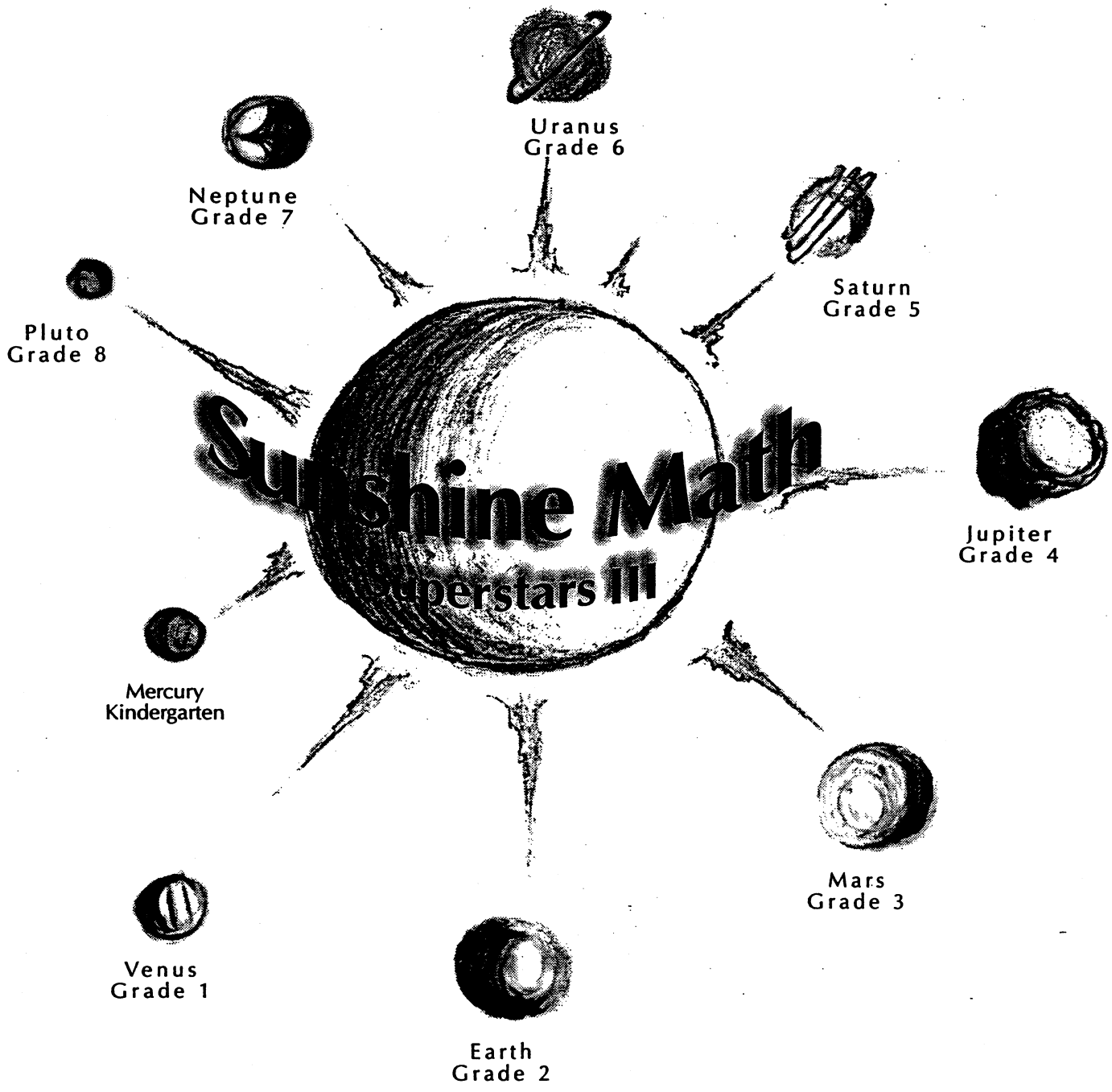
Uranus
Grade 6
Neptune
Grade 7
Saturn
Grade 5
Pluto
Grade 8
Sunshine Math
Superstars III
Jupiter
Grade 4
Mercury
Kindergarten
Mars
Grade 3
Venus
Grade 1
Earth
Grade 2

Mars
Grade 3

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The following Florida educators were primarily responsible for developing, field testing, and publishing *Sunshine Math*:

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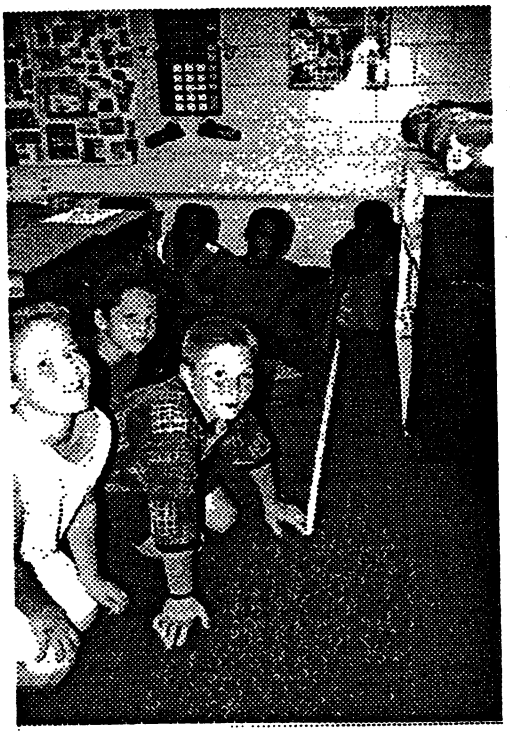
Additional copies of *Sunshine Math* may be purchased at cost from the Panhandle Area Educational Consortium (PAEC), 753 West Boulevard, Chipley, Florida 32428, or by calling the PAEC Clearinghouse, (850) 638-6131, Suncom 769-6131, FAX (850) 638-6336. Out-of-state schools that purchase copies have permission to reproduce the document for use with their students for non-profit educational purposes.

Preface

Sunshine Math and its predecessor programs, *Superstars* and *Superstars II,* dwell on the positive aspects of students, parents, teachers, and administrators working together. This program assumes that children, even young children, are capable of and interested in learning; that teachers want to help them learn to think for themselves; that administrators see their jobs as clearing the path so that quality education is delivered effectively in their schools; and that parents care about their child's learning and are willing to work with the school system toward that goal. Each of these four groups has a vital role to play in implementing *Sunshine Math*..

The program's initiators believed that elementary students are capable of much more than we normally ask of them, and the subsequent success of *Superstars* indicates that many children are on the path to becoming independent learners. A number of children in *any* classroom are bright, energetic, and willing to accept extra challenges.



The basic purpose of the *Superstars* program is to provide the extra challenge that self-motivated students need in mathematics, and to do so in a structured, long-term program that does not impinge on the normal classroom routine or the time of the teacher. The system is not meant to replace any aspect of the school curriculum -- it is offered as a peripheral opportunity to students who identify with challenges and who want to be rewarded for their extra effort. Participation in the program is always optional -- only those students who voluntarily choose to participate will, in the long run, benefit from this program. Any student, regardless of prior academic performance, should be encouraged to participate as long their interest is maintained.

The predecessor programs for *Sunshine Math* - the Florida Department of Education's *Superstars II* and *Superstars*-- have demonstrated that this concept can be extremely successful. What is required are several dedicated adults who devote a few hours each week to operate the system effectively in the school; an administrator who provides highly visible support; teachers who welcome a supplementary experience for their students to engage in higher-order thinking; and a typical classroom of students. If all of those ingredients are present, *Sunshine Math* will become an integral part of the school fabric.

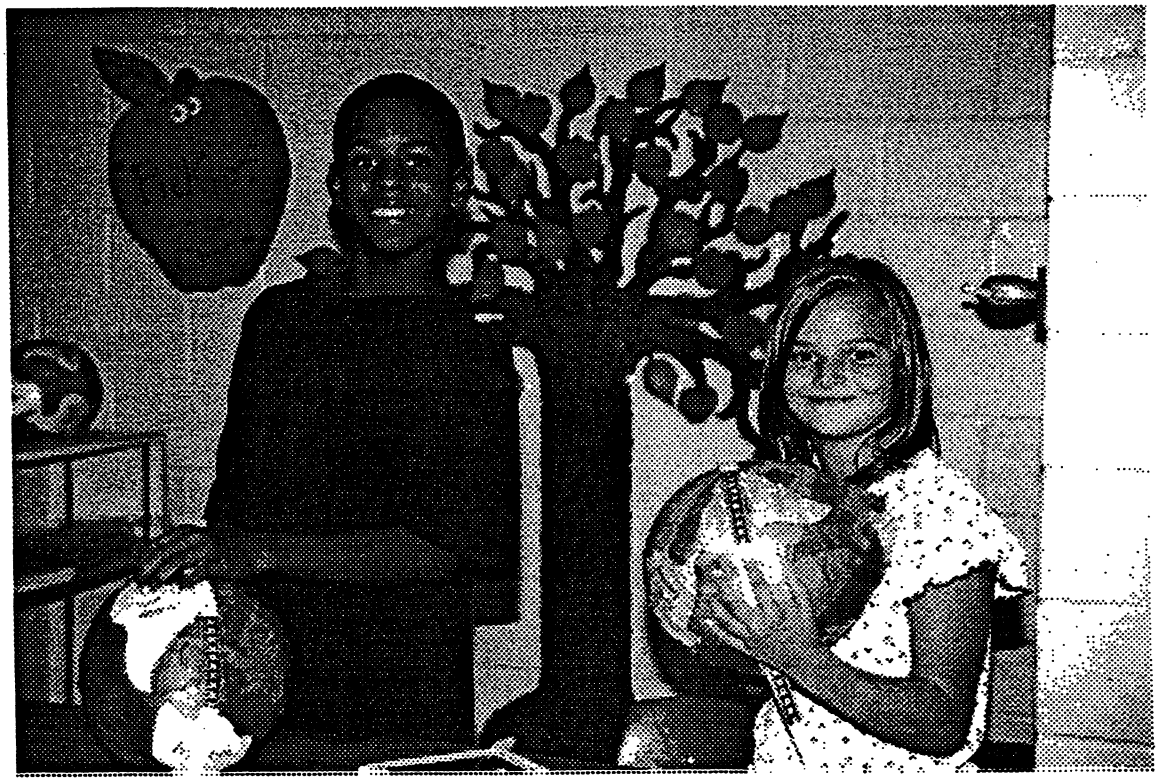
ORGANIZATION OF THESE MATERIALS

Section I **Description of the *Sunshine Math* Program**

1. General Information
2. Information/ checklist for principals
3. Information/checklist for assisting adults
4. Information for teachers
5. Letter to participating students and their parents

Section II **Student worksheets for *Sunshine Math***

Section III **Commentary for student worksheets for *Sunshine Math***



Sunshine Math General Information

Sunshine Math is a K-8 program designed as an enrichment opportunity for self-directed learners in mathematics. The levels of the program are named after the planets of our solar system:

Kindergarten	Mercury	Fifth Grade	Saturn
First Grade	Venus	Sixth Grade	Uranus
Second Grade	Earth	Seventh Grade	Neptune
Third Grade	Mars	Eighth Grade	Pluto
Fourth Grade	Jupiter		

Students of all ability levels choose on their own to participate in *Sunshine Math.* The visual reinforcement of seeing their names displayed in a prominent place in the school, with a string of stars indicating their success, is the reward a student receives for the extra work. In many cases, the school decides to enhance the basic reward system by awarding certificates or other forms of recognition for achieving certain levels of success in *Sunshine Math.*

Sunshine Math can function in a school in a number of different ways. The "tried and true" way is for assisting adults (volunteers, aides, etc.) to manage the program for the entire school, with support provided by school administrators and classroom teachers. This system has been modified at the school level, with varying degrees of success, over the years. The basic model for running *Sunshine Math* is discussed below, with variations described on the next page.

The Basic Model

The basic model for *Sunshine Math* is for a school to establish a weekly cycle early in the fall, according to these guidelines:

> On Monday of each week, student worksheets are distributed by the assisting adults to those in the program. Students have until Friday to complete the problems, working entirely on their own. On Friday, the classroom teacher hosts a brief problem-solving session for the students in the program. The more difficult problems on the worksheet for that week are discussed, with students describing their thinking about how to approach and solve the problems. They do not give their answers for the problems, only their strategies.
>
> Students get double-credit for problems they complete prior to the problem-solving session, and regular credit for those they complete successfully over the weekend. On Monday, all papers are handed in, checked by the assisting adult, and stars are posted for problems successfully worked. This completes the cycle for the preceding week, allows for the new worksheets to be passed out, and the cycle begins again.

Sunshine Math is not for every child -- it's only for those who are self-motivated and who are not easily frustrated by challenging situations. This does not diminish the value of the program, but rather makes us realize that there are children of all ability and socio-economic levels who are self-directed learners and who need challenges beyond those of the regular school day. These children will shine in *Sunshine Math.*

Variations of the Basic Model

The first variation that has been used successfully retains the weekly cycle and assisting adult role as in the basic model. However, the teacher involves the entire class in the problem-solving discussions. For example, the teacher might pick the four hardest problems on the worksheet for that week, and do a "parallel problem" with the entire class to open the mathematics class on Tuesday through Friday. Using this variation, all students are exposed to the problem-solving strategies, but only those who are in *Sunshine Math* exhibit that they have learned the material by completing the worksheet over the weekend.

A second variation is for the assisting adults to run the entire program, including the problem-solving session for students. This method has been used in situations in which some teachers in a school lacked commitment to the program, and thus it was being implemented inconsistently. In such cases, the assisting adults must have a progressive view of what constitutes problem solving in elementary mathematics. They must also be given extra assistance from the principal to ensure students are released from class and that the process works smoothly in general.

Yet another variation is for a parent to run *Sunshine Math* at home, for their own child. The basic rules are the same -- a child gets the worksheet once a week and time to work the problems alone. The parent has a pre-established night to listen to the way the child thought about each problem, interjecting her or his own methods only when the child seems stuck. The reward system is basically the same -- stars on a chart -- but is usually enhanced by doing something special for the child, such as a trip to the movies or to the skating rink, when the child reaches certain levels of success. If this method is adopted, the parent must be sure not to try to "teach the child." *Sunshine Math* is a program designed to stimulate discussion of problem-solving strategies; it is not a program designed for adults to "teach children how to think."

Other variations abound. The basic model on the previous page is the approach that reaches more children in a consistent fashion than any of the other methods. However, individual schools, teachers, or parents are encouraged to get some version started, even if it's not one of the above. Some sunshine is better than none at all!

Sunshine Math: Information for Principals

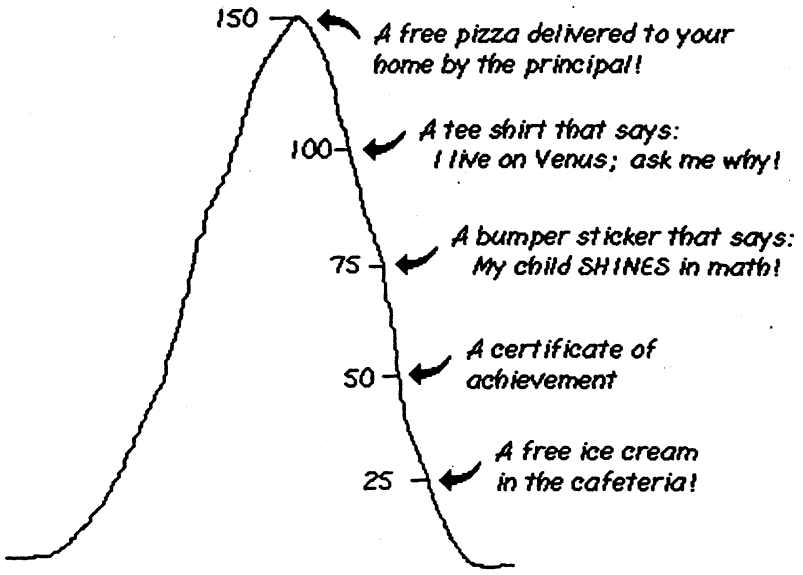
Sunshine Math is a K-8 enrichment package for mathematics, designed to be managed by volunteer assisting adults with coordinated support from the classroom teacher and school administrators. The purpose of the program is to give self-motivated students of all ability levels a chance to extend themselves beyond the normal mathematics curriculum. The complete set of materials comes in nine packages, one for each K-8 grade. The grade levels are named for the planets in the solar system, in order starting from the sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto.

Your support is vital if this program is to succeed. As the school administrator, you need to stay in close touch with *Sunshine Math*. A "checklist for success" follows:

- ❑ Become familiar with the philosophy and component parts of the program.
- ❑ Introduce *Sunshine Math* to the faculty early in the school year. Ensure that each teacher understands the philosophy of the program and has a copy of the student worksheets and commentary for that grade level.
- ❑ Speak to parents at your school's first "open house" of the year, explaining the purpose of *Sunshine Math* and the long-term value of children working independently on the worksheets.
- ❑ Recruit several assisting adults (PTA members, aides, senior citizens, business partners, churches, and so on) who are enthusiastic, dependable people to manage the program. Early in the year, meet with these assisting adults to plan such details as:
    - ✔ A prominent place and format for the STAR CHART.
    - ✔ A designated time each Monday and Friday for the assisting adult to be in the school to receive and distribute papers from students, and post stars.
    - ✔ A system for the activity sheets to be duplicated each week.
    - ✔ A plan for extra incentives for accumulating stars. ("World records" to be kept from year-to-year; a celebration day planned for the end of school; students earning prizes for attaining certain levels of success -- see the reverse side of this page for examples.)
    - ✔ A schedule for when the program will begin, and whether or not there should be a "start over" point at some time in the school year. Review a school calendar, and use only weeks that have at least four school days in them. If there isn't time in the school year to cover all the activity sheets under these conditions, decide which sheets to eliminate or when to "double up."
    - ✔ If possible provide volunteers with a *Sunshine Math* cap, name tag, tee-shirt, or other identifying feature.
- ❑ Monitor the program every two weeks to clear up any unforeseen problems. Administrators need to be highly visible for *Sunshine Math* to succeed.

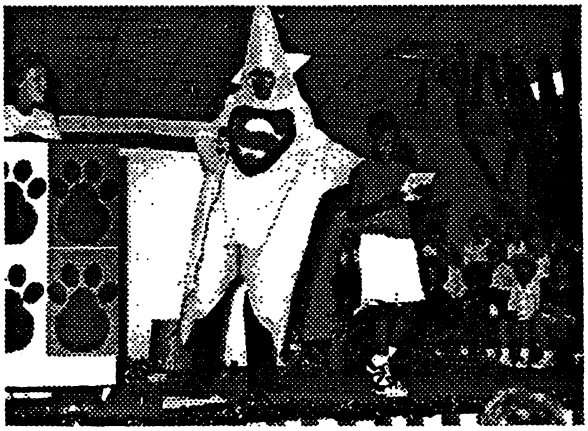
Sunshine Math is an optional program for students. It should be available to any student who wants to participate, regardless of prior success in mathematics. A large number of students will usually begin the program, but a majority of them will lose interest. However, a significant number of students will continue their interest over the life of the program. This is normal and simply means that *Sunshine Math* is successfully addressing the needs of the self-directed learner.

Visual reminders help children see that mathematics is challenging and rewarding. Some ideas are presented below, merely to start your creative juices flowing:



Climb the Mountain this Year!!!

Join the Sunshine Math Club



Tom Walker, Principal at Bashaw Elementary School in Bradenton, passes out awards for achievement levels in Superstars.

Sunshine Math: Information for Assisting Adults

Sunshine Math is designed to give assisting adults a well-defined role to play in the school's mathematics program. The success of *Sunshine Math* depends on a team effort among teachers, administrators, parents, and you. Reliability and punctuality are important -- students will rapidly come to depend upon you to be there as scheduled, to check their papers and post their stars, and to listen to alternate ways in which they may have interpreted a problem to arrive at a unique answer. If possible, wear an outfit that fits with the *Sunshine Math* logo; students will quickly begin to identify you as an important person in their school.

Participating students have from Monday until Friday to work the problems entirely on their own -- the only help they can receive during that time is for someone to read the problems to them. On Friday, the teacher hosts a problem-solving session in the classroom, having students describe their approaches to the more difficult problems. Students who have already worked the problems discussed, prior to the problem-solving session, can earn double stars -- you can identify these by looking for the teacher's initials beside certain problems. The students will have the weekend to complete any problems they want to -- for successfully completing these problems, they earn the indicated number of stars.

Be creative when designing a star chart. The basic method of posting stars individually is a good way to begin, but eventually you will want a color-coded system, or perhaps posting only one star each week, with a number in its center. Personalize the chart and the entire *Sunshine Math* center with pictures of students, "smiling faces," and so on. Occasionally bring in a reward for each child -- perhaps a cookie or a hand stamp in the shape of a star -- just for turning in their worksheet. Be creative and enjoy your role -- you are helping enthusiastic students develop higher-level thinking skills!

