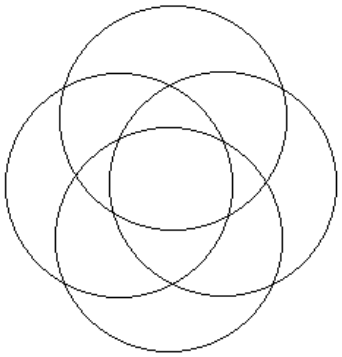
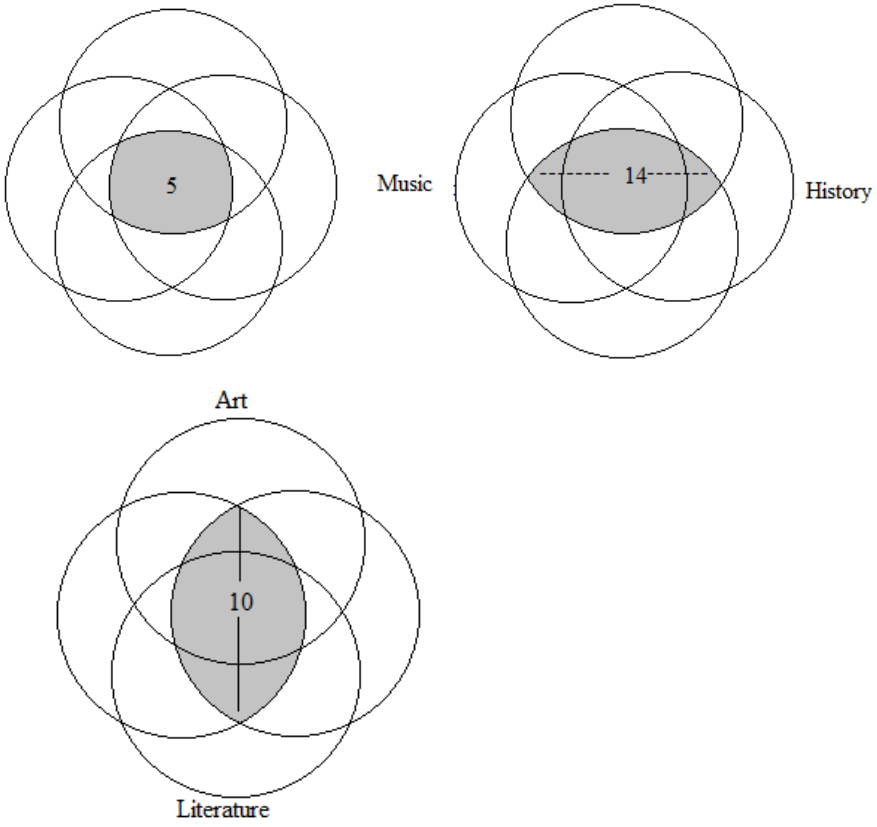
1. A. Interquartile range is the positive difference between 25^{th} and 75^{th} percentile. 75-30 = 45.
2. E. ((13-10)^2)/10+((8-15)^2)/15+((6-7.5)^2)/7.5+((12-7.5)^2)/7.5+((11-10)^2)/10 =109/15
3. D. There are three blue sides that Maya can have: The side opposite the black side, side "A" of the all blue card, and side "B" of the all blue card. Either side "A" or side "B" will be blue on the other side. 2/3.
4. A. Expected value for geometric is 1/(p of success). 1/(1-.27) = 100/73.
5. A. The numbers 0 and 1 make up 20% of all the digits, and A is the only choice that uses this.
6. B. Power = 1 – β, where β is the probability of a Type II error and equals .22 in this situation. The significance level is the probability of a Type I error, so is .05. .05+.22 = .27
7. A. Degrees of freedom here = n-2. 10-2 = 8.
8. B. Sum of residuals equals 0 by definition.
9. C. This is the coefficient of determination, r^2
10. D. If the frequency of a homozygous recessive genotype is .16, then .16 = q^2 as there are two recessive, and the frequency of a recessive allele q is the square root of that, .4. As $q = 1 – p$, p=.6, so p^2, the frequency of a homozygous dominant genotype is .36. Now we have .36+ $2pq$+.16=1. The only genotype left to be accounted for is heterozygous. Then the frequency of a heterozygous genotype is $2pq$= .48.
11. C. The mean is 750. The deviations are {-250, -249, -248, … 0, 1, 2,… 250}. To find sum of square of deviations, use the sum of squares formula for 1-250, then multiply by 2. so, 2*250*(250+1)(2*250+1)/6 = 10479250. Then, divide by (501-1)= 20958.5 Take the square root. 144.771
12. C. Using 30-60-90 rule, the area of the shaded region is the area of the hexagon with sidelength 4- area of triangle = $24\sqrt{3}$- $9\sqrt{3}$= $15\sqrt{3}$. The area of the circle is 16π. $15\sqrt{3}/16\pi$ = .5169
13. A (8-1)!/2!2!1!1!1!1!= 10080
14. A Most of the information is extraneous. Draw a Venn Diagram like this (can do this because there is no singular overlap with literature and art or music and history):



