



Spy Intelligence-Pre Visit Activities

Secret Message

Key words:

Whole numbers

Order

Materials:

Copy of message and answer sheet

Pencils

Scissors

Instructions:

You are trying to get your classmate to figure out your favorite number.

Cut out the five message cards and use words to write out five clues as to what your favorite number might be but **DO NOT** write down the number itself. For example if your favorite number is twelve you could write: Number of inches in a foot, three times four, thirty-seven minus twenty-five, one half of twenty-four, and the number of donuts in a dozen.

Put your clues in order from what you think is the hardest to what you think is the easiest. Trade clues with your partner. Read the clues that your partner gave you. On your answer sheet write the number that you think your partner is trying to get you to figure out.

Questions to ask: Were you able to figure out the number with the first clue? Did all of the clues lead you to the same number? What was the most interesting clue that you got? What clue was the hardest? What clue was the easiest?

Mathematics, Number sense and operations

3.1

Secret Message	Secret Message	Secret Message
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Cabbage Indicator

Key Words:

Acid

Base

Neutral

pH

Materials:

Red cabbage

Knife

Boiling water

Filter paper (coffee filters work well)

One large glass container

Small glass containers

Household ammonia

Baking soda

Washing soda

Lemon juice

Vinegar

Instructions:

1. Chop the cabbage into small pieces until you have about 2 cups of chopped cabbage. Place the cabbage in a large glass container and add boiling water to cover the cabbage. Allow at least ten minutes for the color to leach out of the cabbage.
2. Filter out the plant material to obtain a red-purple-bluish colored liquid. This liquid is at about pH 7.
3. Pour about 50 - 100 mL of your red cabbage indicator into each small glass container. Use separate containers for each chemical. Add the chemicals to the indicator until a color change is obtained.

What's Going On:

Red cabbage contains a pigment molecule called flavin. This is a water-soluble pigment that is also found in some fruits and flowers. Very acidic solutions will turn the

solution a red color. Neutral solutions result in a purplish color. Basic solutions appear in greenish-yellow. Different types of indicators will have different pH color scales.

The color of the juice changes in response to changes in its hydrogen ion concentration. pH is the $-\log[H^+]$. Acids will donate hydrogen ions in an aqueous solution and have a low pH ($pH < 7$). Bases accept hydrogen ions and have a high pH ($pH > 7$).

A neutralization experiment could be performed using cabbage juice indicator. First add an acidic solution such as vinegar or lemon juice until a reddish color is obtained. Then add washing soda or vinegar until the solution neutralizes turning a bluish color

Chemicals used in this demo may be safely washed down the drain with water.

You can also make pH test strips by soaking filter papers in a very concentrated red cabbage juice and then hanging the papers to dry.

The color change that you see is a physical change but the loss or addition of Hydrogen ions is a chemical change.

pH	color
2	Red
4	Purple
6	Violet
8	Blue
10	Blue-Green
12	Greenish Yellow



Criminal Info

Key Words:

0 = impossible

1 = certain-to-happen

Grid square

Materials:

Pencils

Scrap paper

Criminal Info worksheets

Instructions:

Print and copy the criminal info worksheets. The students will use the worksheets to find out information about our criminal.

What's Going On:

The students will be identifying forms of whole numbers. If it is a form of the number twenty four they will write a 1 signifying that is certain to be 24. If it is not a form of the number 24 they will write a 0 signifying that it is impossible to be 24.

The students will then fill in the grid to reveal the information. They will have to determine the location of grid squares A-1 thru U-7 and mark the appropriate number in the square.

If the students have filled out the chart correctly, they will find information about the criminal.

Mathematics, Number and Number systems

3.3

Mathematics, Number sense and operations

3.1

Criminal Information-work sheet

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1																					
2																					
3																					
4																					
5																					
6																					
7																					

Last night a criminal broke into COSI’s Gadgets Lab. The whole place was a mess. The idea of a break in very much disturbed special agent “G”, the head of the gadgets lab. He wants all of the information from the past 24 hours.

Please go through the information below. If the equation is one that is certain to equal the number 24, then mark a 1 on the line. But if it is impossible for the equation to equal 24 then mark a 0 on the line.

Once you have solved all of the equations mark a 1 or a zero in all of the corresponding boxes in the grid above.

Completely shade in any box that contains a 1 in order to find the clue.

