

To achieve success with Common Core standard 1—make sense of problems, then solve them persistently, students need math skills.

The key to getting skills is practice.

The key to keeping skills is using them to solve problems.

Here are free useful math sites you can use to help students practice math skills and then solve realistic problems.

Early Childhood Games

<http://www.ictgames.com/resources.html>

Infants and Toddlers

<https://www.pbs.org/parents/earlymath/>

Primary Games from Public Television

<http://pbskids.org/games/math/>

Math Games for Grades 3-5

<http://pbskids.org/cyberchase/math-games/>

Advanced Challenges from the Museum of Math

<http://momath.org/activities/>

Activities for After-School Programs from the Exploratorium

<http://www.exploratorium.edu/education/publications/math-explorer>

Lots of activities that will help your child practice math skills.

<http://resources.woodlands-junior.kent.sch.uk/maths/>

Great games to practice math facts.

<http://www.maths-games.org>

Math Hunt

With the help of the character “Number Cruncher” scour the web to find social studies and science information to help crack math problems.

<http://teacher.scholastic.com/mathhunt/>

Math Maven’s Mysteries

Use math to help crack open mystery cases

<http://teacher.scholastic.com/maven/>

Counting/Number Activity Sites

Bobbie Bear

Use counting strategies to make as many outfits for Bobbie Bear as you can, using different colored shirts and pants.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=3>

Chairs

Explore the number of chairs needed when tables are arranged in a restaurant.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=144>

Electronic Abacus

Explore an abacus model for representing numbers and performing addition.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=8>

Operations Activity Sites

Primary Krypto

Use five number cards and arithmetic operations to create the "target" number in this fun math game.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=173>

Product Game

Exercise your skill with factors and multiples.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=29>

Times Table

Practice multiplying single-digit numbers with this interactive multiplication table.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=155>

Around the World in 80 Seconds

Help Maggie fly around the world. Pick addition, subtraction, multiplication, division or a mix of all four. Each question answered correctly gets Maggie to her next stop.

<http://teacher.scholastic.com/activities/adventure/math2.htm>

Deep Sea Duel

Play a strategy game that requires you to select cards with a specified **sum** before your opponent.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=207>

Operations Activity Sites (continued)

Determine the Missing Operation Study Jams

Sometimes to solve a word problem or story problem, you need to figure out which symbol to use. Follow this step-by-step strategy

http://teacher.scholastic.com/activities/studyjams/math_operations/

Flashcards for Basic Arithmetic

Flashcards for all operations, organized by level.

<http://free-ed.net/sweethaven/Math/arithmetic/arithDrill02.asp>

Operations with Signed Numbers

Use these "flash cards" to work with an endless list of signed-number problems-- addition, subtraction, multiplication, and division of both positive and negative numbers.

http://www.free-ed.net/sweethaven/Math/arithmetic/SignedValues01_EE.asp

Operations with Whole Numbers

A complete set of activities featuring arithmetic operations with whole numbers.

Activities can be assigned according to level of difficulty as well as special features such as division with/without remainders.

http://207.5.42.159/sweethaven/math/pre-algebra/prealg01/ee/wholenuml02_ee.asp

Order of Operations with Integers

This is a set of endless drills that build confidence with solving integer operations that involve combinations of addition, subtraction, multiplication, and division. There are four levels of difficulty.

http://www.waybuilder.net/sweethaven/Math/pre-algebra/PreAlg01/ee/IntegerPrec01_EE.asp

Periods of Place Values

Rewrite numbers separating each period of place values with a comma

<http://www.waybuilder.net/sweethaven/Math/pre-algebra/drills/wholeNums01.asp>

Geometry Activity Sites

Proof Without Words: Pythagorean Theorem

Watch a dynamic, geometric "proof without words" of the Pythagorean Theorem.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=30>

Scale Factor

A common misconception is that when the dimensions of an object are doubled, the area is doubled, too. But this is not true! Use this applet to investigate how changes in the scale factor influence the ratio of perimeters and the ratio of areas between figures.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=176>

Shape Cutter

Draw and cut shapes, then use slides, turns, and flips to move the cut pieces around.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=72>

Shape Sorter

Sort shapes according to their properties using Venn diagrams.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=34>

Shape Tool

Draw, color, paste, slice, rotate, reflect, expand, and contract various shapes.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=35>

Tessellation Creator

Create patterns to cover the screen using regular polygons.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=202>

Turtle Pond

Estimate length and angle measure while guiding a turtle to a pond.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=83>

Interactive Geometry Dictionary: Areas in Geometry

Understand and investigate the area of the rectangle, parallelogram and triangle.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=21>

Patch Tool

Design a pattern using geometric shapes.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=27>

Perimeter, Area, and Volume of Common Geometric Figures

http://www.waybuilder.net/sweethaven/Math/pre-algebra/PreAlg01/ee/geometry/PreGeom01_EE.asp

Geometry Activity Sites (continued)

Angle Sums

Explore the sum of the interior angle measures for various polygons.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=9>

Area Tool

Investigate how changes in the base and height of trapezoids, parallelograms, and triangles affect their area.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=108>

Circle Tool

Compare the circumference and area of a circle to its radius and diameter.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=116>

Cube Nets

Examine various two-dimensional figures to determine which ones can be folded into a cube.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=84>

