MAKE SUMMER
COUNT!

MATH GUIDEBOOK

Summer 2013

Make Summer Count Initiative

Overview

Each year a number of students leave for summer vacation with the grade level skills and knowledge that they worked hard to achieve. Many of these students will participate in summer camps, family vacations, and summer workshops that will continue to enhance and strengthen their skills. However, a number of students, particularly in poor communities will lose what they have gained because of unequal access to the experiences, tools, and information that is often part of their more advantaged peers.

"Summer learning loss disproportionately affects low-income students. While all students lose some ground in mathematics over the summer, low-income students lose more ground in reading, while their higher-income peers may even gain. Most disturbing is that summer learning loss is cumulative; over time, the difference between the summer learning rates of low-income and higher-income students contributes substantially to the achievement gap" (Making Summer Count, 2011).

Since October 2012, a group of community leaders and summer service providers came together to address summer learning loss in reading and mathematics. What follows is a summer-guidebook designed for summer staff to help their students maintain math skills and knowledge.

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Make Summer Count for Math

Introduction

Thinking and reasoning mathematically are integral to children's construction of mathematical knowledge. As children collect, organize, interpret, apply, and evaluate information in problem-solving activities, they are developing pathways and memory structures. As they extend, extrapolate, identify patterns, and make connections, they integrate and reinforce their knowledge. As they conjecture and test, not only do they learn how to confirm or reject trains of thought, but they also develop inquiry skills and the "habits" of questioning and justifying. "Reasoning mathematically is a habit of mind," write the authors of NCTM's Principles and Standards for School Mathematics, "and like all habits, it must be developed through consistent use in many contexts" (NCTM 2000, 56).

At the very core of math education is a problem solving or an inquiry-oriented approach to solving authentic questions that we are faced with in daily life. The characteristics of this approach are: creating, conjecturing, exploring, testing and verifying in order to help students construct a "deep understanding of mathematical ideas and processes.

The Summer Guidelines activities have been developed with these principles in mind. The "correct answer" is not necessarily the goal of the math problem, but rather helping students make evident their thinking processes and developing the ability to work through problems in a logical and functional manner.

The activities developed in this guidebook are consistent with the teaching philosophy of math education in Columbus City Schools and have been vetted by math experts that work within the middle grade years. The activities are merely suggestions to provoke problem solving and therefore similar strategies can be used with students that you may be serving from the elementary grades.

Preparing- Student Thinking & Communicating

General Guidelines for Student Thinking & Communicating

Below are four general guidelines to consider when teaching students how to apply their own thinking skills to solve math problems.

1. **Students must use their own thinking**. It is the thinking that makes the difference between whether students are able to remember the math that they learn and retain.

2. **Students must communicate their own mathematical thinking**. They are encouraged to use their own thinking to solve problems and then communicate their thinking to others.

3. **The actual question you ask is not as important as asking the question.** Here are some suggestions for questions to ask to encourage student thinking:

    a. Can you tell me what you're doing?
    b. Before you begin, can you predict what you think the answer might be?
    c. Would you explain to me how you figured this out?
    d. Why did you do this?
    e. Can you convince me that you're correct?
    f. Would it help to use blocks or paper to solve this problem?
    g. Can you draw for me on paper what you did with the blocks?
    h. Can you do this same problem in a different way?
    i. What else can you tell me about this problem?
    j. What does that mean?
    k. I understand what you're saying. Can you show me how your idea works?
    l. Does anyone have the same answer but a different way to explain it?
    m. Would you ask the rest of the kids that question?
    n. Can you convince the rest of us that that makes sense?
    o. Why do you think that?
    p. Why is that true?
    q. How did you reach that conclusion?
    r. Does that make sense?
    s. Can you make a model to show that?
    t. Does that always work?
    u. Why did you solve the problem this way?

4. **Use mathematical processes and practices as often as possible**. The mathematical processes and practices listed below are the kinds of habits of mind that students are required to exhibit during mathematical experiences. Keep these in mind as you are facilitating the activities.

Mathematical Processes:

1: Problem solving
2: Reasoning
3: Communication
4: Using multiple representations
5: Making connections within and between mathematics topics

Mathematical Practices:

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

Preparing- Using Stations for Learning

Three-Station Set-Up

For each Math Session that you have at your camp, we suggest that you use a three-station set-up. Set up a space in three areas:

1. The first area or station is called "First in Math". This space can either be computer stations or a place where campers can play with some cards.

2. The second area is called "Think Tank Time". This space could be tables and chairs or a floor space for campers to think about math situations and write down what they are thinking.

3. The third area is called "Math in Action". This last space can be tables and chairs, floor space, or an outdoor setting.

Divide your group of campers into three groups and assign one group per station. Each group will work at their assigned station for about 25 minutes and then they can move to the next station as indicated in the chart on the following page.

We know that students will often get engaged on a task and not want to move to the next station because they want to finish. We love to see this kind of engagement, so if possible, let it happen.

Preparing- Context for Doing Mathematics

Planning for Activities

We understand that not all facilities are the same. Some are in buildings and some outdoors. Some have no available electricity or no Internet access and others do. Within this guide, we hope that we have included plenty of ideas that can be done in each situation. Here are some ideas for some non-traditional settings for doing academic work.

You could organize tasks by using the Think Tank Task Template *(see **Appendix A**)*. With this one page, campers could describe the task that he/she wants to work on and then draw a picture, calculate what is needed, and then write about how he/she thought through the process.

Below are a few examples of ways to incorporate math in common settings:

1) Parks.
   How many blades of grass are on this soccer field?
   How tall is this tree? How old do you think it is? How tall do you think it may be in 10 years?
   How long does is take to fill a balloon with water? How many balloons do we need for a balloon toss game? How long do we need to prepare for the balloon toss game?
   What is the average height of all the campers here? See if you can figure this out without using any tools.
   If you were to design a playground in this area, what would you do? What types of things would you include? How will you create it? What will you need? What will it look like at the end?

2) Courts.
   Why are basketball courts designed the way they are?
   Why is there a box on the backboard?
   What actions do you need to take to improve your chances to make a basket?

3) Pools.
   (*See Swimming Task Templates in **Appendix A***)

Math Guidebook Activities

Components of the Program

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1. ***First in Math*® *(www.firstinmath.com)***
   - Computer-based program
   - FIRST IN MATH is great for differentiated instruction. K to 8 content is organized into six basic modules: Skill Sets; Just the Facts; Know & Show; Workout Gyms; Bonus Games and Measurement World. Activities are presented in an online "Game" format that engages students.
   - While the emphasis is on the improvement of numerical fluency and mathematical skills, each activity is also designed to strengthen problem-solving, reasoning and communication skills. Modules parallel each other; completing Game 1 of any Skill Set unlocks a multitude of Bonus games geared to that skill level.
   - The program features a competition/rankings component to provide motivation and sustain high activity levels. As students play, they earn virtual award "stickers" that accrue to their personal and classroom score.

