Abacus

AIDS Awareness

Acknowledgement: This activity originally appeared in The California Mathematics Council Communicator, *September 1995, p. 45. It was submitted by Beverly Gleason and Helen Olmsted from Santa Monica High School.*

Strand: Statistics and Probability

Skills: Conducting an experiment, analyzing patterns

Grades: 11-12 [but could be adapted for use in grades 7-10 as well]

Materials: vials, eyedroppers, sodium hydroxide, phenolphthalein

Description:

When Marla Weiss of Beverly Hills High School shared this activity with teachers at CSU Northridge, it seemed the ideal activity for mathematics and science students during AIDS Awareness Week in late April. Despite the harmless appearance of each clear vial and the exchange of liquids with friends they trusted, students were impressed with how quickly the "virus" spread.

Each student received a small vial of clear liquid. All vials were filled with water except for one which was filled with 6 ml of sodium hydroxide (NaOH). For larger classes, several vials should hold sodium hydroxide.

During round #1, students used eyedroppers to exchange two droppers full of liquid with another student. During round #2, students do another exchange with a different student. After the third exchange, the student "physician" places one drop of the indicator phenolphthalein in each vial. Those which contain the "virus" turn bright magenta to indicate contamination.

Students calculate to determine how they became infected and they analyze patterns to determine who carried the virus. This experiment was an effective way for students to see how quickly the virus travels through the exchange of fluids.



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Please, Chew Your Data!

Acknowledgement: This activity created by E. Suzanne Henderson from East Prairie Elementary School in Tuscola, Illinois originally appeared in the November 1995 issue of The Illinois Mathematics Teacher *on pp. 3-7.*

Active involvement of the students in a lesson which promotes prediction, data gathering and analysis, and measurement skills is the focus of the following lesson. The *Standards* stress that these skills be taught in a real world situation. Connecting the child's real world to these areas makes the lesson exciting and valuable to the child.

"Does bubble gum weigh more before it is chewed or after it has been chewed?" This question will get the attention of any intermediate age student. They will have an opinion and they will be great at convincing one that they are right.

"Of course it weighs more after it is chewed because of the saliva that is in it." "But no, that can't be because it always seems smaller after you chew it."

This type of dialogue about a "sticky" problem will really motivate the students. The following "Bubble gum lesson" has proven to be a perennial favourite in my fifth grade classroom. Since gum comes in packs of five, the class is divided into groups of five for this activity. Due to class sizes it may be necessary to have some groups of four. This is not a problem as there is always someone in a group willing to chew two pieces of gum. Each group will be given a different kind of bubble gum. There should also be five balls of gum from a machine and one pack of sugar free gum. Before chewing the gum the students will predict what will happen to the weight of the gum when it has been chewed. Fifth graders generally come up with the consensus that saliva will go into the gum and make it weigh more. After some predictions have been made, the activity proceeds following this procedure:

1. Each group of five will be given one pack of gum or the five gum balls from a gum machine and five small paper cups. Condiment cups work well.
2. Each child gets one piece of gum and one small cup. The students are to first make an estimate of the weight of their own piece and then multiply by five to get a pack estimate. This should be recorded on the group data sheet. (Figure 1)
3. Each group weighs all five empty cups.
4. Each group member places his/her unwrapped gum in the paper cup and the group weighs all five pieces at once to get the unchewed pack weight. The weight of the empty cups must be subtracted to get the gum weight.
5. After all groups have completed the "weigh-in" the students will all begin to chew their gum. Again to retain reliability the chewing will begin on signal and continue for eight minutes. Use a timer; it seems more official to the students.

During the chewing time the class will be engaged in discussion on ways to organize and display the data. The students may be very creative on this point. One good way to display the data would be with a double bar graph (Figure 2). One bar would be the total unchewed weight and the other bar could be the total chewed weight of each pack. This could also be achieved with a pictograph set up in the same fashion.

While chewing, the students might also take a minute to reflect back to the original prediction about what will happen to the weight of the gum. Some may wish to change their prediction.

When the eight minutes has passed the activity continues:

6. Each child places his gum back into his paper cup and the group reweighs the pack of gum. The students must again subtract the weight of the empty cups. The results are recorded.

7. All cups with gum still in them are thrown away!

After all groups have completed the weighing the class compiles all the data so that it can be organized, displayed, and interpreted. Again use the group data sheet, Figure 1, to compile the data. A class graph can be created with each group displaying their own data on a group graph. Using this class graph, the class now enters into a discussion on the uses of such information. Who could possibly benefit from knowing what the students have discovered? The students will come up with a variety of answers.

