Practice Final Exam

136.102

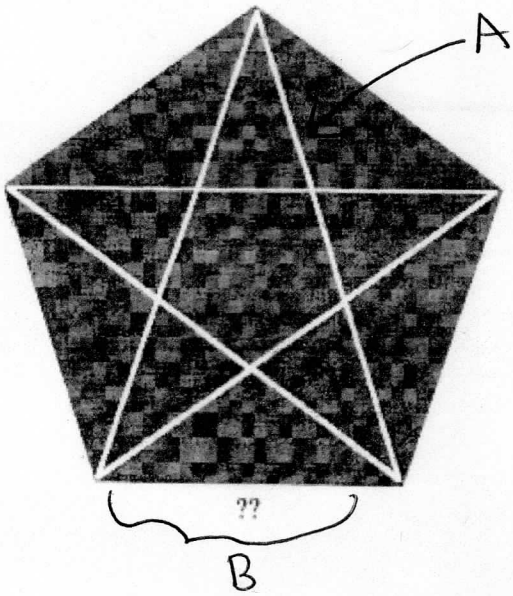
1. Construct (using only a ruler and a compass) an angle of 30 degrees.

2.

EXAMINATION: Math in Art EXAMINERS: R. Padmanabhan/T. Lysenko

Values

2. You are commissioned to construct a huge 5-star made up of, say, rope light, to be installed within a regular pentagonal wooden frame as shown below. If the total length of the rope light is 8090 feet, find the base of the regular pentagon.



know $\frac{A}{B} = 1.618$

& $5A = 8090$

$\Rightarrow A = \frac{8090}{5} = 1618$

So $\frac{A}{B} = 1.618 \Rightarrow B = \frac{A}{1.618} = 1000\text{ ft}$

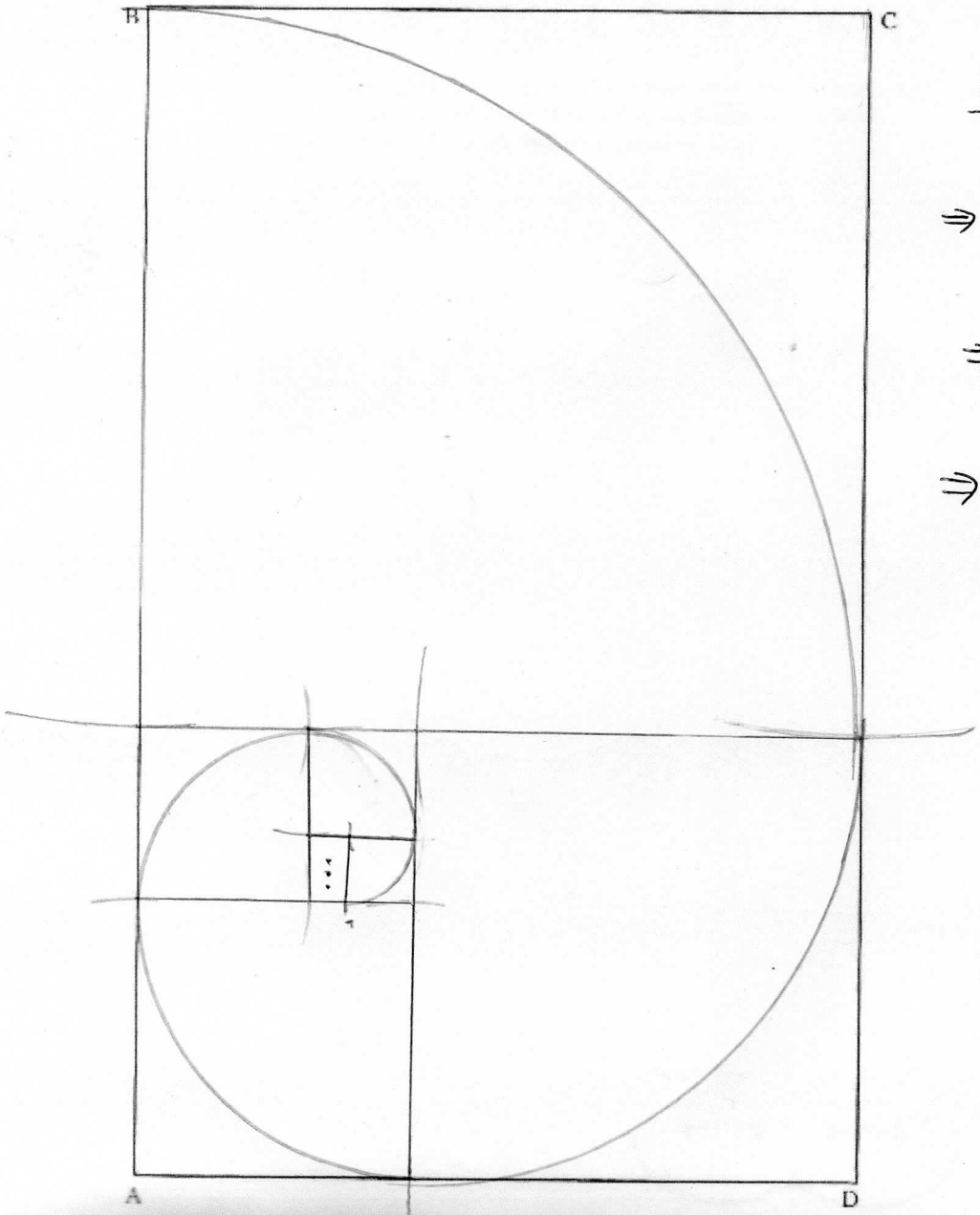
3.

