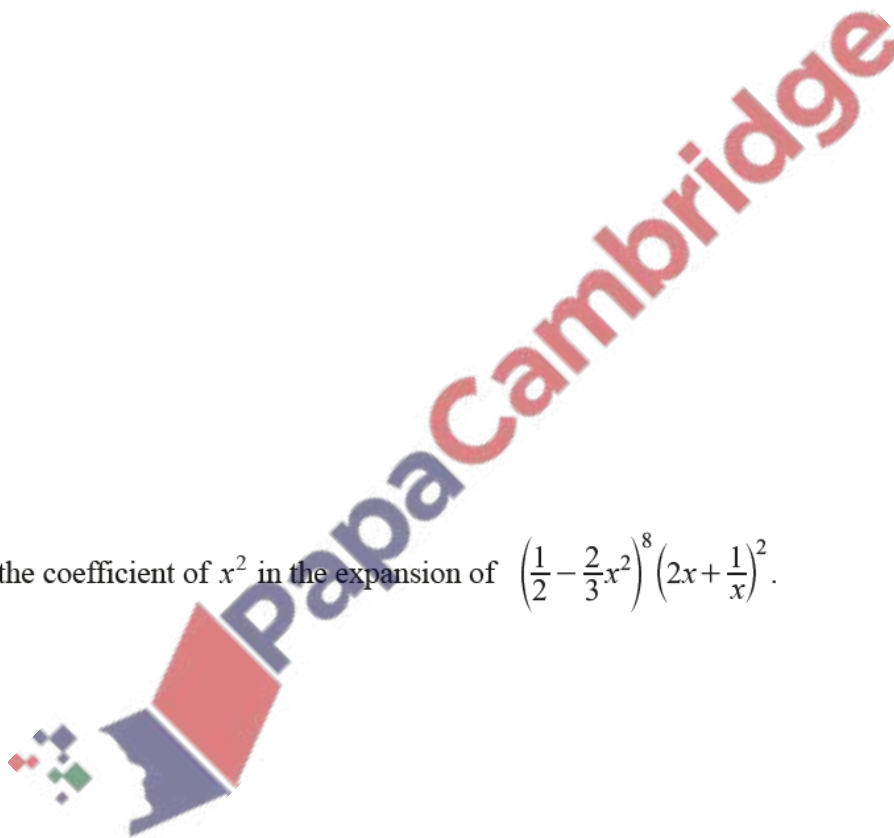


1. Nov/2021/Paper_13/No.4

- (a) Find the first three terms, in ascending powers of x^2 , in the expansion of $\left(\frac{1}{2} - \frac{2}{3}x^2\right)^8$. Write your coefficients as rational numbers. [3]

- (b) Find the coefficient of x^2 in the expansion of $\left(\frac{1}{2} - \frac{2}{3}x^2\right)^8 \left(2x + \frac{1}{x}\right)^2$. [3]

