Chapter 10. Quadratic And Exponential Functions

Ex. 10.7

Answer 2CU.

Consider a geometric sequence.

The objective is to explain why the definition of a geometric sequence restricts the values of the common ratio to numbers other than 0 and 1.

A geometric sequence is a sequence in which each term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio r, where

$r \neq 0,1$.

Symbolically a geometric sequence can be written as

$$a, ar, ar^2, ar^3, \ldots \qquad (a \neq 0; r \neq 0,1)$$

In $r = 0$, then the above geometric sequence becomes

$$a, a(0), a(0)^2, a(0)^3, \ldots$$

$$= a, 0, 0, 0, \ldots$$

Here common ratio

$= \frac{0}{a}$, not defined (Divide third term by with second term)

So the common ratio,

$r \neq 0$.

If $r = 1$, then the above geometric sequence becomes.

$$a, a(1), a(1)^2, a(1)^3, \ldots$$

$$= a, a, a, a, \ldots$$

Here first term is repeating. So the common ration,

$r \neq 1$.

Therefore, in the definition of a geometric sequence restricts the values of the common ratio to numbers other than 0 and 1.

Answer 3CU.

The objective is to give an example of a sequence that is neither arithmetic nor geometric.

A geometric sequence is sequence in which each term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio r, where

$r \neq 0,1$.

An arithmetic sequence is a sequence in which each term after the non zero first term is found by adding the previous term by a constant called the common differenced, where

$d \neq 0$.

Consider a sequence $1, 4, 9, 16, 25, \ldots$

In this sequence,

$\frac{4}{1} \neq \frac{9}{4}$, common ratio is not same.

And $\begin{aligned} 4-1 &= 3 \\ &\neq 5 \\ &= 9-5, \end{aligned}$ common difference is not same.

Then the sequence $1, 4, 9, 16, 25, \ldots$ is neither arithmetic nor geometric.

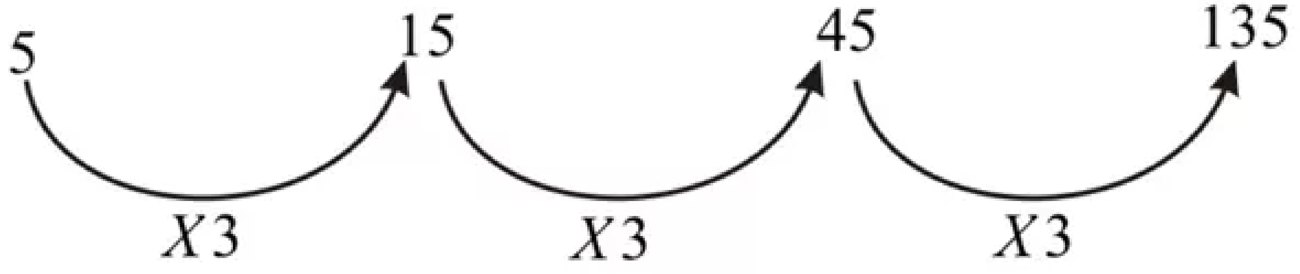
Therefore, the sample sequence $\boxed{1, 4, 9, 16, 25, \ldots}$ is an example of a sequence that is neither arithmetic nor geometric.

Answer 4CU.

Consider the sequence $5, 15, 45, 135, \ldots$

The objective is to check whether the given sequence is geometric or not.

A geometric sequence is a sequence in which each term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0,1$.



In this sequence, each term is found by multiplying the previous term times 3.

This sequence is geometric.

Therefore the answer is yes.

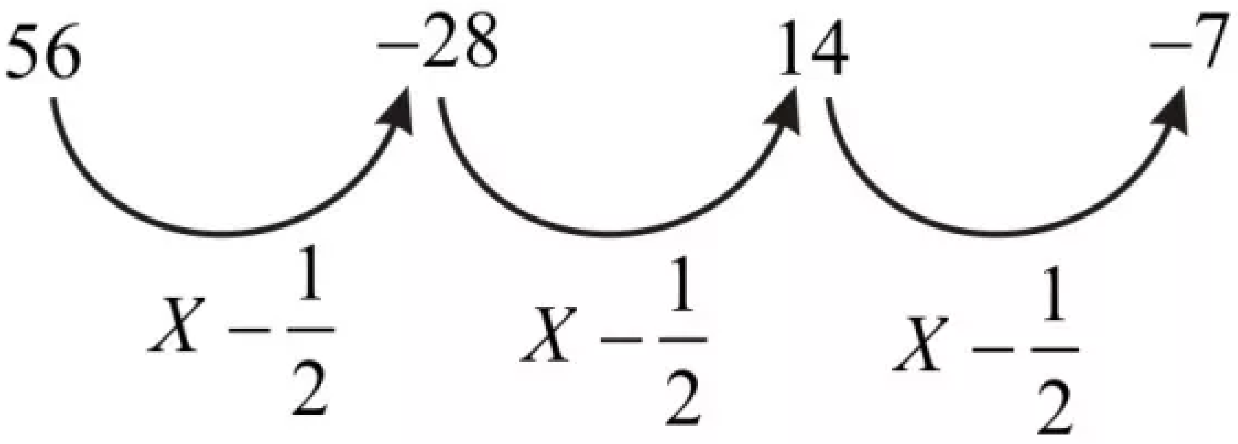
Answer 5CU.

Consider the sequence $56, -28, 14, -7, \ldots$

The objective is to check whether the sequence is geometric or not.

A geometric sequence is a sequence in which each term after the non zero first term is found by multiplying the previous term by a constant called the common ratio ' r ', where

$r \neq 0, 1$.



In this sequence each term is found by multiplying the previous term times $\frac{-1}{2}$.

This sequence is geometric.

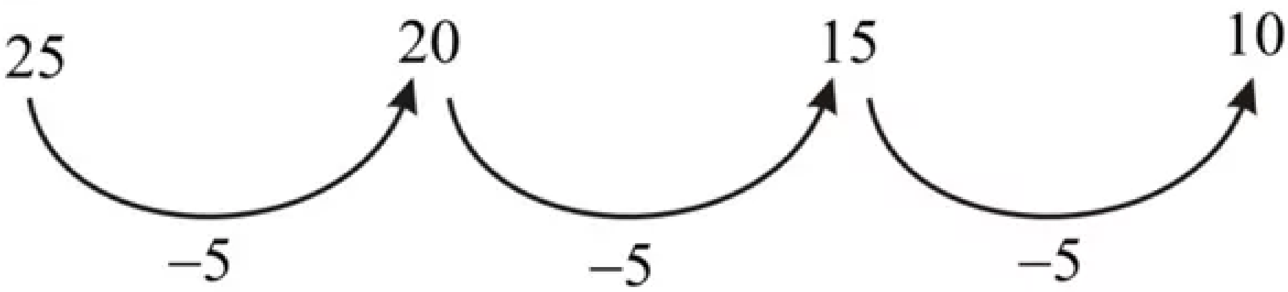
Therefore, the answer is yes.

Answer 6CU.

Consider the sequence $25, 20, 15, 10, \ldots$

The objective is to check whether the sequence is geometric or not.

A geometric sequence is a sequence in which each term after the non zero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0, 1$.



In this sequence, each term is found by subtracting 5 to the previous term.

This sequence is arithmetic, not geometric.

Therefore, the answer is No.

Answer 7CU.

Consider the geometric sequence $5, 20, 80, 320, \ldots$

The objective is to find the next three terms in the given geometric sequence.

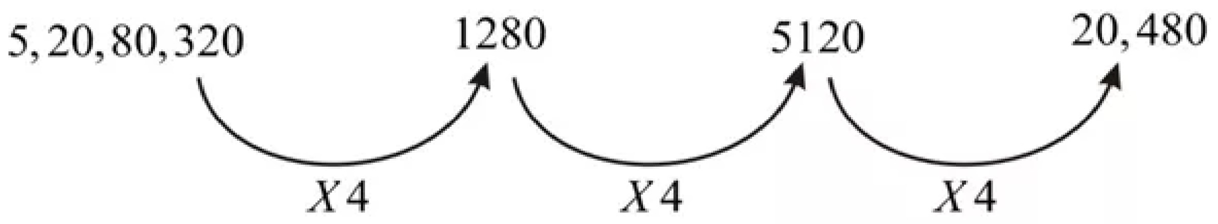
A geometric sequence is a sequence in which each term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio r, where

$r \neq 0, 1$.

$\frac{20}{5} = 4$ Divide the second term by the first.

The common factor is 4.

Use this information to find the next three terms.



Therefore the next three terms are $\boxed{1280; 5120; 20,480}$.

Answer 8CU.

Consider the geometric sequence $176, -88, 44, -22, \ldots$

The objective is to find the next three terms in the given geometric sequence.

A geometric sequence is a sequence in which each term after the non zero first term is found by multiplying the previous term by a constant called the common ratio ‘ r ’, where

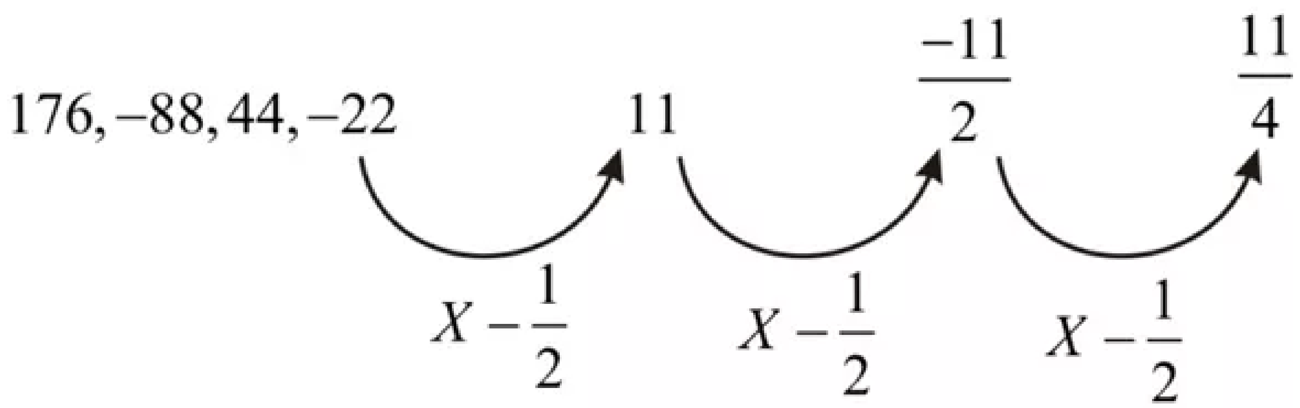
$r \neq 0, 1$

$\frac{-88}{176} = -\frac{1}{2}$ (Divide the second term by the first)

$= -0.5$ (Divide)

The common factor is -0.5.

