Family Math Night To Go!

Presented by Heidi Belle-Isle
H_blisle@sau9.org
Family Math Night To Do List

2 Months in Advance
- Is there another organization you can partner with (Title 1, PTA)
- Set date & time
- Reserve the building
- Reserve the date with staff

1 Month in Advance
- Assign math activities to each staff member
- Ask for school/parent volunteers
- Decide the location of each math activity
- Order math games for door prizes
- Start advertising in the school newsletter

2 Weeks in Advance
- Order refreshments
- Obtain a materials list from each staff member and go shopping
- Create take home packets for each family
- Determine where volunteers are needed
- Send home another advertisement
- Send invitations to any important afterschool program advocates or community members

1 Week in Advance
- Talk with each staff member and volunteer to make sure they are all set with their activity/duty
- Create a sign for every activity with an activity name and suggested grade level
- Advertise on the school announcements or go class to class to talk it up with the kids

1 Day in Advance
- Send home one last reminder about the event
- Call and confirm any refreshments that you ordered

Day of Event
- Pick up food
- Have staff members set up their area/activity
- Take photos!
- Set up a sign in table complete with information about your program
- HAVE FUN!!!!

After the Event
- Send out thank you notes to special guests, volunteers, and staff
- Send photos and/or an article to the local newspaper
All Pine Tree Families are Invited to...

Family Math Night!!!
Sponsored by Title 1
And Project SUCCEED

Wednesday, November 30
5:15 - 6:45 p.m.
Pine Tree Gym & Cafeteria

Enjoy an evening of fun math games and activities that your entire family will enjoy! 50 families will receive a bag containing directions and materials for a variety of math games that you can play at home!

Sandwiches will be served. Please RSVP so we can plan our food accordingly.

Sandwiches  Raffle Prizes

_ _ _ RSVP by Monday, November 28 _ _ _

Child’s Name _____________________________

Our family will be attending Family Math Night.

A total of ___________ people will be attending.
Take Home Packet

It is suggested that you put together a packet of games to give each family as they leave the festivities. These packets will encourage families to play math games at home. This will help increase math achievement as well as support positive family interactions. Game directions should be photocopied and placed in a folder. Materials such as dice and cards can be packaged in sandwich bags.

Suggested Games:
- Match My Number
- Hamburgers
- Frog Hop
- Battle of the Dice
- Solitary Sum
- Addition Top-It
- What’s the Difference?
- Multiplication Top-It
- Baseball Math
- Multiplication Snap
- Sloth Races
- Pick and Choose
- No Consecutive Number Puzzle

Suggested Materials:
- Deck of Cards
- Two 6-Sided Dice
- Two 10-Sided Dice

Packaging Supplies:
- Folders
- Sandwich Bags
## List of Games and Activities

### Group Activity
- **David Copperfield’s Circus Train**

### Mathematical Practices
- **Problem Solving**

### Basic Math Skills
- **Match My Number**
  - **Kindergarten Counting and Cardinality**
    - Identifying the Number of Elements in a Set
    - Matching a Given Number with a Matching Set

- **Making Necklaces**
  - **Kindergarten Operations and Algebraic Thinking**
    - 1 to 1 Correspondence
    - Adding & Subtracting

- **Hamburgers**
  - **Kindergarten Counting and Cardinality**
    - Value of Numbers 1 to 10

- **Frog Hop**
  - **Kindergarten Counting and Cardinality**
    - Number Recognition

### Addition & Subtraction
- **Battle of the Dice**
  - **Grade 1 & 2 Operations and Algebraic Thinking**
    - Addition Facts Through 12
    - Comparing Numbers

- **Solitary Sum**
  - **Grade 1 & 2 Operations and Algebraic Thinking**
  - **Grade 2 Numbers and Operations in Base Ten**
    - Addition of Three 1-Digit Addends

- **Addition Top-It**
  - **Grade 2 Operations and Algebraic Thinking**
    - Addition Facts Through 12 + 12

- **What’s the Difference**
  - **Grade 2 & 3 Numbers and Operations in Base Ten**
    - Subtracting 3 Digit Numbers

### Multiplication & Division
- **Multiplication Top-It**
  - **Grade 3 Operations and Algebraic Thinking**
    - Multiplication Facts Through 12 x 12

