

Math 202 Section 4

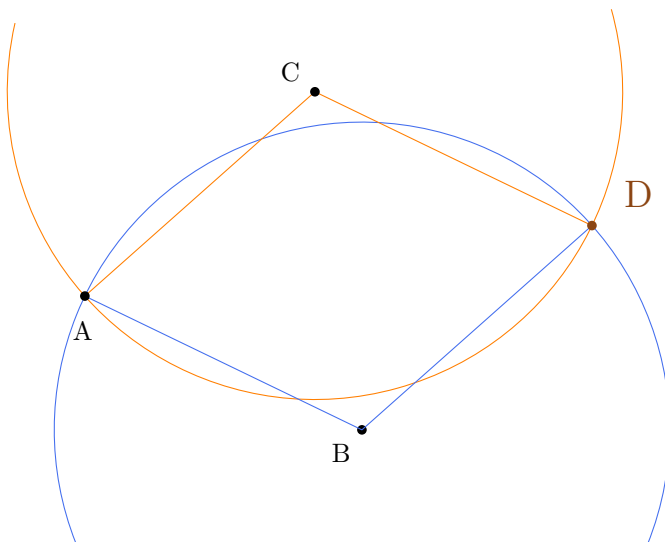
QUIZ 4 SOLUTIONS

Feb 4, 2008

Show your work in all problems.

1. Construct the following using straightedge and compass only. This means there should be no guessing involved, only using measurable distances (with compass) and drawing a line only when two points on it are already known. Don't erase your intermediate drawings (unless they turned out wrong). Label new points that you will use (as circle centers or points on a line).

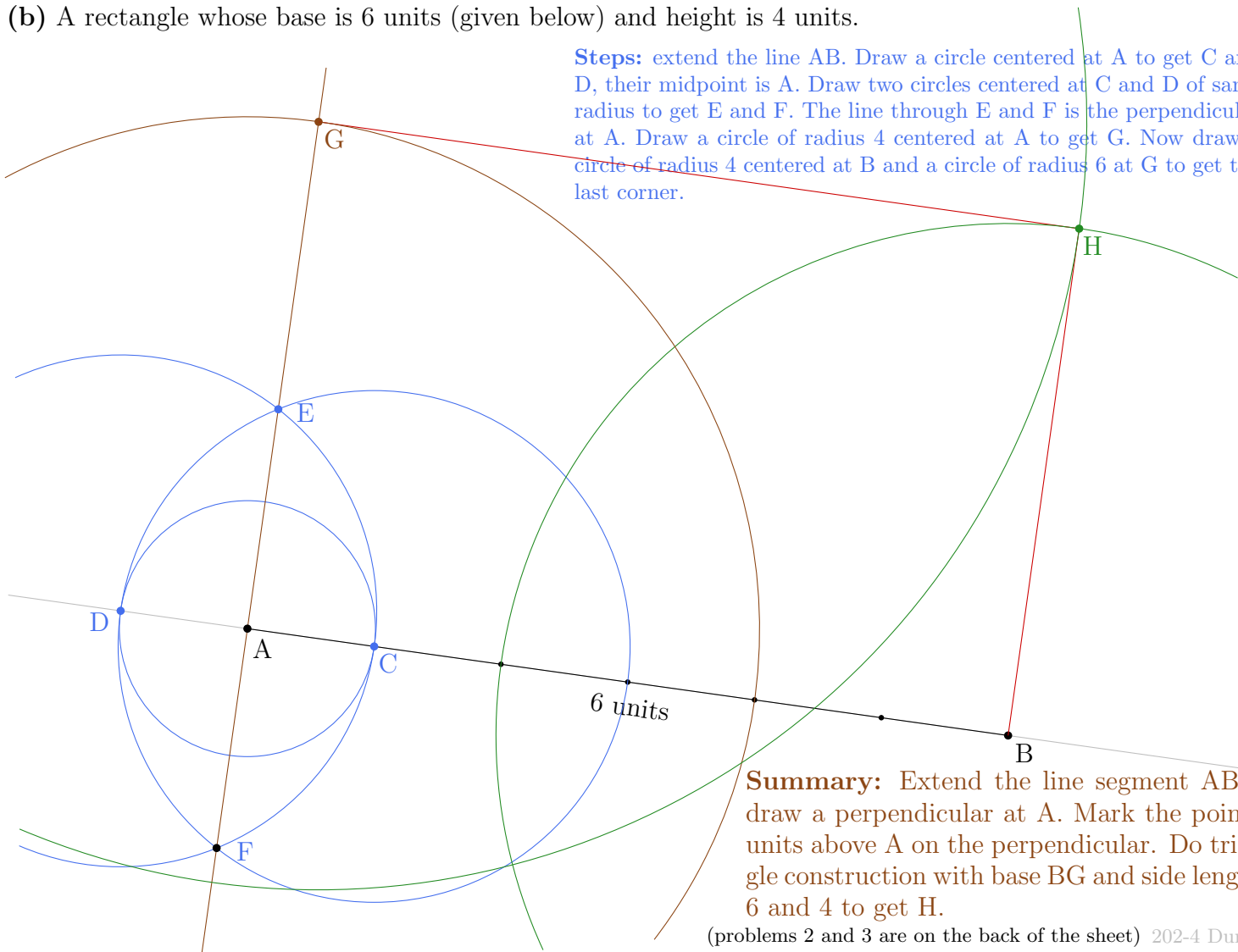
(a) The rhombus whose 3 vertices are given below. Explain by one sentence why it is indeed a rhombus.



