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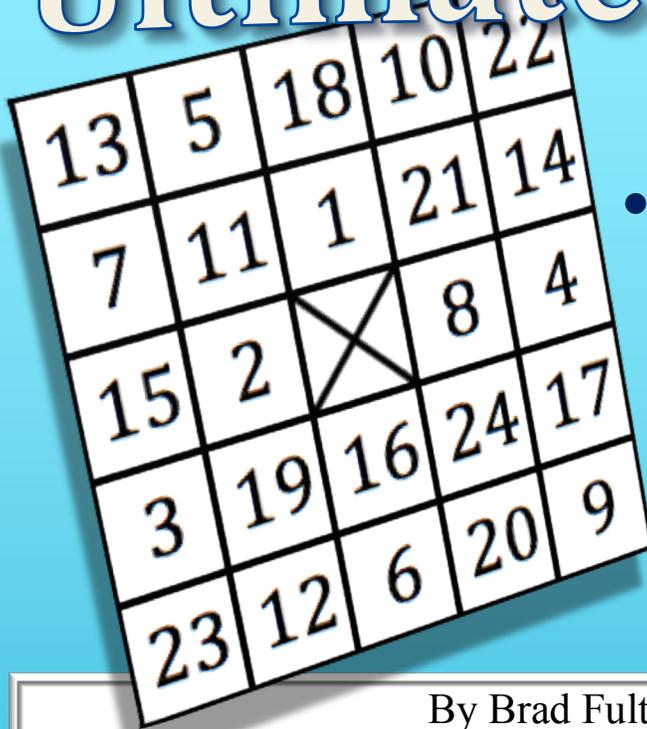
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# Math Bingo, & Ultimate Bingo



- Two great games that educate & motivate
- Minimum prep & maximum return

**20 premade worksheets included!**

By Brad Fulton

Educator of the Year, 2005

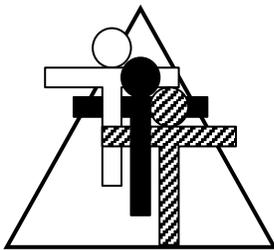
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## Brad Fulton

### Educator of the Year

- ◆ Consultant
- ◆ Educator
- ◆ Author
- ◆ Keynote presenter
- ◆ Teacher trainer
- ◆ Conference speaker

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Known throughout the country for motivating and engaging teachers and students, Brad has co-authored over a dozen books that provide easy-to-teach yet mathematically rich activities for busy teachers while teaching full time for over 30 years. In addition, he has co-authored over 40 teacher training manuals full of activities and ideas that help teachers who believe mathematics must be both meaningful and powerful.

#### **Seminar leader and trainer of mathematics teachers**

- ◆ 2005 California League of Middle Schools Educator of the Year
- ◆ California Math Council and NCTM national featured presenter
- ◆ Lead trainer for summer teacher training institutes
- ◆ Trainer/consultant for district, county, regional, and national workshops

#### **Author and co-author of mathematics curriculum**

- ◆ Simply Great Math Activities series: six books covering all major strands
- ◆ Angle On Geometry Program: over 400 pages of research-based geometry instruction
- ◆ Math Discoveries series: bringing math alive for students in middle schools
- ◆ Teacher training seminar materials handbooks for elementary, middle, and secondary school

#### **Available for workshops, keynote addresses, and conferences**

All workshops provide participants with complete, ready-to-use activities that require minimal preparation and give clear and specific directions. Participants also receive journal prompts, homework suggestions, and ideas for extensions and assessment.

*Brad's math activities are the best I've seen in 38 years of teaching!*

Wayne Dequer, 7th grade math teacher, Arcadia, CA

*"I can't begin to tell you how much you have inspired me!"*

Sue Bonesteel, Math Dept. Chair, Phoenix, AZ

*"Your entire audience was fully involved in math!! When they chatted, they chatted math. Real thinking!"*

Brenda McGaffigan, principal, Santa Ana, CA

*"Absolutely engaging. I can teach algebra to second graders!"*

Lisa Fellers, teacher

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Thanks and happy teaching,

Brad 

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# Math Bingo

## Overview:

Here's a motivating way for students to practice the order of operations in a game context. Students of varying abilities automatically adapt the game to their skill level, making the game fair for the entire class. You can create many variations of the game to provide practice opportunities to your students without boring them.

## Required Materials:

Paper

## Optional Materials:

Calculators

Dice or spinner

Bingo cards

## Procedure:

1. Have students make a game board as shown in the sample in the margin. They should then write the numbers from 1 through 24 in the empty squares of the Bingo board *in any order they wish*. If you wish, you may give them a copy of the game board to fill in. A blank master is provided along with several copies of pre-numbered game boards.

11	17	8	13	3
22	1	20	18	24
6	16	X	10	14
21	4	12	2	23
9	7	19	5	15

2. The object of the game is to claim five squares in a row, either horizontally, vertically, or diagonally as in a standard game of Bingo. The middle square is a free square which may be used in forming a row. Students may work alone or in pairs.
3. Randomly select three numbers. This can be done using a regular six-sided die, a ten-sided die, or one of the spinners provided in this handout. Some calculators have a random number generator or you can find one online.
4. Students use the three numbers to make a numerical expression that equals any one of the numbers on their game board. For example, if the numbers 2, 4, and 5 are selected, then some of some examples of the numerical expressions that may be formed are:

$$1 = 2 + 4 - 5$$

$$2 = 2 \cdot (5 - 4)$$

$$3 = 5 - 4 + 2$$

$$4 = 5 - \left( \frac{\sqrt{4}}{2} \right)$$

$$5 = 5 + 2 - \sqrt{4}$$

$$6 = 5 + \left( \frac{\sqrt{4}}{2} \right)$$

$$7 = 5 + \left( \frac{4}{2} \right)$$

$$8 = 2 \cdot 5 - \sqrt{4}$$

$$9 = 5 + \sqrt{4} + 2$$

$$10 = \frac{4 \cdot 5}{2}$$

- Students may use the four operations of arithmetic as well as parentheses, exponents, square roots, and the greatest integer function (see Taking a Closer Look below). Their choices will depend on their skill level. In fact, one of the reasons this game is so effective is that students of differing abilities can compete against one another. More highly skilled students will use more sophisticated operations, but even less skilled students have tools they can use. Also, all students will push themselves to use more advanced operations when they are competing in a game.
- Students write their numerical expression on their game board to claim their square. You may want to have them write their expressions in ink so they don't change their answers.
- Play continues until one or more students gets a bingo.



### Journal Prompts:



Using the numbers 2, 3, and 6, show a student who was absent how to make expressions that equal 1, 2, 3, 4, and 5.

Does multiplication always make an answer larger than the original digits? Why or why not?

### Homework:



Have the students try to find expressions for as many of the numbers from 1 through 24 as they can using three (or four) numbers that you assign. A practice master is provided for this purpose. For example, using the numbers 1, 2, 3, and 6 all the numbers from 1 through 24 can be generated as shown here.

$$1=(6\times 1)\div(3\times 2)$$

$$2=6-2-(3-1)$$

$$3=6\times 2\div 3-1$$

$$4=1\times 6\times 2\div 3$$

$$5=6\times 1-(3-2)$$

$$6=6\times 1\times(3-2)$$

$$7=6\times 1+(3-2)$$

$$8=6\times 2-3-1$$

$$9=6\times 2-3\times 1$$

$$10=6\times 2-3+1$$

$$11=6\times 1+3+2$$

$$12=1+2+3+6$$

$$13=6+(3\times 2)+1$$

$$14=6\times 2+3-1$$

$$15=6\times 2+3\times 1$$

$$16=6\times 2+3+1$$

$$17=6\times 3+1-2$$

$$18=6\times 3\times(2-1)$$

$$19=6\times 3+2-1$$

$$20=6\times 3+2\times 1$$

$$21=6\times 3+2+1$$

$$22=6\times(3+1)-2$$

$$23=3\times(6+2)-1$$

$$24=3\times 1\times(6+2)$$

Keep in mind that there are many different ways students may find to reach a target number. Depending upon the level of the students and their creativity, they might find valid expressions such as these:

$$24 = 3! \times (6 - 2) \times 1$$

$$24 = 26 - 3 + 1$$

$$24 = 6 \times (3 + 1^2)$$

### Taking a Closer Look:



You may also wish to introduce the *Greatest Integer Function* in this game. The *Greatest Integer Function* provides a way for students to obtain integer answers to expressions that would otherwise be non-integer. The notation is usually written using square brackets [ ]. Effectively, this function rounds any decimal or fraction *down* to the nearest integer. The examples below illustrate this.

