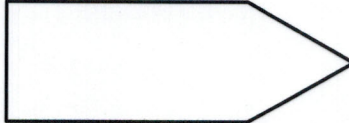# Answers for 2.2

For use with pages 82–85

2.2 Skill Practice

1. converse

2. Points are collinear if one line contains them; points are collinear if and only if one line contains the points.

3. If $x = 6$, then $x^2 = 36$.

4. If an angle is a straight angle, then its measure is 180°.

5. If a person is registered to vote, then they are allowed to vote.

6. The hypothesis and conclusion are not written correctly; if a student is a high school student, then the student takes four English courses.

7. If two angles are complementary, then they add to 90°; if two angles add to 90°, then they are complementary; if two angles are not complementary, then they do not add to 90°; if two angles do not add to 90°, then they are not complementary.

8. If it is an ant, then it is an insect; if it is an insect, then it is an ant; if it is not an ant, then it is not an insect; if it is not an insect, then it is not an ant.

9. If $3x + 10 = 16$, then $x = 2$; if $x = 2$, then $3x + 10 = 16$; if $3x + 10 \neq 16$, then $x \neq 2$; if $x \neq 2$, then $3x + 10 \neq 16$.

10. If a point is the midpoint of a segment, then the point bisects the segment; if a point bisects a segment, then it is the midpoint of the segment; if a point is not the midpoint of a segment, then the point does not bisect the segment; if a point does not bisect a segment, then it is not the midpoint of the segment.

11. False; *Sample:*

12. true

13. False; *Sample answer:*
    $m\angle ABC = 60°, m\angle GEF = 120°$

14. true

15. False. *Sample answer:* 2

16. True; the diagram indicates that $\angle ABC$ is a right angle and the measure of a right angle is 90°.

17. False; there is no indication of a right angle in the diagram.

18. True; $\angle MNP$ is a straight angle and the measure of a straight angle is 180°.

19. An angle is obtuse if and only if its measure is between 90° and 180°.

20. Two angles are a linear pair if and only if they are adjacent angles whose noncommon sides are opposite rays.

21. Points are coplanar if and only if they lie in the same plane.

22. not a good definition

23. good definition

24. not a good definition

25. A

26. If $x > 0$, then $x > 4$; false. *Sample answer:* 2 is greater than zero but not greater than 4.

27. If $-x > -6$, then $x < 6$; true.

28. If $x \leq 0$, then $x \leq -x$; true.

29. *Sample answer:* If the dog sits, she gets a treat.

30. If $\angle 1$ and $\angle 2$ are linear pairs, then $m\angle 2$ is 90°; if $\angle 1$ and $\angle 4$ are linear pairs, then the $m\angle 4$ is 90°; if $\angle 4$ and $\angle 3$ are linear pairs, then the $m\angle 3$ is 90°.

2.2 Problem Solving

31. true

32. False; $d = 1$ mm (Ash)

33. Find a counterexample. *Sample answer:* Tennis is a sport, but the participants do not wear helmets.

34. a. True, the mean is the average, which lies between the smallest value and the largest value, unless all heights are the same.

   b. If the mean of the data is between x and y, then x and y are the least and greatest values in the data set; false; the mean can lie between two numbers in the data set neither of which is the smallest and/or largest.

   c. Mode. *Sample answer:* The mode is the number that occurs most often and has to be an element of the set. The mean and median can both be a number that is not in the set.

35. *Sample answer:* If a student is a member of the jazz band, then the student is a member of the band but not the chorus.

36. a. If igneous rock is formed, then molten rock was cooled; if sedimentary rock is formed, then the rock was formed from pieces of other rocks; if metamorphic rock is formed, then there were changes in temperature, pressure, or chemistry.

b. If molten rock is cooled, then igneous rock is formed; if the rock was formed from pieces of other rocks, then it is sedimentary; if a rock was formed by changes in temperature, pressure, or chemistry, then it is metamorphic; true, true, true; each hypothesis is the definition of the conclusion.

c. *Sample answer:* If it is a rock, then it could have been formed in different ways; false; if something can be formed in different ways, it doesn't necessarily mean it has to be a rock. It could be soil for example.

37. no

38. No; if the contrapositive is true, then the conditional must also be true, but the converse can be true or false. You can write a biconditional only when both the conditional and its converse are true.
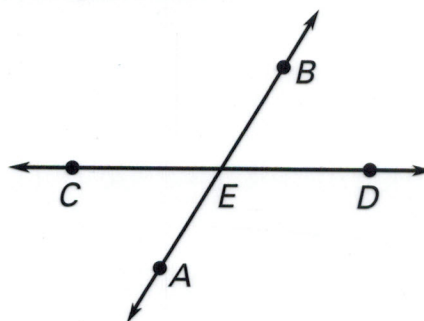
39. It is Tuesday, I have art class, I don't have study hall, I have music class; since it is Tuesday I have art class, and since I have art class I don't have study hall, and since I don't have study hall, I have music class.

2.2 Mixed Review
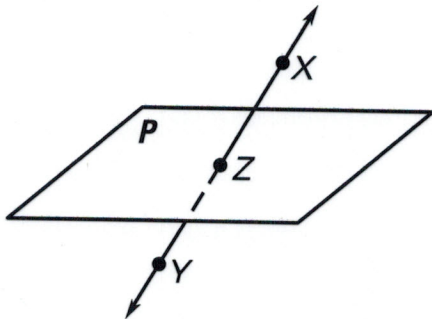
40. −20   **41.** −45   **42.** 48
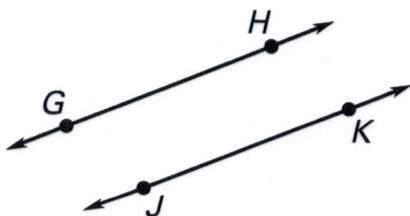
43. 200   **44.** 36   **45.** −40

46. *Sample answer:*

47. *Sample answer:*

48. *Sample answer:*

49. *Sample answer:*
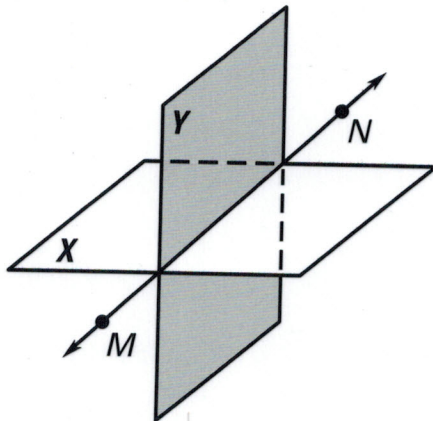
50. $(7, 5)$

51. $(1, 1)$

52. $\left(\dfrac{3}{2}, 0\right)$

53. polygon; convex

54. Not a polygon; part of the figure is not a segment.

55. polygon; concave