Quick and Fun Activities for Preservice Teacher Courses

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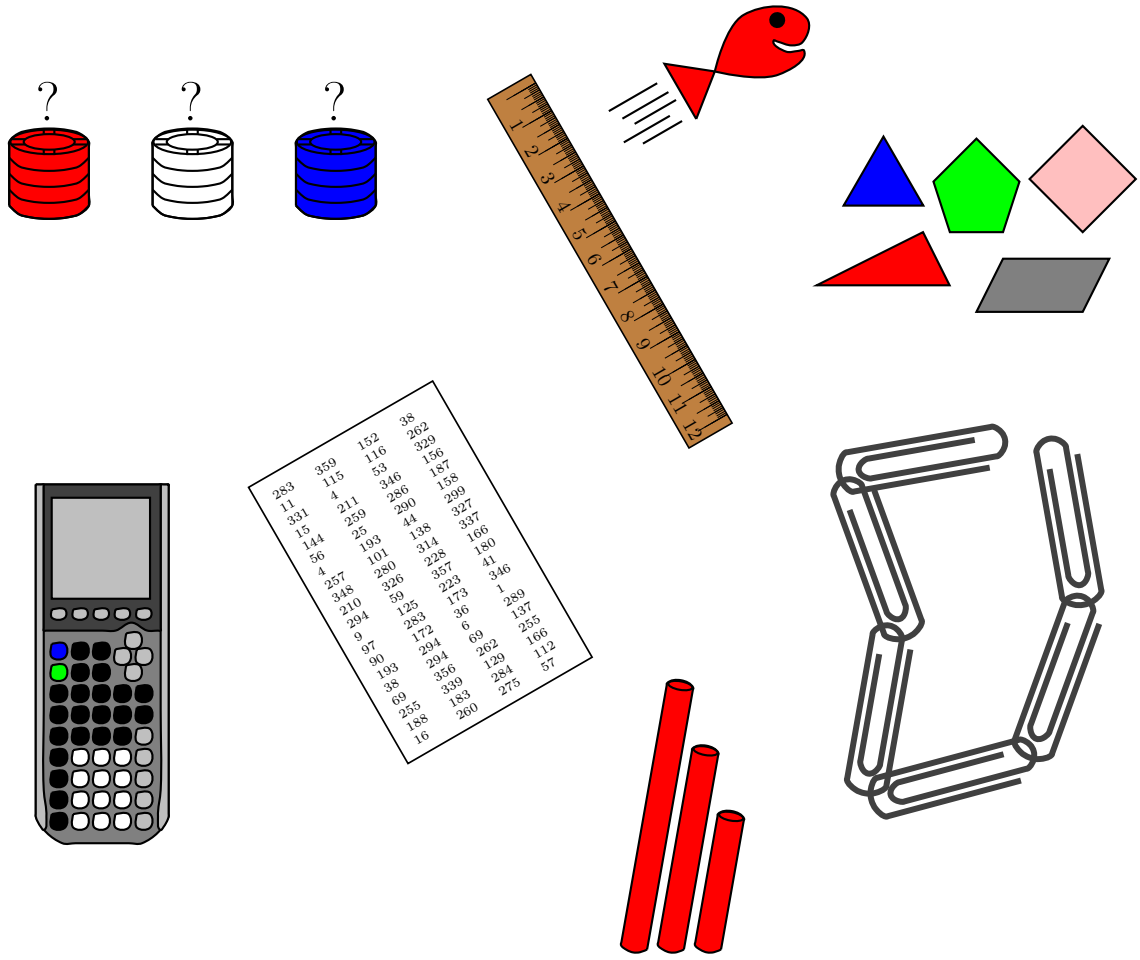
These activities focus on topics from the second part of the preservice teacher course: probability, statistics, geometry, and measurement. All seven activities take an hour or less of class time to conduct. Most importantly, these activities are fun and challenging for preservice students as well as the children they will someday teach. Students leave our class with activities that they can take directly to their elementary or middle school classroom.

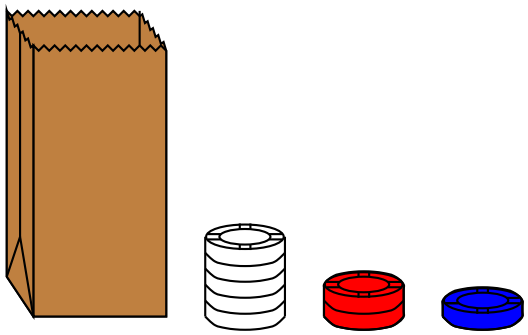


No Peeking!

