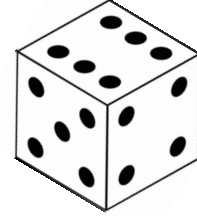
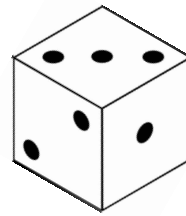
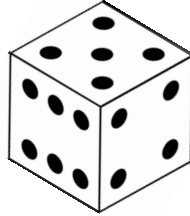
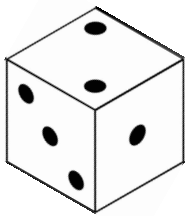
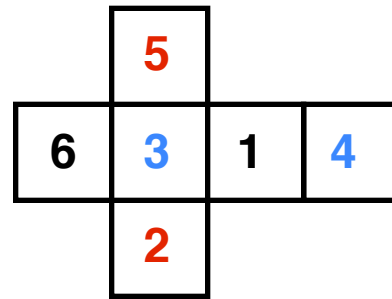
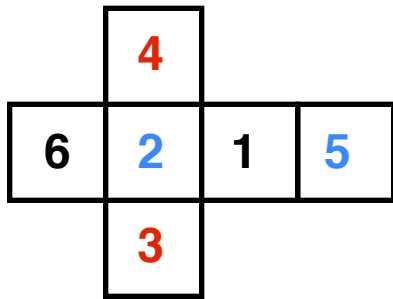


Basic Facts #1 About Die.

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 the common 2 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.



This fact can be used in many clever ways to create mathematical effects that seem like magic.

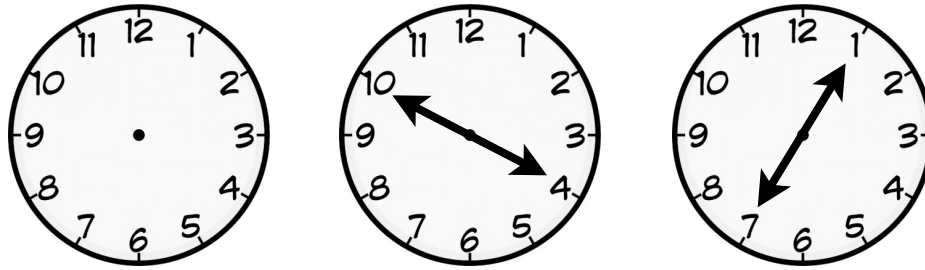
Short Stack

Ask a student to stack 4 die on top of each other on the desk without you looking. Have a couple of other students watching and also doing the computations. Turn around and look at the top number on the stack. Pretend you are looking through the dice to see the hidden number on the hidden tops and bottoms of the die in the stack. Write down a number on a paper, fold it and put it on the desk. Ask the student to turn each die over and add up the numbers that were hidden on the tops and bottoms of the die in the stack. Have them open the paper and check their total with what's written on the paper and they will see that you were correct. This trick can be repeated a few times to produce several addition problems.

How to find the total of the number on the tops and bottoms of the 5 die;

Opposite sides of a single die always die total 7. If you have 4 die the total of the 8 sides must be 28. Subtract the number showing on the top from 28 and that will be the total of the 7 hidden sides.

Opposites Attract



Point out the classroom clock and note that the numbers 1 to 12 are printed on the face. Note that the number 10 is opposite the number 2 and the number 7 is opposite the number 4. Have a couple of students tell you other pairs of numbers on the clock face that are opposite each other. Ask a student to pick one of the numbers that are on the clock and the number that is opposite it.

Now tell them to subtract the **smallest** of the 2 numbers they selected from the **largest** number. Finally ask them to add 1. You now say that they selected opposite numbers on the clock and that you will roll a die to get a pair of numbers that are opposite each other. Roll a die and note the numbers on the top and bottom are opposite and their sum is the exact number the student just found. That the uppermost face and the opposite, or bottom face, will add up to the number that they have.

How to find their number: The opposite side of a die add to 7 and so does one more than the difference of 2 numbers on a clock.

Impossible Total

Ask a student to roll 2 die on the desk. Say that you will turn around before they roll the die so that you cannot see the numbers. Have a couple of other students watching and also doing the computations. Ask students to add the two numbers showing on the tops of the die. Have one of the students pick up one of the die, turn it over show the number on the bottom to the group. Have them add that number to to the total of the other 2 numbers. Ask the student to roll the single die they just held up and add the number showing to the total.

Turn around and announce the students total.

How to find their total:

Look at the two die on the desk. Add the numbers showing and then add 7 to that total.

Bottoms Up !

Have a student roll 5 die on the desk. Pretend you are looking through the dice to see the numbers on the bottom. Write down a number on a paper , fold it and put it on the desk. Ask the student to turn each die over and add up the numbers that were hidden. Have them open the paper and see that you were correct. This trick can be repeated a few times to produce several addition problems.

How to find the total of the number on the opposite sides of the 5 die.

Opposite sides of a single die always die total 7. If you have 5 die the of the 10 sides must be 35. Add up the 5 sides you can see and subtract that number from 35. That will be the total of the 5 numbers on the opposites sides.

Extension. Bottoms Up In a Glass Glass.

Drop 3 die into a see through glass. It even better if there is water in the glass but that may make a mess in some situations. Tell the student you know the sum of the numbers on the bottom of the glass. Ask the student to lift the glass up and look at the hidden number and add them up. Announce the total and have them verify you are correct. and see that you were correct.

How to find the total of the number on the opposite sides of the 3 die.

Opposite sides of a single die always die total 7. If you have 3 die the of the 6 sides must be 18. Add up the 3 sides you can see and subtract that number from 18. That will be the total of the 3 numbers on the opposites sides.

The Three Dice Trick: Long Division

Ask a student or group of students to get out a calculator a pen and paper. Hand one student 3 die and ask them to roll three dice once you have turned your back to them. Then ask them student to put the dice in a horizontal row and write down the three values shown on the dice to make a three digit number. Ask them to find the three digit number made by the numbers on the bottoms of the die and write them to the right of the 3 digit number to make a 6 digit number. Ask them to divide that 6 digit number by 111. Have then subtract 7 form that number and tell you the result.

You then tell them what the 3 numbers on the top of the die are.