Use this information to find the next three terms.



Therefore, next three terms $\boxed{11, \frac{-11}{2} \& \frac{11}{4}}$.

Answer 9CU.

Consider the geometric sequence $-8,12,-18,27,\ldots$

The objective is to find the next three terms in the given geometric sequence.

Geometric sequence is a sequence in which each term after the non zero first term is found by multiplying the previous term by a constant called the common ratio ' r ', where

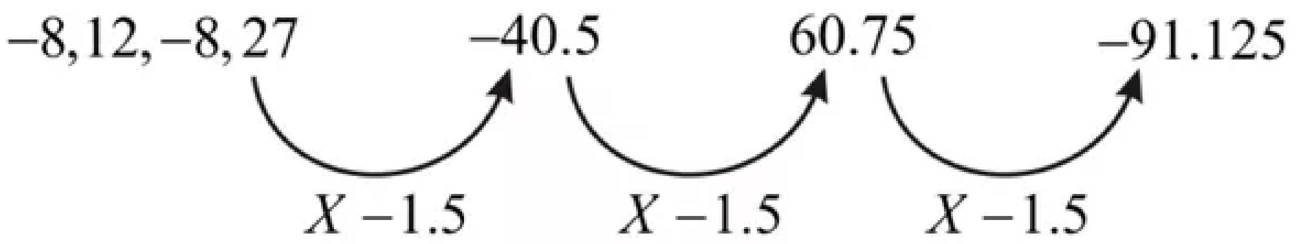
$r \neq 0,1$

$\frac{12}{-8} = \frac{-3}{2}$ (Divide the second term by the first)

$= -1.5$ (Divide)

The common factor is -1.5.

Use this information to find the next three terms.



Therefore, the next three terms are $\boxed{-40.5, 60.75 \& -91.125}$.

Answer 10CU.

Consider $a_1 = 3$,

$n = 5$,

$r = 4$

The objective is to find *n*th term of geometric sequence.

The *n*th term a_n of a geometric sequence with the first term a_1 and common ratio r is given by $a_n = a_1 \cdot r^{n-1}$.

Here $n = 5$, so the objective is to find the 6th term of geometric sequence.

$a_n = a_1 \cdot r^{n-1}$ (Formula for the *n*th term of a geometric sequence)

$\Rightarrow \quad a_5 = (3) \cdot (4)^{5-1}$ (Replace $a_1 = 3, n = 5, r = 4$)

$\Rightarrow \quad a_5 = (3)(4)^4$ (Do subtraction: $5 - 1 = 4$)

$\Rightarrow \quad a_5 = 3(256)$ (Evaluate exponent: $4^4 = 256$)

$\Rightarrow \quad a_5 = 768$ (Multiply: $3(256) = 768$)

Therefore the fifth term of the geometric sequence is $\boxed{768}$.

Answer 11CU.

Consider $a_1 = -1,$

$n = 6,$
$r = 2$

The objective is to find nth term of geometric sequence.

The nth term ' a_n ' of a geometric sequence with the first term ' a_1 ' and common ratio ' r ' is given by

$$a_n = a_1 r^{n-1}$$

Here $n = 6$, so the objective is to find 6th term of geometric sequence.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$$a_6 = (-1)(2)^{6-1}$$

(Replace $a_1 = -1, n = 6, r = 2$)

$\Rightarrow \quad a_6 = (-1)(2)^5$ (Do subtraction: $6 - 1 = 5$)

$\Rightarrow \quad a_6 = (-1)(32)$

(Evaluate exponent: $2^5 = 32$)

$\Rightarrow \quad a_6 = -32$ (Multiply: $(-1)32 = -32$)

Therefore, the sixth term of the geometric sequence is $\boxed{-32}$.

Answer 12CU.

Consider $a_1 = 4,$

$n = 7,$
$r = -3$

The objective is to find *n*th term of geometric sequence.

The *n*th term a_n of a geometric sequence with the first term a_1 and common ratio r is given by $a_n = a_1 \cdot r^{n-1}$.

Here $n = 7$, so the objective is to find the 7th term of geometric sequence.

$a_n = a_1 \cdot r^{n-1}$ (Formula for the *n*th term of a geometric sequence)

$\Rightarrow \quad a_7 = (4)\cdot(-3)^{7-1}$ (Replace $a_1 = 4, n = -3, r = 7$)

$\Rightarrow \quad a_7 = (4)(-3)^6$ (Do subtraction: $7 - 1 = 6$)

$\Rightarrow \quad a_7 = (4)(729)$ (Evaluate exponent: $3^6 = 729$)

$\Rightarrow \quad a_7 = 2916$ (Multiply: $(4)(729) = 2916$)

Therefore the 7th fifth term of the geometric sequence is $\boxed{768}$.

Answer 13CU.

Consider the geometric sequence $7, -, 28$.

The objective is to find the geometric mean in the given sequence.

Missing term between two non consecutive terms in a geometric sequences is called geometric mean.

The nth term ' a_n ' of a geometric sequence with the first term ' a_1 ' and common ratio ' r ' is given by

$a_n = a_1 r^{n-1}$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = 7$ and

$a_3 = 28$

To find ' a_2 ', first find ' r '.

$a_n = a_1 r^{n-1}$ (Formula for nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace ' n ' by 3)

$\Rightarrow \quad 28 = 7r^2$ (Replace $a_3 = 28, a_1 = 7$)

$\Rightarrow \quad \frac{28}{7} = \frac{7}{7}r^2$ (Divide each side by 7)

$\Rightarrow \quad 4 = r^2$ (Simplify)

$\Rightarrow \quad \pm 2 = r$ (Take the square – root of each side)

If $r = 2$, the geometric mean is

$7 \cdot 2 = 14$

If $r = -2$, the geometric mean is

$7 \cdot (-2) = -14$.

Answer 14CU.

Consider the geometric sequence $48, -, 3$.

The objective is to find the geometric mean in the given sequence. Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$$a_n = a_1 r^{n-1}$$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = 48$, and

$a_3 = 3$.

To find a_2, first find r.

$a_n = a_1 \cdot r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 \cdot r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad 3 = 48 \cdot r^2$ (Replace $a_1 = 48$ and $a_3 = 3$)

$\Rightarrow \quad \frac{3}{48} = \frac{48r^2}{48}$ (Divide each side by 48)

$\Rightarrow \quad \frac{1}{16} = r^2$ (Simplify)

$\Rightarrow \quad \pm\frac{1}{4} = r$ (Take the square root of each side)

If $r = \frac{1}{4}$, the geometric mean is

$$48\left(\frac{1}{4}\right) = 12.$$

If $r = -\frac{1}{4}$, the geometric mean is

$$48\left(-\frac{1}{4}\right) = -12.$$

Therefore, the geometric mean is $\boxed{\frac{1}{4} \text{ or } \frac{-1}{4}}$.

Answer 15CU.

Consider the geometric sequence $-4, -, -100$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term ' a_n ' of a geometric sequence with the first term ' a_1 ' and common ratio ' r ' is given by $a_n = a_1 r^{n-1}$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = -4$ and

$a_3 = -100$

To find ' a_2 ' , first find ' r '.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace ' n ' by 3)

$\Rightarrow \quad -100 = -4r^2$ (Replace $a_3 = -100$ and $a_1 = -4$)

$\Rightarrow \quad \frac{-100}{-4} = \frac{-4r^2}{-4}$ (Divide each side by -4)

$\Rightarrow \quad 25 = r^2$ (Simplify)

$\Rightarrow \quad \pm 5 = r$ (Take the square root of each side)

If $r = 5$, the geometric mean is

$-4(5) = -20$

If $r = -5$, the geometric mean is

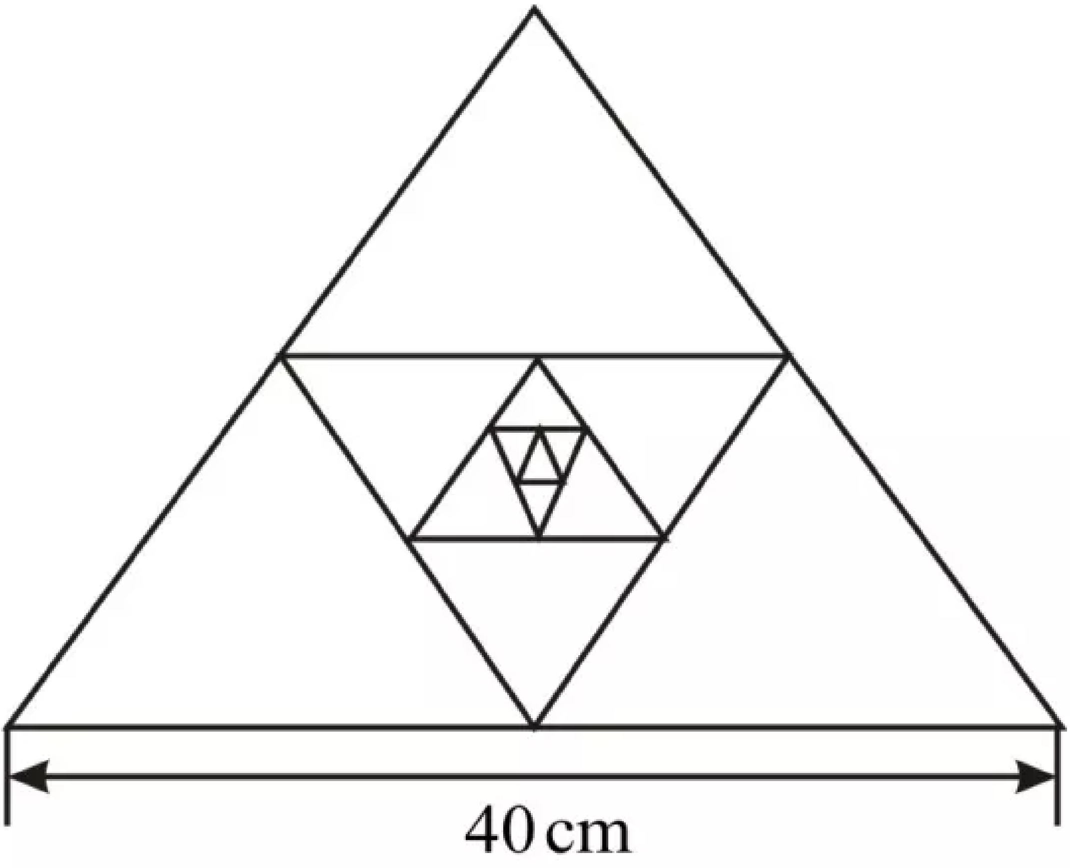
$-4(-5) = 20$

Therefore, the geometric mean is $\boxed{-20 \text{ or } 20}$.