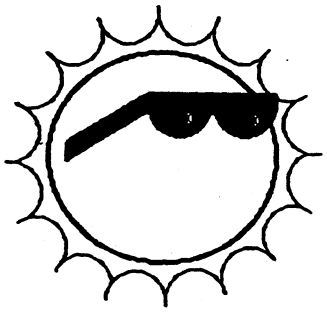
Checklist for assisting adults:

- ❑ Plan with the principal the following:
  - ✔ A prominent place and format for the STAR CHART.
  - ✔ The time and place for you to take up and check papers, and distribute new worksheets.
  - ✔ The system for duplicating worksheets each week, ensuring legible copies.
  - ✔ Any extra incentives ("world records," stickers, coupons, pencils, tee shirts, etc.) that will be part of the system for rewarding levels of achievement in *Sunshine Math.*
- ❑ Make the *Sunshine Math* center a happy place. Use bright colors, smiles, and cheerful words. Show confidence, friendliness, and encouragement to students.
- ❑ Collect the letters which are sent home prior to the first worksheet and signed by each student and parent. If in the future you have evidence that the work turned in does not represent the thinking of the student, discuss the situation with the classroom teacher. These situations are best handled individually in a firm, consistent manner.
- ❑ Check the worksheets from the previous week consistently. If you give partial credit for a problem with several parts, do so in a fair way that can be explained to students. Do not award partial credit for problems with only one answer.
- ❑ Have answer sheets available and encourage students to look at the answers when they hand in their worksheets. Allow them to explain their thinking if they arrived at a different answer. Award them full credit if they show a unique interpretation of the problem, and logical reasoning in obtaining an answer.
- ❑ Leave extra worksheets with the classroom teacher for participating students who were absent on Monday. Accept a late-arriving worksheet only if the student was absent on Monday. If a students' name is missing, or on the wrong place on a worksheet, check the paper but award the stars to "no name" on the STAR CHART. Adhering strictly to these rules will rapidly teach responsibility to the students, and keep your work load manageable.
- ❑ Keep all returned worksheets. As the same worksheets are used year-after-year, and many participating students have siblings who will later be in *Sunshine Math*, it is important that the students not be allowed to keep their worksheets.
- ❑ On weeks when *Sunshine Math* will not be available, post a sign such as "No star problems this week, but please come back after the vacation for more!"

Sunshine Math: Information for Teachers

Sunshine Math is a program designed to complement your regular classroom mathematics curriculum. It offers a peripheral opportunity for students to practice mathematics skills appropriate for their grade level and, at the same time, to participate in problem-solving experiences. It offers a challenge to those students who are self-directed learners by giving them something worthwhile to do outside of class.

Your involvement is strictly as a teacher. *Sunshine Math* will remain special to students if it's managed by someone outside the classroom, and if the teacher is viewed as a facilitator in the system, rather than as the authority figure. Your primary role is to monitor the system in your own classroom and host a brief problem-solving session for *Sunshine Math* students on Friday of each week. You will also need to release the participating students from your class at a set time on Monday to turn in their worksheet and obtain a new one. You might make yourself a special pin like that shown to the right, to wear on Monday and Friday to remind students that those days are special.



Each student worksheet has an accompanying commentary page. This sheet provides hints on parallel problems which you might use in the Friday problem-solving session. It is important that students participate actively in this session, and that you solicit from them their unique approaches to the problem discussed. Only after students present their ideas should you provide guidance on the problems, and then only when necessary. Even though there is a comment provided for each problem, you will have to decide which 3 or 4 problems you will cover during this brief session. Concentrate on those whose solution requires a strategy. The problem-solving session should last no more than 15 minutes.

Do not be disappointed if a large number of your students begin *Sunshine Math*, but many drop out after a few weeks. This is normal; problem solving requires a great deal of effort, and only certain students are ready for this challenge. On the other hand, you will also note that certain students *do* chose to stay in *Sunshine Math* week after week, even though they aren't as successful as other students at earning stars. Their participation should be encouraged, as they are certainly learning from the experience. Under no circumstances should *Sunshine Math* be reserved for only the advanced students in your class.

As a purely practical consideration, students are not allowed to discuss the problems with other students or their parents prior to the Friday "cooperative group" problem-solving session. This allows the "think time" necessary for students to develop into independent thinkers; it also prevents students from earning stars for work that is basically someone else's, which is the surest way to disrupt the entire *Sunshine Math* program. As the teacher, you must monitor this in your classroom and ensure that students abide by the established rule.

It is important that you understand and support the overall philosophy of *Sunshine Math.* Do not worry if students encounter problems for which they have not been prepared in class -- such is the nature of true problem solving. Do not provide remedial instruction to ensure that students master certain types of problems -- they will meet these same problem types repeatedly in the program, and likely will learn them on their own and from listening to other students at the problem-solving session. You should enjoy what the students *can* do, and not worry about what they can't do. You should also read over the general information about the program, to see how your role fits into the entire system.

Here are some hints that you might find useful in your support role for Sunshine Math:

- ✔ Allow your students to leave the classroom at the designated time on Monday to turn in their worksheets and pick up a new one.

- ✔ Read each week's worksheet yourself, and feel free to structure classroom activities that parallel those on the *Sunshine Math* worksheet.

- ✔ During the school week, students should be allowed to work on their *Sunshine Math* problems during their spare time, but the only help they can receive is for someone to read the problems to them. Give the students one warning if you observe them discussing the worksheets, and take away their papers for the next violation. If it happens another time, dismiss them from *Sunshine Math* for a month.

- ✔ At the problem-solving session on Friday, remember these points:

  - ➞ Students come to this session with their worksheets, but without pencils.

  - ➞ The session must be brief -- 15 minutes at most. Discuss only the 3 or 4 most difficult problems on the worksheet.

  - ➞ Help students summarize their own approaches to the problems, in a non-judgmental fashion. Offer your own approach last, and only when it's different from the student strategies. Do not allow answers to be given to the problems.

  - ➞ End the session by encouraging students to complete the problems over the weekend. Put your initials beside any problem discussed in class which a student has already completed successfully. The assisting adult will award double stars for these.

- ✔ Remember that part of the *Sunshine Math* philosophy is that students learn responsibility by following the rules of the system, if participation is important to them. *Sunshine Math* becomes very important to certain students, so they will adhere to rules about where their names goes on each paper, no credit if they forget their paper on Monday, no talking about the problems prior to the problem-solving session, etc., if *you* enforce the rules.

- ✔ Enjoy *Sunshine Math.* Students will impress you with their ability to think, and their creative ways to solve problems that appear to be above their level.

Here's a song for your students -- to the tune of "When you wish upon a star":

When you get your SUPERSTARS .....
It won't matter who you are ....
Try a few ....
See what you can do ....
.... and ....
Success will come to you!!!

Sandy Parker, Lake Weir Middle School, Ocala, FL

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

WELCOME TO *SUNSHINE MATH !* We are happy that you want to try some new and different kinds of math problems! As you read the *SUNSHINE* problems, you may find yourself *?PUZZLED?*. Your teacher will be helping you each week with some of the hardest problems. Also, your parents may read the problems to you and offer hints for solving them.

If you would like to begin earning ★STARS★ for solving math problems, sign your name below.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

(Your name)_____ I am ready to begin the *SUNSHINE MATH* Program. I promise to do my own thinking on each problem.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Dear Parents,

We welcome your child and you to *SUNSHINE MATH*, a program designed to enhance your child's journey through mathematics. By expressing an interest in more challenging problem solving, your child has taken the first step toward becoming an independent learner who is able to address many types of problems.

Your child will receive a worksheet each Monday which will be discussed on Friday and collected the following Monday. Each problem is ranked according to its level of difficulty. The more stars you see beside a problem, the higher the level of difficulty, and the more stars your child can earn for solving it.

Each Friday, your child will attend a "help session" to discuss the most challenging problems of the week. Any problem solved prior to the help session will be given double stars, or double credit. After the session, your child may rework problems before the sheets are collected on Monday.

Your role in *SUNSHINE MATH* is to encourage and facilitate problem solving. During the week, allow time for your child to think about each problem. You may need to read the problem to your child, explaining any new words encountered. Feel free to suggest a strategy for solving the problem, offer "counters" or manipulatives, or listen as your child shares her or his thinking, but please **DO NOT GIVE THE ANSWERS.** In order for this program to be effective, the thinking must be done by the students.

It is normal for a child NOT to be able to complete every problem on a worksheet. The process of reading, understanding and approaching the problems is a valuable step in solving many types of problems. Remind your child that she or he is not expected to know the answers to every problem.

Thank you for allowing your child the chance to embark on this mathematical adventure. Your signature gives permission for your child to begin.

_____

(parent's signature)


WORKSHEETS

SUNSHINE MATH - 3
Mars, I

Name: _____

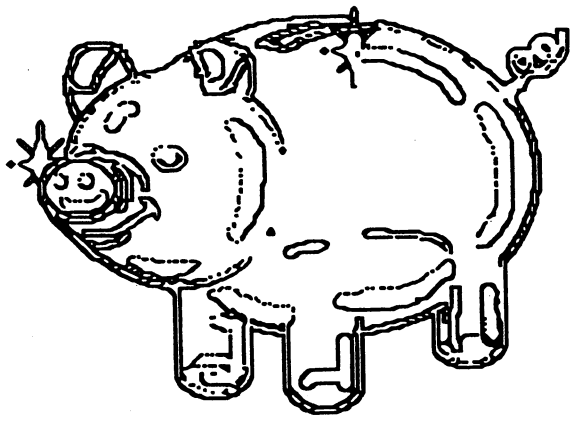
(This shows my own thinking.)

★ 1. Ann was asked to find the number of marbles that were added to the other marble groups to get the total. Can you find the number?

3 marbles + ____ marbles + 2 marbles = 13 marbles.

Answer: _____ marbles

★★ 2. Joe has 3 quarters, 1 dime and 2 nickels in his piggy bank. How much money does he have to spend in the candy store?



Answer: _____cents

★★ 3. Tom is helping his sick neighbor by taking her dog for a walk every day, bringing her the mail, and doing other odd jobs. Mrs. Burns pays him $7.50 a week for his help. How much will he earn in 4 weeks?

Answer: _____

★★★ 4. Find the pattern in these numbers and then continue the pattern by writing the next three numbers.

1 6 3 8 5 10 7 _____ _____ _____

★★★ 5. Robin gave her friend a puzzle like the one below. Solve the number puzzle yourself!

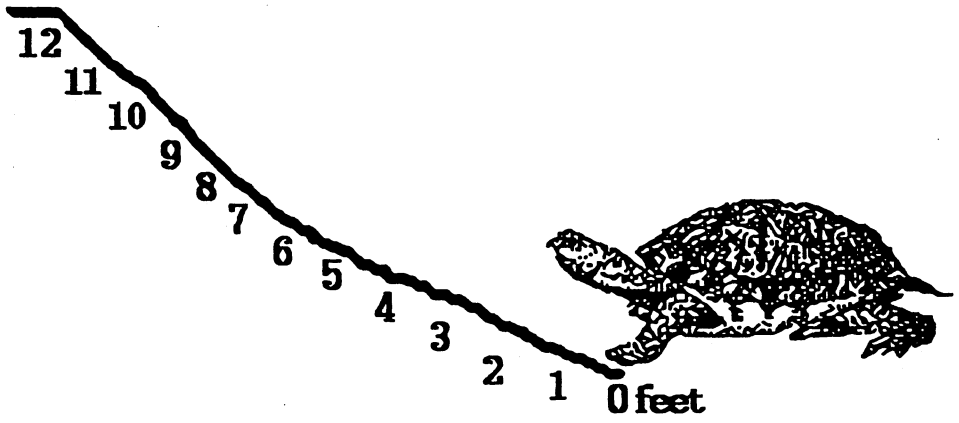
Find ✻ + 11 if you know that 8 + ✻ = 12.

Answer: ✻ + 11 = _____

★ 6. There was a line waiting for movie tickets. Sue realized that there were 6 people in front of her and 6 people behind her in the line. How many people were waiting in line for movie tickets?

Answer: _____people

★★★★ 7. A turtle crawls up a 12 foot hill after a heavy rainstorm. The turtle crawls 4 feet, but when it stops to rest, it slides back $1\frac{1}{2}$ feet. How many tries does the turtle make before it makes it up the hill?



Answer: _____tries

★★ 8. Four classmates are to stand in order from tallest to shortest. Tom is taller than Sally. Sally is taller than Bob. Maria is taller than Bob but shorter than Sally. Using the clues, place the four friends in order from tallest to shortest.

Answer: Tallest _____ _____ _____ _____Shortest

SUNSHINE MATH - 3
Mars, II

Name: _____

(This shows my own thinking.)

★★★★ 1. Use the rule given. Write the missing numbers.

Rule: If x is a number in column A, then x - 7 is beside it in column B.

A	B
14	
7	
24	
	1

★★ 2. One way to add numbers mentally is to add the tens together first, followed by the ones. For example, to find 43 + 25, you might do this:

40 + 20 = 60
60 + 5 = 65
65 + 3 = 68

Practice these problems using this way to add. You will be asked to work a problem mentally when you turn in your paper.

47 + 22 = 56 + 45 = 43 + 27 = 44 + 27 =

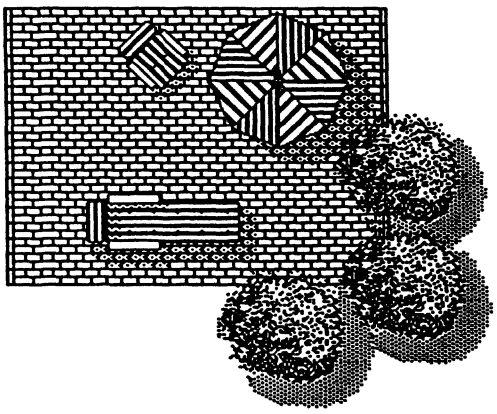
Answer for the later problem: _____

★★★ 3. Mrs. Buchanan's third grade class needs 150 paper napkins for a party. A small package of 50 napkins costs $0.99. A large package of 150 napkins costs $2.75. How much money would the class save by buying the large package of napkins?

Answer: _____

★★★ 4. Georgia is making a patio in the shape of a rectangle. The width of the patio is 10 feet. The perimeter is 50 feet. What is the length of the patio?

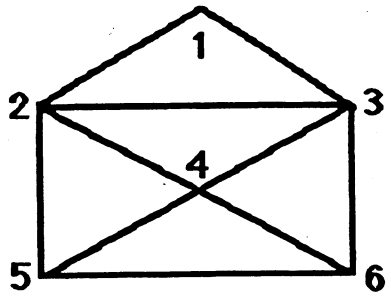
Answer: _____ feet



★ 5. At the baseball game, Brian saw a player hit a home run. About how far did the ball go? Circle the most reasonable answer.

a. 8 feet b. 300 feet c. 2,500 feet

★★★★ 6. Trace each line of this shape without lifting the pencil. You can cross a point several times, but do not retrace a whole line.

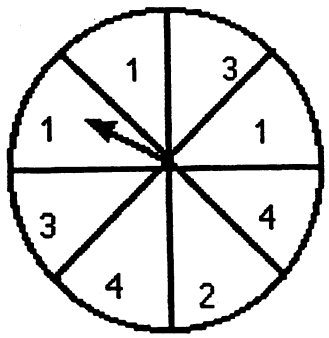


List your numbers in the order that you traced the figure:_____

★★ 7. Look at the spinner.

a. Which are you more likely to spin, a 2 or a 3?_____

b. Which is more likely, a 1 or a 4?_____



★★★ 8. On Monday 2 students went to the school store. On Tuesday, 4 students went, and on Wednesday, 8 students. If the pattern continues, how many students will go to the school store on Friday?

Answer:_____ students

SUNSHINE MATH - 3
Mars, III

Name: _____

(This shows my own thinking.)

★ 1. Tom had 45 marbles. He gave some to Dan. He had 19 marbles left. How many marbles did he give to Dan?

Answer: _____ marbles

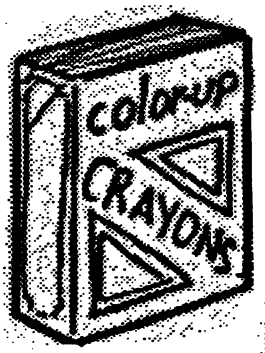
★★ 2. Ann gets up at 6:15 AM. It takes her 30 minutes to get ready for school, 10 minutes to eat breakfast, and 5 minutes to walk to the bus stop. At what time does she reach the bus stop?

Answer: _____AM

★ 3. John is emptying tennis balls into a bin for a special sale to help his father. Each can holds 3 tennis balls. How many balls will be in the bin if he empties 7 cans?

Answer: _____ balls

★★ 4. Drew has $2.00 to spend. He wants to buy a box of crayons and a bottle of paste. Use the posted prices below. Does Drew have enough money?
Answer ***yes*** or ***no***



$1.25

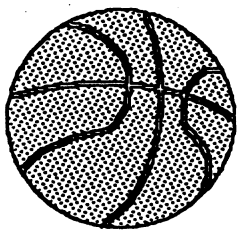
$ 0.79

Answer: _____

★★ 5. David had 1 bug in his insect collection on Monday, 3 bugs on Tuesday, 6 bugs on Wednesday, and 10 bugs on Thursday. If this pattern continues, how many bugs will he have in his collection on Saturday?

Answer: _____ bugs

★★★★ 6. Five basketball teams are playing in a tournament. The teams will play each other only one time. How many games will be played by the end of the tournament? (Hint: Draw a picture or make a list of the teams playing.)



Answer: _____ games

★★★ 7. What is the least number of coins that can be used to give a customer 42¢ in change? What are the coins?

Answer: _____ coins

List the coins: _____

★★★ 8. Find the missing digits in the following problems. Place your answers in the boxes.

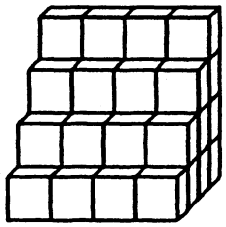
A	B	C
2 □	5 4	6 5
+ □ 6	+ 2 □	+ □ 3
6 9	□ 1	1 3 □

SUNSHINE MATH - 3
Mars, IV

Name: _____

(This shows my own thinking.)

★★ 1. How many small blocks does it take to build the set of steps below?



Answer: _____ blocks

★★★ 2. Write the correct number or symbol in each box.

$1 = 9 - \square$ $\quad 11 = 3 \square 8$ $\quad 4 = 4 \square 0$

★★ 3. The students in Mrs. Jower's third grade class are taking turns going to the library. Five students went to the library first. When they returned, 10 students went. The third time, 15 students went to the library. If the pattern continues, how many students will go to the library on the fifth trip?

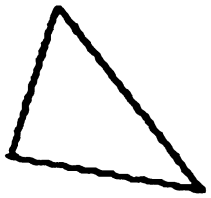
Answer:_____ students

★★★ 4. Samantha earns $2.50 each week for helping her father mow the grass. If she saves all of her money, how much will she have in 6 weeks?

Answer:_____

★★★ 5. I am a triangle. My *perimeter* is 96 centimeters. Two sides are 34 centimeters and 25 centimeters long. How long is my third side?

Answer: ____ cm



★★ 6. Julio's dad didn't have enough candles for his cake, so he let the dark candles stand for 2 years and the white candles for 1 year. How old was Julio?

Answer: _____ years old

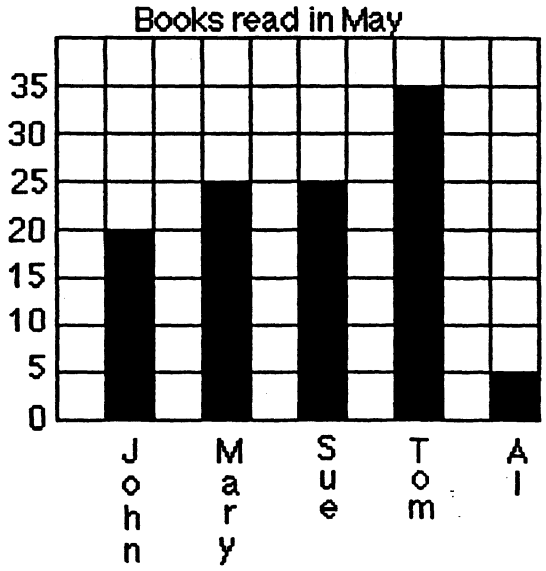
★★★★ 7. Look at the graph and answer the following questions:

a. Which children read at least 20 books? Answer: _____

b. How many more books did John read than Al? Answer: _____

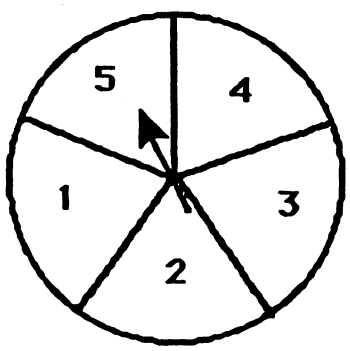
c. Who read the same number of books? Answer: _____ and _____

d. If Al read a total of 12 books for May and June, how many books did he read in June? ____



★★ 8. Bill, Mark, Maria, Sue, and Julie played a game. Each boy took an *even*-numbered space on the spinner. Each girl took an *odd*-numbered space. Who was more likely to win, a girl or a boy?

Answer: _____ (boy or girl)



SUNSHINE MATH - 3
Mars, V

Name: _____

(This shows my own thinking.)

★★ 1. Write the following in standard form without adding.

30 + 700 + 8 + 5,000

Answer: _____

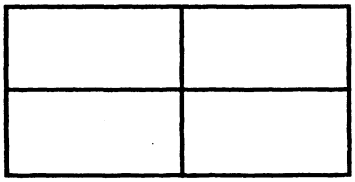
★★ 2. There are 5 red, 3 green, and 4 blue marbles in a bag. What would be the chance of getting a red marble if the marble was pulled out of the bag without looking?

Answer: _____

★★★ 3. The 30 students in Mrs. Brown's third grade class are preparing for a Trivia Contest in the afternoon. Each team will have 4 members. How many teams can the students make if two classmates are absent?

Answer: _____teams

★★★★ 4. Find the number of rectangles in this *visual challenge* presented by David.