$$23 + .16 = 23.16, \text{ but } [23 + .16] = [23.16] = 23$$

$$23 + 1.6 = 24.6, \text{ but } [23 + 1.6] = [24.6] = 24$$

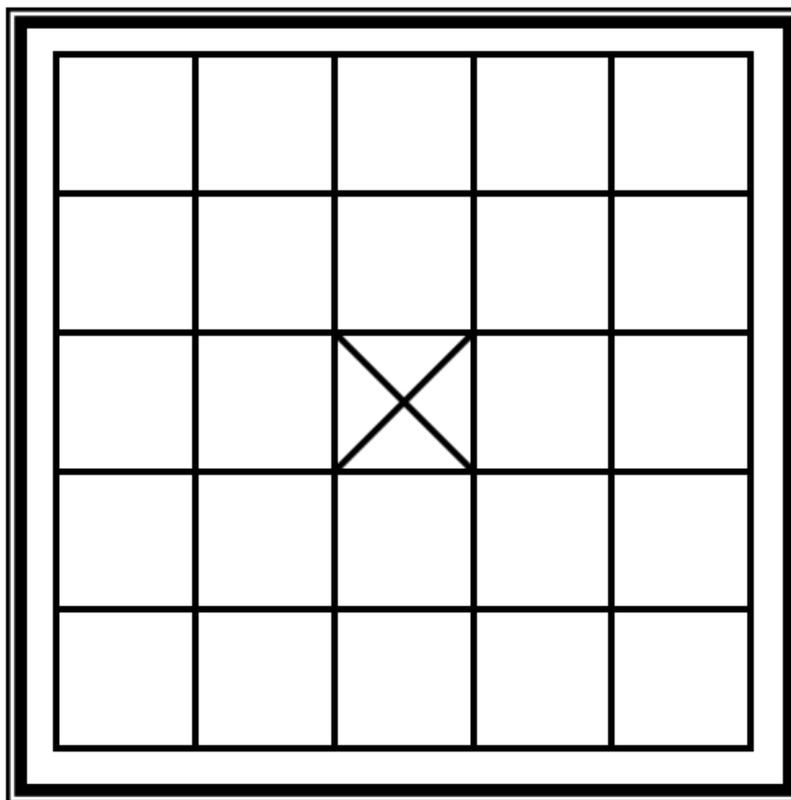
$$4! + .123 = 24.123, \text{ but } [4! + .123] = 24$$

**Assessment:**

Students who claim to have scored a bingo can give their game boards to another student to verify, or they can read them to the teacher to confirm them. Typing an expression into a calculator is an easy way to check answers too.

# MATH BINGO

Write the numbers 1 through 24 in the spaces of the Bingo board.-



1= \_\_\_\_\_

2= \_\_\_\_\_

3= \_\_\_\_\_

4= \_\_\_\_\_

5= \_\_\_\_\_

6= \_\_\_\_\_

7= \_\_\_\_\_

8= \_\_\_\_\_

9= \_\_\_\_\_

10= \_\_\_\_\_

11= \_\_\_\_\_

12= \_\_\_\_\_

13= \_\_\_\_\_

14= \_\_\_\_\_

15= \_\_\_\_\_

16= \_\_\_\_\_

17= \_\_\_\_\_

18= \_\_\_\_\_

19= \_\_\_\_\_

20= \_\_\_\_\_

21= \_\_\_\_\_

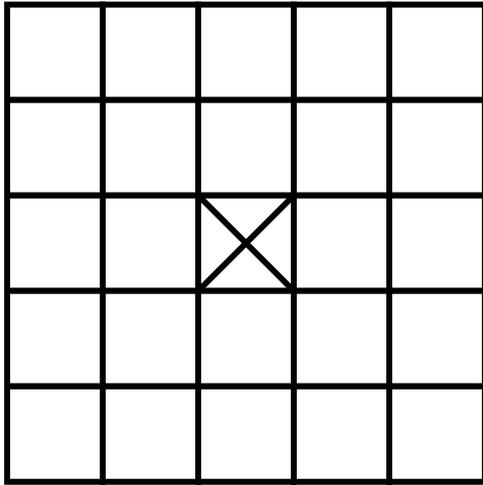
22= \_\_\_\_\_

23= \_\_\_\_\_

24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

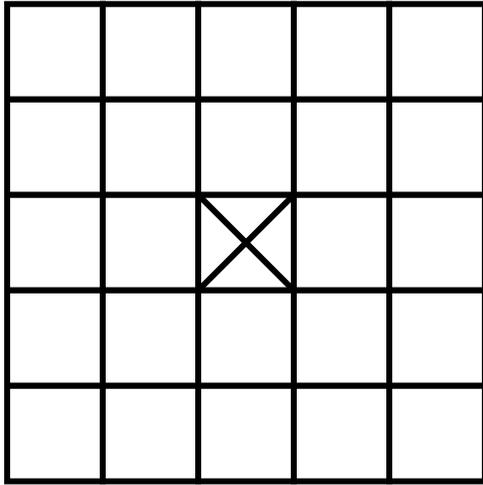


Write the numbers  
1 through 24 in the  
spaces of the Bingo  
board.

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
4= \_\_\_\_\_ 5= \_\_\_\_\_ 6= \_\_\_\_\_  
7= \_\_\_\_\_ 8= \_\_\_\_\_ 9= \_\_\_\_\_  
10= \_\_\_\_\_ 11= \_\_\_\_\_ 12= \_\_\_\_\_  
13= \_\_\_\_\_ 14= \_\_\_\_\_ 15= \_\_\_\_\_  
16= \_\_\_\_\_ 17= \_\_\_\_\_ 18= \_\_\_\_\_  
19= \_\_\_\_\_ 20= \_\_\_\_\_ 21= \_\_\_\_\_  
22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO



Write the numbers  
1 through 24 in the  
spaces of the Bingo  
board.

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
4= \_\_\_\_\_ 5= \_\_\_\_\_ 6= \_\_\_\_\_  
7= \_\_\_\_\_ 8= \_\_\_\_\_ 9= \_\_\_\_\_  
10= \_\_\_\_\_ 11= \_\_\_\_\_ 12= \_\_\_\_\_  
13= \_\_\_\_\_ 14= \_\_\_\_\_ 15= \_\_\_\_\_  
16= \_\_\_\_\_ 17= \_\_\_\_\_ 18= \_\_\_\_\_  
19= \_\_\_\_\_ 20= \_\_\_\_\_ 21= \_\_\_\_\_  
22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

5	20	14	7	22
11	9	3	18	12
21	15	<del>23</del>	1	6
10	4	8	13	17
16	24	19	2	17

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
4= \_\_\_\_\_ 5= \_\_\_\_\_ 6= \_\_\_\_\_  
7= \_\_\_\_\_ 8= \_\_\_\_\_ 9= \_\_\_\_\_  
10= \_\_\_\_\_ 11= \_\_\_\_\_ 12= \_\_\_\_\_  
13= \_\_\_\_\_ 14= \_\_\_\_\_ 15= \_\_\_\_\_  
16= \_\_\_\_\_ 17= \_\_\_\_\_ 18= \_\_\_\_\_  
19= \_\_\_\_\_ 20= \_\_\_\_\_ 21= \_\_\_\_\_  
22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

13	5	18	10	22
7	11	1	21	14
15	2	<del>8</del>	4	17
3	19	16	24	17
23	12	6	20	9

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
4= \_\_\_\_\_ 5= \_\_\_\_\_ 6= \_\_\_\_\_  
7= \_\_\_\_\_ 8= \_\_\_\_\_ 9= \_\_\_\_\_  
10= \_\_\_\_\_ 11= \_\_\_\_\_ 12= \_\_\_\_\_  
13= \_\_\_\_\_ 14= \_\_\_\_\_ 15= \_\_\_\_\_  
16= \_\_\_\_\_ 17= \_\_\_\_\_ 18= \_\_\_\_\_  
19= \_\_\_\_\_ 20= \_\_\_\_\_ 21= \_\_\_\_\_  
22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

16	11	20	21	4
13	1	8	14	10
7	22	<del>17</del>	6	19
18	12	3	5	23
24	15	9	23	2

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
4= \_\_\_\_\_ 5= \_\_\_\_\_ 6= \_\_\_\_\_  
7= \_\_\_\_\_ 8= \_\_\_\_\_ 9= \_\_\_\_\_  
10= \_\_\_\_\_ 11= \_\_\_\_\_ 12= \_\_\_\_\_  
13= \_\_\_\_\_ 14= \_\_\_\_\_ 15= \_\_\_\_\_  
16= \_\_\_\_\_ 17= \_\_\_\_\_ 18= \_\_\_\_\_  
19= \_\_\_\_\_ 20= \_\_\_\_\_ 21= \_\_\_\_\_  
22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

19	5	21	24	8
2	14	10	1	12
7	18	<del>23</del>	16	20
11	15	3	6	20
22	9	17	13	4

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
4= \_\_\_\_\_ 5= \_\_\_\_\_ 6= \_\_\_\_\_  
7= \_\_\_\_\_ 8= \_\_\_\_\_ 9= \_\_\_\_\_  
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22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

17	8	1	22	6
23	14	4	2	24
3	20	<del>X</del>	16	13
21	12	11	5	18
9	15	19	7	10

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
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22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

22	2	19	24	11
6	14	9	4	21
10	16	<del>X</del>	12	15
23	1	20	3	8
5	13	7	18	17

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
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22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

