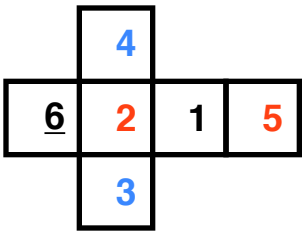
# Making Magic

## Dice Addition

Most people have used a set of dice. Many may not know a basic fact about them. The **opposite sides of a die contain 2 numbers that total 7.** A 1 and a 6 are on opposite sides, a 2 and a 5 are on opposite sides, and a 3 and a 4 are on opposite sides. The pattern below shows one of the layouts of a normal dice. When you fold the 2d pattern to create the 3d die you will see that each of the the opposite pairs of sides total 7.




Each set of opposite faces totals 7

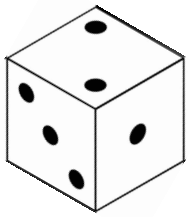
4 + 3 = 7  2 + 5 = 7  6 + 1 = 7

1. Have the student Roll 3 dice. Have them add the 3 number that are face up to get a total.

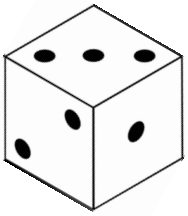
2. Turn each of the die over so the face down numbers now showing. Use the total from step 1 and add the 3 numbers that are now showing to the top total to get a total of all 6 numbers.

3. The total of the 6 face up and face down will always be 21.

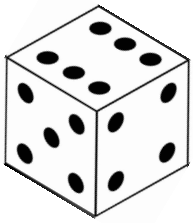
### Example



5 is on the bottom



4 is on the bottom



1 is on the bottom

Top total = 2 + 3 + 6 = 11
Bottom total 5 + 4 + 1 = 10
Total of face up and
face down numbers = 21.

### Example

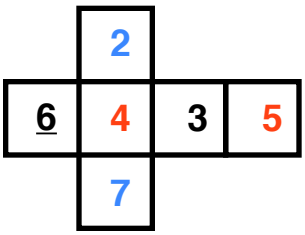
top number

bottom number

Top total = 5 + 4 + 1 = 10
Bottom total 2 + 3 + 6 = 11
Total of face up and
face down numbers = 21.

You could use 4 or more dice to increase the total, but the total will always be 7 times the number of die used.

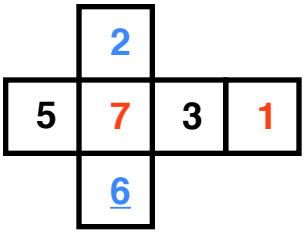
You can change the numbers on the die so the total is not a multiple of 7. This is done by making the opposite sides of each die total a different number.




**Die 1**

Each set of opposite faces totals 9

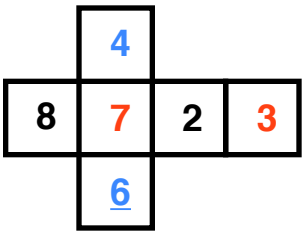
**7 + 2 = 9  4 + 5 = 9  6 + 3 = 9**




**Die 2**

Each set of opposite faces totals 8

**6 + 2 = 8  7 + 1 = 8  5 + 3 = 8**




**Die 3**

Each set of opposite faces totals 10

**6 + 4 = 10  7 + 3 = 10  8 + 2 = 10**

The Die 1has all opposite sides total 9. Each face up and face down pair total 9.
The Die 2 has all opposite sides total 8. Each face up and face down pair total 8.
The Die 3 has all opposite sides total 10. Each face up and face down pair total 10.

**No matter what numbers are rolled,**
**the total of the 6 face up and face down numbers will always be 27**.

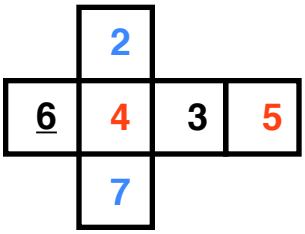
Once you understand the process you can pick any number for the total of the 3 opposite sides of any single die. Then you can make several die, each with different individual totals. In that way you can create many combinations where the total of the face up and face down numbers is whatever total you desire.

## Making Magic
## Dice Addition

Now all that remains is to find ways to create magic effects using this information. In general we will have students roll different sets of dice to find the face up and face down totals and find different ways to show that we knew in advance what that total would be.