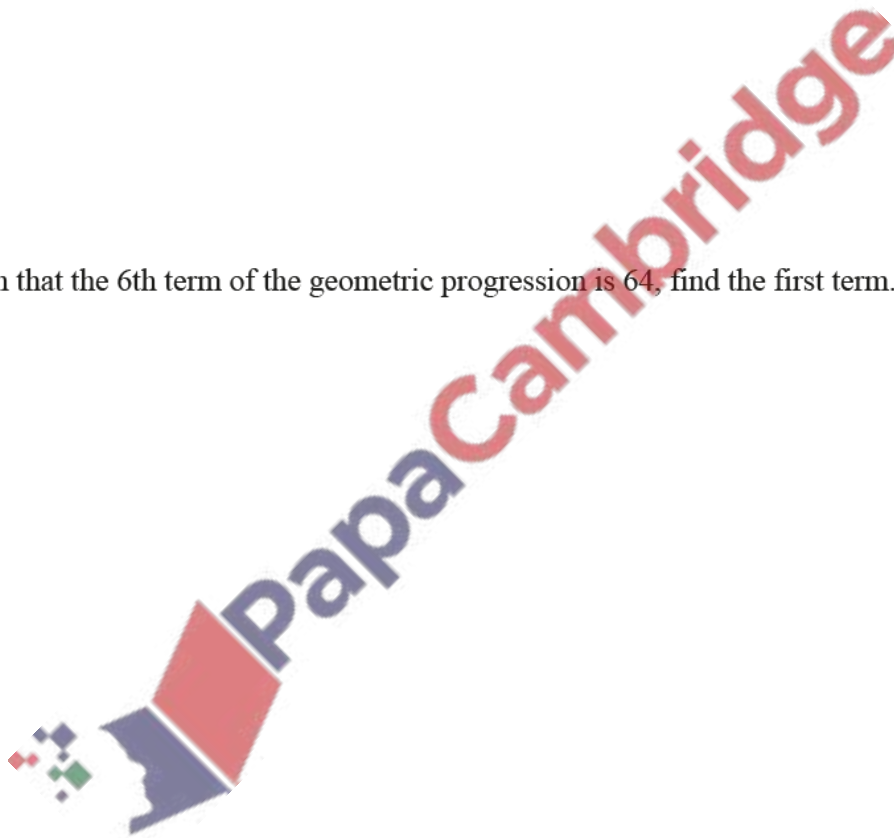


2. Nov/2021/Paper_13/No.5

A geometric progression is such that its sum to 4 terms is 17 times its sum to 2 terms. It is given that the common ratio of this geometric progression is positive and not equal to 1.

(a) Find the common ratio of this geometric progression. [3]

(b) Given that the 6th term of the geometric progression is 64, find the first term. [2]

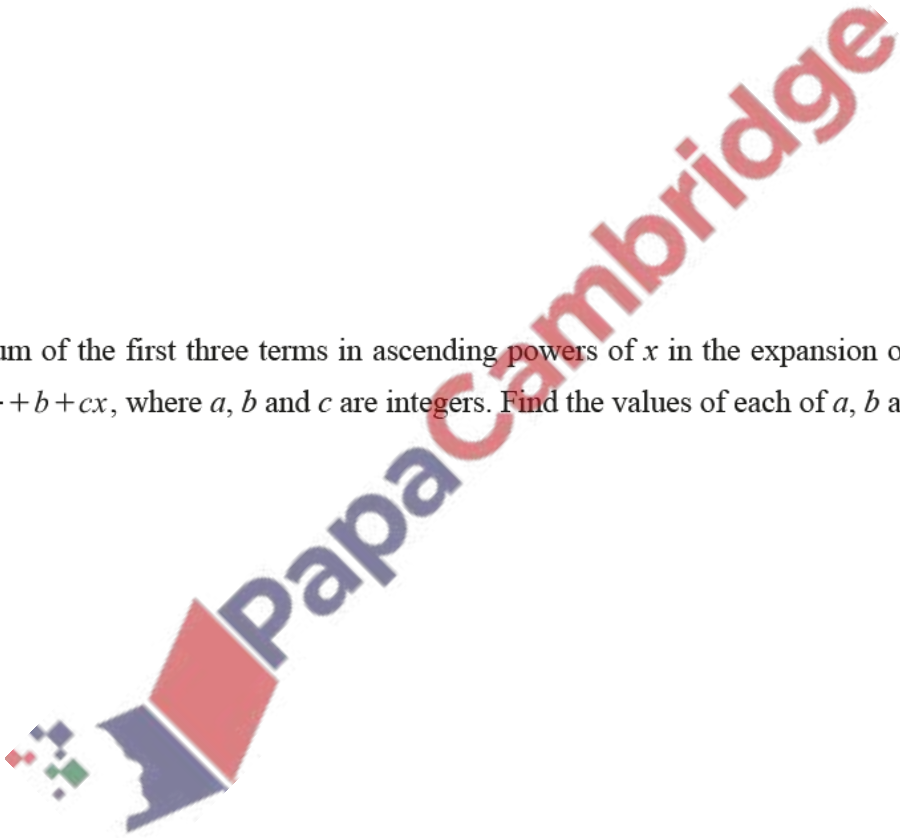


(c) Explain why this geometric progression does not have a sum to infinity. [1]

(a) Expand $(2 - 3x)^4$, evaluating all of the coefficients.