13	7	17	3	11
2	10	20	14	19
21	15	<del>6</del>	1	22
23	12	4	8	9
5	18	24	16	9

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
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Name \_\_\_\_\_

# MATH BINGO

11	20	3	21	15
1	18	12	7	19
14	6	<del>24</del>	10	10
9	17	13	2	22
8	23	4	16	5

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
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Name \_\_\_\_\_

# MATH BINGO

23	5	4	12	16
8	17	11	21	3
15	13	<del>7</del>	1	
19	22	6	18	2
10	24	20	9	14

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_
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- 19= \_\_\_\_\_ 20= \_\_\_\_\_ 21= \_\_\_\_\_
- 22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

20	4	18	1	12
15	2	7	17	16
8	6	<del>5</del>	3	
21	10	23	11	13
14	19	9	22	24

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_
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- 7= \_\_\_\_\_ 8= \_\_\_\_\_ 9= \_\_\_\_\_
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- 22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

3	10	21	13	9
15	18	2	19	1
8	11	<del>5</del>	22	
20	6	16	17	14
24	7	12	4	23

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
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22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

19	24	5	23	14
3	10	20	1	21
15	12	<del>16</del>	8	
9	7	2	18	11
4	22	13	6	17

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
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22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

12	2	9	8	17
23	10	4	7	5
11	6	<del>14</del>	14	19
24	18	21	1	15
16	3	13	22	20

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
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22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

Name \_\_\_\_\_

# MATH BINGO

24	19	13	22	17
12	3	4	18	2
21	7	<del>5</del>	5	11
6	16	8	20	14
23	9	10	1	15

- 1= \_\_\_\_\_ 2= \_\_\_\_\_ 3= \_\_\_\_\_  
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22= \_\_\_\_\_ 23= \_\_\_\_\_ 24= \_\_\_\_\_

# Ultimate Bingo

## Overview:

Looking for a quick and ready lesson plan? Want an activity that will hold your students' interest while challenging them, engaging them, and developing their skills? How about a game that is completely adaptable to whatever grade level or whatever mathematical concept you teach? Here it is!

### Required Materials:

Paper

### Optional Materials:

Textbook or workbook

## Procedure:

1. Have students make a game board as shown in the margin. You can write the answers from the activity master of your choice on the board for them to copy. They should place the answers in the 24 empty spaces in any order they wish.

81	84	210	54	102
363	300	70	231	319
112	150	X	63	80
341	95	35	82	152
90	201	73	131	101

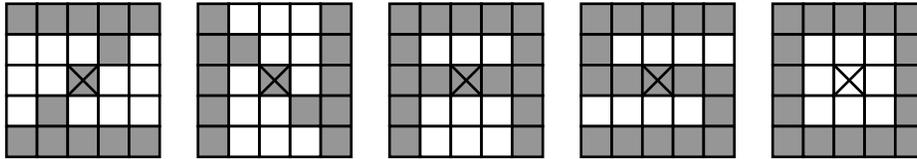
2. The object of the game is to claim five squares in a row horizontally, vertically, or diagonally as in a standard game of Bingo. The middle square is a free square which may be used in forming a row. Students may work alone or in pairs.

3. Display a random problem to the class from an activity master. You can write it on the board or say it aloud. The problems on the activity masters are written in rectangles in a larger font so that you may cut these out if you wish and draw them at random.

4. Students solve the problem and claim the square that has that answer. Students then write the equation in the blank at the bottom along with their answer. This allows you to check their work. It is a good idea to have students write their work in ink so they don't change their answers.

5. Continue displaying problems to the class. Students can continue to play even after they get a bingo. (They can get several if you wish.) You can also continue play until half the class has a bingo, or until each member of a team of four students finds a bingo.

6. You can also play for a design such as the block letters Z, N, A, S, or O, or try for a blackout. Your goal is to have students work as many problems as possible.



7. This game is extremely versatile. You can create problems that have solutions other than the ones given in the activity masters. For instance, you might want to have your students solve equations with rational number solutions.

8. Several activity masters are provided for game variations. Make up others to suit the needs of your current math topic.

9. For a quick lesson plan that adapts perfectly to the math topic you have been studying, give the students the answers to 24 problems from a page of their textbook or workbook. Then select one of the 24 problems randomly and write it on the board or say it aloud. The students solve the problem and mark their answer as in the standard version described above. They are doing textbook practice in a new and fun format!

### Good Tip!



Using Ultimate Bingo as a review just before a test is an excellent way to motivate students to recall and hone their skills. It's also a great way to reinforce math terminology. Students can make up their own game boards as well.

10. To make the game last longer and provide more practice for the students, display 30 or 36 answers. The students then write any 24 of them. Now there will be times that the problem you select will have an answer that is not on their game board. Thus it will take longer to score a bingo, and the students will have to work even harder to get one. In most cases, if a student solves their problem and doesn't see the answer on the game board, they will solve it again just to make sure that they did it correctly; they are doing their math twice!



### Journal Prompts:



Create four different problems that have the same answer on your game board.

Renaldo said he could sometimes find the answer on his game board by estimating without solving the problem to find the exact answer. Explain how this could be done. Give an example.

### **Homework:**



Give the students an Ultimate Bingo game board and have them fill in 24 answers that you give them. For homework, ask them to create 24 problems that have those answers.

Another option is to have them write the 24 answers and then tell them to solve enough problems so that they score a Bingo. Even though this means that they only need to solve four or five problems, they will think critically in choosing their problems and practice estimation and other high order thinking skills.

### **Taking a Closer Look:**



One of the advantages of this game is that the students know that the answers to the problems are on their game board. This gives them immediate feedback; if they have an incorrect answer they will solve the problem again until they get the answer that appears on their game board. Thus, there is no need for you to correct papers!

### **Assessment:**



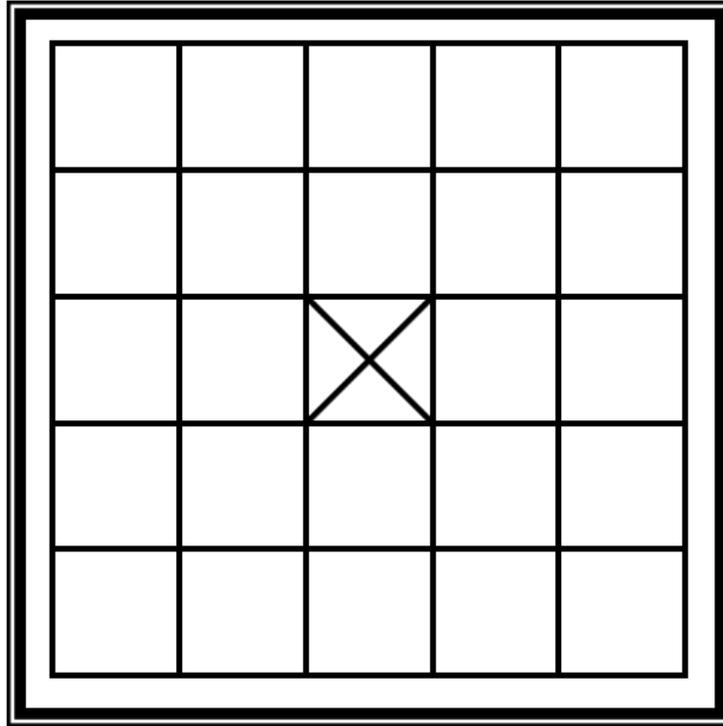
It is easy to check students' answers with the answer key to the problems. Alternatively, you can give one or two students the answer key, and let them check student work.

If you are using a textbook or workbook to generate the problems, use the teacher's manual as your answer key.

# ULTIMATE BINGO

Name \_\_\_\_\_

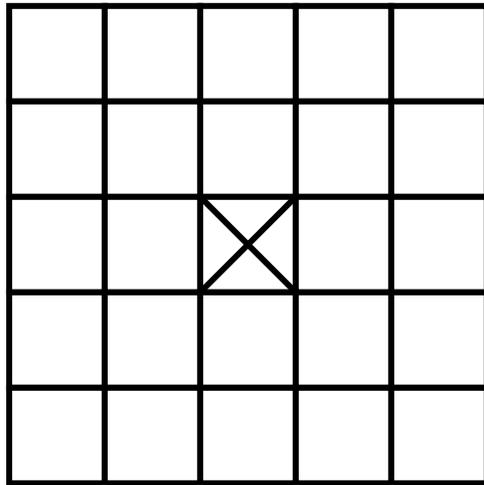
Write the answers your teacher provides in the spaces of the Bingo board.