How do you find the 3 numbers?

Then you divide the total they got by following your instructions by 9. The 3 digit s of the answer are the three number they rolled to start the trick

The Three Dice Trick: Easy Math

Ask a group of 3 or 4 students to get a piece of paper and a pencil ready. Have each student perform the calculations separately but check each others work as they go. This helps prevent “bad calculations” from spoiling the performance. Turn you back so you cannot see the die as they are rolled. Ask 1 student to roll the three dice so that you can't see the resulting numbers. Have that student put the 3 die in a row in front of them from left to right.

Have each student perform the following steps as you lead them through the process.

Multiply the number on the first die by 2

Add 5

Multiply by 5

Add the number on the second die

Multiply by 10

Add the number on the third die.

Ask for the students what number they have calculated. Subtract 125 from that number. This gives you a three digit number with each digit representing a number on the dice.

Sum Products

You will need 2 die to perform this trick. Get 2 students in front of a desk. You will step far enough away towards the back of the room so that you cannot see the numbers they roll. They can even stand so as to block your vision.

Have a student roll 2 dice. Have them follow the following steps.

1. Multiply the 2 numbers on the top of the die together and write down that number.
2. Multiply the 2 numbers on the bottom of the die together and write down that number.
3. Multiply the top number on tone die by the bottom number on the other die and write down that number.
4. Multiply the other pair of top number on one die and bottom number on the other die and write down that number.
5. **Add up the 4 numbers.**
6. Have a second student roll 1 die.
7. Ask them to add the top and bottom numbers together and square that number (multiply it by itself). Have each of them announce their totals. They will both have 49.

The number will always be 49.

The Invisible Dice Trick

Ask a few students to get a piece of paper and a pencil ready. Show your hand open and ask them if they can see the invisible pair of die you have in your hand. Say “Let me show you how they work.” Pretend to roll the die and say I rolled a 2 and a 6. Do it a second time and say I rolled a 5 and a 4. Have them open their hand and pretend to put the pair of invisible die into their hand. Ask them to roll the two die onto the desk and tell everyone what two numbers they rolled.

Now get ready to start the trick. Ask the student with the dice to roll the pair of dice onto the desk and write down the two numbers that are showing on tier paper. Have the student show these numbers to the other students but not to you. Have each student perform the following steps as you lead them through the process.

Pick one of the numbers and multiply the number on the die by 2

Add 5 to that number

Multiply this new number by 5.

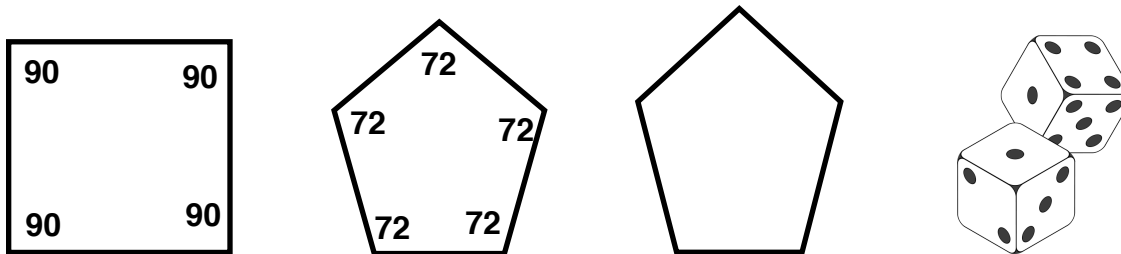
Add the number on the second die.

Ask he students to tell you what the number total they calculated is. Subtract 25 from that number. This gives you a two digit number with each digit representing a number on the dice. The ones digit is the number that they started with. The second number is the other number. Announce the two numbers on the invisible die they rolled at start the trick. If they ask how you do the trick say” I just looked at the die, you rolled them and left them in front of me on the desk.

The following trick uses exactly the same math as the invisible Dice trick but is completely changed to allow the teacher to teach about regular polygons with 4 and 5 sides. Many teacher master a simple trick and then start to change the basic format to teach other topics. Once you have the basic idea use it wherever you want to to make it your own.

The Pentagon Dice Trick

A regular regular polygon has sides that are all the same length and angles that are all the same measure. The total off all the angles in any regular polygon is 360 degrees. A die has 6 sides and each side is a square. A square is a regular 4 sided polygon. Each side of the square is the same length and each angle has the same measure. The total off all the angles in any regular polygon is 360. The square has 4 equal angles. If we divide 360 by 4 we get 90 so each angle in a square is 90 degrees, which we call a right angle. The next regular polygon after the square is a five sided figure. We call a regular sided figure a regular pentagon. If we divide 360 by 5 we get 72 so each angle in a regular pentagon is 72 degrees. The middle 2 figures are regular pentagons. I aded a door and 2 windows to the one on the right so it looks like a house.



Start the trick: Draw a pentagon on the board and and place two dice on the desk.

Have a small group of students take a sheet of paper and try to draw a regular pentagon using the one you drew on the board. as a model. Ask a student to roll one of the dice on the desk with your back turned and cover it with a piece of paper. You then turn around and say something like this. "This trick used two doe so multiply the number you rolled with the die by two. A pentagon is a 5 sided figure so please add five to the last number to get a new number. A pentagram has five points that we call vertex so multiply the last number by five. With my back turned roll the second die, add the number rolled on the second die to the last number you found. Cover both die with the paper. Finally please write the number you have in the centre of the pentagram you drew. You now turn to face your students. Ask one of the students to see their pentagon and note the number inside it. Subtract 25 from that number. This gives you a two digit number with each digit representing a number on one of the dice.

For example, a 5 thrown first and 4 last.

$$5 \times 2 = 10$$

$$10 + 5 = 15$$

$$15 \times 5 = 75$$

$$75 + 4 = 79$$

You then subtract 25

$$79 - 25 = 54$$

or a 5 and 4

3 Die versus 1 or Over and Back

You will need 4 die to perform this trick. Get a group of 4 students in front of a desk. and ask each one of them to have a price of paper and pencil ready. Handing out a post it to each one will also work. You will step far enough away towards the back of the room so that you cannot see the numbers they roll. They can even stand so as to block your vision.

