Answers to HW #1 – Unit Review for Constructions

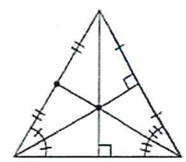
P 193: 2-6

2. $AM = 20$; $SM = 7$; $TM = 14$; $UM = 8$. By the Centroid Conjecture, $AM = 2(MO) = 2(10) = 20$. $SM + TM = TS = 21$. By the Centroid Conjecture, $TM = 2(SM)$. Therefore, $SM + 2(SM) = 3(SM) = 21$. So, $SM = 7$. $TM = 2(SM) = 14$. By the Centroid Conjecture, $CM = 2(UM)$. Because $CM = 16$, $UM = 8$.

3. $BG = 24$; $IG = 12$. $EG + GR = ER = 36$. By the Centroid Conjecture, $EG = 2(GR)$. So, $2(GR) + GR = 3(GR) = 36$. Therefore, $GR = 12$. It is given that $GN = GR$, so $GN = 12$. By the Centroid Conjecture, $BG = 2(GN) = 24$. It is given that $IG = GR$, so $IG = 12$.

4. $RH = 42$; $TE = 45$. By the Centroid Conjecture, $AZ = 2(CZ) = 28$. Because $RZ = AZ$, $RZ = 28$. By the Centroid Conjecture, $RZ = 2(HZ)$, so $HZ = 14$. $RH = RZ + HZ = 28 + 14 = 42$. By the Centroid Conjecture, $TZ = 30 = 2(EZ)$, so $EZ = 15$. Therefore, $TE = TZ + ZE = 30 + 15 = 45$.

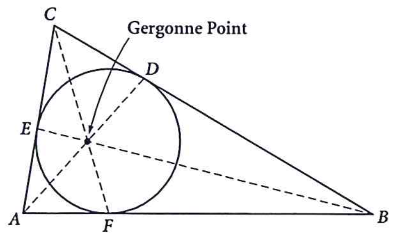
5. The points of concurrency are the same point for equilateral triangles because the segments are the same.



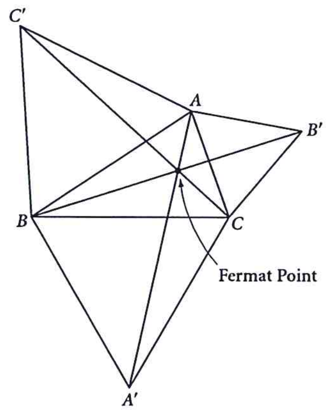
6. The center of gravity is the centroid. She needs to locate the incenter to create the largest circle within the triangle.

Pp 196-198: 1, 5, 8-25, 27-28

See next page down.



To construct the Fermat Point for $\triangle ABC$, construct equilateral $\triangle ABC'$ on $\overline{AB}$, equilateral $\triangle ACB'$ on $\overline{AC}$, and equilateral $\triangle BCA'$ on $\overline{BC}$. Then, connect A to A', B to B', and C to C'. The intersection of these segments is the Fermat Point.



CHAPTER 3 REVIEW

Exercises

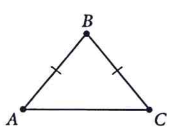
1. False. You use a straightedge and a compass.

2. False. A diagonal connects any two *nonconsecutive* vertices.

3. True

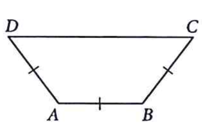
4. True

5. False. Possible counterexample:



6. False. The set of all points in the plane that are a given distance from the segment is a pair of *segments* parallel to the given segment and a pair of semicircles connecting them. The lines can't be a given distance from a segment because the segment has finite length and the lines are infinite.

7. False. Possible counterexample:



8. True

9. True

10. False. The orthocenter does not always lie inside the triangle.

11. A

12. B or K

13. I

14. H

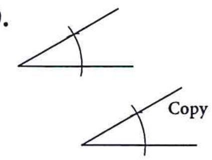
15. G

16. D

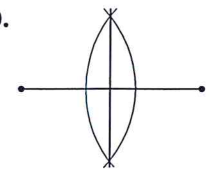
17. J

18. C

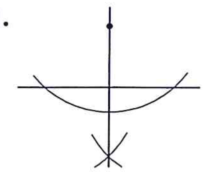
19.



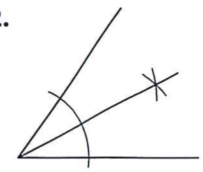
20.



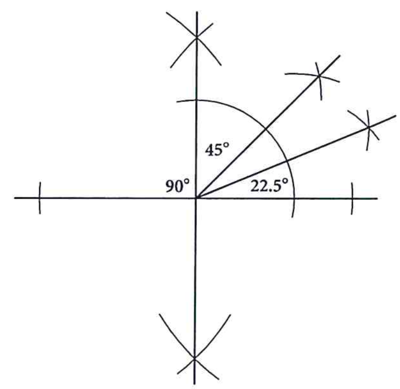
21.



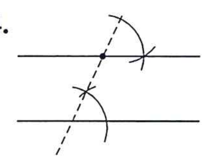
22.



23. Construct a 90° angle and bisect it. Bisect a 45° angle.



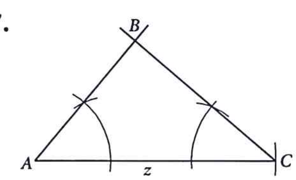
24.



25. Incenter

26. Dakota Davis should locate the circumcenter of the triangular region formed by the three stones, which is the location equidistant from the stones.

27.



28.