_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Name \_\_\_\_\_

# ULTIMATE BINGO



Write the answers  
your teacher  
provides in the  
spaces of the Bingo  
board.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

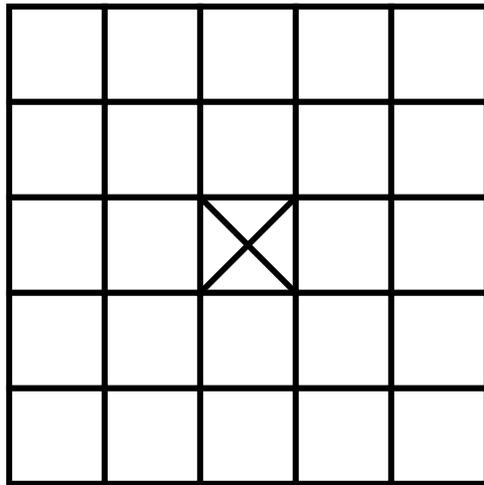
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_

# ULTIMATE BINGO



Write the answers  
your teacher  
provides in the  
spaces of the Bingo  
board.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Addition with regrouping:

$26 + 44$	$46 + 27$	$206 + 25$
$56 + 39$	$55 + 25$	$114 + 38$
$72 + 78$	$38 + 46$	$145 + 65$
$67 + 34$	$71 + 19$	$164 + 37$
$17 + 18$	$66 + 36$	$253 + 88$
$28 + 26$	$29 + 34$	$206 + 94$
$37 + 44$	$33 + 98$	$237 + 82$
$63 + 19$	$45 + 67$	$274 + 89$

Answer Key

$26 + 44 = 70$	$46 + 27 = 73$	$206 + 25 = 231$
$56 + 39 = 95$	$55 + 25 = 80$	$114 + 38 = 152$
$72 + 78 = 150$	$38 + 46 = 84$	$145 + 65 = 210$
$67 + 34 = 101$	$71 + 19 = 90$	$164 + 37 = 201$
$17 + 18 = 35$	$66 + 36 = 102$	$253 + 88 = 341$
$28 + 26 = 54$	$29 + 34 = 63$	$206 + 94 = 300$
$37 + 44 = 81$	$33 + 98 = 131$	$237 + 82 = 319$
$63 + 19 = 82$	$45 + 67 = 112$	$274 + 89 = 363$

Subtraction with regrouping:

$52 - 17$	$100 - 34$	$206 - 112$
$44 - 36$	$102 - 51$	$227 - 138$
$71 - 39$	$104 - 27$	$337 - 246$
$60 - 35$	$116 - 44$	$414 - 388$
$84 - 38$	$121 - 56$	$523 - 471$
$62 - 7$	$131 - 98$	$607 - 499$
$33 - 29$	$152 - 99$	$605 - 577$
$41 - 14$	$144 - 94$	$728 - 659$

Answer Key

$52 - 17 = 35$	$100 - 34 = 66$	$206 - 112 = 94$
$44 - 36 = 8$	$102 - 51 = 51$	$227 - 138 = 89$
$71 - 39 = 32$	$104 - 27 = 77$	$337 - 246 = 91$
$60 - 35 = 25$	$116 - 44 = 72$	$414 - 388 = 26$
$84 - 38 = 46$	$121 - 56 = 65$	$523 - 471 = 52$
$62 - 7 = 55$	$131 - 98 = 33$	$607 - 499 = 108$
$33 - 29 = 4$	$152 - 99 = 53$	$605 - 577 = 28$
$41 - 14 = 27$	$144 - 94 = 50$	$728 - 659 = 69$

One-digit multiplication:

$3 \times 8 =$	$6 \times 7 =$	$5 \times 8 =$
$5 \times 5 =$	$6 \times 6 =$	$9 \times 0 =$
$4 \times 8 =$	$3 \times 9 =$	$7 \times 7 =$
$8 \times 9 =$	$2 \times 9 =$	$4 \times 7 =$
$4 \times 5 =$	$8 \times 8 =$	$5 \times 3 =$
$7 \times 3 =$	$9 \times 6 =$	$9 \times 7 =$
$7 \times 8 =$	$6 \times 8 =$	$9 \times 9 =$
$6 \times 5 =$	$7 \times 2 =$	$4 \times 4 =$

Answer Key

$3 \times 8 = 24$	$6 \times 7 = 42$	$5 \times 8 = 40$
$5 \times 5 = 25$	$6 \times 6 = 36$	$9 \times 0 = 0$
$4 \times 8 = 32$	$3 \times 9 = 27$	$7 \times 7 = 49$
$8 \times 9 = 72$	$2 \times 9 = 18$	$4 \times 7 = 28$
$4 \times 5 = 20$	$8 \times 8 = 64$	$5 \times 3 = 15$
$7 \times 3 = 21$	$9 \times 6 = 54$	$9 \times 7 = 63$
$7 \times 8 = 56$	$6 \times 8 = 48$	$9 \times 9 = 81$
$6 \times 5 = 30$	$7 \times 2 = 14$	$4 \times 4 = 16$

Two-digit x one-digit multiplication:

$4 \times 56$	$4 \times 45$	$8 \times 35$
$37 \times 3$	$43 \times 5$	$29 \times 4$
$4 \times 26$	$6 \times 70$	$28 \times 7$
$31 \times 9$	$2 \times 77$	$17 \times 9$
$8 \times 22$	$39 \times 3$	$53 \times 6$
$9 \times 60$	$34 \times 7$	$80 \times 8$
$56 \times 2$	$39 \times 9$	$19 \times 4$
$48 \times 5$	$5 \times 79$	$23 \times 7$

Answer Key

$4 \times 56 = 224$	$4 \times 45 = 180$	$8 \times 35 = 280$
$37 \times 3 = 111$	$43 \times 5 = 215$	$29 \times 4 = 116$
$4 \times 26 = 104$	$6 \times 70 = 420$	$28 \times 7 = 196$
$31 \times 9 = 279$	$2 \times 77 = 154$	$17 \times 9 = 153$
$8 \times 22 = 176$	$39 \times 3 = 117$	$53 \times 6 = 318$
$9 \times 60 = 540$	$34 \times 7 = 238$	$80 \times 8 = 640$
$56 \times 2 = 112$	$39 \times 9 = 351$	$19 \times 4 = 76$
$48 \times 5 = 240$	$5 \times 79 = 395$	$23 \times 7 = 161$

Two-digit x two-digit multiplication:

$22 \times 30$	$14 \times 14$	$15 \times 32$
$34 \times 53$	$42 \times 30$	$81 \times 11$
$41 \times 38$	$25 \times 60$	$34 \times 75$
$20 \times 84$	$31 \times 40$	$52 \times 52$
$47 \times 61$	$33 \times 33$	$31 \times 39$
$90 \times 11$	$55 \times 99$	$80 \times 30$
$51 \times 22$	$31 \times 29$	$44 \times 41$
$50 \times 18$	$28 \times 29$	$90 \times 12$

Answer Key

$22 \times 30 = 660$	$14 \times 14 = 196$	$15 \times 32 = 480$
$34 \times 53 = 1802$	$42 \times 30 = 1260$	$81 \times 11 = 891$
$41 \times 38 = 1558$	$25 \times 60 = 1500$	$34 \times 75 = 2550$
$20 \times 84 = 1680$	$31 \times 40 = 1240$	$52 \times 52 = 2704$
$47 \times 61 = 2867$	$33 \times 33 = 1089$	$31 \times 39 = 1209$
$90 \times 11 = 990$	$55 \times 99 = 5445$	$80 \times 30 = 2400$
$51 \times 22 = 1122$	$31 \times 29 = 899$	$44 \times 41 = 1804$
$50 \times 18 = 900$	$28 \times 29 = 812$	$90 \times 12 = 1080$

Division—single-digit divisor with no remainder:

$28 \div 4$	$0 \div 7$	$123 \div 3$
$24 \div 6$	$14 \div 14$	$24 \div 8$
$90 \div 6$	$100 \div 5$	$42 \div 3$
$24 \div 2$	$25 \div 5$	$135 \div 5$
$108 \div 6$	$24 \div 3$	$72 \div 8$
$18 \div 9$	$128 \div 8$	$30 \div 3$
$54 \div 9$	$55 \div 5$	$38 \div 2$
$52 \div 4$	$22 \div 1$	$126 \div 6$

Answer Key

$28 \div 4 = 7$	$0 \div 7 = 0$	$123 \div 3 = 41$
$24 \div 6 = 4$	$14 \div 14 = 1$	$24 \div 8 = 3$
$90 \div 6 = 15$	$100 \div 5 = 20$	$42 \div 3 = 14$
$24 \div 2 = 12$	$25 \div 5 = 5$	$135 \div 5 = 27$
$108 \div 6 = 18$	$24 \div 3 = 8$	$72 \div 8 = 9$
$18 \div 9 = 2$	$128 \div 8 = 16$	$30 \div 3 = 10$
$54 \div 9 = 6$	$55 \div 5 = 11$	$38 \div 2 = 19$
$52 \div 4 = 13$	$22 \div 1 = 22$	$126 \div 6 = 21$

Division—single-digit divisor with remainder:

$51 \div 4$	$41 \div 8$	$26 \div 3$
$29 \div 2$	$33 \div 9$	$47 \div 9$
$36 \div 7$	$73 \div 7$	$52 \div 3$
$54 \div 5$	$82 \div 6$	$78 \div 8$
$58 \div 6$	$55 \div 7$	$83 \div 6$
$99 \div 5$	$71 \div 8$	$74 \div 9$
$20 \div 3$	$81 \div 4$	$36 \div 5$
$28 \div 8$	$81 \div 5$	$79 \div 2$