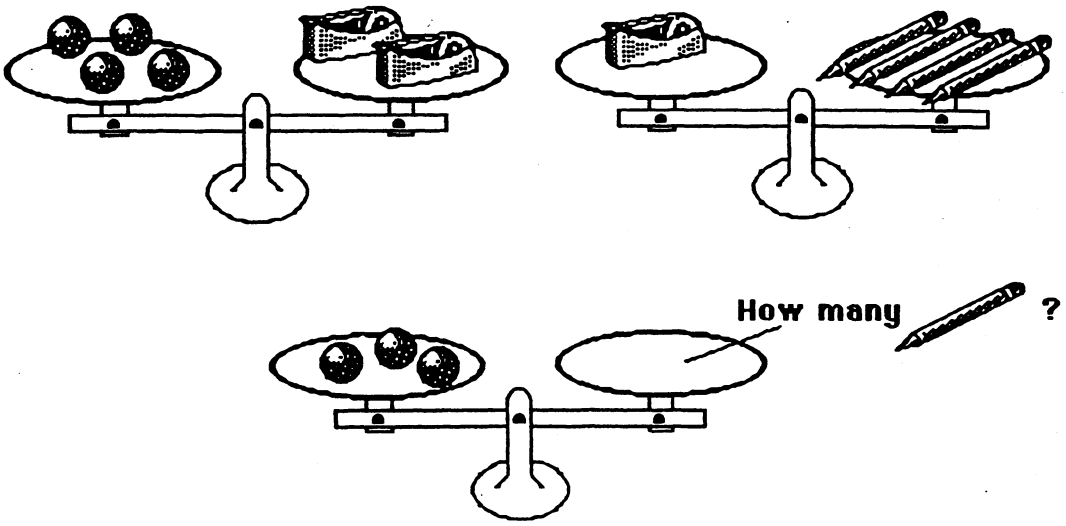
Answer: _____ rectangles

★★ 5. Laquinda has a number riddle for you to solve:

I am a **two-digit number less than 40.** You say me when you count by **fives.** The sum of my digits is **7.** What number am I?

Answer: _____

★★★★ 6. Look at the top two scales. Decide how many pencils would balance three marbles. Draw that number of pencils on the bottom scale.



★★★ 7. Dan went to the bookstore. He has spent $17.00 of his $20.00 already. He needs to buy a few disks. How many can he buy with his remaining money if each disk costs 90¢?


90 ¢ each

Answer: _____ disks

★★ 8. Use the line to the right as 1 unit. Measure the length and width of this paper. Measure to the nearest whole number.

Answer: _____ units long and _____ units wide

SUNSHINE MATH - 3
Mars, VI

Name: _____

(This shows my own thinking.)

★★ 1. How many 2-ounce hot dogs would make a pound?

Answer:_____hot dogs

★★★ 2. Write a number sentence using all of the given numbers and symbols.

6, 9, 7, 5, 3, =, +, +, -

Answer:_____

★ 3. Without adding, write the following in "standard form."

70 + 400 + 2 + 3,000 + 80,000 =

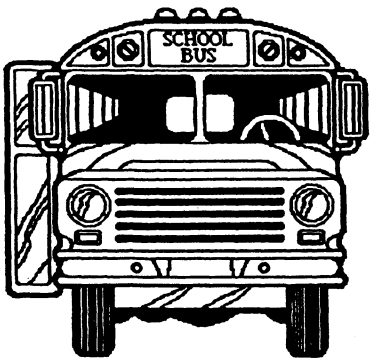
Answer:_____

★★ 4. The lunchroom workers are giving away free cookies today. They gave the first graders 4 cookies. They gave the second graders 8 cookies. They gave the third graders 12 cookies. They gave the fourth graders 16 cookies. If the pattern continues, how many cookies will the seventh graders receive?

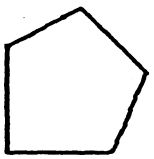
Answer:_____cookies

★ 5. The students rode a school bus on their field trip. About how many students could ride in 1 bus? Circle your best estimate.

a. 400 students b. 40 students c. 4 students



★★★ 6. Alexander's back yard is in the shape of a pentagon. The perimeter is 134 meters. Four of the sides measure 20, 21, 32, and 35 meters. What is the length of the fifth side?

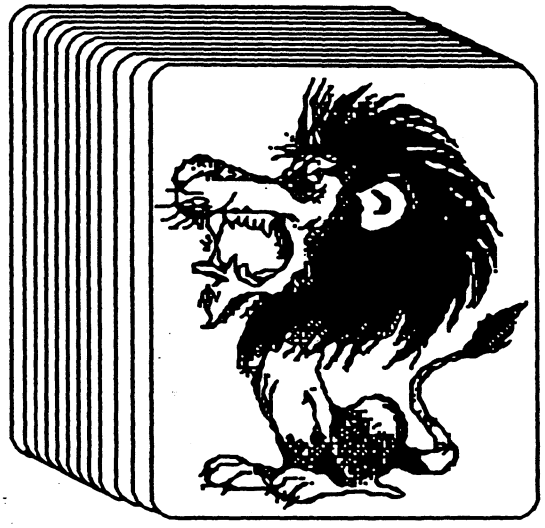


Answer:_____ meters

★★ 7. Draw the next figure in the pattern.

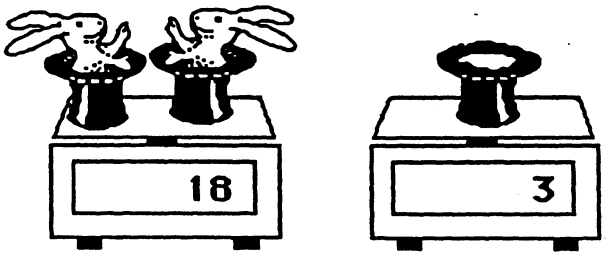
★ 8. Darrell has a set of animal cards in a covered box. There are 2 giraffes, 5 lions, 2 monkeys, and 4 llamas. Which is more likely that Darrell will pick out of the box without looking, a giraffe card or a llama card ?

Answer: _____ card



★★★ 9. A magician weighed his twin rabbits and identical hats together and got 18 pounds. He then weighed one hat and got 3 pounds. What was the weight of one rabbit?

Answer: _____ pounds



SUNSHINE MATH - 3
Mars, VII

Name: _____

(This shows my own thinking.)

★ 1. Find the mystery number (?) using the relationships shown:

28 : 7 20 : 5 16 : 4 12 : ?

Answer: _____

★★ 2. John is helping his father box up used golf balls for a special sale. Each box will hold 6 golf balls. How many boxes will they need to box up 52 golf balls?

Answer: _____boxes

★★★ 3. Solve the following magic squares. The sum across each row, and down each column, must be the same sum as the sum along the diagonal. **(Place the numbers in the boxes)**

	1	8
	5	3
2		

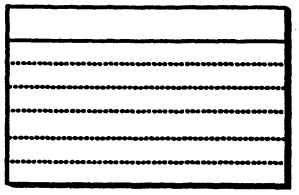
12		14
	11	
	15	10

★★★ 4. Ricardo is 4 years older than his sister Rosa. If their ages are added together, the sum is 14. What are the ages of Ricardo and Rosa?

Answer: Ricardo is _____ years old.

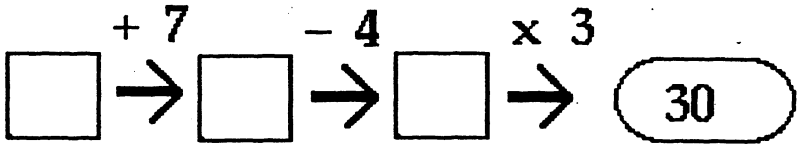
Rosa is _____ years old.

★★★★ 5. An index card is shown to the right. How many rectangles are formed on this card?



Answer: _____ rectangles

★★ 6. What is the starting number in this puzzle?



Answer: _____

★★ 7. How many 3-digit numbers can be made using the following digits only once in each number?

Use the digits: **2 , 3, 4**

Answer: _____ numbers can be made

★★★ 8. Pam is using beads to make a necklace. The bowl contains 40 yellow beads, 20 blue beads, and 40 red beads. If she uses *half* of each color that is in the bowl, how many beads of each type will she use?

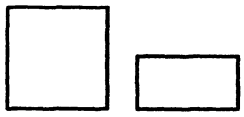
Answer: She will use _____ yellow, _____ blue, and _____ red beads.

SUNSHINE MATH - 3
Mars, VIII

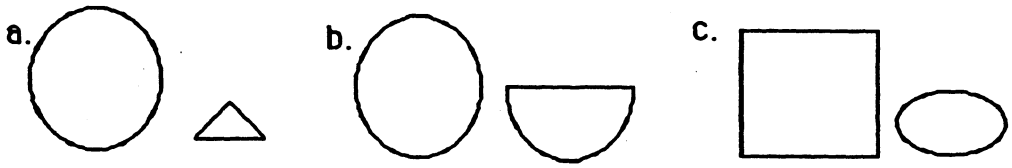
Name: _____

(This shows my own thinking.)

★★ 1. Notice how the two shapes are alike:



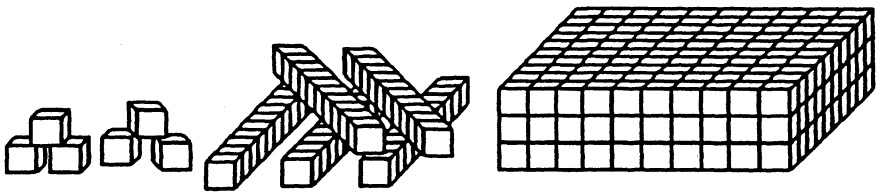
Which pair of shapes are alike in the same way? Circle your answer.



★ 2. Ashley has a set of color tiles in a bag. There are 2 greens, 5 reds, 2 yellows, and 4 blues. Without looking, is Ashley more likely to pick a green tile or a yellow tile?

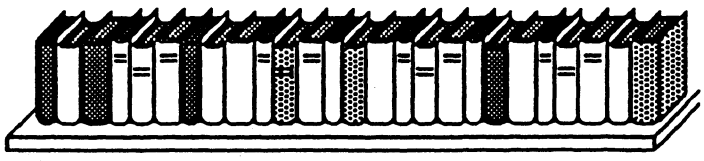
Answer:_____

★★ 3. How many small cubes are there in the entire collection below?



Answer:_____cubes

★★★ 4. There are 4 bookshelves in the classroom. Each bookshelf has room for 20 books. If Mrs. Hogan has 90 books, how many books will not be able to fit on the shelves?

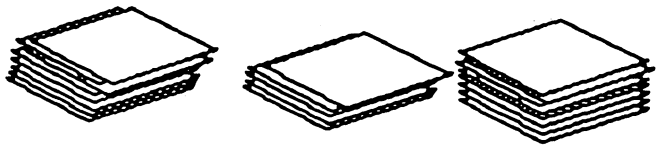


Answer:_____books

★★★ 5. Three rose and two holly bushes are planted at the first stop of the nature trail. Then three rose and two holly bushes are planted at the second stop. Rose and holly bushes are planted in the same way until 20 bushes are planted. How many rose and how many holly bushes are planted?

Answer: _____ rose bushes; _____ holly bushes

★★★ 6. Abraham had three stacks of baseball cards. One stack had 25 cards in it, the next stack had 20 cards in it, and the third stack had 30 cards. How many cards would be in each stack if Abraham made them all the same height?



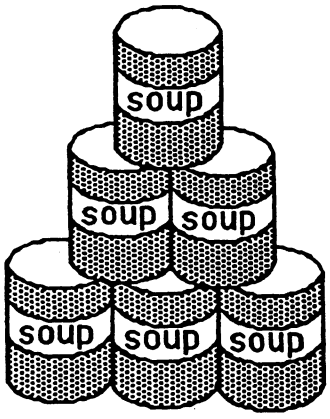
Answer:_____cards

★★★ 7. Solve the magic square. The sum across each row, and down each column, must be the same as the sum along each diagonal.

5		
	6	2
3		7

★★★ 8. A can of soup weighs 251 grams. How many cans would weigh about 1 kilogram?

Answer: _____ cans



SUNSHINE MATH - 3
Mars, IX

Name: _____

(This shows my own thinking.)

★★ 1. Ann is thinking of a number. She gives Tina this clue:

> *If you multiply my number by 4, and then subtract 3, the answer is 17.*

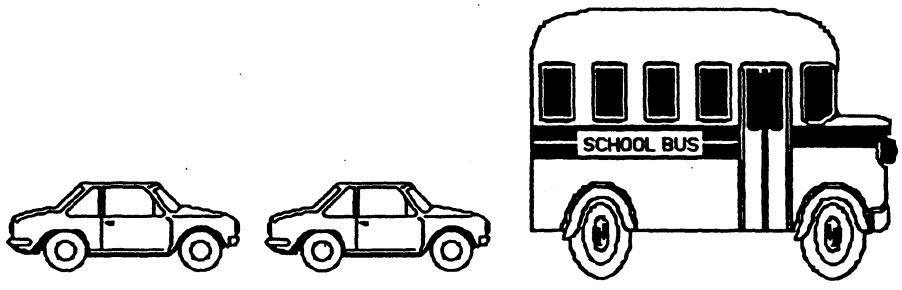
What is Ann's number ? _____

★★★★ 2. Use the symbols = (equal to) , < (less than) , and > (greater than) to compare the problems below. Work each side before deciding which sign to use. Put your answers in the boxes.

a. 23 + 42	☐	76 - 15
b. 5 x 4	☐	3 x 6
c. 27 - 13	☐	18 + 5
d. 72 ÷ 9	☐	48 ÷ 6

★★★ 3. Eighty-four students went on a field trip to another city. The school had one bus that held 68 students. The rest of the students had to travel by car. If 4 students could ride in each car, how many cars were needed?

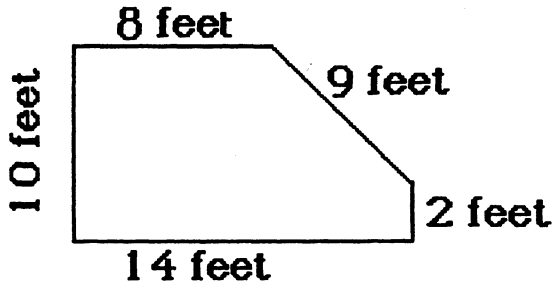
Answer: ____ cars



★★ 4. Gina is having a birthday party at home. Each time the doorbell rings, two of her friends arrive. If the doorbell rings 4 times, how many people are at the party?

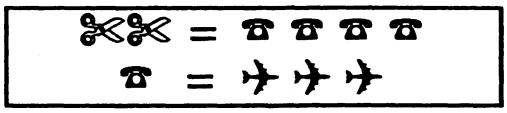
Answer : _____ people

★★★ 5. Joe's grandmother is planting a vegetable garden. She needs a fence to keep animals out. She has to know the *perimeter* of her garden to buy the right amount of fencing. How much fence does she need?



Answer: _____ feet

★★★ 6. Study the following puzzle. Then answer the question.



How many ✈'s is a ✂ worth?

Answer: _____ ✈'s

★ 7. Sergio bought a hand-held game and an adapter for $28.00. The game cost $19.00. What was the cost of the adapter?

Answer: _____

★★ 8. Tom, Bill, and Joe picked oranges from the tree in their grandfather's yard. Tom picked 12 more oranges than Joe. Joe picked 8 less oranges than Bill. Bill picked 23 oranges. How many oranges did they pick together?

Answer: _____ oranges

SUNSHINE MATH - 3
Mars, X

Name: _____

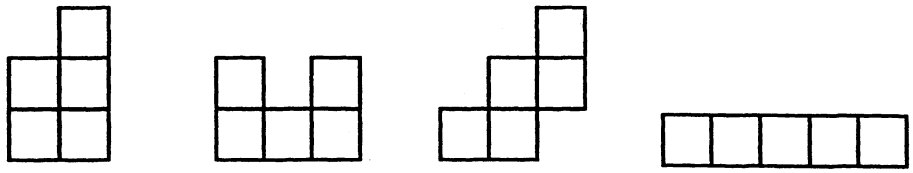
(This shows my own thinking.)

★★ 1. Shayna has a set of blocks in a bag. There are 2 squares, 5 circles, 2 triangles, and 4 rectangles. What fraction of the blocks are squares? Circles?

Answer:_____ of the blocks are squares

Answer:_____of the blocks are circles

★★ 2. Which figure will fold into an open box? Circle it



a b c d

★ 3. Which digits below are made up of only line segments? Circle them.

2 4 3 5 7

★★ 4. Rebecca bought a pack of 12 pencils. About how much did she spend? Circle your answer.

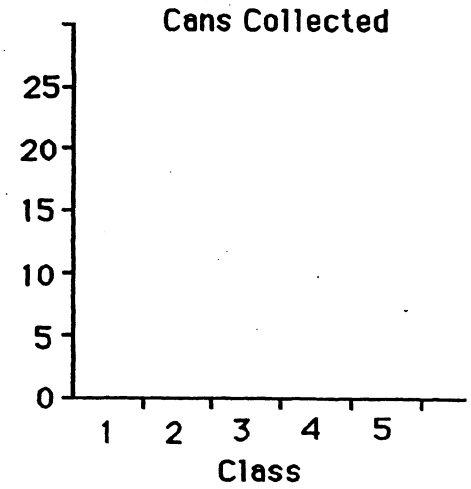
a. $2.25 b. $10.25 c. $0.10

★★★ 5. Amanda eats supper from 6:30 to 7:00. Then she watches a half-hour television program. She takes 5 minutes to brush her teeth, 15 minutes to take a bath, and 5 minutes to dress for bed. How much time is left for Amanda to read if she goes to sleep at 8:30?

Answer:_____

★★ 6. Five third-grade classes collected cans. The table gives you the data. Complete the bar graph to show the data.

Class	Cans
1	15
2	25
3	25
4	20
5	20



★★★ 7. The classes above put all their cans together. Then they divided them equally among the five classes. How many cans did each class end up with?

Answer: _____

★★ 8. Watch how Marcus multiplies in his head:

For 2 X35, first I do 2 X30 = 60. Then I do 2 X5 = 10. Last, I add 10 to 60 to get 70. So 2 X35 = 70.

Practice doing these problems the way Marcus does, in his head. You will be given a problem to do mentally when you turn in your paper.

3 X 22 = 3 X 24 = 2 X 45 =

Answer for the problem given later:_____

★★★ 9. Bart and Luwan prepared the tables for art. They put 2 pieces of poster board and 6 markers on each table. There are 24 markers on the tables. How many pieces of poster board are on the tables?

Answer:_____pieces

SUNSHINE MATH - 3
Mars, XI

Name: _____

(This shows my own thinking.)

★★ 1. What numbers belong in the following number sentences? Write your answer in the boxes.

$$288 + \square = 395$$

$$579 - \square = 395$$

★★★ 2. Mrs. Brown's third grade class planted 35 tomato seeds in their class garden. Only 4 out of every 5 seeds grew into plants. How many plants were there?

Answer: _____ plants

★★ 3. Tom has a stamp album. Each page has 5 rows of 6 stamps. He has stamps in 3 whole rows and one-half of the fourth row. How many *more* stamps can he put on that page?

Answer: _____ stamps

★★ 4. Bill needs some computer disks. At the store the plain disks are formatted for IBM. The disks with the Apple are the type he needs. Study the picture. What fraction of the disks should he buy? What fraction of the disks should he not buy?

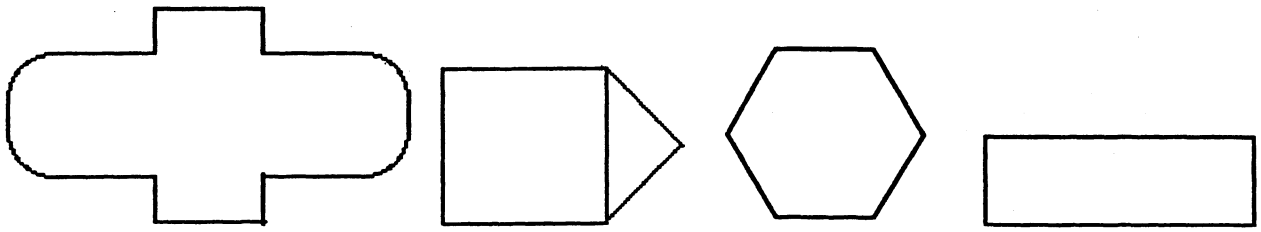
Answer : _____ of the disks he can buy

_____ of the disks he should not buy

★★ 5. Sally bought 4 stamps at 32 ¢ each. How much change should she receive from the dollar and a half she gave the clerk?

Answer: _____

★★★★ 6. Symmetry means that a shape can be folded in half and both sides will match perfectly. Draw the lines of symmetry in the shapes below. Some shapes will have more than one line of symmetry.

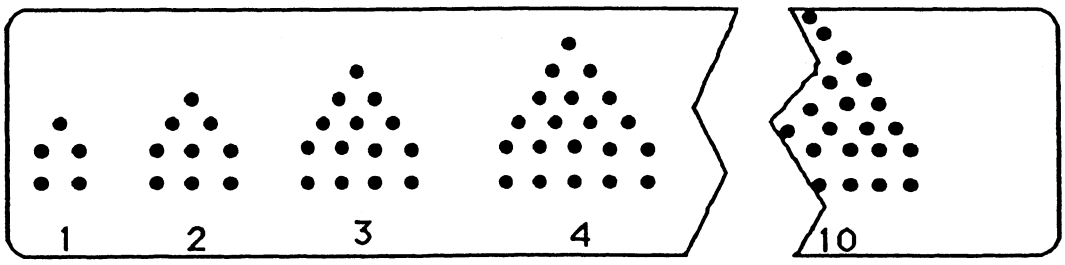


★★★ 7. The library at Miller Elementary School has an odd number of tables. Some tables will seat 4 students and some tables that will seat 6 students. A total of 32 students can sit at the tables with no empty seats. What is the number of tables of each type? (Drawing a picture might help).

