(9) 1-3. True-False:  Write in the blank T for each true statement, F for false.

   1. a. ___ Every square is a rectangle.

      b. ___ Every rectangle is a trapezoid.

      c. ___ A rhombus is a square.

   2. a. ___ The least possible number of faces on a polyhedron is five.

      b. ___ A prism may have eight faces.

      c. ___ A pyramid may have exactly one face that is a regular pentagon.

   3. a. ___ A quadrilateral  may have exactly two right angles.

      i. ___ There is only one* triangle with sides of lengths 15 cm, 7 cm, 6cm.

      k. ___ There is only one* quadrilateral with sides 10cm, 7cm, 6cm, & 8cm long (in that order.)

   *"only one" in the sense that any two figures satisfying these conditions must be congruent.

(12) 4. Multiple choice.

   For each statement, choose the BEST completion of the statement from this list:

A tetrahedron   B dodecahedron   C prism      D pyramid    E cube
F octahedron     G icosahedron      H square      J polygon     K cone
L quadrilateral   M parallelogram   N rectangle   O rhombus   P polygon

   a.     A quadrilateral with all sides congruent is a __

   b.     A quadrilateral with all angles congruent is a __

   c.     The net above right can be folded up into a polyhedron known as a __

   d.     A simple closed curve consisting of line segments in a plane is a __

   e.     A surface that encloses space, with a pentagonal base and triangular sides is a __

   f.     The regular polyhedron in which three triangles meet at each vertex is a __
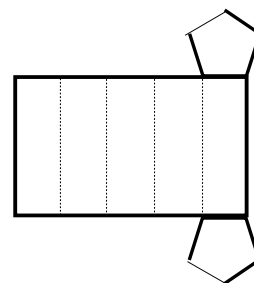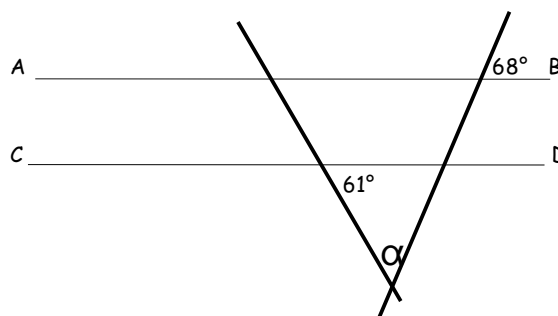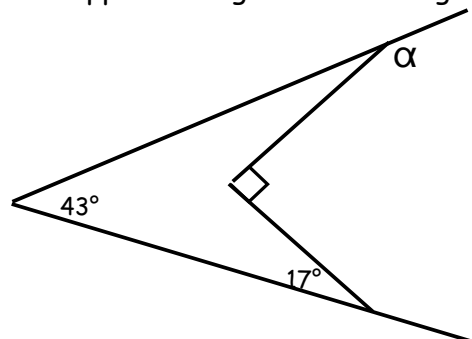
(4) 5.  Sketch a prism with fifteen edges.

(6) 6.  Find the measure of the angles marked α .  (Figures are not drawn exactly to scale!)
   All apparent segments ARE segments.            Segments $\overline{AB}$ and $\overline{CD}$ are parallel.

α

43°

17°

A _____ 68° B
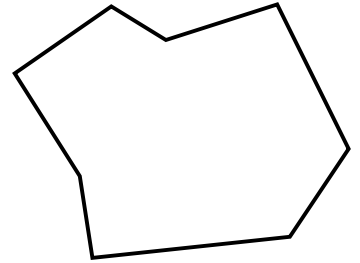
C _____ D

61°

α

31

(8) 7a.  <u>Sketch</u> (neatly) a **pyramid** with a pentagonal base.

b.  State the number of faces:  _____

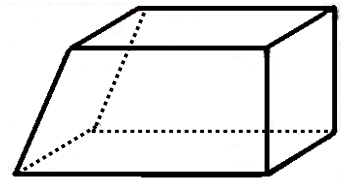_____  the number of edges:  _____

and vertices:  _____

c.  Show Euler's formula (section 9.4) holds.

(6) 8.  Without using a protractor, showing your work, find the SUM of
the measures of the interior angles in the polygon at right:

Showing your work, find the measure of one interior angle of a regular ICOSAGON.

(8) 9.  The sketch at right is NOT that of a RIGHT RECTANGULAR PRISM.
Explain why not (details), and state the most specific possible
name for a polyhedron that could be illustrated with this sketch.
(Assume angles that appear right are right, and so forth.)