DEPARTMENT & COURSE NO: 054/136.102 TIME: 2 HOURS

EXAMINATION: Math in Art EXAMINERS: R. Padmanabhan/T. Lysenko

Values

7. If ABCD is a *golden recangle* with the longer side AB = 210 mm, what is the approximte size of the shorter side BC? Using the technique of drawing circular arcs, draw a smooth golden spiral within the given golden rectangle ABCD.



$$\frac{AB}{BC} = 1.618$$

$$\Rightarrow \frac{210}{BC} = 1.618$$

$$\Rightarrow BC = \frac{210}{1.618}$$

$$\Rightarrow BC = 129.79$$

4.

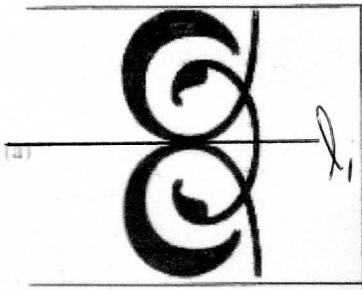
DEPARTMENT & COURSE NO: 054/136.102 TIME: 2 HOURS

EXAMINATION: Math in Art EXAMINERS: R. Padmanabhan/T. Lysenko

Values

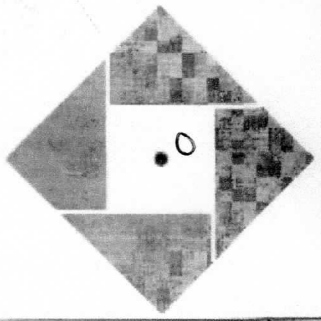
1. For each of the following designs given below, identify all the symmetries of the design (i.e. list all the rotational and reflectional symmetries present in the whole design)

(a)



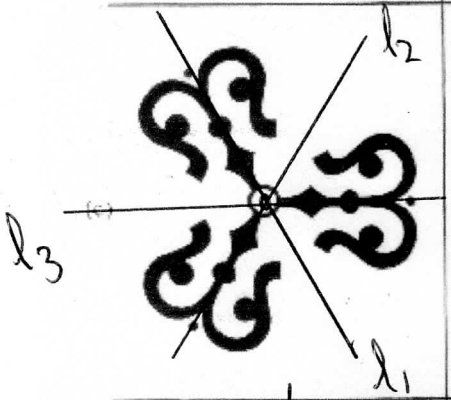
{I, reflection l_1}

(b)



