

1. The answer is $\left(\frac{5}{6}\right)^3 = \frac{125}{216}$. On a given roll, the probability that Catherine does not roll a 6 is $\frac{5}{6}$. Therefore, the probability that she does not roll a 6 on the first three attempts is $\left(\frac{5}{6}\right)^3$.
2. The answer is $\frac{1}{6}$. Since each roll is independent, it is simply the probability that he rolls a 6 on a given roll.
3. The answer is .4. From the information, we can see that there are 10 students in the class who got an A. Since 4 of the students who got an A are in Math Club, the probability is $4/10 = .4$.
4. The answer is $\frac{1}{81}$. The area of the dartboard is 9π , and the area of the bull's-eye is π . Therefore, the probability of hitting the bull's-eye is $\frac{\pi}{9\pi} = \frac{1}{9}$. Since Zach's and Katie's attempts are independent, the probability that they both hit the target is $\left(\frac{1}{9}\right)^2 = \frac{1}{81}$.
5. The answer is .081. If Zack and Rob only teach Avram for three days, then Avram does not learn the answer on the first two days, but he learns it on the third. The probability of this happening is $.9 \cdot .9 \cdot .1 = .081$.
6. The answer is 3. The z-score is $\frac{x-\mu}{\sigma} = \frac{220-130}{30} = 3$.
7. The answer is 1.5. For the P(x) to be a probability distribution, the area under the curve must be 1. Since the area under P(x) from x=0 to x=1 is .5 (since it is a triangle with base 1 and height 1) and the curve is zero when x is not between 0 and a, the area of the curve from x=1 to x=a must be .5. Note that this is a rectangle with height 1 and length a-1, so it has area a-1. Therefore, $a-1 = .5$. Therefore, $a = 1 + .5 = 1.5$.
8. The answer is 150. The mean of the sum of the distributions is the sum of the means. Therefore, the mean is $50 + 100 = 150$.
9. The answer is 50. The standard deviation of the sum of the distributions is $\sqrt{(30)^2 + (40)^2} = \sqrt{2500} = 50$.
10. The answer is .2. The sum of all of the probabilities must be 1. Therefore, $y = 1 - .6 - .1 - .05 - .03 - .02 = .2$.
11. The answer is -2.56. The expected value is $-5(.6) + 0(y) + 1(.1) + 2(.05) + 4(.03) + 6(.02) = -3 + .1 + .1 + .12 + .12 = -2.56$.
12. The answer is $\frac{22}{425}$. The probability for a given suit is $\left(\frac{13}{52}\right)\left(\frac{12}{51}\right)\left(\frac{11}{50}\right)$. Therefore, since there are four possible suits, the answer is $4\left(\frac{13}{52}\right)\left(\frac{12}{51}\right)\left(\frac{11}{50}\right) = \left(\frac{12}{51}\right)\left(\frac{11}{50}\right) = \left(\frac{2}{17}\right)\left(\frac{11}{25}\right) = \frac{22}{425}$.
13. The answer is 8. The mean of the set is $\frac{1+1+3+9+10+13+13+14}{8} = 8$.
14. The answer is .4. Since there are 80 circles and 32 red circles, the probability that a circle is red is $\frac{32}{80} = \frac{2}{5} = .4$.

15. The answer is .2. Since there are 60 blue objects and 12 blue squares, the probability that a blue object is a square is $\frac{12}{60} = .2$.
16. The answer is 30. There are $\frac{5!}{2!2!} = 5 \cdot 3 \cdot 2 = 30$ permutations since there are 2 T's and 2 S's.
17. The answer is .25. Note that $n = 4$ is the smallest positive integer such that $\left(\text{cis}\frac{\pi}{4}\right)^n = \text{cis}\frac{n\pi}{4}$ is a real number. Therefore, $\left(\text{cis}\frac{\pi}{4}\right)^n$ will be a real number if and only if n is divisible by 4. Therefore the probability is $\frac{1}{4} = .25$.
18. The answer is 1. All numbers are complex.
19. The answer is .85. The probability that at least one of the marbles is white is 1 minus the probability that both are blue. The probability that both are blue is $\left(\frac{10}{25}\right)\left(\frac{9}{24}\right) = \left(\frac{1}{5}\right)\left(\frac{3}{4}\right) = \frac{3}{20} = .15$, so the answer is .85.
20. The answer is 4. Let y be the number of tests that Evan took. Then $\frac{(y-1) \cdot .9 + .7}{y} = .85 \Rightarrow .9y - .9 + .7 = .85y \Rightarrow .05y = .2 \Rightarrow y = 4$.
21. The answer is 10. The mean, median, mode, and range of the set are all clearly 10, so the mean of them is 10.
22. The answer is 12. First, reorder the data into 5, 8, 10, 13, 14, 17, 20, 22, 29, 30. Then the median of the first half of the data set is 10 and the median of the second half of the data set is 22, so the IQR is $22 - 10 = 12$.
23. The answer is .5. $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{.2}{.4} = .5$.
24. The answer is 30%. Since 80% of 9th and 10th graders are voting for her, this will be $.8 \cdot .4 = .32$ of the total vote. Therefore, to get the additional .18, this will be $.18 / .60 = .3$ of the 11th and 12th graders.
25. The answer is 0. The non-resistant measures are the mean, range, and standard deviation, whose average is 0.