[4]

(b) The sum of the first three terms in ascending powers of x in the expansion of $(2 - 3x)^4 \left(1 + \frac{a}{x}\right)$ is $\frac{32}{x} + b + cx$, where a , b and c are integers. Find the values of each of a , b and c . [4]

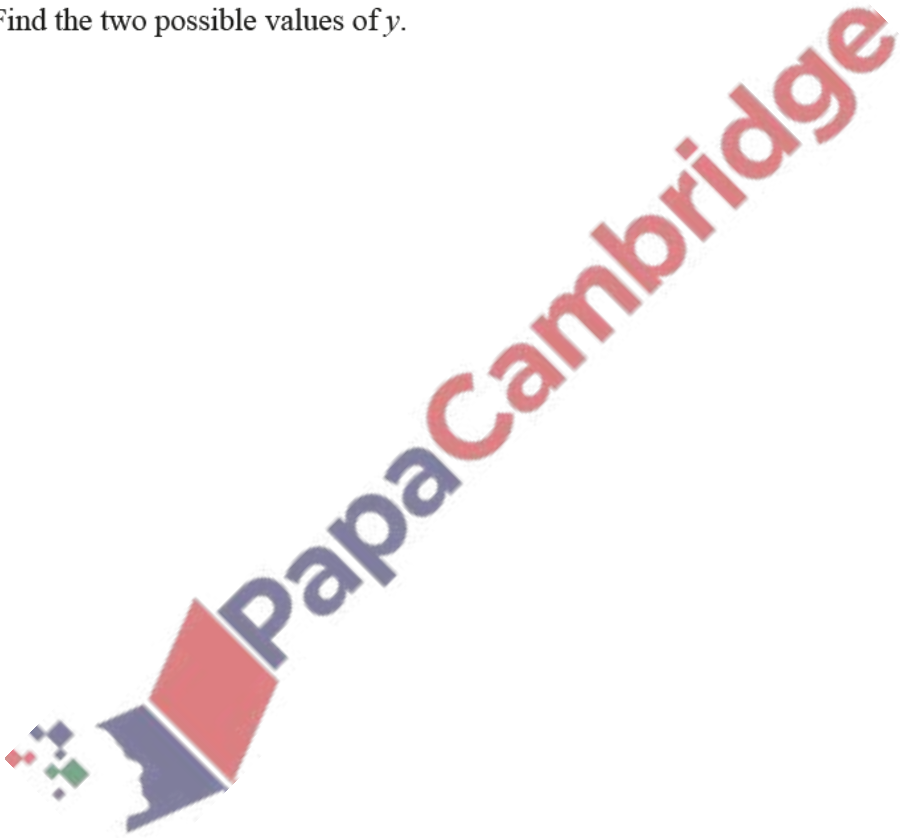


4. Nov/2021/Paper_22/No.10

(a) The first three terms of an arithmetic progression are x , $5x-4$ and $8x+2$. Find x and the common difference. [4]

(b) The first three terms of a geometric progression are y , $5y-4$ and $8y+2$.

(i) Find the two possible values of y . [4]



