PROBLEM SOLVING

Set B

Compiled by members of the TEAM project
"**T**eaching **E**xcellence **a**nd **M**athematics"

Department of Public Instruction
301 N. Wilmington Street
Raleigh, NC 27601-2825

Michael E. Ward, Superintendent

Original funding through D. D. Eisenhower
Mathematics and Science Education Program

There are many commercial resources available to challenge students to become better problem solvers. This is a collection of some of our favorite problems.

You might consider allowing students to work with partners. Many of these problems are best solved with calculators. All of these problems lend themselves to students telling and writing about their thinking.

Consider expanding this problem solving deck by adding your own problems on the backs of the cards or photocopying the blank master we have included for you.

We hope you will share your great problems with us. Send them to :

Mathematics Section
Department of Public Instruction
301 N. Wilmington St.
Raleigh, NC 27601-2825

Problem
Solving Strategies

1. Act out the problem
2. Use models and manipulatives
3. Make a picture or a diagram
4. Make a table or chart
5. Make an organized list
6. Work backwards
7. Use logical reasoning; deduction
8. Guess and check
9. Use or look for a pattern
10. Solve a simpler problem
11. Write an equation
12. Brainstorm ideas

There are many commercial resources available to challenge students to become better problem solvers. This is a collection of some of our favorite problems.

You might consider allowing students to work with partners. Many of these problems are best solved with calculators. All of these problems lend themselves to students telling and writing about their thinking.

Consider expanding this problem solving deck by adding your own problems on the backs of the cards or photocopying the blank masters we have included for you. We hope you will share your great problems with us. Send them to Math Staff at the address on the back of this card.

If McDonald's sells Big Macs for $1.59 each, how many could you buy with a $10.00 bill? Write a letter to a friend to tell how you figured this out.

Card 1 **Set B**

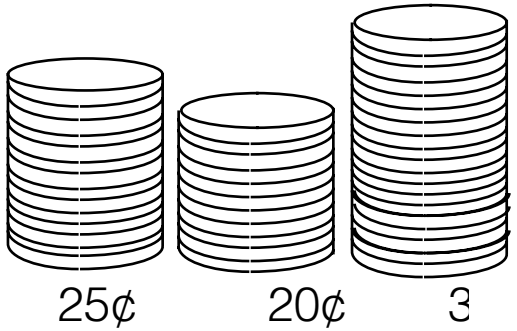
A school cafeteria sells popsicles for 25¢, nutty buddies for 40¢, and ice cream sandwiches for 30¢. If a student spent $6.00 in the month of October for ice cream, what could the student have bought? List as many combinations as you can find.

Card 2 **Set B**

Sarah owes a friend $2.38. She has $5.25. Will she have enough money for a $2.25 movie after she pays her friend? Exactly how much money does she have left?

Card 3 **Set B**

How can you make each stack have the same number of pennies and use all the pennies?



Explain how you figured this out.

Card 4 **Set B**

Every bike slot in a bicycle rack was filled. Donna's bike was in the middle. There were six bikes to the right of Donna's. How many bicycles were in the bicycle rack?

Card 5 **Set B**

If you must use 15 or fewer coins, how many different combinations of coins can be used to make $1.00?

Card 6 **Set B**

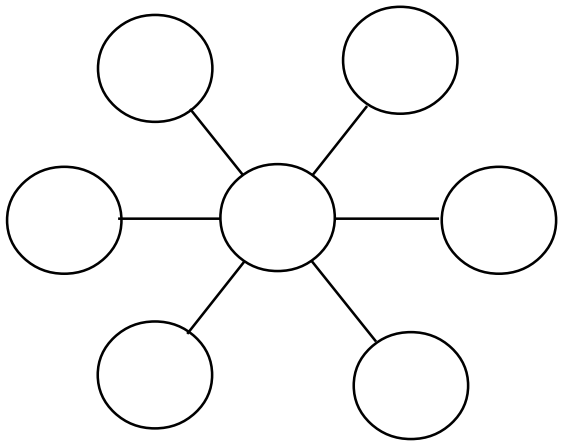
At a school store the following items are for sale:

Erasers	5¢
Pencils	10¢
Paper	15¢
Markers	20¢

Ronald has 50¢. What combination of supplies can he buy?

Card 7 **Set B**

What different single digits can you put in the circles so that the sum of 3 numbers in a line will equal 17?



Extension: How many different combinations could you have?

Card 8 **Set B**

Write the last 4 digits of a telephone number. List all the 4-digit numbers you can make using those four numbers.

- What is the highest number you can make?
- What is the lowest number you can make?
- Find the difference in the highest and lowest number.