Each group will be given the task to work on one mathematical situation and one connected activity and then to make a presentation to the class based on their work. The math related task would be to use the data sheet and to create one problem solving activity that all the students could solve using their own data sheets. Examples of these situations would be to find which gum had the highest percentage of loss during chewing; to organize a survey in which to find the favourite gum in the fifth grade from the ones tested; to make an attribute chart which has such categories as colour, shape, size and flavour included or to make a chart showing price comparisons. Calculators need to be available for such things as the percentage problems.

Each group would have its own individual second task. The second related task could come from the following ideas:

1. Research the origin of gum. Find where the raw materials come from and display that information on a map.
2. Research the various sugars that might be present in gum.
3. Devise a rating card that would indicate the favourite gum. This could be done with a number system ranging from 1-4 and rating such things as flavour, texture, ease of bubble blowing, bubble size, and length of time the flavour lasts.
4. Research what pioneers used for chewing gum, and find out how it was made.
5. Write a television commercial for their gum flavour. A video tape presentation would be good for this.
6. Write an instruction manual on "How to Blow Bubbles".

Other fun things to go along with this gum lesson would be to estimate the number of gum balls in one pound [or kilogram], write poetry about gum or bubbles, or to write the principal or teacher a letter trying to convince them that gum chewing in school is a good idea. It is also fun to listen to a recording of "Does Your Chewing Gum Lose Its Flavor on the Bedpost Overnight?" written by Rose and Mary Bloom. The lyrics can be found in *Kid's America.*

This rather "sticky" lesson will have your intermediate age students chewing up math. This is real life math that is quite relevant to the middle grade student. It gives them opportunities to collect data, interpret it, and display it. It also allows for connections with other academic areas, and it certainly reinforces skills which are stressed in the *Standards* such as measurement and data collection and analysis.

References:

Caney, Steven. *Kid's America.* Workman Publishing Company, 1978, p. 176.

Project AIMS. *Jaw Breakers and Heart Thumpers.* Fresno, CA: AIMS Education Foundation, 1987, pp. 34-36.

Figure 1 Which Will You "Chews"?

Consumers:_____

Estimated weight of your unwrapped piece _____.

Estimated weight of your group's package _____ (You only need ***your*** piece to do this.)

Instructions:

1. Each member is to get one piece of gum, unwrap it, and estimate the weight to the nearest gram. Then determine what the estimated pack weight is. DO NOT CHEW YOUR GUM YET!!
2. Each group must weigh the five empty cups together. Record this number for use in the next instruction.
3. Put your piece of gum in your paper cup. Everyone will weigh their gum at one time in the balance pan. Subtract the weight of the empty cups so that you only have the weight of the gum. Record your total pack weight.
4. Wait for the signal to chew your gum. Keep your paper cup.
5. When chewing time is over you will reweigh your gum as you did the first time and record your results. ***Remember*** to subtract the weight of the empty cups.
6. We will compile the rest of the chart for the other flavours in class together.

Whole Class Data Chart

	Brand	Flavour	Unchewed Pack Weight	Chewed Pack Weight
1				
2				
3				
4				
5				
6				

Figure 2

Which Will You "Chews"?

		0	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51
Flavour																			
	Total																		
	Chewed																		
	Total																		
	Chewed																		
	Total																		
	Chewed																		
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	Chewed																		

Key:

Each block equals 3 grams. **Total Weight** ☐ **Chewed Weight** ☐

Early Years Teaching Ideas

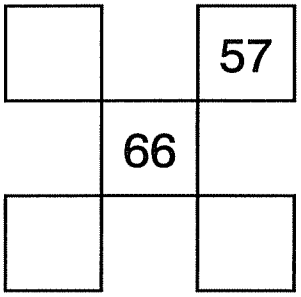
Acknowledgement: This article is reprinted from the January 1996 issue of The Math Journal of the Manitoba Association of Mathematics Teachers *(pp. 4-5). It was compiled by Dianne Soltess.*

Our Early Years Representative has submitted some sample test questions , based on the St. James, Gr. 3 Assessment, 1995. These questions are used at a level 3, to assess Patterns and Relations, and Problem Solving.