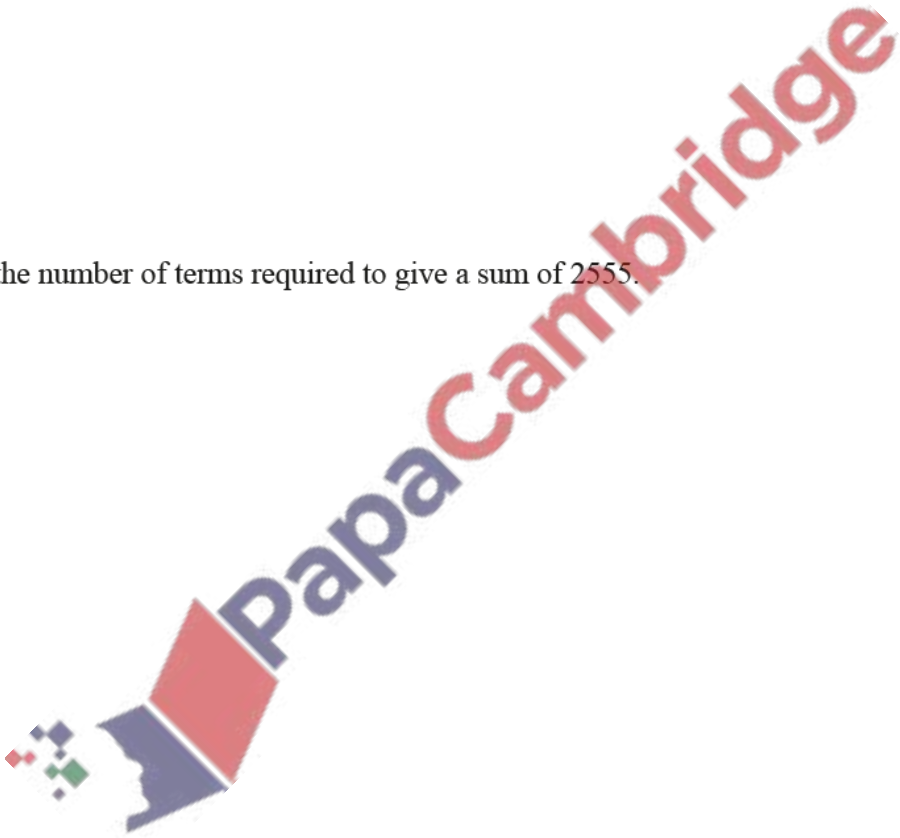
(ii) For each of these values of y , find the corresponding value of the common ratio. [2]

5. Nov/2021/Paper_23/No.9

An arithmetic progression has first term a and common difference d . The third term is 13 and the tenth term is 41.

(a) Find the value of a and of d . [4]

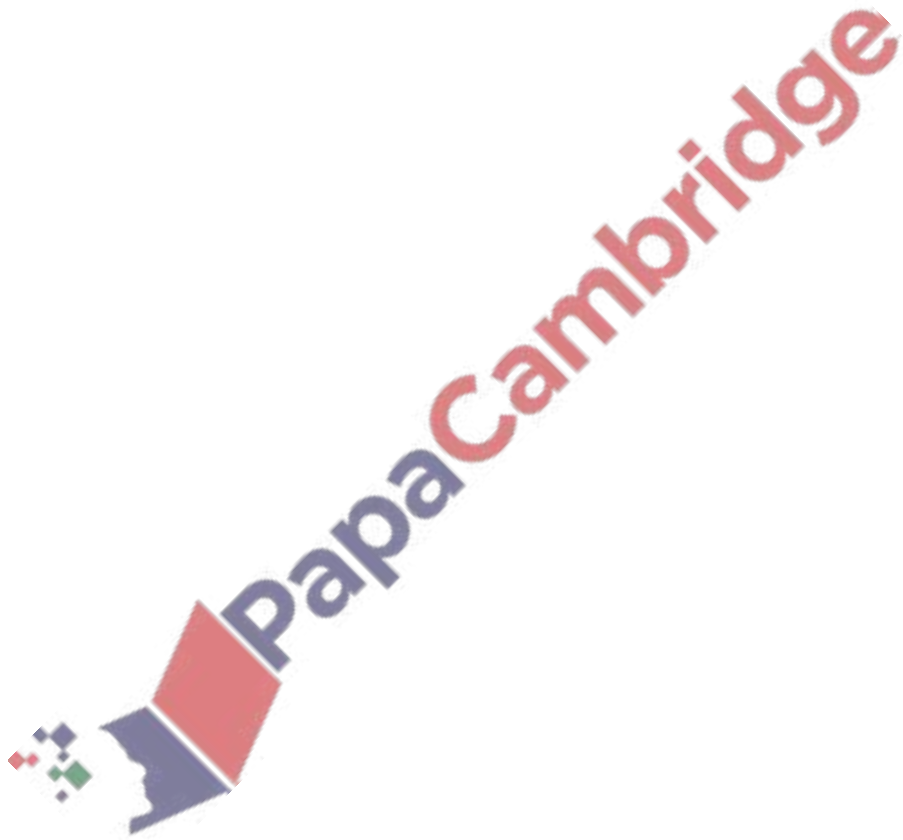
(b) Find the number of terms required to give a sum of 2555. [4]