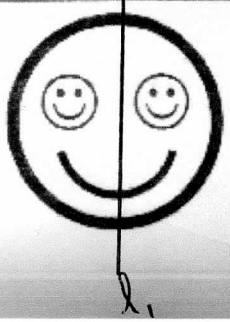
{I, rotation about O by 90°, 180°, 270°}

(c)



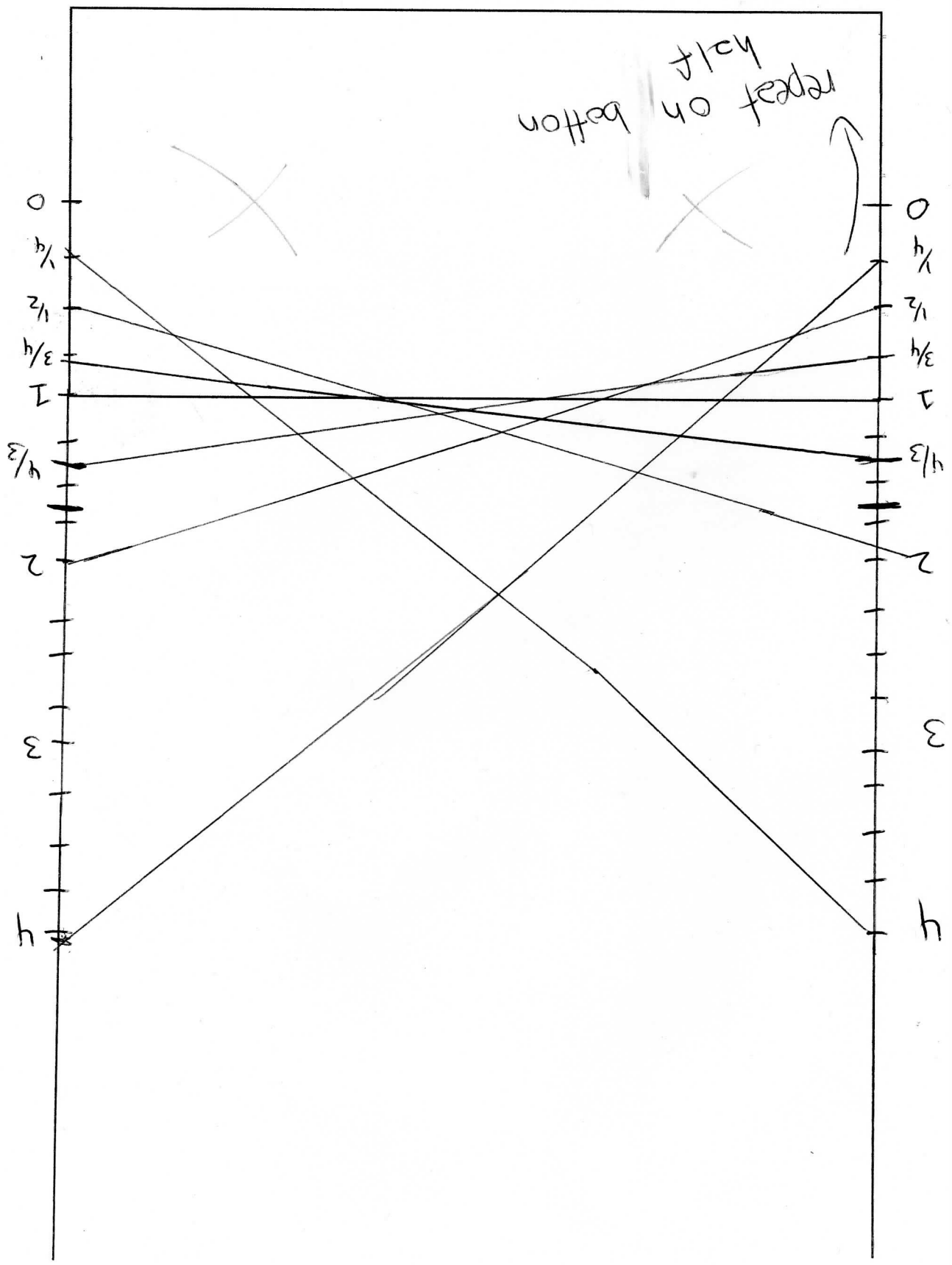
{I, reflection l_1, l_2, l_3, rotation about O by 120°, 240°}