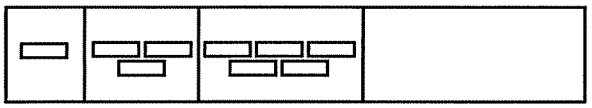
Mathematics - Grade 3

Patterns and Relations

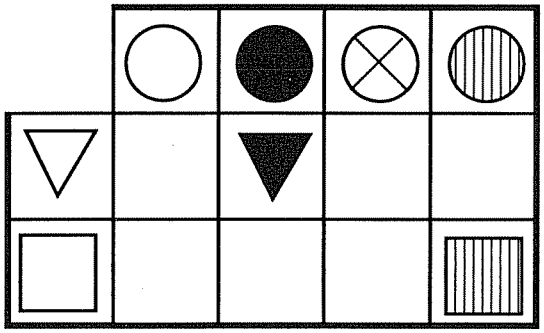
1. This is a piece cut from a hundred chart. Fill in the missing numbers.



2. Draw the next figure in the pattern.

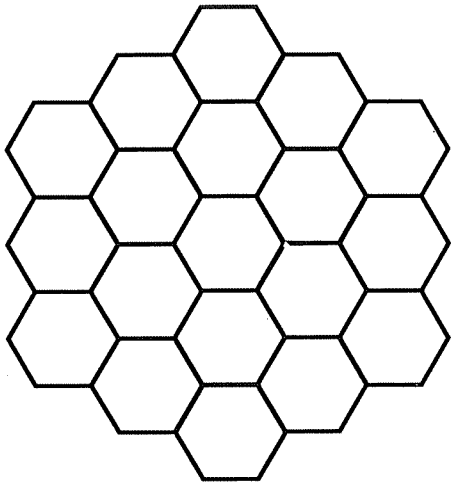


3. Complete the chart.



4. Bees were making honeycomb. They started on day 1 with the middle cell. Each day they added another row of cells all around the honeycomb.

   How many cells will there be after the 6th day?
   There will be _____ cells.



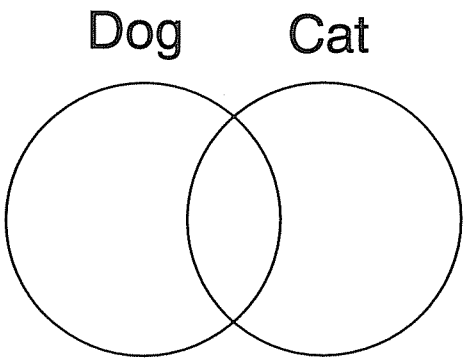
5. On Friday, 15 people are in the Sea Sub on the first trip down, 13 people are on the second trip, 11 people are on the third trip, and 9 people are on the fourth trip. If the pattern continues, how many people will be on the sixth trip?

Trip	People
1	15
2	13
3	11
4	
5	
6	

   There will be _____ on the sixth trip in the Sea Sub.

6. Paul surveyed 16 students in his class. He asked whether they had a cat or a dog for a pet. He got the following results: Dog - 6, Cat - 4, Both a dog and a cat - 2, and No dog or cat - 4.

Record the results on the Venn diagram below.



7. Look for a pattern and then write the next line of the pattern.

   1 + 3 = _____

   3 + 5 = _____

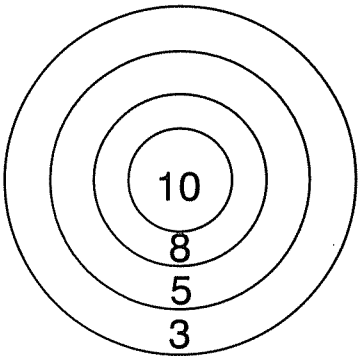
   5 + 7 = _____

   _ + _ = _____

8. Dart Throw

   Bob threw three darts. If his score was 20, where could his shots have landed?

   The darts could have landed on _____, _____, and _____.

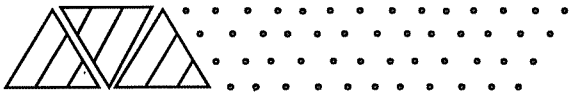


9. Look at the table. Look for a pattern to help you find the secret rule. Complete the table and write the rule.

IN	3	4	5	6	9
OUT	9	12	15		

Rule: _____

10. Draw the next 2 figures to continue the pattern.



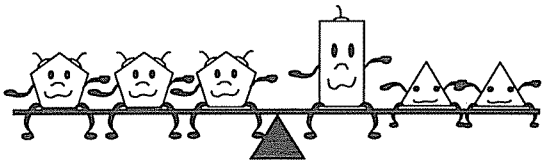
11. Rules:

    Balance the seesaw.