- **Baseball Math**
  - **Grade 3 Operations and Algebraic Thinking**
    - Multiplication Facts

- **Multiplication Snap**
  - **Grade 3 Operations and Algebraic Thinking**
    - Multiplication Facts to 50

- **Doggone Division**
  - **Grade 3 Operations and Algebraic Thinking**
    - Division Facts
<table>
<thead>
<tr>
<th>Math Odds &amp; Ends</th>
<th>Grade 3 &amp; 4 Numbers and Operations - Fractions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cookie Fractions</td>
<td>Fractions</td>
</tr>
<tr>
<td>Sloth Races</td>
<td>Grade 6 Statistics and Probability</td>
</tr>
<tr>
<td></td>
<td>Grade 1 &amp; 2 Operations and Algebraic Thinking</td>
</tr>
<tr>
<td></td>
<td>Probability</td>
</tr>
<tr>
<td></td>
<td>Addition to 12</td>
</tr>
<tr>
<td>Candy Statistics</td>
<td>Grade 6 Statistics and Probability</td>
</tr>
<tr>
<td></td>
<td>Creating Frequency Tables &amp; Bar Graphs</td>
</tr>
<tr>
<td></td>
<td>Statistical Data (Mean, Median, Mode)</td>
</tr>
<tr>
<td>Pick and Choose</td>
<td>Mathematical Practices</td>
</tr>
<tr>
<td></td>
<td>Patterns</td>
</tr>
<tr>
<td></td>
<td>Problem Solving</td>
</tr>
<tr>
<td>Problem Solving</td>
<td></td>
</tr>
<tr>
<td>Penny Problems</td>
<td>Mathematical Practices</td>
</tr>
<tr>
<td></td>
<td>Problem Solving</td>
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<tr>
<td>Toothpick Problems</td>
<td>Mathematical Practices</td>
</tr>
<tr>
<td></td>
<td>Problem Solving</td>
</tr>
<tr>
<td>No Consecutive Numbers Puzzle</td>
<td>Mathematical Practices</td>
</tr>
<tr>
<td></td>
<td>Problem Solving</td>
</tr>
<tr>
<td>Balancing Nail Trick</td>
<td>Mathematical Practices</td>
</tr>
<tr>
<td></td>
<td>Grade 4 Geometry</td>
</tr>
<tr>
<td></td>
<td>Problem Solving</td>
</tr>
</tbody>
</table>

Bold type signifies alignment with the Common Core State Standards for Mathematics
David Copperfield’s Circus Train*

Math Skills:
Mathematical Practices
Problem Solving

The following 9 cards represent nine cars on a Circus Train. You may start in the Dancing Bears, Circus Performers, Elephants, or Lions cars. You may move one step up, down, left, or right. You may not move diagonally.

Clown Car | Dancing Bears | Tent
---|---|---
Circus Performers | Engine | Elephants
Caboose | Lions | Snack Car

Step #1 - Make 4 moves
You couldn’t be in the Snack car, so remove it

Step #2 - Make 5 moves
You couldn’t be in the Elephant car, so remove it

Step #3 - Make 2 moves
You couldn’t be in the Lions car, so remove it

Step #4 - Make 3 moves
You couldn’t be in the Tent or Caboose cars, so remove them

Step #5 - Make 3 moves
Since many of you just left the Dancing Bears card, remove it

Step #6 - Make 1 move
You are in the Circus Performers car
David Copperfield’s Circus Train

Start in Clown Car, Tent, Engine, Caboose, or Snack Car

Move 3 – remove Clown Car
Move 4 – remove Snack Car
Move 5 – remove Dancing Bears
Move 1 – remove Tent
Move 2 – remove Caboose
Move 3 – remove Lions
Move 2 – remove Circus Performers
Move 1 – remove Engine

YOU ARE IN THE Elephants CAR

Start in the Caboose, Staff, Engine, Clown Car, or Tent Car

Move 4 – remove Dancing Bears
Move 3 – remove Snack Car
Move 2 – remove Tent and Caboose
Move 3 – remove Lions
Move 1 – remove Clown Car
Move 3 – remove Circus Performers and Elephant Car

EVERYONE IS IN THE ENGINE
Start in the Dancing Bears, Circus Performers, Elephants or Lions Car

Move 2 – remove Caboose

Move 3 – remove Elephants

Move 5 – remove Snack and Tent

Move 3 – remove Lions

Move 1 – remove Engine

Move 3 – remove Circus Performers and Dancing Bears

YOU ARE IN THE CLOWN CAR

* When David Copperfield performs this trick he calls it the Orient Express. I have changed the name of the train and the individual cars to make it more appropriate and fun for kids of all ages.
David Copperfield’s Circus Train

Your assignment is to explain why this magic trick works.

