Page 329, #1-12

1. $PQ = 9.6$

2. $JM = 58$

3. $AC = 51$

4. EQ for $\perp$ Bisector

$M(-1,-3)$ & $N(7,1)$

midpt: $\left(\frac{-1+7}{2}, \frac{-3+1}{2}\right) = (3,-1)$

$(\overline{MN})\ m = \frac{1-(-3)}{7-(-1)} = \frac{4}{8} = \frac{1}{2}$

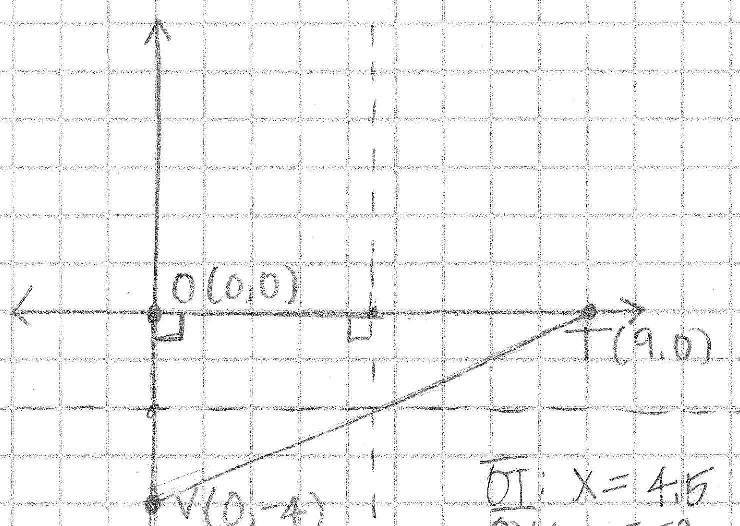
$(\perp \text{Bis})\ m = -2$

EQ: $y+1 = -2(x-3)$

5. $PS = 83.9$
$XT = 46.7$

6. $m\angle GJK = 49°$
distance from K to $\overline{HJ} = 21$

7.



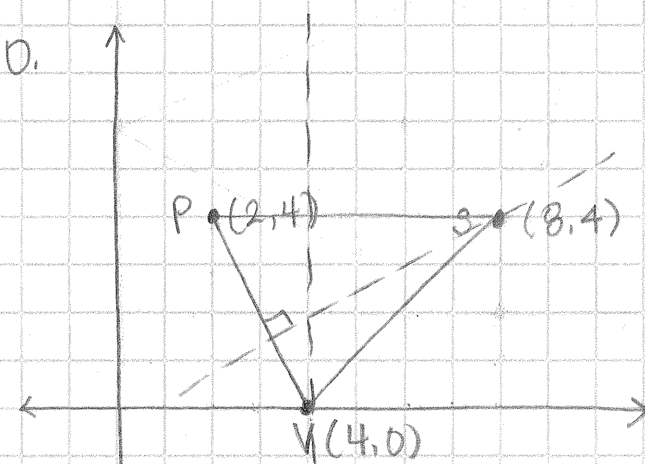
$\overline{OT}$: $x = 4.5$
$\overline{OV}$: $y = -2$

circumcenter: $(4.5,-2)$

8. $BW = 1/3(87) = 29$
$CW = 1/2(38) = 19$
$CE = 38 + 19 = 57$

9. SKIP

10.



$x = 4$

Orthocenter $(4,2)$

$(8,4)$ $m = 1/2$
$y-4 = 1/2(x-8)$
$y-4 = 1/2(4-8)$
$y-4 = -2$
$y = 2$

11. $ZV = 1/2(90) = 45$
$PM = 2(53) = 106$
$m\angle RZV = 36°$ (alt int $\angle$s)

12. $XZ = 2(39) = 78$ m.

