

8.3 Exercises

Concept Check

Fill-in-the-Blank. Complete the sentences using information found in this section.

1. _____ is a process of reaching a generalization or conclusion from specific incidents or observations.
2. A _____ is an educated guess based on inductive reasoning.
3. A _____ is an instance or time when a conjecture does not hold true.
4. _____ is the process of reaching a specific conclusion from generalized statements.
5. _____ uses specific incidents and observations to reach a general conclusion.
6. _____ uses general statements to a specific conclusion.

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

7. It is possible to reach the same conclusion using either inductive reasoning or deductive reasoning.
8. Deductive reasoning is used to identify patterns.
9. Concluding that there will be an unannounced quiz in Biology at the end of each section because there have been unannounced quizzes in Biology at the end of the last three sections is an example of deductive reasoning.
10. Concluding that spaghetti cooks in water because all pasta cooks in water and spaghetti is a type of pasta is an example of deductive reasoning.

Practice

Find a counterexample to disprove each conjecture. There may be more than one correct answer. See Example 1.

1. All odd numbers less than 10 are prime numbers.
2. All even numbers between 11 and 19 are divisible by 3.
3. All days of the week contain exactly two vowels.
4. No month of the year contains the vowel “i.”
5. No month of the year contains less than 5 letters.
6. All cards in a standard deck of cards are black cards.

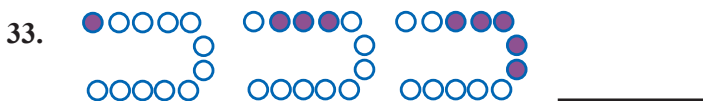
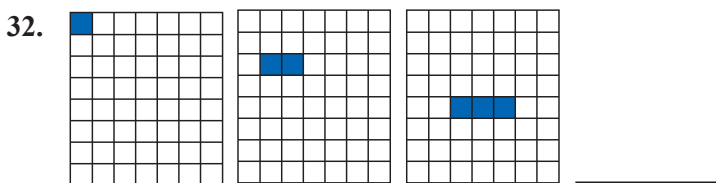
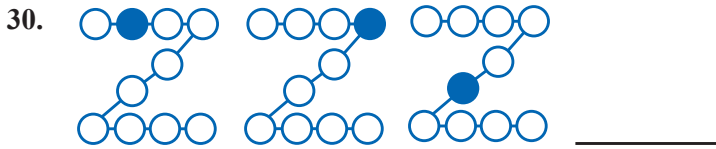
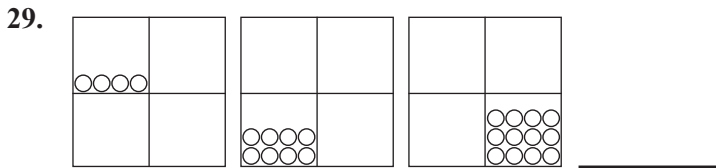
7. No whole numbers between 7 and 14 are divisible by 5.
8. No perfect square less than 100 is also a perfect cube less than 100.
9. All of the United States touch another state.
10. No ocean touches the United States.
11. All integers are whole numbers.
12. All real numbers are rational numbers.
13. No planet starts with a vowel.
14. All continents start with the letter A.

Identify a pattern in the list and use the pattern and inductive reasoning to find the next entry in the list. See Example 2.

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15. 3, 8, 13, 18, _____
 16. 4, 8, 16, 32, _____
 17. 12, 10, 8, 6, _____
 18. 10000, 5000, 2500, 1250, _____
 19. 7, 8, 10, 13, _____
 20. 2, 4, 12, 48, _____
 21. 25, 5, 1, _____
 22. a, c, e, g, _____
 23. m, p, s, v, _____
 24. a, bb, ccc, dddd, _____
 25. abcde, bcdea, cdeab, deabc, _____
 26. dog, 1, dog, 2, dog, _____
 27. Sunday, Monday, Tuesday, Wednesday, _____

Describe the pattern and use the pattern to draw the next figure in the sequence. See Example 3.

28. _____



Use deductive reasoning to determine a conclusion that can be drawn from each set of facts. See Example 4.

34. All apples have cores and stems. A MacIntosh is a type of apple.
35. All states in the United States have capital cities. New York is a state in the United States.
36. All fish have fins. A trout is a fish.
37. All basketball players on the college team must attend mandatory study halls every weekday night. Harry is a basketball player on the college team.
38. All professors in the Math Department teach four classes per semester. Dr. Adams is a professor in the Math Department.
39. Today is Tuesday. All Tuesdays are 2-for-1 burger nights at Bobby's Burger Joint.
40. Franklin is my cat. All my pets have black fur.
41. Every year Christmas is celebrated on December 25. Today Christmas is being celebrated.
42. All milkshakes sold at Bobby's Burger Joint contain at least 500 calories. Phil buys a milkshake from Bobby's Burger Joint.

43. Marie wraps all Christmas presents with red bows. Marie wrapped a Christmas present for Neil.

Determine if inductive reasoning or deductive reasoning was used to reach the conclusion. See Example 5.

44. The last four times Joe went to the movies, Joe ate a large popcorn with butter and drank a large soda. Tonight when Joe goes to the movies, he will eat a large popcorn with butter and drink a large soda.
45. All moviegoers at the Party Cinema order two large boxes of candy before the movie. Joe went to the Party Cinema to see a movie. Joe ordered two large boxes of candy before the movie.
46. All cats purr when they feel loved. My cat Troubles is purring. My cat Troubles feels loved.
47. The last five times I opened the drapes, my cat Troubles jumped up on the window seat and meowed. I just opened the drapes near the window seat. My cat Troubles jumped up on the window seat and meowed.
48. In this list of numbers: 5, 9, 13, 17, the next number will be 21.
49. Carol observed that $5 + 7 = 12$, $9 + 5 = 14$, $11 + 13 = 26$, and concluded that the sum of two odd numbers is an even number.
50. In this list of letters: fffff, eeeee, dddd, ccc, the next entry will be bb.
51. Ben noticed that $6 \cdot 4 = 24$, $4 \cdot 2 = 8$, and $10 \cdot 12 = 120$. He concluded that the product of two even numbers is an even number.
52. Andy looked at a map of the world and concluded that the names of all seven continents end in a vowel.
53. All police officers are trained in first aid. Jason is a police officer. Jason is trained in first aid.

Writing & Thinking

54. Write a list of 4 numbers that uses a pattern of adding 3 to the preceding number so that the 5th number on the list is 19.
55. Write a list of 3 numbers that uses a pattern of multiplying the preceding number by 3 so that the 4th number on the list is 999.
56. Two identical twin brothers live together. One of the brothers always tells the truth, while the other always lies. The police arrive at their place and one of them opens the door. What is one question that the police officer can ask the brother who opened the door to know if the other one is home?