Ask 3 of the students to roll one die each and then have them line the die up in a horizontal row in any order they want. State that the die are now in order the first die is on the right and the second die is in the middle and the third die is on the left end.

Have the first student add the numbers of the first and second die from the right die and write that total down.

Have the second student turn over the second and third die and then add then numbers they see on the die and write that total down.

Have the third student turn over the first and third die and then add then numbers they see on those die and write that total down.

Have one of the student add up the numbers the 3 students have written down

Have a fourth student roll a die. Have them add the top and bottom numbers on the die. Say that since they only have 1 die and the other group has 3 you must have this die do the work of 3 so multiply that number by 3.

Have them announce their totals. They will both have 21. The single die did the work of 3 die.

Here is an algebra proof that the total will be 21.

	First	Second	Third
Die	x	y	z
Student 1	x	y	
Student 2		7 - y	7 - z
Student 3	7 - x		z

Total of all 3 is $x + y + 7 - y + 7 - z + 7 - x + z = 21$

The total of the top and bottom of the 1 died rolled is 7 and 3 times 7 is 21.

A much easier proof can be stated if you think of the name of the trick Over and Back. The first die had its top number used by student 1 and its bottom number used by student 3. The second die had its top number used by student 1 and its bottom number used by student 2. The third die had its top number used by student 3 and its bottom number used by student 1. Each die had been over and back one time so each die had its top and bottom numbers added for a total of 3 sevens or 21.

First One to 50

(NIM using Dice)

NIM is a classic math game played in many classrooms. A web search will provide you with a lot of links. The die controls the size of the possible number that can be added. It takes a few more addition steps to get to 50 with die than the traditional NIM games. Adding the use of die also fits your die collection of tricks.

Both you and a student have 1 die. Say that you are going to play a game called First One To 50. Ask a student if they want to start the game by going first or if they want you to go first. Let's say they want to go first. Have a student put down a die with any number they choose showing upward. Say the current total of the faces is and name their number. Next you place your die with number facing upward say you are adding that number to the total and say the current total of the faces is and name the total. Continue this process with the winner being the person who gets EXACTLY 50.

The key to winning.

You must get a total of **1, 8, 15, 22, 29, 36 or 43. 43.** As soon as possible add a number to the current total to get to one of those numbers. Once you get to that number add whatever it takes so the student's number and yours totals 7. You will always be able to get to 50 before the student. If you go first you will need to watch the numbers so that at some point you can get on track. Unless the student knows the game they will get to a point where that is possible.

Example:

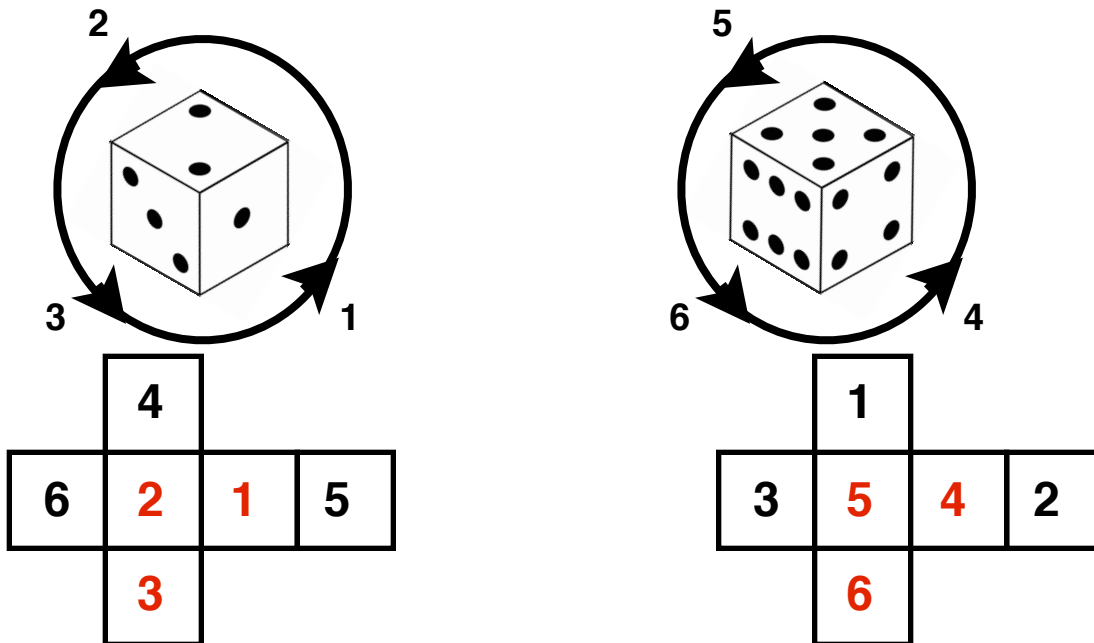
The student puts down a 4. You put down a 4 to get to 8. The student puts down a 6 so you put down a 1 to get to 15. The student puts down a 2 so you put down a 5 to get to 22. The student puts down a 3 so you put down a 4 to get to 29. The student puts down a 6 so you put down a 1 to get to 36. The student puts down a 5 so you put down a 2 to get to 43. Whatever the student puts down you will be able to get to 50.

Note: Let pairs of students play the game 20 times. Ask them to try and find patterns. After the 20 games you play a few students one at a time, winning every time. Then have a great discussion about possible strategies. If no student makes any connections then suggest working backwards from 50. If that does not work list **1, 8, 15, 22, 29, 36 or 43. 43** on the board and have them try and see the connection.

Extra for the Experts

When you look at a die the maximum number of faces that you can see is 3. There are 2 vertical sides and a top side that have a common vertex that protrudes out in the front. The numbers on the 3 sides rotate about this point. Opposite sides of a die add up to seven. This forces the 1, 2 and 3 faces to share a common corner (vertex). If you put that common vertex towards the top and front of the die you can see the 1 – 2 and 3 AT THE SAME TIME WITH THE 4 -5 and 6 hidden. These faces may be placed so that 1 – 2 – 3 are read **counter clock wise** when counted in order or so that 1 – 2 – 3 are read clock wise when counted in order. If 1 – 2 – 3 can be read **counter clock wise** when **counted in order** we call the die right handed die. 1 – 2 – 3 are read clock wise when counted in order then the 3 – 4 – 5 will also be an be read **counter clock wise** when **counted in order**. If the Western dice are normally right-handed and Chinese dice are normally left-handed. The material that follows will assume you are using right-handed die. Check to make sure before you perform this tricks shown below.