There is an alternate activity, **24 game®, for those without computer access.(See **Appendix B** for order information for **First in Math**® and **24 game**®.)*

2. ***Think Tank Time***
   - Instructor is facilitator of student thinking
   - Students are all given a problem to solve
   - The problems selected must take time and focus on the mathematical practices
   - Open-ended problem solving helps students develop new strategies to solve problems that make sense to them.
   - Important math concepts and skills are embedded in the problems.
   - Small group discussion centers on what is known in each problem and what the student is looking for in each problem

See **Appendix A for Think Tank Task Template.*

3. ***Mathematics in Action***
   - This component focuses on using mathematics through application and synthesis of information.
   - Performance Tasks- students complete real-world performance tasks. Incorporate tasks that support service learning in the community.
   - Photographs- students use photographs to create and solve word problems.

Each of these components can be expanded for service learning or community outreach.

Structure of Time

Divide the students into three groups. Groups can change from week to week.

Time	Group A	Group B	Group C
25 minutes	**First in Math®** Students working independently on the computer or using alternate 24 game® cards	**Think Tank Time** Students working with the facilitator promoting discussion	**Mathematics in Action** Students working with partners/teams to complete assigned task
25 minutes	**Think Tank Time** Students working with the facilitator promoting discussion	**Mathematics in Action** Students working with partners/teams to complete assigned task	**First in Math®** Students working independently on the computer or using alternate 24 game® cards
25 minutes	**Mathematics in Action** Students working with partners/teams to complete assigned task	**First in Math®** Students working independently on the computer or using alternate 24 game® cards	**Think Tank Time** Students working with the facilitator promoting discussion
15 minutes	**Debrief** Select a student from each group to share their strategies. Try to get three different strategies. Provide opportunities for students to discuss.	**Debrief** Select a student from each group to share their strategies. Try to get three different strategies. Provide opportunities for students to discuss.	**Debrief** Select a student from each group to share their strategies. Try to get three different strategies. Provide opportunities for students to discuss.

Materials Needed

First in Math®

First in Math is a computer-based program- each student in the group will need access to a computer with internet access. This program must be ordered for the summer and there is a minimal cost per student to participate (*see **Appendix B** for order information and contact information).*

Alternate non-computer option: there is also a paper version of this game called 24 game®. This is the original game that First is Math is based on. More information can be found at http://www.24game.com *(see **Appendix B** for order information).*

Think Tank Time

During Think Tank Time, students will work on the enclosed math problems (both questions and answers are provided).

Students should have access to a variety of problem solving "math tools" to use as they find solutions to problems. Several types of math tools can be combined into one container that is placed on the table so that students have a choice as they solve each problem.

Remember that math tools, such as place value blocks or color tiles, do not teach a concept, but are used to represent a concept. Therefore, students may select math tools to represent an idea or relationship for which that tool is not typically used (e.g., ten bears may be used to represent a group of 10 rather than selecting a rod or ten individual cubes). Some examples of math tools may include: one inch color tiles, centimeter cubes, Unifix® or snap cubes, two-color counters, and frog, bear or other type of animal counters. Students should also have access to a hundred chart and a number line.

Mathematics in Action

Mathematics is a time devoted to mathematical investigations. Students will either complete the enclosed math performance tasks to promote critical thinking or they will engage in discussions centered on the enclosed photographs.

Component 1: First in Math

Overview

The backbone of the First In Math® Online Program is the 24® GAME—a classroom staple since 1988. Online games range from Addition to multi-step Algebra, and are organized into **SKILL SETS**®. Each Skill Set is comprised of three sequential 24 Games, labeled 1, 2 and 3. Each game builds upon the skills acquired in previous games.

A Pre-test/Post-test module called **JUST THE FACTS** records each student's proficiency with basic facts, so you will never have to check another fact sheet! Includes assessment of each student's skill improvement.

Three **KNOW & SHOW** modules provide a unique way for students to experience the type of problems found in standardized tests. Students solve problems from nine categories that tie to national standards

WORKOUT GYMS build automaticity with addition, subtraction, multiplication and division facts, and progress to include fractions, decimals and integers.

After completing certain Skill Set requirements, students can play **BONUS GAMES.** Serving as incentives that encourage students to continue to achieve, these games offer various types of skill-building activities, such as sequencing and working with tens. Bonus Games are targeted to skills students need to master at each grade level, based on national standards.

MEASUREMENT WORLD showcases games and activities that focus on Money, Time, Length, Distance, Area, Volume and Weights.

The First In Math® Online Program's **FAMILY LINK** feature involves family members in the process of their child's education in a groundbreaking way. A family member becomes an engaged participant in the education process. Family Link provides students' family members with an extra First In Math User ID/Password—enabling them to log on and play the games, learn and refresh math skills 24/7, just like students who are playing at school. Student and family member scores are combined for a Family Link total score, providing a mechanism for students and families to spur each other on to greater mathematics achievement.

*All this information comes from the First In Math® website: www.firstinmath.com.

Component 2: Think Tank Time

Introduction to Mathematics Problem Solving Strategies

The facilitator:

- Poses a rich problem or task
- Asks probing question (not leading questions)
- Listens to students and groups
- Watches for different strategies and reasoning and misconceptions
- Selects students to share their strategies
- Allows students to struggle
- Conducts meaningful classroom discussions

The students:

- Spend time with problems
- Grapple with difficult problems
- Work with others to solve problems
- Discuss their thinking-strategies-confusions
- Listen and critique other students' thinking-strategies-confusions
- Reflect on their thinking and revise if necessary-look for and try out different or more efficient strategies
- Use math tools appropriately-give them up if not needed to solve a problem
- Make connections to other problems-topics-subjects
- Synthesize information to draw conclusions and complete tasks
- Use appropriate mathematical language and compute accurately

There may be some tasks that extend over several days. Students must be given problems and tasks that take them time to solve or they will not be able to demonstrate the Mathematical Practice that includes persevering through a problem.

The product is the student thinking.

The focus of any problem solving situation is the process students go through in order to solve a problem. Phil Daro, a writer for the Common Core said that the answer is part of the process, not the product. The product is the student thinking. Therefore, students must be given ample time to discuss their thinking and listen to other students' thinking. During this discussion time, students are given the opportunity to develop proficiency in the Mathematical Practices.

When students listen to other student's thinking and processing, they can and will adopt a strategy if it makes sense to them. When students listen to the facilitator's strategy, they attempt to adopt it even if it does not make sense. They stop their own struggle because they think the "right" way is the facilitator's way.

Introduction to Think Tank Time

The Common Core State Standards for Mathematical Practices focus on a mastery of mathematical thinking. Developing mathematical thinking through problem solving empowers students to develop their own ideas, strategies and make connections to mathematics. Focusing on true problem solving allows the students to gain an understanding of the relationships of numbers which is significantly different then just memorizing facts.

Many students learn "math rules and procedures." These can be powerful tools to have when solving problems, however if students only memorize the rules and procedures, then they never develop an understanding of the relationships among numbers. Students need to develop fluency. However, teaching these relationships first, will allow students an opportunity to have a deeper understanding of mathematics.

Think Tank Time focuses on providing children with opportunities to think and share their thinking with others. This time with children provides the facilitator opportunities to help them develop good mathematical behaviors.

