F.6 Mathematics

MC Exercise

6-2 Geometric Sequences

1. It is given that the general term of a geometric sequence is $T_n = \left(-\frac{3}{5}\right)^{2n-1}$. Find the common ratio of the sequence.

A. $-\frac{3}{5}$

B. $\frac{3}{5}$

C. $-\frac{9}{25}$

D. $\frac{9}{25}$

2. Find the general term T_n of the geometric sequence 12, –24, 48, –96, ⋯.

A. $-3(2)^n$

B. $-3(2)^{n+1}$

C. $3(-2)^n$

D. $3(-2)^{n+1}$

3. Find the number of terms in the geometric sequence a^6, a^9, a^{12}, ⋯, a^{60}.

A. 18

B. 19

C. 20

D. 21

4. It is given that the $(n+1)$th term of a geometric sequence is $2(-3)^{2-n}$, where $n > -1$. Find the first term and the common ratio of the sequence.

	First term	Common ratio
A.	–6	$-\frac{1}{3}$
B.	–6	–3
C.	18	$-\frac{1}{3}$
D.	18	–3

5. If the 3rd term and the 8th term of a geometric sequence are –63 and 15 309 respectively, then the common ratio of the sequence is

A. –7.

B. –3.

C. ±3.

D. ±7.

6. If $x+1$, $4x+4$, $160-2x$ form a geometric sequence, find the value(s) of x.

A. 17

B. 8

C. –1

D. 8 or –1

7. If a, b, c form a geometric sequence, where $a+b+c=6$ and $abc=-64$, then $a+c=$

A. –4.

B. 2.

C. 4.

D. 10.

8. If x, y, z form a geometric sequence with the common ratio of r, then the common ratio of the geometric sequence $3x^2$, $3y^2$, $3z^2$ is

A. $2r$.
B. $3r$.
C. r^2.
D. r^3.

9. Which of the following must be true?

I. A sequence with the general term $T_n = \dfrac{4^{n+2}}{7^{2n-1}}$ is a geometric sequence.

II. A sequence with the general term $T_n = \dfrac{2^{n^2+1}}{3^{n^2+3}}$ is a geometric sequence.

III. A sequence with the general term T_n, where $T_2 = 40$, $T_4 = 10$ and $T_6 = \dfrac{5}{4}$, is a geometric sequence.

A. I only
B. I and II only
C. II and III only
D. I, II and III

10. Consider the geometric sequence -288, -192, -128, ⋯. If the kth term of the sequence is greater than -0.1, find the minimum value of k.

A. 19
B. 20
C. 21
D. 22

11. Let T_n be the general term of a geometric sequence with common ratio r, where $0 < r < 1$. It is given that $T_1 + T_2 + T_3 = 19$ and $T_1 T_2 T_3 = 216$. Find $T_1 - T_3$.

A. 5
B. $\sqrt{97}$
C. 13
D. Cannot be determined

12. Find the sum of the first 7 terms of the geometric sequence 4, 20, 100, 500, ⋯.

A. 15 624
B. 62 500
C. 78 124
D. 390 624

13. Find the value of the geometric series $2^2 + 2^4 + 2^6 + \cdots + 2^{14}$.

A. 16 383
B. 21 844
C. 32 766
D. 65 532

14. It is given that $a \neq b$ and $b \neq 1$. The value of the geometric series $a^{100} + a^{99}b + a^{98}b^2 + \cdots + b^{100}$ is

A. $\dfrac{a^{100}(b^{100}-1)}{b-1}$.
B. $\dfrac{a^{100}(b^{101}-1)}{b-1}$.
C. $\dfrac{b^{100}-a^{100}}{b-a}$.
D. $\dfrac{b^{101}-a^{101}}{b-a}$.

15. If the sum of the first m terms of the geometric sequence $-12, -48, -192, \cdots$ is smaller than -10^6, find the minimum value of m.

A. 7
B. 8
C. 9
D. 10

16. Find the sum of all positive terms of the geometric sequence $-3, 6, -12, 24, -48, 96, \cdots, 24\,576$.

A. 8 190
B. 16 383
C. 32 766
D. 49 149

17. Find the sum of the 6th to 10th terms of the geometric sequence $7, -21, 63, \cdots$.

A. −104 608
B. −103 761
C. −34 587
D. 309 582

18. The sum of the first 3 terms of a geometric sequence is 1 008, and the sum of the following 3 terms is −126. Find the common ratio of the sequence.

