

Precalculus · Series, Binomial Theorem and an Introduction to Limits · Quiz

Common Core A-APR.C.5, A-SSE.B.4, F-BF.A.2 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

Ten multiple-choice questions on sigma notation, arithmetic and geometric series, Pascal's triangle, the binomial theorem and limits. Exactly one option is correct, and each explanation names the common mistake.

PrecalculusCommon Core: A-APR.C.5 · A-SSE.B.4 · F-BF.A.2

Questions

Question 1

Evaluate $\sum_{k=1}^4 (k^2+1)$.

- A. 30
- B. 34
- C. 31
- D. 35

Question 2

An arithmetic sequence has $a_1=6$ and $d=5$. Find a_{12} .

- A. 66
- B. 61
- C. 55
- D. 71

Question 3

Find the sum of the first 10 terms of $4+7+10+ \dots$.

- A. 350
- B. 310
- C. 175
- D. 165

Question 4

Find $18+6+2+\frac{2}{3}+ \dots$ to infinity.

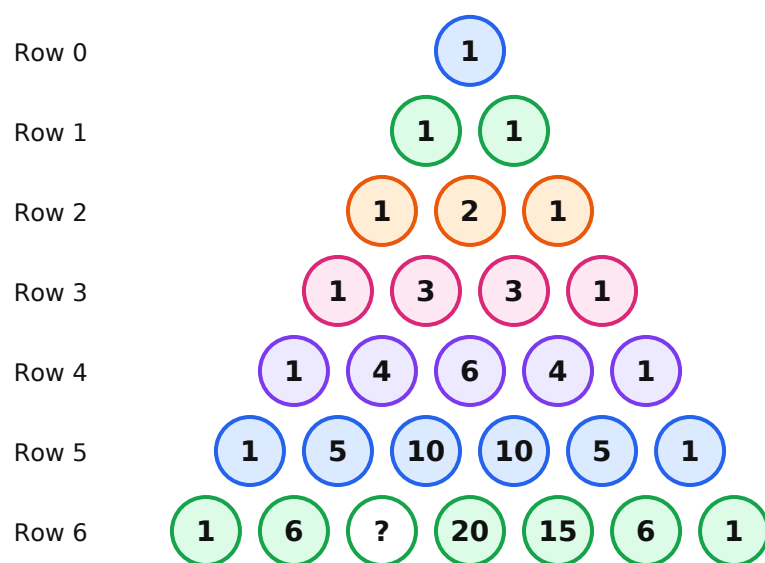
- A. 54
- B. 26
- C. 9
- D. 27

Question 5

Which infinite series has no sum?

- A. $10 + 1 + 0.1 + 0.01 + \dots$
- B. $3 + 1.5 + 0.75 + 0.375 + \dots$
- C. $2 + 2.4 + 2.88 + 3.456 + \dots$
- D. $1 - 1/3 + 1/9 - 1/27 + \dots$

Question 6



Each entry is the sum of the two entries above it.

What number belongs in the circle marked ?

- A. 15
- B. 20
- C. 12
- D. 16

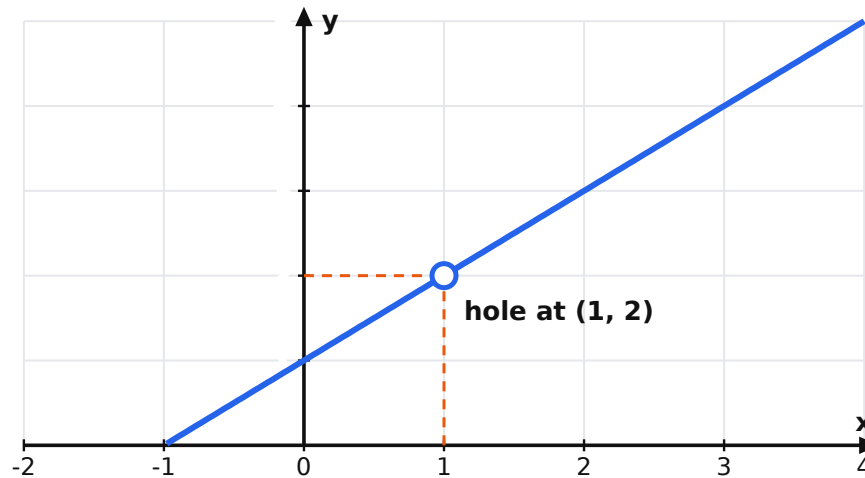
Question 7

Find the coefficient of x^2 in $(x+3)^4$.