Page 370, #1-8

1. $KL = 9.8$

2. $m\angle WXY = 34°$

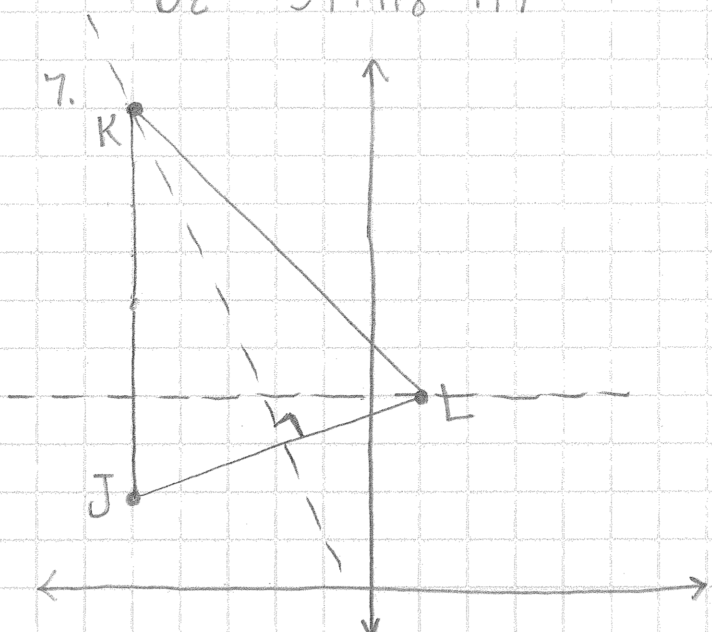
3. $2n+9 = 5n-9$ ($\perp$ Bis Thm)
$9 = 3n-9$
$18 = 3n$
$n = 6$
$BC = 5(6)-9$
$= 30-9$
$BC = 21$

4. $RS = 6.8$
$RQ = 4.9$

5. $m\angle GEF = 44°$
distance from G to $\overline{DF} = 3.7$ ($\angle$ Bis Thm)

6. $XW = \frac{2}{3}(261) = 174$
$BW = \frac{1}{2}(118) = 59$
$BZ = 59+118 = 177$

7.



① $y = 4$

$(-3, 4)$
orthocenter

② $(-5, 10)$, $m = -3$
$y-10 = -3(x+5)$
$4-10 = -3(x+5)$
$-6 = -3(x+5)$
$2 = x+5$ $x = -3$

8. $PR = \frac{1}{2}(102) = 51$
$GJ = 2(74) = 148$
$m\angle GRP = 71°$

43. $m\angle ABC = m\angle ABD + m\angle DBC$
$= 180 - (30 + 110) + 50$
$= 90°$
$\angle ABC$ is a rt. $\angle$, so $\triangle ABC$ is a rt. $\triangle$.

44. $\angle PSQ$ and $\angle PQS$ are comp. By the Converse of the $\angle$ Bisector Theorem, $\overrightarrow{QS}$ is the bisector of $\angle PQR$. So $m\angle PQR = 2m\angle PQS$
$= 2(90 - m\angle PSQ)$
$= 2(90 - 65) = 50°$.

45. $\angle QTV$ and $\angle VTS$ are supp., and $\angle TQV$ and $\angle QTV$ are comp. By the Converse of the $\angle$ Bisector Theorem, $\overrightarrow{QS}$ is the bisector of $\angle PQR$. So
$m\angle VTS = 180 - m\angle QTV$
$= 180 - (90 - m\angle TQV)$
$= 180 - (90 - m\angle PQS)$
$= 180 - (90 - 42) = 132°$.

46. By the $\angle$ Bisector Theorem, $PS = SR$ and $TU = TV$. Substitute in the given equation.
$SR = 3TU$
$PS = 3TV$
$7.5 = 3TV$
$TV = 2.5$

READY TO GO ON? PAGE 365

1. Possible answer:
Given: $\angle A$ and $\angle B$ are supplementary. $\angle A$ is an acute angle.
Prove: $\angle B$ cannot be an acute angle.
Proof: Assume that $\angle B$ is an acute angle. By the def. of acute, $m\angle A < 90°$ and $m\angle B < 90°$. When the 2 inequalities are added. $m\angle A + m\angle B < 180°$. However, by the def. of supp., $m\angle A + m\angle B = 180°$. So $m\angle A + m\angle B < 180°$ contradicts the given information, and the assumption that $\angle B$ is an acute $\angle$ is false. Therefore $\angle B$ cannot be acute.

2. $\overline{KM}$ is the shortest side, so $\angle L$ is the least $\angle$.
$\overline{KL}$ is the longest side, so $\angle M$ is the greatest $\angle$.
From smallest to greatest, the order is $\angle L$, $\angle K$, $\angle M$.

3. $m\angle D = 90 - 48 = 42°$, $m\angle E = 90°$
$\angle D$ is the least $\angle$, so $\overline{EF}$ is the shortest side.
$\angle E$ is the greatest $\angle$, so $\overline{DF}$ is the longest side.
From shortest to longest, the order is $\overline{EF}$, $\overline{DE}$, $\overline{DF}$.

4. No; possible answer: the sum of 8.3 and 10.5 is 18.8, which is not greater than 18.8. By the $\triangle$ Inequality Thm., a $\triangle$ cannot have these side lengths.

5. Yes; possible answer: when $s = 4$, the value of $4s$ is 16, the value of $s + 10$ is 14, and the value of s^2 is 16. The sum of each pair of 2 lengths is greater than the third length. So a $\triangle$ can have sides with these lengths.