Answer 16CU.

Consider the inscribed equilateral triangles at the right. The perimeter of each triangle is one – half of the perimeter of the next larger triangle.

The objective is to find the perimeter of the smallest triangle.



Given one side of the triangle $= 340\,\text{cm}$

The perimeter of equivalateral triangle

$= 3$(one side of the triangle)

$= 3(40)$

$= 120$

In the figure, there are five triangles.

Also given that perimeter of each triangle is one – half of the perimeter of the next larger triangle.

Let a_1 be the perimeter of the larger triangle.

And similarly a_2, a_3, a_4, a_5 are perimeters of the next smaller triangles.

So the objective is to find the value of a_5.

$a_1 = 120 \xrightarrow{X\frac{1}{2}} a_2 = 60 \xrightarrow{X\frac{1}{2}} a_3 = 30 \xrightarrow{X\frac{1}{2}} a_4 = 15 \xrightarrow{X\frac{1}{2}} a_5 = 7\cdot 5$

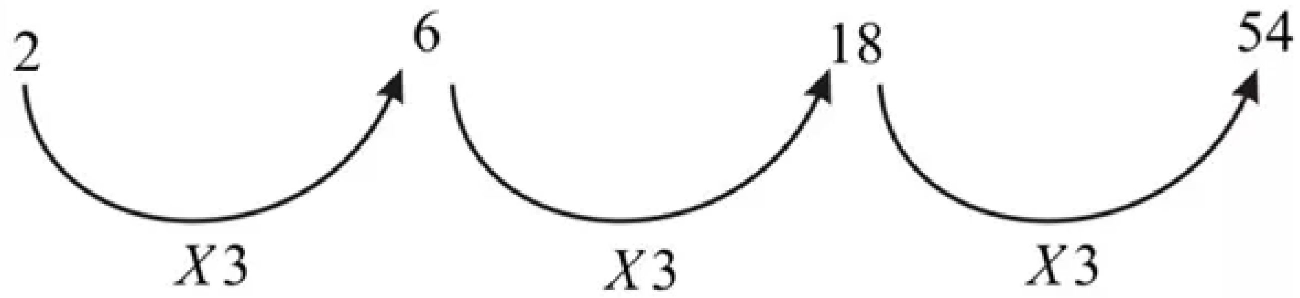
Therefore the perimeter of the smallest triangle is $\boxed{7.5\,\text{cm}}$.

Answer 17PA.

Consider the sequence $2, 6, 18, 54, \ldots$

The objective is to check whether the given sequence is geometric or not.

A geometric sequence is a sequence in which each term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0, 1$.



In the sequence, each term is found by multiplying the previous term times 3.

This is a geometric sequence.

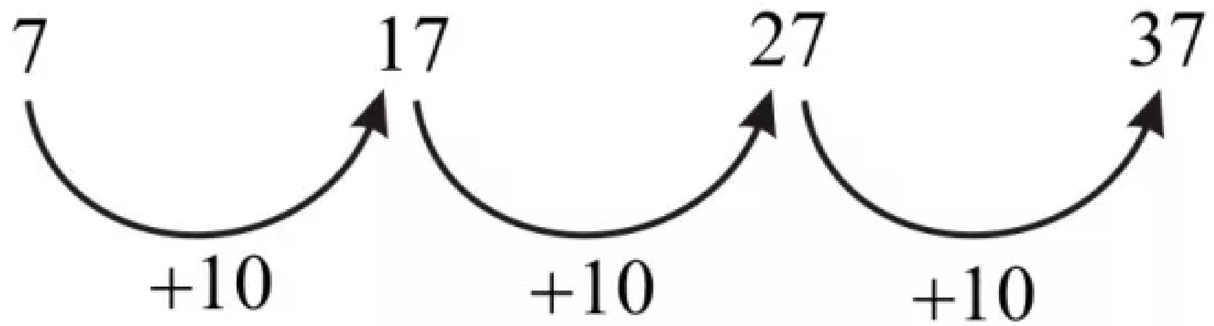
Therefore, the answer is Yes.

Answer 18PA.

Consider the sequence $7, 17, 27, 37, \ldots$

The objective is to determine whether the sequence is geometric or not.

A geometric sequence is a sequence in which term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio 'r', where $r \neq 0, 1$.



In this sequence, each term is found by adding 10 to the previous term.

This sequence is arithmetic, not geometric.

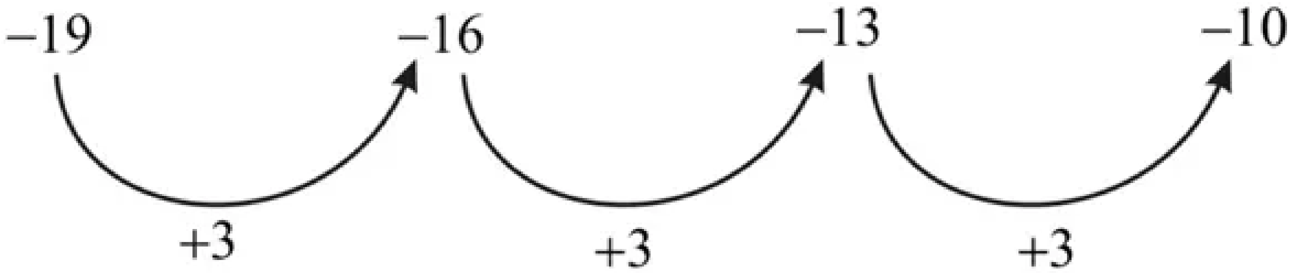
Therefore, the answer is No.

Answer 16PA.

Consider the sequence $-19,-16,-13,-10,...$

The objective is to check whether the sequence is geometric or not.

A geometric sequence is a sequence in which each term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0,1$.



In this sequence, each term is found by adding 3 to the previous term.

The sequence is arithmetic, not geometric.

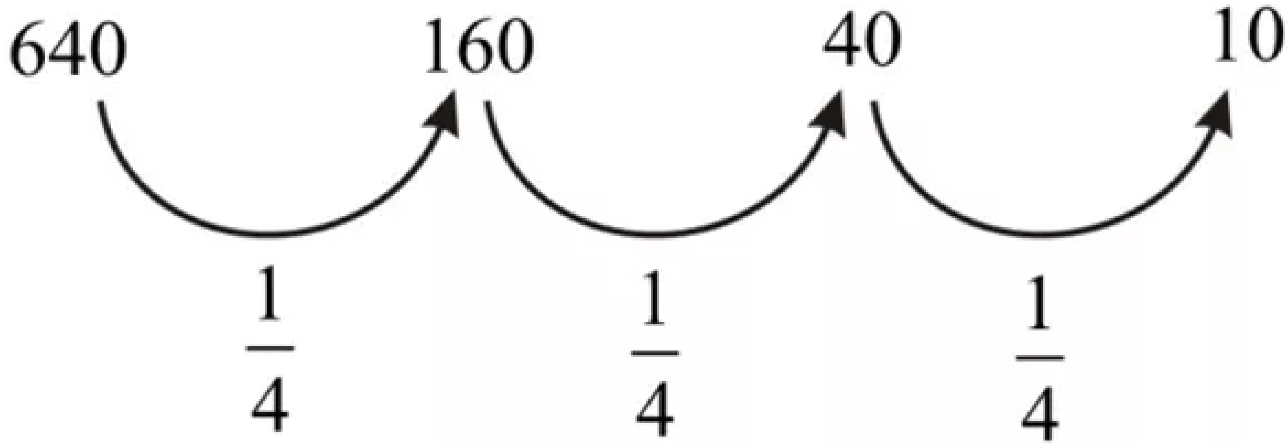
Therefore, the answer is No.

Answer 20PA.

Consider the sequence $640,160,40,10,...$

The objective is to check whether the sequence is geometric or not.

A geometric sequence is a sequence in which each term after the non zero first term is found by the common ratio ' r ', where $r \neq 0,1$.



In this sequence each term is found by multiplying the previous term times $\frac{1}{4}$.

This sequence is geometric.

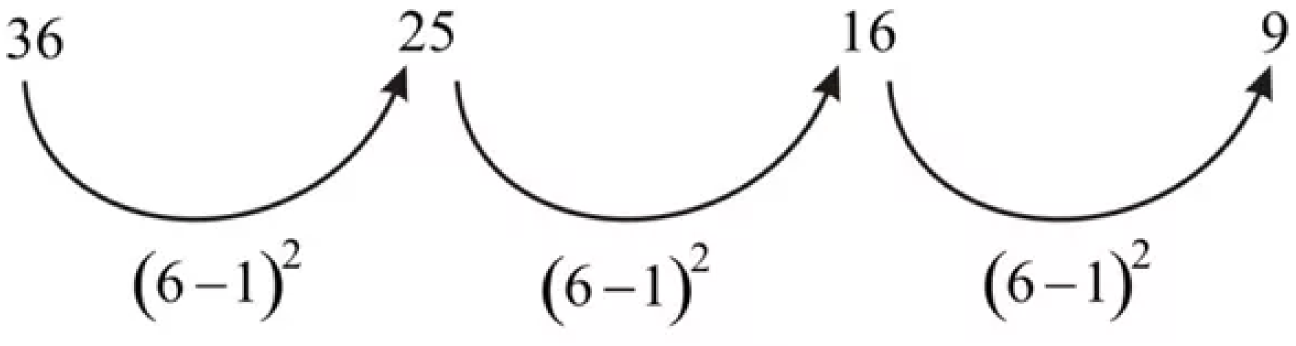
Therefore, the answer is yes.

Answer 21PA.

Consider the sequence $36, 25, 16, 9, \ldots$

The objective is to check whether the given sequence is geometric or not.

A geometric sequence is a sequence in which each term after the non zero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0, 1$.



In this sequence, each term is found by as shown above.

This sequence is not geometric.

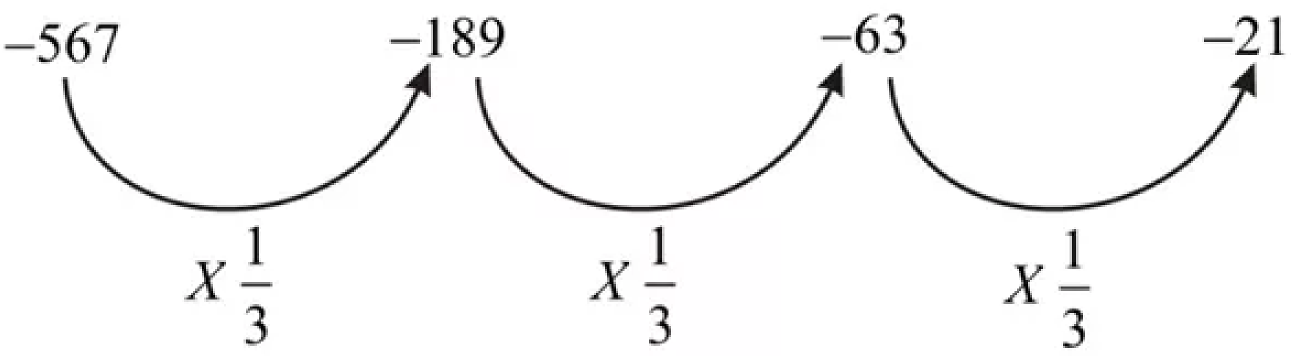
Therefore, the answer is No.

