

Mixed Arith Geo Series

51 min
53 marks

1. The first four terms of a sequence are 18, 54, 162, 486.

(a) Use all four terms to show that this is a geometric sequence.

(2)

(b) (i) Find an expression for the n^{th} term of this geometric sequence.

(ii) If the n^{th} term of the sequence is 1062 882, find the value of n .

(4)

(Total 6 marks)

2. The first three terms of an arithmetic sequence are 7, 9.5, 12.

(a) What is the 41st term of the sequence?

(b) What is the sum of the first 101 terms of the sequence?

Working:

Answers:

(a)

.....

...

(b)

.....

...

(Total 4 marks)

3. In an arithmetic sequence, the first term is 5 and the fourth term is 40. Find the second term.

Working:

Answer:

.....

(Total 4 marks)

4. The first term of an infinite geometric sequence is 18, while the third term is 8. There are two possible sequences. Find the sum of each sequence.

Working:

Answers:

.....

.....

(Total 6 marks)

5. Each day a runner trains for a 10 km race. On the first day she runs 1000 m, and then increases the distance by 250 m on each subsequent day.

- (a) On which day does she run a distance of 10 km in training?
- (b) What is the total distance she will have run in training by the end of that day? Give your answer exactly.

Working:

Answers:

(a)

.....

...

(b)

.....

...

(Total 4 marks)

6. Consider the infinite geometric series $405 + 270 + 180 + \dots$

- (a) For this series, find the common ratio, giving your answer as a fraction in its simplest form.
- (b) Find the fifteenth term of this series.
- (c) Find the **exact** value of the sum of the infinite series.

(Total 6 marks)

7. In an arithmetic sequence, the first term is -2 , the fourth term is 16 , and the n^{th} term is $11\,998$.

(a) Find the common difference d .

(b) Find the value of n .

Working:

Answers:

(a)

.....

...

(b)

.....

...

(Total 6 marks)

8. The diagrams below show the first four squares in a sequence of squares which are subdivided in half. The area of the shaded square A is $\frac{1}{4}$.

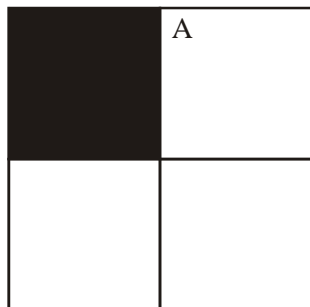


Diagram 1

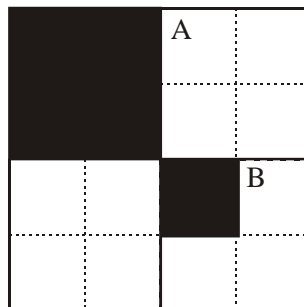


Diagram 2

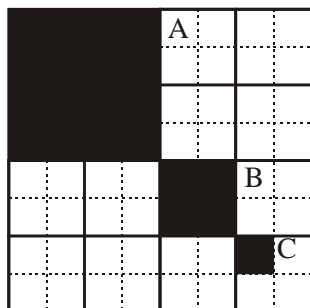


Diagram 3

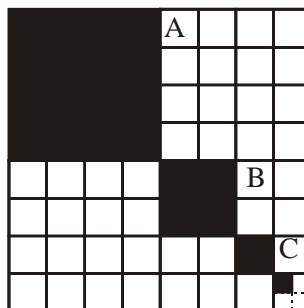


Diagram 4

- (a) (i) Find the area of square B and of square C.
(ii) Show that the areas of squares A, B and C are in geometric progression.
(iii) Write down the common ratio of the progression.

(5)

- (b) (i) Find the **total** area shaded in diagram 2.
(ii) Find the **total** area shaded in the 8th diagram of this sequence.
Give your answer correct to six significant figures.

(4)

- (c) The dividing and shading process illustrated is continued indefinitely.
Find the total area shaded.

(2)

(Total 11 marks)

9. Gwendolyn added the multiples of 3, from 3 to 3750 and found that

$$3 + 6 + 9 + \dots + 3750 = s.$$

Calculate s .

Working:

Answer:

.....

(Total 6 marks)