(d)



{I, reflection l_1}

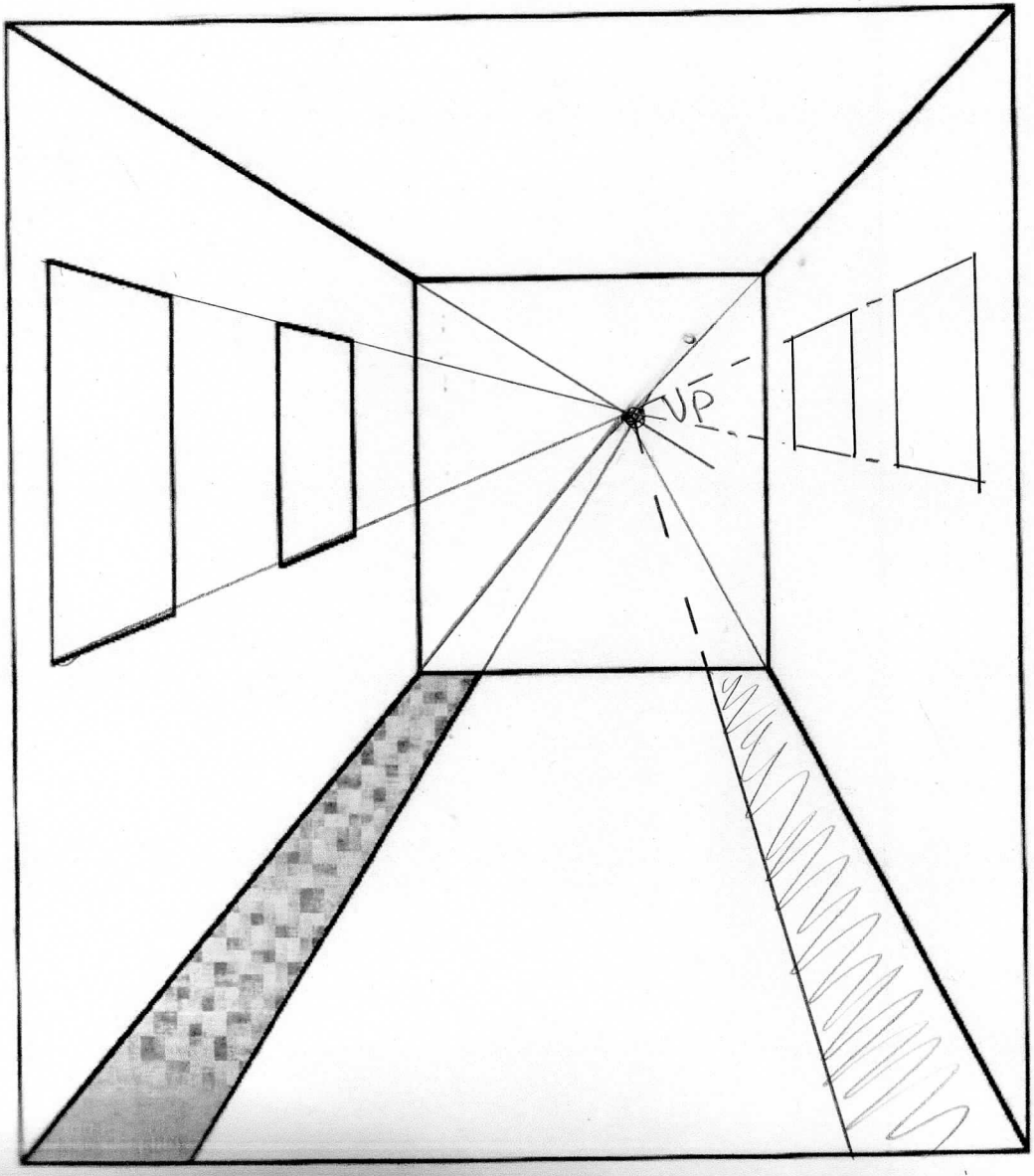
5. Using strings (tangents) construct an ellipse inscribed in the given rectangle.