Right handed die

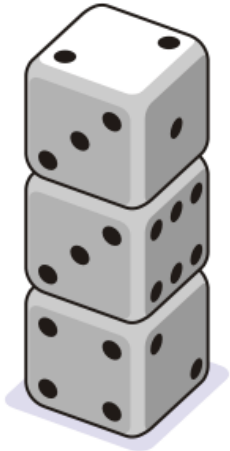


Common Dice are mostly Right Handed

Right handed die probably account for over 90% of all die in the USA. Milton Bradley & Yatzee account for millions of right handed dice per year. More than 99 % of Casino Dice are right handed dice. I have found only two exceptions: Some of Harrah's Casino dice and some of Caesars Palace dice. Many drawings on the internet have incorrect orientations. Some are based on die made or used in asia where different orientations are used. Printed dice, where it looks like opposite sides are printed at the same time change from RH to LH depending on how they are handled in production. I have found printed sets of five dice that have several variations and both RH and LH dice in the same set of five. If you use die in your class try to be sure they are the common right handed die. The material here is based on this assumption.

The student places 3 die on the desk stacked one on top of the other without the teacher watching the die being placed. The teacher is allowed to view the stack only from the front view as shown. The teacher is able to name the number on every face of every die.

Example



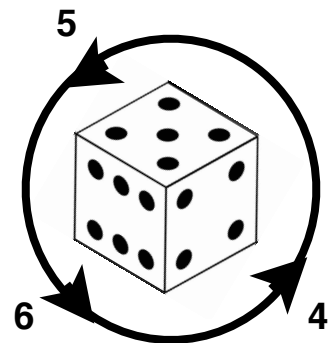
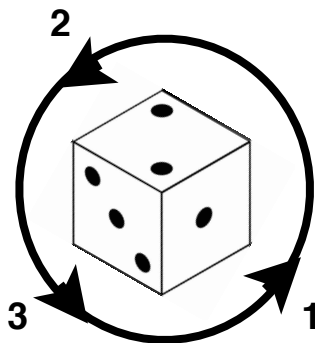
The bottom die has a 1 on top and a 6 on the bottom
there is a 5 opposite the 2 and a 3 opposite the 4

The middle die has a 5 on top and a 2 on the bottom
there is a 1 opposite the 6 and a 4 opposite the 4

How is it done

Dice have their faces arranged so that opposing sides always add up to 7 (i.e. 1&6; 2&5; 3&4). There are two possible arrangements of the numbers on a die that have this property. They are mirror images of each other. One is called right handed and the other is called left handed. There are only 3 rules that allow you to determine the hidden sides. I will use the right handed die to develop these rules.

There are two cycles you need to be familiar with and these are shown in the two diagrams below.



The 1 2 3 cycle is counter clockwise about the protruding corner
and the 4 -5 6 cycle is counter clockwise about the protruding corner

Rule 1

If you can count **1 – 2 – 3 consecutively counter clockwise** about the protruding corner around the top face then you know the top number

1 → 2 → 3

consecutively counter clockwise about the protruding corner around the top face



with 3 on top



with 2 on top



with 1 on top

If you can count **4 – 5 – 6 consecutively counter clockwise** about the protruding corner around the top face then you know the top number

4 → 5 → 6

consecutively counter clockwise about the protruding corner around the top face



with 6 on top



with 5 on top



with 4 on top

If you can count **1 – 2 – 3 or 4 – 5 – 6**

consecutively counter clockwise about the protruding corner around the top face then you know the top number



1 → 2 → 3
with 3 on top



3 → 1 → 2
with 2 on top



2 → 3 → 1
with 1 on top



4 → 5 → 6
with 6 on top



6 → 4 → 5
with 5 on top



5 → 6 → 4
with 4 on top

Rule 2

If you must count **1 – 2 – 3 consecutively counter clockwise** around the bottom face then you know the bottom number and you can find the **top number**

1 → 2 → 3

must be counted **consecutively counter clockwise** about the protruding corner **around the bottom face**



3

with 3 on bottom



2

with 2 on bottom



1

with 1 on bottom

If you must count **4 → 5 → 6 consecutively counter clockwise** around the bottom face then you know the bottom number and you can find the **top number**

4 → 5 → 6

must be counted **consecutively counter clockwise** around the bottom face



6

with 6 on bottom
and 1 on top



5

with 5 on bottom
and 2 on top



4

with 4 on bottom
and 3 on top

If you must count **1 – 2 – 3 or 4 – 5 – 6**

consecutively counter clockwise around the bottom face then you know the bottom number and you can find the **top number**



3

1 → 2 → 3
with 3 on
the bottom



2

3 → 1 → 2
with 2 on
the bottom



1

2 → 3 → 1
with 1 on
the bottom



6

4 → 5 → 6
with 6 on
the bottom



5

6 → 4 → 5
with 5 on
the bottom



















4

5 → 6 → 4
with 4 on
the bottom

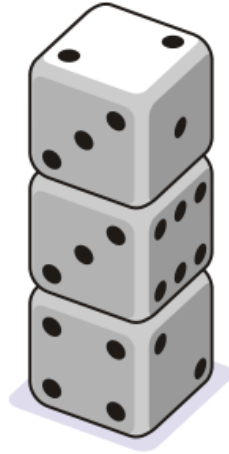
What happens when the numbers on the left and right faces come from the different cycles (for example 1 and 5). You then need to do a little mental gymnastics. You need to switch in your head one of the numbers for its opposite so that the left and right faces are in reverse numerical order. In our example we have to switch the 1 for a 6 to make them in reverse numerical order. If we switched the 5 for a 2 it would be ascending order. Once we've decided which side to switch for its opposite, the final step is easy. As we've now got a 5 and 6 from the 456 cycle we know the top face is a 4.