A. −8
B. $-\frac{1}{8}$
C. −2
D. $-\frac{1}{2}$

19. $9 \times 9^3 \times 9^9 \times 9^{27} \times \cdots \times 9^{3^n} =$

A. 3^{3^n}.
B. $3^{3^{n+1}-1}$.
C. $3^{\frac{3}{2}(3^n+1)}$.
D. 3^{n+2}.

20. Let a_n be the nth term of a geometric sequence. If $a_4 > 0$ and $a_7 < 0$, which of the following must be true?

I. $a_1 < 0$
II. $a_3 = \sqrt{a_2 a_4}$
III. $a_1 + a_2 + a_3 + \cdots + a_7 < 0$

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

21. Find the value of the geometric series $6 + 0.6 + 0.06 + \cdots$.

A. $\frac{2}{3}$
B. 666
C. 667
D. $6\frac{2}{3}$

22. Find the value of $\frac{1}{3} - \frac{2}{3^2} + \frac{1}{3^3} - \frac{2}{3^4} + \frac{1}{3^5} - \frac{2}{3^6} + \cdots$.

A. $\frac{1}{8}$
B. $\frac{1}{5}$
C. $\frac{5}{8}$
D. 1

23. It is given that the sum to infinity of a geometric sequence is 35 and the first term is 20. Find the common ratio of the sequence.

A. $-\frac{4}{7}$

B. $-\frac{3}{7}$

C. $\frac{3}{7}$

D. $\frac{4}{7}$

24. If $1+\sin\theta+\sin^2\theta+\cdots=2(2+\sqrt{3})$, where $0°<\theta<90°$, find the value(s) of $\cos\theta$.

A. $\frac{1}{2}$

B. $\frac{\sqrt{3}}{2}$

C. $\frac{1}{2}$ or $-\frac{1}{2}$

D. $\frac{\sqrt{3}}{2}$ or $-\frac{\sqrt{3}}{2}$

25. It is given that 4, k and $k-\frac{8}{9}$ are the first 3 terms of a geometric sequence. Find the sum to infinity of the sequence.

A. $\frac{1}{3}$

B. $\frac{4}{3}$

C. 6

D. 6 or 12

26. The 2nd and the 4th terms of a geometric sequence are -35 and $-\frac{35}{16}$ respectively. Find the sum to infinity of the sequence.

A. $-\frac{560}{3}$

B. $\frac{560}{3}$

C. $\frac{560}{3}$ or -112

D. $-\frac{560}{3}$ or 112

27. If the sum of the first 2 terms of a geometric sequence is 35 and the sum to infinity is 63, find the first term of the sequence.

A. -21

B. $\frac{2}{3}$ or $-\frac{2}{3}$

C. 28

D. 21 or 105

28. It is given that the sum to infinity of the geometric sequence $T_1, T_2, T_3, \cdots$ is $\frac{2}{3}T_1$. Find $T_2+T_4+T_6+\cdots$.

A. $-\frac{2}{3}T_1$

B. $-\frac{1}{3}T_1$

C. $\frac{1}{3}T_1$

D. $\frac{4}{3}T_1$

29. Consider the geometric sequence $x^2, 3x^3, 9x^4, \cdots$. If the sum to infinity of the geometric sequence exists, which of the following is a possible value of x?

A. 0

B. $\frac{1}{2}$

C. $\frac{1}{3}$

D. $\frac{1}{4}$

30. Air is leaking out from a balloon. In the first minute, $30\,\text{cm}^3$ of air leaks out from the balloon. After that, the volume of air leaked in each minute is 70% of that in the preceding minute. What is the total volume of air leaked in the first 5 minutes?

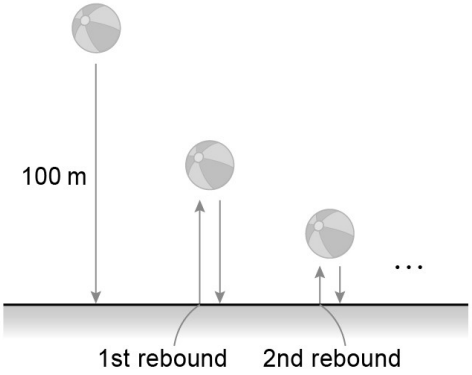
A. $5.0421\,\text{cm}^3$

B. $42.753\,\text{cm}^3$

C. $75.99\,\text{cm}^3$

D. $83.193\,\text{cm}^3$

31. A ball is dropped from a spot of 100 m above the ground. After each rebound, the ball only rises to half of its preceding height.



How many rebounds will the ball make when it travels a distance of 290 m?