Answer Key

$51 \div 4 = 12 \text{ R}3$	$41 \div 8 = 5 \text{ R}1$	$26 \div 3 = 8 \text{ R}2$
$29 \div 2 = 14 \text{ R}1$	$33 \div 9 = 3 \text{ R}6$	$47 \div 9 = 5 \text{ R}2$
$36 \div 7 = 5 \text{ R}1$	$73 \div 7 = 10 \text{ R}3$	$52 \div 3 = 17 \text{ R}1$
$54 \div 5 = 10 \text{ R}4$	$82 \div 6 = 13 \text{ R}4$	$78 \div 8 = 9 \text{ R}6$
$58 \div 6 = 9 \text{ R}4$	$55 \div 7 = 7 \text{ R}6$	$83 \div 6 = 13 \text{ R}5$
$99 \div 5 = 19 \text{ R}4$	$71 \div 8 = 8 \text{ R}7$	$74 \div 9 = 8 \text{ R}2$
$20 \div 3 = 6 \text{ R}2$	$81 \div 4 = 20 \text{ R}1$	$36 \div 5 = 7 \text{ R}1$
$28 \div 8 = 3 \text{ R}4$	$81 \div 5 = 16 \text{ R}1$	$79 \div 2 = 39 \text{ R}1$

Simplifying fractions:

$\frac{15}{36}$	$\frac{18}{32}$	$\frac{6}{20}$	$\frac{4}{24}$	$\frac{21}{48}$	$\frac{12}{15}$
$\frac{6}{9}$	$\frac{4}{10}$	$\frac{3}{30}$	$\frac{33}{36}$	$\frac{5}{15}$	$\frac{4}{20}$
$\frac{14}{20}$	$\frac{45}{50}$	$\frac{2}{24}$	$\frac{2}{50}$	$\frac{27}{60}$	$\frac{6}{8}$
$\frac{2}{40}$	$\frac{5}{10}$	$\frac{24}{32}$	$\frac{14}{24}$	$\frac{3}{12}$	$\frac{2}{32}$

Answer Key

$\frac{5}{12}$	$\frac{9}{16}$	$\frac{3}{10}$	$\frac{1}{6}$	$\frac{7}{16}$	$\frac{4}{5}$
$\frac{2}{3}$	$\frac{2}{5}$	$\frac{1}{10}$	$\frac{11}{12}$	$\frac{1}{3}$	$\frac{1}{5}$
$\frac{7}{10}$	$\frac{9}{10}$	$\frac{1}{12}$	$\frac{1}{25}$	$\frac{9}{20}$	$\frac{3}{4}$
$\frac{1}{20}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{12}$	$\frac{1}{4}$	$\frac{1}{16}$

Finding the Least Common Multiple:

2, 3	4, 5	16, 4
2, 4	5, 2	2, 6, 9
9, 27	2, 11	11, 3
2, 17	6, 4	2, 4, 8
3, 5	9, 4	25, 5
7, 2	14, 4	4, 8, 6
4, 5, 8	3, 7	7, 3, 6
3, 9	7, 5	6, 5

Answer Key

6	20	16
4	10	18
27	22	33
34	12	8
15	36	25
14	28	24
40	21	42
9	35	30

Adding fractions with unlike denominators:

$\frac{1}{10} + \frac{1}{5}$	$\frac{3}{4} + \frac{1}{6}$	$\frac{1}{4} + \frac{1}{8}$	$\frac{1}{5} + \frac{1}{3}$
$\frac{1}{8} + \frac{1}{8}$	$\frac{3}{4} + \frac{1}{4}$	$\frac{2}{3} + \frac{1}{5}$	$\frac{1}{3} + \frac{5}{8}$
$\frac{3}{10} + \frac{1}{5}$	$\frac{1}{3} + \frac{1}{2}$	$\frac{1}{6} + \frac{1}{2}$	$\frac{1}{5} + \frac{1}{4}$
$\frac{3}{5} + \frac{1}{4}$	$\frac{1}{4} + \frac{1}{3}$	$\frac{1}{3} + \frac{1}{10}$	$\frac{1}{16} + \frac{1}{8}$
$\frac{1}{6} + \frac{1}{6}$	$\frac{1}{2} + \frac{1}{8}$	$\frac{1}{5} + \frac{1}{6}$	$\frac{1}{4} + \frac{2}{5}$
$\frac{1}{5} + \frac{1}{2}$	$\frac{2}{3} + \frac{1}{12}$	$\frac{3}{4} + \frac{1}{5}$	$\frac{1}{6} + \frac{1}{4}$

Answer Key

$\frac{3}{10}$	$\frac{11}{12}$	$\frac{3}{8}$	$\frac{8}{15}$
$\frac{1}{4}$	1	$\frac{13}{15}$	$\frac{23}{24}$
$\frac{1}{2}$	$\frac{5}{6}$	$\frac{2}{3}$	$\frac{9}{20}$
$\frac{17}{20}$	$\frac{7}{12}$	$\frac{13}{30}$	$\frac{3}{16}$
$\frac{1}{3}$	$\frac{5}{8}$	$\frac{11}{30}$	$\frac{13}{20}$
$\frac{7}{10}$	$\frac{3}{4}$	$\frac{19}{20}$	$\frac{5}{12}$

Subtracting fractions with unlike denominators:

$\frac{7}{15} - \frac{1}{10}$	$\frac{3}{5} - \frac{1}{5}$	$\frac{5}{8} - \frac{1}{4}$	$\frac{3}{10} - \frac{1}{15}$
$\frac{1}{2} - \frac{1}{4}$	$\frac{3}{4} - \frac{2}{5}$	$\frac{4}{5} - \frac{3}{4}$	$\frac{9}{10} - \frac{1}{5}$
$\frac{3}{7} - \frac{1}{8}$	$\frac{7}{8} - \frac{1}{3}$	$\frac{2}{3} - \frac{1}{4}$	$\frac{3}{10} - \frac{1}{5}$
$\frac{4}{5} - \frac{1}{2}$	$\frac{4}{7} - \frac{1}{3}$	$\frac{2}{5} - \frac{1}{5}$	$\frac{7}{10} - \frac{1}{8}$
$\frac{3}{16} - \frac{1}{8}$	$\frac{5}{6} - \frac{1}{4}$	$\frac{3}{10} - \frac{1}{6}$	$\frac{5}{6} - \frac{1}{3}$
$\frac{11}{15} - \frac{1}{2}$	$\frac{2}{9} - \frac{1}{18}$	$\frac{1}{5} - \frac{1}{20}$	$\frac{3}{4} - \frac{1}{8}$

Answer Key

$\frac{11}{30}$	$\frac{2}{5}$	$\frac{3}{8}$	$\frac{7}{30}$
$\frac{1}{4}$	$\frac{7}{20}$	$\frac{1}{20}$	$\frac{7}{10}$
$\frac{17}{56}$	$\frac{13}{24}$	$\frac{5}{12}$	$\frac{1}{10}$
$\frac{3}{10}$	$\frac{5}{21}$	$\frac{1}{5}$	$\frac{23}{40}$
$\frac{1}{16}$	$\frac{7}{12}$	$\frac{2}{15}$	$\frac{1}{2}$
$\frac{7}{30}$	$\frac{1}{6}$	$\frac{3}{20}$	$\frac{5}{8}$

Multiplying fractions:

$\frac{1}{10} \times \frac{1}{5}$	$\frac{3}{4} \times \frac{2}{3}$	$\frac{1}{2} \times \frac{3}{8}$	$\frac{3}{5} \times \frac{1}{3}$
$\frac{1}{8} \times \frac{3}{4}$	$\frac{1}{2} \times \frac{4}{15}$	$\frac{1}{3} \times \frac{1}{15}$	$\frac{5}{8} \times \frac{1}{10}$
$\frac{2}{3} \times \frac{4}{5}$	$\frac{2}{3} \times \frac{6}{11}$	$\frac{4}{7} \times \frac{7}{12}$	$\frac{1}{9} \times \frac{3}{6}$
$\frac{4}{7} \times \frac{1}{16}$	$\frac{2}{9} \times \frac{9}{10}$	$\frac{7}{10} \times \frac{2}{5}$	$\frac{4}{15} \times \frac{5}{8}$
$\frac{1}{2} \times \frac{1}{2}$	$\frac{3}{4} \times \frac{3}{5}$	$\frac{2}{3} \times \frac{2}{3}$	$\frac{1}{8} \times \frac{1}{5}$
$\frac{1}{10} \times \frac{1}{10}$	$\frac{1}{4} \times \frac{1}{6}$	$\frac{3}{16} \times \frac{4}{15}$	$\frac{4}{11} \times \frac{1}{2}$