Card 9 **Set B**

Joey got a new puppy. The puppy weighed four pounds. This was half the weight of his bowling ball. How much does his bowling ball weigh?

What would five puppies of the same size weigh?

Card 10 **Set B**

If John usually walks four miles per hour, about how long would it take him to walk two miles? Explain how you got your answer.

Card 11 **Set B**

How many different ways can Alex make change for a 50¢ piece <u>without</u> using pennies?

Make a chart to show all of the possible ways.

Card 12 **Set B**

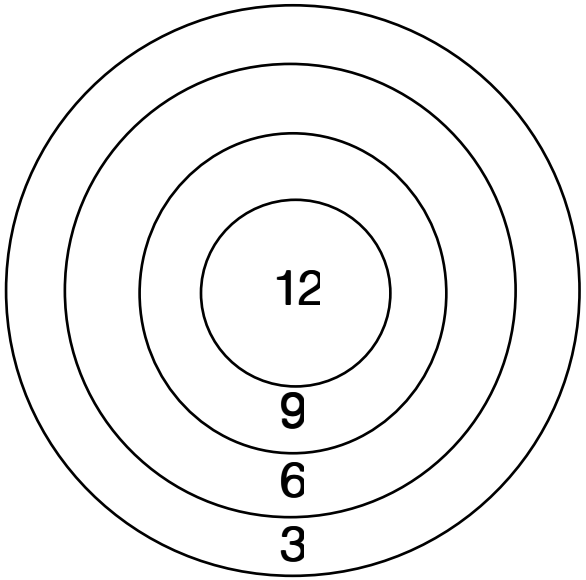
In Friday night's football game, North High School lost to South High School 20-12. What are the different ways North High could have scored 12 points?

Card 13 **Set B**

Your calculator is showing an answer of 242. What problems could have been put into the calculator to get this answer?

Card 14 **Set B**

David was playing darts and scored exactly 21 with 3 darts. Show where his darts might have landed.



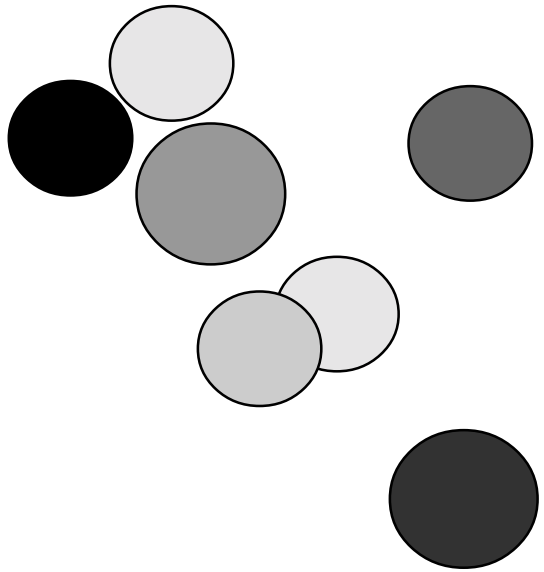
If he got all three darts on the board, what other scores could he have made?

Card 15 **Set B**

Daniel has a bad cold and has to take 1 teaspoon of cough syrup every 45 minutes. He took his first dose at 2:20 p.m. He is supposed to take 6 doses before he goes to bed at 8:00. Can he do this? Explain.

Card 16 **Set B**

You have $2.00 with which to buy marbles. Aggies cost 14¢ each and migs cost 18¢ each. How many of each kind of marbles can you buy for $2.00?



Card 17 **Set B**

The key for number 5 does not work on Hector's calculator.

How can he use his broken calculator to figure out

235 - 198?

Explain what Hector will push on his calculator.

Card 18 **Set B**

Using digits 1 to 9, arrange the numbers in three groups so that the sum is the same in each group. Is there more than one way to do this? Explain.

Card 19 **Set B**

Write math problems that this chart would help you to solve:

MENU

Turkey sandwich	$0.75
Ham and cheese sandwich	$1.60
Potato salad	$0.80
Lemonade	$0.90
Milk	$0.85

Card 20 **Set B**

In Booth's Bicycle Shop, Henry counted some bicycles and tricycles. He counted 19. When he counted the wheels, he got a total of 45. How many bicycles and tricycles were there?

Card 21 **Set B**

Eugene had 33¢ in his pocket. He had 9 coins. He did not have a quarter. What were the coins he had in his pocket?

Card 22 **Set B**

Arlene wants to participate in two running events in the track meet. She can select from the 50 m dash, the 75 m dash, 100 m dash, and the 400 m relay. How many different choices does Arlene have?