6.

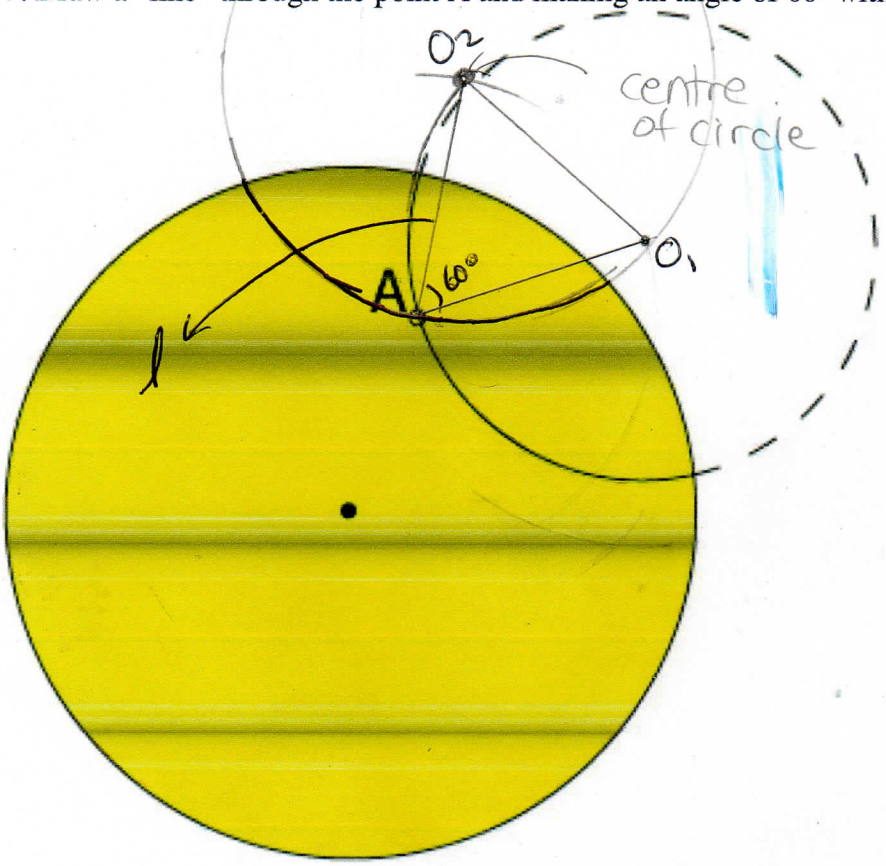
Values

6. The picture below shows a hallway with two windows in the left wall.
(a) How many vanishing points are there in this perspective drawing? Locate them.
(b) Using the principles of perspectivity, draw a similar set of windows on the right wall. Also, add the missing strip of carpet on the right side of the hallway.



a) 1 VP

7. Draw a "line" through the point A and making an angle of 60° with the given "line" l.



- 2 arcs make an angle of "θ" if their radial line segments at the point where they cross make an angle of "θ".