Answer: _____ tables of 4

_____ tables of 6

★★★ 8. Study the pattern of dots. How many dots made the 10th figure, before the paper was cut?



Answer: _____ dots

SUNSHINE MATH - 3
Mars, XII

Name: _____

(This shows my own thinking.)

★ 1. Mrs. Boyd baked 22 rolls. She baked 12 *more* muffins than rolls. How many muffins and rolls did she bake together?

Answer:_____ muffins and rolls

★★★ 2. Mrs. Smith's class was observing birds in the trees. There were three mockingbirds and two cardinals in each tree. The class left after counting 35 birds. How many mockingbirds and cardinals did they see?

Answer: _____ mockingbirds _____ cardinals

★★ 3. Practice these problems using mental math. You will be given a problem to do mentally when you turn in your paper. (Hint: think of money)

3 x 25 = 4 x 50 = 2 x 25 = 5 x 25 =

Answer for the problem given later:_____

★★ 4. At the school store, paper costs 35¢; a pencil costs 25¢; and an eraser costs 5¢. Jamie has 50¢. Does Jamie have enough money for paper and a pencil? Katie has 75¢. Can she buy one of each item?

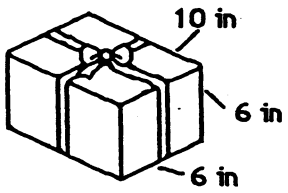
Answer for Jamie:_____ Answer for Katie: _____

★★★★ 5. Mazie counted her dimes. When she put them in groups of 4, she had two dimes left over. When she put them in groups of 5, she had one left over. What is the smallest number of dimes she could have, if she has more than 10?

Answer: _____

★★★★ 6. Joshua gave Warren a birthday present. How much ribbon did he need to go around the present and make the bow? The bow took 12 inches by itself.

Answer: _____ inches

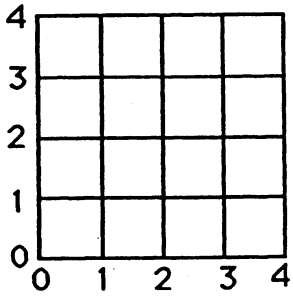


★★ 7. I am a 3-digit number less than 300. My tens digit is less than my ones digit and my ones digit is less than my hundreds digit? Who am I?

Answer:_____

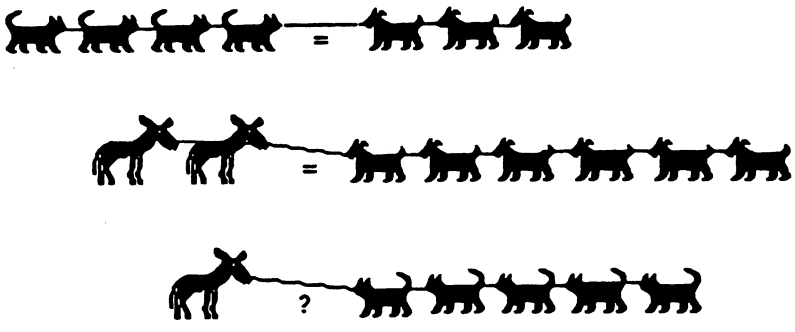
★★★ 8. On the grid below, find the point for each number pair. Connect the points in order. Name the figure. (Hint: the first number of each pair says how far *out*; the second how far *up*.)

Here are the number pairs: (1,2) (2,3) (4,3) (4,1) (2,1) (1,2)



Answer: The figure is a _____.

★★★ 9. Dogs, cats, and donkeys had a tug-of war. Four cats tied with three dogs. Two donkeys tied with six dogs. Which side won when one donkey tugged with five cats?



Answer: _____

SUNSHINE MATH - 3
Mars, XIII

Name: _____

(This shows my own thinking.)

★ 1. Sue asked her friend to find the next 3 numbers in the sequence below. Write them on the blanks.

4, 9, 7, 12, 10, 15, 13, _____, _____, _____

★★★ 2. Crystal has exactly $2.40 in quarters, dimes, and nickels. She has the same number of each type of coin. What is that number?

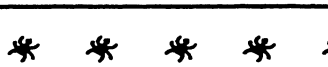
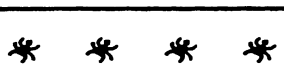
Answer: _____ quarters, dimes, and nickels

★★★ 3. Tom, Alan, Bill, and Joe enjoy collecting insects. They made a graph to compare their collections. Study their pictograph and answer the following questions:

a. Who has the largest insect collection? _____

b. How many more insects does Alan have than Tom? _____

c. Who has exactly half the insects that Bill has? _____

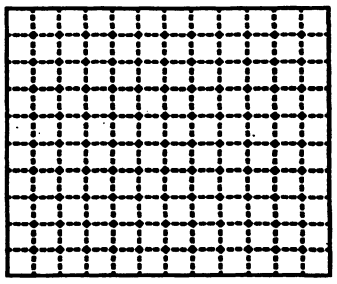
INSECT COLLECTIONS	
Tom:	
Bill:	
Alan:	
John:	

KEY:  = 5 insects

★★ 4. Ted started his homework when he got home from school. He worked 45 minutes on his homework. He then walked the dog for 30 minutes. It was 5:00 when he finished walking the dog. At what time did he get home and start his homework?

Answer: _____

★★★ 5. Brenda wants new carpet in her room. Her father told her to find the area of the room so they would know how much carpet to buy. Look at the drawing of her room and find the amount of carpet she needs. (*Area* is number of square feet in her room.)

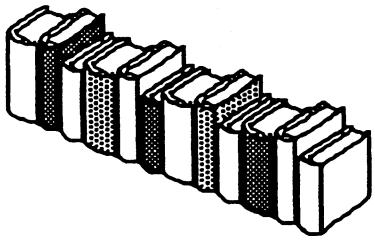


Answer: _____ square feet.

★★ 6. Quentin has a bag of numbered blocks. Each of the blocks has a **2, 3, 4, 5, or 6** on it. He pulled 4 different blocks from the bag. The total of the numbers on the 4 blocks was 18. What blocks did he pull out?

Answer: _____ _____ _____ _____

★★★ 7. Ellen was dusting her bookcase. The top shelf has 16 books. The second shelf has 23 books. The third shelf has 21 books. The bottom shelf has 28 books. She rearranged the books and put the same number on each shelf. How many books were on each shelf then?



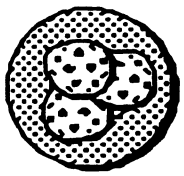
Answer: _____ books

★★★★ 8. Pam gave her friend Tammy the number riddle below. Solve it.

I am a 2-digit number less than 84. The sum of my digits is 9. The ones digit is twice the tens digit. What number am I?

Answer: _____

★★★ 9. There were 3 cookies on a plate. Henry ate $\frac{1}{3}$ of the cookies on the plate. Marsha ate $\frac{1}{2}$ of what was left. How many cookies were left for Art to eat?



Answer: _____ cookies

SUNSHINE MATH - 3
Mars, XIV

Name: _____

(This shows my own thinking.)

★ 1. Stephanie had 35 crayons. She gave 12 crayons to Brian. How many crayons did Stephanie have left? Circle the number sentence that correctly answers the problem.

a. 35 + 12 = 47 b. 35 - 12 = 23 c. 35 - 23 = 12

★★★★ 2. Two dogs together weigh 36 pounds. Fido weighs twice as much as Rex. How much does each dog weigh?

Answer: Fido:_____ pounds

Rex: _____pounds

★★ 3. I am a number between 500 and 600. My ones digit is 5. My tens digit is the difference between my ones and hundreds digits. Who am I?

Answer:_____

★★★ 4. Georgia and Samantha baked a cake. They wanted to divide it into two equal parts to take home and share with their families. Which of these ways below show the top of a cake pan divided into equal parts? Circle all the correct ways.

a b c d

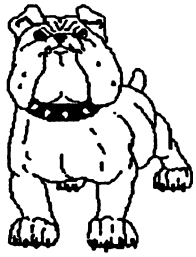
★★★ 5. Should the object be measured in grams or in kilograms?

a. a feather: _____

b. bulldog: _____

c. television set: _____

d. a penny: _____



★★★★ 6. There are 4 more oranges than apples in the fruit bowl. There are 5 more apples than bananas. There are 2 bananas. How many of each type of fruit is in the bowl? How many pieces of fruit in all?

_____ bananas _____ oranges

_____ apples _____ fruit

★★ 7. Use mental math. Circle the correct amount of change:

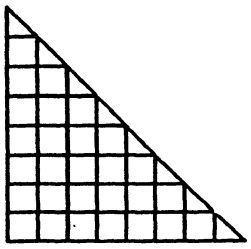
Richard gave the cashier $5.00 for a game that costs $3.50.

a. $1.00 b. $1.25 c. $1.50

Cameron gave the cashier $3.00 for marbles that cost $2.25.

a. $0.50 b. $0.75 c. $0.85

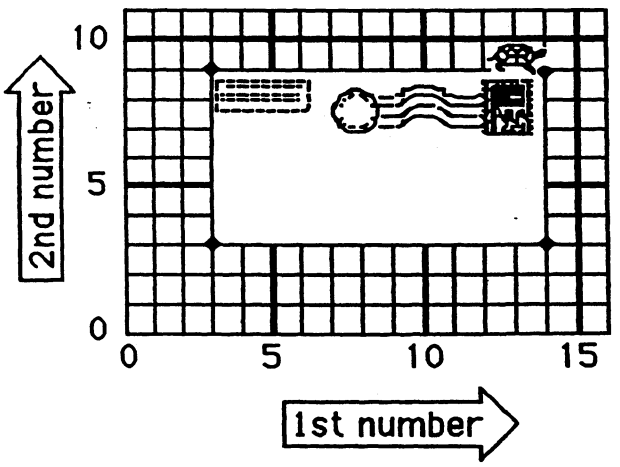
★★★ 8. What is the area of the triangle below?



Answer: _____ square units

★★★★ 9. Tell the turtle how to go *clockwise* around postcard. Fill in the blanks with ordered pairs of numbers from the grid.

Start at (14, 9). Turn right 90°.
Go to (___,___).Turn right 90°.
Go to (___, ___). Turn right 90°.
Go to (___, ___). Turn right 90°.
Go to (___, ___).



SUNSHINE MATH - 3
Mars, XV

Name: _____

(This shows my own thinking.)

★ 1. Place the correct sign (=, <, or >) in the box.

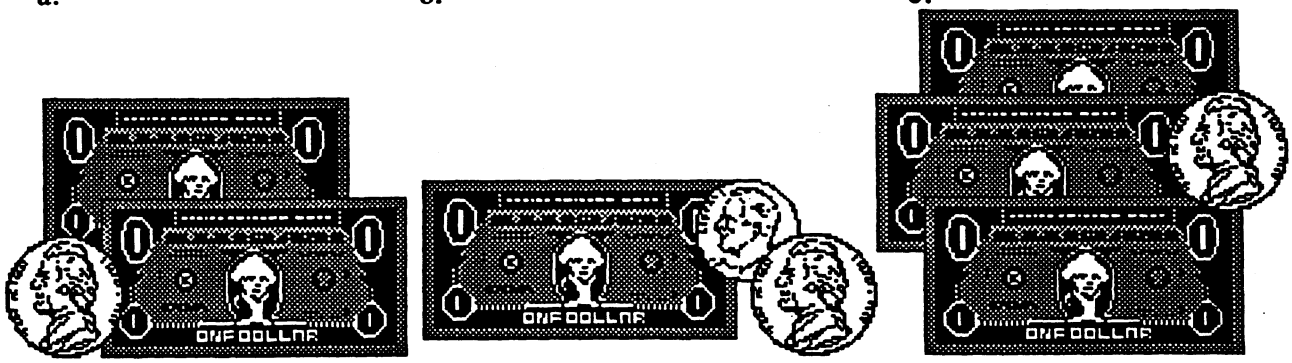
$$81 \div 9 \square 5 \times 3$$

★★ 2. Ben has 5 marbles. Kate has 7 more marbles than Ben. Tina has 9 more marbles than Kate. Who has the greatest number of marbles? How many marbles do they have in all?

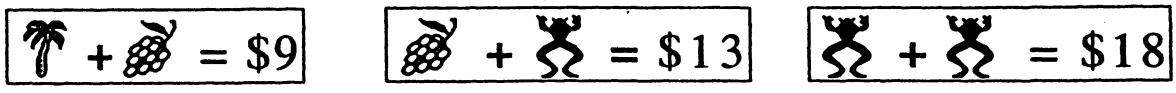
Answer: _____ has the greatest number; there are _____ marbles in all

★★★ 3. Ken is buying a bicycle with money he got for Christmas. The bicycle cost $87.95. Which of the following is his change from the $90.00 he gave the clerk? Circle the correct change.

a. b. c.

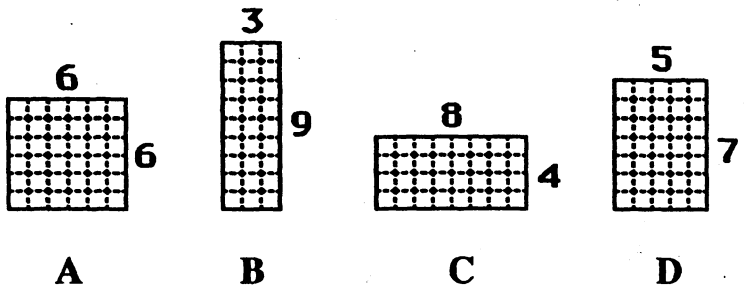


★★★ 4. Find the value of each item used in the following sentences.



Answer: = _____ = _____ = _____

★★★ 5. Mr. Smith is planning to fence his new garden. He has 24 feet of fencing to use around the perimeter of his garden. He wants the greatest *area* for his garden. Which of the following gardens will give him the greatest area ? Circle your choice.



★★★ 6. Some nonsense names are given to a group of numbers that are alike in some way. This is an example:

These numbers are *kewees*: 54, 78, 112, 246, 480, 574, 942
These numbers are *not* kewees: 33, 67, 147, 259, 421, 505, 863
Which of these are *kewees*? 43, 58, 166, 369, 620, 891

Answer : _____ _____ _____

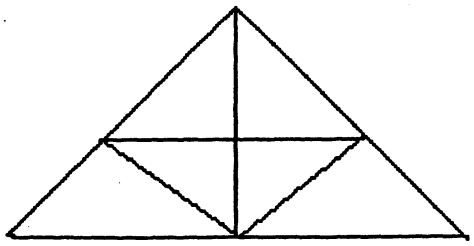
★★ 7. Sam asked Tim to find 3 consecutive even numbers whose sum is 48. The following are examples of consecutive even numbers that do *not* sum to 48:

2 + 4 + 6 = 12; 4 + 6 + 8 = 18; 6 + 8 + 10 = 24.

Help Tim by finding 3 consecutive even numbers whose sum is 48.

Answer: _____ _____ _____

★★★★ 8. Look carefully at the triangle puzzle that Paul drew. How many triangles are there?



Answer: _____ triangles

SUNSHINE MATH - 3
Mars, XVI

Name: _____

(This shows my own thinking.)

★ 1. How many more people like blue than red?

Favorite Colors	
Blue	●●●●●●●●●●
Green	●●●●●●●
Red	●●●●●●●●●
Yellow	●●●●

● = 2

Answer:_____ people

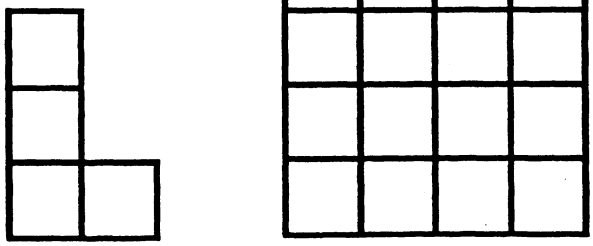
★★ 2. Patrick wants to make 6 bows for his Christmas presents. It takes 14 inches of ribbon to make each bow. The ribbon comes in spools of either 70 inches or 125 inches. Which size spool does Patrick need to buy?

Answer:_____

★★★ 3. There are four fewer pink crayons than blue crayons in the tub. There are five more blue crayons than brown crayons. There is one less brown crayon than red crayon. There are six red crayons. How many crayons in all are in the tub?

Answer: There are _____ crayons in the tub.

★★★ 4. Show how to use four of the "L-shapes" to the left below, to cover the square to the right. Color each "L-shape" a different color, inside the square.

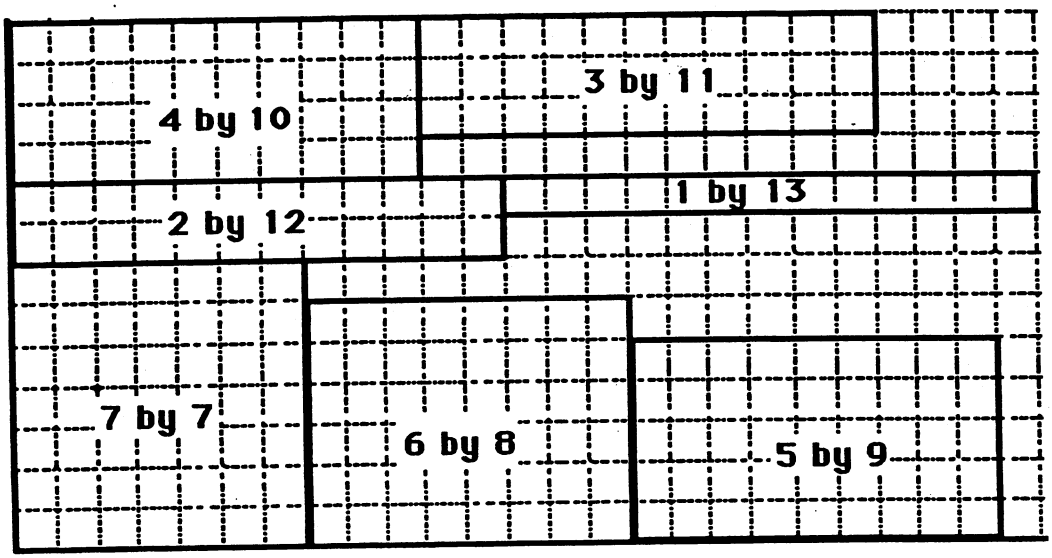


★ 5. Practice doing these problems mentally. When you turn in your paper, you will have a problem like these to do in your head.

a. 4 x 100 = _____ b. 15 x 10 = _____ c. 24 x 10 = _____

Answer for the problem given later: _____

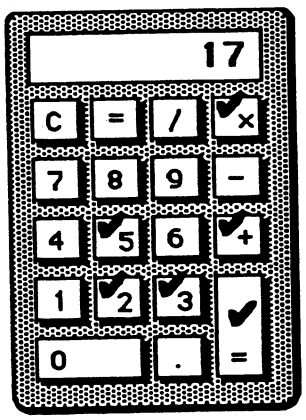
★★★★ 6. Find the *perimeter* and *area* of each rectangle. Then answer the questions below the grid.



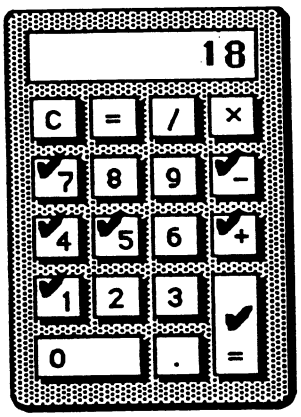
(a) Do all of the rectangles have the same *perimeter*? _____ If so, what is the perimeter? ___

(b) Do all of the rectangles have the same *area*? _____ If so, what is the area? ___

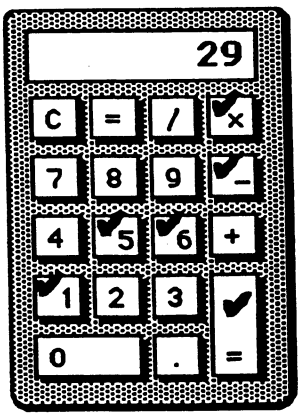
★★★ 7. Below each calculator, write a number sentence to give the answer shown. The symbols and digits to use are checked on each calculator.



_____



_____



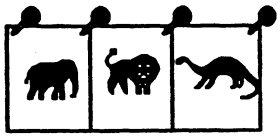
_____

SUNSHINE MATH - 3
Mars, XVII

Name: _____

(This shows my own thinking.)

★ 1. It takes 4 push-pins to hang 3 pictures if the pictures overlap. Ann is hanging up 8 pictures on the wall for her teacher. How many push-pins will Ann need if she overlaps the corners?



Answer: _____ push-pins

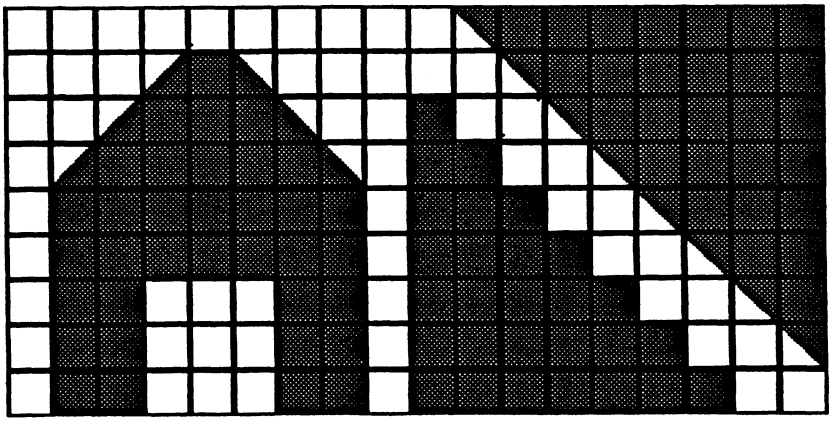
★★ 2. Mike has 8 more goldfish than Alan. Alan has 4 fewer goldfish than Suzie. Mike has 12 goldfish. How many goldfish do the 3 friends have all together ?