Answer Key

$\frac{1}{50}$	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{1}{5}$
$\frac{3}{32}$	$\frac{2}{15}$	$\frac{1}{45}$	$\frac{1}{16}$
$\frac{8}{15}$	$\frac{4}{11}$	$\frac{1}{3}$	$\frac{1}{18}$
$\frac{1}{28}$	$\frac{1}{5}$	$\frac{7}{25}$	$\frac{1}{6}$
$\frac{1}{4}$	$\frac{9}{20}$	$\frac{4}{9}$	$\frac{1}{40}$
$\frac{1}{100}$	$\frac{1}{24}$	$\frac{1}{20}$	$\frac{2}{11}$

Dividing fractions:

$\frac{1}{10} \div \frac{1}{5}$	$\frac{1}{4} \div \frac{2}{3}$	$\frac{1}{2} \div \frac{5}{8}$	$\frac{1}{5} \div \frac{1}{3}$
$\frac{3}{8} \div \frac{1}{2}$	$\frac{3}{11} \div \frac{2}{3}$	$\frac{1}{2} \div \frac{7}{8}$	$\frac{3}{10} \div \frac{1}{3}$
$\frac{1}{8} \div \frac{3}{4}$	$\frac{1}{2} \div \frac{4}{7}$	$\frac{1}{20} \div \frac{1}{15}$	$\frac{5}{18} \div \frac{1}{2}$
$\frac{1}{12} \div \frac{3}{4}$	$\frac{1}{9} \div \frac{4}{15}$	$\frac{1}{3} \div \frac{11}{15}$	$\frac{1}{6} \div \frac{4}{5}$
$\frac{1}{8} \div \frac{2}{7}$	$\frac{1}{3} \div \frac{5}{8}$	$\frac{1}{15} \div \frac{1}{3}$	$\frac{1}{7} \div \frac{2}{3}$
$\frac{1}{8} \div \frac{1}{8}$	$\frac{1}{2} \div \frac{14}{15}$	$\frac{2}{3} \div \frac{1}{3}$	$\frac{3}{4} \div \frac{4}{5}$

Answer Key

$\frac{1}{2}$	$\frac{3}{8}$	$\frac{4}{5}$	$\frac{3}{5}$
$\frac{3}{4}$	$\frac{9}{22}$	$\frac{4}{7}$	$\frac{9}{10}$
$\frac{1}{6}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{5}{9}$
$\frac{1}{9}$	$\frac{5}{12}$	$\frac{5}{11}$	$\frac{5}{24}$
$\frac{7}{16}$	$\frac{8}{15}$	$\frac{1}{5}$	$\frac{3}{14}$
1	$\frac{15}{28}$	2	$\frac{15}{16}$

Converting fractions, decimals, and percents

$\frac{1}{4}$	$\frac{2}{5}$	$\frac{4}{9}$	$\frac{1}{8}$	$\frac{3}{10}$	$\frac{5}{6}$	$\frac{2}{3}$	$\frac{7}{8}$
$\frac{9}{10}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{2}{9}$	$\frac{7}{10}$	$\frac{3}{4}$
$\frac{3}{5}$	$\frac{1}{9}$	$\frac{8}{9}$	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{3}{8}$	$\frac{4}{5}$	$\frac{5}{9}$

.25	.4	$\bar{.4}$	.125	.3	$.8\bar{3}$	$\bar{.6}$	.875
.9	.625	.5	$.1\bar{6}$	$\bar{.3}$	$\bar{.2}$	.7	.75
.6	$\bar{.1}$	$\bar{.8}$	.1	.2	.375	.8	$\bar{.5}$

25%	40%	$44\frac{4}{9}\%$	$12\frac{1}{2}\%$	30%	$83\frac{1}{3}\%$	$66\frac{2}{3}\%$	$87\frac{1}{2}\%$
90%	$62\frac{1}{2}\%$	50%	$16\frac{2}{3}\%$	$33\frac{1}{3}\%$	$22\frac{2}{9}\%$	70%	75%
60%	$11\frac{1}{9}\%$	$88\frac{8}{9}\%$	10%	20%	$37\frac{1}{2}\%$	80%	$55\frac{5}{9}\%$

Addition of integers:

$(-6) + 11$	$16 + (-5)$	$(-5) + (-5)$
$6 + (-15)$	$8 + (-14)$	$(-8) + 14$
$(-3) + (-9)$	$13 + (-3)$	$(-9) + 6$
$(-4) + 5$	$(-4) + 3$	$(-17) + 17$
$(-2) + 10$	$11 + (-13)$	$6 + (-14)$
$(-12) + 5$	$(-8) + 10$	$12 + (-16)$
$(-4) + 11$	$5 + (-16)$	$19 + (-16)$
$(-13) + 8$	$8 + (-4)$	$17 + (-8)$

Answer Key

5	11	-10
-2	-6	6
-12	10	-3
1	-1	0
8	-2	-8
-7	2	-4
7	-11	3
-5	4	9

Subtraction of integers:

$5 - (-5)$	$6 - 11$	$(-2) - (-7)$
$4 - 15$	$3 - (-4)$	$(-1) - 5$
$0 - (-1)$	$(-9) - (-6)$	$4 - (-4)$
$(-4) - 4$	$(-3) - (-6)$	$7 - 16$
$0 - (-4)$	$(2) - (-7)$	$(-8) - (-8)$
$(-6) - 6$	$3 - (-8)$	$(-2) - 8$
$(-1) - (-3)$	$8 - 12$	$(-3) - (-9)$
$12 - 13$	$12 - 19$	$(-7) - (-5)$

Answer Key

10	-5	5
-11	7	-6
1	-3	8
-8	3	-9
4	9	0
-12	11	-10
2	-4	6
-1	-7	-2

Multiplying integers:

$(-3)(3)$	$(-8)(-7)$	$(-7)(-7)$
$(12)(-7)$	$(5)(-5)$	$(-8)(-8)$
$(-5)(-5)$	$(7)(6)$	$(-8)(12)$
$(8)(11)$	$(11)(-6)$	$(-8)(11)$
$(-7)(8)$	$(7)(-7)$	$(-6)(7)$
$(-9)(8)$	$(-9)(-6)$	$(-8)(-6)$
$(-7)(-12)$	$(7)(-5)$	$(-6)(-12)$
$(6)(-9)$	$(-8)(8)$	$(-3)(-3)$

Answer Key

-9	56	49
-84	-25	64
25	42	-96
88	-66	-88
-56	-49	-42
-72	54	48
84	-35	72
-54	-64	9

Division of integers:

$(-60) \div 5$	$15 \div (-5)$	$(-49) \div (7)$
$(-56) \div 7$	$32 \div (-8)$	$42 \div (-7)$
$(-72) \div (-8)$	$(-40) \div (-8)$	$(-99) \div (-9)$
$28 \div (-2)$	$(-49) \div (-7)$	$(-9) \div (-9)$
$(-26) \div (-2)$	$(-42) \div (-7)$	$(-88) \div 8$
$81 \div (-9)$	$(-35) \div 7$	$(-15) \div (-3)$
$(-39) \div 3$	$(-60) \div (-5)$	$(-56) \div (-7)$
$3 \div (-3)$	$(-32) \div (-8)$	$(-28) \div (-2)$

Answer Key

-12	-3	-7
-8	-4	-6
9	5	11
-14	7	1
13	6	-11
-9	-5	5
-13	12	8
-1	4	14

Solving equations 1:

$3x + 9 = -21$	$1 = -7x + 50$
$14x - 7 = 35$	$36 = 5x - 24$
$-2x + 13 = 25$	$12 = 5x + 32$
$3x - 29 = 1$	$-2 = 6x - 14$
$-4x + 2 = -2$	$-3 = 11x + 19$
$-5x + 25 = 50$	$-70 = 5x - 35$
$-7x + 32 = -24$	$-17 = -4x + 19$
$9x - 17 = -17$	$-91 = 8x - 3$
$-3x + 14 = 23$	$-17 = 4x - 61$
$6x + 50 = -4$	$1 = -2x + 13$
$7x - 21 = 14$	$-47 = 8x + 17$
$9x + 4 = 40$	$-19 = -9x - 28$

Answer Key

-10	7
3	12
-6	-4
10	2
1	-2
-5	-7
8	9
0	-11
-3	11
-9	6
5	-8
4	-1

Solving equations 2:

$4x + 4 = 6x - 14$	$7x + 15 = 2x + 25$
$3x + 11 = x + 7$	$8x = 3x + 25$
$6x - 7 = 12x - 1$	$-8x - 7 = -9x + 4$
$2x + 29 = -x + 2$	$11x + 41 = -x - 43$
$8x - 84 = x$	$3x = 7x + 16$
$11x - 7 = 9x - 1$	$6x - 4 = 5x + 4$
$7x = 4x - 18$	$-5x + 19 = x + 19$
$-4x + 50 = -9x - 5$	$8x - 29 = x - 1$
$4x - 24 = x - 6$	$4x + 13 = 2x - 7$
$5x - 13 = 2x + 17$	$6x + 48 = x + 8$
$-6x + 22 = 16x$	$-3x - 23 = 2x + 2$
$-3x + 3 = -11x - 21$	$9x + 7 = 11x - 7$

