

EASY 1



Five couples go to a party and everybody shakes hands with everybody else. How many handshakes are there? What if each person shakes hands with everyone excepting their partner?

Answer: 45 and 40.

Solution: There are 10 people in total, and each shakes hands with 9 other people. So, that's 90 hands shaken. However each handshake accounts for two hands, so there is a total of 45 shakes. If the partners don't shake, then that is 5 fewer shakes, giving a total of 40.

EASY 2



A cylindrical drinking glass is three times as tall as it is wide. Which is greater, the height of the glass or its circumference?

Answer: The circumference.

Solution: The height of the glass is 3 times its diameter (width), and the circumference is π times the diameter. So, the circumference is greater.

EASY 3

999

Find all pairs of prime numbers that add up to 999.

Answer: The only pair is 2 and 997.

Solution: The sum of two odds numbers is even, and all prime numbers are odd except for 2. So, the only possible pair is 2 and 997. We can then check that 997 is in fact prime.

EASY 4

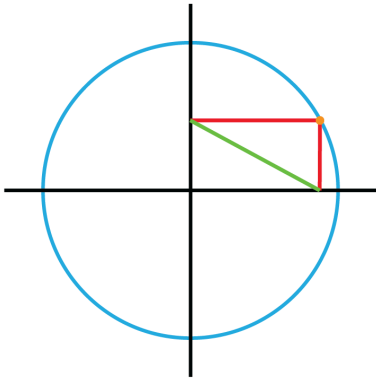


In the Mix & Match book pictured above every page consists of a top, a middle and a bottom. It is promised that there are "over 300 mix-ups". What is the smallest number of pages the book could have?

Answer: 7 pages.

Solution: If there are N pages then there are N^3 mix-ups. Since $6^3 = 216$ and $7^3 = 343$, there must be at least 7 pages.

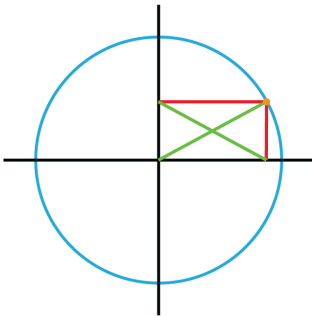
EASY 5



If the diameter of the circle above is 2, how long is the green segment?

Answer: 1.

Solution: The green segment is the diagonal of a rectangle, and the other diagonal (which is of course the same length) is also a radius of the circle. So, our segment is half the diameter, which is 1.



EASY 6



Norbert tosses a coin four times. What are the chances that the coin comes up tails every time? What are the chances of Norbert getting tails on exactly three of the four tosses?

Answer: $1/16$ and $1/4$.

Solution: The chances of getting 4 tails in a row is $1/2 \times 1/2 \times 1/2 \times 1/2 = 1/16$. To get exactly three tails, the possibilities are TTTH, TTHT, THTT and HTTT. Each of these has a $1/16$ chance, giving a total possibility of $4/16 = 1/4$.

EASY 7

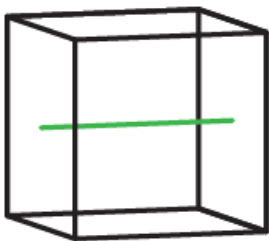


There are 50 teachers At Maths Masters High School. Yesterday 152 letters were delivered for the teachers, and Ms. Noether received more letters than anybody else. What is the smallest number of letters that Ms. Noether could have received?

Answer: 5

Solution: If Ms. Noether received only 4 letters then every other teacher must have received 3 or fewer. But that totals to no more than $4 + (3 \times 49) = 151$. So, Emmy must have received at least 5 letters. And, just 5 letters to Ms. Noether is possible, if all the other teachers received exactly 3.

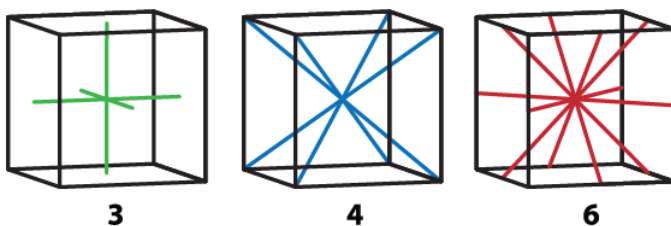
EASY 8



An *axis* of a cube is a line about which we can rotate the cube and after which the cube is back in its original position. For example, the cube above can be rotated 90, 180 or 270 degrees around the green line. (360 degree rotations don't count!) How many axes does a cube have?

Answer: 13

Solution:



EASY 9



In a recent council election, Bernard received the most votes: 73 more than Henri, 87 more than Karl, and 95 more than Augustin. There were 1233 votes in total. How many votes did Bernard receive?

Answer: 372 votes.

Solution: If Bernard received T votes then the other candidates received $T - 73$, $T - 87$ and $T - 95$ votes. Summing these we have $4T = 1233 + 73 + 87 + 95 = 1488$, giving $T = 372$ votes for Bernard.

EASY 10

	7		19	
18	22	3		
11		13	21	
	6		4	24
12		17		10

Complete the magic square above. All the numbers from 1 to 25 must be used, and every row, column and diagonal must sum to the same number.

Answer: The number in the top left corner is 16, and then the rest follows easily.

Solution: Since each row sums to the same number S , we must have $5S = 1 + 2 + \dots + 25 = 325$. It follows that the magic number S is 65. That means the top left number must be $65 - (22 + 13 + 4 + 10) = 16$, and then the rest of the squares can be filled in one by one.

16	7	9	19	14
18	22	3	20	2
11	5	13	21	15
8	6	23	4	24
12	25	17	1	10