# Dice Addition 1

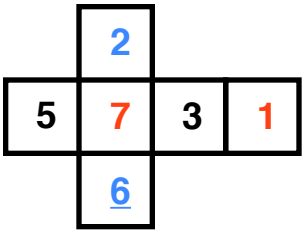
**Preparation:**




**Die 1**

Each set of opposite faces totals 9

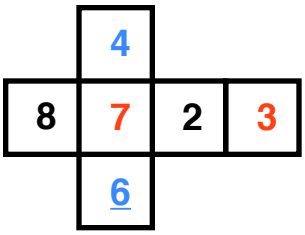
7 + 2 = 9  4 + 5 = 9  6 + 3 = 9




**Die 2**

Each set of opposite faces totals 8

6 + 2 = 8  7 + 1 = 8  5 + 3 = 8




**Die 3**

Each set of opposite faces totals 10

6 + 4 = 10  7 + 3 = 10  8 + 2 = 10

**No matter what numbers are rolled,**
**the total of the 6 face up and face down numbers will always be 27**.

1. Use 3 blank cubes and write the numbers shown above on each die.
2. Make a prediction card by writing the number 27 on a piece of paper (or note card and fold it over.)

If you want you can hand the 3 dice to a student while you take out a blank note card and marker and write the number 27 on it, then fold it and put it on the table.

**Procedure**

1. Take out the 3 die and the folded prediction. Have the student roll the 3 dice. Have them add the 3 face up numbers and state that total OUT LOUD. (You may want to write this number down if you think the student will forget it.

2. Have the student turn each of the die over so the face down numbers now showing (watch that they do it correctly). Use the total from step 1 and add the 3 numbers that are now showing to the top total to get a total of all 6 numbers.Have the student announce the total.

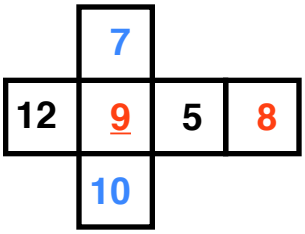
3. Ask the student to take the notecard, open it and state the number on the notecard.

**Note:** For these die I do not have the student write down the 6 numbers as there are so many repeated numbers. If you use larger totals for each die you can have a different number on every side of the die. In this case I like to have the student write all 6 numbers and then add then at the end. This effect is shown next.

# Dice Addition 2

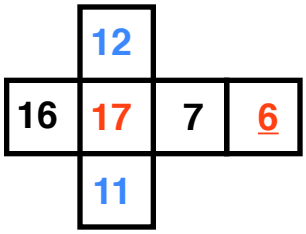
**Preparation:**

**Die 1**



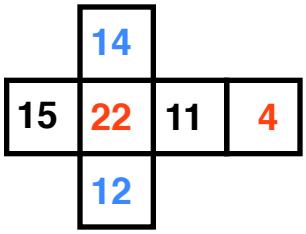

**Opposite sides total 17**

**Die 2**




**Opposite sides total 23**

**Die 3**




**Opposite sides total 26**

**No matter what numbers are rolled,**
**the total of the 6 face up and face down numbers will always be 56**

**Preparation**

1. Use 3 blank cubes and write the numbers shown above on each die.
2. Make a prediction card by writing the number 56 on a piece of paper or note card and fold it over. If you want you can hand the 3 dice to a student while you take out a blank notecard and marker and write the number 56 on it, then fold it and put it on the table.

**Procedure**

1. Take out the 3 die and the folded prediction. Have the student roll the 3 dice. Have them write the 3 numbers on the board or on a piece of paper.

2. Have the student turn each of the die over so the face down numbers now showing (watch that they do it correctly). Have them record the 3 numbers that are now showing. Now have the student add the 6 numbers and write it down. Have the student announce the total. If they are doing the work on a paper have them hold up the paper so the class can see the work

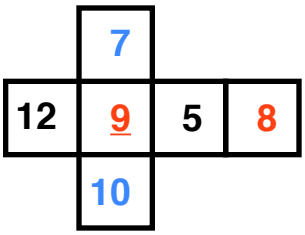
3. Ask the student to take the notecard, open it and state the number on the notecard.

