Geometric sequences

Student name: _____ Score: _____

1. The fourth term, u_4, of a geometric sequence is 135. The fifth term, u_5, is 101.25.

(a) Find the common ratio of the sequence. *[2 marks]*

(b) Find u_1, the first term of the sequence. *[2 marks]*

2. The second term of an arithmetic sequence is 30. The fifth term is 90.

The first, second and fifth terms of this arithmetic sequence are the first three terms of a geometric sequence.

Calculate the seventh term of the **geometric** sequence. [3]

3. Only one of the following four sequences is arithmetic and only one of them is geometric.

$$a_n = 1\,,\,2\,,\,3\,,\,5\,,\,\ldots$$
$$b_n = 1, \frac{3}{2}, \frac{9}{4}, \frac{27}{8}, \ldots$$
$$c_n = 1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots$$
$$d_n = 1\,,\,0.95\,,\,0.90\,,\,0.85\,,\,\ldots$$

(a) State which sequence is

(i) arithmetic;

(ii) geometric. [2]

(b) For **another** geometric sequence $e_n = -6, -3, -\frac{3}{2}, -\frac{3}{4}, \ldots$

(i) write down the common ratio; [1]

(ii) find the **exact** value of the tenth term. Give your answer as a fraction. [3]

4. The first three terms of a geometric sequence are $u_1 = 0.64$, $u_2 = 1.6$, and $u_3 = 4$.

Find the value of r. [2]

5. Consider a geometric sequence where the first term is 768 and the second term is 576.

Find the least value of n such that the nth term of the sequence is less than 7.

6. Consider the geometric sequence $2048, 1536, 1152, 864 \ldots$

(a) Find the common ratio, r. [1]

(b) Write down the next term of the sequence, u_5. [1]

(c) Find the largest term in the sequence that is **not** an integer. [2]

7. Consider a geometric sequence where the first term is 768 and the second term is 576.

Find the least value of n such that the nth term of the sequence is less than 7.

8. The first term of a geometric sequence is 2 and the third term is 2.205.

Calculate

(a) the common ratio of the sequence; *[2 marks]*

(b) the eleventh term of the sequence; *[2 marks]*

9. The third term of a geometric sequence is 12 and the fifth term is $\frac{16}{3}$.
All the terms in the sequence are positive.
Calculate the value of the common ratio.

10. Consider the geometric sequence $8, a, 2, \ldots$ for which the common ratio is $\frac{1}{2}$.

(a) Find the value of a.

(b) Find the value of the eighth term.

11. Consider the infinite geometric sequence $25, 5, 1, 0.2, \ldots$.

(a) Find the common ratio.

(b) Find

(i) the 10^{th} term;

(ii) an expression for the n^{th} term.

Geometric sequences

Student name: _____ANSWERS_____ Score: _____

1. The fourth term, u_4, of a geometric sequence is 135. The fifth term, u_5, is 101.25.

(a) Find the common ratio of the sequence. $r = 0.75$ *[2 marks]*

(b) Find u_1, the first term of the sequence. 320 *[2 marks]*

2. The second term of an arithmetic sequence is 30. The fifth term is 90.

The first, second and fifth terms of this arithmetic sequence are the first three terms of a geometric sequence.

Calculate the seventh term of the **geometric** sequence. 7290 [3]

3. Only one of the following four sequences is arithmetic and only one of them is geometric.

$$a_n = 1, 2, 3, 5, \ldots$$
$$b_n = 1, \frac{3}{2}, \frac{9}{4}, \frac{27}{8}, \ldots$$
$$c_n = 1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots$$
$$d_n = 1, 0.95, 0.90, 0.85, \ldots$$

(a) State which sequence is

(i) arithmetic; d_n

(ii) geometric. b_n [2]

(b) For **another** geometric sequence $e_n = -6, -3, -\frac{3}{2}, -\frac{3}{4}, \ldots$

(i) write down the common ratio; $r = 0.5$ [1]

(ii) find the **exact** value of the tenth term. Give your answer as a fraction. $\frac{3}{256}$ [3]

4. The first three terms of a geometric sequence are $u_1 = 0.64$, $u_2 = 1.6$, and $u_3 = 4$.

Find the value of r. $r = 2.5$ [2]

5. Consider a geometric sequence where the first term is 768 and the second term is 576.

Find the least value of n such that the nth term of the sequence is less than 7. $n = 18$

6. Consider the geometric sequence $2048, 1536, 1152, 864 \ldots$

(a) Find the common ratio, r. 0.75 [1]

(b) Write down the next term of the sequence, u_5. 648 [1]

(c) Find the largest term in the sequence that is **not** an integer. 364.5 [2]

7. Consider a geometric sequence where the first term is 768 and the second term is 576.

Find the least value of n such that the nth term of the sequence is less than 7. 18

8. The first term of a geometric sequence is 2 and the third term is 2.205.

Calculate

(a) the common ratio of the sequence; $r = 1.05$ *[2 marks]*

(b) the eleventh term of the sequence; $n = 3.26$ *[2 marks]*

9. The third term of a geometric sequence is 12 and the fifth term is $\frac{16}{3}$.
All the terms in the sequence are positive.
Calculate the value of the common ratio. $r = \frac{2}{3}$

10. Consider the geometric sequence $8, a, 2, \ldots$ for which the common ratio is $\frac{1}{2}$.

(a) Find the value of a. $a = 4$

(b) Find the value of the eighth term. 0.0625

11. Consider the infinite geometric sequence $25, 5, 1, 0.2, \ldots$.

(a) Find the common ratio. $r = \frac{1}{5}$

(b) Find

(i) the 10th term; 0.0000128

(ii) an expression for the n^{th} term. $u_n = 25\left(\frac{1}{5}\right)^{n-1}$