Card 23 **Set B**

A basketball player can score 3-point baskets and 2-point baskets. If the player scored 37 points, what combinations of baskets could he have made?

Card 24 **Set B**

For breakfast in the morning, you may choose among three different cereals; corn flakes, oatmeal, or wheat chunks. You might also choose a juice, either apple juice or orange juice. What are all the different breakfast combinations that you could have if you have one cereal and one juice?

Card 25 **Set B**

A Nintendo game costs $53.25, including tax. John got $10.00 for his birthday and he can save $4.00 each week to go towards the game. How many weeks until John can afford the game? Explain how you know.

Card 26 **Set B**

A group of students is sitting in a circle. Every student faces someone across the circle. The students count off in order, starting with number one. Student two sits directly across from student seven. How many students are in the circle? Explain.

Card 27 **Set B**

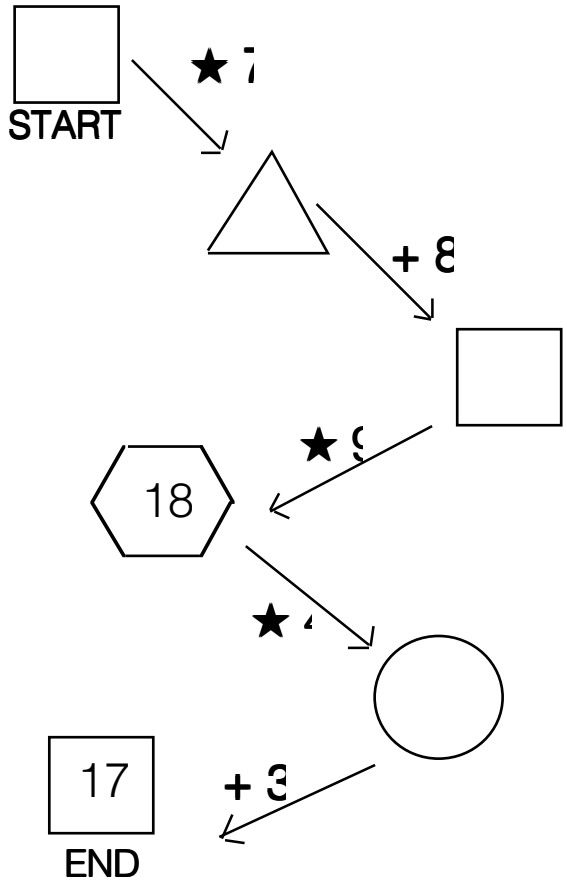
At the Burnsville School library, 34 students can sit at seven tables with no empty seats. There are small tables for four students and large tables for six students. How many small tables are in the library? How many large tables are in the library? Explain how you found your answer.

If all of the tables were small, how many students could sit in the library?

If all of the tables were large, how many students could sit in the library?

Card 28 **Set B**

Write a number in each empty shape to complete the chain.



Card 29 Set B

Jo gave a number problem to Nelda. She told her to pick a number, add 10 to it, double that sum, and then subtract 5. Nelda's answer was 39. What number did Jo pick?

?

Card 30 Set B

I am a 2-digit number over 50. When you put me in groups of 7, two are left over. The sum of my digits is 11. What number am I?

Write another number puzzle for a friend to solve. Make your puzzle have three or four clues.

Card 31 **Set B**

Complete the pattern, then write a sentence that tells how to write more numbers in the pattern:

50, 44, 38, 32, ___, ___, ___.

What comes next in this pattern?

1, 4, 2, 5, 3, 6, 4, ___, ___.

Explain how you know.

Card 32 **Set B**

What seven coins together are worth 50¢?

If you have seven coins, but no pennies or fifty-cent pieces, what is the most money you could have?

Card 33 **Set B**

Sandra is more than 20 years old and less than 60 years old. You can count by 7's to reach Sandra's age. Next year you will be able to count by 5's to reach Sandra's age. How old is Sandra? Explain how you figured this out.

Card 34 **Set B**

Using a total of 15 straws of two different lengths and clay or pipe cleaners as connectors, make a structure which illustrates as many different geometric vocabulary words as possible.

Note: If you have tinker toys, use 15 rods and no more than 8 wheels.

Card 35 **Set B**

In the product:

1 x 2 x 3 x 4 x 5 x 6,

which one of the six numbers should be increased by 1 to cause the greatest increase in the product? Predict and then check your prediction on a calculator. Check other possibilities until you are certain you know the correct answer.

Card 36 **Set B**

Given this table, what comes next in the pattern?

