

## Practice - Geometric Sequences – Nth Term Formula

### \* Key Problems:

Solve problems 1, 4, 6, 7

Do more if you want more practice.

Use the  $N^{\text{th}}$  Term formula for geometric sequences.

$$u_n = u_1 \cdot r^{n-1}$$

- 1 A geometric sequence has the form 4, 8, 16, ...
  - a State the common ratio for this sequence.
  - b Calculate the 20th term of this sequence.
- 2 A geometric sequence has the form 6, 2,  $\frac{2}{3}$ , ...
  - a State the common ratio for this sequence.
  - b Calculate the 10th term of this sequence.
- 3 A geometric sequence has the form 1280, -640, 320, -160, ...
  - a State the common ratio for this sequence.
  - b Find the 8th term of this sequence.
- 4 A geometric sequence has all its terms positive.  
The first term is 5 and the third term is 20.
  - a Find the common ratio.
  - b Find the 7th term of this sequence.
- 5 The second term of a geometric sequence is 18 and the fourth term is  $\frac{81}{2}$ .  
All the terms in the sequence are positive.
  - a Calculate the value of the common ratio.
  - b Find the 8th term in the sequence.
- 6 Consider the geometric sequence -16,  $a$ , -4, ... for which the common ratio is  $\frac{1}{2}$ .
  - a Find the value of  $a$ .
  - b Find the value of the eighth term.
- 7 The second term of a geometric sequence is 18 and the fourth term is 8.  
All the terms are positive.  
Find the value of the common ratio.
- 8 A geometric sequence has all its terms positive. The first term is 12 and the third term is 48.
  - a Find the common ratio.
  - b Find the 12th term.

## SOLUTIONS:

**1 a**  $r = \frac{8}{4} = 2$       **b**  $u_{20} = 4(2)^{19} = 2\,097\,152$

**2 a**  $r = \frac{2}{6} = \frac{1}{3}$       **b**  $u_{10} = 6\left(\frac{1}{3}\right)^9 = 0.000\,305 = \frac{2}{6561}$

**3 a**  $r = -\frac{640}{1280} = -0.5$       **b**  $u_8 = 1280(-0.5)^7 = -10$

**4 a**  $u_1 = 5$   $u_3 = 5r^2 = 20$

$$r^2 = \frac{20}{5} = 4$$

$$r = 2$$

**b**  $u_7 = 5(2)^6 = 320$

**5 a**  $u_2 = u_1 r = 18$        $u_4 = u_1 r^3 = \frac{81}{2}$

$$\frac{u_1 r^3}{u_1 r} = \frac{81}{2} \times \frac{1}{18} = 2.25$$

$$r^2 = 2.25$$

$$r = 1.5$$

**b**  $u_1 = \frac{18}{r} = \frac{18}{1.5} = 12$

$$u_8 = 12(1.5)^7 = 205.031\,25$$

**6 a**  $a = -16 \times \frac{1}{2} = -8$

**b**  $u_8 = -16\left(\frac{1}{2}\right)^7 = -0.125$

**7**  $u_2 = u_1 r = 18$        $u_4 = u_1 r^3 = 8$

$$\frac{u_1 r^3}{u_1 r} = \frac{8}{18} = \frac{4}{9}$$

$$r^2 = \frac{4}{9}$$

$$r = \frac{2}{3}$$

**8 a**  $u_1 = 12$   $u_3 = u_1 r^2 = 48$

$$12r^2 = 48$$

$$r^2 = \frac{48}{12} = 4$$

$$r = 2$$

**b**  $u_{12} = 12(2)^{11} = 24\,576$