These student behaviors include:

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

This approach provides students with opportunities to develop strategies for understanding mathematical content and communicate their knowledge to others. Important math concepts and skills are embedded in the problems. Small group and whole group discussions give students opportunities to make connections between the explicit math skills and concepts from the standards. Open-ended problem solving helps students develop new strategies to solve problems that make sense to them.

Implementing Think Tank Time

Problem solving may look different day to day and problem to problem. **However, all Think Tank Time problem solving has four main parts.** In each session, facilitator poses a problem, gives students the freedom to solve the problem (*using math tools, drawing a picture, acting it out, etc.),* and record their thinking. Finally, the students share their thinking and strategies (*Construct viable arguments and critique the reasoning of others*).

Part 1- Pose the problem

- Once a problem is posed, students should solve the problem independently and/or in small groups.

Part 2- Solve the problem

- **During Think Tank Time, students need to record their thinking. Students can record their** thinking either formally using an ongoing math notebook or informally using white boards or thinking paper. For longer programs, formal math notebooks allow you, parents and students to see growth as the summer progresses. Math notebooks also give students the opportunity to refer back to previous strategies when solving new problems.

- *Facilitators should provide opportunities for students to revise their solutions and explanations as other students share their thinking. Students' written explanations should include their "work". This could be equations, numbers, pictures, etc. If students used math tools to solve the problem, they should include a picture to represent how the tools were used. Students' writing should include an explanation of their strategy as well as justification or proof that their answer is reasonable and correct.*

Part 3 – Promoting critical thinking through facilitator questioning

- As students are working on solving the problem, facilitator will ask questions to promote thinking for that student. Some sample questions include: *Can you tell me what you're doing? Before you begin, can you predict what you think the answer might be? Would you explain to me how you figured this out?*

**Additional questions can be found on the next page and in the Appendix.

Part 4- Share solutions, strategies and thinking

- After students have solved the problem, gather the class together as a whole to share students' thinking. Ask one student or group to share their method of solving the problem while the rest of the class listens. Early in the week, the facilitator models for students how to ask clarifying questions and questions that require the student(s) presenting to justify the use of their strategy. As the summer progresses, students should ask the majority of questions during the sharing of strategies and solutions.

- When that student or group is finished, ask another student in the class to explain in his/her own words what they think the student did to solve the problem. Ask students if the problem could be solved in a different way and encourage them to share their solution. At the end of each session, the mathematical thinking should be made explicit for students so they fully understand the strategies and solutions of the problem. Misconceptions should be addressed.

- As students share their strategies, you may want to give the strategies names and post them in the room. When you give the strategy a name (i.e., "What Thomas did is called the '*Guess and Check'* strategy.") it helps students to write and discuss their work more precisely. Add to the list as strategies come up during student sharing rather than starting with a whole list posted. This keeps students from assuming the strategies on a pre-printed list are the ONLY strategies that can be used.

  Possible strategies students may use include:

• Act It Out	• Find a Pattern	• Make a List
• Draw a Picture	• Guess and Check	• Make a Table

Think Tank Time Questions

1. Can you tell me what you're doing?
2. Before you begin, can you predict what you think the answer might be?
3. Would you explain to me how you figured this out?
4. Why did you do this?
5. Can you convince me that you're correct?
6. Would it help to use blocks or paper to solve this problem?
7. Can you draw for me on paper what you did with the blocks?
8. Can you do this same problem in a different way?
9. What else can you tell me about this problem?
10. What does that mean?
11. I understand what you're saying. Can you show me how your idea works?
12. Does anyone have the same answer but a different way to explain it?
13. Would you ask the rest of the kids that question?
14. Can you convince the rest of us that that makes sense?
15. Why do you think that?
16. Why is that true?
17. How did you reach that conclusion?
18. Does that make sense?
19. Can you make a model to show that?
20. Does that always work?
21. Why did you solve the problem this way?

Think Tank Problems

*Choose one problem each day- some problems may take more than one day. Answers to all problems can be found in the **Appendix C**.*

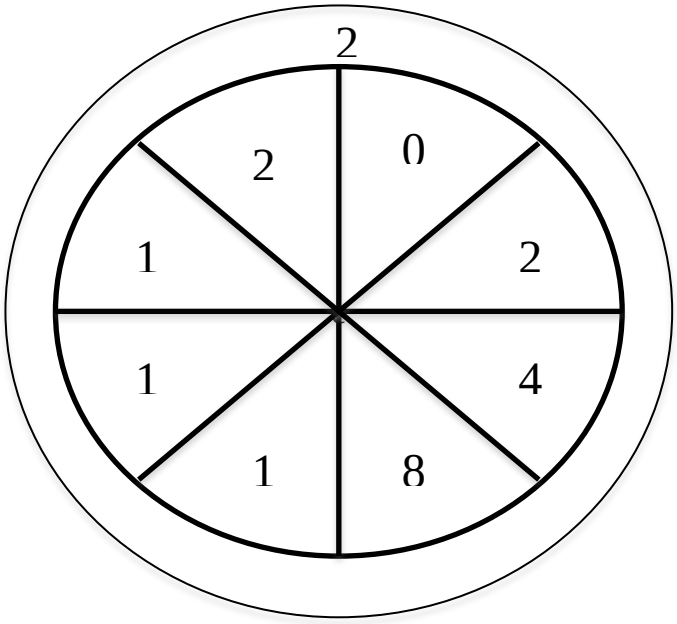
Problem #1- Target Number

You have 5 darts and your target score is 44.
You are an excellent player and every dart hits the board.
How many different ways could you score 44?

-BUT-

You can NOT hit the same 5 numbers even in a different order. At least one number has to be different for each score of 44.

Try putting your own set of numbers onto the dart board. You can use 44 as your target number or choose a new one.



Problem #2- Pedro's Pizza

Pedro's Pizza is opening a new restaurant. They have purchased 24 small square tables for the banquet room of the restaurant. A rectangular banquet table will be made by pushing the small square tables together. Each small table can seat one person on a side and has an area of nine square feet. They are trying to decide how many people they could seat if they pushed all the tables together. They know that they can arrange the small tables to make several different rectangular banquet tables. What is the greatest number of people they could seat by putting all the tables together? What is the least number of people they could seat with all the tables pushed together?

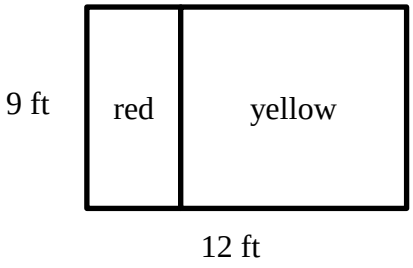
If the banquet room is 40 feet long by 15 feet wide, what is largest group that they can seat in the room with all the tables pushed together? Justify your answer using words, numbers, and/or pictures.

Problem #3- Vegetable Garden

Phylis has a rectangular vegetable garden in her backyard that measures 10 feet by 12 feet. She has decided to make her garden smaller by making the sides half as long. How much less area does she have in her new garden? Explain what happened to the area of her garden when the sides were halved.

Problem #4 - Painting a Room

James is painting his bedroom wall two different colors. One quart of paint will cover 50 sq. ft. Find the area of each wall section and determine how many quarts of each color of paint James will need. Explain your answer.