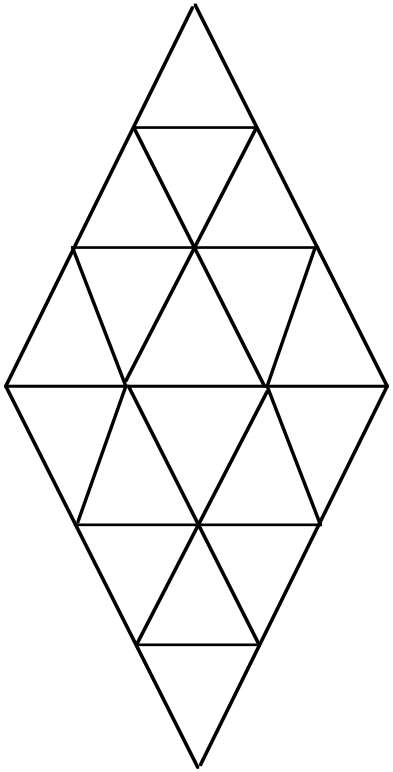
BAGS	CANDIES
2	48
3	72
4	—
5	—
6	—
7	—

Card 37 **Set B**

A cook is making a cake requiring four cups of flour. She only has two measures, which hold 7 cups and 10 cups. How can she use her measures to measure exactly 4 cups?

Card 38 **Set B**

How many triangles are here?



Card 39 **Set B**

The answer is 8. What could the question be? Write three different possible questions. Try to make the questions very different from each other.

Card 40 **Set B**

How many different ways can you show one-half on a geoboard?

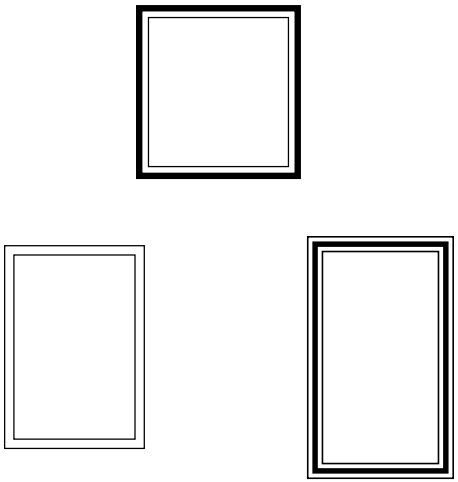
Card 41 **Set B**

Using digits 0 - 9, only once each, choose three digits to make an addend and three other digits to make a second addend. Using the two addends, make the largest possible sum.

Using the same 0 - 9 digits one time each, find the smallest possible sum when you add three 2-digit numbers.

Card 42 **Set B**

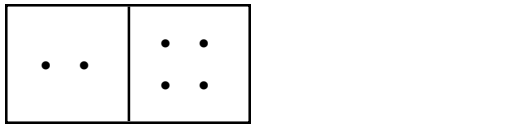
Amy painted three pictures in art class. She wants to hang them in a triangle-shaped arrangement, like the one shown. How many different ways can Amy hang her three pictures in this triangle-shaped arrangement?

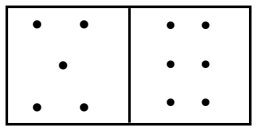


The Nine-Patch Quilt

Laura is making a nine-patch quilt for her doll. She is using red and blue patches. How many symmetrical designs can she create with the two colors of patches? What could she make with three colors of patches? Show the possibilities and draw the line or lines of symmetry on each.

The people of Domino City use dominoes to show their house numbers. Each domino has two sets of dots on it. Different sets of dots are used on each street. The people who live on Peach Street use just these sets to make their house numbers:





What are all the different house numbers that people on Peach Street can make?

Card 45 **Set B**

January 1 is on a Tuesday.
Su-Lin's birthday is in January.

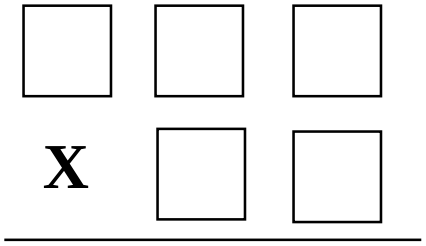
1. It is not on a weekend.
2. The date has two digits.
3. You say the date when you count by twos.
4. The sum of the two digits is 7.

What is the date of her birthday?

Card 46 **Set B**

If a person starts with 9 and repeatedly adds 4 on a calculator, what would the number showing in the display be after six additions?

To get the greatest product, where should a student place the numbers 2, 3, 4, 5, and 6 in the boxes below?



One of the letters in the box does not belong.