6. Let d be the distance from the theater to the zoo.
$d + 9 > 16$ $\quad$ $9 + 16 > d$
$d > 16 - 9 = 7$ $\quad$ $25 > d$
Range of the distances: greater than 7 km and less than 25 km.

7. $\overline{PQ} \cong \overline{ST}$, $\overline{QR} \cong \overline{TV}$, and $m\angle Q > m\angle T$.
By the Hinge Theorem, $PR > SV$.

8. $\overline{JK} \cong \overline{JM}$, $\overline{JL} \cong \overline{JL}$, and $KL < ML$.
By the Converse of the Hinge Theorem, $m\angle KJL < m\angle MJL$.

9. $\overline{AD} \cong \overline{BC}$, $\overline{BD} \cong \overline{BD}$, and $m\angle ADB < m\angle DBC$.
By the Hinge Theorem,
$AB < CD$ $\quad$ $AB > 0$
$4x - 13 < 15$ $\quad$ $4x - 13 > 0$
$4x < 28$ $\quad$ $4x > 13$
$x < 7$ $\quad$ $x > 3.25$
$3.25 < x < 7$

10. $x^2 = 5^2 + 9^2$
$x^2 = 106$
$x = \sqrt{106}$

11. $a^2 + 9^2 = 11^2$
$a^2 + 81 = 121$
$a^2 = 40$
$a = \sqrt{40} = 2\sqrt{10}$
The side lengths do not form a Pythagorean triple, because $2\sqrt{10}$ is not a whole number.

12. $10 + 12 = 22 > 16$ ✓
The side lengths can form a $\triangle$.
$16^2 \stackrel{?}{=} 10^2 + 12^2$
$256 \stackrel{?}{=} 100 + 144$
$256 > 244$
The $\triangle$ is obtuse.

13. Length of the walkway $= \sqrt{50^2 + 80^2}$
$= \sqrt{8900} \approx 94$ ft 4 in.

14. Length of the shorter leg of a 30°-60°-90° $\triangle$ is $36 \div 2 = 18$ in. So $h = 18\sqrt{3} \approx 31$ in.

15. $x = 8\sqrt{2}$

16. $22 = x\sqrt{2}$
$22\sqrt{2} = 2x$
$11\sqrt{2} = x$

17. $5\sqrt{3} = x\sqrt{3}$
$5 = x$
$y = 2x$
$= 2(5) = 10$

#1-36

STUDY GUIDE: REVIEW, PAGES 366–369

1. equidistant
2. midsegment
3. incenter
4. locus

LESSON 5-1

5. $BD = 2CD = 2(3.7) = 7.4$

6. $XY = YZ$
$3n + 5 = 8n - 9$
$14 = 5n$
$n = 2.8$
$YZ = 8(2.8) - 9 = 13.4$

7. $HT = FT = 5.8$

8. $m\angle MNV = m\angle PNV$
$2z + 10 = 4z - 6$
$16 = 2z$
$z = 8$
$m\angle MNP = 2m\angle MNV$
$= 2[2(8°) + 10°] = 52°$

9. The midpoint of $\overline{AB}$ is (1, 0);
slope of $\overline{AB} = \frac{-10}{10} = -1$, so the slope of the perpendicular bisector is 1;
the equation of the perpendicular bisector is $y = x - 1$.

10. The midpoint of $\overline{XY}$ is (4, 6);
slope of $\overline{XY} = \frac{8}{2} = 4$, so the slope of the perpendicular bisector is -0.25;
the equation of the perpendicular bisector is $y - 6 = -0.25(x - 4)$.

11. No; to apply the Converse of the Angle Bisector Theorem, you need to know that $\overline{AP} \perp \overline{AB}$ and $\overline{CP} \perp \overline{CB}$.

12. Yes; since $\overline{AP} \perp \overline{AB}$, $\overline{CP} \perp \overline{CB}$, and $\overline{AP} \cong \overline{CP}$, P is on the bisector of $\angle ABC$ by the Converse of the Angle Bisector Theorem.

LESSON 5-2

13. $GY = HY = 42.2$

14. $GP = JP = 46$

15. $GJ = 2GX$
$= 2(28.8) = 57.6$

16. $PH = JP = 46$

17. distance from A to $\overline{UV}$ = distance from A to $\overline{UW}$
$= 18$

18. $m\angle WVU + m\angle VUW + m\angle UWV = 180$
$2m\angle WVA + 2(20) + 66 = 180$
$2m\angle WVA = 74$
$m\angle WVA = 37°$

19. $\overline{MO}$ is vertical, so the equation of the horizontal perpendicular bisector is $y = 3$;
$\overline{NO}$ is horizontal, so the equation of the vertical perpendicular bisector is $x = 4$.
The circumcenter is at (4, 3).