Problem #5- Sophia's Ride

Sophia rode her bike to her friend's house. She stopped at the grocery store to get some candy when she was half way to her friend's house. When she was one-fourth of the way between the grocery store and her friend's house, she stopped at the bakery to get her friend a donut. Her friend lives 2 miles from Sophia's house. How far is the bakery from Sophia's house? What fraction of the trip is left after Sophia got to the bakery?

Problem #6- Parking Log

A grocery store parking lot has space for 1000 vehicles. On Tuesday, mini vans were parked in 2/5 of the spaces. The parking lot was 3/4 full. How many mini vans were in the parking lot? How many cars were in the parking lot?

Problem #7- John Conway's Family Puzzle

John says, "I have sons and daughters. Each of my daughters has an equal number of brothers and sisters. Each of my sons has twice as many sisters as brothers. How many sons and daughters do I have?" Can you solve John's problem? A good strategy might be trial and error. Pick different numbers and see if they work. If you're working as a class or with a group of friends, maybe you can act it out. Explain your solution!

Website: **http://www.princetonfriendsschool.org**

Problem #8- Pizza Pizza

Pizza Palace provided free pizza to Scottsdale Elementary's after school program. At the end of the day the following amounts of pizza was left:

1/3 cheese pizza
4/6 pepperoni pizza
3/12 sausage pizza
12/18 Hawaiian pizza

Which type of pizza has the least left over? How do the pizza's compare to each other?

Mrs. Smith, the after school coordinator placed all of the remaining pizza into boxes. If the leftover pizza was combined to make a whole pizza, how many pizza's could be made with the leftovers?

Problem #9- Butterfly Garden

Room 12 is creating a rectangular butterfly garden. They are enclosing the area with fence. They received a donation of 25 ft of fence material. Their garden is

$6\frac{3}{4}$ ft by $5\frac{1}{2}$ ft.

Determine if they have enough fencing to enclose their garden and show your work using words, pictures, and numbers.

Problem #10- Buying an iPad

Ashley wants to buy a new iPad. She can purchase one on sale from Best Buy for $665. The sale will last for the next 6 weeks. Ashley has $240 in her bank account. She has a babysitting job that pays her $75 a week. If she saved her money each week, would she have enough to buy the iPad before the sale ends? Make a table to show how long it will take Ashley to save the money to buy the iPad. How much sooner could she buy the iPad if she added a second babysitting job that paid her an additional $20 a week?

Problem #11- Savings Account

Super saving Sally is putting $300 in her savings account every year. Frivolous Fran, her sister, puts only $200 in her account every year. If Fran is three years older, how many years will it take for Sally to have put as much in her account as her sister if they each start saving when they turn ten? Show or explain your work.

Problem #12- Fox, Chicken and Grain

A farmer wants to get across the river with his fox, chicken, and grain. The boat only has enough room for him and one of his possessions. If he leaves the fox with the chicken, the fox will eat the chicken. If he leaves the chicken with the grain, the chicken will eat the grain. How can he get them all across? Justify your answer.

Website: **http://www.princetonfriendsschool.org**

Problem #13- Fault Free Rectangles

Can you arrange some dominoes into a rectangle that has no fault lines? (Fault lines are cracks between the dominoes that run from top to bottom or side to side.) Make a neat drawing of your solution or solutions. What's the smallest one you can make?

Website: **http://www.princetonfriendsschool.org**

Problem #14- The Dark and Stormy Bridge

It was a dark and stormy night. A family had to get to safety across a rickety old bridge. They have only seventeen minutes before the flood destroys the bridge. And they have only one flashlight, which they must use to cross the bridge. Grandpa takes ten minutes to cross the bridge; Mom takes five minutes; Brother takes two minutes; Sister takes one minute. No more than two people can cross at a time, sharing the flashlight. Can they all make it to the other side in seventeen minutes? Explain how. Is there more than one solution? If you think it's impossible, explain why. (No gimmicks, such as throwing the flashlight back! Someone has to bring the flashlight back to the people who are still waiting to cross.)

Website: **http://www.princetonfriendsschool.org**

Problem #15- School Makeover

Lou has been contracted to tile classroom floors as part of the renovation of a local school. During the first five days on the job, Lou completed tiling 4, 5, 6, 4 and 8 classrooms, respectively. What is the average number of classrooms Lou tiled each day during that five-day period? Express your answer as a decimal to the nearest tenth.
Electricians Chris and Dave have been contracted to wire every classroom in the same school. Each of the classrooms requires exactly the same electrical work. Working alone, Chris can complete the wiring for one classroom in 20 hours, and it takes Dave 15 hours to do the same job by himself. After 120 hours of work they had completed wiring 1/2 of the classrooms in the school. How many classrooms are in the school?

Website: **www.mathcounts.org**

Problem #16- Buying Scarves

Raven went shopping with her friends at Easton. Raven and her five friends put their money together to buy scarves for $7.35 a piece. The store charged 0.06% sales tax. The cashier gave Raven $13.25 in change. How much money did she give the cashier?

If Raven had a coupon for 1/3 off total price, before tax, how much is the total price of the scarves with the discount? How much will each girl save on their scarf?

Problem #17- Babysitting

Jayla got a new job babysitting for her neighbor Ms. Clark every day. Ms. Clark offered to pay Jayla $350 for each week (Monday-Friday) or she would pay her $30 for the first day and double it for each following day. Which offer should Jayla accept and why?

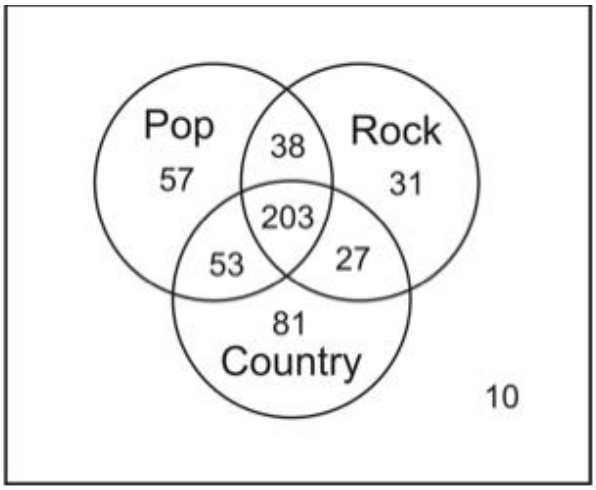
Jayla wants to buy a new iPad for $925. How long will Jayla have to work for Ms. Clark to make enough money to buy the iPad?

Problem #18- Cupcake Fundraiser

The yearbook club made 435 cupcakes for a fundraiser. They put 6 cupcakes into each box. They sold each box of cupcakes for $4.50 or $8.00 for one dozen cupcakes. How many boxes of cupcakes did they have available to sell? If they sold all of the boxes of cupcakes and half of the cupcakes they sold were purchased by the dozen, how much money did they make?

Problem #19- American Idol Math

Susie asked the first 500 American Idol hopefuls at the local audition how they would classify their favorite music genre (pop, rock, or country). The Venn diagram shows the results of the survey.



What is the positive difference between the number of contestants that consider country music to be their favorite genre (or one of their favorite genres) and the number of contestants that do not list country music as one of their favorite genres?