Answer key

9	2
-2	5
-1	11
-9	-7
12	-4
3	8
-6	0
-11	4
6	-10
10	-8
1	-5
-3	7

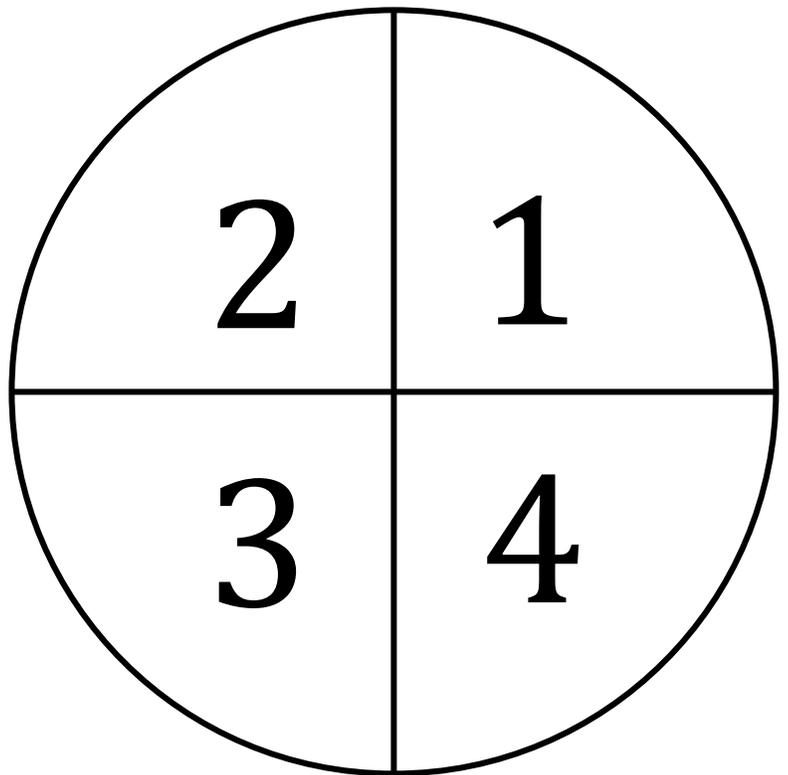
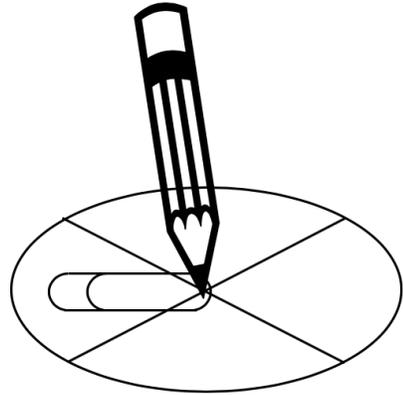
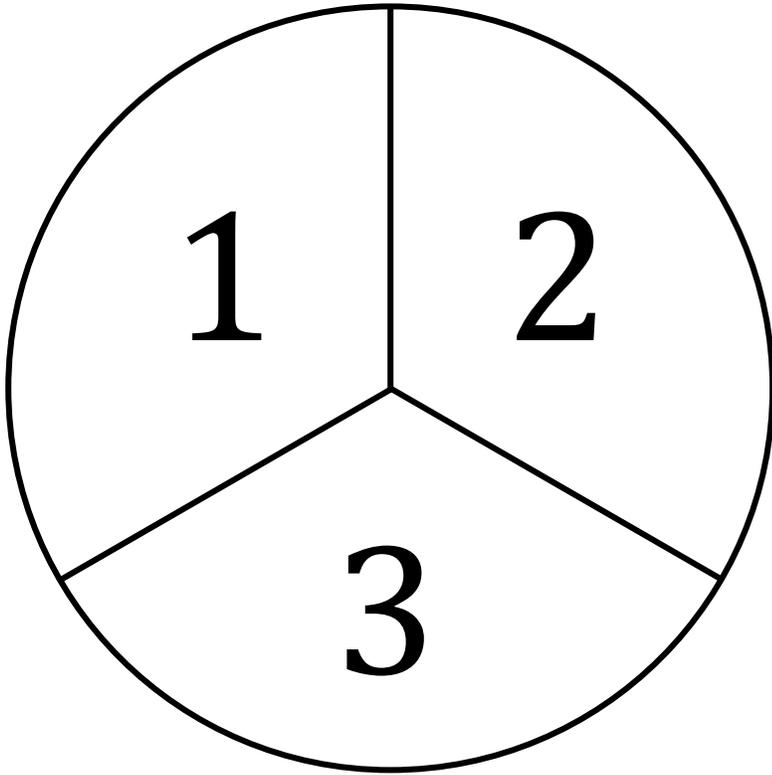
Simplifying radicals:

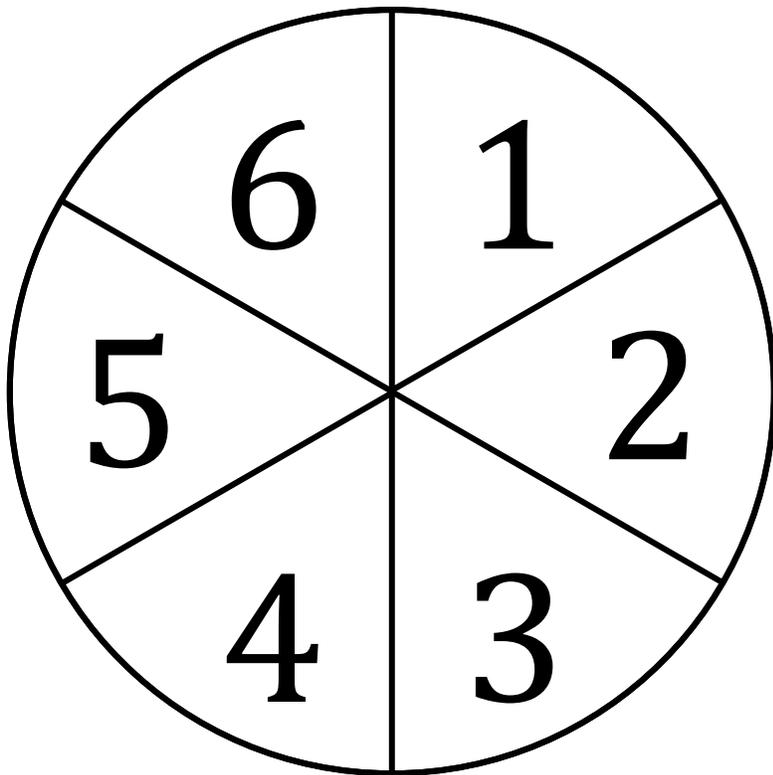
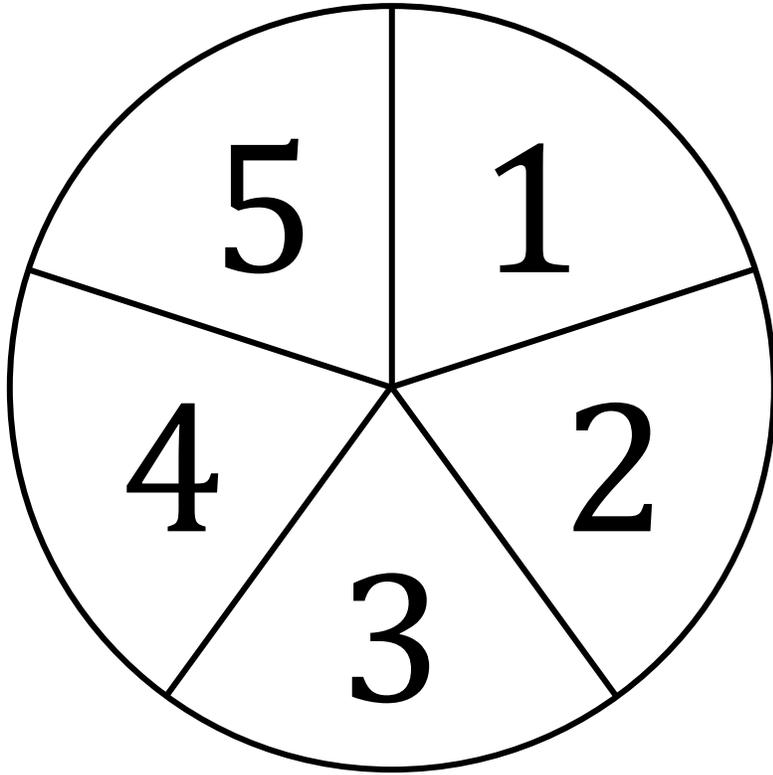
$-\sqrt{81}$	$\sqrt{80}$	$\sqrt{4x^2}$
$\sqrt{36}$	$\sqrt{200}$	$\sqrt{10x^4}$
$\sqrt{121}$	$\sqrt{50}$	$\sqrt{3x^2}$
$\sqrt{400}$	$\sqrt{72}$	$\sqrt{8x^2}$
$-\sqrt{100}$	$\sqrt{75}$	$\sqrt{49x^2}$
$\sqrt{169}$	$\sqrt{60}$	$\sqrt{7x^6}$
$-\sqrt{225}$	$\sqrt{63}$	$\sqrt{50x^2}$
$\sqrt{324}$	$\sqrt{45}$	$\sqrt{4x^3}$