20. $\overline{OR}$ is vertical, so the equation of the horizontal perpendicular bisector is $y = -3.5$;
$\overline{OS}$ is horizontal, so the equation of the vertical perpendicular bisector is $x = -6$.
The circumcenter is at $(-6, -3.5)$.

LESSON 5-3

21. $DZ = \frac{2}{3}DB$
$= \frac{2}{3}(24.6) = 16.4$

22. $DB = 3ZB$
$24.6 = 3ZB$
$ZB = 8.2$

23. $EZ = 2ZC$
$11.6 = 2ZC$
$ZC = 5.8$

24. $EC = 3ZC$
$= 3(5.8) = 17.4$

25. $\overline{JK}$ is vertical, so the equation of the altitude from L is $y = 0$;
$\overline{KL}$ is horizontal, so the equation of the altitude from J is $x = -6$.
The orthocenter is at $(-6, 0)$.

26. $\overline{AB}$ is horizontal, so the equation of the altitude from C is $x = 1$;
$\overline{AC}$ is vertical, so the equation of the altitude from B is $y = 2$.
The orthocenter is at (1, 2).

27. $\overline{RT}$ is horizontal, so the equation of the altitude from S is $x = 7$;
$\overline{RS}$ has slope $\frac{5}{5} = 1$, so the equation of the altitude from T is $y - 3 = -(x - 8)$.
At the orthocenter, $x = 7$ and $y - 3 = -(7 - 8) = 1$
$\rightarrow y = 4$, so the orthocenter is at (7, 4).

28. $\overline{XY}$ is horizontal, so the equation of the altitude from Z is $x = 3$;
$\overline{XZ}$ has slope $\frac{6}{-6} = -1$, so the equation of the altitude from Y is $y - 2 = x - 5$ or $y = x - 3$.
At the orthocenter, $x = 3$ and $y = x - 3 = 0$, so the orthocenter is at (3, 0).

29. $G = \left(\frac{1}{3}(0 + 3 + 6), \frac{1}{3}(4 + 8 + 0)\right) = (3, 4)$

LESSON 5-4

30. $BC = \frac{1}{2}XY$
$= \frac{1}{2}(70.2) = 35.1$

31. $XZ = 2AB$
$= 2(32.4) = 64.8$

32. $XC = \frac{1}{2}XZ$
$= AB = 32.4$

33. $m\angle BCZ = m\angle ABC$
$= 42°$

34. $m\angle BAX = 180° - m\angle ABC$
$= 180° - 42° = 138°$

35. $m\angle YXZ = m\angle BCZ = 42°$

36. $V = (-1, -1)$; $W = (6, 1)$; slope of $\overline{VW} = \frac{2}{7}$;
slope of $\overline{GJ} = \frac{4}{14} = \frac{2}{7}$; since the slopes are the same, $\overline{VW} \parallel \overline{GJ}$.
$VW = \sqrt{2^2 + 7^2} = \sqrt{53}$;
$GJ = \sqrt{4^2 + 14^2} = 2\sqrt{53}$, so $VW = \frac{1}{2}GJ$.

LESSON 5-5

37. $\angle A$ is the smallest $\angle$, so $\overline{BC}$ is the shortest side;
$\angle C$ is the largest $\angle$, so $\overline{AB}$ is the longest side;
From shortest to longest, the order is $\overline{BC}$, $\overline{AC}$, $\overline{AB}$.

38. $\overline{GH}$ is the shortest side, so $\angle F$ is the smallest $\angle$;
$\overline{FH}$ is the longest side, so $\angle G$ is the largest $\angle$;
From smallest to largest, the order is $\angle F$, $\angle H$, $\angle G$.

39. $x + 4.5 > 13.5$ $\quad$ $4.5 + 13.5 > x$
$x > 9$ $\quad$ $18 > x$
Range of the values: > 9 cm and < 18 cm

40. $6.2 + 8.1 \stackrel{?}{=} 14.2$
$14.3 > 14.2$
Yes; possible answer: the sum of each pair of 2 lengths is greater than the third length.

41. $z + z \stackrel{?}{>} 3z$
$2z \not> 3z$
No; possible answer: when $z = 5$, the value of $3z$ is 15. So the 3 lengths are 5, 5, and 15. the sum of 5 and 5 is 10, which is not greater than 15. By the $\triangle$ Inequality Thm., a $\triangle$ cannot have these side lengths.