

Series and applications



Limiting sum (1)

QUESTION 1 Write down the condition for a geometric series to have a limiting sum. _____

QUESTION 2 The given series has a limiting sum. True or false?

a $625 + 500 + 400 + 320 + 256 + \dots$

b $2500 + 3000 + 4320 + 5184 + \dots$

c $15\,552 - 12\,960 + 10\,800 - 9000 + 7500 - \dots$

d $9 + 9 + 9 + 9 + 9 + \dots$

e $1536 + 960 + 600 + 375 + 234.375 + \dots$

f $59\,049 - 13\,122 + 2916 - 648 + 144 - \dots$

QUESTION 3 Find the limiting sum of a geometric series with first term a and common ratio r :

a $a = 500, r = 0.8$

b $a = 900, r = -0.6$

c $a = 10, r = 0.7$

d $a = 1458, r = \frac{2}{3}$

e $a = 31\,250, r = \frac{3}{5}$

f $a = 4096, r = -\frac{3}{4}$

g $a = 2000, r = 0.1$

h $a = -6400, r = -\frac{1}{2}$

i $a = 1, r = \frac{1}{2}$

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Limiting sum (2)

QUESTION 1 Find the limiting sum for each geometric series.

a $768 + 384 + 192 + 96 + 48 + \dots$

b $33\,614 + 14\,406 + 6174 + 2646 + 1134 + \dots$

c $17\,500 - 14\,000 + 11\,200 - 8960 + 7168 - \dots$

d $23\,328 + 3888 + 648 + 108 + 18 + \dots$

QUESTION 2 A geometric series has common ratio $r = 0.4$ and limiting sum $S = 5000$.
Find the first term of the series.

QUESTION 3 An infinite geometric series has limiting sum $S = 80$ and first term $a = 60$. Find the second term.

Page 153 1 $-1 < r < 1$ 2 a true b false c true d false e true f true 3. a 2500 b 562.5 c $33\frac{1}{3}$ d 4374 e 78 125

f $2340\frac{4}{7}$ g $2222\frac{2}{9}$ h $-4266\frac{2}{3}$ i 2

Page 154 1 a 1536 b 58 824.5 c $9722\frac{2}{9}$ d 27 993.6 2 3000 3 15