Topic covered: Probability

Class time needed: 20 minutes if one bag per student is used
30 minutes if one bag per two students is used

Materials needed: Brown lunch bags (one for each student or one for every two students)
Blue, red, and white poker chips (enough to fill each brown bag with 1 blue, 2 red, and 5 white poker chips)
The following "No Peeking" worksheet
The following "No Peeking!" all class data sheet



Summary: Many probability activities utilize counting strategies to determine probability. This activity works backwards. Students draw 8 chips, one at a time, from a bag (with replacement). Using their knowledge of probability, they work backwards to determine how many of each color is in the bag.

NO PEEKING!

In front of you is a bag containing 8 poker chips. Some are red, some are blue, and some are white. **Without peeking**, you will determine how many of each color is in the bag using your understanding of probability.

Directions: Divide into groups. Reach into the bag and draw out one chip. Record the color in the table below in tally form, then replace the chip and shake the bag well to mix up the chips. Repeat 8 times. After you have drawn 8 chips, calculate how many chips of each color were drawn at the end of the 8 draws. Record this in the table as well. Each member of the group will repeat this 8 chip draw 4 times. This means that each member of the group should have different table values.

	Red Chips		Blue Chips		White Chips	
	Tally	Total	Tally	Total	Tally	Total
1^{st} 8 Chip Draw						
2^{nd} 8 Chip Draw						
3^{rd} 8 Chip Draw						
4^{th} 8 Chip Draw						

1. Use the data *you* collected to guess the number of chips of each color in the bag.

Red chips: _____ Blue chips: _____ White chips: _____

2. Combine your data with the other people in your group. Now, guess how many chips of each color are in the bag.

Red chips: _____ Blue chips: _____ White chips: _____

3. Combine your data with the entire class. Now, guess how many chips of each color are in the bag.

Red chips: _____ Blue chips: _____ White chips: _____

NO PEEKING!

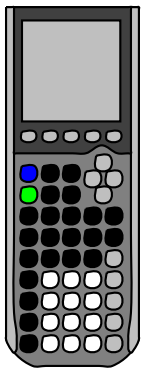
Red Chip Totals				Blue Chip Totals				White Chip Totals			
1^{st}	2^{nd}	3^{rd}	4^{th}	1^{st}	2^{nd}	3^{rd}	4^{th}	1^{st}	2^{nd}	3^{rd}	4^{th}

The Birthday Problem

Topic covered: Probability and simulations

Class time needed: 30 minutes

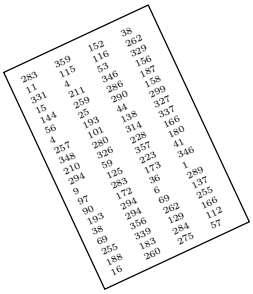
Materials needed: Calculator with simulation capabilities (You can use a random digit table, although it will increase the amount of time needed to conduct the activity.)
The following "The Birthday Problem" worksheet
The following "The Birthday Problem" all class data sheet



283	359	152	38
11	115	116	262
331	4	53	329
15	211	346	156
144	259	286	187
56	25	290	158
4	193	44	299
257	101	138	327
348	280	314	337
210	326	228	166
294	59	357	180
9	125	223	41
97	283	173	346
90	172	36	1
193	294	6	289
38	294	69	137
69	356	262	255
255	339	129	166
188	183	284	112
16	260	275	57

Summary: The birthday problem is a fun and interesting probability activity where the result is quite unexpected for students. This activity gives students practice in conducting a simulation then determining an experimental probability from the simulated data.

The Birthday Problem



Directions: Get into groups of 3 or 4. Each member of the group will do 5 simulations and thus everyone in the group will have different data in their chart.

Suppose there are twenty people enrolled in a math class.

1. Guess the probability that at least 2 people in this class will have the same birthday.

Guess: _____

2. Use a random digit table or your calculator to generate 20 random integers between 1 and 365 (inclusive) and see if at least 2 match up. Repeat the simulation 4 more times to obtain an experimental probability. Record your simulation in the table below. If at least 2 numbers match up in that column, circle "yes" at the bottom of the column, if not, circle "no".

Simulation 1	Simulation 2	Simulation 3	Simulation 4	Simulation 5
Yes/No	Yes/No	Yes/No	Yes/No	Yes/No

3. Using *your* chart:
How many total yes's do you have?

How many total no's do you have?