Answer 22PA.

Consider the sequence $-567, -189, -63, -21, \ldots$

The objective is to check whether the given sequence is geometric or not.

A geometric sequence is a sequence in which each term after the non zero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0, 1$.



In this sequence, each term is found by multiplying the previous term times $\frac{1}{3}$.

This sequence is not geometric.

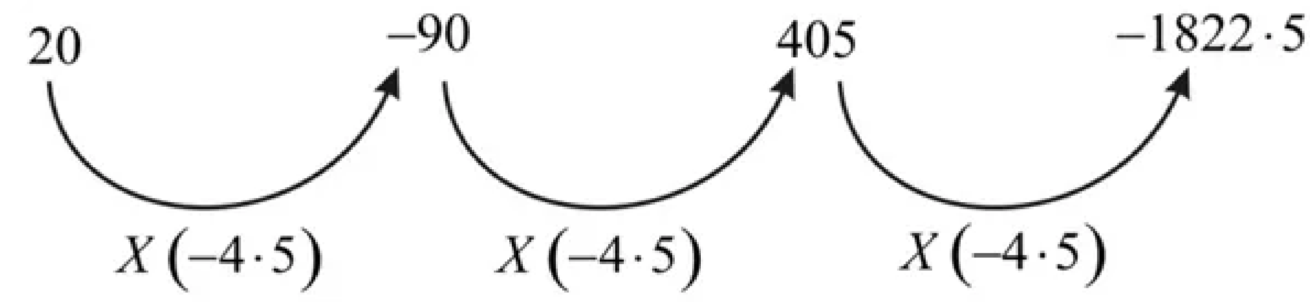
Therefore, the answer is Yes.

Answer 23PA.

Consider the sequence $20, -90, 405, -1822\cdot5, \ldots$

The objective is to check whether the given sequence is geometric or not.

A geometric sequence is a sequence in which each term after the non zero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0,1$.



In this sequence, each term is found by multiplying the previous term times $(-4\cdot5)$.

This sequence is not geometric.

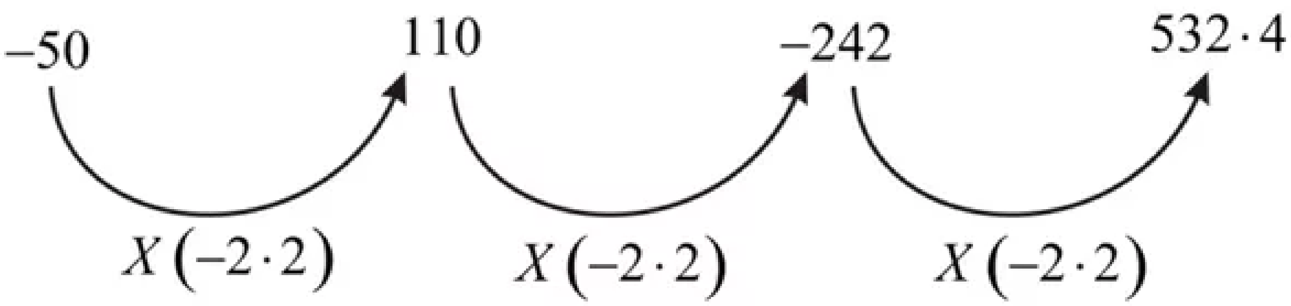
Therefore, the answer is Yes.

Answer 24PA.

Consider the sequence $-50, 110, -242, 532\cdot4, \ldots$

The objective is to check whether the given sequence is geometric or not.

A geometric sequence is a sequence in which each term after the non zero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0,1$.



In this sequence, each term is found by multiplying the previous term times $(-2\cdot2)$.

This sequence is not geometric.

Therefore, the answer is Yes.

Answer 25PA.

Consider the geometric sequence $1,-4,16,-64,\ldots$

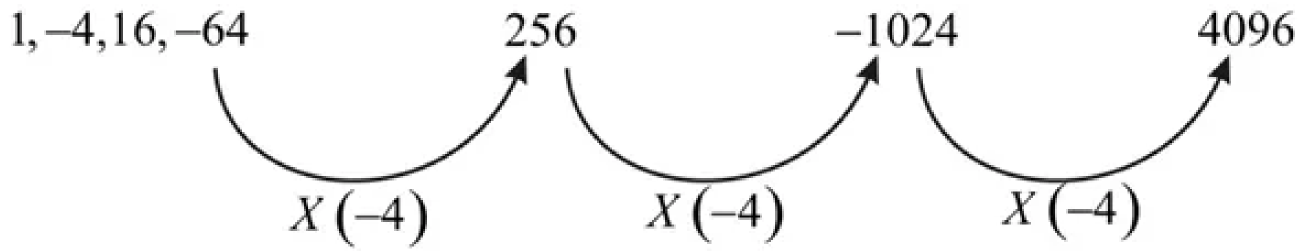
The objective is to find the next three terms in the given geometric sequence.

A geometric sequence is a sequence in which each term after the nonzero first term if found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0,1$.

$\frac{-4}{1} = -4$ Divide the second term by the first.

The common factor is -4.

Use this information to find the next three terms.



Therefore the next three terms are $\boxed{256,-1024,4096}$.

Answer 26PA.

Consider the geometric sequence $-1,-6,-36,-216,\ldots$

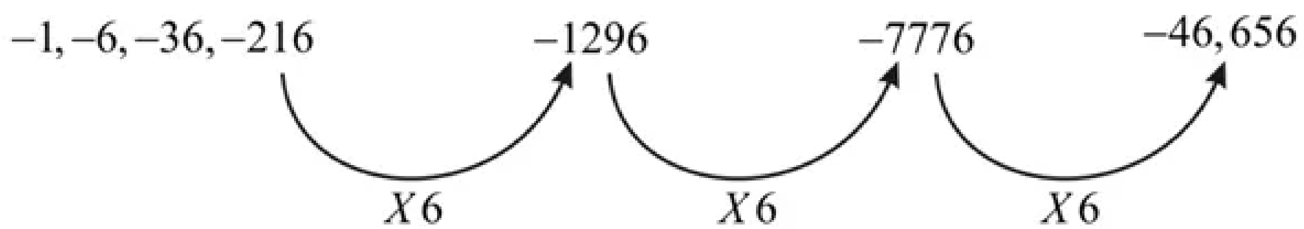
The objective is to find the next three terms in the given geometric sequence.

A geometric sequence is a sequence in which each term after the nonzero first term if found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0,1$.

$\frac{-6}{-1} = 6$ Divide the second term by the first.

The common factor is 6.

Use this information to find the next three terms.



Therefore the next three terms are $\boxed{-1296;-7,776;-46,656}$.

Answer 27PA.

Consider the geometric sequence $1024, 512, 256, 128, \ldots$

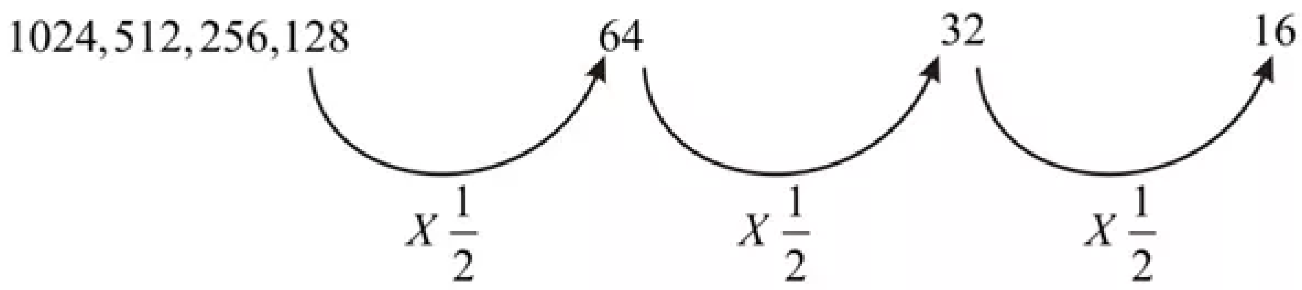
The objective is to find the next three terms in the given geometric sequence.

A geometric sequence is a sequence in which each term after the nonzero first term if found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0, 1$.

$\frac{512}{1024} = \frac{1}{2}$ Divide the second term by the first.

The common factor is $\frac{1}{2}$.

Use this information to find the next three terms.



Therefore the next three terms are $\boxed{64, 32, 16}$.

Answer 28PA.

Consider the geometric sequence $224, 112, 56, 28, \ldots$

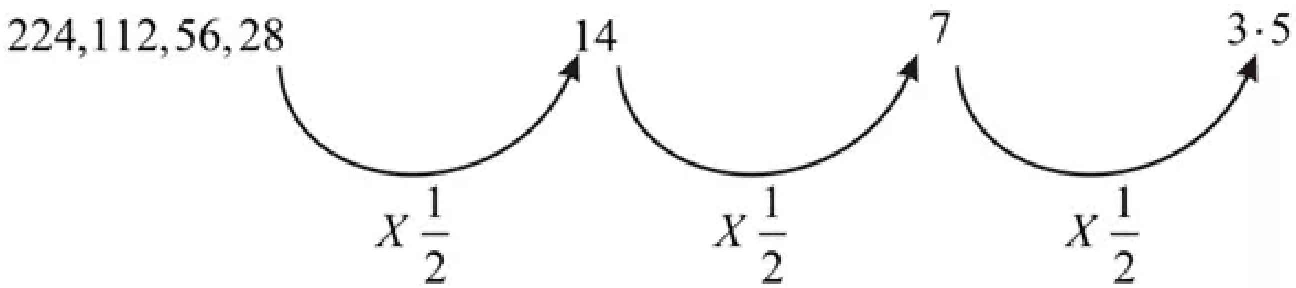
The objective is to find the next three terms in the given geometric sequence.

A geometric sequence is a sequence in which each term after the nonzero first term if found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0, 1$.

$\frac{112}{224} = \frac{1}{2}$ Divide the second term by the first.

The common factor is $\frac{1}{2}$.

Use this information to find the next three terms.