Rule 3

If both the two numbers you can see on the left and right faces DON'T belong to the 123 or 456 cycle then switch one of the numbers for its opposite so that the cycle is in counterclockwise numerical order, then the TOP face is the remaining number in that cycle.

	think		counter clockwise order is		becomes	
	think		counter clockwise order is		becomes	
	think		counter clockwise order is		becomes	
	think		counter clockwise order is		becomes	

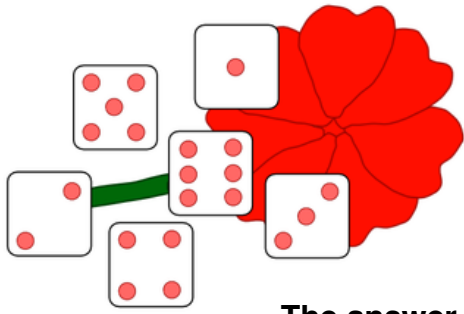
Example



The lower die has a 1 on the top a 6 on the bottom and a 3 and a 5 on the back.



The middle die has a 5 on the top a 2 on the bottom and a 1 and a 4 on the back.



Petals Around The Rose

Dice Puzzle

The answer is 6

This is a famous dice puzzle involving some famous people (like Bill Gates) who were some of the major players during the early days of the developments in computer programming. Mark James, the Seer of Comex at USC invented the puzzle and Lloyd Borrett has kept it alive.

The name of the game is Petals Around the Rose, and that name is significant.

You roll 5 dice and I tell you the answer for that roll. You continue to roll 5 dice and I continue to tell you the answer for each roll until you can tell me how I am getting the answers.

The name of the game is Petals Around the Rose, and that name is significant.

What is the rule used to get the answer if the answers for each of the 4 rolls below are given?



The answer is fourteen.



The answer is zero.



The answer is four.



The answer is four again.

The amazing story behind the puzzle

<http://www.borrett.id.au/computing/petals-bg.htm>

In the September -October 1977 edition of "Personal Computing" magazine, Henry Gilroy provided the following report. It was June 1977, the very early days of the microcomputer industry. The founders of Microsoft, Bill Gates and Paul Allen, some Personal Computing writers and a couple of MITs folks were among those heading home to Albuquerque from the National Computer Conference in Dallas. Henry Gilroy provided the following brain teaser. He started by saying "The name of the game is Petals Around the Rose, and that name is significant. You will throw 5 dice as many time as need to find the rule. I will tell you the answer for every throw of the dice. And that's all the information they get.

One of the Microsoft members rolled the five dice and Henry gave the answer

Roll #1.



The answer is fourteen.

"The answer is what?" says the new player. "14." "On that roll?" "Yes." "Would it still be two if I just rearranging the pattern?" Henry replied "I can tell you only the name of the game and then give you the answer for any particular throw. In this case the answer is 14."

"So that's how it is. What am I supposed to do?" "You're supposed to tell me the answer before I tell you. I'll give you all the time you want, but don't tell me your theory, just the answer. If you figure it out, you don't want to give the idea away to these other jokers around you. Make them work for the answers, too. If you get the answer right on six successive rolls, I'll take that as prima facie evidence that you understand the game."

"OK, roll again."

Roll #2.



The answer is zero.

"I give up. "Roll again."

Roll #3.



The answer is four.

Roll #4.



The answer is four again.

By this time half a dozen people are sitting on the floor around the snorting and guffawing in disgust while guessing consistently wrong on the answers. Security types stop occasionally to give steely glances at the proceedings, and waiting strangers stop reading to listen to the discussion. Some blush at the language. Some people, like Personal Computing's Marketing Coordinator, Louise, catch on in half a dozen rolls, shrugging the whole thing off as trivial. Mark James, the Seer of Comex at USC who gave us the game in the first place, observes that many brilliant, learned folk who visit him and subject themselves to this, depart hours later without the answer. Many draw sketches of the throws and carry the sketches off to laboratories for study. Weeks later, they may call Comex with proposed answers based on computer analyses of the puzzle. The answers proposed are more often wrong than right. Petals Around the Rose may be almost as great a drag on the national economy as Star Trek.

Roll #5



The answer is 6.

"Six? It can't be!" That shoots my last two algorithms! Gimme a piece of paper so I can work on this. Let me list everything. The name of the game is Petals Around the Rose?" "Can I roll the dice myself or do you have to do it?" "Oh, you're welcome to roll them."

Roll #7.



"Is the answer 2? "No, it's 6." "Well, it can't be very complicated or you wouldn't be able to spit out the numbers so fast.

Roll #8.



The answer is sixteen.

"Wait, we haven't gone that high before. I thought the upper limit was 14." How high can it go?" I can tell you three things...

After takeoff, it was possible to throw the dice on a fold-down table while leaning over the back of a seat. Seven people watched without too much trouble. Rich Weiland caught on after another half hour. Paul Allen's neck got stiff fairly soon and he gave up to read his book. Bill Gates hung on grimly. Funny thing about Bill, he began to get answers right, but not consistently. He admitted that he was remembering throws he'd seen before, along with the answers, but had no plausible theory to account for answers. Remembering?

"Oh, sure," he said, "Like this throw... Roll #59.



The answer is six.

... it's just like a roll we saw earlier. Bill must have had two dozen rolls, with answers, committed to memory by the time this discussion came up. He had taken leave of his undergraduate courses at Harvard to lead this little company, Microsoft, which is creating BASIC and FORTRAN. They had no applications software in their product line yet, just system packages that are making them famous and may at length make them rich. "I think I'd better use a piece of paper," said Bill, who was by this time the only active player who had still failed to divine the secret. "Aha," said he after about an hour and a half of this foolishness. "The answer is four on this roll." "Yes." "The answer is six on this roll." Yes. And the answer to this is ten. Yes. He rattled off the next dozen answers without a quiver, declaring that he wasn't just remembering history now but knew what was going on. Like the others he didn't feel cheated by the game, but was satisfied that his effort paid off.

When you go through this at Comex and finally get the answer, a committee forces you to kneel in the middle of the floor so you can be sworn in as a member of the Fraternity OF the Petals Around The Rose. (Look it up on the web) while somebody taps you on the shoulders with a piece of wood. Certain people tend to be kissed during the process. I was struck smartly with a blackboard pointer. Comex even hands out a nice printed card. We didn't try all this on the airplane.