Based upon just *your* simulations, what is the probability that out of 20 people at least 2 will share a birthday?

4. Now compare with *your group*.
How many total yes's does *your group* have?

How many total no's does *your group* have?

Based upon *your group* simulations, what is the probability that out of 20 people at least 2 will share a birthday?

5. Now compare with *the entire class*.
How many total yes's does *the whole class* have?

How many total no's does *the entire class* have?

Based upon *the entire class* simulations, what is the probability that out of 20 people at least 2 will share a birthday?

6. Which of the 3 probabilities above do you feel is the most accurate? Explain your answer.

The Birthday Problem

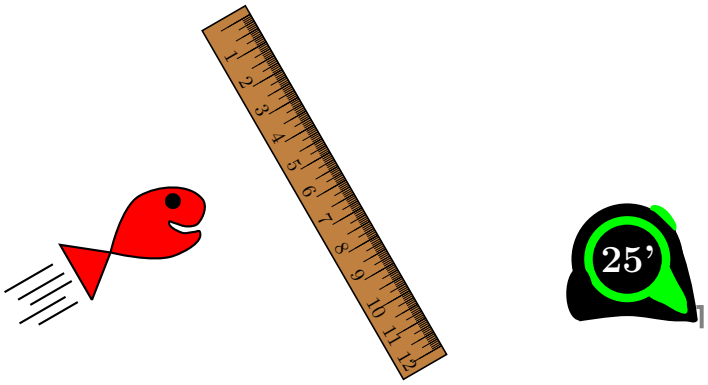
Number of Yes's	Number of No's

Flying Fish

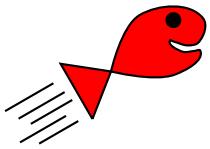
Topic covered: Statistics

Class time needed: 50 minutes - 1 hour

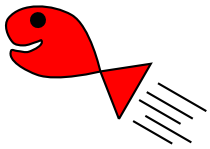
Materials needed: 1 bag of Swedish Fish
1 ruler for every group
1 tape measure for every group
The following "Flying Fish" worksheet



Summary: This is an activity that students have thoroughly enjoyed for many years. This is a fun way to collect and analyze data for students as well as the children they will someday be teaching.



Flying Fish



In this activity you will work in groups to collect and analyze data. We will fashion a catapult using a ruler and a textbook. Using this catapult, we will send Swedish Fish flying through the air.

Directions: After each fish is launched, measure its distance in inches rounded to the nearest inch. Note this distance on the table below then fill in the information at the bottom of this page. Each person should fling 10 fish. One person is the "flinger", one records the data, and one measures the straight-line distance from the end of the ruler.

Trial	1	2	3	4	5	6	7	8	9	10
Distance										

Trial	11	12	13	14	15	16	17	18	19	20
Distance										

Trial	21	22	23	24	25	26	27	28	29	30
Distance										

1. Mean: Lower Quartile:

Median: Upper Quartile:

Mode: Interquartile Range:

Standard Deviation:

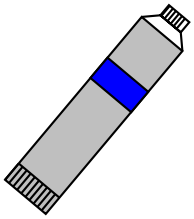
2. Are there any outliers in your data? Justify your answer.

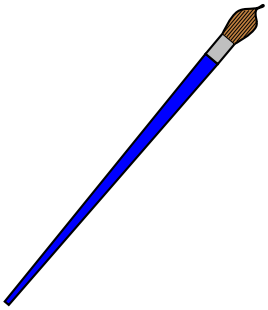
Stained Glass Window

Topic covered: Geometry

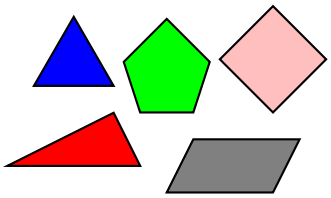
Class time needed: 15 minutes to explain the assignment and show examples

Materials needed: Students will need to get:
1 8×10 inch frame
Stained glass paint
Paint brushes

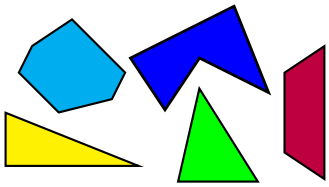




Summary: This is an idea from an article by Barbara H. Morris in the March 2004 issue of Mathematics Teaching in the Middle School (Volume 9, issue 7, page 358). Students must include at least 20 geometric figures in their drawing. Students may include additional shapes.



Stained Glass Window



The stained glass window is the ideal example of the beautiful union of mathematics and art. In this activity you will make your own stained glass window.