Answer: _____ goldfish

★★★ 3. Use the digits 5, 6, 7, and 8 to create three 4- digit numbers. Each digit can be used only 1 time in a number. Find the 3 highest possible numbers.

Answer: _____ _____ _____

★★★ 4. Find the area of the shaded figures below.

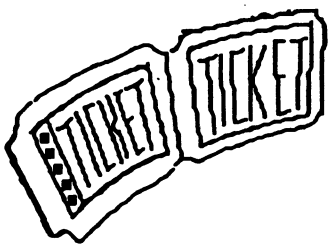


Answer: The garage has _____ ■ 's.

The stairs have _____ ■ 's.

The triangle has _____ ■'s.

★★★★ 5. A family group of 6 went to a show. Tickets for adults are $6. Tickets for children are $4. The family spent $30 for tickets. How many adult and children tickets did they buy?



Answer: _____ adult tickets

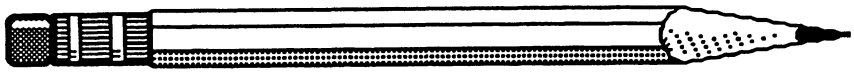
_____ children tickets

★★ 6. The Tigers played 20 baseball games during the summer. They won 4 more games than they lost. How many games did they win? How many games did they lose?

Answer: _____ games won

_____ games lost

★★ 7. Use a ruler to measure the pencil below from eraser tip to point. Measure it in both centimeters and inches.



Answer : _____ centimeters

_____ inches

★ 8. Study the number crossword. One operation sign (+ , -, x, ÷) belongs in every circle. What operation sign belongs in the circles? Write it in all the circles.

4	◯	2	=	8
◯	■	◯	■	◯
4	◯	1	=	4
=	■	=	■	=
16	◯	2	=	32

SUNSHINE MATH - 3
Mars, XVIII

Name: _____

(This shows my own thinking.)

★ 1. Wednesday, Ashley practiced her gymnastic routine for 55 minutes. Thursday she practiced for 63 minutes. How much longer did she practice on Thursday than on Wednesday?

Answer:_____

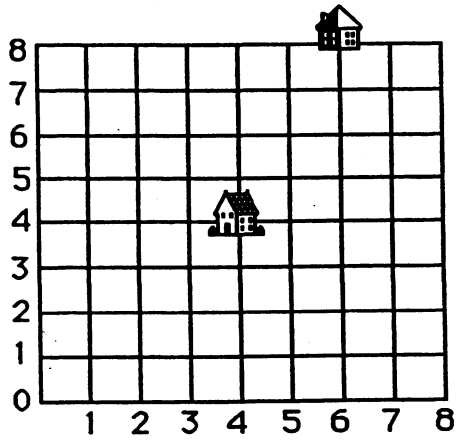
★ 2. What is the least three-digit number with a 3 in the tens place?

Answer:____ ____ ____

★★★★ 3. Below is a grid that represents Tracy's neighborhood. Each line is a street. The school is located at point (4,4) and Tracy's house is located at (6,8). Tracy only walks *down* a block or *to the left* a block when going to school.

How many different ways can Tracy walk to school if he never goes more than 6 blocks?

Answer: ____ ways



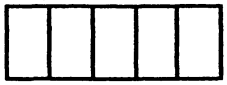
★★★ 4. Circle the measurement you would use for these items: (mL = milliliter; L = liter)

a. fish tank	5 mL	or 15 L
b. medicine dropper	1 mL	or 1L
c. liquid soap bottle	70 mL	or 70 L

★★★ 5. Darrell and Sara went to the library. On the table, there were twice as many art books as history books. There were two fewer history books than music books. There were four more music books than science books. There were four science books. How many books were on the table?

Answer:_____books

★★★ 6. How many rectangles are in the figure?



Answer: _____ rectangles

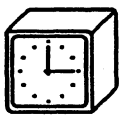
★★ 7. A strategy to add numbers mentally is called *compensation*. You change one number to make it easy to use, then change the answer to *compensate*. This is how Abraham would add 39 + 15:
"39 is 1 less than 40. 40 + 15 = 55. 1 less than 55 is 54."

Practice these problems. You will be asked to work a problem mentally when you turn in your paper.

49 + 18 = 27 + 29 = 39 + 43 = 56 + 29 =

Answer for the problem given later: _____

★★★ 8. Name a time when the hands of a clock form a right angle. Name a time when they form an acute angle. Name a time when they form an obtuse angle.

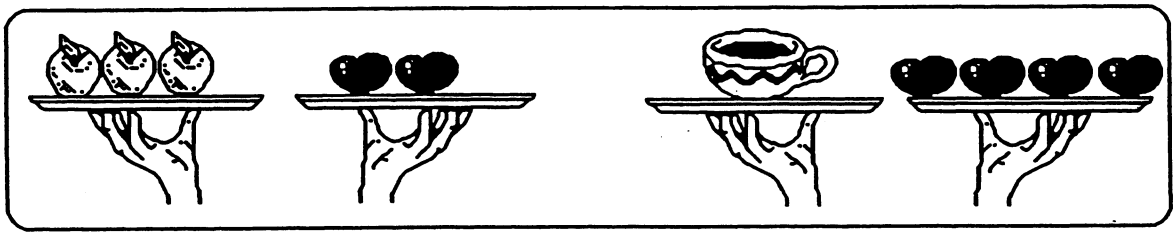


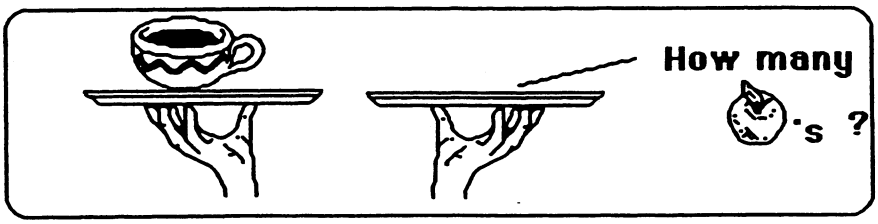
Answer: A right angle is at: _____

An acute angle is at: _____

An obtuse angle is at: _____

★★★ 9. For a waiter, 3 apples balance with 2 tomatoes. Also, 1 cup of soup balances 4 tomatoes. How many apples balance with 1 cup of soup? Draw them on the empty plate.





SUNSHINE MATH - 3
Mars, XIX

Name: _____

(This shows my own thinking.)

★★ 1. Find the missing numbers in the number sentences below.

a. $164 + x = 259$ b. $357 - y = 259$

Answer: a. $x =$ _____

b. $y =$ _____

★★★ 2. Tara's age is twice Sally's age. Joan is twice Tara's age. Tara is 12 years old. How old are Sally and Joan?

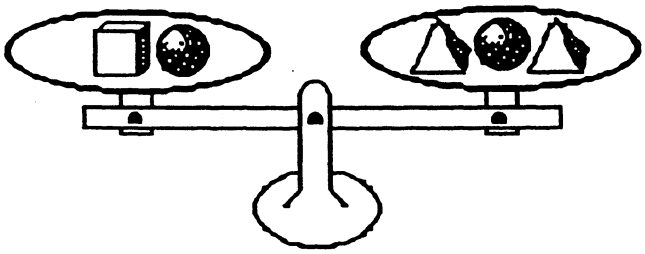
Answer: _____ Sally's age

_____ Joan's age

★★ 3. Mike is buying boxes of popcorn for himself and his friends at the movie theater. Each box of popcorn is $1.25 plus 7¢ tax. How much does Mike spend on 3 boxes of popcorn?

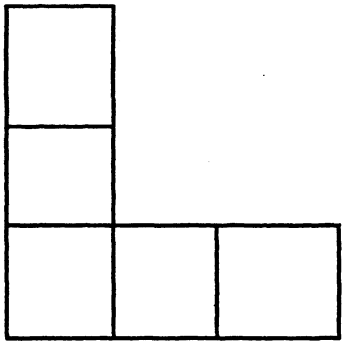
Answer: $_____

★★ 4. Which is heavier, a box or a pyramid?



Answer: A _____ is heavier.

★★★★ 5. How many rectangles are in this figure? Lettering them and listing them will help you find all the rectangles.



Answer: ____ rectangles.

★★ 6. Use the digits 2, 4, 6, and 8 to complete the two number sentences below. Use each number only once in each sentence. Find the number sentence with the greatest sum. Find a number sentence with the least sum. Write the numbers in the boxes.

□□ + □□ = _____ (greatest)

□□ + □□ = _____ (least)

★ 7. Tamika has a secret number. If you subtract her number from 16, the answer is the same as when you subtract 4 from 12. What is Tamika's secret number?

Answer: _____

★★★★ 8. Sergio played a game with bean bags on the playing mat to the right. He added the numbers from 3 throws to get his score. Each bag landed on a different number. His score was 101. On what 3 numbers did his bags land?

Answer: _____, _____, _____

5	12	26
35		18
9	40	17

SUNSHINE MATH - 3
Mars, XX

Name: _____

(This shows my own thinking.)

★ 1. Shayna needs some string to tie up 7 balloons. For each balloon she needs 24 inches of string. Should Shayna buy a 150-inch roll of string or a 200-inch roll?

Answer:_____

★★ 2. There were seven brothers and sisters in the Smith family. Five of them went to the theater while the rest stayed home. What fraction of the brothers and sisters went to the theater? What fraction stayed home?

Answer: _____ went to the theater; _____ stayed home.

★★★ 3. Rebecca and her brother together ordered a burger and fries, a Jr. salad, and two Cokes. How much money did they spend?

Answer: _____

MENU

Served with fries:

Burger	Grilled cheese	Chicken
$3.50	$2.95	$4.50

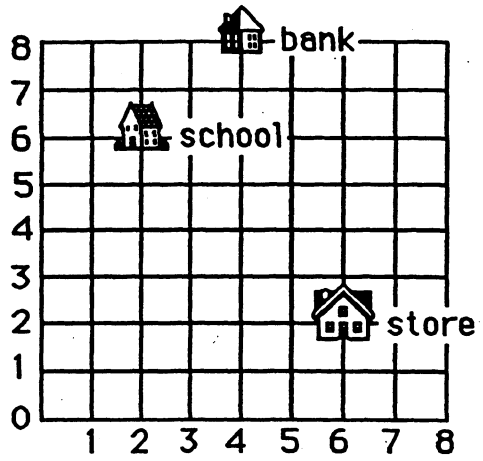
Jr. Salad	Beverages
$2.95	$0.75

★★★★ 4. Amanda bought 8 stickers for her sticker book. She bought at least one of each kind. She paid $0.42 for the stickers. What combination of stickers could she buy?

Answer: ____ animal; ____ sports; ____ space

Stickers	
Animals	6¢
Sports	7¢
Space	4¢

★★★ 5. Name the building located at each numbered pair:



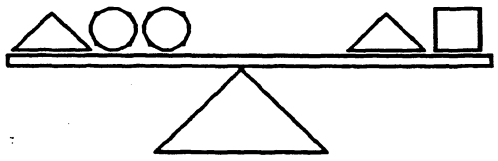
Answer: a. (2, 6) _____ b. (6, 2) _____ c. (4, 8) _____

★★★ 6. Circle the measurement you would choose for the following items:

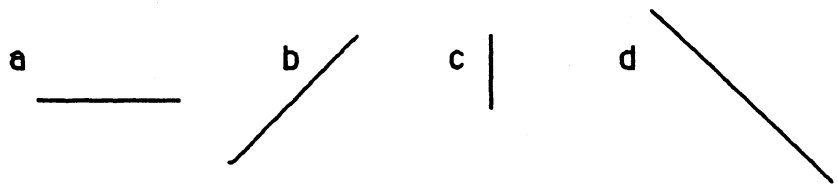
a. bag of potatoes	5 oz or 5 LB
b. a slice of cheese	1 oz or 10 LB
c. large dog	70 oz or 70 LB

★★★★ 7. The triangle weighs 5 ounces. The square weighs 4 ounces. How much does each circle weigh?

Answer: _____ ounces



★★ 8. Order the line segments from shortest to longest without measuring.



Answer: _____

SUNSHINE MATH - 3
Mars, XXI

Name: _____

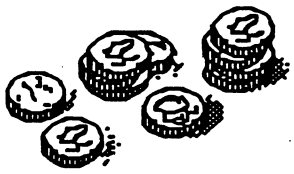
(This shows my own thinking.)

★ 1. Todd has a number riddle for Bill. Solve it.

I am an odd number. I am greater than the sum of 6 and 9. I am less than the sum of 9 and 9. What number am I?

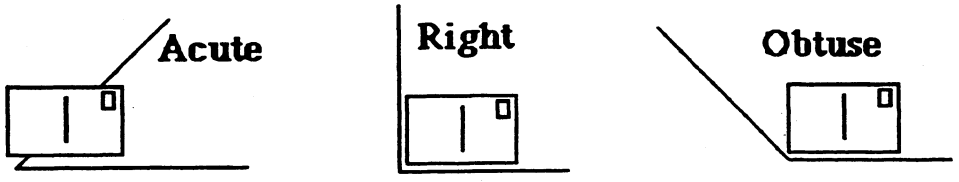
Answer: _____

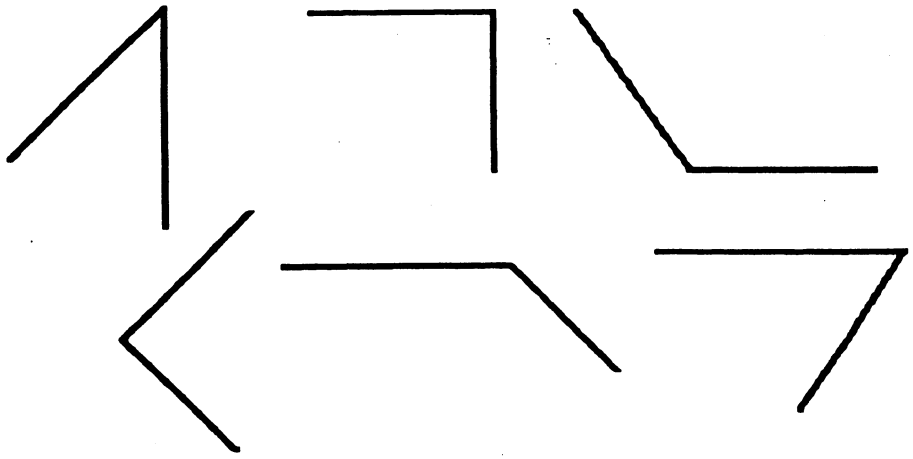
★★ 2. Maria had 28 pogs. Her brother, José, had 12 pogs. Maria gave some of her pogs to José. Now they have the same number of pogs. How many pogs do they each have now?



Answer: ____ pogs each

★★★ 3. A *right angle* is exactly like the corner of a postcard. An *acute angle* is smaller than a right angle. An *obtuse angle* is larger than a right angle. Each angle is illustrated below. Study them a while and then write inside the angles: *acute*, *right*, or *obtuse*.

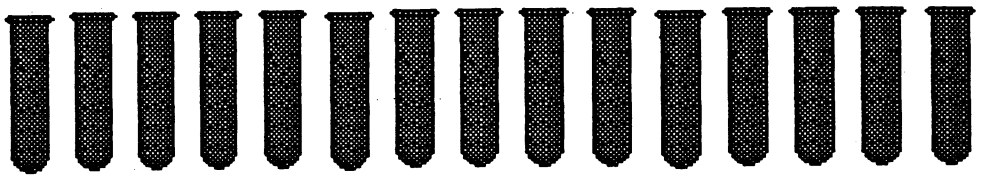




★ 4. Find the missing number in this number sentence. Write the number in the box.

$$634 - \square = 509$$

★★ 5. Circle the best estimate of the total number of milliliters in all these test tubes. Each test tube holds 59 milliliters.



Answer choices:

a. 59 milliliters b. 60 milliliters c. 1000 milliliters d. 900 milliliters

★★★★ 6. Mr. Brown is building 6 shelves in his garage. Each shelf is 8 feet long and costs $2 per foot. He buys 12 brackets to hang the shelves for $2 each. How much does he spend for his shelves and brackets?

Answer: _____

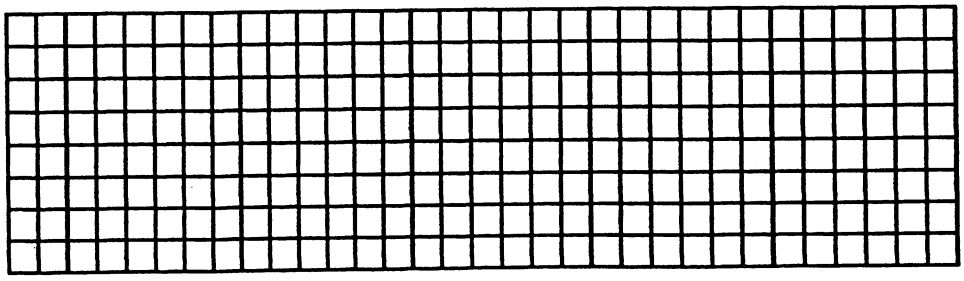
★★★ 7. What digits would make the sentences true? List each possible number.

a. $562 > 5\square 2$ Answer: _____

b. $385 < 38\square$ Answer: _____

c. $472 = \square 72$ Answer: _____

★★★ 8. Make 3 rectangles or squares that have a perimeter of 20 units. The *perimeter* is the distance around the edge of a shape. Shade your shapes so that they can be seen easily.



SUNSHINE MATH - 3
Mars, XXII

Name: _____

(This shows my own thinking.)

★★★ 1. Watch how Marcus divides in his head:

To do 24 ÷ 2, I follow these steps:
1st: 20 ÷ 2 = 10
2nd: 4 ÷ 2 = 2
3rd: 10 + 2 = 12
So 24 ÷ 2 = 12

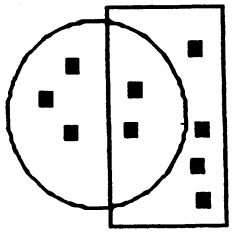
Practice these problems the way Marcus does them. You will be asked to solve a division problem mentally when you turn in your paper.

84 ÷ 2 = 43 ÷ 2 = 36 ÷ 2 =

Answer for later problem: _____

★★ 2. Draw a figure with 8 sides and 8 angles.

★★★ 3. How many squares are inside the circle?



Answer: _____

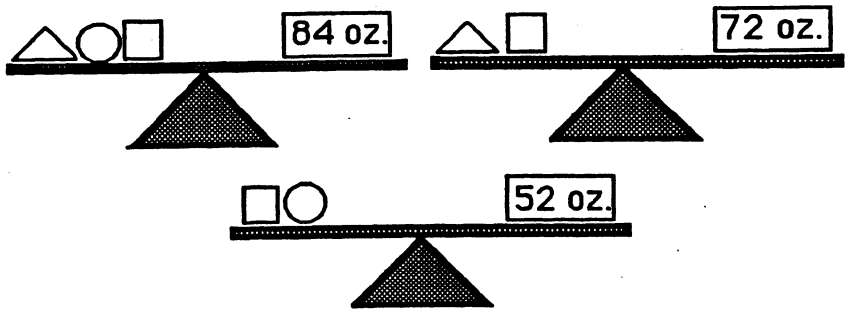
How many squares are inside the rectangle?

Answer: _____

How many squares are inside the circle *and* rectangle?

Answer: _____

★★★★ 4. How much does each item weigh?



Answer: Triangle: ____ oz. Square: ____ oz. Circle: ____oz.

★ 5. Matthew brought paper cups for the class party. He used 12 for juice, 17 for soft drinks, and 5 for milk. How many cups did he use?

Answer:_____cups

★★★★ 6. Amberly's mother said she could order one sandwich and one drink from the menu. How many different combinations can Amberly order?

Sandwiches	Drinks
Hamburger	Iced tea
Reuben	Soft drink
Grilled cheese	Milk

Answer:_____

★★ 7. The third grade class needs to make cocoa to serve 36 people. How many cups of milk will they need?

Answer: _____ cups

Party Cocoa
18 servings

1 cup cocoa	2 cups water
1 cup sugar	12 cups milk
pinch of salt	18 marshmallows

★★ 8. At Wright Elementary, many children walk to school. Janie walks $\frac{1}{2}$ mile. Katie walks $\frac{1}{3}$ mile. Joshua walks $\frac{1}{4}$ mile. Who has the longest walk?

Answer:_____

SUNSHINE MATH - 3
Mars, XXIII

Name: _____

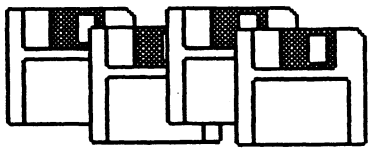
(This shows my own thinking.)

★★ 1. Find the missing digits in each problem. Write the numbers in the boxes.

a.
$$\begin{array}{r} 2\,\square\,4 \\ +\,\square\,6\,\square \\ \hline 7\;2\;1 \end{array}$$

b.
$$\begin{array}{r} 7\,\square\,1 \\ -\,\square\,4\,\square \\ \hline 8\;6 \end{array}$$

★ 2. Mrs. Smith is trying to organize her computer disks. She has 46 disks to place in boxes. Each box holds 10 disks. How many boxes does she need to store her disks?



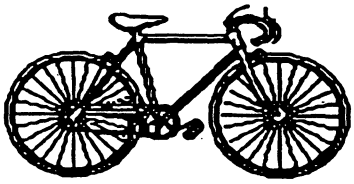
Answer: _____ boxes

★★★ 3. John has drawn the stars below. He has asked you to find what fraction each type of star is of the whole group of stars.