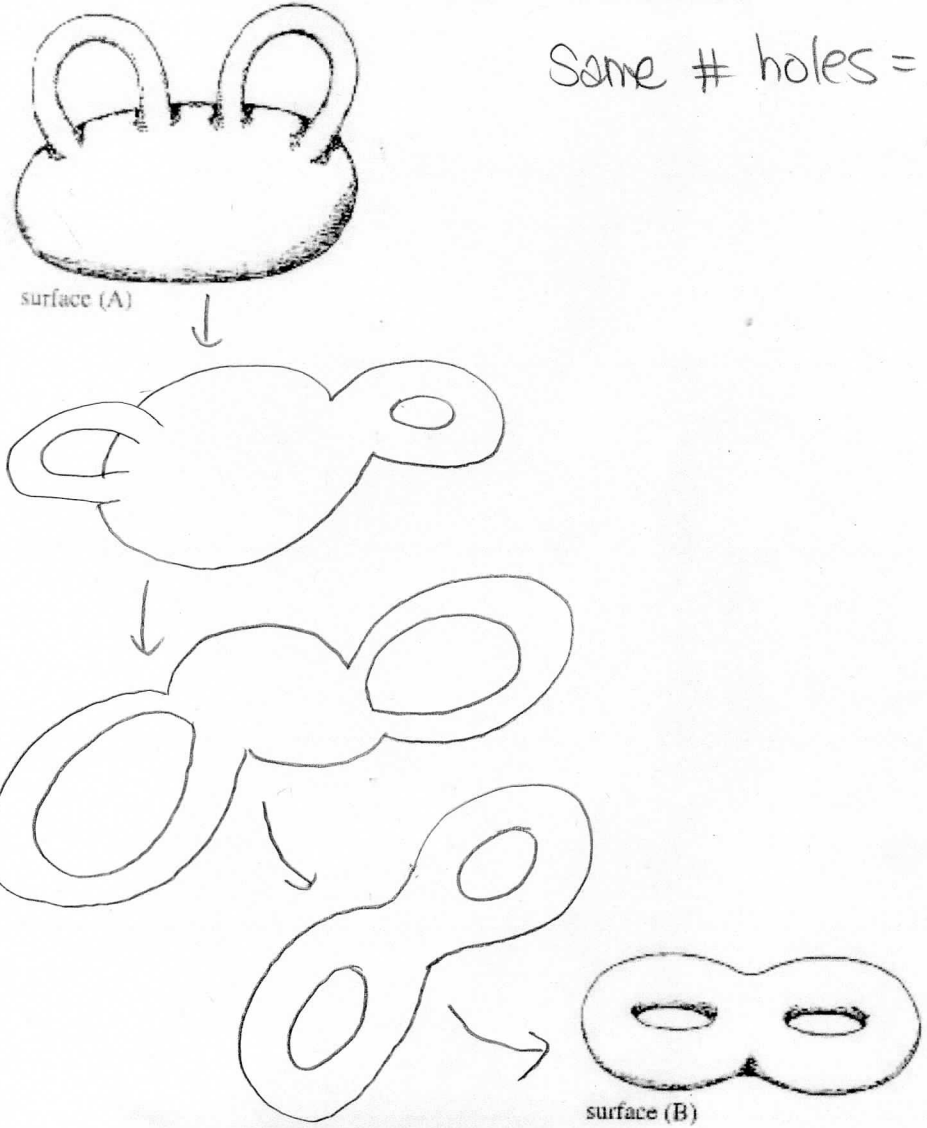
1. connect O_1 to A → make line O_1A
2. build a 60° angle (equil. triangle) at A
3. any circle w/ centre along l will intersect the given "line" at 60°.

8.

8. (a) A set of English alphabets is given below. Find all shapes of letters in the set which are topologically equivalent to the letter "J". Just circle the correct answers.

A B C D E G I J L S U V W Z

(b) The two surfaces A and B given below are topologically equivalent. Do you know why they are topologically the same? Demonstrate their topological equivalence by drawing at least three in-between images which continuously transform A into B.



surface (A)

surface (B)

Same # holes = topologica
equivalen