1) If a square has side length s, its diagonal is  and 

2) The formula is 

3) A Kite could potentially not have opposite sides congruent.

4) The larger angle is 180-27=153. 153/3=51. 90-51=39.

5) It takes ¾ of an hour at 20 miles per hour meaning he traveled a distance of 15 miles. The circumference of the circle is then 

6) There are 13 total stripes, one for each original colony. The first and last stripes are red though, meaning there are 7 of them. Also 

7) Each stripe is 52/13=4 feet tall. There are 3 red lines that are the full 104 feet long and 4 that are (104-36) feet long. Adding the areas of these together yields 

8) If each leg is multiplied by , the total area is  which has been scaled by the requested amount of *k*

9) The area of a 3-4-5 triangle is  The square root of which is 6.

10) And Icosahedron has 20 faces which are all triangles (with 3 sides), so 20-3=17

11) It is implied by the question that everyone eats at least one burger. Since 39 were eaten that means that 9 extra burgers were eaten, meaning that 9 people had two burgers. This means that a=21 and b=9, the distance from (21, 9) to (15, 1) is 

12) Jason must fit all the patties on the grill at once, so there must be at least 81 units of grill space. But since there is no empty grill space the maximum amount of grill space is 81. 81-81=0

13) Using 22/7 as an approximation for pi, the area of the round burger is , and the area of the square burger is 50. The difference in these areas is . Square inches are the units of area.

14) 

15) It should be noted that each red face meets exactly one white and one blue face. The number of spaces that are red but not white is just the number of cubelets on one red side without the edges, multiplied by two (for each red face). This is 8\*10\*2=160. There are also this many white faces that have no red on them, therefore we have 160\*2=320

16) Only the outermost layer is painted, so the 8 layers in the middle are not painted. There are  of these

17) These are just the cubelets that are on the edge of the cube, but are not the corners. Each red face has 8\*4=32 of these, so 64 there, 64 for each white face and 64 for each blue face. However, we must divide by two as we have double counted each edge (the border between red and white were counted again when we counted the borders of the white side). Final answer is 192/2=96

18) The box is 8 inches tall and if he lays them flat, he can get 800 in one stack (100 per inch, 8 inches). This stack of 800 has dimensions 5”x8”x8”. He can fit four of these in the bigger box, with some extra room to spare. The extra room has dimension 10”x2”x8”. If he flips the copies up so that they stand perpendicular to the others, he has 2 inches to fill meaning he can get 200 more in that space. He has room for two stacks of 200. Therefore he can pack 4\*800+2\*200=3600

19) Jeremy is covering 25% of each page with ink, and he has 3600 pages. This is equivalent to completely covering 25% of the 3600 pages, or completely covering 900 pages. 900 pages at 5 by 8 inches each is 36,000 square inches. It costs 5 dollars per 10,000 inches so he pays 36,000(in\*in\*)\*$5/10,000(in\*in)=$18 dollars

20) There are already 50 stars, so one more would be 51, which is 3\*17, so the ordered pair is (51,17).

21) The inner points of the star form a regular pentagon, so it’s interior angle is . By vertical angles, angle Beta is also 108 degrees. Angle Alpha sits at the peak of an isosceles triangle, with base angles 72 (This is because it is the supplement to angle Beta). So it’s measure is 180-72-72=36. 108-36=72 degrees.

22) The surface area of any prism is 2 of its base area plus its lateral area. We simply subtract two bases from the total surface area and we see that the lateral area is 49-7-7=35

23) The longest possible diagonal of the prism is the hypotenuse of the triangle with on leg the height of the prism and the other leg the diagonal of is base. The diagonal has length  so by Pythagorean theorem we have  Solving for *x* yields *x*=6

24) The volume of the hemisphere is  which implies that *r*=3. Since this is the same as the radius of the cone’s base, we can now see that  which shows that *h*=3

25) The positive geometric mean of 32 and 128 is 64 (because 32\*2=64, 64\*2=128) and the arithmetic mean of 37 and 27 is  so 64-32=32

26) The maximum value of a parabola happens exactly halfway between its zeroes (this of course assumes that the parabola opens downward.) The zeroes are easily seen to be 0 and 10, the average of which is 5, so the max value occurs at *x*=5

27) All we want is the value of *r* such that 

28) There are 13 books in Euclid’s elements. Reverse engineering the problem, we wish to find *n* such that *n*(*n*-3)/2=65. Rearranging, we have *n*2-3*n*-130=0, which factors to (*n*-13)(*n*-10)=0 which means that *n*=13 or *n*=10. It should come as no surprise that *n*=13 works.

29) The perimeter is 2\*5+2\*7=24

30) There is (5,0), (3,4) and (4,3) within the first quadrant, and 3 other quadrants with similar points. 3 each quad, 4 quads, 12 total.