1. Match the items on the left with the appropriate choice on the right to make a true statement. Indicate the match by clearly and legibly copying the letter for the item on the right in the blank on the left.

1. _d_ A set
2. _p_ Although we used to think it was curved
3. _g_ Dihedral groups
4. _a_ Great circles
5. _n_ Group multiplication
6. _e_ Kepler thought the Platonic solids
7. _h_ One proof of the Pythagorean theorem
8. _b_ Regular polyhedra
9. _s_ Salvador Dali
10. _c_ The angle sum of a triangle
11. _l_ The Möbius band
12. _i_ The Pythagorean Theorem
13. _k_ The tetrahedron
14. _t_ There are 16
15. _u_ There are 4
16. _r_ There are eight
17. _f_ There are golden rectangles
18. _q_ There are infinitely many
19. _o_ There are only 5
20. _j_ Victor Klee
21. _m_ The Mandelbrot set

a) are lines in spherical geometry
b) are Platonic
c) can tell us about the curvature of space
d) cannot be put into one to one correspondence with its power set
e) determined planetary motion
f) hidden in the Platonic Solids
g) involve symmetry
h) involves areas of triangles and squares
i) is arguably the most influential mathematical result
j) is famous for his art gallery result
k) is its own dual
l) is one sided
m) is the most famous fractal
n) isn't always commutative
o) regular solids
p) scientists now believe the universe is flat
q) sizes of infinities
r) triangular faces on the dual of the cube
s) used four dimensional concepts
t) vertices in a hypercube
u) vertices in a tetrahedron

1pt each

2. If a pair of standard six-sided fair dice with faces numbered 1-6 are tossed, what is the probability that the resulting sum is five?

1,4 2,3
4,1 3,2 $\frac{4}{36} = \frac{1}{9}$ 4 pts

3. Caitlin is five feet tall and standing six feet from a thirteen foot tall vertical pole. How far is the top of the pole from the top of her head?

13'-5=8 $6^2 + 8^2 = 10^2$ 10 feet   4 pts
            $36 + 64 = 100$
5'   6'

4. Scientists can measure angles to determine the curvature of space because: in planar (ie Euclidean) geometry the sum of the angles in a triangle is _180°_; in spherical geometry it is _greater than 180°_ and in hyperbolic geometry it is _less than 180°_ .   4 pts each

5. How many subsets does the set {♡, ◇, ♤, ♧} have? $2^4 = 16$ 4 pts

6. Using white as zero and your pen or pencil color as one, color the triangle above right as Pascal's triangle mod two.   7 pts

7. If you borrow $1000 at 20% interest compounded annually and make no payments how much will you owe after four years?
$1000(1.2)^4 = 2073.60 2073.60   4 pts

144
144
676   576
      1440 0

Complete the following on Extra Paper provided:
8. Below is a mapping from the elements of {♡, ◇, ♤, ♧} to its subsets. Define the mystery subset to be the set of all elements of {♡, ◇, ♤, ♧} with the property that the element is mapped to a subset that does not contain it. What is the mystery subset? Explain briefly how you know before checking that no element is mapped to it. M = {♡, ♤} 4 pts

♡→ {◇, ♤, ♧}
◇ → {◇}
♤ → {♡, ◇, ♤, ♧}
♧ → {}

If an element were mapped to M it would have to simultaneously be in and not be in M. 4 pts

9. What happens if you cut a Möbius strip down the center? you get one large loop w/ 2 twists and 2 sides. 4 pts
10. Write an (approximately half page hand written) essay on something you have learned since the last test. 20 pts.