(c) Given that S_n is the sum to n terms, show that $S_{2k} - S_k = 3k(1 + 2k)$. [4]

6. June/2021/Paper_11/No.4

The first 3 terms in the expansion of $(a+x)^3\left(1-\frac{x}{3}\right)^5$, in ascending powers of x , can be written in the form $27+bx+cx^2$, where a , b and c are integers. Find the values of a , b and c . [8]



- (a) The first three terms of an arithmetic progression are $-4, 8, 20$. Find the smallest number of terms for which the sum of this arithmetic progression is greater than 2000. [4]

- (b) The 7th and 9th terms of a geometric progression are 27 and 243 respectively. Given that the geometric progression has a positive common ratio, find

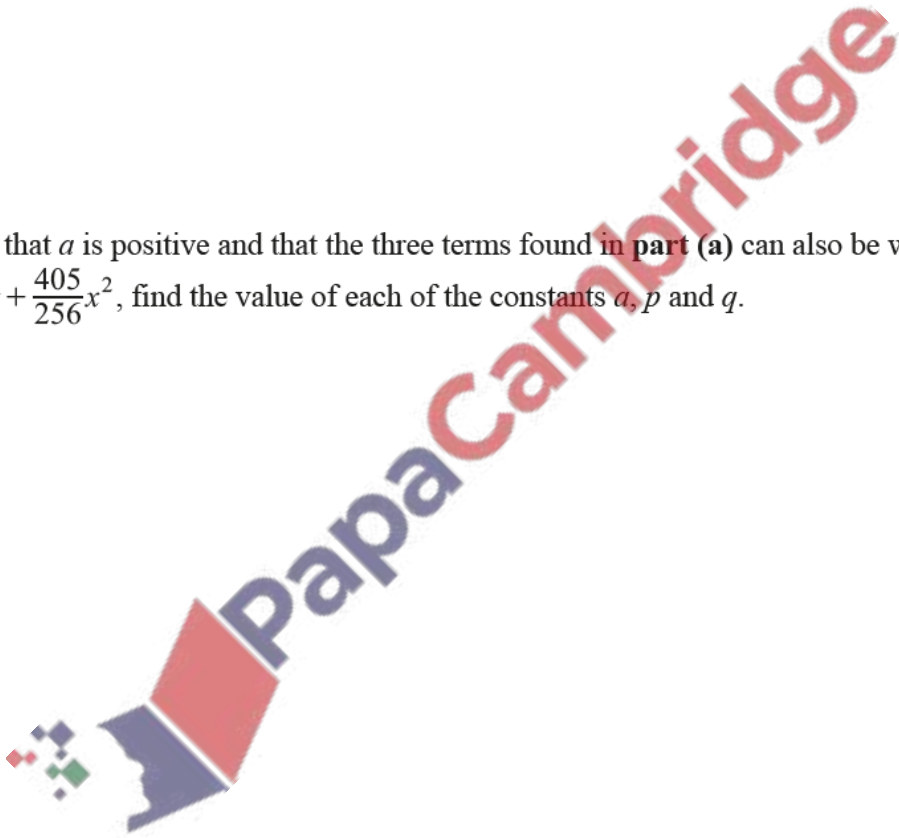
(i) this common ratio, [2]

(ii) the 30th term, giving your answer as a power of 3. [2]

- (c) Explain why the geometric progression $1, \sin \theta, \sin^2 \theta, \dots$ for $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$, where θ is in radians, has a sum to infinity. [2]

- (a) Find the first 3 terms in the expansion, in ascending powers of x , of $(a-3x)^{10}$, where a is a constant. [3]

- (b) Given that a is positive and that the three terms found in part (a) can also be written as $p+qx+\frac{405}{256}x^2$, find the value of each of the constants a , p and q . [3]

