Easy

1. First, we count the small triangles. There are three small triangles. Next, there is one medium triangle consisting of the two right small triangles. Finally, there exists the large triangle, which is the entire figure. Therefore, the answer is $2 + 1 + 1 = \boxed{\text{(E) } 5}$.

2. Setting up an equation, we have $a + b = 7$ children and $3a + 2b = 19$, where a is the number of tricycles and b is the number of bicycles. We can now solve for a. From the first equation, we get $b = 7 - a$. Plugging this into the second equation, we get $3a + 2(7 - a) = 19$ and solving this, we get $a = \boxed{\text{(C) } 5}$ tricycles.

3. If 6 can be seen, then we know that the product of the faces that can be seen must be divisible by 6. Otherwise, if 6 is the bottom face, then the product of the faces that can be seen is $1 \times 2 \times 3 \times 4 \times 5$, which is divisible by 6 since $2 \times 3 = 6$. So, the answer is $\boxed{\textbf{(E) } 1}$ because the product is always divisible by 6.

4. We can just consider all the cubes. The top corner cubes are painted on three sides (all but the bottom face). The bottom corner cubes are painted on one face (only the bottom face). The answer we are looking for is the number of middle cubes, which is $\boxed{\textbf{(B) } 6}$.

5. Suppose we give names to the students. The names are A, B, and C. If we list the possible orderings, we get:

ABC

ACB

BAC

BCA

CAB

CBA

Only 1 of those 6 lists is in alphabetical order, giving an answer of $\frac{1}{6}$ or $\boxed{C}$

We actually did not need to list the possible ways. We know that there are 3 ways to pick the first student, 2 ways to pick the second student, and 1 way to pick the last student, for a total of $3! = 3 \times 2 \times 1 = 6$ ways to line the students up. There is only one successful ordering, which is the alphabetical ordering. Therefore, our answer is once again $\frac{1}{6}$.

6. We first consider the driver's seat. There are only 2 people who can sit there–Bonnie and Carlo. Next, any of the 3 remaining people can go in the front passenger seat. Similarly, any of the 2 people who can go in the first back passenger seat, and the remaining person must go in the last seat. Thus, there are $2 \cdot 3 \cdot 2$ or 12 ways. The answer is then $\boxed{\textbf{(D) } 12}$.

7. We know that the maximum number of five-dollar bills that we can use is 3, because $4 \cdot 5 = 20 > 17$. Therefore, we can just consider all cases of the number of five-dollar bills take.

Case 1: 3 five-dolalr bills We can use 3 five-dollar bills and 1 two-dollar bill to make 17. Therefore, this case is possible.

Case 2: 2 five-dolalr bills We cannot make 17 with 2 five-dollar bills.

Case 3: 1 five-dollar bills We can make 17 with 1 five-dollar bill and 6 two-dollar bills. This case is possible.

Case 4: 0 five-dolalr bills We cannot make 17 with 2 five-dollar bills.

Two cases worked so our answer is $\boxed{\text{(A) } 2}$.

8. We simply list the factors of 36: $1, 2, 3, 4, 6, 9, 12, 18$, and 36.

The multiples of 4 that are in the list are 4, 12, 36. Therefore, the answer is $\boxed{\text{(B) } 3}$.

9. First, we know that the two lines can both intersect the circle twice. We must be careful though and remember that the two lines can intersect each other once, so our answer is $2 + 2 + 1 = \boxed{\textbf{(D) } 5}$.

Medium

1. Since we know that 80% of the people in the science club, which consists 15 people, are in the Math Club also, we can find that $\frac{4}{5} \times 15 = 12$ people are in the both the Math Club and the Science Club.

We als know that these 12 people form 30% of the Math Club.

Setting up a proportion:

$\frac{12}{x} = \frac{30}{100}$

$30x = 1200$

$x = 40$

There are $\boxed{\text{(E) } 40}$ people in the Math Club.

2. The pattern is simple. The first square has a sidelength of 1, the second square 2, and so on. So we that the seventh square has 7 and consists of $7^2 = 49$ unit tiles. The sixth square has 6 and comprises $6^2 = 36$ unit tiles. Therefore, the answer is $49 - 36 = \boxed{\text{(C) } 13}$.

3. We know that because $8 + 8 + 8 = 24$, we realize that at least one of the digits must be a 9. This would then force the other two digits to have a sum of $25 - 9 = 16$. The groups of digits that produce a sum of 25 are 799 and 889.

The number 799 can be arranged in 3 ways, since we just choose which digit is the 7, which can be done in three ways. Similarly, the number 889 can be arranged in 3 ways, since we choose which digit is the 9. Therefore, our answer is $3 + 3 = \boxed{\text{(C) } 6}$.

4. Since the arrow must land in one of the three regions, the sum of the probabilities must be 1. Therefore, we can just subtract the probability of rolling A or B from 1. The answer is $1 - \frac{1}{2} - \frac{1}{3} = \boxed{\text{(B) } \frac{1}{6}}$.

5. The information may be hard to process so we can make a simple table.

	Jonas	Clay	total
boys			52
girls	20		48
total	40	60	100

Because we know that the first two columns must add up to the third column, and the same relation applies with the rows, the rest of the empty boxes can be filled in.

	Jonas	Clay	total
boys	20	32	52
girls	20	28	48
total	40	60	100

The number of boys from Clay is $\boxed{\text{(B) } 32}$.

6. Let's consider the worst case scenario. If a person is super unlucky and gets three gumballs of each of the three

colors, that is, 9 gumballs, he would still not have four of the same color. After getting the 10^{th} gumball, however, the person guarantees to get four of the same color. Therefore, the person must buy $\boxed{\text{(C) } 10}$ gumballs.