(6) 10. Showing your work, find the number of segments connecting eight distinct points, no 3 of which are collinear. (Drawing them is not efficient.)
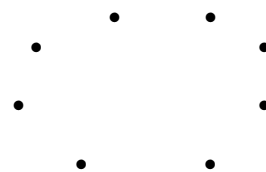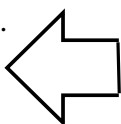
What is the number of diagonals in a convex octagon?

(7) 11. Of the following (curves in parts a through f), which are NOT simple, closed plane curves ? If a figure is not, EXPLAIN in what way it fails.
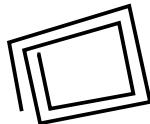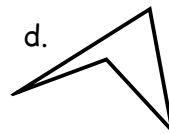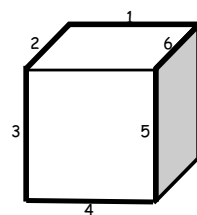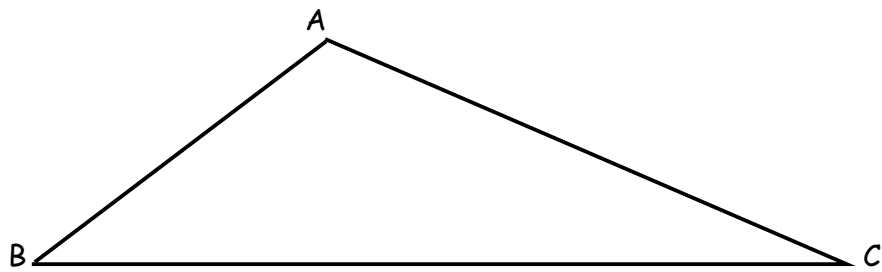
a.

b.

c.

d.

e.

f. The six numbered edges of a cube illustrated at right (Consider the edges numbered 1-6 ONLY).
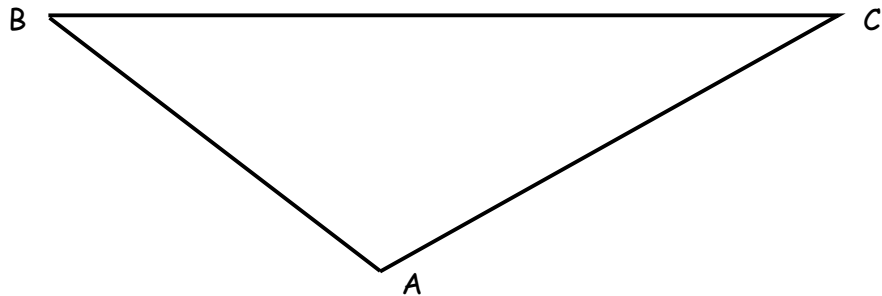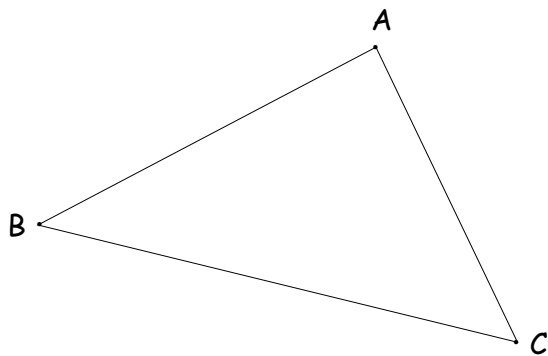
(3) 12. Which of the figures in #11 above are POLYGONS?

(3) 17. a. Showing your work, construct a **line** parallel to BC through A.

A

B ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯ C

(3) 18. Showing your work, construct the **altitude** of triangle ABC from **B**.

B ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯ C

A

(3) 19. Construct an angle bisector of angle BCA.

A

B

C

(3) 13.  If m($\angle\alpha$) = 108° 38' 5", what is the measure of $\alpha$'s supplement?

(5) 14.  If 3x and 4x + 6° are the measures of a pair of complementary angles, what are their measures, in degrees?

(7) 15.  Given that point O is the midpoint of segment AB, and also is the midpoint of segment XY, prove that the lines through A& X and through B & Y must be parallel.

A

X     O     Y

B
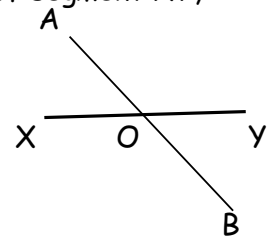
(7) 16.  Prove that the diagonals, AC & BD, of kite ABCD are perpendicular.

A

D     B

C