This is a rhombus because we use the compass with a fixed radius to draw the two circles, hence the line segments AB, AC, BD, CD have same lengths since they occur as radii for the two circles.

Steps: Draw circles centered at B and C of radius same as the length of AB (which is same as length of AC). This gives us the desired point D.

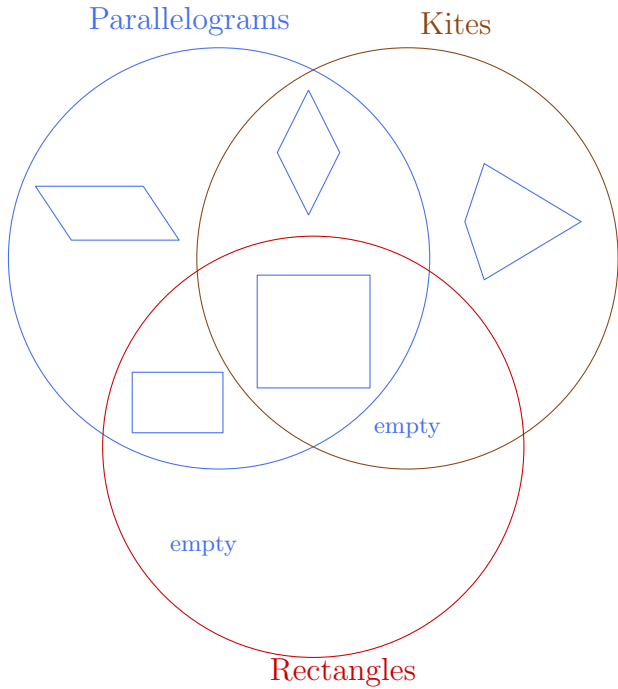
(b) A rectangle whose base is 6 units (given below) and height is 4 units.



Steps: extend the line AB. Draw a circle centered at A to get C and D, their midpoint is A. Draw two circles centered at C and D of same radius to get E and F. The line through E and F is the perpendicular at A. Draw a circle of radius 4 centered at A to get G. Now draw a circle of radius 4 centered at B and a circle of radius 6 at G to get the last corner.

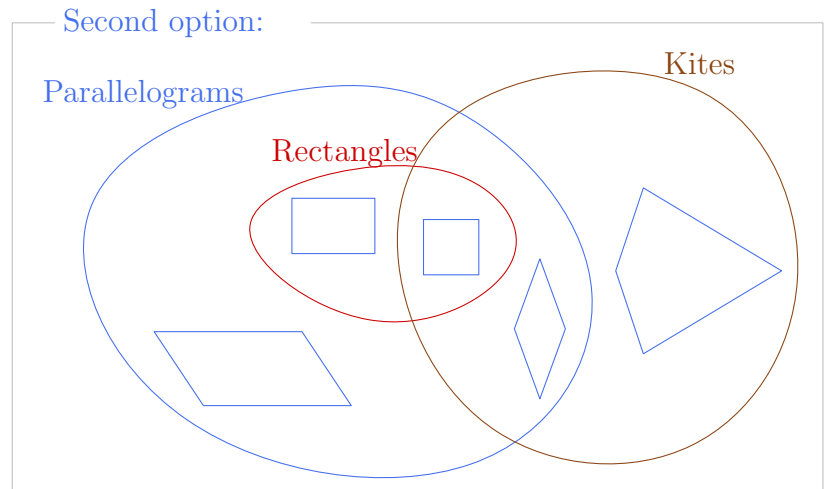
Summary: Extend the line segment AB to draw a perpendicular at A. Mark the point 4 units above A on the perpendicular. Do triangle construction with base BG and side lengths 6 and 4 to get H.

2. Draw a Venn diagram to classify the following: Parallelograms, Kites, Rectangles. In each region draw an example if not empty.