Some suggestions:
- Number the cards (Clown Car = 1, Dancing Bears = 2, Tent = 3)
- Which numbers can you start on? What do these numbers have in common?
- Do the trick several times, recording the numbers of the cars you visit, and the ones you remove.
- How can David Copperfield be sure you’re not in the cars he tells you to remove?

Explanation:

When the cars are numbered 1 to 9, simple rules of addition tell us that:
- An odd plus an odd equals an even
- An even plus an even equals an even
- An even plus an odd equals an odd

So if you start on an odd numbered car and move 3, you will end up in an even numbered car. That means, you can remove any odd numbered car as long as it is around an outside edge (so you don’t trap anyone without a possible next move). Play continues in this fashion until you are left with only one odd or even numbered car.
<table>
<thead>
<tr>
<th>Caboose</th>
<th>Circus Performers</th>
<th>Clown Car</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lions</td>
<td>Engine</td>
<td>Dancing Bears</td>
</tr>
<tr>
<td>Snack Car</td>
<td>Elephants</td>
<td>Tent</td>
</tr>
</tbody>
</table>
Match My Number

Math Skills:
**Kindergarten Counting and Cardinality**
Identifying the number of elements in a set
Matching a given number with a set containing that number of elements

Number of Players:
2 or more

Materials:
Game board
1 marker per player
1 – 10 sided die

Directions:
Put your markers on start.

Youngest player goes first.

Take turns rolling the die. Move your marker forward to the first space that contains the same number of shapes as the number you rolled.

If you cannot move forward, you lose that turn.

You may share a space with another player.

The first player to land on finish is the winner. To land on finish you must roll a 1.
Making Necklaces

Math Skills:
Kindergarten Operations and Algebraic Thinking
1-1 Correspondence
Adding
Subtracting

Number of Players:
1+

Materials:
Cereal with holes (Cheerios, Fruit Loops)
String
Die

Directions:
The first person rolls a die. The player then puts the number of cereal pieces on the string as indicated by the die.

Play continues with any subsequent players.

Play continues until every player has had ten rolls.

After ten rolls, have each player tie their string to make a necklace. Have each player count the number of cereal pieces on their necklace and compare their number to the other players.

Now have each student take turns rolling the die ten times. This time they “subtract” or eat as many pieces off their necklace that the die indicates.

After ten rolls, have students compare how many pieces each student has left.
Hamburgers

Math Skills:
Kindergarten Counting and Cardinality
Value of Numbers 1-10

Number of Players:
2+

Materials:
Number Cards 1-10 (You may use playing cards with Ace=1)

Directions:
Shuffle the cards and put them in a pile face down.

Each player takes two cards and arranges them smallest to largest.

After all players have arranged their cards, one more card is turned over. If this card falls between a player’s two numbers, they score a point.

Example: Player 1 Player 2 Player 3
          3    7    5    10    2    9

If the card that is turned over is 4, players 1 & 3 each score a point.

All cards are collected and shuffled. Continue playing until a player reaches a predetermined number of points.
Frog Hop

Math Skills:
Kindergarten Counting and Cardinality
Number recognition

Number of Players:
2+

Materials:
Game board
Coloring Utensils
Die
25 Small markers to fit into lily pads (beans, pebbles)

Directions:
Each player chooses a frog that they think will reach the pond lily first. Players will identify their frog by coloring it or writing their initials on it.

The first player rolls the die, identifies the number, and places a marker (bean) on the first square of the frog that matches the number.

Take turns rolling the die and advancing the frogs along their path. To advance a frog, place another marker on the next square each time the frog’s number comes up. Remember that the frogs are racing, and you might have to place markers on a frog that is not your own.