Therefore the next three terms are $\boxed{14, 7, 3 \cdot 5}$.

Answer 29PA.

Consider the geometric sequence $-80, 20, -5, 1.25, \ldots$

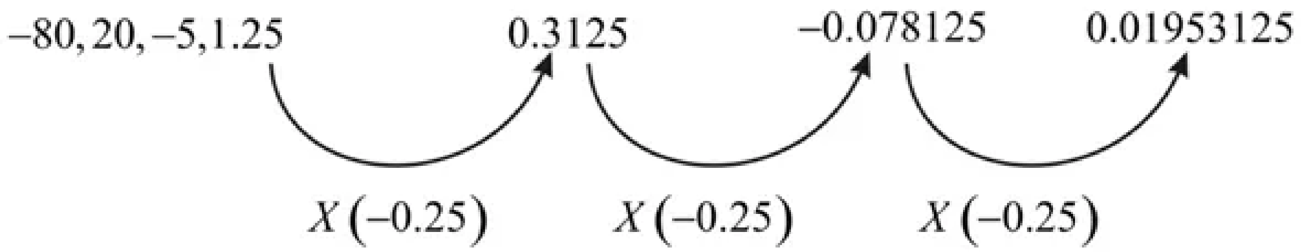
The objective is to find the next three terms in the given geometric sequence.

A geometric sequence is a sequence in which each term after the nonzero first term if found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0, 1$.

$\frac{20}{-80} = -0.25$ Divide the second term by the first.

The common factor is -0.25.

Use this information to find the next three terms.



Therefore the next three terms are $\boxed{0.3125, -0.078125, 0.01953125}$.

Answer 30PA.

Consider the geometric sequence $10{,}000, -200, 4, -0.08, \ldots$

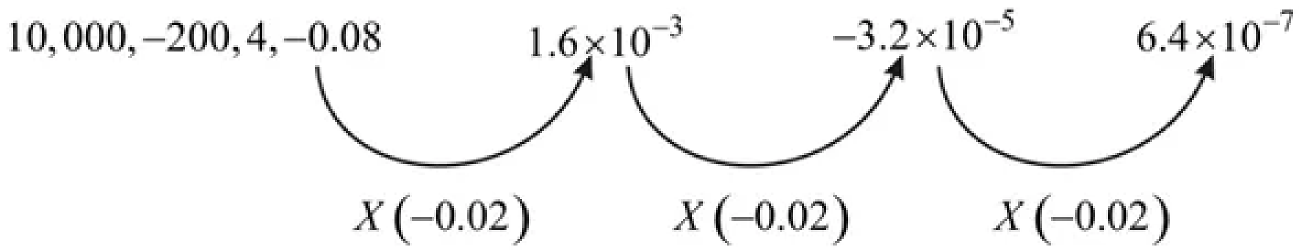
The objective is to find the next three terms in the given geometric sequence.

A geometric sequence is a sequence in which each term after the nonzero first term if found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0, 1$.

$\frac{-200}{10{,}000} = -0.02$ Divide the second term by the first.

The common factor is -0.02.

Use this information to find the next three terms.



Therefore the next three terms are $\boxed{1.6\times10^{-3}, -3.2\times10^{-5}, 6.4\times10^{-7}}$.

Answer 31PA.

Consider the geometric sequence $\frac{1}{2},\frac{1}{3},\frac{2}{9},\frac{4}{27},\ldots$

The objective is to find the next three terms in the given geometric sequence.

A geometric sequence is a sequence in which each term after the nonzero first term if found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0,1$.

$\frac{\frac{1}{3}}{\frac{1}{2}}=\frac{2}{3}$ Divide the second term by the first.

The common factor is $\frac{2}{3}$.

Use this information to find the next three terms.

$$\frac{1}{2},\frac{1}{3},\frac{2}{9},\frac{4}{27} \xrightarrow{X\frac{2}{3}} \frac{8}{81} \xrightarrow{X\frac{2}{3}} \frac{16}{243} \xrightarrow{X\frac{2}{3}} \frac{32}{729}$$

Therefore the next three terms are $\boxed{\frac{8}{81},\frac{16}{243},\frac{32}{729}}$.

Answer 32PA.

Consider the geometric sequence $\frac{3}{4},\frac{1}{2},\frac{1}{3},\frac{2}{9},\ldots$

The objective is to find the next three terms in the given geometric sequence.

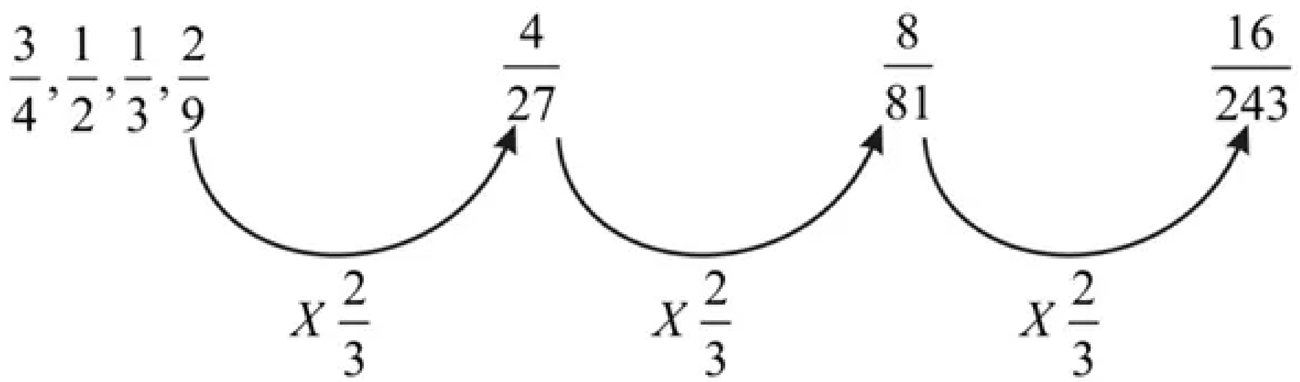
A geometric sequence is a sequence in which each term after the nonzero first term if found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0,1$.

$$\frac{\frac{1}{2}}{\frac{3}{4}}=\frac{1}{2}\times\frac{4}{3}$$ Divide the second term by the first.

$$=\frac{2}{3}$$

The common factor is $\frac{2}{3}$.

Use this information to find the next three terms.



Therefore the next three terms are $\boxed{\frac{4}{27},\frac{8}{81},\frac{16}{243}}$.

Answer 33PA.

Consider a rectangle with 6 inches by 8 inches. The rectangle is cut in half, and one half is discarded. The remaining rectangle is cut in half, and one half is discarded. This is repeated twice.

The objective is to list the areas of the five rectangles formed.

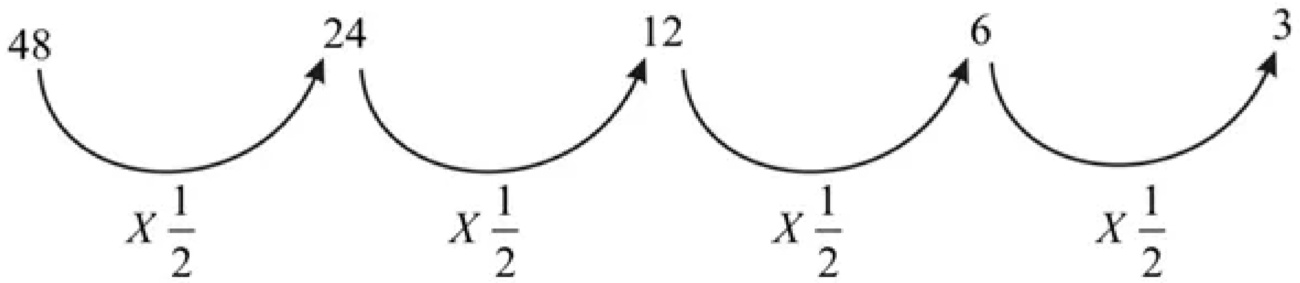
Given rectangle dimensions are 6 inches by 8 inches.

The area of the rectangle is $6 \times 8 = 48\,\text{in}^2$

Also given that this rectangle is cut in half.

So the common factor is $\frac{1}{2}$.

Use this information to find the next five rectangles areas.



Therefore the areas of the five rectangles formed are $\boxed{48\,\text{in}^2, 24\,\text{in}^2, 12\,\text{in}^2, 6\,\text{in}^2, 3\,\text{in}^2}$.

Answer 34PA.

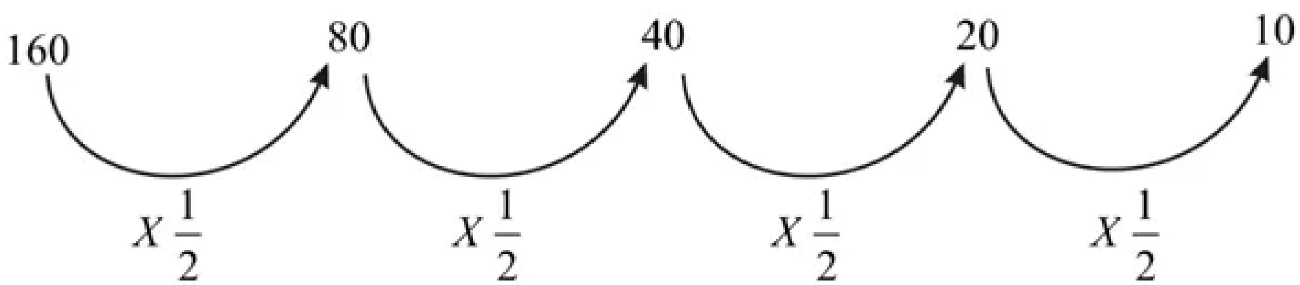
Consider an angle bisector. To bisect an angle means to cut it into two angles with the same measure. Suppose a 160° angle is bisected. Then one of the new angles is bisected. This is repeated twice.

The objective is to measure the four sizes of angles.

Given that to bisect an angle means to cut it into two angle with the same measure.

So the common factor is $\frac{1}{2}$.

Use this information to find the next four sizes of angles.



Therefore the four sizes of angles are $\boxed{80^\circ, 40^\circ, 20^\circ, 10^\circ}$.

Answer 35PA.

Consider $a_1 = 5,$

$n = 7,$
$r = 2$

The objective is to find the nth term of geometric sequence.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by $a_n = a_1 r^{n-1}$.

Here $n = 7$, so the objective is to find the 7th term of geometric sequence.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_7 = (5)(2)^{-1}$ (Replace $a_1 = 5, n = 7, r = 2$)

$\Rightarrow \quad a_7 = (5)(2)^6$ (Do subtraction: $7 - 1 = 6$)

$\Rightarrow \quad a_7 = (5)(64)$ (Evaluate exponent: $2^6 = 64$)

$\Rightarrow \quad a_7 = 320$ (Multiply: $(5)(64) = 320$)

Therefore, the 7th term of the geometric sequence is $\boxed{320}$.