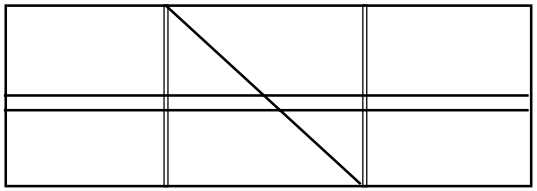
S C D U O

Which letter does not belong? Explain why.

Can you classify these letters in another way so that one letter does not belong?

The answer is 3. Write three different math questions.

How many triangles and how many rectangles are in this figure?



Card 49 **Set B**

Cindy rides her bike to her grandmother's house on Saturdays. Her grandmother lives 12 blocks away.

Last Saturday, Cindy rode 6 blocks, then realized that a book had fallen out of her basket. She rode back and found her book. Then she rode 8 blocks and arrived at her grandmother's house. At which block did she drop her book? How do you know?

Card 50 **Set B**

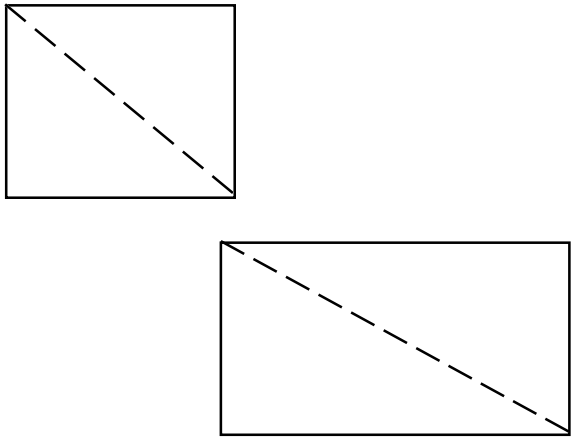
If each car will hold one driver and five students, how many cars will be needed to take Mrs. Wilson's 28 students on their field trip?

How many total people (students and drivers) will there be?

If there were three students absent, how would the answers to these questions change?

Card 51 **Set B**

Trace these figures and cut along the dotted lines. How many different polygons can you create using 2, 3, or 4 pieces?



Card 52 **Set B**

Holly checked a book out of the library and read this notice about fines:

If a book is:

Days Overdue	Amount of Fine
1	1¢
2	2¢
3	4¢
4	8¢

If Holly's book is 7 days overdue, what is the fine? Make a table to show how much the fine will be.

Card 53 **Set B**

Tilly gets 40¢ for an allowance every week. Her mother likes to give her different coins each week, but she never uses pennies.

What are the ways Tilly could have gotten her allowance during the last four weeks?

Card 54 **Set B**

Kim has three coins worth a total of less than a dollar. If she were to lose one of her coins, she would have exactly half as much money as she has now. What coins does Kim have? Explain.

Card 55 **Set B**

How many pennies laid in a row would there be in a mile?

What do you have to know to figure out this problem? Write the steps in a plan to figure this out.

How many pennies would it take?

Card 56 **Set B**

At the grocery store, eggs cost 49¢ for a half-dozen. A dozen eggs cost 91¢. Which is a better buy? Explain your answer.

Card 57 **Set B**

Toni has a piggy bank filled with nickels, dimes and quarters. She has a total of $3.00. If she has fewer than 12 coins, What combination of coins could she have in her bank? How many possibilities can you discover?

Card 58 **Set B**

How Many Tiles Do I Have?

Clues:

A. If I have this many square tiles, I can arrange them into a square and have three left over.

B. With these tiles, I can form a rectangle whose one side is 10 more than the other side.

C. I have less than 60.

How many tiles do I have?

There are 10 pages in Anthony's baseball card album. Each side of the page has 12 pockets for cards. When his book is half full, how many cards will Anthony have collected?

Write a letter to your friend telling how you figured this out.

Suppose that red counters cost 18¢ and yellow counters cost 14¢. You bought 12 counters and paid exactly $2.00. How many of each color did you buy?

Card 61 **Set B**

Which is worth more: 30 cm of quarters placed side by side or 60 cm of dimes placed side by side?

Write the steps you use in solving this problem.

Card 62 **Set B**

There are four boys in the Grant family. Alex is older than Jerry and younger than Stuart. Ross is not the oldest or the youngest. Alex does not have two older brothers. Write the names of the boys from oldest to youngest.

Card 63 **Set B**

Pizzas come two ways at the Pizza Delite. You can buy a whole pizza cut into six slices or a half pizza cut into three slices. How many pizzas should be ordered for this table if the students want this many slices?

Timeka	4
Jose'	5
Benny	3
Laura	2
Alba	6

Card 64 **Set B**