The game works well with real dice. Comex reports that one major convention was largely disrupted when they arranged for the gift shop at the hotel to stock a large supply of dice, then

introduced Petals Around the Rose to many conference attendees. "It was amazing," says Mark, "distinguished looking ladies and gentlemen in neat business clothes could be seen crawling on their hands and knees in little working groups all over the hotel. While speakers were saying important things on lecture platforms, the rattle of dice and mutterings about answers almost drowned them out from all over the dimly lit halls. We don't like to do this too often. Makes enemies."

Even the Microsoft guys agreed that Petals Around the Rose offers a good excuse for doing a bit of applications software. Indeed, Bill scratched out a program for the game on a napkin and passed it over the seat so that it could see daylight in Personal Computing. Figure it out and write the program yourself. However, we'll give you one line of Bill's program as it is written in pencil on the napkin (which is safe in our vault for evidence). Bill's written program makes us feel much better about dealing with a smart guy who can not only program but can remember all those throws of the dice. Things do even out. The line reads:

```
PRINT "THE NAME OF THE GAME IS PEDAL AROUND THE ROSES"
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No wonder he was having trouble.

No More "Hello World"

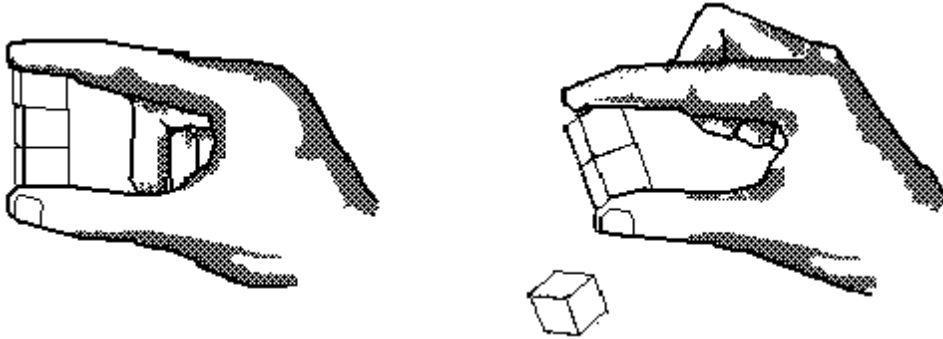
Using the above article back in 1977 whilst working at BHP. Lloyd Borrett wrote a program in BASIC on a Data General minicomputer to introduce Petals Around the Rose to Australia. Since then it's been the first program written in each new language and operating environment Lloyd has worked on. In 1978 it was his first FORTRAN program and in 1979 his first Pascal program. In 1982, Petals Around the Rose was written in ROM BASIC to run on one of the first IBM PCs in Australia, which had a massive 64 Kb of RAM! It's been the first program he wrote using the IBM BASIC and Microsoft QuickBASIC compilers, plus the Borland Turbo C and C++ compilers. Later, it became his first Microsoft Windows program using Microsoft Visual BASIC.

So in 1996, Petals Around the Rose had to be the first Internet related program he would write. Hence the VBScript version using the ActiveX HTML Layout control for use with Microsoft Internet Explorer. And then a few weeks later he came out with a JavaScript version for use with Netscape Navigator v3. It's now more than a thirty year tradition. And it's much more fun than the standard 'Hello World' program. But will Lloyd ever do a Java Applet, C# or PHP version? Who knows!

Tricks with dice

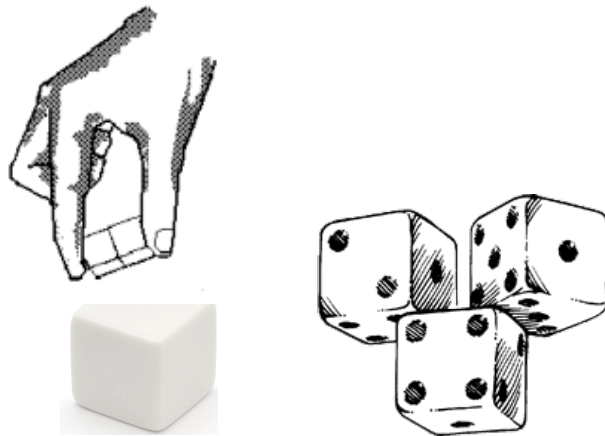
The Magic Three Dice Effect

Hold three dice between your thumb and first finger, slightly moistening the ends of your thumb and finger, first. Now you gently ease the pressure on the dice, and the middle one will magically drop out leaving the other two still held between your thumb and finger.



Balance 2 die on a single die

Ask a student to balance two die on top of a single die without the top die falling off



In rare cases a student will be able to do this by using the die at a diagonal using the hypotenuse of the top face as the place the 2 die meet. It very hard but a few student can do it. Almost any movement will topple the die. You, on the other hand can do it with all 3 die even on the front.

How: Without making it obvious lick the end pointer finger and wet in inside surfaces of 2 die and then immediately press them together. The fewer dots on the common sides the better so chose ones if you like. Keep pressure on them and place them on the bottom die. Surface tension in the water will keep the die stuck together.

Famous Die Tricks sold at Magic Dealers.. Easy to do and under \$ 5 each in most cases



Magic Mystery Die



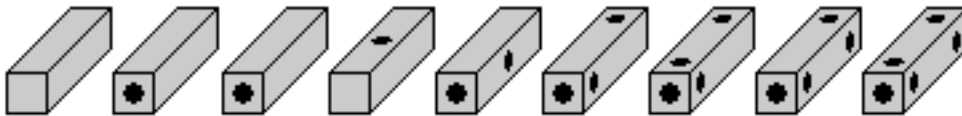