Answer: _____ White star _____ Striped star _____ Shaded star

★★ 4. Bill was staring across the street where bicycles and tricycles were stored. He counted a total of 13 wheels. How many bicycles and tricycles were in the lot?

Answer: ____ bicycles and ____ tricycles.



★★ 5. What is another answer for problem 4?

Answer: ____ bicycles and ____ tricycles.

★★ 6. A flowchart is used to record steps to finish a task. Place the steps below in the correct order to write a letter to a friend. Place the correct number in each box of the flowchart.

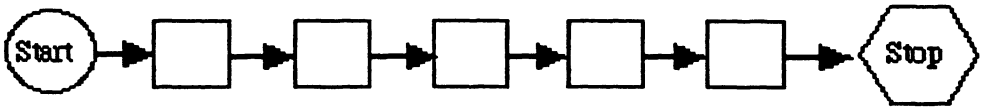
(1) Sign the letter

(2) Write the letter

(3) Mail the letter

(4) Close the letter (*Yours Truly,*)

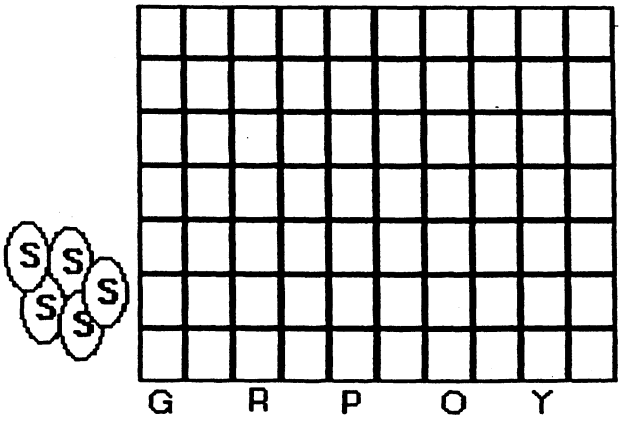
(5) Write the greeting (*Dear ...*)



★★★ 7. Bob has opened his book about motorcycles. When he added the numbers of the two pages together, the sum was 69. To what two pages was the book opened?

Answer: _____ and _____

★★ 8. Patty and her friends bought a bag of Skittles. They recorded the number of each color on a graph for a project. They found 6 green (G), 5 red (R), 4 purple (P), 7 orange (O), and 3 yellow (Y). Use their numbers to make a graph.



SUNSHINE MATH - 3
Mars, XXIV

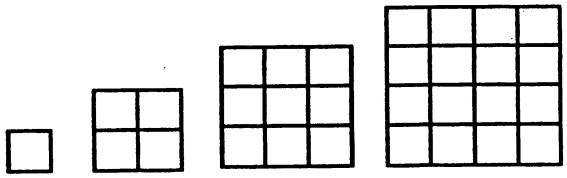
Name: _____

(This shows my own thinking.)

★★ 1. Write the number in the box that will make the sentence true.

$$3 \times \square + 6 - 4 = 20$$

★★ 2. Look at the pattern below. How many small squares would make the next largest square?

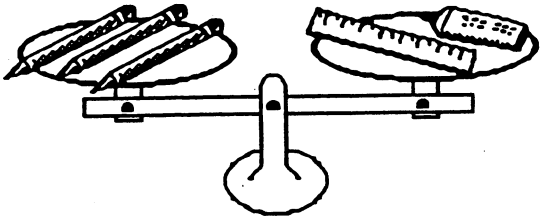


Answer: _____ squares

★★★ 3. Mia weighs 75 pounds. Her mother weighs 132 pounds, and her father weighs 184 pounds. The paddle boat can hold 400 pounds. Can Mia and her parents ride at the same time?

Answer:_____

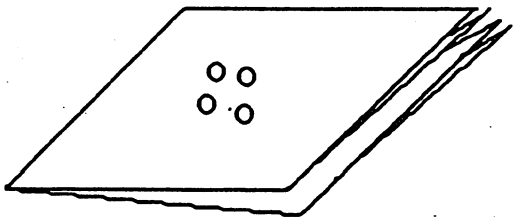
★★★★ 4. Each pencil weighs 3 ounces. What could the ruler and the glue weigh? Find as many solutions as you can. Fill in the chart.



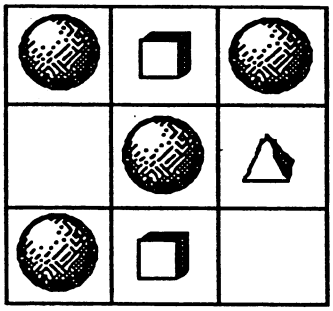
ruler	glue

★★★ 5. Fold a piece of paper in half twice. Punch 4 holes in the center. How many holes are in the paper when unfolded?

Answer: _____



★★ 6. Look at the pattern in the puzzle. Complete the puzzle with the correct shapes.



★★★ 7. Watch how Marcus adds when one number ends in 9:

To add 48 and 39, first notice that 39 is real close to 40, and 40 is easy to add. So I turn 39 into 40 by adding 1. Then I add 48 + 40 in my head to get 88. Now I subtract 1 from 88 since I really had 39 to add instead of 40. So 48 + 39 is 87.

You will be asked to add a problem in your head when you turn in your paper. Practice on these:

29 + 67 38 + 19 39 + 25 34 + 49

Answer for later problem:_____

★★★ 8. Write a decimal and a fraction for each part of a dollar below:

a. one cent: _____ _____ c. one nickel: _____ _____

b. one dime: _____ _____ d. one quarter: _____ _____

SUNSHINE MATH - 3
Mars, XXV

Name: _____

(This shows my own thinking.)

★★ 1. Find the value of ■ and ▲. Use the two number sentences below for clues.

■ + ■ + ▲ = 12 and also ▲ + ▲ + ■ = 15

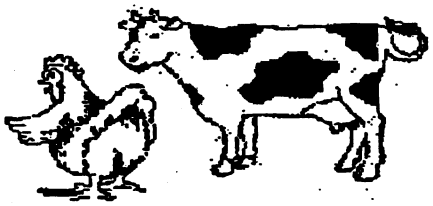
Answer: ■ is _____ ▲ is _____

★★★ 2. Write the answers in the _____ in each sentence below.

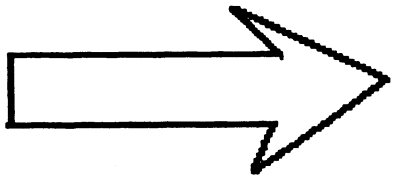
a. Paul saw 5 chickens and 6 cows.
He saw _____ legs in all.

b. Sue counted 26 legs.
She saw 4 cows and _____ chickens.

c. Pam counted 40 legs.
She saw _____ cows and 8 chickens.



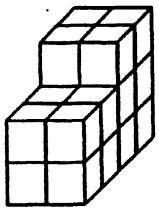
★★ 3. Estimate the length of the arrow in centimeters. Then measure the arrow with a ruler. Record both answers.



Answer: Estimate: _____ cm

Actual: _____ cm

★★★ 4. Count the cubes to find the *volume* of the steps. Remember there are some cubes you cannot see.

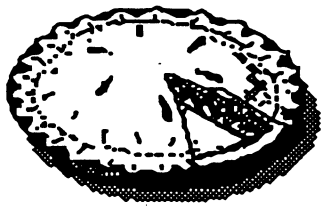


Answer: The volume is _____ cubes.

★ 5. Study the sequence and fill in the missing numbers.

1, 7, 5, 11, 9, 15, 13,_____, _____, 23, _____

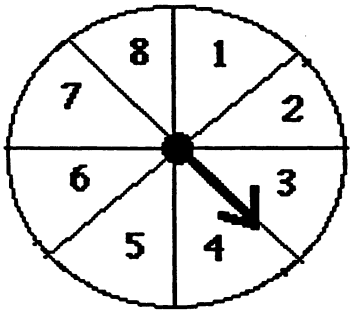
★★★ 6. Pam's mother baked a pie for her family. It was divided into 6 pieces. Pam's Dad ate $\frac{1}{2}$ of the pie. Mom ate $\frac{1}{3}$ and Pam ate $\frac{1}{6}$ of the pie. How many pieces did each person eat?



Answer:

Dad:____ pieces; Mom:____ pieces; Pam:____ pieces.

★★★ 7. This spinner is divided into 8 parts. Sally and her friends are going to use it to play "Spin the Sum." Study the spinner and the questions. Write your answer as a fraction:

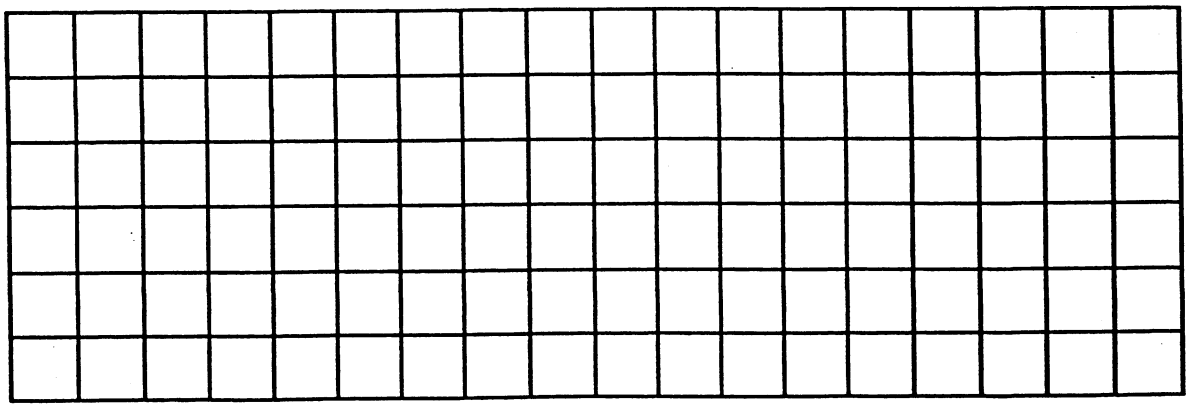


a. What are the chances of getting a spin higher than 4? ☐

b. What are the chances of getting a spin higher than 6? ☐

c. What are the chances of getting a spin lower than 4? ☐

★★★ 8. Make 3 rectangles with different lengths and widths. Each rectangle should have an *area* of 24 ☐'s.




ANSWERS

Commentary

Mars, I

1. **(8)** Most students will first add the two groups of marbles they have, 3 and 2, to get 5. The students can then subtract 13 - 5 to find the missing marbles, or use the *counting up* method from 5 to 13.

2. **(95)** The student can use coins to count out the change: 25, 50, 75, 85, 90, 95. The values of each coin can be added for the total: 3 quarters = 75 cents; 1 dime = 10 cents; and 2 nickels = 10 cents, so 75 + 10 + 10 = 95 cents.

3. **($30)** The student can add $7.50 four times or group by two sums of $15. Counting the money like change could be used: $7.50, $15.00, $22.50, $30.00. This leads to the concept of multiplication -- some students might even perform $7.50 X 4 on their calculator.

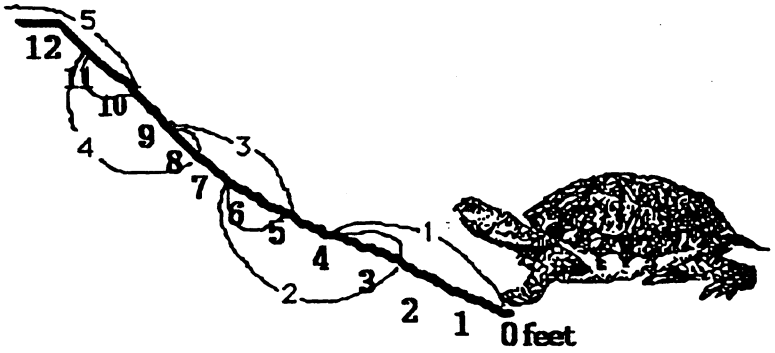
4. **(12, 9, 14)** The repeating pattern is to **add 5**, then **subtract 3**. Once discovered, the student should check to see if the pattern continues on the next few numbers. It does, so they would conjecture that the next three numbers are obtained by: *7 + 5 = 12; 12 -3 = 9; 9 + 5 = 14.*

   Notice that there is no way for the student to be sure they have discovered a pattern that always holds true; also note that students might discover another pattern that would give the numbers 1, 6, 3, 8, 5, 10, and 7, thus arriving at different numbers than 12, 9, and 14.

5. **(15)** The student can *count up* from 8 to 12, or solve 12 - 8 to find that ✻ = 4. Then the student substitutes 4 for the ✻ in ✻ + 11. So, 4 + 11 = 15.

6. **(13)** There are 12 people (6 + 6) in the movie ticket line, excluding Sue. When Sue is counted in the line there would 12 + 1 or 13 people.

7. **(5)** The student can physically mark the turtle's progress and slides to get to the top.



8. **(Tom, Sally, Maria, Bob)** Drawing a picture as each clue is used is a way for the student to find the students places' from tallest to shortest:

Tom is taller then Sally:	Tom Sally
Sally is taller than Bob:	Tom Sally Bob
Maria is taller than Bob but shorter than Sue:	Tom Sally Maria Bob

Commentary

Mars, II

1. **(7, 0, 17, 8)** Students can subtract 7 from the number in column A to get the number in the column B. Students must reverse the thought process to do the last part. The number in B is given, so they must ask themselves "What number, if I subtracted 7, would give me 1."

2. **(59)** Give the students this problem posted where several can read it at one time:

   $\boxed{34 + 25 = ?}$

   and have them write only the answer on their paper.

3. **($0.22)** The class would have to buy 3 small packages of napkins which would cost $2.97. Most students will find this number by adding 99¢ three times, but some might multiply on a calculator. In either case, they must then subtract $2.75.

4. **(15)** Students might first label the two sides of the patio for which they know the length. That would be 20 feet of the 50-foot perimeter. Then students would subtract 20 feet from 50 feet and realize they have 30 feet left for the other two sides. They will use various methods to divide 30 feet into two equal pieces.

5. **(300)** 8 feet is not a reasonable length for a home run. 2,500 feet is also not reasonable, as a mile is about 5,000 feet, so 2,500 feet is about 1/2 mile. 300 feet is reasonable. That's the length of a football field.

6. **(6-3-5-6-2-3-1-2-5 is one solution)** All successful solutions have these in common: they either start at 6 and end at 5, or start at 5 and end at 6. That's because 5 and 6 are the only places in this network that have an odd number of paths going in and coming out.

7. **(a. 3; b. 1)** The area for 3 is twice as much as that for 2, so 3 is twice as likely as a landing for the spinner. The area for 1 is also bigger than the area for 4, as there are three equal sized pieces that make up 1 and only 2 pieces for 4.

8. **(32)** It will help if students make a list or complete a chart for this problem. If so, they will likely notice that the number of children is doubling each day. Therefore on Thursday there would be 16, and on Friday there would be 32.

Commentary

Mars, III

1. **(26)** The student can count up from 19 to 45, or subtract 19 from 45 to get 26.

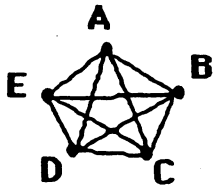
2. **(7:00)** A clock for hands-on exploration would assist the student in adding 30 minutes to find 6:45, then adding 10 minutes to find 6:55, and adding 5 minutes to reach 7:00 AM.

3. **(21)** The student can add 3 groups of 7 or use the multiplication fact, $3 \times 7 = 21$.

4. **(No)** The student could start at \$1.25 and count the change left if buying only the crayons. If 75¢ is left, then the paste for 79¢ would make the cost over \$2.00. Most students will simply add \$1.25 and \$0.79 and realize that \$2.04 is more than Drew has.

5. **(21)** The pattern involves adding one more at each step than the step before. Start with 1 on Monday, then add 2 to get Tuesday's total, then 3 for Wednesday's total, then add 4 for Thursday and 5 for Friday, and finally 6 for Saturday. The total is 21.

6. **(10)** This problem resembles the handshake problem. It can be solved by assigning the 5 teams a letter or number and drawing a picture that shows team A plays B, C, D & E; Team B plays C, D, and E (they've already played A). Team C plays D & E as they have already played A and B. Team D plays E. Then the games are added: $4 + 3 + 2 + 1 = 10$. Repeated work with this type of problem shows a pattern in the solutions.



AB BC CD DE
AC BD CE
AD BE
AE

7. **(5 coins; 1 quarter, 1 dime, 1 nickel, and 2 pennies)** Some students may choose 4 dimes and 2 pennies (6 coins) to make 42¢. Extra work with using quarters in change will increase their skill with the least amount of coins in making change.

8. **(The answers are shown below.)** Using the concepts of counting up, counting back, or addition and subtraction sense, the missing numbers can be found. Problems B & C involve regrouping ones and tens.

A	B	C
23	54	65
+ 46	+ 27	+ 73
69	81	138

Commentary

Mars, IV

1. **(40)** Students will need good spatial skills to be able to count the cubes that aren't visible, or the students might actually build such a set of steps and count the cubes they use.

2. **(8; +; + or -)**

3. **(25)** The pattern is that the numbers increase by five each time: 5, 10, 15, ... The next two numbers would be 20 and 25.

4. **($15)** There are a number of ways students will solve this problem. One is with a calculator, adding $2.50 six times or possible multiplying $2.50 by 6. Another is that they might add $2.50 plus $2.50 to get $5, and then add $5 three times.

5. **(37)** Students might add the two sides then subtract from 96. Or they might subtract one side from 96, then the other side from the difference. If students have trouble with the problem, encourage them to label the sides of the triangle shown with the two numbers given.

6. **(13)** Students might count by twos for the dark candles, then count by ones for the light candles.

7. **(a. John, Mary, Sue, and Tom; b. 15; c. Mary and Sue; d. 7)** The problem involves reading and interpreting a bar graph.

8. **(girl)** Since the girls have 3 of the equal-sized areas on the spinner and the boys have 2, the girls have more area on the spinner. Therefore the girls have a better chance of winning. There's a 3/5 or 60% chance a girl will win any spin, and a 2/5 or 40% chance that a boy will win.

Commentary

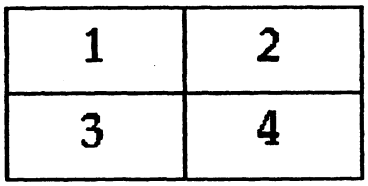
Mars, V

1. **(5,738)** The purpose of this problem is for students to unscramble the place values before writing the answer. Students can use a place value chart to check their number.

2. **($\frac{5}{12}$)** There are 12 marbles in the bag. Since there are 5 red marbles, then there is a 5 in 12 chance of pulling out a red marble. "Five in twelve" can be written as the fraction $\frac{5}{12}$.

3. **(7)** The 2 absent students can be removed from 30, which leaves 28. Then the situation becomes a division problem: 28÷ 4 = 7. The student could use counters or marks to "act out" the last part of the problem -- taking 28 counters and removing them in groups of four, asking *how many groups are removed* -- as many students will not have met division yet..

4. **(9)** Numbering the small rectangles provides an organized way to count them.



1 big rectangle - 1&2&3&4
4 small rectangles - 1, 2, 3, 4
4 medium rectangles - 1&2, 3&4, 1&3, 2& 4

5. **(25)** Students might write the numbers less than 40 as they count by 5: *5, 10, 15, 20, 25, 30, 35* . The sum of the digits adding to 7 means that 25 is the number.

6. **(6)** From the top left scale, taking half of each side means that 2 marbles balance 1 tape dispenser. So 2 marbles can be substituted for the tape dispenser in the top right scale, giving that 2 marbles balance 4 pencils. This means each marble balances 2 pencils. Therefore 3 marbles balance 6 pencils. This type of thinking is a precursor to algebraic thinking in that students gain an intuitive notion of substituting equal quantities for other quantities, multiplying or dividing both sides of a balanced situation by the same amount, and so on.

7. **(3)** Dan has $3.00 left to spend ($20.00 - $17.00). Each disk costs 90¢ which is almost a dollar each. So the student reasons he can get 3 disks with the remaining $3.00. The more advanced student might multiply $0.90 times 3 which is $2.70.

8. **(5 measures long; 4 measures wide)** (Paper size being 8 1/2 inches by 11 inches.) Students might mark the length on a piece of paper and use it to measure. Making a small mark at the end of each measure will help them count the number of times they measure.

Commentary

Mars, VI

1. **(8)** Students might find this answer by drawing pictures of hot dogs and labeling each one "2 ounces", and counting by twos until they reach sixteen. The problem also relies on students knowing that 16 ounces is one pound -- many third graders might have to be told this.

2. **(7 + 5 - 9 + 3 = 6 is one solution)** Students can try writing the numbers and signs on small pieces of paper or index cards, and moving them around until they reach a solution. They might try lining up the numbers in a certain order, and just manipulating the signs to see if they can get a number sentence that works. If not, change the order of the numbers and try again.

3. **(83,472)** The problem has students unscramble the order of the numbers given, according to place value.

4. **(28)** The pattern involves increasing the number of cookies by four, for each new grade level.

5. **(40)** The problem tests students' number sense, in that 400 is far too many students for a school bus, and 4 is obviously too few. Therefore 40 is the only reasonable number.

6. **(26)** The four sides can be added together and that sum subtracted from the perimeter. Some students might prefer to subtract each number in turn from the perimeter.

7. **(The figure is shown below.)** The repeating pattern involves adding another vertical line to the circle, and then another horizontal line to the circle, each time you move to the right.

8. **(llama)** There are 4 llama cards and 2 giraffe cards out of the 13 in the box. This problem does not ask directly what is the probability of pulling each card out of the box, but gives a hint that there is some mathematical basis for such a question. The chances of pulling out a llama card is 4/13, while the chances of pulling out a giraffe card is 2/13.

