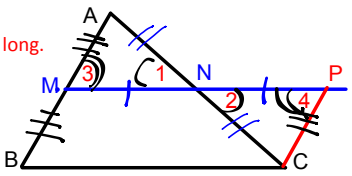
Theorem 24: The sum of the angles of a quadrilateral is 360°.
Def: A rectangle is a quadrilateral each of whose angles is a right angle.
Corollary to Theorem 24: A quadrilateral is equiangular iff it is a rectangle.
Def: A parallelogram is a quadrilateral whose opposite sides are parallel.
Theorem 25: The opposite sides and angles of a parallelogram are equal.
Theorem 26: The diagonals of a parallelogram bisect each other.
Theorem 27: A quadrilateral is a parallelogram if its opposite sides are equal.
Theorem 28: A quadrilateral is a parallelogram if its opposite angles are equal.
Theorem 29: A quadrilateral is a parallelogram if two opposite sides are both parallel and equal.
Theorem 30: A quadrilateral is a parallelogram if its diagonals bisect each other.
Def: A square is a quadrilateral all of whose sides and angles are equal. Every square is a rhombus.
Def: A rhombus is a quadrilateral all of whose sides are equal.
Theorem 31: All rectangles are parallelograms.
Theorem 32: All rhombuses are parallelograms.
Theorem 33: The diagonals of a rectangle are equal.
Theorem 34: The diagonals of a rhombus are perpendicular.
Def: A regular polygon is one that is equilateral and equiangular.
Def: A trapezoid is a quadrilateral that has exactly one pair of parallel sides. The parallel sides are called the bases of the trapezoid, and the non-parallel sides are called its legs. The pairs of angles that include each base are called base angles.
Def: An isosceles trapezoid is a trapezoid whose legs are equal.
Theorem 35: The base angles of an isosceles trapezoid are equal.
Theorem 36: The diagonals of an isosceles trapezoid are equal.
If a quadrilateral is a trapezoid, then its diagonals cannot bisect each other.

7.6 – The Midsegment Theorem

Def: A midsegment of a triangle is a line segment that connects the midpoints of two of its sides.

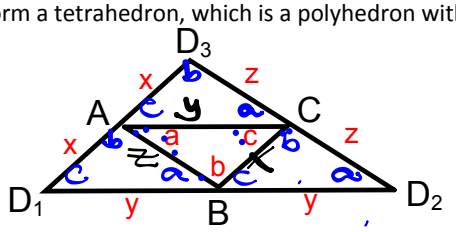
Theorem 37: The Midsegment Theorem –
A midsegment of a triangle is parallel to the third side and half as long.
Given: MN is a midsegment of ΔABC.
Prove: MN||BC and MN=(1/2)BC.

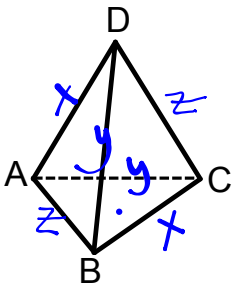


Proof:

Statements	Reasons
1. Draw line MN	Two points define a line
2. Choose a point P so that NP=MN	Ruler Postulate
3. ∠1=∠2	Vertical angles are equal
4. AN=NC	N is midpoint of AC & divides it into 2 equal parts
5. ΔAMN≅ΔCPN	SAS congruence
6. MA=CP	corresponding parts of congruent Δs are equal
7. BM=MA	M is midpoint of AB & divides it into 2 equal parts
8. BM=CP	Substitution (#6 & #7)
9. ∠3=∠4	corresponding parts of congruent Δs are equal
10. BA||CP	equal alternate interior ∠s mean lines are parallel
11. BCPM is a parallelogram	a pair of opposite sides that is both equal & parallel makes a parallelogram
12. MP||BC and MP=BC	A parallelogram has opposite sides equal & parallel
13. MP=MN+NP	Betweenness of points theorem
14. MP=MN+MN=2MN	Substitution (#2 & #13)
15. MN=(1/2)MP	Division
16. MN=(1/2)BC	Substitution (#12 & 15)

An edition of Euclid's Elements published in London in 1570 featured little paper models attached to the pages that could be folded up to form three-dimensional figures. One pattern consisted of a triangle and its three midsegments. It could be folded to form a tetrahedron, which is a polyhedron with four triangular faces.





38. What must be true about the four triangles in each figure?

all are congruent by SSS

Two edges of a tetrahedron that do not intersect are called opposite edges; for example, AC and BD are opposite edges.

40. What do you notice about the opposite edges of the tetrahedron?

they have the same lengths

41. What is the sum of the three angles at each vertex of the tetrahedron? $a+b+c=180°$

8.1 – Transformations

Def: A transformation is a one-to-one correspondence between two sets of points.