    Robots that are the same have the same weight.

    Robots that are different have different weights.

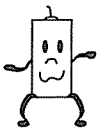
    All robots weigh more than zero kilograms.





If on the seesaw weighs 5 kilograms, what could the other robots weigh?

Give one possibility.



_____kg.

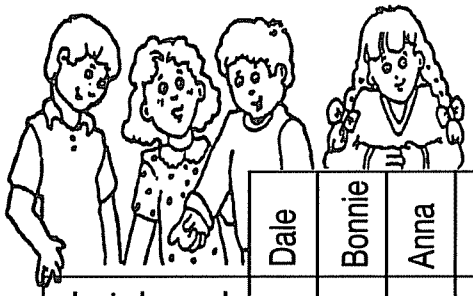


_____kg.

12. Solve the following logic problem.

    Four children rode to the park. Read all the clues. Then make x's on the chart to match the children with the things they rode to the park.

1. Dale loves to ride his bike.
2. Dale lives across the street from the person with the skateboard.
3. Bert lives next door to Dale.
4. Bonnie just got her new scooter.



	Dale	Bonnie	Anna	Bert
skateboard				
bike				
roller skates				
scooter				

THE GAME

Acknowledgement: This activity was first published in the California Mathematics Council Communicator, *March 1996 edition. It was written by James Baird of Hidden Creek, Conejo Valley Unified.*

Strand: Number, logic

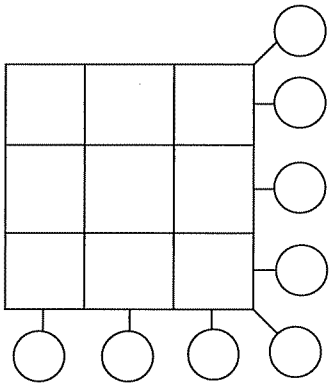
Skills: Reinforce basic facts and computational skills

Grades: 3 - 8

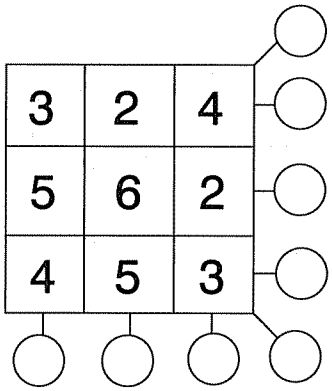
Materials: Dice, paper, pencil

Description:

On an overhead or on the chalkboard, make a grid like the one below. The students make a copy on their paper. Be sure they make only eight balloons.

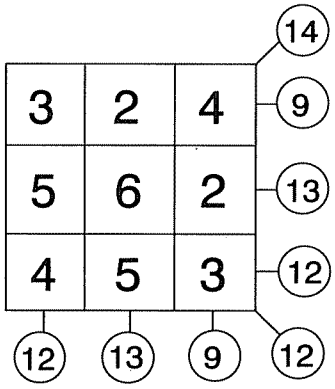


The teacher then rolls a die nine times. As the die is rolled, each number that is rolled is placed into one of the nine squares on the grid. This continues until the grid is complete. For example, if you rolled 5, 3, 4, 5, 2, 2, 6, 4 and 3, the grid would look like this:



The students make their own decisions as to where they will place the numbers as they are rolled. Once a number is placed on the grid it can not be moved.

The numbers in each row, column, and diagonal are added separately, and the respective totals are placed in the appropriate balloon as shown below.



Any totals that are duplicated at least twice are used to determine the game score for the round. For example, from the grid above there were two 9's, two 13's and three 12's. These totals are added together to get the game score for the round:

9 + 9 + 13 + 13 + 12 + 12 + 12 = 80.

The high score wins that round.

The game may be played several times. Each player saves his/her total score from each round. These can be added to determine a high score winner. Other possibilities for declaring a winner are to use the mean, median, mode and/or range of each individual's scores. Another alternative is to ask each group to compute their total scores and averages.

The luck of the game is in the roll of the die. The strategy is in placing the numbers in positions that allow repeating sums.

The teacher can play along with the students because they love to beat the teacher's score. After a period of time the student with the highest score is allowed to roll the die for the next round of the game.

Extension:

A die with larger numbers, other than 1 - 6, or a die made with positive and negative numbers, can be used.