Column A

Column B

Column C

- | | | |
|-----------------------|-----------------------|-----------------------|
| 1. $8+12$ _____ | 1. 4×8 _____ | 1. 8×6 _____ |
| 2. $36 / 2$ _____ | 2. $19+7$ _____ | 2. $21+3$ _____ |
| 3. 3×7 _____ | 3. $44-18$ _____ | 3. $19+5$ _____ |
| 4. $35-10$ _____ | 4. 2 dozen _____ | 4. 5×5 _____ |
| 5. $6+21$ _____ | 5. $67- 43$ _____ | 5. $16+8$ _____ |
| 6. 4×6 _____ | 6. $27 / 3$ _____ | 6. $46-13$ _____ |
| 7. $1/2$ of 48 _____ | 7. $9+11$ _____ | 7. $52 / 2$ _____ |

Column D

1. 8×3 _____
2. $15 + 7$ _____
3. $31 - 8$ _____
4. 4×7 _____
5. $47 - 23$ _____
6. $42 / 7$ _____
7. $18 + 9$ _____

Column E

1. 5×4 _____
2. $21 + 3$ _____
3. $88 - 64$ _____
4. 9×8 _____
5. $19 + 5$ _____
6. $54 / 9$ _____
7. 8×7 _____

Column F

1. 9×8 _____
2. $16 + 5$ _____
3. $29 - 7$ _____
4. $20 + 4$ _____
5. $96 / 4$ _____
6. $33 - 18$ _____
7. $8 + 12$ _____

Column G

1. 7×6 _____
2. $16 + 9$ _____
3. $61 - 43$ _____
4. 5×4 _____
5. $50 - 31$ _____
6. 2 feet _____
7. $22 + 2$ _____

Column H

1. 9×3 _____
2. $17 + 6$ _____
3. $28 - 7$ _____
4. 8×6 _____
5. $76 - 34$ _____
6. $99 / 11$ _____
7. $12 + 14$ _____

Column I

1. 7×4 _____
2. $19 + 6$ _____
3. $35 - 13$ _____
4. $75 / 3$ _____
5. $37 - 19$ _____
6. $72 / 6$ _____
7. $15 + 7$ _____

Column J

1. 9×6 _____
2. $23 + 4$ _____
3. $144 / 6$ _____
4. $17 + 7$ _____
5. $87 - 63$ _____
6. $104 / 4$ _____
7. $13 + 8$ _____

Column K

1. 6×3 _____
2. $8 + 16$ _____
3. $68 - 41$ _____
4. 3×3 _____
5. $54 / 2$ _____
6. $56 - 32$ _____
7. $17 + 4$ _____

Column L

1. 12×2 _____
2. $18 + 7$ _____
3. $44 - 18$ _____
4. $1/2$ of 50 _____
5. $76 - 43$ _____
6. $27 / 3$ _____
7. $19 + 5$ _____

Column M

1. $10 + 14$ _____
2. $21 + 5$ _____
3. $54 - 34$ _____
4. 7×3 _____
5. $46 - 33$ _____
6. $36 / 3$ _____
7. $6 + 18$ _____

Column N

1. 8×9 _____
2. $7 + 17$ _____
3. $58 - 37$ _____
4. 1 dozen _____
5. $59 - 35$ _____
6. $22 + 2$ _____
7. 9×4 _____

Column O

1. 5×3 _____
2. $4 + 21$ _____
3. $36 - 21$ _____
4. 8×5 _____
5. $66 - 41$ _____
6. $78 / 3$ _____
7. $12 + 15$ _____

Column P

1. 9×9 _____
2. $8 + 14$ _____
3. $38 - 15$ _____
4. 8×7 _____
5. $65 - 44$ _____
6. $57 / 3$ _____
7. $6 + 12$ _____

Column Q

1. $8 + 16$ _____
2. $72 / 3$ _____
3. $44 - 20$ _____
4. $13 + 11$ _____
5. $60 - 36$ _____
6. $24 / 1$ _____
7. $1 + 23$ _____

Column R

1. $67 - 43$ _____
2. $19 + 7$ _____
3. $44 - 18$ _____
4. 3×8 _____
5. $27 / 3$ _____
6. $9 + 11$ _____
7. $8 + 16$ _____

Column S

1. 8×3 _____
2. $19 + 9$ _____
3. $49 - 26$ _____
4. $96 / 4$ _____
5. $76 - 34$ _____
6. 6×5 _____
7. $67 - 43$ _____

Column T

1. $48 / 2$ _____
2. $16 + 7$ _____
3. $107 - 42$ _____
4. 6×8 _____
5. $68 - 43$ _____
6. 7×5 _____
7. $19 + 5$ _____

Column U

1. 12×2 _____
2. $18 + 7$ _____
3. $44 - 18$ _____
4. 5×6 _____
5. $76 - 43$ _____
6. $27 / 3$ _____
7. Hours a day _____