What percent of the contestants listed more than one genre as their favorite? Express your answer to the nearest tenth.

If Susie had extended her survey to include the next ten people in line she would have found that they all would have listed Pop as their only favorite genre. If these contestants had been included, by how many percentage points would the percent of contestants that listed pop as their only favorite genre increase? Express your answer to the nearest tenth.

Problem #20- Cider

Nancy and Tim have an apple cider stand at their school every morning during the fall to raise money for their club. Since September 22 is the Autumnal Equinox, the first day of fall and their first day of business will be September 22...

Several weeks ago, in preparation for their 2009 opening, Nancy and Tim went to pick their apples from a local orchard (all of their cider is homemade). Nancy picked apples at a rate of 30 apples per hour and Tim picked apples at a rate of 25 apples per hour. Tim and Nancy picked the same number of apples. Nancy picked apples for 5 hours, so how many hours must Tim have spent picking apples?

Each gallon of cider produced requires one bushel of apples (40 apples), which cost Nancy and Tim $30 at the orchard. Anxious to calculate how much they will make, Nancy decides to calculate their profits, based on serving 6 oz cups of cider (in cups that were donated by a friend) and charging $2.00 per cup. Assuming they sell all of the cider they can make, how much profit will they make from the apples they picked? Note: There are 128 oz in 1 gallon. Hoping to make more than what the calculations show, Nancy ponders what will happen if they add some water to the cider. She decides to calculate how much they would profit if they added 1.5 gallons of water to the 7.5 gallons of cider. If they sell the diluted cider for the same price as they had planned to cider for ($2.00 per 6 ounce cup), how much additional profit will be made?

Website: **www.mathcounts.org**

Problem #21- The Turtle and the Rabit

It takes the turtle five minutes to travel 100 feet. The rabbit can go that distance in one minute. How long would the rabbit have to wait in order for the turtle to tie him in a 1,000 foot race? Show or explain your work.

Problem #22- Ant Farm

Laura was given an ant farm for her birthday. The farm can hold 100,000 ants. The farm came with 1,500 ants. The next week there were 3,000 ants and then the next week there were 6,000 ants. If the pattern continues, how many weeks will it be until the ant farm is full?

Problem #23- Planet Vu

On the planet Vu there are two kinds of creatures Zios and Zepts. The Zios have three legs and the Zepts have 7 legs. The great space explorer Nicko, who first discovered the planet Vu, saw a crowd of Zios and Zepts. He managed to see that there was more than one of each kind of creature before they saw him. As soon as they saw Nicko, they all rolled over onto their heads and put their legs in the air. Nicko counted 52 legs. How many Zios and how many Zepts were there?

Website: **http://nrich.maths.org**

Component 3: Mathematics in Action

Introduction to Mathematics in Action

There are two components to Mathematics in Action: Performance Tasks and Photography. Both include a variety of activities that promote the application of math skills in real-world situations.

Performance Tasks

- Provides students opportunities to apply their mathematical knowledge in real-world situations
- Student discussions and use of strategies to complete the tasks provide opportunities to make connections
- Students depth of understanding is observed during the process

Using Photographs

- Provides students opportunities to use photographs to create word problems
- In creating word problems students are given opportunity to synthesis their understanding of mathematics concepts
- Provides students opportunities to assess their won understanding of mathematics
- Provides students opportunities to communicate their knowledge

Performance Tasks

Teacher Directions

Provide students with performance tasks to complete. These tasks help them apply the mathematics that they are learning. They will take longer than a day to complete. Some tasks take longer than others to complete.

As students complete the tasks, you may want to have them work in groups of 2 or 4. Each group will then present their solution to the rest of the groups.

There are four tasks:

1. Precise measurement task
2. Long jump competition task
3. Designer doghouse
4. Grocery advertisement (extended to include sharing information to inform the community)

Task #1- Precise Measurement

Teacher Directions: Mark with masking tape the length of 117cm. When students say they have the correct length of string, test them by having them measure their string on your masking tape. If not correct, send them back to the drawing board.

Student Task: You have been asked to create a string that is exactly 117cm long. You have been given the following materials: various lengths of yarn, rulers, meter sticks. Using only those materials measure the string to the exact measurement of 117 cm.

Task #2- Long Jump Competition

Teacher Directions: Pose the task, observe, do not assist, then ask all groups to come together and each make a poster from which to explain how they designed and conducted their competition.

Student Task: You have been asked to work in a group to design, build, and then conduct a long-jump competition to see who can make the longest jump. Explain how you did everything. You have been given the following materials: two meter sticks, masking tape, paper and pencil.

Task #3- Designer Doghouse

Teacher Directions: Give each student the task, observe, and allow them to work in pairs. Do not assist, and have all students share what and how they created their doghouse.

Student Task: You have been asked to design and build a model doghouse using only 1 sheet of construction paper. In addition to the construction paper you have also been given scissors, tape, grid paper, pencils, and rulers.

Task #4- Grocery Advertisement

Teacher Directions: Provide students with the Grocery Advertisement Task. This is an extended task. As a result of completing this task, they will develop a way to educate their community on how to determine the best deals when buying groceries. They can make a flyer, create a poster, give a talk to community members, make a video, etc.

Materials Needed: Variety of Grocery Advertisements

Every week supermarkets spend lots of money on advertisements, with every supermarket claiming to have the lowest prices. Study the prices in recent ads from several supermarkets, Determine if any supermarket tends to have lower prices on some items and higher prices on others. Be careful to note the sizes and quantities (ounces, grams, pounds,) connected with the costs.

After you have made this determination, notice how the advertisements are laid out and how the prices are displayed in the ads. Which items are featured? How are prices quoted differently in the ads? How does each supermarket go about making their products look less expensive?

Based on this analysis, come to at least two conclusions about the people who produce the advertisements for supermarkets and what they must think people want or will believe. Communicate your analysis using a variety of ways.

Support each of your conclusions with evidence from the ads you examined. You must include evidence gained from your computations involving the prices and quantities in the ads.

Sharing with the Community: Using the information you learned from your analysis, develop a plan to educate your community on how to find the best deals when buying groceries. How will you share the information? (flyer, poster, community event, video, etc.)

Using Photographs

Teacher Directions

Provide the students with some pictures (*see **Appendix E***). Ask them to look at the pictures and come up with things they wonder about the pictures?

Have students work with a group (2-4 people) to select one picture. Looking at the picture students will complete the "**I Wonder**" sheet (*see **Appendix D***).

Example: In looking at this picture of Nachos students may wonder…

- How much do the nachos cost?
- How many nachos will fit in the container?
- How do you know there is enough cheese in the tray for your nachos?
- How much profit does a movie theatre make on the nachos they sell?
- Is a rectangular shaped container the best shape to use for nachos?
- If you used another shape would you make more money or loose money if you kept the dimensions similar?
- How long will it take to eat this container of nachos?

Students will work in groups (2-4) to select a question to investigate. They might need resources (internet, interview people, construction paper, etc.) to conduct their research. Working together, they will then formulate a plan to find the solution to their question. Once they have discovered the solution, each group will peresent that information (make a poster, give a spech, write a summary, draw a picture, make a flyer, etc.) making sure to communicate their mathematical thinking to the rest of the groups.