Answer 36PA.

Consider $a_1 = 4,$

$n = 5,$
$r = 3$

The objective is to find the nth term of geometric sequence.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by $a_n = a_1 r^{n-1}$.

Here $n = 5$, so the objective is to find the 5th term of geometric sequence.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_5 = (4)(3)^{5-1}$ (Replace $a_1 = 4, n = 5, r = 3$)

$\Rightarrow \quad a_5 = (4)(3)^4$ (Do subtraction: $5 - 1 = 4$)

$\Rightarrow \quad a_5 = (4)(81)$ (Evaluate exponent: $3^4 = 81$)

$\Rightarrow \quad a_5 = 324$ (Multiply: $(4)(81) = 324$)

Therefore, the 5th term of the geometric sequence is $\boxed{324}$.

Answer 37PA.

Consider $a_1 = -2,$

$n = 4,$

$r = -5$

The objective is to find the nth term of geometric sequence.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by $a_n = a_1 r^{n-1}$.

Here $n = 4$, so the objective is to find the 4th term of geometric sequence.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_4 = (-2)(-5)^{4-1}$

(Replace $a_1 = -2, n = 4, r = -5$)

$\Rightarrow \quad a_4 = (-2)(-5)^3$

(Do subtraction: $4 - 1 = 3$)

$\Rightarrow \quad a_4 = (-2)(-125)$

(Evaluate exponent: $(-5)^3 = -125$)

$\Rightarrow \quad a_4 = 250$ (Multiply: $(-2)(-125) = 250$)

Therefore, the 4th term of the geometric sequence is $\boxed{250}$.

Answer 38PA.

Consider $a_1 = 3,$

$n = 6,$
$r = -4$

The objective is to find the nth term of geometric sequence.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by $a_n = a_1 r^{n-1}$.

Here $n = 6$, so the objective is to find the 6th term of geometric sequence.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_6 = (3)(-4)^{6-1}$

(Replace $a_1 = 3, n = 6, r = -4$)

$\Rightarrow \quad a_6 = (3)(-4)^5$

(Do subtraction: $6 - 1 = 5$)

$\Rightarrow \quad a_6 = (3)(1024)$

(Evaluate exponent: $(-4)^5 = 1024$)

$\Rightarrow \quad a_6 = 3072$ (Multiply: $(3)(1024) = 3072$)

Therefore, the 6th term of the geometric sequence is $\boxed{3072}$.

Answer 39PA..

Consider $a_1 = -8,$

$n = 3,$

$r = 6$

The objective is to find the nth term of geometric sequence.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by $a_n = a_1 r^{n-1}$.

Here $n = 3$, so the objective is to find the 3rd term of geometric sequence.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = (-8)(6)^{3-1}$

(Replace $a_1 = -8, n = 3, r = 6$)

$\Rightarrow \quad a_3 = (-8)(6)^2$

(Do subtraction: $3 - 1 = 2$)

$\Rightarrow \quad a_3 = (-8)(36)$

(Evaluate exponent: $(6)^2 = 36$)

$\Rightarrow \quad a_3 = -288$ (Multiply: $(-8)(36) = -288$)

Therefore, the 3rd term of the geometric sequence is $\boxed{-288}$.

Answer 40PA..

Consider $a_1 = -10,$

$n = 8,$

$r = 2$

The objective is to find the nth term of geometric sequence.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by $a_n = a_1 r^{n-1}$.

Here $n = 8$, so the objective is to find the 8th term of geometric sequence.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_8 = (-10)(2)^{8-1}$

(Replace $a_1 = -10, n = 8, r = 2$)

$\Rightarrow \quad a_8 = (-10)(2)^7$

(Do subtraction: $8 - 1 = 7$)

$\Rightarrow \quad a_8 = (-10)(128)$

(Evaluate exponent: $(2)^7 = 128$)

$\Rightarrow \quad a_8 = -1280$ (Multiply: $(-10)(128) = -1280$)

Therefore, the 8th term of the geometric sequence is $\boxed{-1280}$.

Answer 41PA.

Consider $a_1 = 300,$

$n = 10,$

$r = 0.5$

The objective is to find the nth term of geometric sequence.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by $a_n = a_1 r^{n-1}$.

Here $n = 10$, so the objective is to find the 10th term of geometric sequence.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_{10} = (300)(0.5)^{10-1}$

(Replace $a_1 = 300, n = 10, r = 0.5$)

$\Rightarrow \quad a_{10} = (300)(0.5)^9$

(Do subtraction: $10 - 1 = 9$)

$\Rightarrow \quad a_{10} = (300)(0.001953125)$

(Evaluate exponent: $(0.5)^9 = 0.001953125$)

$\Rightarrow \quad a_{10} = 0.5859375$

(Multiply: $(300)(0.001953125) = 0.5859375$)

Therefore, the 10th term of the geometric sequence is $\boxed{0.5859375}$.

Answer 42PA.

Consider $a_1 = 14,$

$n = 6,$

$r = 1.5$

The objective is to find the nth term of geometric sequence.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by $a_n = a_1 r^{n-1}$.

Here $n = 6$, so the objective is to find the 6th term of geometric sequence.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_{10} = (14)(1.5)^{6-1}$

(Replace $a_1 = 14, n = 6, r = 1.5$)

$\Rightarrow \quad a_6 = (14)(1.5)^5$

(Do subtraction: $6 - 1 = 5$)

$\Rightarrow \quad a_6 = (14)(7.59375)$

(Evaluate exponent: $(1.5)^5 = 7.59375$)

$\Rightarrow \quad a_6 = 106.3125$

(Multiply: $(14)(7.59375) = 106.3125$)

Therefore, the 6th term of the geometric sequence is $\boxed{106.3125}$.

Answer 43PA.

Consider the geometric sequence $5, -, 20$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$a_n = a_1 r^{n-1}$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = 5$ and

$a_3 = 20$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad 20 = 5r^2$ (Replace $a_1 = 5$ amd $a_3 = 20$)

$\Rightarrow \quad \frac{20}{5} = \frac{5r^2}{5}$ (Divide each side by 5)

$\Rightarrow \quad 4 = r^2$ (Simplify)

$\Rightarrow \quad \pm 2 = r$ (Take square root of each side)

If $r = 2$, the geometric mean is

$5(2) = 10$

If $r = -2$, the geometric mean is

$5(-2) = -10$.

Therefore, the geometric mean is $\boxed{\pm 10}$.

Answer 44PA.

Consider the geometric sequence $6, -, 54$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$$a_n = a_1 r^{n-1}$$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = 6$ and

$a_3 = 54$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad 54 = 6 \cdot r^2$ (Replace $a_1 = 6$ amd $a_3 = 54$)

$\Rightarrow \quad \frac{54}{6} = \frac{6r^2}{6}$ (Divide each side by 6)

$\Rightarrow \quad 9 = r^2$ (Simplify)

$\Rightarrow \quad \pm 3 = r$ (Take square root of each side)

If $r = 3$, the geometric mean is

$6(3) = 18$

If $r = -3$, the geometric mean is

$6(-3) = -18$.

Therefore, the geometric mean is $\boxed{\pm 18}$.

Answer 45PA.

Consider the geometric sequence $-9, -, -225$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$$a_n = a_1 r^{n-1}$$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = -9$ and

$a_3 = -225$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad -225 = (-9)r^2$ (Replace $a_1 = -9$ and $a_3 = -225$)

$\Rightarrow \quad \frac{-225}{-9} = \frac{-9r^2}{-9}$ (Divide each side by -9)

$\Rightarrow \quad 25 = r^2$ (Simplify)

$\Rightarrow \quad \pm 5 = r$ (Take square root of each side)

If $r = 5$, the geometric mean is

$(-9)(5) = -45$

If $r = -5$, the geometric mean is

$(-9)(-5) = 45$.

Therefore, the geometric mean is $\boxed{\pm 45}$.

Answer 46PA.

Consider the geometric sequence $-5, -, -80$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$$a_n = a_1 r^{n-1}$$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = -5$ and

$a_3 = -80$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad -80 = (-5) r^2$

(Replace $a_1 = -5$ and $a_3 = -80$)

$\Rightarrow \quad \frac{-80}{-5} = \frac{-5r^2}{-5}$ (Divide each side by -5)

$\Rightarrow \quad 16 = r^2$ (Simplify)

$\Rightarrow \quad \pm 4 = r$ (Take square root of each side)

If $r = 4$, the geometric mean is

$(-5)(4) = -20$

If $r = -4$, the geometric mean is

$(-5)(-4) = 20$.

Therefore, the geometric mean is $\boxed{\pm 20}$.

Answer 47PA.

Consider the geometric sequence $128, -, 8$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$$a_n = a_1 r^{n-1}$$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = 128$ and

$a_3 = 8$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad 8 = (128) r^2$

(Replace $a_1 = 128$ and $a_3 = 8$)

$\Rightarrow \quad \frac{8}{128} = \frac{128 r^2}{128}$

(Divide each side by -5)

$\Rightarrow \quad \frac{1}{16} = r^2$ (Simplify)

$\Rightarrow \quad \pm\frac{1}{4} = r$ (Take square root of each side)

If $r = \frac{1}{4}$, the geometric mean is

$$(128)\left(\frac{1}{4}\right) = 32$$

If $r = \frac{-1}{4}$, the geometric mean is

$$(128)\left(-\frac{1}{4}\right) = -32.$$

Therefore, the geometric mean is $\boxed{\pm 32}$.

Answer 48PA.

Consider the geometric sequence $180, -, 5$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$$a_n = a_1 r^{n-1}$$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = 180$ and

$a_3 = 5$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad 5 = (180) r^2$

(Replace $a_1 = 180$ and $a_3 = 5$)

$\Rightarrow \quad \frac{1}{36} = r^2$ (Divide each side by 180)

$\Rightarrow \quad \pm\frac{1}{6} = r$ (Take square root of each side)

If $r = \frac{1}{6}$, the geometric mean is

$$\frac{1}{6}(180) = 30$$

If $r = -\frac{1}{6}$, the geometric mean is

$$\left(\frac{-1}{6}\right)(180) = -30.$$

Therefore, the geometric mean is $\boxed{\pm 30}$.

Consider the geometric sequence $-2,-,-98$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$a_n = a_1 r^{n-1}$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = -2$ and

$a_3 = -98$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad -98 = (-2) r^2$

(Replace $a_1 = -2$ and $a_3 = -98$)

$\Rightarrow \quad 49 = r^2$ (Divide each side by -2)

$\Rightarrow \quad \pm 7 = r$ (Take square root of each side)

If $r = 7$, the geometric mean is

$7(-2) = -14$

If $r = -7$, the geometric mean is

$(-7)(-2) = 14$.