Keep rolling the die until one frog crosses the finish line and reaches his/her pond lily.
Battle of the Dice

Math Skills:
Grade 1 & 2 Operations and Algebraic Thinking
Addition facts through 12
Comparing numbers

Number of Players:
2 to 6

Materials:
Game sheet
Writing utensil
2 dice per player

Directions:
Designate a scorekeeper for the entire game. The scorekeeper will record each player’s points in the correct column on the game sheet. A running total should be kept.

All players roll their 2 dice at the same time. The player with the greatest sum gets 1 point.

If there is a tie between 2 or more players, all the players roll their dice again. The player with the greatest sum gets 2 points.

The first player to reach 10 points is the winner.

Variations:
This game could be played using icosahedron dice (20-sided) to practice attaining higher sums.

The player who rolls the highest product, highest difference, least sum, least product, or least difference is the winner.
<table>
<thead>
<tr>
<th>Player's Names</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
</tr>
</thead>
</table>

**Battle of the Dice**
Solitary Sum

Math Skills:
Grade 1 & 2 Operations and Algebraic Thinking
Grade 2 Numbers and Operations in Base Ten
Addition of three 1-digit addends

Number of Players:
2+

Materials:
1 die (the higher the number of sides on the die, the more challenging the game)
1 game sheet per player
1 writing utensil per player

Directions:
One player rolls the die and calls out the number.

All players write the number in any of the nine squares of their game grid.

Continue until all 9 squares of the grid are filled.

Find the sum of the 3 numbers in each row and write it beside the row. Find the sum of the 3 numbers in each column and write it beside the column.

Cross out any of your sums that appear more than once.

Add up the remaining sums to find your score.

The player with the highest score wins.

<table>
<thead>
<tr>
<th>6</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

9

10

13

Score 38

_____  _____  _____
Solitary Sum

Game 1

Game 1
Score ______

Game 2

Game 2
Score ______
**Addition Top-It**

**Math Skills:**  
**Grade 2 Operations and Algebraic Thinking**  
Addition facts through $12 + 12$

**Number of Players:**  
2

**Materials:**  
Deck of cards with jokers removed (Ace=1, J=0, Q=11, K=12)

**Directions:**  
Shuffle the deck and divide the cards equally between two players.

Each player turns over the top 2 cards and finds the sum. Each player announces the sum to the other player.

The player with the highest sum gets all 4 cards.

If the sums are equal, then each player lays 3 cards face down on the pile. Then they turn over 2 new cards, add the numbers, and announce the sum. The player with the highest sum wins all the cards in the pile.

Play continues until 1 player has all the cards.

**Variations:**  
Play Subtraction Top-It. Subtract the smaller number from the larger one to find the difference. The player with the highest difference gets the cards.

Turn over 3 or more cards for each player to increase the addition challenge.
What’s the Difference?

Math Skills:
Grade 2 & 3 Numbers and Operations in Base Ten
Subtracting 3 digit numbers

Number of Players:
2+

Materials:
10 sided die (or number cards 0-9)
A game board for each player
A writing utensil for each player

Directions:
Roll the die.

Each player selects a space on their game board and writes the number of the die on it.

The die is rolled 5 more times. Players continue to add the numbers to their game board.

Once all the spaces are filled in, players compute the difference.

The player with the smallest difference wins the round and receives 1 point. If there is a tie both players receive 1 point for the round. A negative difference results in no points.

Play continues until one player receives a predetermined amount of points.

Variations:
Vary the number of cards to make the game level easier or more challenging.
What's the Difference?
**Multiplication Top-It**

**Math Skills:**
*Grade 3 Operations and Algebraic Thinking*
Multiplication facts through 12 x 12

**Number of Players:**
2

**Materials:**
Deck of cards with jokers removed (Ace=1, J=0, Q=11, K=12)

**Directions:**
Shuffle the deck and divide the cards equally between two players.

Each player turns over the top 2 cards and finds the product. Each player announces the product to the other player.

The player with the highest product gets all 4 cards.

If the products are equal, then each player lays 3 cards face down on the pile. Then they turn over 2 new cards, multiply the numbers, and announce the product. The player with the highest product wins all the cards in the pile.