This is a time of exploration for students to identify mathematics ideas that exsist in everyday life and communicate their mathematical understanding. The students will continue to work on this throughout the week.

Extending the Learning into the Community

An extension idea for this activity would be to have the students look at the picture to "spark" an idea of something that they can do to help the community. For example, with this picture they might discuss how people think of the movies when they think of nachos. They could create a proposal for a partnership with a community partner to host a family movie night. People from the community can bring can goods for the local food pantry as their ticket into the movie. They could sell nachos and popcorn at the movie to support the food bank. The proposal should include a description of what they are planning to do, costs associated, estimated profit or benefit to the community. Proposals could also contain charts and graphs where appropriate to support student's argument for their idea Students could plan the entire event, determine the cost and approximate amount of money and canned goods that would be donated to the food pantry.

Student Directions

For each of the photographs, students use the following questions to help guide their thinking:

1. Work with a group (2-4 people) and together select one picture to focus on.
2. What do you wonder about in each of the pictures? (In other words, what questions do you have?)
3. Complete the **I Wonder** Sheet based on the picture selected.
4. Select a question to solve. Work together to develop a plan on how to investigate and solve the problem. (Note, finding the solution will take some investigating. When forming your plan think of the resources you will need to get the necessary information?)
5. Solve the problem and record your solution.
6. Prepare to present your solution to the other groups (speech, poster, picture, flyer, commercial, etc.) Be creative!

**Note – This will take multiple days to complete*

Appendix A- Task Templates

Think Tank Time

Name _____ Date _____

Describe your task	Draw
Calculate	Explain your strategy

Think Tank Time

Name _____ Date _____

Swimming Task 1: **How many strokes does it take to swim the length of the pool?** **How many to swim the width?** **How about a diagonal?** **How do you think these numbers might be related?** **Can you predict the numbers before you get the answers?**	**Draw**
Calculate	**Explain your strategy**

Think Tank Time

Name _____ Date _____

Swimming Task 2: **How fast can you swim?** **How do you know?** **How can you improve your time?**	**Draw**
Calculate	**Explain your strategy**

Think Tank Time

Name _____ Date _____

Swimming Task 3: **Design, conduct, and report a swim meet.** **What do you need?**	**Draw**
Calculate	**Explain your strategy**

Think Tank Time

Name _____ Date _____

Swimming Task 4: **What do you want to know about swimming or swimming pools? Create a task and solve it.**	**Draw**
Calculate	**Explain your strategy**

Appendix B- Math Games Order Information

First in Math

The cost is $3.50 per student. To order, go to www.firstinmath.com to obtain the Summer Subscription Order Form or contact the Ohio Sales Representative:

Jack Heim
888-289-8261
jheim@zoominternet.net

Easy to Set Up and Use- No Load on Teachers

The First in Math Online Program is web-based, so there is so software to install, and program updates are automatic. Students can practice at school or at home using a computer with internet access. All User IDs and Passwords are preregistered and easy to print, so you can be up and running in just minutes.

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24 Game

There are different sets of cards for each math function. To order, go to www.24game.com. You can order directly online or obtain the Order Form to fax or mail in. Questions should be directed to:

610-253-5255
Email: info@24game.com

Download free Certificates of Excellence at www.24game.com.

Appendix C- Think Tank Time Questions & Answers

1. **Can you tell me what you're doing?**
2. **Before you begin, can you predict what you think the answer might be?**
3. **Would you explain to me how you figured this out?**
4. **Why did you do this?**
5. **Can you convince me that you're correct?**
6. **Would it help to use blocks or paper to solve this problem?**
7. **Can you draw for me on paper what you did with the blocks?**
8. **Can you do this same problem in a different way?**
9. **What else can you tell me about this problem?**
10. **What does that mean?**
11. **I understand what you're saying. Can you show me how your idea works?**
12. **Does anyone have the same answer but a different way to explain it?**
13. **Would you ask the rest of the kids that question?**
14. **Can you convince the rest of us that that makes sense?**
15. **Why do you think that?**
16. **Why is that true?**
17. **How did you reach that conclusion?**
18. **Does that make sense?**
19. **Can you make a model to show that?**
20. **Does that always work?**
21. **Why did you solve the problem this way?**

Problem #1- Target Number

Answer: Answers will vary. Possible solutions are as follows:

22 + 22+ 0 + 0 + 0 = 44
18 + 2 + 11 + 11 + 2 = 44
18 + 8 + 4 + 10 + 4 = 44
22 + 10 + 10 + 2 + 0 = 44
10 + 10 + 10 + 10 + 4 = 44
8 + 2 + 10 + 22 + 2 = 44

Emphasize that the same 5 numbers can NOT be hit in a different order.

Problem #2- Pedro's Pizza

Pedro's Pizza is opening a new restaurant. They have purchased 24 small square tables for the banquet room of the restaurant. A rectangular banquet table will be made by pushing the small square tables together. Each small table can seat one person on a side and has an area of nine square feet. They are trying to decide how many people they could seat if they pushed all the tables together. They know that they can arrange the small tables to make several different rectangular banquet tables. What is the greatest number of people they could seat by putting all the tables together? What is the least number of people they could seat with all the tables pushed together?

Answer: The greatest number of people they could seat is 50 people by making a table that is 1 small table wide by 24 small tables long. The least number of people they could seat is 20 people by making a table that is 4 small tables wide by 6 small tables long.

If the banquet room is 40 feet long by 15 feet wide, what is largest group that they can seat in the room with all the tables pushed together? Justify your answer using words, numbers, and/or pictures.

Answers will vary. A table that is 12 small tables by 2 small tables would fit in the room (it would be 36 feet long by 6 feet wide) and would seat 28 people. Students may say that a table that is 8 small tables by 3 small tables (24 feet long by 9 feet wide) would be a better fit because it would allow more space at the ends of the table to move around the room. The 8 small tables by 3 small tables arrangement would seat 22 people.

Problem #3- Vegetable Garden

Answer: Phylis's garden will be 90 sq. feet less in area. When the sides of the garden were made half as long, the area was reduced by 75% or ¾. The original garden was 10 ft. by 12 ft. giving it an area of 120 sq ft. (10 x 12 = 120). The new garden measures 5 ft. by 6 ft. (half of 10 is 5; half of 12 is 6) giving it an area of 30 sq ft. (5 x 6 = 30). The difference between the area of the original garden and the new garden is 90 sq ft. (120 – 30 = 90). The original garden was 120 sq ft. and the new garden is 30 sq ft. making the new garden 25% or ¼ the size of the original garden.