Miracle Die Tube (adams)



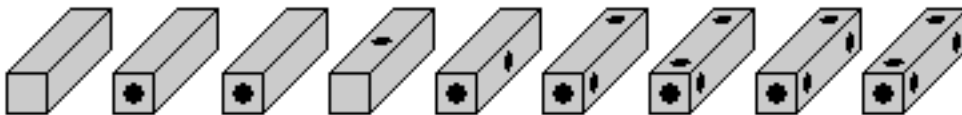
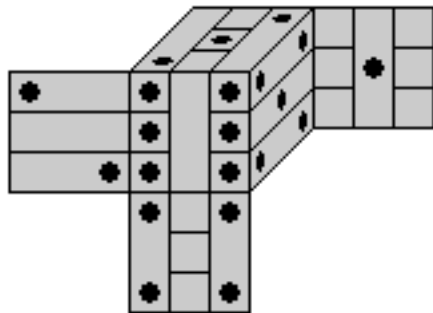
Mirror dice illusion mirror

Cube Puzzle

Use the sticks below to make a correct die.



Solution



You can make a nice cube puzzle, if you cut the die in nine bars.

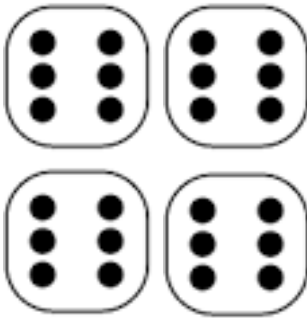
The vertical bars are in the middle layer, the horizontal ones on the outside. Then the puzzle is more interesting.

Slide and Glide

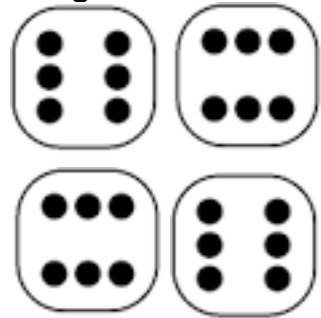
Start with the tops of 4 die lined up as shown below on the left.

Move any 2 die held together AS A PAIR

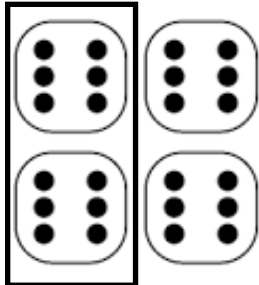
to have the tops of the die lined up as shown below on the right in 3 moves



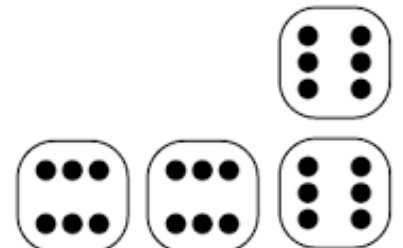
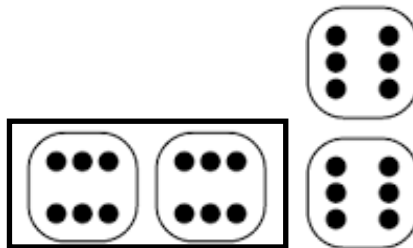
**Move any 2 die
held together AS A PAIR
to have the die lined up
as shown on the right
in 3 moves**



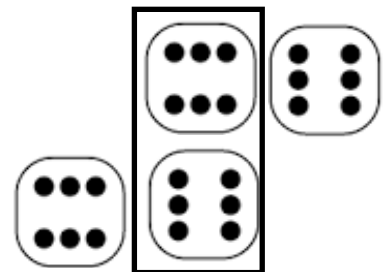
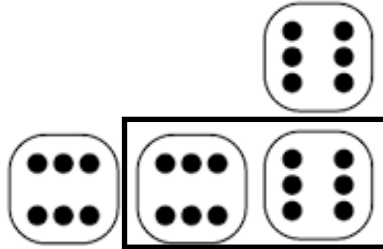
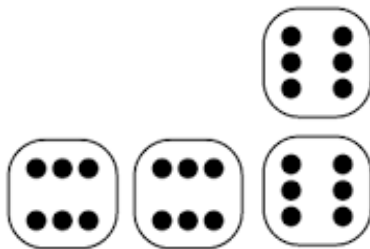
Solution:



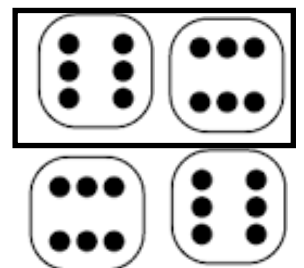
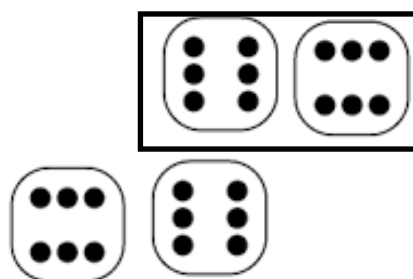
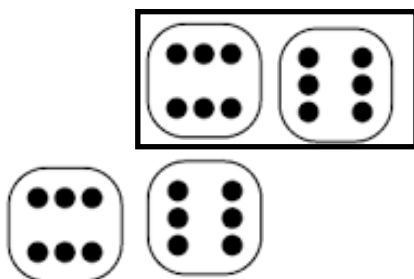
Step 1



Step 2



Step 3



Rotate the 2 die 180

Slide the 2 die to the right

How Well Do You Know Your Dice?

Roll them bones



Archaeologists can't pinpoint the first human who threw dice, but they do know that dice throwing appeared independently all across the populated world. The oldest known dice date back 8,000 years. The first dice were made of fruit pits but the forefathers of today's dice were made of the ankle bones of hoofed animals such as sheep. These bones were chosen because they are roughly cube-shaped, with two rounded sides that couldn't be landed on, and four flat ones that could. Which side would be facing up after a toss, or a series of tosses, was as much a gamble to our ancestors as it is to us today. The first dice throwers weren't gamers, they were religious shamans who used the bones for divination. A die could be used to guide the hunt. The shamans would use the die to predict the future by rolling the die and saying "If the bones land short side up, we will search for game to the south; if not, we look north." After the hunt, the hunters might cast the bones to determine who would go home with the most desirable cuts.

Dice first appeared in board games in Ur, a city in southern Mesopotamia. Now referred to as the "Royal Game of Ur," this early version of backgammon (circa 3,000 BC) used four-sided, pyramid shaped dice. The most common dice, then and now, are six-sided cubic hexahedrons with little dots, or pips, to denote their values. The pip pattern still in use today, one opposite six, two opposite five, and three opposite four first appeared in Mesopotamia circa 1300 BC.



WHEN IN ROME

In the first millennium BC, civilizations thrived in Greece, India, and China and they all threw dice. In Rome, it was common for gamblers to call out the goddess Fortuna's name while rolling a 20-sided die during a game of chance. One surviving fresco depicts two quarreling dicers being thrown out of a public house by the proprietor. When General Julius Caesar led his army across the Rubicon River to attack Rome in 49 BC he stated that there was no turning back, proclaiming, "Lea iacta est." Translation: "The die is cast." Later Roman leaders were also dice aficionados, including Mark Antony Claudius, Nero, and Nero who built special dicing rooms in the palace. In 12th-century China, a variation of a dice game led to the introduction of dominoes, which are basically flattened-out dice. The use of dice continued through the Middle Ages, being one of the few leisure activities affordable to peasants. "They dance and play at dice both day and night," wrote Chaucer in *The Canterbury Tales*.

A CRAPPY ORIGIN