Play continues until 1 player has all the cards.

**Variations:**
Turn over 3 or more cards for each player to increase the multiplication challenge.

Play Division Top-It. Use only the cards 1-9. Turn over 3 cards. Use the largest 2 cards to make a 2 digit number. Divide the 2 digit number by the number on the 3rd card. The player with the highest quotient wins.
Baseball Math

Math Skills:
**Grade 3 Operations and Algebraic Thinking**
Basic multiplication facts through 36, 81, or 144

Number of Players:
2

Materials:
2- 6 sided dice (facts through 36)
2- 9 sided dice (facts through 81)
2- 12 sided dice (facts through 144)
Game sheet
4 markers (beans, pennies)
Writing utensils
Batting Chart

Directions:
Each player rolls the dice to see who goes first. The player that rolls the greater product is at bat first.

The batter rolls the dice, finds the product, and uses the Batting Chart to see if he/she has hit a single, double, triple, homerun, or if he/she is out. All players (indicated by the markers) on base run the number of bases that the batter hits and runs. Play continues until player 1 has made 3 outs. An incorrect answer is an automatic out.

The player with the highest score at the end of 6 full innings is the winner.
Batting Chart

If your product is:

5 or less …… You are out!

6 to 15 …… Single (one base)

16 to 24 …… Double (two bases)

25 to 35 …… Triple (three bases)

36 …… Home run!

Products up to 36
If your product is:

8 or less …… You are out!

9 to 19 …… Single (one base)

20 to 35 …… Double (two bases)

36 to 50 …… Triple (three bases)

Over 50 …… Home run!

Products up to 81
If your product is:

19 or less …… You are out!

20 to 45 …… Single (one base)

46 to 70 …… Double (two bases)

71 to 100 …… Triple (three bases)

Over 100 …… Home run!
Baseball Math

Runs and Outs Tally

<table>
<thead>
<tr>
<th>Inning</th>
<th>Team 1</th>
<th>Team 2</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Runs</td>
<td>Outs</td>
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</tbody>
</table>

Scoreboard

<table>
<thead>
<tr>
<th>Inning</th>
<th>Team 1</th>
<th>Team 2</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
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</tbody>
</table>
Multiplication Snap

Math Skills:
Grade 3 Operations and Algebraic Thinking
Multiplication facts to 50

Number of Players:
2

Materials:
Deck of cards 1-10 (ace = 1)

Directions:
Divide the cards into two piles; cards ace-5 are in one pile, and cards 6-10 are in another pile. Each player takes one of the piles and places it in front of them face down.

At the same time, each player turns over their top card. Players find the product of the 2 cards. The first player to orally give the correct answer collects both cards.

If both players give the correct answer at the same time, they turn over the 2 cards and place 2 new cards on top. The first player to give a correct answer collects all accumulated cards.

Play continues until the 2 original piles are finished. The player that has accumulated the most cards is the winner.

Variations:
To make the game more challenging divide the cards 1-10 randomly, allowing the product to be up to 100.

Use the Jack as 11 and the Queen as 12 to make products up to 144.
Doggone Division

Math Skills:
Grade 3 Operations and Algebraic Thinking
Division facts

Number of Players:
2

Materials:
Division flashcards
Game board
Writing Utensil
Calculator (if the division flashcards do not have answers on the back side)

Directions:
Decide who plays first.

The first player picks a division flashcard off the top of the pile and calculates the quotient.

The second player checks the answer using the back of the flashcard or a calculator.

If player 1 is correct than he/she gets to draw a line segment on the game board between 2 consecutive dots.

Play continues with player 2.

A player that draws a line that completes a 4-sided box writes their initials in the box and gets to draw a bonus line segment.

Once all dots are connected into boxes, players add up their scores. A box with an initial in worth 1 point, a box with a dog is worth 4 points. The player with the highest score wins.
Doggone Division

Scoring

Player 1

Player 2
Cookie Fractions

Math Skills:
Grade 3 & 4 Numbers and Operations - Fractions
Fractions
Strategizing

Number of Players:
2 players or teams

Materials:
2 dice
Game board
A different colored writing utensil for each player

Directions:
Players take turns rolling the dice. The smallest number is the numerator, the largest number is the denominator. Example: a 1 and a 4 would equal \( \frac{1}{4} \).