Directions: You will need an 8×10 inch picture frame. You will first construct your design on a sheet of 8×10 inch paper (regular paper is 8.5 inches by 11 inches, so you will need to trim off a little bit) then transfer it onto the glass. Make sure to put the glass back in the frame when its is dry. Your design should be original and include at least one of each of the following geometric figures (you can add more shapes if you like):

1. Acute triangle
2. Complementary angles
3. Corresponding angles
4. Equilateral triangle
5. Pentagon
6. Two congruent shapes
7. Parallelogram
8. Isosceles triangle
9. Obtuse triangle
10. Parallel lines
11. Perpendicular lines
12. Alternate exterior angles
13. Rhombus
14. Right triangle
15. Scalene triangle
16. Convex polygon
17. Concave polygon
18. Supplementary angles
19. Trapezoid
20. Vertical angles

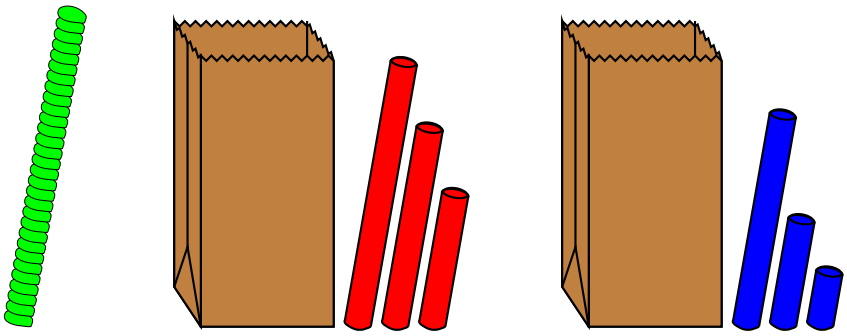
Your grade will be determined by your window only. Please turn in your paper with your window. Your paper should have all 20 items clearly labeled. You may want to share the cost of the paint with some of your classmates. Have fun and be creative!

Making Triangles

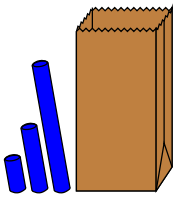
Topic covered: The SSS congruence property and the triangle inequality

Class time needed: 45 minutes

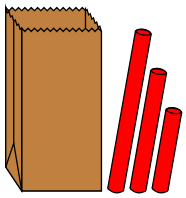
Materials needed: 1 pipe cleaner for each student
Two bags of straws for each student
one with straws of length 2 in, 3 in, and 4 in
one with straws of length 1 in, 3 in, and 5 in
The following "Making Triangles" worksheet



Summary: This is an idea borrowed (with permission) from two math instructors at Rock Valley College in Rockford, IL: Kathleen Almy and Heather Foes. This activity is intended to demonstrate the SSS congruence property via construction. By attempting to construct different triangles, students will hopefully see that only one triangle can be formed. Also, the triangle inequality is demonstrated through construction (or lack thereof). Students will see an example of how a triangle can not always be formed using three line segments.



Making Triangles



Part I

In front of you is a bag of straws and a pipe cleaner. The straws have length 2 in, 3 in, and 4 in.

Directions: Construct a triangle whose sides have length 2 in, 3 in, and 4 in by sliding the pipe cleaner through the three straws. Bend the pipe cleaner to form the vertices of the triangle. Make sure the ends of the straws are touching in the triangle.

When you are finished, compare your triangle with others around you. Keep in mind that the colors do not necessarily represent the same length from bag to bag. In other words, the green straw might be the longest in one bag and the shortest in another bag.

1. What do you notice about the triangle(s) formed by your group?

2. How many different triangle(s) was/were your group able to form?

3. Briefly explain your answer from problem 2.

Part II

Put away the straws from part one and give them to your instructor. You will be given another bag of straws. These straws have length 1 in, 3 in, and 5 in. Use the same pipe cleaner and these new straws to form a new triangle. When you are finished, compare your triangle with others around you. Again, keep in mind that the colors do not necessarily represent the same length from bag to bag.

1. What do you notice about the triangle(s) formed by your group?

2. How many different triangle(s) was/were your group able to form?

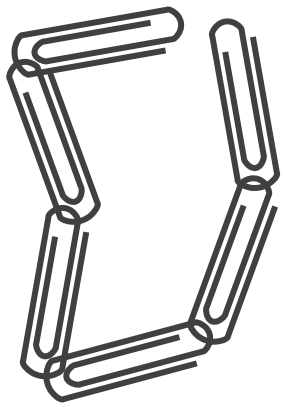
3. Briefly explain your answer from problem 2.

