Find a pattern for each sequence. Use the pattern to show the next two terms.

1. 2, 3, 5, 7, 11, 13, . . .
   To start, look for a relationship between terms. The terms are consecutive numbers.

2. $\frac{1}{4}, \frac{1}{16}, \frac{1}{64}, \ldots$


4. Use the sequence and inductive reasoning to make a conjecture.

5. What is the 12th figure in the sequence?

6. What are the coordinates of the point in the 8th figure in the sequence?

Make a conjecture for each scenario. Show your work.

7. the sum of the first 100 even numbers
   To start, find the first few terms of the sequence and look for a pattern.
   $2 = 2 = 1 \times 2$
   $2 + 4 = 6 = 2 \times \square$
   $2 + 4 + \square = \square = 3 \times \square$
   $2 + 4 + 6 + \square = \square = \square \times \square$

8. the product of an even and odd number
Find one counterexample to show that each conjecture is false.

9. The product of two positive numbers is greater than either number.
   To start, write a statement that describes a counterexample: Find two positive numbers with a product less than ___.

10. The difference of two integers is less than either integer.

11. Known: $AB = BC$
    Conjecture: $B$ is the midpoint of $AC$.

Find a pattern for each sequence. Use inductive reasoning to show the next two terms.

12. $\frac{2}{16}, \frac{2}{7}, \frac{1}{2}, \frac{4}{5}, \ldots$
    To start, look for a pattern by writing terms in an equivalent form.

13. $-13, 8, -5, 3, -2, \ldots$

14. A student dips a high-temperature wire into a solution containing sodium chloride (salt). He passes the wire through a flame and observes that doing so produces an orange-yellow flame. The student does this with additional salt solutions and finds that they all produce an orange-yellow flame. Make a conjecture based on his findings.

15. $1, 3, 9, 27, 81, \ldots$

16. $12, 0.5, 6, 3, 18, \ldots$

Draw the next figure in each sequence.

17. 

18. 

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Find a pattern for each sequence. Use the pattern to show the next two terms.

1. 2, 3, 5, 7, 11, 13, . . . 17, 19
   To start, look for a relationship between terms.
   The terms are consecutive prime numbers.

2. 1, $\frac{1}{4}$, $\frac{1}{16}$, $\frac{1}{64}$, . . . $\frac{1}{256}$, $\frac{1}{1024}$
   Each term is one-quarter the value of the term preceding it.

3. III, V, VII, IX, . . . XI, XIII
   Each term is a consecutive odd roman numeral.

4. 
   Successive terms alternate adding a box to the left column and then to the right column.

Use the sequence and inductive reasoning to make a conjecture.

5. What is the 12th figure in the sequence?

6. What are the coordinates of the point in the 8th figure in the sequence? $(-2, -5)$

Make a conjecture for each scenario. Show your work.

7. the sum of the first 100 even numbers
   The sum is 10,100; the sum equals $n(n + 1)$, where $n$ is the number of terms.
   To start, find the first few terms of the sequence and look for a pattern.
   
   $2 = 2$ = $1 \times 2$
   
   $2 + 4 = 6$ = $2 \times 3$
   
   $2 + 4 + 6 = 12$ = $3 \times 4$
   
   $2 + 4 + 6 + 8 = 20$ = $4 \times 5$

8. the product of an even and odd number
   Even; the product of every even and odd number is an even number.
Find one counterexample to show that each conjecture is false.

9. The product of two positive numbers is greater than either number. 0.5 \times 2 = 1
   To start, write a statement that describes a counterexample:
   Find two positive numbers with a product less than \(?\). \text{ one of the numbers}

10. The difference of two integers is less than either integer. 5 - (-2) = 7

11. Known: \(AB = BC\)
   Conjecture: \(B\) is the midpoint of \(AC\). \(B\) is the vertex of isosceles \(\triangle ABC\).

Find a pattern for each sequence. Use inductive reasoning to show the next two terms.

12. \(\frac{2}{16}, \frac{2}{7}, \frac{1}{2}, \frac{4}{5}, \ldots \) \(\frac{5}{3}, \frac{6}{4}, \frac{1}{4}, 2\)
   To start, look for a pattern by writing terms in an equivalent form.
   \(\frac{1}{8}, \frac{2}{7}, \frac{3}{6}, \frac{4}{5}, \ldots \)

13. \(-13, 8, -5, 3, -2, \ldots 1, -1\)

14. A student dips a high-temperature wire into a solution containing sodium chloride (salt). He passes the wire through a flame and observes that doing so produces an orange-yellow flame. The student does this with additional salt solutions and finds that they all produce an orange-yellow flame. Make a conjecture based on his findings.
   \text{Salt solutions will produce an orange-yellow flame in a flame test.}

15. 1, 3, 9, 27, 81, \ldots \ 243, 729
16. 12, 0.5, 6, 3, 18, \ldots \ 54, 972

Draw the next figure in each sequence.

17. \[
\begin{align*}
\text{Figure 1} & \quad \text{Figure 2} & \quad \text{Figure 3} & \quad \text{Figure 4} & \quad \text{Figure 5} \\
\text{Figure 6} & \quad \text{Figure 7} & \quad \text{Figure 8} & \quad \text{Figure 9} & \quad \text{Figure 10}
\end{align*}
\]

18. \[
\begin{align*}
\text{Figure 1} & \quad \text{Figure 2} & \quad \text{Figure 3} & \quad \text{Figure 4} & \quad \text{Figure 5} \\
\text{Figure 6} & \quad \text{Figure 7} & \quad \text{Figure 8} & \quad \text{Figure 9} & \quad \text{Figure 10}
\end{align*}
\]