All you need to know is:



Because of this, there are 10-5+14-5 = 14 students who take exactly 3 classes.

15. C 3 components works if 2 or 3 are working
    --> 3p^2q+p^3
    5 components works if 3,4,or5 are working
    --> 10p^3q^2+5p^4q+p^5
    set the 10p^3q^2+5p^4q+p^5 > 3p^2q+p^3, q=1-p
    you get 3(p-1)^2(2p-1)>0
    obviously 3(p-1)^2>0, so 2p-1>0, so p>1/2. least possible value of x is 1/2.
16. A Plotting this graph will tell you this is a semicircle with a radius k. The value of k that will give a circle of area 2 (hence semicircle area 1) is $\frac{\sqrt{2\pi}}{\pi}$

17. B $30 \pm z*8/10$ = the interval (28.432, 31.568), so z = 1.96. This is the z-value for the 95% confidence level.
18. B 6 down, 11 across. ${}_{17}C_{11} = 12376$
19. C $({}_6C_2)(.25)^2(.75)^4 = 1215/4096$. $m=4$.
20. D The 90% confidence interval would be $67 \pm 1.645*5/\sqrt{14}$ = rounded (64.802, 69.198). This makes the integers *a* and *b* 64 and 70 (as rounding up for *a* or down for *b* would not be in the interval). 70-64=6.
21. E. The first ten digits are 3,1,4,1,5,9,2,6,5,4. If you don't know this, hit the pi button. If you have no pi button, you should know up to 3.14159, and 1 and 9—"large" values are in there. Regardless, IQR =3. 3*1.5 = 4.5 Q1=2 and Q3=5. Any numbers between -2.5 and 9.5. All of the first 10 values fall in this interval so there are no outliers.
22. A observed – expected = 10 – expected = 7.5. Expected = 2.5. solve the equation for t : $2.5 = 0 + 7t - \frac{1}{2}9.8t^2$ t=5/7
23. A
24. B $P(x=25) = P(x \leq 25) - P(x \leq 24) = P(z \leq .14) - P(z \leq -.14) = .5557 - .4443 = .1114$
25. C 1(0)+(2)1/6+ (3)2/6 + (4)3/6
26. D 89-x=1.28*12. x= 73.64
    z-score for Marshall is 1.78 which is approximately the 96^{th} percentile.
27. D Expected value of $x^2 = (25)(.1)+(36)(.15)+(9)(.4)+(64)(.2)+(49)(.15) = 31.65$
28. D set A= {2,3,5,7,11,13,17,19,23} the prime numbers up to 23,
    B= {1,3,6,10,15,21,28,36,45} the triangular numbers up to 45.
    Mean of A = 100/9
    V(A) = (4004/9)/(9-1)=1001/18
    Mean of B = 165
    V(B)= 1892/(9-1) = 473/2.
    1001/18+473/2 =2629/9
29. A definition
30. B $(1)({}_3C_1)({}_2C_1)({}_7C_2)/({}_{15}C_1)({}_3C_1)({}_2C_1)({}_8C_2)$