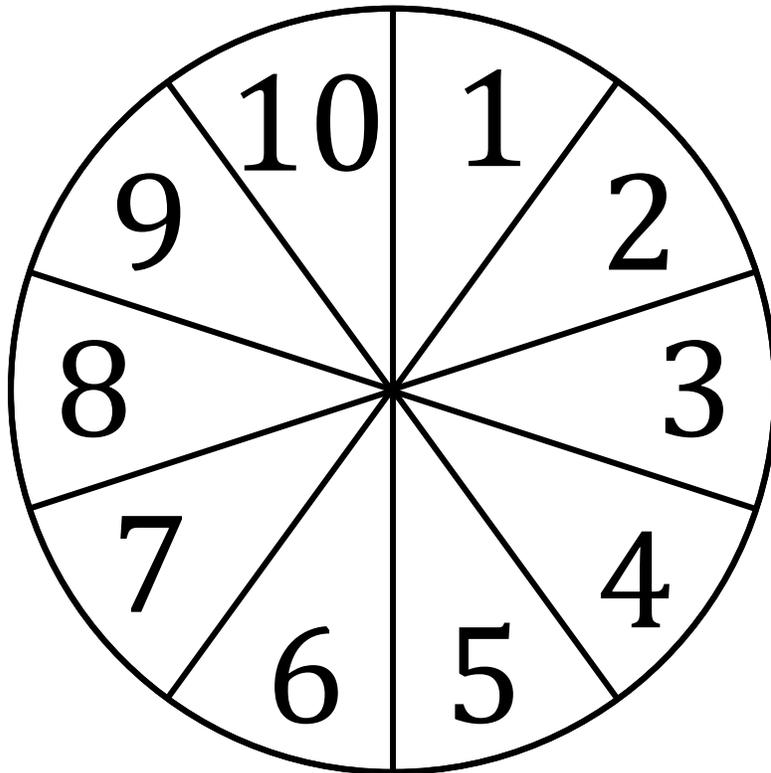
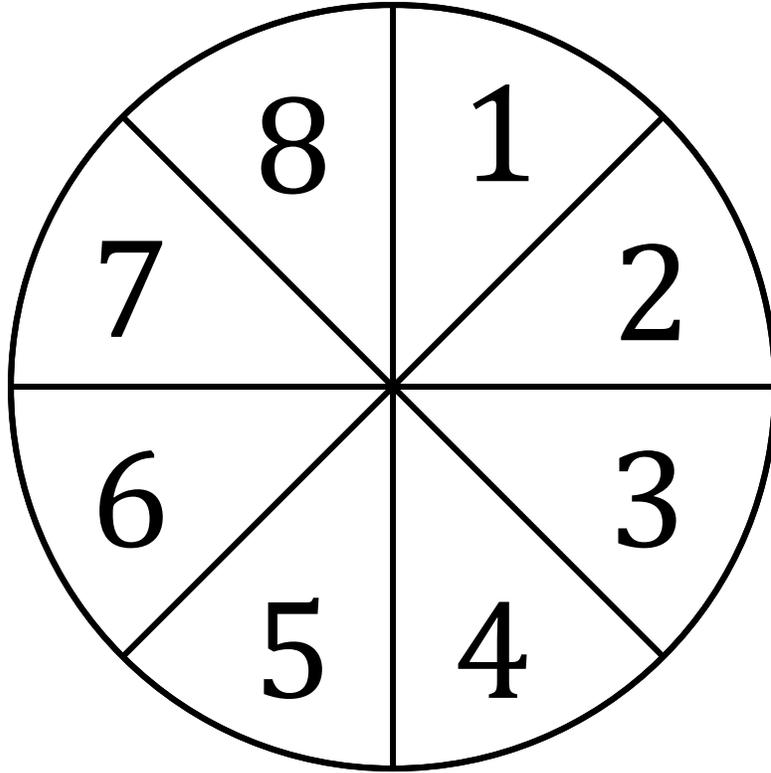
Answer Key

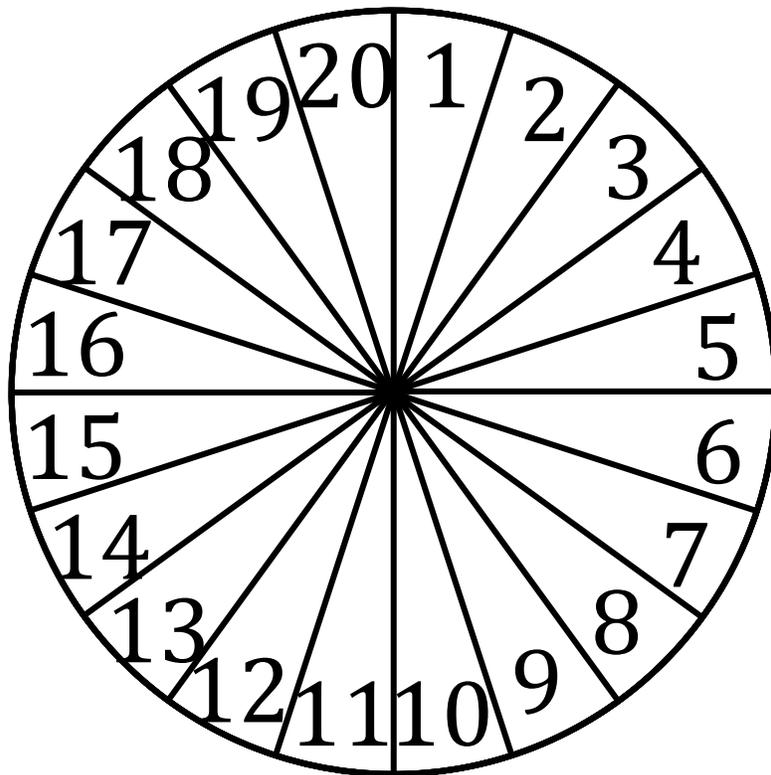
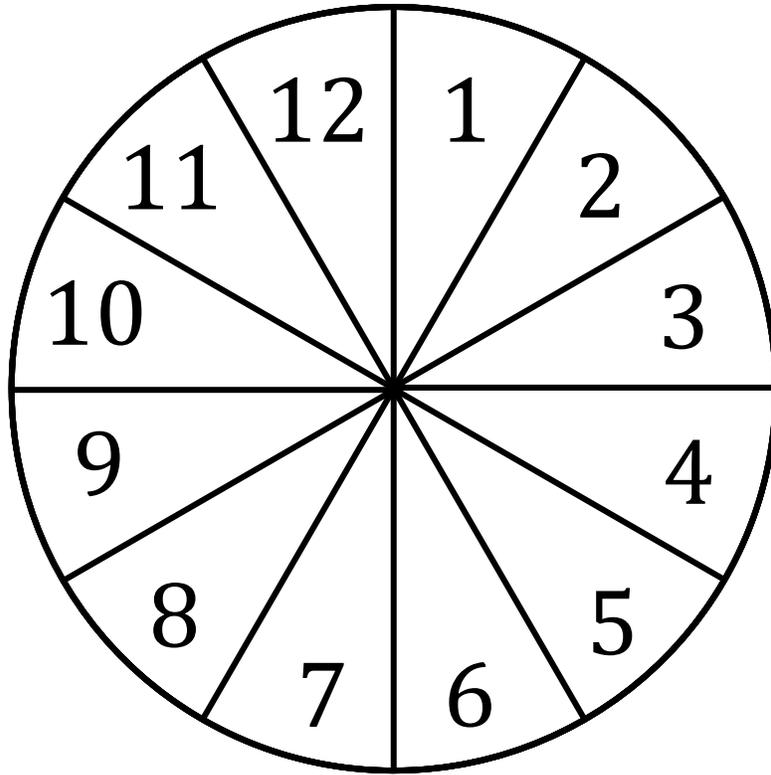
-9	$4\sqrt{5}$	$2 x $
6	$10\sqrt{2}$	$x^2\sqrt{10}$
11	$5\sqrt{2}$	$ x \sqrt{3}$
20	$6\sqrt{2}$	$2 x \sqrt{2}$
-10	$5\sqrt{3}$	$7 x $
13	$2\sqrt{15}$	$ x^3 \sqrt{7}$
-15	$3\sqrt{7}$	$5 x \sqrt{2}$

If you do not have dice available you can easily make spinners with these masters, a pencil, and a paper clip. Simply place the tip of the pencil on the center of the spinner with a paper clip around the pencil's tip as shown:









If you liked this activity, you might also like some of the other lessons available in my TeachersPayTeachers store.

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Feel free to contact me if you have questions or comments or would like to discuss a staff development training or keynote address at your site.

Happy teaching,  
*Brad*