Name _____ Date _____

LESSON 2.3

Practice B

For use with pages 88–95

Determine if statement (3) follows from statements (1) and (2) by either the Law of Detachment or the Law of Syllogism. If it does, state which law was used. If it does not, write invalid.

1. (1) If an angle measures more than 90°, then it is not acute.

(2) $m\angle ABC = 120°$

(3) $\angle ABC$ is not acute.

2. (1) All 45° angles are congruent.

(2) $\angle A \cong \angle B$

(3) $\angle A$ and $\angle B$ are 45° angles.

3. (1) If you order the apple pie, then it will be served with ice cream.

(2) Matthew ordered the apple pie.

(3) Matthew was served ice cream.

4. (1) If you wear the school colors, then you have school spirit.

(2) If you have school spirit, then the team feels great.

(3) If you wear the school colors, then the team will feel great.

5. (1) If you eat too much turkey, then you will get sick.

(2) Kinsley got sick.

(3) Kinsley ate too much turkey.

6. (1) If $\angle 2$ is acute, then $\angle 3$ is obtuse.

(2) If $\angle 3$ is obtuse, then $\angle 4$ is acute.

(3) If $\angle 2$ is acute, then $\angle 4$ is acute.

In Exercises 7–10, decide whether *inductive* or *deductive* reasoning is used to reach the conclusion. *Explain* your reasoning.

7. Angela knows that Walt is taller than Peter. She also knows that Peter is taller than Natalie. Angela reasons that Walt is taller than Natalie.

8. Josh knows that Brand X computers cost less than Brand Y computers. All other brands that Josh knows of cost less than Brand X. Josh reasons that Brand Y costs more than all other brands.

9. For the past three Wednesdays, the cafeteria has served macaroni and cheese for lunch. Dana concludes that the cafeteria will serve macaroni and cheese for lunch this Wednesday.

Name _____ Date _____

LESSON 2.3

Practice B *continued*

For use with pages 88–95

10. If you live in Nevada and are between the ages of 16 and 18, then you must take driver's education to get your license. Anthony lives in Nevada, is 16 years old, and has his driver's license. Therefore, Anthony took driver's education.

In Exercises 11 and 12, state whether the argument is valid. *Explain* your reasoning.

11. Jeff knows that if he does not do his chores in the morning, he will not be allowed to play video games later the same day. Jeff does not play video games on Saturday afternoon. So Jeff did not do his chores on Saturday morning.

12. Katie knows that all sophomores take driver education in her school. Brandon takes driver education. So Brandon is a sophomore.

In Exercises 13–16, use the true statements below to determine whether you know the conclusion is *true* or *false*. *Explain* your reasoning.

If Dan goes shopping, then he will buy a pretzel.

If the mall is open, then Jodi and Dan will go shopping.

If Jodi goes shopping, then she will buy a pizza.

The mall is open.

13. Dan bought a pizza.

14. Jodi and Dan went shopping.

15. Jodi bought a pizza.

16. Jodi had some of Dan's pretzel.

17. **Robotics** Because robots can withstand higher temperatures than humans, a fire-fighting robot is under development. Write the following statements about the robot in order. Then use the Law of Syllogism to complete the statement, "If there is a fire, then __?__."

A. If the robot sets off the fire alarm, then it concludes there is a fire.

B. If the robot senses high levels of smoke and heat, then it sets off a fire alarm.

C. If the robot locates the fire, then the robot extinguishes the fire.

D. If there is a fire, then the robot senses high levels of smoke and heat.

E. If the robot concludes there is a fire, then it locates the fire.

angles if and only if the sum of their measures is 90°. **6.** A polygon is equilateral if and only if all of its sides are congruent.

Challenge Practice

1. If-then form: If angles are adjacent, then they share a common side; converse: If angles share a common side, then they are adjacent; false; counterexample: If point C is in the interior of $\angle ABD$, then $\angle ABD$ and $\angle CBD$ share a common side, but are not adjacent.

2. If-then form: If two circles have the same diameter, then they have the same circumference; converse: If two circles have the same circumference, then they have the same diameter; true; biconditional statement: Two circles have the same circumference if and only if they have the same diameter. **3.** If-then form: If an animal is a leopard, then it has spots; converse: If an animal has spots, then it is a leopard; false; counterexample: A giraffe is an animal and it has spots, but it is not a leopard. **4.** If-then form: If a leopard has pale gray fur, then it is a snow leopard; converse: If a leopard is a snow leopard, then it has pale gray fur; true; biconditional statement: A leopard is a snow leopard if and only if it has pale gray fur. **5.** Some students do not study. **6.** No students are involved in extracurricular activities. **7.** Some children are allowed at the concert. **8.** None of the $20 bills are counterfeit. **9. a.** no **b.** yes

10. a. no **b.** no

Lesson 2.3

Practice Level A

1. Your team wins the baseball game. **2**. Callie is also promoted. **3.** Kendra won the race.

4. The sum is an integer. **5.** $2x < x$

6. The quotient is a factor of x. **7.** If Moose is hungry when he goes to the pizza shop, then he drinks a pitcher of soda.

8. If you mail the payment by noon, then you won't be charged a late fee. **9.** If Estelle takes her broker's advice, then she'll earn 50% on her investment by next year. **10.** If a triangle has two angles of 60°, then it is equilateral. **11.** Law of Syllogism **12.** Law of Detachment **13.** neither

14. inductive; the conclusion is a conjecture based on your perception from a specific example.

15. deductive; the conclusion is based on a computation of the actual percent using the given values. **16.** inductive; the conclusion is a conjecture based on your intuition.