**Note:** You can make as many of these die as you want to. Try to have each face be a different number.

**You can have a different student repeat the effect by rolling the die again. If you do this then have the first student record the 6 numbers from their die on the board and leave them there.**

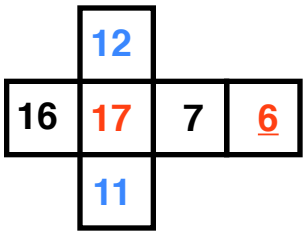
# Dice Addition 3

**Die 1**



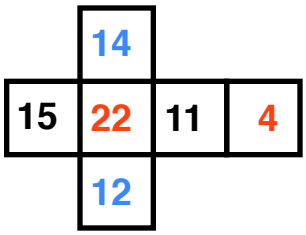

**Opposite sides total 17**

**Die 2**



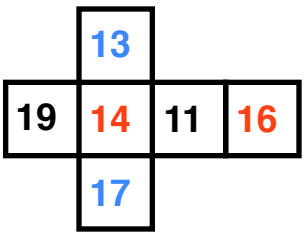

**Opposite sides total 23**

**Die 3**



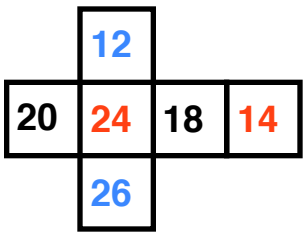

**Opposite sides total 26**

**Die 4**



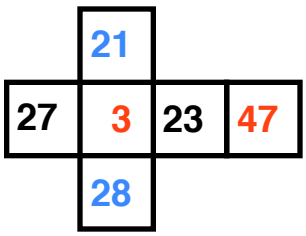

**Opposite sides total 30**

**Die 5**




**Opposite sides total 38**

**Die 6**

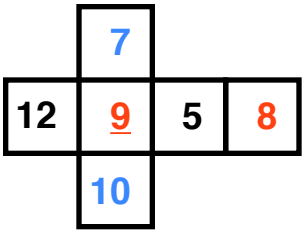



**Opposite sides total 50**

**Preparation**

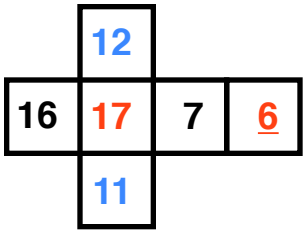
1. Use 6 blank cubes and write the numbers shown above on each die.
2. Select 3 die and the correct prediction card and have them ready to start the effect. If you want you can hand the 3 dice to a student while you take out a blank notecard and marker and write the correct number on it, then fold it and put it on the table.
3. Put the other 3 die in your pocket along with 3 blank cards.

**Die 1**



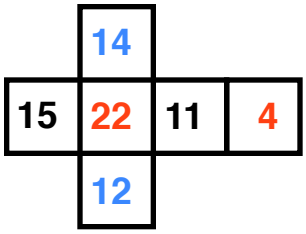

**Opposite sides total 17**

**Die 2**



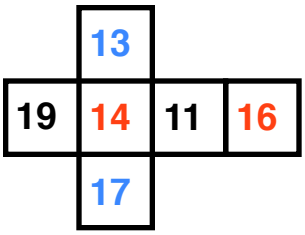

**Opposite sides total 23**

**Die 3**



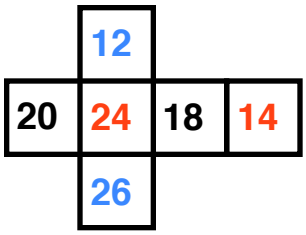

**Opposite sides total 26**

**Die 4**



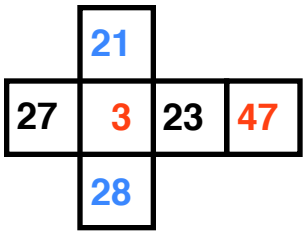

**Opposite sides total 30**

**Die 5**




**Opposite sides total 38**

**Die 6**




**Opposite sides total 50**

**Procedure**

1. Take out the 3 die and the folded prediction. Have the student roll the 3 dice. Have them write the 3 numbers on the board or on a piece of paper.