Problem #4 - Painting a

Answer: The area of the red wall is 27 sq ft. (9 x 3 = 27) requiring 1 qt. of red paint. The area of the yellow wall is 81 sq ft. (9 x 9 = 81) requiring 2

Room	**quarts of yellow paint.**

Problem #5- Sophia's Ride	**Answer: The bakery is 1 ¼ mile away from Sophia's house. The distance between Sophia's house and her friend's house is 2 miles. Half of 2 miles is 1 mile, which is the location of the grocery store. The problem stated that she stopped at the bakery which was one-fourth of the way from the grocery to the friend's house. Students will need to divide the number line from the grocery to the friend's house into intervals of 4 to determine the location of the bakery.** **Sophia still has 3/8 of the distance to go, because the grocery is half of the way and the bakery is 1/8 of the way further so that is 5/8 of the trip.**

Problem #6- Parking Lot	**Answer: There are 750 cars are in parking lot. Students may draw a picture to represent the fractional amount of cars in the parking lot.** **¾ of 1000 parking spaces is equivalent to 750 spaces. 2/5 of 750 vehicles is equivalent to 300 vehicles. 300 parking spaces are occupied by mini vans. 300 mini vans were parked in the parking lot. 300 subtracted from 750 is 450. There are 450 cars parked in the parking lot.**

Problem #7- John Conway's Family Puzzle	**Answer: 4 sisters and 3 brothers** Website: **http://www.princetonfriendsschool.org**

Problem #8- Pizza Pizza	Pizza Palace provided free pizza to Scottsdale Elementary's after school program. At the end of the day the following amounts of pizza was left: **1/3 cheese pizza** **4/6 pepperoni pizza** **3/12 sausage pizza** **12/18 Hawaiian pizza** Which type of pizza has the least left over? How do the pizza's compare to each other? **Answer: There is 2/3 of pepperoni pizza and 2/3 of Hawaiian pizza left, there is 1/3 of cheese pizza left and 1/4 of sausage pizza left. The sausage pizza has the least amount left over.** **There is fewer cheese pizza than pepperoni or Hawaiian.** Mrs. Smith, the after school coordinator placed all of the remaining pizza into boxes. If the leftover pizza was combined to make a whole pizza, how many pizza's could be made with the leftovers? **Answer: They could make 1 whole pizza with 5/6 left over.**

Problem #9- Butterfly Garden

Answer: The perimeter of their garden is $24\frac{1}{2}$ ft. They have $\frac{1}{2}$ ft of extra fencing material.

$$6\frac{3}{4} + 6\frac{3}{4} + 5\frac{1}{2} + 5\frac{1}{2} = 24\frac{1}{2} \text{ ft}$$

Problem #10- Buying an iPad

Answer: Ashley will not be able to buy the iPad before the sale ends. If she saves $75 a week she will have $300 in 4 weeks. With the $240 she already has in her bank account she will have a total of $540. She will not have enough money to buy the iPad before the sale ends. If she takes the extra babysitting job, she will have enough to buy the iPad during the final week of the sale.

Number of weeks	Total (saving $75 a week)	Total with extra baby sitting
0	240	240
1	315	335
2	390	430
3	465	525
4	540	620
5	615	715
6	690	

Problem #11- Savings Account

Answer: It will take 9 years for Sally to have as much money saved as Fran. A table is one way that they can show their answer.

Year	1	2	3	4	5	6	7	8	9
Fran	200	400	600	800	1000	1200	1400	1600	1800
Sally				300	600	900	1200	1500	1800

Problem #12- Fox, Chicken and Grain

Answer: The farmer takes the chicken across leaving the fox and grain by the river. He then puts the fox in the boat and takes him across. He brings the chicken back with him and leaves it by the river while he takes the grain over. The farmer takes the grain over so that the fox and the grain are on the other side of the river. He then returns to pick up the chicken. This is how he gets all of his possessions across. Students may use various ways to show their answers (pictures, diagrams)

Website: **http://www.princetonfriendsschool.org**

Problem #13- Fault Free Rectangles

Answer: The smallest number of dominoes needed to make the rectangles is 6.

Website: **http://www.princetonfriendsschool.org**

Problem #14- The Dark and Stormy Bridge

Answer: It is not possible. Student responses will vary, but they should include mathematical correct explanation.

Website: **http://www.princetonfriendsschool.org**

Problem #15- School Makeover

Lou has been contracted to tile classroom floors as part of the renovation of a local school. During the first five days on the job, Lou completed tiling 4, 5, 6, 4 and 8 classrooms, respectively. What is the average number of classrooms Lou tiled each day during that five-day period? Express your answer as a decimal to the nearest tenth.

Answer: To determine the average number of classrooms calculate the total number of classrooms Lou tiled over the five days and divide by five. Doing so, we find that the average number of classrooms that Lou can tile in a day is (4 + 5 + 6 + 4 + 8) / 5 = 27 / 5 = 5.4 classrooms.

Electricians Chris and Dave have been contracted to wire every classroom in the same school. Each of the classrooms requires exactly the same electrical work. Working alone, Chris can complete the wiring for one classroom in 20 hours, and it takes Dave 15 hours to do the same job by himself. After 120 hours of work they had completed wiring 1/2 of the classrooms in the school. How many classrooms are in the school?

Answer: A common measure would make Chris' and Dave's rates easier to compare. Using the least common multiple of 20 and 15, which is 60, will work. At a rate of 1 classroom every 20 hours, Chris can wire 3 classrooms in 60 hours. At a rate of 1 classroom every 15 hours, Dave can wire 4 classrooms in 60 hours. So every 60 hours they complete wiring a total of 7 classrooms. That means in 120 hours they will complete wiring (120/60) × 7 = 2 × 7 = 14 classrooms. If this is 1/2 of the total number of classrooms, the school must have a total of 2 × 14 = 28 classrooms.

Website: **www.mathcounts.org**

Problem #16- Buying Scarves

Raven went shopping with her friends at Easton. Raven and her five friends put their money together to buy scarves for $7.35 a piece. The store charged 0.06% sales tax. The cashier gave Raven $13.25 in change. How much money did she give the cashier?

Answer: She gave the cashier $60
The total number of scarves being purchased is 6.
6 x 7.50 = $44.10
0.06 x $44.10 = $2.65
$44.10 + $2.65 = $46.75
$46.75 + $13.25 = $60

If Raven had a coupon for 1/3 off total price, before tax, how much is the total price of the scarves with the discount? How much will each girl save on their scarf?

Answer: The total price of the scarves with the discount is $29.40.
44.10 x 1/3 = 14.70
44.10 – 14.70 = 29.40

Each girl will save $2.45 on her scarf.
29.40÷6 = 4.90
7.35 – 4.90 = 2.45

Problem #17- Babysitting

Answer: If Jayla is paid $350 a week she will have enough for the iPad by Week 3 if she saves all of her money. If Jayla is paid $30 and it is doubled, by week 5 she will have $930.

Jayla should take the $30 a day that will be doubled. Week 1 = 30; Week 2 = 60; Week 3 = 120; Week 4 = 240; Week 5 = 480. By the fifth week Jayla will be making more than $350 a week. She will be able to make more money by starting at $30 and doubling it each week.

Problem #18- Cupcake Fundraiser

Answer: They have 72 complete boxes to sell. If they sold all the cupcakes they would make $306.
72÷2=36
36 boxes for $4.50 = $162
36÷2=18 (36 boxes of six cupcakes – 2 boxes make a dozen)
18 boxes for $8.00 = $144
$162 + $144 = $306

Problem #19- American Idol Math

What is the positive difference between the number of contestants that consider country music to be their favorite genre (or one of their favorites) and the # of contestants that do not list country music as one of their favorite genres?

