



**SECTION 2.3
GEOMETRIC SERIES**

- i) Sums of a geometric series and infinite geometric series
- ii) Deriving the formula for the sum of a geometric series and infinite geometric series

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D) SUM OF GEOMETRIC SEQUENCE:

S_n : Sum of a

$S_n =$

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EX: FIND THE SUM OF THE FOLLOWING GEOMETRIC SEQUENCE:

a) $9 + 18 + 36 + 72 + 144 + 288 + 576 + 1152$

b) $14 + 7 + 3.5 + 1.75 + 0.875 + 0.4375 + 0.21875$

$a =$

$r =$

$n =$

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EX: FIND THE SUM:

a) $6.5 + 26 + 104 + \dots + 436207616$

$a =$

$r =$

$n =$

$t_n =$



EX: A RUBBER BALL IS DROPPED FROM A HEIGHT OF 10M. AFTER EACH BOUNCE, THE BALL RETURNS TO 65% OF ITS PREVIOUS HEIGHT. CALCULATE ALL THE VERTICAL DISPLACEMENT RIGHT BEFORE THE 8TH BOUNCE.



Jason gave his son a penny on the first day of the month and doubled the amount each day. How much money will he give his son altogether by the 30th day?



CHALLENGE: THE SUM OF THE SECOND & THIRD TERM IN A GEOMETRIC SERIES IS 45. THE SUM OF THE FOURTH & FIFTH TERM IS 20. FIND THE GEOMETRIC SEQUENCE:



D) WHAT IS AN INFINITE GEOMETRIC SERIES?

- A Geometric series with an infinite number of terms
- If the common ratio is greater than 1, each term will

-
- Each term in the series will get smaller
- Eventually some terms will become so small such that adding them will be



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$$S_n = 1 + 0.5 + 0.25 + 0.125 + 0.0625 \dots + 0.000976562 + 0.00048828 + \dots$$
$$+ 0.000000476 + 0.000000238 + \dots$$

These values are so small such that adding them

- When the ratio is $|r| < 1$ the infinite G.S. will



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II) FORMULA FOR THE SUM OF AN INFINITE G.S.

- o If the Ratio is bigger than 1, the sum will be
- o If the ratio is smaller than -1, the sum will be

- o If the Ratio is between 1 and -1, the sum can be obtained through a formula:

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EX: FIND THE SUM OF THE INFINITE G.S.

a) $14 + 7 + 3.5 + 1.75 + \dots$

$a =$
 $r =$

b) $18 + 12 + 8 + \frac{16}{3} + \dots$

$a =$
 $r =$

EX: THE COMMON RATIO OF AN INFINITE GEOMETRIC SERIES IS 0.75. IF THE SUM OF ALL THE TERMS CONVERGES TO 20, FIND THE FIRST TERM.

GIVEN THE FOLLOWING INFINITE GEOMETRIC SEQUENCE, WHAT SHOULD THE VALUE OF "R" BE SO THAT THE SUM WILL BE 20?

$$a + ar + ar^2 + ar^3 + \dots = 20$$

i) $r = 2$

ii) $r = \frac{7}{6}$

iii) $r = 1.25$

iv) $r = 0.80$



EX: A MOVIE IN A THEATRE GENERATE \$250,000 IN REVENUE IN THE FIRST MONTH OF ITS SHOWING. EACH MONTH, SALES FROM THAT MOVIE DROP BY 15%. IF THE MOVIE IS SHOWN FOR A LONG TIME, WHAT IS THE TOTAL REVENUE GENERATED?