Dice traveled aboard the ships emigrating to the New World. In colonial America, the game of Hazard was introduced by the French in New Orleans, who called it *crapaud*, meaning "toad." The game became popular with slaves, who shortened the name to *craps*, which is one of the most popular gambling dice games in the United States today. In the early 20th century, board games like *Monopoly* and *Chance* became popular. Today, role playing games use a variety of many-sided dice, thus guaranteeing that nearly every American home would have at least one set of dice.

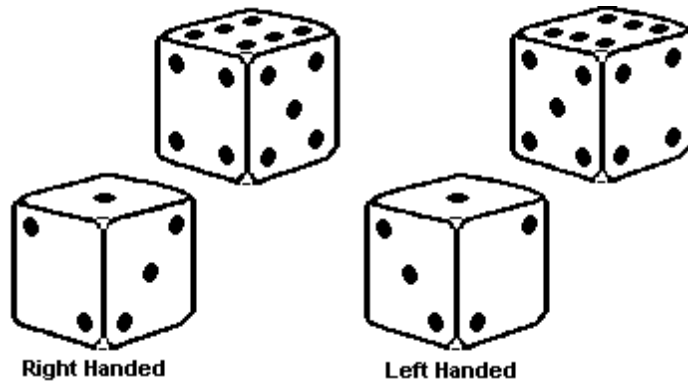
Say It Aint So

While ancient civilizations may have believed the gods were responsible for the outcome of the roll, many unscrupulous players felt the need to give the gods a little help. Loaded dice were found in the ruins of Pompeii. When wooden dice were common, enterprising gamblers would grow small trees around pebbles; then they'd carve the dice with the weight inside, leaving no visible marks. Modern cheaters are just as crafty in their methods. One type of trick dice are trappers: Drops of mercury are loaded into a center reservoir; by holding the die a certain way and tapping it against a table, the mercury travels down a tunnel to another reservoir, subtly weighting the die. Another trick is to fill a die with wax that melts at just below body temperature: Held in a closed fist, the wax melts, settling to the desired side. Today casinos spend millions trying to thwart cheaters in a high tech war of wits using extremely sensitive equipment to detect even the slightest alteration in a pair of suspect dice. To keep people from bringing their own dice to the craps table, all casino dice have tiny serial numbers. A more radical way of stopping cheaters: virtual dice rolled by a computer. This not only makes loading dice impossible, but also allows craps players to "roll the bones" from the keypad of a cell phone. But nothing can replace the actual feeling of shaking the dice in your hands and letting them fly.

Standard Dice In the USA

The standard factory made plastic shop or drugstore dice commonly available will favor the high numbers (6 then 5 then 4) because these sides are lighter than the opposite low number sides due to the indentations of the spots. This bias will only become apparent after a very considerable number of throws

Opposite faces of a die should add up to 7. However, there are two ways of arranging the faces, one a mirror image of the other, so there are left and right handed dice.

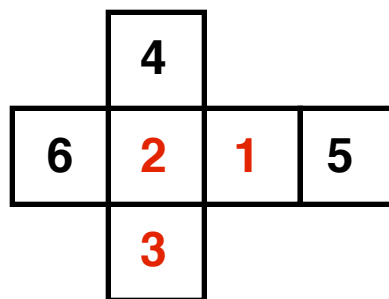
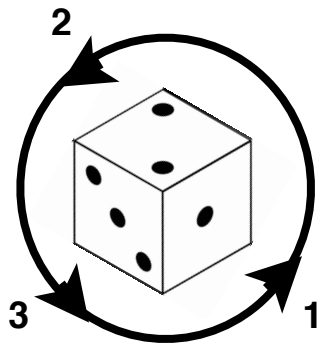


Today Western dice all have the same face arrangement. If the 1-spot is face up and the 2-spot is turned to face the left then the 3-spot is to the right of it. Chinese dice will have the faces the opposite way round. Japanese dice are arranged like Western dice but like other Asian dice they will have a very large and deep 1-spot painted red. Chinese and Korean dice will have a red 4-spot as well as the 1.

There is only one correct red die used in most of the western world. Most of the dice makers follow these rules.

This die has two characteristics:

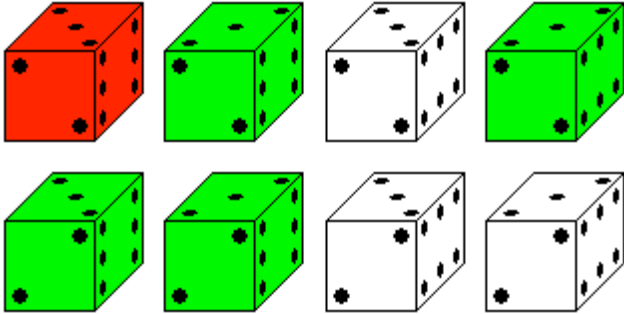
1. The sides opposite each other always add to 7.
2. If you look at the corner with the numbers 1, 2, and 3 they are arranged counter clockwise.



There is a way the dice can be different.

There are two ways of placing the points of number 2, 3, or 6, which change into themselves by turning through 180°. This leads to eight pictures.

The red die is the most frequent. But the green ones can also be found.



There are 30 Dice

If you give the numbers 1, 2, 3, 4, 5, and 6 and form all permutations of the six numbers, you get $1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 = 6! = 720$ cubes. Now there are also those dice among them, which are the same, because you can get them by turning around 13 axes. There are 24 turnings. Hence you only have $720 : 24 = 30$ different cubes.

The following drawing illustrates this. The numbers under the cubes give you the number of turnings.