A translation slides an object a certain distance without turning it. (shift)

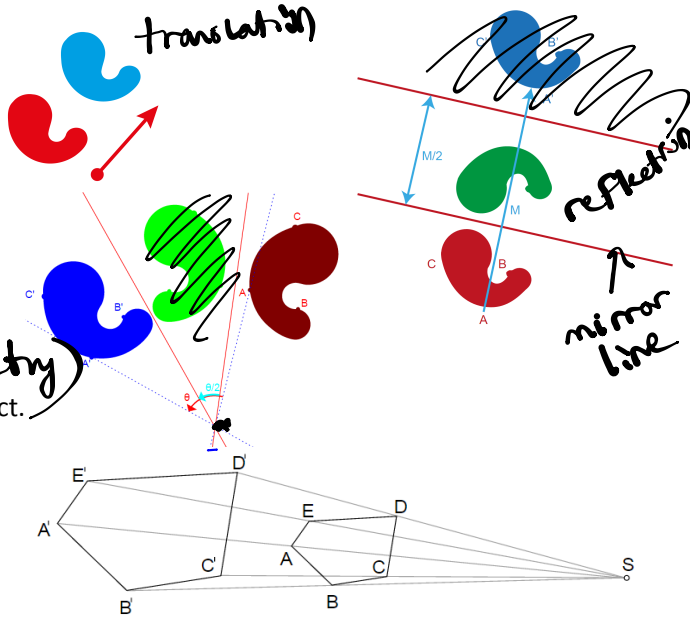
A reflection flips an object over a mirror line. (line symmetry)

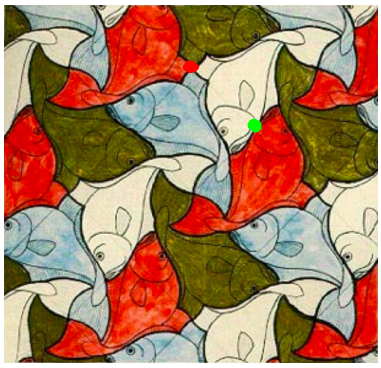
A rotation turns an object a certain number of degrees about a fixed point. (point symmetry)

A dilation enlarges or reduces the size of an object.

Def: an isometry is a transformation that preserves distance and angle measure.

Translations, reflections, and rotations are all examples of isometries, but dilations are not.





M.C. Escher. *Fish (No. 20)*

What type of translation seems to relate

1. Two fish of the same color?

translation

2. A pair of red and white fish?

rotation

3. A pair of blue and white fish?

rotation

Are there any pairs of fish in the figure for which one fish of the pair seems to be

4. A dilation of the other?

nope!

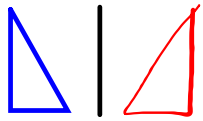
5. A reflection of the other? no

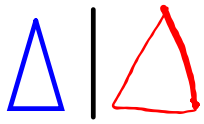
Complete the figures by including the reflection image of the object through the mirror line.

R | Я

8. N | И

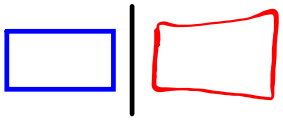
9. A | A

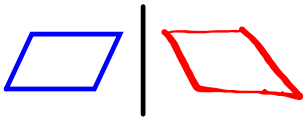
10. 

11. 

12. E | ∃

13. Z | S

14. 

15. 

16. Which figures look the same as their mirror images?

#9, 11, 14

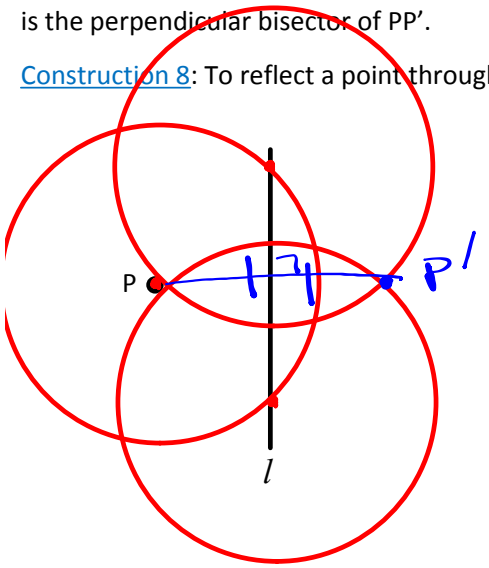
17. What is it about these figures that causes them and their mirror images to look the same?

each figure has mirror symmetry w/in the figure with respect to a vertical line

8.2 – Reflections

Def: The reflection of point P through line l is P itself if P lines on l. Otherwise, it is the point P' such that l is the perpendicular bisector of PP'.

Construction 8: To reflect a point through a line.



HW #1 (submitted Friday, 11/7) - Ch 1 Review Problems pp. 36-38
HW #2 (submitted Friday, 11/14) - Ch 2 Review Problems pp. 71-74, Ch 3 Review Problems pp. 124-128
HW #3 (submitted Friday, 11/21) - Ch 4 Review Problems pp.176-180
HW #4 (submitted Friday, 12/5) - Ch 5 Review Problems pp. 206-209
HW #5 (submitted Monday, 12/15) - Ch 6 Review Problems pp. 250-254

HW #6 (due Friday, 01/09)

- Ch 7 Review Problems pp. 292-295
- Khan Academy exercises: **anything that has been recommended by me!**

("Introduction to Euclidean geometry," "Angles and intersecting lines," "Congruence," etc.)

- Start working on Ch 8 Review Problems (pp. 325-329)

Quiz #4 - Friday, 01/09!