7. We must first find the least common multiple of $15, 20, 25$ by turning the numbers into their prime factorization.

$$15 = 3 * 5, 20 = 2^2 * 5, 25 = 5^2$$

Gather all necessary multiples $3, 2^2, 5^2$ when multiplied gets 300. Now we need to find the multiples of 300 between 1000 and 2000. There are three such multiples: 1200, 1500, and 1800. Therefore, the answer is $\boxed{\textbf{(C) } 3}$.

Hard

1. The different possible (and equally likely) values Tamika gets are:

$8 + 9 = 17$

$8 + 10 = 18$

$9 + 10 = 19$

The different possible (and equally likely) values Carlos gets are:

$3 \times 5 = 15$

$3 \times 6 = 18$

$5 \times 6 = 30$

The successful pairs of numbers are 17, 15; 18, 15; 19, 15; 19, 18. There are four succesful pairs. The total number of pairs is $3 \cdot 3 = 9$. Therefore, our answer is $\frac{4}{9} = \boxed{A}$.

2. This list includes all the three digit whole numbers except 999. Because the hundreds digit cannot be 0, there are 2 ways to choose whether the tens digit or the ones digit is equal to 0. Then for the two remaining places, there are 9 ways to choose each digit. Therefore, this gives a total of $(2)(9)(9) = \boxed{\text{(D) } 162}$.

3. We can consider the cases of the first die.

If one die is 1, then even with an 8 on the other die, no combinations will work.

If one die is 2, then even with an 8 on the other die, no combinations will work.

If one die is 3, then even with an 8 on the other die, no combinations will work.

If one die is 4, then even with an 8 on the other die, no combinations will work.

If one die is 5, then the other die must be an 8 to have a product over 36. Thus, $(5, 8)$ works.

If one die is 6, then the other die must be either 7 or 8 to have a product over 36. Thus, $(6, 7)$ and $(6, 8)$ both work.

If one die is 7, then the other die can be $6, 7$, or 8 to have a product over 36. Thus, $(7, 6)$, $(7, 7)$, and $(7, 8)$ all work.

If one die is 8, then the other die can be $5, 6, 7$, or 8 to have a product over 36. Thus, $(8, 5), (8, 6), (8, 7)$, and $(8, 8)$ work.

There are a total of $1 + 2 + 3 + 4 = 10$ combinations that work out of a total of 64 possibilities.

Thus, the answer is $\frac{10}{64} = \frac{5}{32}$, and the answer is $\boxed{A}$.

4. We think about the possible ways of summing three numbers to get an even number. To have an even sum with

three numbers, we must add either $E+O+O$, or $E+E+E$, where O represents an odd number, and E represents an even number. All other possibilities result in an odd number.

Since there are not three even numbers in the given set, $E+E+E$ is impossible. Thus, we must choose two odd numbers, and one even number.

There are 2 choices for the even number.

There are 4 choices for the first odd number. Next, there are 3 choices for the last odd number. We must be careful because the order of picking these numbers doesn't matter, so this overcounts the pairs of odd numbers by a factor of 2. For example, we would count $89, 95$ and later $95, 89$ even though both are actually the same set. Thus, we have $\frac{4\cdot 3}{2} = 6$ choices for a pair of odd numbers.

In total, there are 2 choices for an even number, and 6 choices for the odd numbers, giving a total of $2 \cdot 6 = \boxed{\text{(D) } 12}$.

5. Denote the original radius r. Since the point must be closer to the center, it must lie within a concentric (same center) circle of radius $r/2$. Otherwise the disance from the point to the center will be greater than $r/2$ and consequently, it will be closer to the boundary of the original circle. Now we compute the probability that the point lies within the concentric circle or radius $r/2$. To find the probability that a point lies within a certain region, we divide the area of the successful region by the area of the total or outer boundary. Our successful region is the inner circle of radius $r/2$, which has area $\pi \cdot (r/2)^2 = \frac{r^2}{4} \cdot \pi$, and the total area $= \pi \cdot r^2$, and the ratio of areas is simply $\frac{1}{4}$, which is $\boxed{A}$.

6. If Apollo gets a 1, then Diana can bet his number in 5 ways: 2, 3, ... 6

Similarly, if Apollo gets a 2, then Diana can bet his number in 4 ways.

If Apollo gets a 3, then Diana can bet his number in 3 ways.

If Apollo gets a 4, then Diana can bet his number in 2 ways.

If Apollo gets a 5, then Diana can bet his number in 1 way.

If Apollo gets a 6, then Diana cannot bet his number.

Therefore, the number of successful outcomes is $5+4+3+2+1 = 15$. The total number of outcomes is $6 \cdot 6 = 36$, because there are 6 possible choices for each die. Our answer is $\frac{15}{36} = \frac{5}{12}$, which is choice $\boxed{B}$.

7. We can count the possible ways for each digit. Because there are 5 odd numbers and 5 even numbers, There are 5 choices for the first digit, 5 choices for the second, 8 remaining choices for the third (because we must pick different digits), and 7 remaining for the fourth, so there are $5*5*8*7 = \boxed{\text{(B) } 1400}$ numbers.

8. An even sum occurs when an even is added to an even or an odd is added to an odd. We look at the areas of the regions, the chance of getting an even in the first wheel is $\frac{1}{4}$ and the chance of getting an odd is $\frac{3}{4}$. On the second wheel, the chance of getting an even is $\frac{2}{3}$ and an odd is $\frac{1}{3}$.

$$\frac{1}{4} \cdot \frac{2}{3} + \frac{3}{4} \cdot \frac{1}{3} = \boxed{\text{(D) } \frac{5}{12}}$$