2. Have the student turn each of the die over so the face down numbers now showing (watch that they do it correctly). Have them record the 3 numbers that are now showing. Now have the student add the 6 numbers and write it down. Have the student announce the total. If they are doing the work on a paper have them hold up the paper so the class can see the work

3. Ask the student to take the notecard, open it and state the number on the notecard.

Now for the next step. It will take some practice to get it right. Try it with only 1 extra die to start and work up to 3.

In general you will need to switch out 1 of the die for the 4th die. As you do this you will need to note the sum of any 2 opposite sides and subtract that total form the first prediction. Then bring out the new blank card and the new die. As you do so look observe the sum of the opposite sides and add that to get the new prediction. As you hand the 3 die to the student write down the new prediction, fold the card and put it one the desk.

Proceeded to repeat the effect as before and the student will get the new total and it will march your prediction. Continue the process for the next 2 die if the students seem to be responding.

# Dice Addition 3

The following Addition Property is given in more detail in the other papers in the making Magic series. I will repeat the basic background and then use it in an effect for an additional effect for Dice Addition.

state any one of their 4 numbers. Write down the number at the top of the page in the ones place.

The Addition Property shown below is discussed in much more detail in the other papers I have posted in the Making Magic series. These papers include more examples and proofs.

### An Interesting Addition Property

| | |
|---|---|
| 9 | 7 |
| 2 | 3 |
| 1 | 5 |
| + 7 | + 4 |
| 19 | 19 |

Pick any 4 single digit numbers whose sum is 19.
Select a second sets of 4 numbers whose sum is19.
The first set selected is shown in **red** and
the next set is shown in **blue**.

We will now create **three 2 digit numbers** by placing the 4 digits from **either set** of 4 numbers shown above in the ones places in **any orde**r and then placing the second set of digits in **any order** in the tens places.

When you find the total of those four 2 digit numbers **the total will always be 209.**

### Examples

| | |
|---|---|
| 1 | 1 |
| 5 1 | 7 4 |
| 7 7 | 2 5 |
| 3 2 | 9 3 |
| + 4 9 | + 1 7 |
| 209 | 209 |

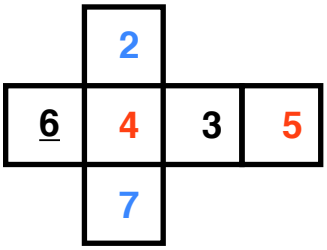
## How do we turn this information into a Magic Trick ?

## Dice Addition 3

1. Select a sum for the ones column. The example above was 19.
2. Select 2 sets of numbers that add to 19. The example above is based on **9 and 10** and **12 and 7**
3. Create a pair of die. One will have aa 3 sets of opposite faces total **9** and the other die will have 3 sets of opposite faces total that total **10.**
4. Create a second pair of die. One will have aa 3 sets of opposite faces total **12** and the other die will have 3 sets of opposite faces total **7.**

**Preparation:**

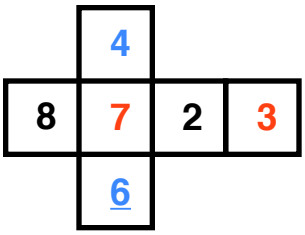
**NOTE:** All the numbers on each face of the die will be in black. The colors are used so you can see the pairs of opposite sides.




**Die 1**

**Each set of opposite faces totals 9**

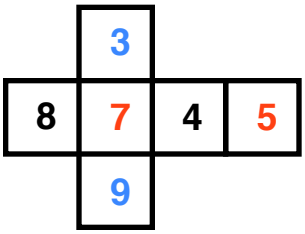
**7 + 2 = 9  4 + 5 = 9  6 + 3 = 9**




**Die 3**

Each set of opposite faces totals 10

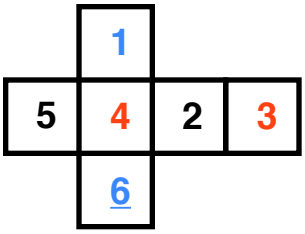
**6 + 4 = 10  7 + 3 = 10  8 + 2 = 10**




**Die 3**

Each set of opposite faces totals 12

**9 + 3 = 13  7 + 5 = 12  8 + 4 = 12**




**Die 2**

Each set of opposite faces totals 7

**6 + 1 = 7  4 + 3 = 7  5 + 2 = 7**

```
  1
  7 4
  5 6
  4 2
+ 3 7
  209
```

The 4 face up and face down numbers of Die 1 and 2 will total always total 19.