Players color the fraction of a cookie represented by their roll. If their fraction is 2/3, they may either color 2/3 of one cookie, or 1/3 of 2 different cookies.

Players continue until all cookies are labeled.

A cookie is awarded to a player if the player colored more than half of it. If each player labeled exactly half of a cookie, no one gets it.

The player with the most cookies wins.
Cookie Fractions
Sloth Races

Math Skills:
Grade 6 Statistics and Probability
Grade 1 & 2 Operations and Algebraic Thinking
Probability
Addition to 12

Number of Players:
2+

Materials:
Game board
Coloring Utensils
Two dice
50 Small markers to fit into the game board squares (beans, pebbles)

Directions:
Each player chooses a sloth that they think will reach their rainforest friends first. Players will identify their snail by coloring it or writing their initials on it.

The first player rolls the two dice and finds the sum of the two numbers. The first player will place a marker (bean) on the first square of the sloth that matches the sum.

Take turns rolling the dice, computing the sum, and advancing the sloths along their path. To advance a sloth, place another marker on the next square each time the sloth’s number comes up. Remember that the sloths are racing, and you might have to place markers on a sloth that is not your own.

Keep rolling the dice and computing the sums until one sloth crosses the finish line and reaches his/her rainforest friends.

Play several times. Keep track of the sloths that won each game.

Which sloths moved slowly? Which sloths moved quickly? Which sloth(s) won the most? Why do you think this happened?
<table>
<thead>
<tr>
<th>Sloth Races</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
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<td>4</td>
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<td>5</td>
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<td>6</td>
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<td>7</td>
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<td>8</td>
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<tr>
<td>9</td>
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<tr>
<td>10</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
</tbody>
</table>
Candy Statistics

Math Skills:
Grade 6 Statistics and Probability
Bar Graph
Frequency Table
Mean, Median, Mode

Materials:
Mini bags of colorful candy (jelly beans, M&M’s, Skittles)

Directions:
Have each student choose a bag of candy.

Follow the directions on the paper.

Sample Problems:

<table>
<thead>
<tr>
<th>Color</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>III</td>
<td>3</td>
</tr>
<tr>
<td>Blue</td>
<td>II</td>
<td>2</td>
</tr>
<tr>
<td>Yellow</td>
<td>I</td>
<td>1</td>
</tr>
<tr>
<td>Green</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>Orange</td>
<td>II</td>
<td>2</td>
</tr>
</tbody>
</table>

Maximum – 4 (largest #)
Minimum – 1 (smallest #)
Range – 3 (largest # minus the smallest #)
Mode – 2 (number that occurs the most)
Median – 2 (middle # when they are in numerical order)
example 1, 2, 2, 3, 4
Mean – 2.4 (the sum of all #’s divided by the number of #’s)
example 1+2+2+3+4 = 12 12/5 = 2.4
Open your bag of candy. How many pieces of candy do you have in all?

_______________________ pieces of candy

Organize your candy by color. Complete the frequency table below.

<table>
<thead>
<tr>
<th>Color</th>
<th>Tally</th>
<th>Frequency</th>
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Statistical Data:
Maximum ______ Minimum ______ Range ______
Mode ______ Median ______ Mean ______
Take the information from the frequency table and create a bar graph. Make sure to add an appropriate title. List the colors on the x-axis, and the frequency on the y-axis.

Graph Title

Colors
**Pick and Choose**

**Math Skills:**
- Mathematical Practices
- Problem Solving
- Strategizing
- Patterns

**Number of Players:**
2

**Materials:**
12 buttons, coins, or other markers

**Directions:**
Place the 12 markers in a row.

Take turns removing 1, 2, or 3 markers from the row.

You may not take the same number of markers removed by your partner on the previous move.

The winner is the player who takes the last marker OR leaves the other player unable to move.

**Variations:**
Add more markers.
Add more players.
Allow players to remove 1, 2, 3, or 4 markers at a time.
Use 13 markers and place them in a circle. Take turns removing 1 or 2 markers from the circle. If you take 2 markers away they must be next to each other.
Penny Problems

Math Skills:
Mathematical Practices
Problem Solving

Number of Players:
1+

Materials:
10 Pennies

Directions:

Penny Moves

Six pennies start out in the triangular shape shown below in Figure 1. They are to be moved into the six-sided shape as shown in Figure 2.