Perimeter Versus Area

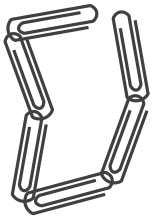
Topic covered: The connection between perimeter and area

Class time needed: 20-25 minutes

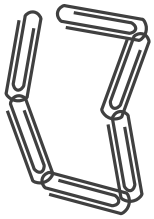
Materials needed: LOTS of paperclips - 32 per student unless you want the students to work in groups
The following "Perimeter Versus Area" worksheet



Summary: Most students think there is a rigid connection between perimeter and area of a rectangle. They mistakenly think that as one increases so must the other. This activity will show them otherwise. A nice byproduct of this activity is the use of a nonstandard unit.



Perimeter Versus Area



Before you read any further, guess whether the following statements are true or false.

_____ **1.** As the area of a rectangle increases, so must the perimeter.

_____ **2.** As the area of a rectangle decreases, so must the perimeter.

Is there a connection between perimeter and area? In this activity you will explore this question using paperclips.

Directions: You have been given a series of paperclips that are hooked together. Without unhooking the paperclips, form 4 different sized rectangles and record the dimensions, the perimeter, and the area of each rectangle in the chart below. ***Make sure to put the correct units on your answers.***

Rectangle	Dimensions	Perimeter	Area
1			
2			
3			
4			

1. What do you notice about the perimeter of every rectangle you formed?

2. Was there an instance where the area increased, but the perimeter did not increase?

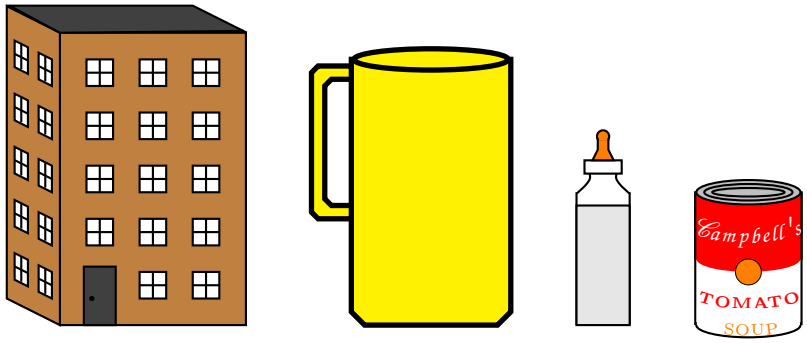
3. Were your guesses for the first two true/false questions correct?

The What and the How

Topic covered: Measurement - length, area, surface area, and volume

Class time needed: 30 minutes

Materials needed: The following "The What and the How" worksheet



Summary: Students do not always have a good sense of measurement - especially when it comes to the metric system. This activity utilizes everyday objects all of which should be familiar to students. This activity emphasizes two very important steps in the measurement process: identifying the attribute to be measured (the what) and choosing an appropriate unit (the how).

The What and the How

Recall that measurement is a three step process: choose an attribute to measure, choose an appropriate unit, determine how many of these units are necessary to run the length, cover, or fill the object. In this activity you will focus on two of these three steps: the attribute to be measured (the what) and the best unit (the how).

Directions: Next to each description are two blanks. In the first blank, label the attribute that is being measured using L for length, A for area, SA for surface area, or V for volume. In the second blank choose the best unit from the given list below. Problem #1 is done for you.

- Choices for units of length: mm, m, km
- Choices for units of area or surface area: in^2, ft^2, acre
- Choices for units of volume: mL, L, kL

Problem	Attribute	Unit	Description
1	L	km	The distance from New York City to Chicago
2			The amount of wrapping paper needed to wrap a CD
3			The height of a 5 story building
4			The width of a cockroach
5			The amount of tea in a pitcher
6			The amount of space covered by a bathroom floor
7			The amount of gas in a car's full gas tank
8			The amount of grass in Central Park
9			The amount of fabric needed to cover a couch cushion
10			The width of a two car garage
11			The wingspan of a hummingbird
12			The amount of space covered by a light switch
13			The amount of liquid held by a baby bottle
14			The size of a ceiling to be painted
15			The amount of paint needed to paint a ceiling
16			The amount of water in a hot tub
17			The thickness of an iPhone
18			The size of a living room rug
19			The size of a label on a soup can
20			The amount of aluminum foil needed to cover a baked potato