9. **(6)** The problem involves several steps, and is a precursor to algebraic thinking. Students know a hat weighs 3 pounds from the scale on the right. On the scale to the left, the two hats would then weigh 6 pounds out of the 18 total, leaving 12 pounds for the two rabbits. Each rabbit then weighs 6 pounds. In later grades, equations such as "$2r + 2h = 18$ and $h = 3$" might be used to show the existing situations, and students would solve the equations for r.

Commentary

Mars, VII

1. **(3)** The first number in each pair is 4 times the second number. Students who have mastered their multiplication facts might have discovered this pattern. Other students might be having trouble if they are looking for an addition or subtraction relationship.

2. **(9)** Some students might choose to draw marks or use counters. If so, they will find that 8 boxes are needed for 48 golf balls, with 4 balls left over. This means a ninth box is needed.

3. The student should first add to find the sum of the diagonal which has all three numbers showing. Then each box can be solved by adding the two numbers and subtracting to find the missing number. See the magic squares below:

6	1	8
7	5	3
2	9	4

12	7	14
13	11	9
8	15	10

4. **(9, 5)** The *guess and check* method is one that can be used. A quicker method is to think of the fact families of 14. Then you look for a difference of 4 between the numbers. The numbers 9 and 5 meet both conditions.

   $7 + 7 = 14$ but $7 - 7 = 0$
   $8 + 6 = 14$ but $8 - 6 = 2$
   $9 + 5 = 14$ and $9 - 5 = 4$ √
   $10 + 4 = 14$ but $10 - 4 = 6$

5. **(28)** Students should be encouraged to approach this problem in an organized way. For example, they might count all of the small rectangles first, those made by the individual lines, and get 7. Then they count all the next larger size, those formed by putting two small rectangles together -- this gives 6. They proceed in this fashion, finding 5 of the next size, 4 of the next, then 3, 2, and 1, which is the whole card itself.

6. **(7)** Either *guess-check-revise* or *work backwards* strategies can be used to find the starting number. With *working backward*, you would ask yourself "What number multiplied by 3 gives 30?" The answer is 10. You would then ask "What number, less 4, gives 10?" The answer is 14. Finally, "What number, when 7 has been added, gives 14?" The answer is 7.

7. **(6)** Once students organize their plan, finding these 6 numbers will be easy.
   Starting with the 2 as the hundreds digit : 234, 243
   Starting with the 3 as the hundreds digit: 324, 342
   Starting with the 4 as the hundreds digit: 423, 432
   The condition of using each number only once limits the number to 6.

8. **(20, 10, 20)** Students with good number sense can intuitively find half of numbers such as 40 and 20 at this time. Other students might need to actually make 40 or 20 marks on a sheet of paper, or work with cubes or other concrete materials to represent the beads, and divide them into two piles with the same amount in each.

Commentary

Mars, VIII

1. **(b)** The given picture shows a rectangle that is one-half of the square. In (b) the half-circle is one-half of the circle. In (a) and (c), the two shapes are not similar and their areas are not in the same relationship as in the given figure. However, if students choose (a) or (c), listen to their reasons -- they might have used some other logical reason for selecting them.

2. **(The chances are the same that she'll pick either color.)** The question is designed to measure both the child's sense of probability, and their confidence. The confidence factor comes in because the question is asked in such a way that they think they should answer with one particular color.

3. **(356)** The challenge is for the student to put the place values in the correct relationship, before finding the total. Most textbooks show pictures like this, but the tens and hundreds blocks have already been placed in their correct, left-to-right order.

4. **(10)** The students can count by 20's, and get to 80 books on 4 shelves. Therefore 10 books, the difference in 80 and 90, will not have a shelf.

5. **(12 rose and 8 holly bushes)** Students might draw a picture of the nature trail, and sketch and label the five bushes at each stop. They would continue until they have 20 bushes in all, then go back and count the rose and holly bushes separately. Making a chart is another way for students to organize this information.

6. **(25)** Students might make such stacks using index cards or some other manipulative. They can then see physically why the answer is 25. This problem is a physical introduction to the concept of the *mean.*

7. **(first row: 5 4 9; second row: 10 6 2; third row: 3 8 7)** Students can begin this magic square by finding the sum along the diagonal which is complete -- 18. Then they look for rows and columns for which there is one missing number, and knowing the sum must be 18, they can find that number.

8. **(4)** Some students will not know a key fact here, which is that 1 kilogram is 1,000 grams. Once they have been reminded of this, they might think of 251 grams as 250 grams, since the problem involves an estimation. Then 250 and 250 is 500, and another 500 would be 1000. Therefore four cans of soup would be about 1000 grams, or 1 kilogram.

Commentary

Mars, IX

1. **(5)** *Working backwards* is one strategy to use. The student asks, "What number, when I subtract 3, leaves 17?" The answer is 20. Continuing, the student asks, "What number multiplied by 4 gives 20?" The answer is 5. By *working backward* the student arrives at 5.

2. **(a. >; b. >; c. <; d. =)** If students compute on both sides of the box, they'll find in (a) that they get 65 on the left and 61 on the right. For (b), they get 20 and 18, for (c) they get 14 and 23, and for (d) they get 8 and 8.

3. **(4)** The student needs to subtract the 68 students that ride the bus from the total of 84. That leaves 16 students to ride in cars. Since 4 students can ride in each car, counting by 4's will show that four cars are needed.

4. **(at least 9)** This problem can be solved by multiplying 4 x 2, or adding 2 four times, since the doorbell rang 4 times and 2 friends arrived at each ring. But the student must remember to add Gina herself to the 8 friends, so there are at least 9 people at the party -- there may be more than 9 since Gina might have someone else at her home that attends the party.

5. **(43)** The perimeter is found by adding all the sides together. So 8 + 9 + 2 + 14 + 10 are added together to find 43 feet.

6. **(6)** The student needs to substitute 3 ✈'s for each ☎. So ✂✂ = 12 ✈'s. Since there are 2 ✂'s, then each ✂ is worth 6 ✈'s.

7. **($9.00)** The student should use subtraction since the cost of the game is given. The cost is taken from the total spent ($28 - $19 = $9).

8. **(65)** The student can use the number Bill picked -- 23 -- to find Joe's total since Joe picked 8 less (23 - 8 = 15). Tom picked 12 more than Joe's 15, so Tom picked 27 oranges. Adding all of these together gives 65.

Commentary

Mars, X

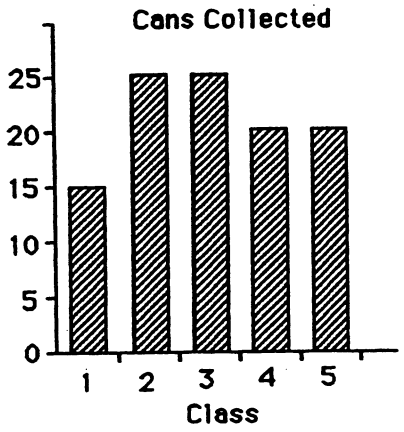
1. **(2/13; 5/13)** It might help students to draw the correct number of each shape mentioned, then look at them as parts of a total set. 2 figures out of 13 figures are squares; 5 figures out of 13 are circles.

2. **(c)** The figures can be traced and then cut out of paper, for students to set how (c) folds into a box. Students who can do this problem without such an aid have very good spatial sense.

3. **(4; 7)** Line segments do not include curved lines. Therefore 2, 3, and 5 are eliminated.

4. **($2.25)** The problem tests a student's number sense and knowledge of the real world. $10.25 would be too much for twelve pencils -- that would be almost $1 per pencil. Likewise, 10¢ is too little -- that would be less than a penny per pencil. $2.25 is the only reasonable answer -- this would be almost 20¢ per pencil.

5. **(35 minutes)** Students are likely to start at 7:00 and add on a half-hour to get 7:30, and then add on the other intervals individually to arrive at 7:55 when she's through. This leaves her 5 minutes till 8:00 arrives to read, and 30 minutes after that, totally 35 minutes.

6. 

7. **(21)** The problem is an intuitive introduction to finding the mean of a collection. At this point, students will simply add the number of cans together to get 105, then use their intuition and number sense to divide 105 cans into 5 groups. One concrete way would be to make 105 marks on their paper and divide these marks fairly. A more sophisticated strategy would be to estimate that each group would have 20, which would be 100 marks altogether, then distribute the remaining five marks.

8. **(128)** Have the problem 4 x 32 written on chart paper or index cards so that several students can see it at the same time, when they turn their papers in. They have to do the problem mentally, and put their answers correctly on their papers.

9. **(8)** This problem is an introduction to the concept of *ratio*. Students might find the answer by drawing the tables and placing the right number of markers on each, until they have used up 24 markers. This would require four tables. Then they would draw 2 pieces of poster board on each table.

Commentary

Mars, XI

1. **(107; 184)** The student might subtract 288 from 395 to find the first missing number, 107. Other students might "add on" to 288, till they get to 395. Similar methods will work for the second problem.

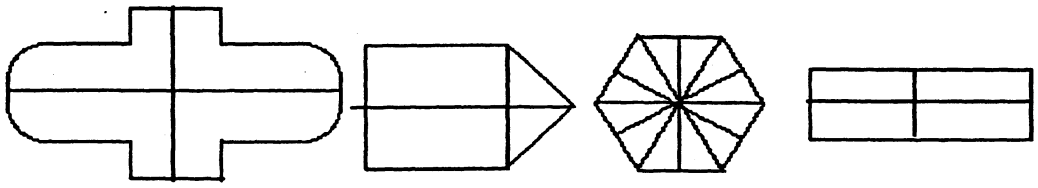
2. **(28)** Students can solve this problem by drawing a row of 35 seeds, and grouping them into sets of 5, and crossing out one seed in each group. Counting the remaining seed gives 28.

3. **(9)** The student might draw a picture to help visualize the problem, or to actually count the places for more stamps. If 3 1/2 rows are full, then 1 1/2 rows are empty. This is one empty row of 6 and another half row of 3, gives 9 more places for stamps.

4. **(5/9; 4/9)** The problem involves writing a part-whole relationship for a collection. The entire collection has 9 disks, so each part is written as a correct numerator over the denominator of 9.

5. **(22¢)** The student must first find out how much Sally spent. 32¢ can be added 4 times or can be multiplied by 4 to give $1.28. To find the amount of change, the student can count out the change with real or play money, or subtract ($1.50 – $1.28 = $0.22).

6. **(There are 11 lines of symmetry as shown below .)**



7. **(5; 2)** The student can draw pictures of tables and count the chairs. Since all tables hold at least 4 people, there can be no more than 8 tables since 8 groups of 4 is 32. But 8 is an even number, so there can be no more than 7 tables. Check and see if it's possible to have a combination of 4- and 6-person tables that total 32 chairs. Seven 4-person tables would be 28 chairs, so take the extra 4 chairs and turn 2 of the tables into 6-person tables, and the problem is solved.

8. **(77)** The pattern of dots is shown below:

dots:	5	9	14	20	?	?	?	?	?	?
figure:	1	2	3	4	5	6	7	8	9	10 ...

The pattern involves adding successive numbers -- 4, 5, 6, 7, etc. -- each time to get the number of dots for the next figure.

Commentary

Mars, XII

1. **(56)** Some students will add 22 and 22 and then 12 more, and others will add 12 to 22 first, and then add 22 and 34.

2. **(21; 14)** Students might draw a diagram of trees and label the birds, and count up until they have 35 birds. This would be in the seventh tree. Then they could count the types of each type of birds in the seven trees. Another method is to make a chart that shows the ratio, such as the one started to the right.

M	C	total birds
3	2	5
6	4	10
9	6	15
.	.	.

3. **(100)** Give the problem 4 x 25. If students think of this as money, as they were encouraged to do, this would represent 4 quarters, which they should know is 100 cents or 1 dollar.

4. **(no; yes)** Students will need to add 35¢ and 25¢ to get the amount that Jamie needs -- 60¢. He doesn't have that much. But that total plus another 5¢ would be 65¢ to buy all three items, and Katie has more than enough.

5. **(26)** Students might work with real or play coins to decide this. More advanced students might write down a list of how many coins she might have under both methods of grouping, and look for a common number.

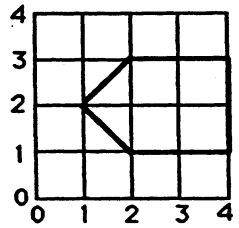
   Grouping by 4, with 2 left: 14, 18, 22, 26, 30, 34, 38, ...
   Grouping by 5, with 1 left: 16, 21, 26, ...

   No need to go any further. Since 26 is in both groups, that number of dimes suffices.

6. **(68)** Students might take an actual box, and draw a ribbon around it and label each part with the correct length. They should find that there are two 10-inch parts, two 6-inch parts and four more 6-inch parts, for a total of 56 inches. Then adding the 12 inches for the bow produces 68.

7. **(201)** Students can use logical reasoning to find this number. Since the number is less than 300, the hundreds digit is a 1 or 2. It must be a 2 so that the ones and tens digits can both be less than the hundreds digit.

8. **(pentagon)** Other students might name the shape as "arrowhead" or "sideways house," which should be accepted. The most important part of the problem is to see the correct drawing, which is shown to the right.



9. **(5 cats won)** Students' reasoning might proceed along the following lines.

   From the second picture, 2 donkeys match 6 dogs so I know that 1 donkey matches with 3 dogs, by dividing both sides in half. Then I can substitute 1 donkey for the 3 dogs in the top picture, and know that 1 donkey matches 4 cats. So in the bottom picture, 5 cats would win over 1 donkey.

   This type of reasoning is important when students begin algebraic experiences with equations.

Commentary
Mars, XIII

1. **(18, 16, 21)** The pattern involves repeatedly adding 5, then subtracting 2. Then the sequence continues as: 13 + 5 = 18; 18 - 2 = 16; 16 + 5 = 21.

2. **(6)** The student can solve this problem by an organized guess and check strategy such as below.

#	quarters	dimes	nickels	total	
3	75¢	30¢	15¢	$1.20	
4	$1.00	40¢	20¢	$1.60	
5	$1.25	50¢	25¢	$2.00	
6	$1.50	60¢	30¢	$2.40	✔

   Some students might see that 3 of each is $1.20, so 6 must be $2.40. Others might start with 1 of each coin being 40¢, and then add 40¢ six times to get $2.40.

3. **(a. Bill; b. 10; c. Tom)** The student can visually see from the pictograph that Bill has the largest collection. A student may answer 2 for how many more Alan has than Tom; but each insect is worth 5 so the answer would be 5 x 2 or 10 more. Students can visually see that Tom has half of Bill's, or they may count Bill's as 6 and look for half of that, which is 3.

4. **(3:45)** A clock can be used to *work backwards* to the time he got home. He walked the dog for 30 minutes, and 30 minutes before 5:00 is 4:30. Counting back 45 minutes from 4:30 might be done in stages, first counting back by 30 minutes to get to 4:00, then 15 more minutes before 4:00 would be 3:45.

5. **(120)** At this grade level area is found by counting square units. The student can count all of the small squares shown, but many will take a short cut and add 12 ten times, or ten 12 times. Some might even multiply, if they have a calculator.

6. **(3, 4, 5 and 6)** Each block has a different number so the student can choose 4 of the numbers and add and then choose another 4 if the sum is not 18. The process can be repeated until the sum of 3 + 4 + 5 + 6 = 18 is reached. (Another approach is to add all of the 4 numbers and get 20, and then see which number to remove to have 18 as the sum.)

7. **(22)** This problem is one which will later be called *finding the mean.* At this point, students will likely not add the number of books and divide by 4. Instead, they might add the numbers to get 88, and then distribute the 88 in chunks, equally, among the four shelves. For example, they would likely give 20 to each shelf first, then 1 to each shelf, and then 1 more, exhausting the total of 88 books.

8. **(36)** A clue that makes this problem accessible is that the sum of the digits is 9. By listing these numbers -- 18, 27, 36, 45, 54, 63, 72, and 81 -- you can then search the list for the number for which the ones digit is twice the tens digit.

9. **(1)** The problem involves finding a fraction of a set, and then a fraction of a subsequent set, and seeing what is left. One-third of 3 cookies is 1 cookie, so Henry ate 1, leaving 2 cookies on the plate. Marsha ate half of two cookies, so she ate 1, leaving 1 on the plate for Art.

Commentary

Mars, XIV

1. **(b)** The number sentence is a one-step subtraction situation.

2. **(24; 12)** Students might *guess-check-revise* to find an answer. Another way to begin is to write down a list of numbers that sum to 36, and look for two addends where one is twice as much as the other. In the middle grades, this problem might be solved algebraically by letting x be Rex's weight and $2x$ be Fido's weight, and $x + 2x = 36$ so $3x = 36$. Then $x = 36 \div 3$ or 12, and $2x = 24$.

3. **(505)** The number being between 500 and 600 means the hundreds digit is 5. The ones digit is also 5, so the difference between the two is 0, giving 505 as the answer.

4. **(a, b, d)** Pan (a) is divided from the corner of one rectangle to the opposite corner, implying the two parts are equal in area. Students might count whole and half squares to find the area of the surface of each of the last three pans, since they aren't divided symmetrically. The area is 3 for each part of a, b, and d. In (c), the two parts have areas of 2 1/2 and 3 1/2.

5. **(a. grams; b. kilograms; c. kilograms; d. grams)** The problem gives a sense of whether the student has number sense related to the weight of common objects, and the metric units used to measure them.

6. **(2 bananas, 7 apples, 11 oranges, and 20 pieces of fruit)** Students can begin with the fact they know -- 2 bananas -- and find the number of apples by adding 5, and the number of oranges by adding 4 to the number of apples.

7. **(part one: $1.50; part two: $0.75)** The problem encourages students to use mental mathematics, as they must do in such problems in the world outside of school.

8. **(32)** Students have not been introduced to the formula for finding the area of a triangle, so they will find it by counting whole and half unit squares. There are 28 whole unit squares, and then they put together the 8 half squares to make another 4 whole squares, for a total of 32.

9. **[(14, 3); (3, 3); (3, 9); (14, 9)]** The problem measures the student's knowledge of the Cartesian coordinate system in which the first number of an ordered pair gives the horizontal distance from the axis, and the second number gives the vertical distance. The problem also involves "clockwise," a term that may be new to some students, and "90°." Some students will associate the problem with the computer program known as Logo, since a turtle's movement around a grid is common to both.

Commentary

Mars, XV

1. **(<)** The student should solve each side of the number sentence first. 81÷ 9 = 9; 5 x 3 = 15. When 9 and 15 are compared, 9 < 15.

2. **(Tina; 38 marbles)** The student can find the number of marbles each person has by building on Ben's total of 5. Kate has 7 more than Ben's 5, so she has 12. Tina has 9 more marbles than Kate's 12, so Tina has 21. To find the total, all 3 numbers must be added: 5 + 12 + 21 = 38 marbles.

3. **(a)** The student might find this problem easier by *counting up* from $87.95 to $90.00.

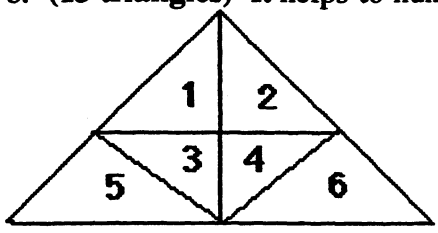
4. **(= $ 5; = $4, = $9)** The student can find the statement that can be solved as it exists, and solve the rest of the sentences by using that answer.
   + = $18, so = $9; + $9 = $13, so = $4; + $4 = $9, so = $5.

5. **(A)** The student must find the area of all the rectangles to find the greatest area. The area can be found by counting unit squares. (A) has 36 ft^2, B has 27 ft^2. C has 32 ft^2, and D has 35 ft^2. So the square that is 6 by 6 has the greatest area.

6. **(58, 166, 620)** The 'kewees' are even numbers and the odd numbers are not 'kewees'. Once this feature is noticed, the student can look at the numbers: 43, 58, 166, 369, 620, and 891. 58, 166, and 620 are even so they are 'kewees'. 43, 369, and 891 are odd so they are not 'kewees. Other answers may be possible, as students may notice other characteristics.

7. **(14, 16, and 18)** Students can follow the examples and try other even numbers. They would find that 8 + 10 + 12 = 30; 10 + 12 + 14 = 36; 12 + 14 + 16 = 42. Then 14 + 16 + 18 = 48. A student might notice the increase by 6 in each 3 numbers and use that to reach 48.

8. **(13 triangles)** It helps to number the small triangles as shown below.



1 & 2 & 3 & 4 & 5 &6 = 1 large triangle
1 ; 2; 3; 4; 5; 6 = 6 small triangles
1&2; 1 & 3; 3 & 4; 2 & 4 = 4 double triangles
1 & 3 & 5; 2 & 4 & 6 = 2 tri-triangles
1 + 6 + 4 + 2 = 13 triangles.

Commentary

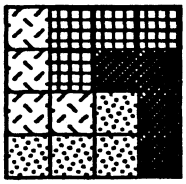
Mars, XVI

1. **(4)** The problem has students read and interpret a graph with a key. Blue has two more dots than red, which indicates 2 x 2 more people.

2. **(125-inch spool)** The students can add 14 six times, or multiply 6 x 14, to find that 84 inches of ribbon are needed. This is more than the 70-inch roll can supply.

3. **(27)** This problem encourages students to start a problem where it makes sense, not necessarily with the beginning words. Students can start with what they know -- there are 6 red crayons. Then they can determine the number of brown crayons from that (5), the number of blue crayons (10) from the number of brown, and finally the number of pink (6) from the number of blue.