Therefore, the geometric mean is $\boxed{\pm 14}$.

Answer 50PA.

Consider the geometric sequence $-6, -, -384$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$a_n = a_1 r^{n-1}$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = -6$ and

$a_3 = -384$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad -384 = (-6) r^2$

(Replace $a_1 = -6$ and $a_3 = -384$)

$\Rightarrow \quad 64 = r^2$ (Divide each side by -6)

$\Rightarrow \quad \pm 8 = r$ (Take square root of each side)

If $r = 8$, the geometric mean is

$8(-6) = -48$

If $r = -8$, the geometric mean is

$(-8)(-6) = 48$.

Therefore, the geometric mean is $\boxed{\pm 48}$.

Answer 51PA.

Consider the geometric sequence $7, -, +1.75$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$a_n = a_1 r^{n-1}$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = 7$ and

$a_3 = +1.75$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad +1.75 = 7r^2$ (Replace $a_1 = 7$ and $a_3 = 1.75$)

$\Rightarrow \quad 0.25 = r^2$ (Divide each side by 7)

$\Rightarrow \quad \pm 0.5 = r$ (Take square root of each side)

If $r = 0.5$, the geometric mean is

$(0.5)(7) = 3.5$

If $r = -0.5$, the geometric mean is

$(-0.5)(7) = -3.5$.

Therefore, the geometric mean is $\boxed{\pm 3.5}$.

Answer 52PA.

Consider the geometric sequence $3, -, 0.75$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$a_n = a_1 r^{n-1}$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = 3$ and

$a_3 = 0.75$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad 0.75 = 3r^2$ (Replace $a_1 = 3$ and $a_3 = 0.75$)

$\Rightarrow \quad 0.25 = r^2$ (Divide each side by 3)

$\Rightarrow \quad \pm 0.5 = r$ (Take square root of each side)

If $r = 0.5$, the geometric mean is

$(0.5)(3) = 1.5$

If $r = -0.5$, the geometric mean is

$(-0.5)(3) = -1.5$.

Therefore, the geometric mean is $\boxed{\pm 1.5}$.

Answer 53PA.

Consider the geometric sequence $\frac{3}{5}, -, \frac{3}{20}$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$$a_n = a_1 r^{n-1}$$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = \frac{3}{5}$ and

$a_3 = \frac{3}{20}$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad \frac{3}{20} = \frac{3}{5}\left(r^2\right)$ (Replace $a_1 = \frac{3}{5}$ and $a_3 = \frac{3}{20}$)

$\Rightarrow \quad \frac{1}{4} = r^2$ (Multiply both side by $\frac{5}{3}$)

$\Rightarrow \quad \pm\frac{1}{2} = r$ (Take square root of each side)

If $r = \frac{1}{2}$, the geometric mean is

$$\left(\frac{1}{2}\right)\left(\frac{3}{5}\right) = \frac{3}{10}$$

If $r = \frac{-1}{2}$, the geometric mean is

$$\left(\frac{-1}{2}\right)\left(\frac{3}{5}\right) = \frac{-3}{10}.$$

Therefore, the geometric mean is $\boxed{\pm\frac{3}{10}}$.

Answer 54PA.

Consider the geometric sequence $\frac{2}{5}, -, \frac{2}{45}$.

The objective is to find the geometric mean in the given sequence.

Missing term between two nonconsecutive terms in a geometric sequence is called geometric mean.

The nth term a_n of a geometric sequence with the first term a_1 and common ratio r is given by

$$a_n = a_1 r^{n-1}$$

Use the formula for the nth term of a geometric sequence to find a geometric mean.

In the given sequence

$a_1 = \frac{2}{5}$ and

$a_3 = \frac{2}{45}$

To find a_2, firs find r.

$a_n = a_1 r^{n-1}$ (Formula for the nth term of a geometric sequence)

$\Rightarrow \quad a_3 = a_1 r^{3-1}$ (Replace n by 3)

$\Rightarrow \quad \frac{2}{45} = \frac{2}{5} r^2$ (Replace $a_1 = \frac{2}{5}$ and $a_3 = \frac{2}{45}$)

$\Rightarrow \quad \frac{1}{9} = r^2$ (Multiply both side by $\frac{5}{2}$)

$\Rightarrow \quad \pm\frac{1}{3} = r$ (Take square root of each side)

If $r = \frac{1}{3}$, the geometric mean is

$$\frac{1}{3}\left(\frac{2}{5}\right) = \frac{2}{15}$$

If $r = \frac{-1}{3}$, the geometric mean is

$$\left(\frac{-1}{3}\right)\left(\frac{2}{5}\right) = \frac{-2}{15}.$$

Therefore, the geometric mean is $\boxed{\pm\frac{2}{15}}$.

Answer 55PA.

Consider a ball which is thrown vertically it is allowed to return to the ground and rebound without interference.

If each rebound is 60% of the previous hight.

The objective is to find the heights of the three rebounds after the initial rebound of 10 meters.

By the observation ball follows geometric sequence.

60% of $10\,\text{m}$ is $10 \times \frac{60}{100} = 6\,\text{m}$

The first rebounce of the ball is $6\,\text{m}$.

60% of $6\,\text{m}$ is $6 \times \frac{60}{100} = 3.6\,\text{m}$

The second rebounce of the ball is $3.6\,\text{m}$

60% of $3.6\,\text{m}$ is

$3.6 \times \frac{60}{100} = 2.16\,\text{m}$

The third rebounce of the ball is $2.16\,\text{m}$

Therefore, the heights of the three rebounds after the initial rebound of 10 meters is $\boxed{6\,\text{m}, 3.6\,\text{m}, 2.16\,\text{m}}$.

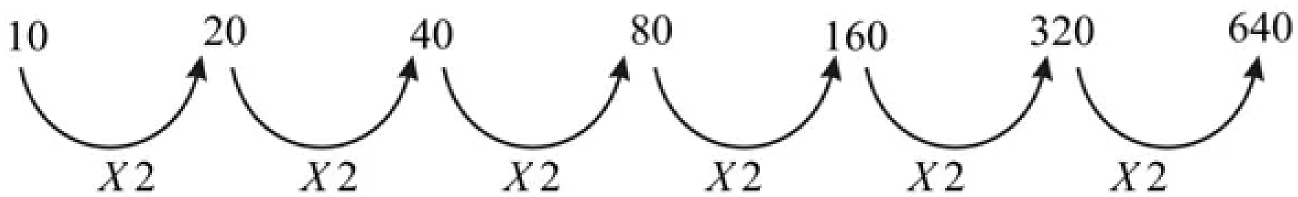
Answer 56PA.

Consider a radio station $WXYZ$ which has a special game for its listeners. A trivia question is asked, and the player scores 10 points for the first correct answer. Every correct answer after that doubles the player's score.

The objective is to list the scores after each of the first 6 correct answers.

By observation it is clear that it follows a geometric sequence.

A geometric sequence is a sequence in which each term after the non zero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0, 1$.



Therefore, the scores after each of the first 6 correct answer is $\boxed{10, 20, 40, 80, 160, 320, 640}$.

Answer 61PA.

Consider if each term of the sequence is multiplied by the same non zero real number, there is a new sequence.

The objective is the new sequence always, sometimes, or never a geometric sequence.

A geometric sequence is a sequence in which each term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0,1$.

Consider a sequence $a_1, a_2, a_3, \ldots$

Multiply this sequence with a nonzero number k.

The common ratio is k. So the new sequence is a geometric sequence.

Therefore, the answer is always.

Answer 62PA.

Consider if the same nonzero number is added to each term of the sequence, there is a new sequence.

The objective is the new sequence always, sometimes, or never a geometric sequence.

A geometric sequence is a sequence in which each term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0,1$.

Consider a sequence $a_1, a_2, a_3, \ldots$

Add a nonzero number k to the above sequence.

There is no common factor for this sequence. There is a common difference k in this sequence. So the new sequence is never a geometric sequence.

Therefore, the answer is never.

Answer 63PA.

The objective is to explain how can a geometric sequence be used to describe a bungee jump. And an explanation of how to determine the tenth term in the sequence, and the number of rebounds the first time the distance from the stopping place is less than one foot, which would trigger the end of the ride.

A geometric sequence is a sequence in which each term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio r, where $r \neq 0, 1$.

Consider a bungee jump ride with a bungee rope that will stretch when a person jumps from the platform. The ride continues as the person bounces back and forth closer to the stopping place of the rope. Each bounce is only $\frac{3}{4}$ as for from the stopping length as the preceding bounce.

Since the distance of each bounce is $\boxed{\frac{3}{4}}$ times the distance of the last bounce, the list of the distances from the stopping place is a geometric sequence.

- To find the 10th term, multiply the first term $\boxed{80}$ by $\boxed{\frac{3}{4}}$ to the 9th power.
- The 17th bounce will be the first bounce less than $\boxed{1\text{ ft}}$ from the resting place.

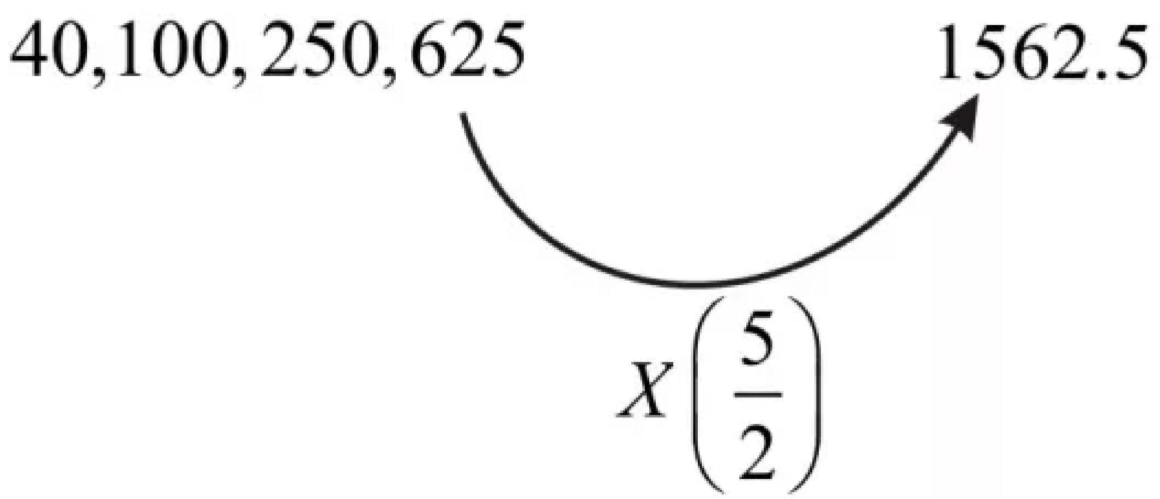
Answer 64PA.