All rectangles are parallelograms. Any rectangle that is a kite has to be a square. Any kite that is a parallelogram has to be a rhombus.

Note: Venn diagrams are used in classifying objects. Each region contains objects having properties of the circles containing them, and not having properties of the circles that they are not contained in.

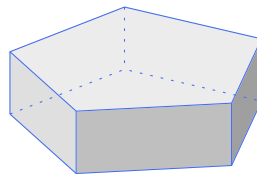
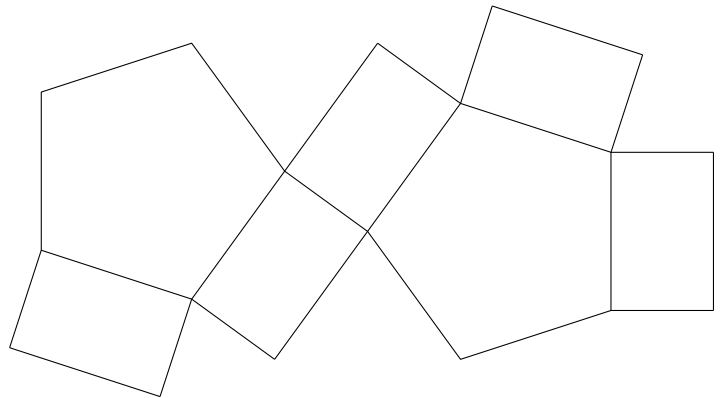


3. (a) Give a precise definition for *polyhedron*.

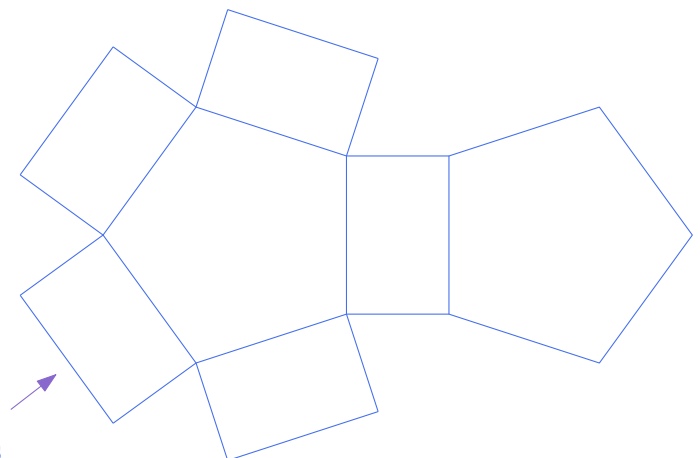
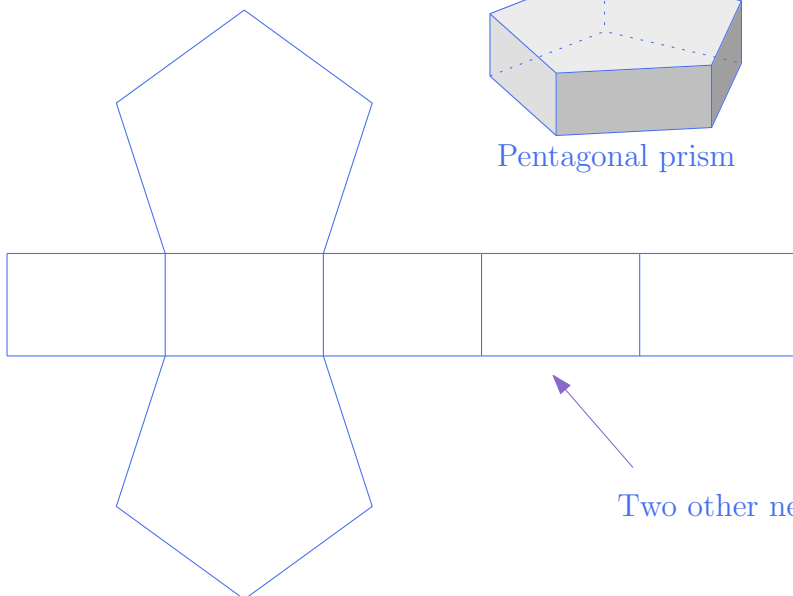
A polyhedron is a closed surface in 3D formed by polygons glued along their edges.

(b) The following net belongs to a polyhedron. Describe what the polyhedron looks like (what type of pyramid or prism or ...), give a count of its vertices, edges and faces, and draw two other nets that give the same polyhedron.

Pentagonal prism. It has 7 faces, 15 edges and 10 vertices. It is a convex polyhedron, so it satisfies $\# \text{ faces} + \# \text{ vertices} = 2 + \# \text{ edges}$.



Pentagonal prism



Two other nets