Computing Pi

Compare two methods for computing pi.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=161>

Cubes

Determine the volume of a box by filling it with cubes, rows of cubes, or layers of cubes.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=6>

Fractal Tool

Explore iteration and patterns in shapes and numbers with fractals.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=17>

Geometric Solids

Manipulate various geometric solids. Color the solid to investigate properties such as the number of faces, edges, and vertices.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=70>

Time, Speed, and Distance Activity Sites

Distance to Horizon

Investigate the relationship between your height above the Earth and the distance you can see to the horizon.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=150>

Sound Sketch Tool

Sketch and quantify sound using two different representations.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=36>

Vector Investigation: Boat to the Island

Adjust the magnitude and direction of a velocity vector to "drive" a boat.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=42>

Vector Investigation: Dual Vector, Airplane Storm Chaser

Adjust the magnitude and direction of a velocity vector and a wind vector to "fly" a plane.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=43>

Word Problems: Time, Speed, and Distance

Practice your knowledge of time, speed, and distance with word problems

<http://www.waybuilder.net/sweethaven/Math/pre-algebra/dstProblems01.asp>

Probability Activity Sites

Adjustable Spinner

Create a spinner and examine the experimental and theoretical outcomes for a specified number of spins.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=79>

Fire

Simulate the spread of a wildfire using a probability applet.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=143>

Random Drawing Tool—Individual Trials

Explore the relationship between theoretical and experimental probabilities.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=67>

Fractions, Decimals, and Percentages Activity Sites

Concentration

Play a matching game with different representations of equivalent items — match quantities to their numerals, shapes to their names, or fractions to decimals and percents.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=73>

Equivalent Fractions

Create equivalent fractions by shading squares and circles.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=80>

Fraction Game

Explore relationships among fractions while playing this interactive game.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=18>

Fraction Model

Explore different representations for fractions.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=45>

Fractions, Fractions, Fractions

This is version 2.0 of the popular fractions "flash cards." Fractions are learned by looking at a lot of examples and they are mastered by doing a lot of problems.

<http://edgeroamer.com/sweethaven/math/ee/fracs03.asp>

Fractions Study Jams

Watch a video and take a quiz about understanding fractions

<http://teacher.scholastic.com/activities/studyjams/fractions/>

Free Ride

Use this applet to explore fractions using the context of a bicycle and gear ratios.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=178>

Mastering Decimal Fractions

This is a complete set of endless drills with decimal arithmetic. You can select among 24 different activities that are arranged according to type of operation and level of difficulty.

http://www.waybuilder.net/sweethaven/Math/pre-algebra/Decimals01_EE.asp

Rounding Decimal Fractions

Activities for practice of rounding decimal fractions

http://www.sweethaven.com/sweethaven/Math/pre-algebra/PreAlg01/ee/DecRound01_EE.asp

Working with Percents

Practice percent problems, converting between decimals and percents, and determining parts and rates

http://www.waybuilder.net/sweethaven/Math/pre-algebra/PreAlg01/ee/Percent01_EE.asp

Algebra Activity Sites

Algebraic Transformations

Explore commutativity and associativity within a geometric situation.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=193>

Pan Balance—Expressions

Investigate the concept of equivalence by "weighing" numeric and algebraic expressions.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=108>

Pan Balance—Numbers

Find equivalent numerical expressions using a balance scale.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=26>

Pan Balance—Shapes

Explore relationships among weights of various objects by placing them on either side of a balance scale

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=33>

Roots and Powers

Some problems require the aid of a calculator, while others encourage the learner to work the problem "on paper."

http://www.free-ed.net/sweethaven/Math/pre-algebra/RootPow01_EE.asp

Solving Linear Equations in One Variable

A list of activities for solving linear equations in one variable for independent learners

http://www.waybuilder.net/sweethaven/Math/algebra/linearEq/LinEqOne01_EE.asp

FACTORS Activity Sites

Factor Game

A game that exercises your factoring ability. Test your skills against a human or the computer.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=12>

Factorize

Divide numbers into two factors, and build arrays to represent each factorization.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=64>

Graphing Activity Sites

Bar Grapher

Create a customized bar graph with your own data, or display a bar graph from an included set of data.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=63>

Box Plotter

Create a customized box plot with your own data, or display a box plot of an included set of data.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=77>

Circle Grapher

Create a customized circle graph with your own data, or display a circle graph from an included set of data.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=60>

Histogram Tool

Create a customized histogram with your own data, or display a histogram from an included set of data.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=78>

Introduction to Graphing

Here is a selection of graphic activities, from plotting points to plotting linear equations.

http://www.free-ed.net/sweethaven/Math/GraphOps/GraphPlotters/graphing02_EE.asp

Isometric Drawing Tool

Create dynamic drawings on isometric dot paper. Draw figures using edges, faces, or cubes, and then shift, rotate, color, decompose, or view them in 2-D or 3-D.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=125>

Line of Best Fit

Use this applet to plot a set of data and determine a line of best fit.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=146>

Linear Regression

Investigate a regression line and determine the effects of adding points to a scatterplot.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=82>

Mean and Median

Investigate the mean, median, and box-and-whisker plot for sets of data that you create.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=160>

State Data Map

Use color-coding to represent state information, such as population, area, and gasoline usage.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=151>