To move a penny, you must slide it so that it does not disturb any other penny and so that it ends up touching two other pennies. The pennies must stay flat on the surface at all times.

Can you complete the problem above using only four moves?

Figure 1

Figure 2
Invert the Triangle

Use ten pennies to create a triangle as shown below in Figure 3. What is the smallest number of pennies that have to be moved to turn the triangle pattern upside down as shown below in Figure 4?

![Figure 3](triangle.png)  ![Figure 4](upside_down_triangle.png)

Jumping Pennies

Use nine pennies to cover nine of the circles below, leaving one circle uncovered. Jump one penny over another, making sure there is an empty circle behind it on which to place the jumping penny. Take the penny that was jumped over off the board. Continue jumping over one penny at a time until there are no more jumps to make. Can you play until there is only one penny left on the board?

![Penny Jumping](penny_jumping.png)
Penny Problems – Answers

Penny Moves

A

1

2

3

4

5

6

B

1

2

4

5

6

C

1

4

5

6

3

D

1

5

4

6

2

3

E

1

5

4

6

2

3

Inverted Triangle

1

2

3

4

5

6

7

8

9

10

7

2

3

4

5

6

8

9

1

Jumping Pennies

- 9 jumps 8, remove 8
- 2 jumps 5, remove 5
- 7 jumps 4, remove 4
- 1 jumps 7, remove 7
- 2 jumps 9, remove 9
- 6 jumps 3, remove 3
- 2 jumps 1, remove 1
- 6 jumps 2, remove 2
Toothpick Problems

Math Skills:
Mathematical Practices
Problem Solving

Number of People:
1+

Materials:
15 Toothpicks

Directions:

The Farmer’s Sheep Pens
Figure 1 below shows how a farmer used thirteen toothpicks to make six identical sheep pens. Unfortunately, one of the toothpicks was broken. Use twelve toothpicks to show how the farmer can still make six identical pens.
**Toothpick Squares**

Remove three toothpicks from the fifteen shown below in Figure 2 so that only three squares of equal size are left.

Can you remove only two toothpicks to leave three squares? This time the squares do not have to all be the same size.
Toothpick Animal

Show how by moving exactly one toothpick to another position you can obtain a second animal that is the same size and shape as the first.
**Toothpick Problems – Answers**

The Farmer’s Sheep Pens

Toothpick Squares

Toothpick Animal
No Consecutive Numbers Puzzle

Math Skills:
Mathematical Practices
Problem Solving
Counting

Number of Players:
1+

Materials:
Scissors & Game Sheet
OR
Blocks and a Game Board

Directions:
Arrange the numbers 1, 2, 3, 4, 5, 6, 7 and 8 in the squares of the figure below so that no two consecutive counting numbers are together horizontally, vertically or diagonally.
No Consecutive Numbers Puzzle – Answer

5 3

2 8 1 7

6 4
Balancing Nail Trick

Math Skills:
Mathematical Practices
Grade 4 Geometry
Problem Solving
Geometry

Number of Players:
1+

Materials:
A block of wood about 4 inches square and ½ inch high
12 or more 10 penny nails
Hammer

Directions:
Start by hammering one of the nails into the center of the block of wood.

Place the wood block flat on a desk or table.

The challenge is to balance all of the nails on the standing nail in the wooden block. *

To win the challenge, none of the eleven nails may touch the wood block, the desk or table, or anything else that might help hold them up.

No additional equipment other than the wood block and the nails may be used.

* You may use less than or more than the suggested number of nails.
Balancing Nails – Hints

Hint 1

Try building a movable structure on the table with the nails. Then attempt lifting the structure onto the “balancing” nail.

Hint 2

Use your knowledge of geometry to build your movable structure. If you are using 11 nails you will have 9 nails that are parallel to each other. The last 2 nails will be parallel to each other, but perpendicular to the other 9.

Hint 3

Hint 4
Family Math Night To Go!
Bibliography of Resources & Suggested Materials

Books


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Toss Up! Patch Products Inc.