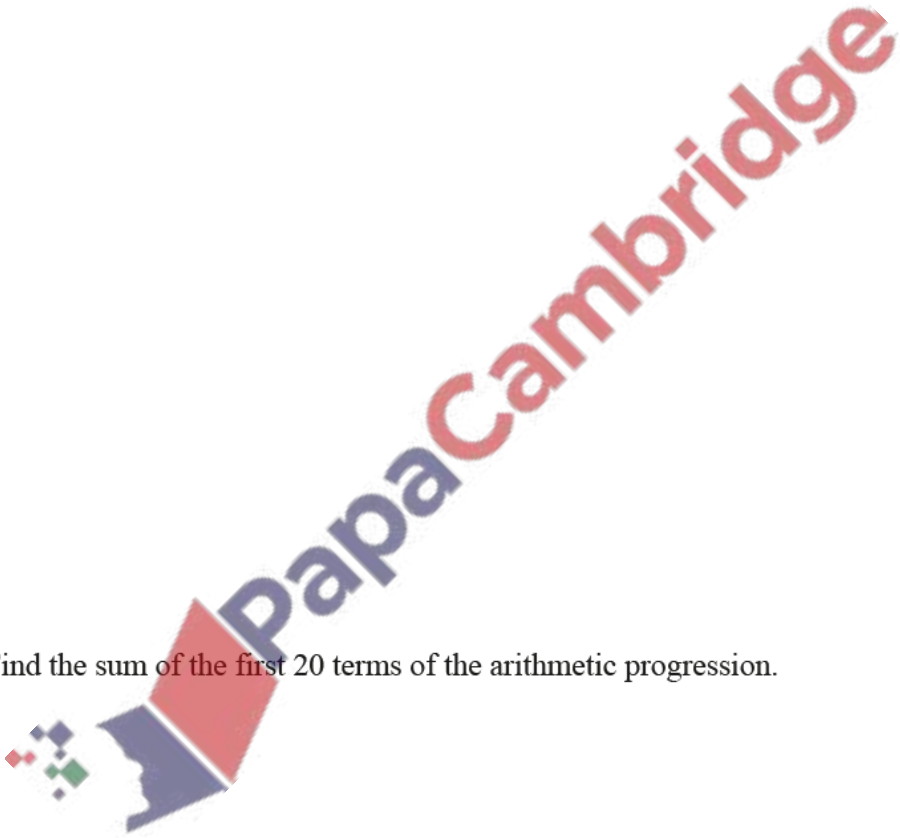


9. June/2021/Paper_21/No.11

The 2nd, 8th and 44th terms of an arithmetic progression form the first three terms of a geometric progression. In the arithmetic progression, the first term is 1 and the common difference is positive.

(a) (i) Show that the common difference of the arithmetic progression is 5. [5]

(ii) Find the sum of the first 20 terms of the arithmetic progression. [2]