Answer: (81 + 53 + 203 + 27) – (57 + 38 + 31 + 10) = 364 – 136 = 228 people

What percent of the contestants listed more than one genre as their favorite? Express your answer to the nearest tenth.

Answer: [(53 + 38 + 27 + 203)/500](100) = (321/500)(100) = 64.2%

If Susie had extended her survey to include the next ten people in line she would have found that they all would have listed Pop as their only favorite genre. If these contestants had been included, by how many percentage points would the percent of contestants that listed pop as their only favorite genre increase? Express your answer to the nearest tenth.

Answer: Original percent of contestants that listed pop as a favorite: (57/500)(100) = 11.4%

New percent:
((57 + 10)/(500 + 10))(100) ≈13.137%
Thus, the additional people would result in an increase of 13.137 – 11.4 = 1.7 percentage points, to the nearest tenth.

Problem #20- Cider

Nancy and Tim have an apple cider stand at their school every morning during the fall to raise money for their club. Since September 22 is the Autumnal Equinox, the first day of fall and their first day of business will be September 22...

Several weeks ago, in preparation for their 2009 opening, Nancy and Tim went to pick their apples from a local orchard (all of their cider is homemade). Nancy picked apples at a rate of 30 apples per hour and Tim picked apples at a rate of 25 apples per hour. Tim and Nancy picked the same number of apples. Nancy picked apples for 5 hours, so how many hours must Tim have spent picking apples?

Answer: 5(30) = 150
150/25 = 6 hours

Each gallon of cider produced requires one bushel of apples (40 apples), which cost Nancy and Tim $30 at the orchard. Anxious to calculate how much they will make, Nancy decides to calculate their profits, based on serving 6 oz cups of cider (in cups that were donated by a friend) and charging $2.00 per cup. Assuming they sell all of the cider they can make, how much profit will they make from the apples they picked? Note: There are 128 oz in 1 gallon.

Answer: 300 apples/40 = 7.5 bushels = 7.5 gallons of cider
7.5 gallons(128 oz/gal) = 960 oz of cider
960/6 = 160 cups of cider
160($2.00) = $320.00
$320 – ($30 per bushel × 7.5 bushels) = $95.00

Hoping to make more than what the calculations show, Nancy ponders what will happen if they add some water to the cider. She decides to calculate how much they would profit if they added 1.5 gallons of water to the 7.5 gallons of cider. If they sell the diluted cider for the same price as they had planned to cider for ($2.00 per 6 ounce cup), how much additional profit will be made?

Answer: Since they are adding 1.5 gallons of water, they will have an additional 1.5 gallons of liquid to sell without any additional expenses. Thus, those (1.5 gallons)(128 oz per gallon)/(6 oz per cup) = 32 extra cups are pure profit. Which will result in an additional profit of 32($2.00) = $64.00.

Website: **www.mathcounts.org**

Problem #21- The Turtle and the Rabit

Answer: It would take the turtle 50 minutes to travel 1,000 feet (There are 10 groups of 100 in 1,000; Each 100 feet takes 5 minutes – 5 x 10 = 50). It would take the rabbit 10 minutes to travel 1,000 (1 x 10 = 10). The rabbit would be waiting 40 minutes for the turtle to catch up.

Problem #22- Ant Farm

Answer: Week 1 = 1,500; Week 2 = 3,000; Week 3 = 6,000; Week 4 = 12,000; Week 5 = 24,000; Week 6 = 48,000; Week 7 = 96,000. The ant farm will be full after 7 weeks.

Problem #23- Planet Vu

Answer: There are 8 Zios and 4 Zepts.

Students may create a number sentence and use the guess and check strategy to solve this problem. A possible number sentence could be 3(p) + 7 (s) = 52 legs. First, substitute the digit 2 for p. If we subtract 6 legs from 52 legs, 46 legs are remaining.

3(p) + 7(s) = 52
3(2) + 7(s) = 52
6 + 7(s) = 52
52 – 6 = 46;

There is no factor that can be multiplied by 7 that is equal to 46.

Students know that by adding the legs of the Zios and the Zepts, 52 legs were seen. Students also know that each Zio and Zept is seen more than once. Looking at the multiples of 3 and 7, students will be able to combine three sets of numbers to get the sum of 52. Referring back to the question, there had to be more than one of each kind of creature, so the possible answer is 8 Zios and 4 Zepts.
24 + 28 = 52
3(p) + 7(s) = 52
3(8) + 7(4) = 52

Website: **http://nrich.maths.org**

Appendix D- I Wonder…

Tape Photograph here

Identify the mathematics in the photograph

What do you wonder about when looking at this picture? Write down questions you have based on the picture.

Work with a partner and begin constructing a plan to find a solution to one of your challenging questions.

Appendix E- Photographs


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NO REFUNDS
FLAT RATE
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Resources

Click titles to view links below.

National Association Resources

Afterschool Alliance

National After-School Association

National Summer Learning Association

National Girls Collaborative Project

Sources for Rich Problems

Ohio Resource Center

Inside Mathematics

Balanced Assessment (MARS task)

NCTM Illuminations

Problems of the Week: http://www.kent.wednet.edu/pcpow/
http://www.stfx.ca/special/mathproblems/welcome.html
(word problems by grade level)

Lesson Plan Archives

http://www.math.fsu.edu/Vrtual/index.php?f=4 (Math Virtual Library)
http://www.learner.org/exhibits/dailymath/ (Math in Daily Life)
http://mathforum.org (Math Forum)
http://ohiorc.org Ohio Resource Center
http://scssi.scetv.org/mims/lessplns.htm
http://www.nytimes.com/learning/teachers/lessons/mathematics.html
http://www.pbs.org/teachersource/math.htm?default
http://www.math.hmc.edu/funfacts/
http://GoENC.com/ (Eisenhower National Clearinghouse)
http://www.nctm.org/ (National Council of Teachers of Mathematics)
http://mtl.math.uiuc.edu/menu.php?page=classroomres (University of Illinois)
http://archives.math.utk.edu/ (University of Tennessee)
http://www.ed.gov/free/s-math.html (Federal resources for Education Excellence)
http://www.educationworld.com/math/
http://www.nku.edu/~mathed/gifted.html (Resources for Gifted Students)
http://www.webmath.com/ (Homework Help)
http://earlymath.erikson.edu (for younger children)

Activities & Curriculum

- Academic Enrichment in Afterschool Training Toolkit http://www.sedl.org/afterschool/toolkits/about_toolkits.html?tab=science
- Conrad Foundation - Spirit of Innovation Award http://www.conradawards.org/about
- PBS Parents Exploring Science with Children http://www.pbs.org/parents/exploringscience/
- FETCH! PBS Kids Go! http://www.pbs.org/parents/fetch/program/index.html
- NASA Summer of Innovation: http://www.nasa.gov/offices/education/programs/national/summer/education_resources/index.html
- PBS Teacher Featured Classroom Resources http://www.pbs.org/teachers/
- PEAR (Programs in Education, Afterschool, and Resiliency) http://www.pearweb.org/research/ilsa.html
- SMILE (Science and Math Informal Learning Educators pathway of the National Science Digital Library) http://howtosmile.org/

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