- A. 6
- B. 36
- C. 54

D. 27

Question 8

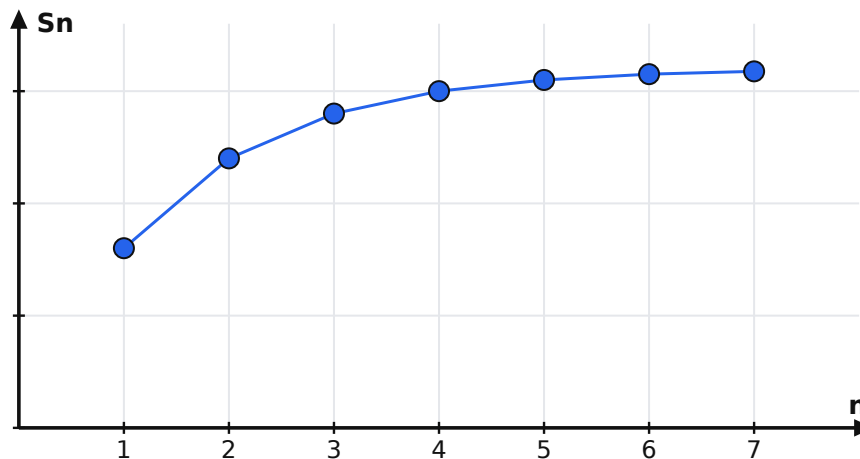


The open circle marks a point the graph skips.

The graph shows $f(x) = \frac{x^2-1}{x-1}$. What is $\lim_{x \rightarrow 1} f(x)$?

- A. 0
- B. 1
- C. does not exist
- D. 2

Question 9



The partial sums level off at the limit of the series.

The graph shows partial sums of a geometric series. What value do the partial sums approach?

- A. 16

- B. 15.875
- C. 8
- D. 32

Question 10

Find $\lim_{n \rightarrow \infty} \frac{4n-1}{2n+3}$.

- A. 2
- B. 4
- C. $\frac{1}{2}$
- D. $-\frac{1}{3}$

Answer key

1. **B** - The terms are 2, 5, 10, 17, which total 34. Forgetting the +1 in every term gives 30, and starting at $k = 0$ gives 35.
2. **B** - $a_{12} = 6 + 5(11) = 61$. Using 12 instead of 11 as the multiplier gives 66.
3. **C** - $a_{10} = 31$, so $S_{10} = \frac{10(4+31)}{2} = 175$. Forgetting to divide by 2 gives 350.
4. **D** - With $r = \frac{1}{3}$, the sum is $\frac{18}{1-\frac{1}{3}} = 27$. Dividing by r instead of $1-r$ gives 54.
5. **C** - The first series has ratio 1.2, and a ratio with absolute value 1 or more means divergence. The other ratios are 0.1, 0.5 and $-\frac{1}{3}$.
6. **A** - Add the two entries above: $5 + 10 = 15$. Using $10 + 10$ or reading the center entry gives 20.
7. **C** - $C(4,2) \cdot 3^2 = 6 \cdot 9 = 54$. Dropping the power of 3 gives 6.
8. **D** - Near $x = 1$ the graph approaches the hole at height 2. The function is undefined at 1, but the limit still exists.
9. **A** - With $a = 8$ and $r = 1/2$, the sum is $8/(1 - 1/2) = 16$. The last plotted point, 15.875, is only the 7th partial sum.
10. **A** - Divide by n : the quotient becomes $(4 - 1/n)/(2 + 3/n)$, which approaches $4/2 = 2$.

Remember:

- Standards A-SSE.B.4, A-APR.C.5 and F-BF.A.2: sum finite and infinite geometric series, use the binomial theorem, and write sequences recursively and explicitly.
- Arithmetic series: $S_n = \frac{n(a_1 + a_n)}{2}$. Finite geometric series: $S_n = \frac{a_1(1-r^n)}{1-r}$.
- An infinite geometric series with $|r| < 1$ has sum $\frac{a_1}{1-r}$; otherwise it diverges.
- Binomial theorem: $(a+b)^n = \sum_{k=0}^n C(n,k) a^{n-k} b^k$, with coefficients from Pascal's triangle.
- A limit describes the value approached: $\lim_{x \rightarrow 2} \frac{x^2-4}{x-2} = 4$ even though the function is undefined at 2.