17. inductive; the conclusion is a conjecture drawn on your race observations rather than on the actual training effort. **18.** The area of one square is one-fourth of the area of another square with sides that are twice as long.

19. $A_1 = s^2 = x^2$, $A_2 = (2x)^2 = 4x^2$; $A_1 = \frac{1}{4}A_2$

20. Law of Detachment **21.** *Sample answer:* If A is pushed into B, then B will be knocked into C. If B is knocked into C, then C will fall down. Conclusion: If A is knocked into B, then C will fall down. **22.** *Sample answer:* If A is pushed into B, then B will be knocked into C. If B is knocked into C, then C will knock into D. If C knocks into D, then D will fall down. Conclusion: If A is pushed into B, then D will fall down.

Practice Level B

1. Law of Detachment **2.** invalid **3.** Law of Detachment **4.** Law of Syllogism **5.** invalid

6. Law of Syllogism **7.** deductive reasoning; Deductive reasoning is based on logic and order. If Walt is taller than Peter and Peter is taller than Natalie, then Walt is taller than Natalie.

8. inductive reasoning; Inductive reasoning depends on previous examples and patterns to form a conjecture. If Brand Y costs more than Brand X and Brand X costs more than any other brand, then Brand Y costs more than all other brands. **9.** inductive reasoning; Inductive reasoning depends on previous examples and patterns to form a conjecture. Dana came to her conclusion based on previous examples.

10. deductive reasoning; Deductive reasoning is based on logic and order. If Anthony is a 16–18 year old with a license in Nevada, then Anthony must have taken the required driver education.

11. not valid; It does not say that Jeff is not allowed to play video games on Saturday afternoon. It says that he does not play video games on Saturday afternoon. **12.** not valid; Katie knows that all sophomores take driver education. It does not say that only sophomores take driver education. You do not know if Brandon is a sophomore. **13.** false; The mall is open. Therefore Jodi and Dan went shopping, and therefore Dan bought a pretzel. You cannot conclude that Dan also bought a pizza.

14. true; The mall is open, therefore Jodi and Dan went shopping. **15.** true; The mall is open. Therefore Jodi and Dan went shopping, and therefore Jodi bought a pizza. **16.** false; The mall is open. Therefore Jodi and Dan went shopping, and therefore Dan bought a pretzel and Jodi bought a pizza. You cannot conclude whether or not Jodi had some of Dan's pretzel.

17. D, B, A, E, C; The robot extinguishes the fire.

Practice Level C

1. Dr. Klein will operate with precision today; detachment **2**. If we don't make any stops, then we should be in time to see the kickoff; syllogism

3. If a player receives two technical fouls in one game, then the player has to sit out the following game; syllogism **4.** The police will not hold the accused suspect; detachment **5.** There is significant danger to the firefighters; detachment

6. If the newspaper does not receive the order for the advertisement soon enough, then the store will lose money; syllogism **7.** If the company contributes $20,000 to the charity, then it will go into a lower tax bracket; syllogism **8.** You should set the parking brake; detachment **9.** The result is the perfect square; detachment **10.** If there is a large, rapid decrease in air temperature, then the ice on a lake may not be safe to walk on for up to 24 hours; syllogism **11.** The ball will float in water; detachment **12.** The car will not be able to stop in time to keep from hitting the other vehicle; detachment **13.** inductive; the conclusion is a conjecture based on your specific results from the first three weeks. **14.** deductive; you calculated the actual slope using the slope formula.

15. inductive; you are making a conjecture based on your normal spending habits.

16. inductive; you are making a conjecture based on specific trials.

17. *Sample answer:* The area of one circle is one-fourth the area of another circle with a radius that is twice as long.

18. $A_1 = \pi r^2, A_2 = \pi(2r)^2 = 4\pi r^2$, so $A_1 = \frac{1}{4}A_2$

19. Either a catch platform must be installed or each worker must wear a safety belt attached to an approved lifeline, because the eave is over 16 feet high and the pitch is greater than 4 to 12.

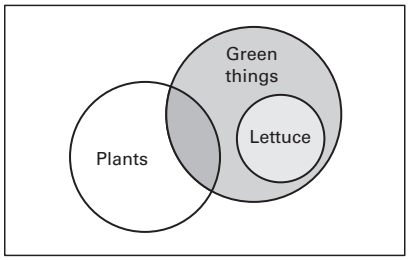
20. Either a catch platform must be installed or each worker must wear a safety belt attached to an approved lifeline because the eave is over 16 feet high and the pitch is 9 to 24 which is greater than 4 to 12.

Review for Mastery

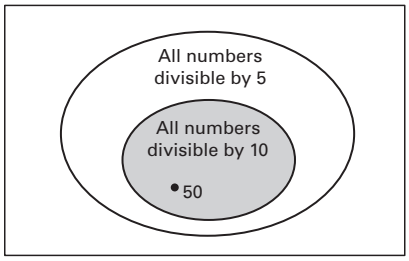
1. $0° < m\angle B < 90°$ **2.** $DE + EF = DF$ **3.** If you study hard, you will graduate. **4.** If $x > 4$, then $x^2 > 8$. **5.** The sum of two odd integers is an even integer.

Challenge Practice

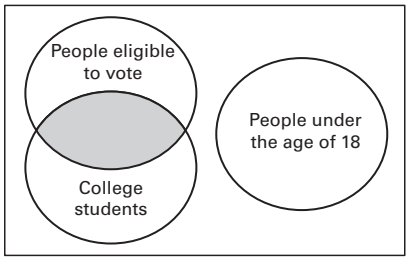
1. Invalid



2. Valid



3. Invalid



4. Valid