1. Put the numbers in increasing order and find the median, which is 20.5. Find the first quartile, the median of the first half of the data, which is 14. Find the third quartile, the median of the second half of the data, which is 45. 45 – 14 = 31.
2. This is the same idea as 12 slots – 10 for toys and 2 for dividers. 12C2 = 66
3. The formula for the line of best fit is . Plugging in the given values and rearranging into slope-intercept form gives you y = 0.75x + 15 or y = 15+0.75x.
4. Case: 8 heads = $\frac{10!}{8!\*2!}\*.5^{8}\*.5^{2} $=$45\*.5^{10}$
Case: 9 heads = $\frac{10!}{9!\*1!}\*.5^{9}\*.5 $=$10\*.5^{10}$
Case: 10 heads = $\frac{10!}{10!\*0!}\*.5^{10}$ =$ .5^{10}$
Add all three cases: $56\*.5^{10}\rightarrow 7\*.5^{-3}\*.5^{10}=\frac{7}{128}$
5. 68 = probability of being within 1 standard deviation. 95 = probability of being within 2 standard deviations. 99.7 = probability of being within 3 standard deviations. So, to be between 1 and 2, we do 95-68 = 27% or .27.
6. The number cards only show numbers between 2-10, inclusive. This is 36 cards, and 630 possible pairs. Consider the cases to get a product less than or equal to 12. If one card is a 2, there are 4 different possible suits for this card, 4 viable numerical values for the second card, which are of a different value(3,4,5,6) and 4 ways to choose the other card’s suit: 64 cases. If one card is a 3 and the other card is greater than 3, there are only 16 combinations possible (4\*4 for the different suits possible). If the numerical values are the same on both cards (2 or 3 are the only options), only 6 combinations are possible for each. Thus, 64+16+6\*2 = 92 (/630) = 46/315. 1-46/315 = 269/315
7. The formula for a chi squared test is $x^{2}= \sum\_{i=0}^{k}\frac{(O-E)^{2}}{E}$. Plug in to get $x^{2}=14/3$.
8. Type I Error (Rejected a correct Null Hypothesis)
9. z-score = $\frac{170-125}{15}=3$
10. First ball being blue:$\frac{5}{22}$
Having the second ball be blue: $\frac{4}{21}$
Total probability of two blue balls: $\frac{10}{\begin{array}{c}231\\\end{array}}$ Thus, the ODDS are 10:221
11. Use the formula $\frac{\left(n-1\right)!}{2}$. With n=8, we get 2520.
12. 23
13. First find the mean, which is 12. Then subtract the mean from each value and square the differences. The sum of the difference is 262. Divide by (n-1), or 4 in this case, to give a variance of 131/2. Then take the square root to get the answer $\sqrt{131/2}=\frac{\sqrt{262}}{2}.$
14. Draw this in the Argand plane – the conditions on either part of the complex number form a square with area 25 in the fourth quadrant with one vertex on the origin. To have a magnitude less than 5 translates to a circle with radius 5, centered at the origin. The overlapping region has an area of 25pi/4. Thus, the probability is (25pi/4)/25 = pi/4
15. Expected value = 3(0.1) + 6(0.5) + 9(0.3) + 12(0.1) = 7.2
16. Mode: x+4 appears twice, the other values appear once only.
 Mean: $\frac{x+7+x+4+x+3+x+6+x-1+x+4+x-10}{7}=x+\frac{13}{7}$
Difference: $\left(x+4\right)-\left(x+\frac{13}{7}\right)=\frac{15}{7}$
17. Monty Hall
18. Count the ways in which the block of friends can be formed, then multiple this by 6, because the order in which they sit redefines the class seating chart (6 rows, 4 columns, and 4 diagonals \* 6 = 84 ways). Now, take into account the fact that the other students have (12-3)!ways in which they can sit. Multiply these together, to get 30481920 ways in which the girls may sit together in the room
19. Call x his grade on his last test. Then, we have $\frac{69+78+82+86+95+x}{6}=85$. Solving for x, we get x=100.
20. The data in order is: 2,3,3,3,5,6,7,7,8,9. From this you see the median is $\frac{5+6}{2}=5.5$ and the mode is 3. Add the numbers given and the total is 53. Divide by the number of numbers to get a mean of 5.3. So the sum of the mean, median, and mode is 5.3+5.5+3 = 13.8.
21. By definition, the total area is 1.
22. P(52,3) = 52\*51\*50 = 132600
23. Add the numbers given and the total is 270. Divide by the number of numbers and the solution is 27.
24. Solution: $\frac{\left(O-E\right)^{2}}{E}$ $\rightarrow \frac{\left(15-12\right)^{2}}{12}+\frac{\left(20-25\right)^{2}}{25}+\frac{\left(13-10\right)^{2}}{10}=\frac{9}{12}+1+\frac{9}{10}=\frac{53}{20}$
25. The average of the set is $\frac{32+x}{3}$. Thus the standard deviation can be described as: $\sqrt{\left(20-\frac{32+x}{3}\right)^{2}+\left(12-\frac{32+x}{3}\right)^{2}+\left(x-\frac{32+x}{3}\right)^{2}}= \sqrt{\left(\frac{28-x}{3}\right)^{2}+\left(\frac{4-x}{3}\right)^{2}+\left(\frac{32-2x}{3}\right)^{2}}$. To minimize, we need to take the derivative: .5\*$\left(\left(\frac{28-x}{3}\right)^{2}+\left(\frac{4-x}{3}\right)^{2}+\left(\frac{32-2x}{3}\right)^{2}\right)^{-.5}\*2(-\left(\frac{28-x}{3}\right)^{}-\left(\frac{4-x}{3}\right)^{}-\left(\frac{32-2x}{3}\right)^{})$ = 0. We need only consider the numerator: $\frac{\left(28-x\right)+\left(4-x\right)+(32-2x)}{3}=0\rightarrow 64=4x\rightarrow x=16$