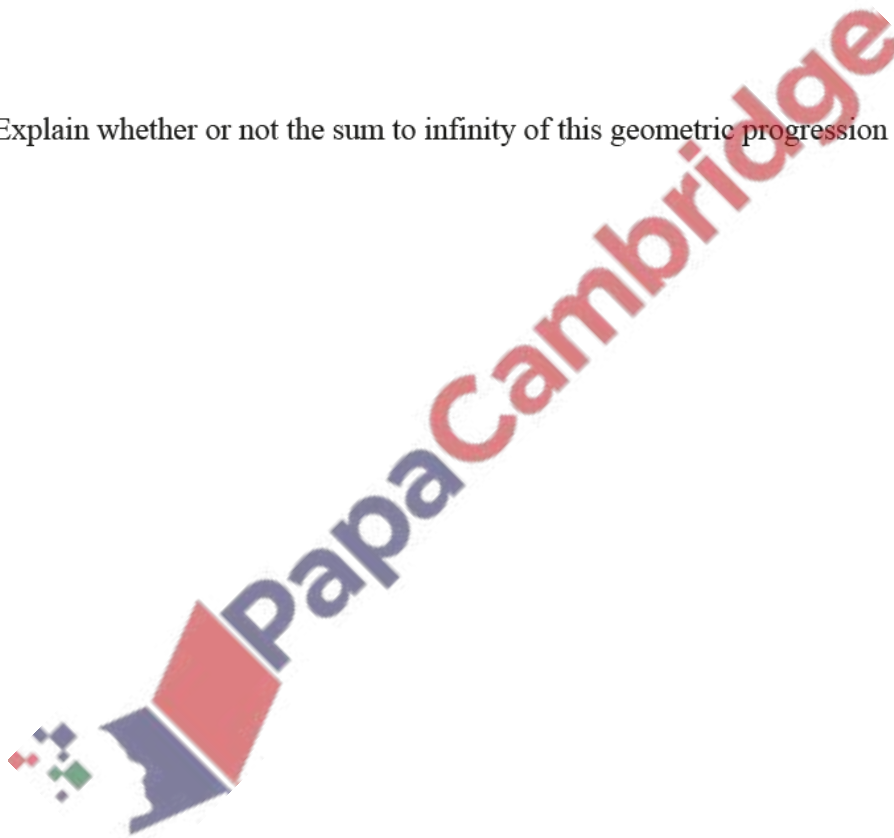


(b) (i) Find the 5th term of the geometric progression.

[2]

(ii) Explain whether or not the sum to infinity of this geometric progression exists.

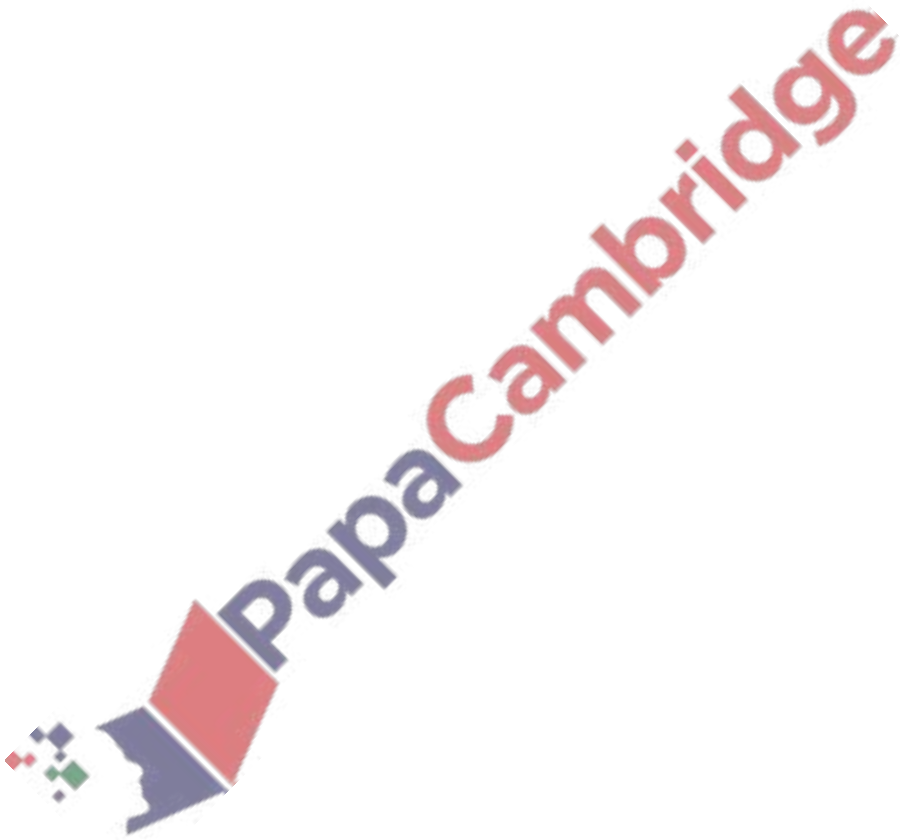
[1]



10. June/2021/Paper_22/No.1

Using the binomial theorem, expand $(1 + e^{2x})^4$, simplifying each term.

[2]



11. June/2021/Paper_24/No.12

- (a) The first term of an arithmetic progression is -5 and the fifth term is 7 . Find the sum of the first 40 terms of this progression. [4]

- (b) A geometric progression has third term of 8 and sixth term of 0.064 . Find the sum to infinity of this progression. [4]