A. 4

B. 5

C. 6

D. 7

32. Raymond's monthly salary is \$10 000 this year and it increases by 10% each year. If Raymond saves 20% of his monthly salary every month, at least how many years later will his total savings exceed \$200 000?

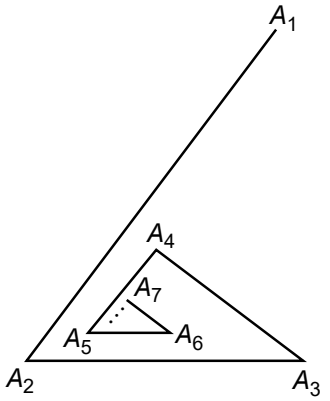
A. 6 years

B. 7 years

C. 8 years

D. 9 years

33. The figure is formed by an infinite number of line segments A_1A_2, A_2A_3, A_3A_4, $\cdots$, where $A_2A_3 = \frac{2}{3}A_1A_2$, $A_3A_4 = \frac{2}{3}A_2A_3$, $\cdots$. If $A_1A_2 = 90\,\text{cm}$, find $A_1A_2 + A_2A_3 + A_3A_4 + \cdots$.



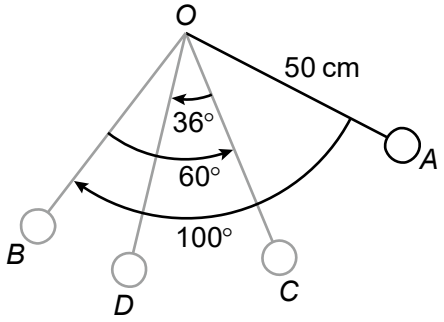
A. 54 cm

B. 270 cm

C. 405 cm

D. 540 cm

34. The figure shows a pendulum with the length of 50 cm. It is released from A and it keeps swinging until it comes to rest. The angles swung $\angle AOB, \angle BOC, \angle COD, \cdots$ form a geometric sequence. Find the total distance travelled by the end of the pendulum $\overset{\frown}{AB} + \overset{\frown}{BC} + \overset{\frown}{CD} + \cdots$.

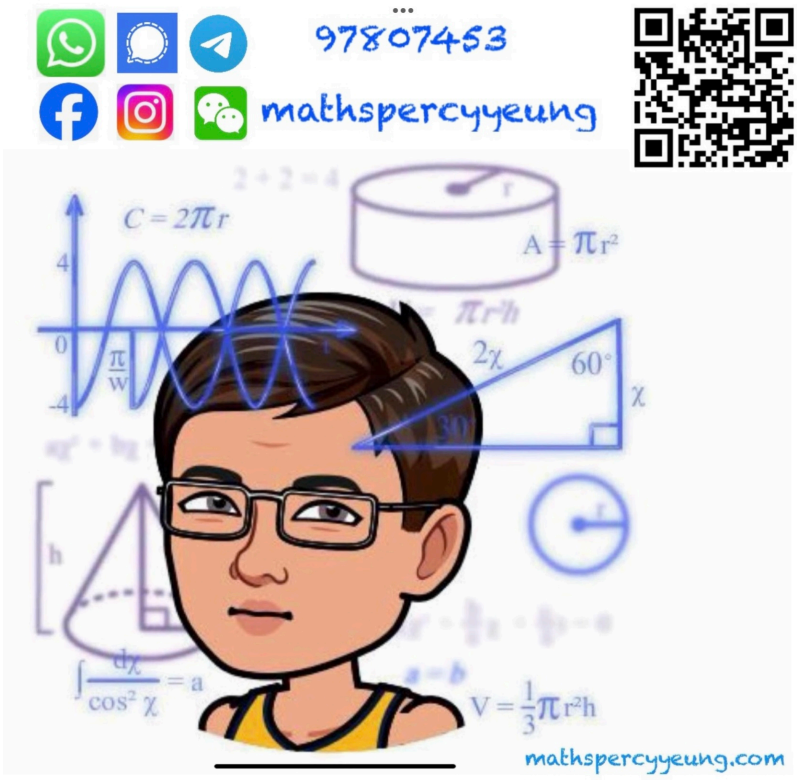


A. $\frac{125\pi}{3}$ cm

B. $\frac{625\pi}{3}$ cm

C. $\frac{625\pi}{9}$ cm

D. $\frac{625\pi}{18}$ cm


97807453
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C = 2πr
A = πr²
πr²h
2χ
60°
χ
30°
h
∫ dχ / cos² χ = a
V = 1/3 πr²h
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