The 4 face up and face down numbers of Die 3 and 4 will total always total 19

If one set of 4 numbers is used in the ones column and the other in the tens column the 4 two digit numbers will total 209.

**Preparation**

1. Use 4 blank cubes and write the numbers shown above on each die. If you like one pair of cubes can be one color and the second can be a different color so it is easy to keep the pairs together.

2. Make a prediction card with 209 on it, fold it in half so the number does not show.

**Procedure:**

1. Have 2 students come up to help. Lay out the 2 pair of die on the desk but keep the pairs apart. Ask one student to select 1 pair of die and the other student can take the remaining pair.

2. Have each student roll their pair of dice. Have each of them **record** on a small piece of paper the 2 numbers that are now showing. Have each student turn each of the die over so the face down numbers now showing (watch that they do it correctly) and write them down also. At this point they will each have 2 face op numbers and 2 face down numbers recorded

3. Tell the 2 student remaining that they will use their 4 numbers create 4 two digit numbers. Ask one of the students if they want to have their 4 numbers put in the ones or tens column. Whichever one they chose tell the other student that their numbers will be used in the other column.

3. Get a pad of paper and pen or use the white board. Ask the student with the cards that will go in the ones place to state any one of their 4 numbers. Write down the number at the top of the page in the ones place. Ask the student with the numbers that will go in the tens place to state any one of their 4 numbers. Write down the number at the top of the page in the tens place. Repeat this until you have used all 4 numbers for the students and have 4 digit numbers written under each other.

4. You now have 4 two digit numbers lined up under each other. Remind the class that each student had a free choice of what pair of dice they selected. They had a free choice of putting their numbers in the 1‘s or 10’ s place. Draw a line under the 4 two dight numbers and ask one of the 2 students to find the total of the 4 numbers. (check their work). Ask them the total. They will say 209.

5. Ask one of the students to open the prediction card and read out the number. It is 209.

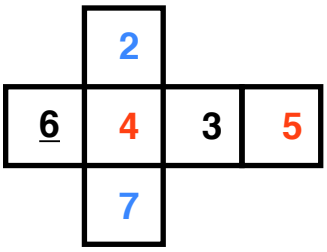
## You can create your own numbers for the die and get your own total.

If you want to only use 1 digit numbers and have few repeated number on the faces there is a limit to the combinations

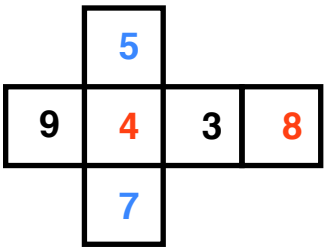
1. Select a sum for the ones and tens columns. Lets use 21.
2. Select a set of numbers that add to 21. Lets use **9 and 12**

   Create a pair of die. Die 1 will have all pairs of opposite faces total **9** and die 2 will have all pairs of opposite faces total **12.**

**Die 1(9)**

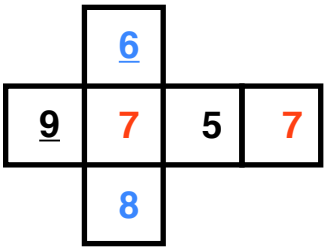



**Die 2 (12)**

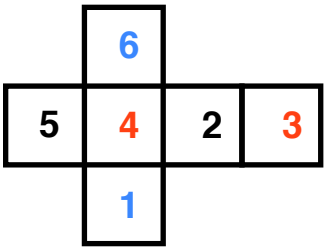



**2.** Select a second set of numbers that add to 21. Lets use and **14 and 7**
Create a pair of die. Die 3 will have all pairs of opposite faces total **14** and Die 4 will have all pairs of opposite faces total **7.**

**Die 1(14)**




**Die 2 (7)**




When you roll Die 1 and Die 2 the 4 face up and face down numbers will total 21.
When you roll Die 3 and Die 4 the 4 face up and face down numbers will total 21.
When you create the 2 four digit numbers the total will be 231.

```
  2
  8 2
  6 7
  5 4
+ 2 8
-------
  231
```

The 4 two digit numbers creates will always total 231.