Consider the geometric sequence $40, 100, 250, 625, \ldots$

The objective is to find the next number in the geometric sequence.

$\frac{100}{40} = \frac{5}{2}$, Divide the second term by the first.

The common factor is $\frac{5}{2}$. Use this information to find the next term in the geometric sequence.



The next term in the given geometric sequence is $\boxed{1562.5}$.

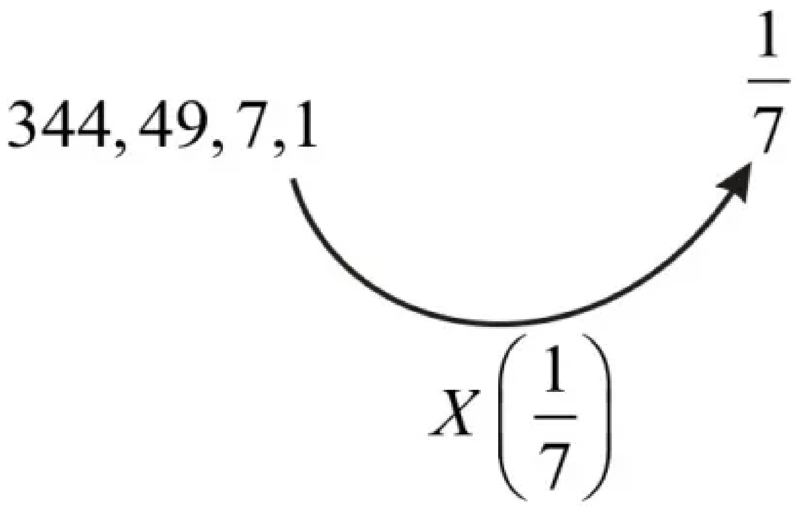
Answer 65PA.

Consider the geometric sequence $343, 49, 7, 1, \ldots$

The objective is to find the next number in the geometric sequence.

$\frac{49}{343} = \frac{1}{7}$, Divide the second term by the first.

The common factor is $\frac{1}{7}$. Use this information to find the next term in the geometric sequence.



Therefore, the next term in the given geometric sequence is $\boxed{\frac{1}{7}}$.

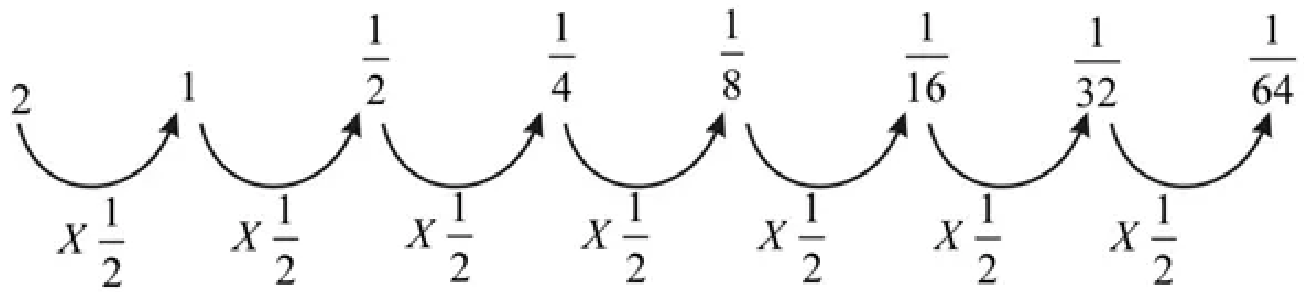
Answer 68PA.

Consider the nth term of the sequence $2, 1, \frac{1}{2}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \ldots$

The objective is to find the value that the nth term will approach as 'n' approaches infinity.

A geometric sequence is a sequence in which each term after the nonzero first term is found by multiplying the previous term by a constant called the common ratio 'r', where

$r \neq 0, 1$.



In this sequence each term is found by multiplying the previous term times $\frac{1}{2}$.

This sequence is geometric.

The nth term 'a_n' of a geometric sequence with the first term 'a_1' and common ratio 'r' is given by

$$a_n = a_1 \cdot r^{n-1}$$

First term of the sequence

$(a_1) = 2$

Common ratio

$(r) = \frac{1}{2}$

$n = a_1 \cdot r^{n-1}$ (Formula for the nth term of a geometric sequence)

$n = 2 \cdot \left(\frac{1}{2}\right)^{n-1}$ (Substitute $a_1 = 2, r = \frac{1}{2}$)

$= \frac{2\left(\frac{1}{2}\right)^n}{\frac{1}{2}}$ (Since $a^{m-n} = \frac{a^m}{a^n}$)

$= 2\left(\frac{1}{2}\right)^n \cdot 2$ (Simplify)

$= 4\left(\frac{1}{2}\right)^n$ (Multiply)

$= \frac{4}{2^n}$

As ‘ n ’ approaches infinity,

$t_n = \frac{4}{2^n}$ tends to zero.

Therefore, nth term will approaches to <u>zero</u> as ‘ n ’ approaches infinity.

Answer 69PA.

Consider the data

The amount invested is $\$1500$.

Rate of interest is 6.5%

Compounded monthly for 3 years

The objective is to determine the value of investment

Use the formula

$A = P\left(1+\frac{r}{n}\right)^{nt}$ to determine the final amount where

' A ' represents the amount of the investement

' P ' represents the principal

' r ' represents the annual rate of interest expressed as a decimal.

' n ' represents the number of times that the interest is compounded each year and

' t ' represents the number of years that the money is invested.

Then, $P = \$1500,$

$r = 6.5\%$ or $0.065,$

$n = 12,$

$t = 3$

$A = P\left(1+\frac{r}{n}\right)^{nt}$ (Compound interest equation)

$$A = 1500\left(1+\frac{0.065}{12}\right)^{12\cdot 3}$$

(Substitute $P = 1500, r = 6.5\%$ or $0.065, n = 12, t = 3$)

$$A = 1500(1+0.0054)^{36}$$

(Divide: $\frac{0.065}{12} = 0.0054$, multiply: $12\cdot 3 = 36$)

$= 1500(1.0054)^{36}$ (Do addition: $1+0.0054 = 1.0054$)

≈ 1822.01 (Simplify)

Therefore, the value of the investment is about $\boxed{\$1822.01}$.

Answer 70MYS.

Consider the data

x	3	5	7	9
y	10	12	14	16

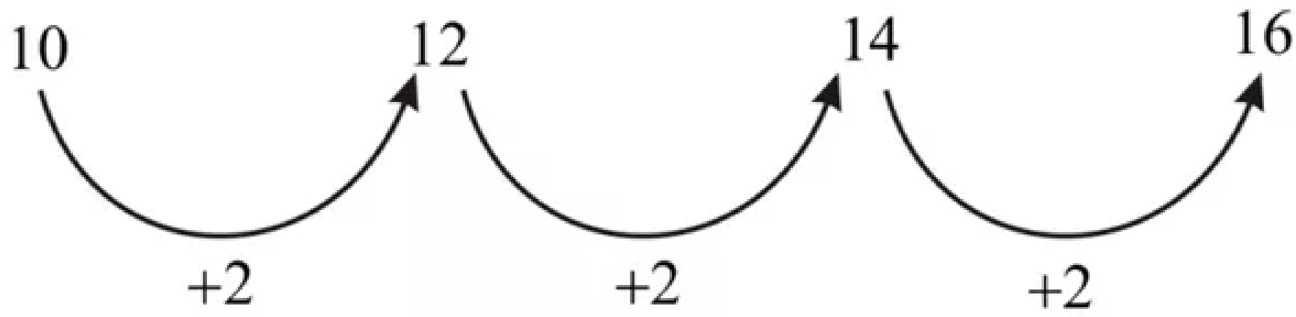
The objective is to determine whether the data in the given table has exponential behavior or not.

The domain values are $3,5,7,9$.

The range values are $10,12,14,16$.

The domain values are at regular intervals of 2.

The range values have a common difference 2.



The data do not display exponential behavior, but rather linear behaviors.

Therefore, the answer is No, the domain values are at regular intervals and the range values have a no common factor.

Answer 71MYS.

Consider the data

x	2	5	8	11
y	0.5	1.5	4.5	13.5

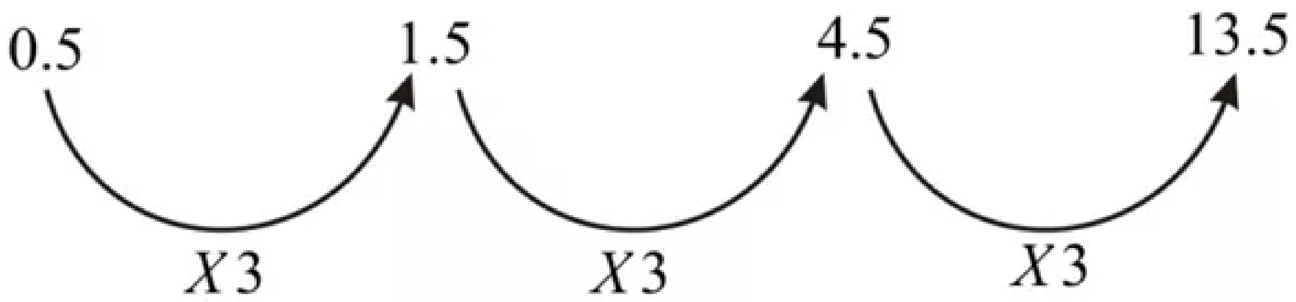
The objective is to determine whether the data in the given table has exponential behavior or not.

The domain values are $2,5,8,11$.

The range values are $0.5,1.5,4.5,13.5$.

By the domain values are at regular intervals of 3.

The range values have a common difference 3.



Since the domain values are at regular intervals and the range values have a common factor, the data probably exponential.

The equation for the data may involve $(3)^x$.

Therefore, the answer is yes, the domain values are at regular intervals and the range values have a no common factor 3.

Answer 73MYS.

Consider the trinomial $2x^2-5x-12$.

The objective is to factor the given trinomial, if possible.

If the trinomial cannot be factored using integers, write prime.

$2x^2-5x-12$ (Original equation)

$=2x^2-8x+3x-12$ (Write $-5x$ as $-8x+3x$)

$=2x(x-4)+3(x-4)$ (Take common $2x$ from the first two terms and take common 3 from the remaining terms)

$=(x-4)(2x+3)$ (Take common $(x-4)$ from the trinomial)

Therefore, the factor of the trinomial $2x^2-5x-12$ is $\boxed{(x-4)(2x+3)}$.