4. One solution:



5. **(420)** Give the problem 42 x 10 to students as they hand in their papers. They should realize, after practice, that multiplying by ten simply appends a zero, and multiplying by 100 appends two zeros. This is extended, of course, to multiplying by any higher power of ten.

6. **(a. Yes, 28; b. no)** The problem points out to students that rectangles can have the same perimeter, or distance around the outside, but have different areas.

7. **(3 x 5 + 2 = 17; 17 + 5 - 4 = 18 or 15 + 7 - 4 = 18; 6 x 5 - 1 = 29)** Some students will come up with different, but equivalent, ways to write the number sentences.

Commentary

Mars, XVII

1. **(9)** The students may need to draw a picture with 8 rectangles and place a dot for the tacks to discover that 9 thumbtacks will be needed to hang all 8 pictures with overlapping corners.

2. **(24)** The problem states that Mike has 12 goldfish. This fact is used to find the number of Alan's goldfish. If Mike has 8 more than Alan, then Alan has 4 fish (12 – 8 = 4). Alan has 4 fewer than Mark, so Mark has 4 + 4 more which is 8 goldfish. Then the student should add the fish totals together: 12 + 4 + 8 = 24 goldfish.

3. **(8765, 8756, and 8675)** The student might first place the digits from greatest to least: 8765. Then if the 6 and 5 are exchanged, the second number is found: 8756. Since there is no other possibility with the 7 as the hundreds' digit, the student should use the 6: 8675. If the student exchanges the 7 and 5, they will have the next highest number: 8657 which is not needed for the answer. The student will become skilled with more problems like this one.

4. **(Garage = 38 ■' s; Stairs = 28 ■ 's; Triangle = 32 ■ 's)** The student will count the whole squares with little trouble. Then they must reason that 2 halves can be put together to make 1 whole square, and count the rest of the area of the garage and the triangle. Recounting is an excellent method for accuracy.

5. **(3 adult and 3 children's' tickets)** The *guess and check* strategy is excellent for this type of problem. The student might try 2 adult (2 x $6 = $12) and 4 children (4 x $4 = $16). But when $12 and $16 are added, they get $28, not $30. So they need to make another guess. If 3 adult (3 x $6= $18) and 3 children (3 x $4 = $12) is tried, then the total of the $18 and $12 is $30 -- the amount the family spent for the tickets!

6. **(12 won, 8 lost)** The student might make a list of the numbers that add to 20, since the wins and losses taken together must add to twenty. From the list, select the pair of numbers such that one number is four more than the other. A partial list is demonstrated below:

10 + 10 = 20	10 - 10 = 0	13 + 7 = 20	13 - 7 = 3
14 + 6 = 20	14 - 6 = 8	12 + 8 = 20	12 - 8 = 4 √
11 + 9 = 20	11 - 9 = 2		

   Some students will become skilled at doing such problems in their heads if they have a strong fact base knowledge.

7. **(11 cm ; $4\frac{5}{16}$ inches)** The student should receive credit if their answers are close to the above numbers. Accept from 10.9 to 11.1 cm, and $4\frac{1}{4}$ (or $4\frac{4}{16}$) as alternate answers

8. **(x)** The student might look at several of the equations to ensure that x is the correct sign. It is likely that, as the student places each of the other x signs in the circles, they will also check the mathematics quite naturally.

Commentary

Mars, XVIII

1. **(8 minutes)** This is a simple subtraction problem: 63 - 55. Some students may solve it by *counting up* from 55 to 63.

2. **(130)** A 3-digit number is called for, and the smallest such would have a 1 in the hundreds place, and a zero in the units place.

3. **(15)** Most students will trace the 12 ways on the map itself. A more advanced way to solve the problem would be to label each move to the left as L, and each move down as D. Then the student must make 2 L's and 4 D's to get to school, and they can come in any order. So the question is: How many ways can you arrange 2 L's and 4 D's. The ways are shown below:

   LLDDDD; LDLDDD; LDDLDD; LDDDLD; LDDDDL;
   DDDDLL; DDDLDL; DDLDDL; DLDDDL; DLDLDD
   DDDLLD; DDLLDD; DLLDDD; DLDDLD; DDLDLD

4. **(a. 15L; b. 1mL; c. 70mL)** The problem tests the number sense of students. They might need to be reminded that a mL of water is about a drop; a L of water is about half as big as a 2-liter bottle of soda.

5. **(30)** Work backwards by starting with what is known, the number of science books--4. Then find from that the number of music books--8. From that we know the number of history books--6, and then the number of art books--12. The total is 30.

6. **(15)** 1 large; 5 small; 4 rectangles made of 2 small; 3 rectangles made of 3 small; 2 rectangles made of 4 small.

7. **(93)** Give the problem 19 + 74 =

8. **(right angle - 90 degree angle: 3:00 or 9:00)** Check individually.
   (acute angle - less than 90 degrees) Check individually.
   (obtuse angle - more than 90 degrees) Check individually.

9. **(6)** In the top left picture, 3 apples balance 2 tomatoes. Therefore 3 apples can substitute twice for the 4 tomatoes in the right hand picture. In the bottom picture, 6 apples then balance with 1 cup of soup.

Commentary

Mars, XIX

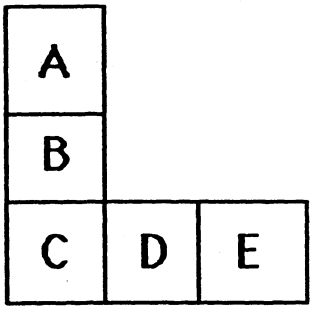
1. **(a. 95; b. 98)** The student can use subtraction to find both missing numbers. Or the student might add-on to the smaller number, to get the larger number, and keep count of how much was added.

2. **(Sally is 6 yrs; Joan is 24 yrs.)**The student can solve this problem by building on the fact that Tara is 12. If Tara is double Sally's age, then Sally's age is $12 \div 2 = 6$. If Joan is double Tara's age, then Joan's age is $12 \times 2 = 24$.

3. **($3.96)** The student can add the tax of 7¢ to $1.25 to get $1.32 for each popcorn box, and then add this amount 3 times or multiply by 3. A student might decide to find 3 times $1.25 and then add the tax of 21¢.

4. **(The box is heavier.)** Solving the problem requires intuition about a balance scale, but this same intuition will help in algebraic thinking. The student can see that the ball is on both sides of the scale, and therefore the ball can be removed and the scale will stay balanced. This means that a box balances two pyramids. Therefore a box is twice as heavy as a pyramid, which will seem strange to some students because there is an *inverse* relationship between the number of items of each, and the relative weights.

5. **(11 rectangles)** Labeling the rectangles and listing them will help the student find them all as shown below:



A, B, C, D, E; CD, DE, CDE; AB, BC, ABC

6. **(Greatest: 84 + 62 or 82 + 64 = 146 ; Least: 46 + 28 or 26 + 48 = 74)** The student should place the largest numbers in the ten's place for the largest sum. The student should place the smallest numbers in the ten's place for the smallest sum.

7. **(8)** Reading the problem carefully is a key to success. When 4 is subtracted from 12, the answer is 8. If 8 is subtracted from 16, the answer is also 8, so the secret number is 8.

8. **(26, 35, 40)** The student might reason that for a score of 101, some of the large numbers need to be chosen. If the student starts with the 2 largest numbers -- 35 and 40, which is 75 -- then 26 is needed to reach 101. Some students might solve the problem simply by *guess-check-revise.*

Commentary

Mars, XX

1. **(200-inch roll)** An estimation strategy would be to round 24 to 25 and think of it in terms of money. Four 25's is 100 and three more is 75; so she will need about 175 inches and will therefore buy the 200-inch roll. The exact answer for how much she needs (168 inches) will be obtained by some students by adding or multiplying.

2. **($\frac{5}{7}$ of the children went to the theater; $\frac{2}{7}$ of the children stayed home.)** The problem is a part:whole ratio problem. Students might want to draw a diagram of the seven children, and partition it accordingly, to find the answer.

3. **($7.95)** The problem involves reading a menu and making decisions from the context of the story. The answer is found by adding $3.50, $2.95, $0.75 and $0.75.

4. **(2, 2, and 4; or 1, 4, and 2)** *Guess-check-revise* or *make a list* are strategies that can be used with this problem. One creative approach is to notice that "one of each" means that the problem can be simplified by removing that much money (17¢) from the total, leaving 25¢ to be distributed among the three types.

5. **(a. school; b. store; c. bank)** The Cartesian coordinate system is used in this problem. The first number in each ordered pair tells the horizontal distance; the second number tells the vertical distance.

6. **(a. 5 LB; b. 1 oz. c. 70 LB)** This gives a student the chance to demonstrate they have real-world number sense. Unreasonable answers can be eliminated.

7. **(2)** Students should have intuitive knowledge about balance scales for this problem. Since the triangle is on both sides of the scale, it doesn't matter how much it weighs -- it can be removed and the scale still balances. Then the square and two circles must weigh the same amount. Therefore, one circle weighs half of a square.

8. **(c, a, b, d)** Visual estimation skills are required for this problem. Students might want to actually measure the lengths, to check their estimations.

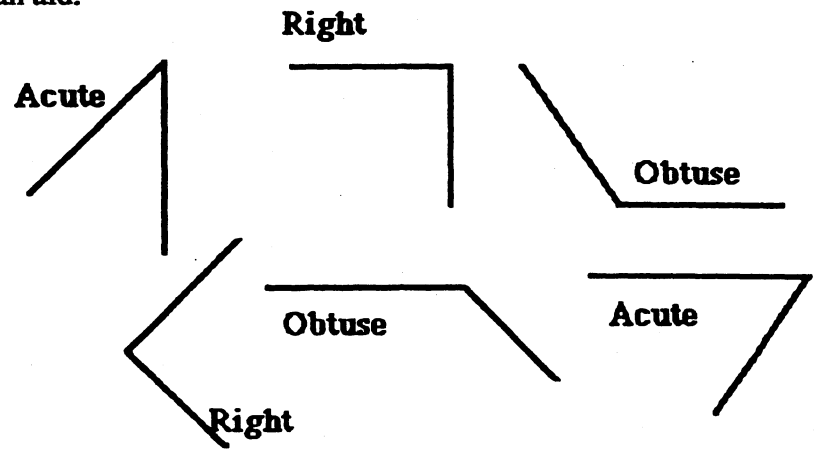
Commentary

Mars, XXI

1. **(17)** Adding 6 and 9 gives 15. Adding 9 and 9 gives 18. So the odd number is between 15 and 18 which makes the number 17.

2. **(20 pogs)** The student needs to find out how many pogs Maria and José have together, so 28 + 12 = 40. If they have the same number of pogs after Maria gives some pogs to José, then the total of 40 must be divided in half. 40 ÷ 2 = 20, so each one has 20 pogs. Some students may solve the problem without computation by simply giving one pog at a time from Maria to José, until they both have the same number, which is 20.

3. **(See the answers below.)** Most students would use the example angles to help in identification. The students should be encouraged to actually use a sheet of paper with a square corner as an aid.



4. **(125)** Students can either *count up* from 509 to 634, and remember how many they counted, or subtract 509 from 634. Perhaps the most difficult way, but one that many students will use, is to align the problem vertically as in a subtraction problem, and find the digits one-at-a-time, going from right to left using the subtraction algorithm.

5. **(900)** There are many ways for students to estimate the answer. One method is to think of 59 milliliters as 60 milliliters, and then ten of the tubes would hold about 600 milliliters, and the next five tubes would hold half that, or 300 milliliters. Together, then, all 15 would hold 900.

6. **($120)** Each of the 6 shelves measures 8 feet, so the total feet would be 6 x 8 = 48 feet. Each foot costs $2 so the 48 feet must be added twice or multiplied by $2 ($96). The cost of the brackets can be found by adding twice or multiplying $12 by 2 ($24). The last step is to add $96 and $24 to find the total Mr. Brown spent.

7. **(a. 5, 4, 3, 2, 1, 0)** All digits less than 6 will work.
   (b. 6, 7, 8, 9) All digits greater than 5 will work.
   (c. 4) For the numbers to be equal, the digits must all be the same.

8. **(The choices are a 5 x 5 square, or 7 x 3; 9 x 1, 4 x 6, or 2 x 8 rectangles.)**

Commentary

Mars, XXII

1. **(13)** Give the problem 39+ 3.

2. **(Any octagonal shape is acceptable)**

3. **(5 inside the circle; 6 inside the rectangle; 2 inside the circle and the rectangle)** The problem involves a Venn diagram. Students first find the number in each separate shape, disregarding the other. Then they find the number of squares in the overlap area, meaning in both the circle and rectangle.

4. **(triangle -- 32; square -- 40; circle -- 12)** The following is one way to solve the problem -- there are others. The top right scale shows that a triangle and square weigh 72 together. This value (72) can then be substituted for the square and triangle in the top left scale, indicating that the circle plus 72 must weigh 84, so the circle weighs 84 - 72 or 12. In the bottom scale, then 12 can be substituted for the circle and you know that the square plus 12 is 52, or the square is 52 - 12 or 40. Since the square and triangle are 72 from the top left, and the square is 40, the triangle is 72 - 40 or 32.

5. **(34 cups)** This is a simple addition problem.

6. **(9)** Students might draw a picture or make a list. Match the hamburger up with each drink for 3 combinations. Then match the Reuben up with each drink for another 3 combinations. Finally, match the grilled cheese up with each drink for the last 3 combinations.

7. **(24)** The recipe is for 18 servings, so it must be doubled to serve 36. Therefore the amount of milk needed must also be doubled.

8. **(Janie walks the farthest at $\frac{1}{2}$ mile)** Students might want to take 3 strings the same length to represent 1 mile, then divide each string into either halves, thirds, or fourths. Cut off 1/2, 1/3, and 1/4 and compare the strings.

Commentary

Mars, XXIII

1. (254 + 467 = 721 731 - 645 = 86) The student can use knowledge of addition and subtraction facts and regrouping to solve the problems. Some students may need several tries.

2. **(5)** Students might count by tens to 40 or 50. If only 4 boxes were used, 6 disks would not be protected, so the 5th box is necessary.

3. **($\frac{4}{12}$ or $\frac{1}{3}$ - white; $\frac{5}{12}$ - striped; $\frac{3}{12}$ or $\frac{1}{4}$ - shaded)** The total number of stars is need for this part-whole situation. Then the number of each kind of star can be counted and compared to the whole group.

4. **(5 bicycles and 1 tricycle or 2 bicycles and 3 tricycles)** The student might use an organized *guess-and-check* strategy, as shown below.

   2 b + 3 t = 4 + 9 = 13 wheels√
   3 b + 2 t = 6 + 2 = 12 wheels
   4 b + 2 t = 8 + 6 = 14 wheels
   5 b + 2 t = 10 + 6 = 16 wheels
   5 b + 1 t = 10 + 3 = 13 wheels√

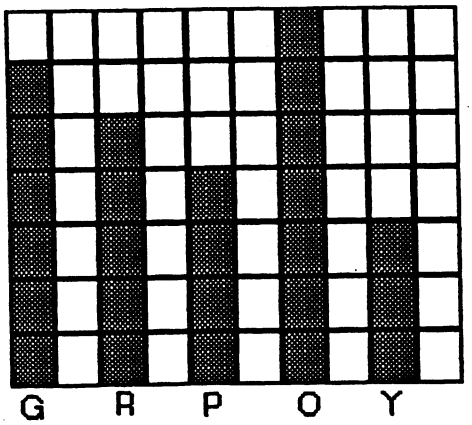
5. **(The answer not given for #4 is called for here.)** The purpose of this extension to the previous problem is to show students that many times there is more than one solution to a mathematics problem.

6. **(5, 2, 4, 1, 3)** The student might actually write someone a letter, and check the steps.

7. **(34, 35)** The student might use an "educated" *guess-and-check* strategy, reasoning that half of 60 is 30, so the page numbers must be around 30. The numbers must also be consecutive. Then 30 + 31, 31+ 32, 32 + 33, 33 + 34, and 34 + 35 can be tried until the numbers add to 69 (34 + 35).

   Some students might actually thumb through a book, until they find page numbers that sum to 69. If so, they might notice an interesting pattern in that the odd numbers are always on the right, and the even numbers always on the left, in any book they pick up. This is because books always begin with page 1 on the right-hand side.

8. **(See the graph)**



Commentary

Grade 3, XXIV

1. **(6)** Students might work backwards by asking "What number, when 4 is subtracted, gives 20 -- it's 24. What number, when 6 is added, gives 24 -- it's 18. What number do I multiply by three, to get 18 -- it's 6." Another way to solve the problem is to *guess-check-revise.*

2. **(25)** The pattern involves the *square numbers.* These are the numbers 1, 4, 9, 25, 36, and so on. Students might want to draw the next square, which would have 5 small squares on each side.

3. **(yes)** They weigh 391 pounds all together, so they could all get in the boat that holds 400 pounds.

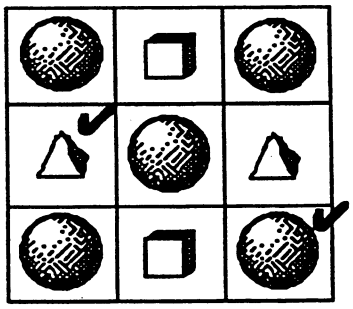
4. **(See chart below.)** Each pencil weighs 3 ounces, so the left-hand pan has 9 ounces. Therefore the ruler and glue together weigh 9 ounces. The student has to find different ways to have 9 ounces. Most will not choose fractions, although that is possible.

ruler	glue
1	8
2	7
3	6
4	5
5	4
6	3
7	2
8	1

Give 1 star for every 2 answers. They may not be arranged in an orderly fashion, as they are in this chart.

5. **(16)** The number of holes doubles with each fold. The problem can be extended to several more folds.

6. The two missing figures are checked. If the students come up with a different pattern, have them justify their solution.



7. **(65)** Give this problem: 36 + 29

8. **(a. 0.01 and $\frac{1}{100}$; b. 0.10 and $\frac{10}{100}$; c. 0.05 and $\frac{5}{100}$; d. 0.25 and $\frac{25}{100}$)**
This problem is accessible to students if they think of writing the coin values using a dollar sign. Students might give other fractional names than the ones above, such as 1/10, 1/20, and 1/4 for the dime, nickel, and quarter, respectively.

Commentary
Mars, XXV

1. **(■ is 3; ▲ is 6)** The student can use a *guess-and-check* strategy. If a 4 is used for the ■, then ▲ would also be 4 in the first sentence; but in the second sentence, $4 + 4 + 4 \neq 15$. If 5 is tried for ■ in the first sentence, then ▲ is 2 and the second sentence is again false: $5 + 5 + 2 \neq 15$. When 3 is tried as ■, then ▲ would be 6 from the first sentence, and the second sentence is then true: $6 + 6 + 3 = 15$.

2. **(a. 34; b. 5; c. 6)** In (a), the student might multiply to get the total for each animal, and then add: 5 x 2 plus 6 x 4 totals 34 legs. Another method is for the student to draw the animals as stick figures, and simply count the legs. Similar methods of drawing 26 legs, making 4 cows and counting the rest as chickens, will solve (b). Or the student might multiply 4 x 4 and subtract the total from 26 to get 10 legs left, and divide by 2 to have 5 chickens. Similar reasoning will produce the answer to (c).

3. **(accept 4 - 6 cm as a good estimate; 5 cm is the actual measurement)** Students should be encouraged to remember and use a "personal benchmark" for estimating common measures. For example, the width of their finger is about a centimeter. Extra practice using metric measure will make students better at estimating centimeters.

4. **(20)** Students might physically build this set of stairs, if they have trouble visualizing the hidden cubes. They can think of the shape as a set of layers, and count the cubes in each layer. The 4 cubes on top are easy to see and that should help the student visualize the cubes in the other 2 layers. That would give a total of $4 + 8 + 8 = 20$ cubes.

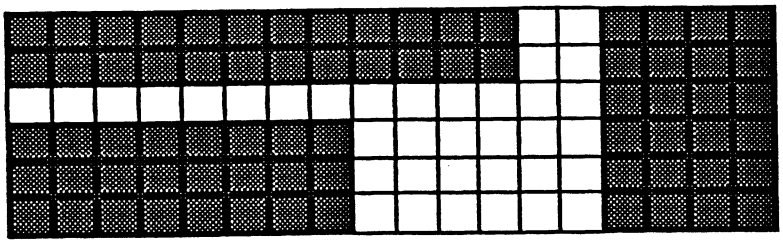
5. **(19, 17, 21)** Using addition and subtraction to find differences between terms, the repeated procedure of adding 6, then subtracting 2 will be discovered. Follow this procedure by adding 6 to 13; taking 2 from 19, adding 6 to 17, and then taking 2 from 23 for 21.

6. **(3; 2; 1)** Drawing the pie cut into 6 pieces is a natural way to begin this problem. Then 1/2 of the pie is seen as 3 pieces. Then 1/3 of the pie is 2 pieces and 1/6 of the pie is 1 piece. For students who might need more than a drawing, encourage them to cut a circle from cardboard for the pie, divide it into 6 pieces, and use the physical model to find the answers.

7. **(a. 4/8 or 1/2)** The numbers above 4 are 5, 6, 7, and 8, which is 4 of the 8 sections.
   (b. 2/8 or 1/4) The numbers above 6 are 7 and 8, which is 2 of the 8 sections.
   (c. 3/8) The numbers below 4 are 1, 2, and 3, which is 3 of the 8 sections.
   Note: Students should not be expected to find the lowest terms fraction.

8. **(Rectangles of 2 x 12; 3 x 8; and 4 x 6)** The 1 x 24 rectangle with this same area cannot be drawn on this grid. Arrangements will differ from that shown below..

Areas of 24 squares



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