Example Questions.

Ex 5c

5.

a) Show that the sequence

$$12, -6, 3, -\frac{3}{2}, \dots$$

is geometric

b) Find u_n and u_{13}

a) $\dfrac{-6}{12} = -\dfrac{1}{2}$

and each term is

$-\dfrac{1}{2} \times$ the previous term.

b) $\quad u_n = 12\left(-\dfrac{1}{2}\right)^{n-1}$

$$U_{13} = 12\left(-\dfrac{1}{2}\right)^{12}$$

$$= \frac{12}{2^{12}}$$

$$= \frac{2^2 \times 3}{2^{12}}$$

$$= \frac{3}{2^{10}} = \frac{3}{1024}$$

10. The first 3 terms of a geometric sequence are

$$k-1, \ 6, \ 3k$$

a) Find possible terms for k

b) For each k find the next term in the sequence.

a) $\dfrac{6}{k-1} = \dfrac{3k}{6}$

$$36 = 3k(k-1)$$
$$36 = 3k^2 - 3k$$
$$3k^2 - 3k - 36 = 0$$
$$k^2 - k - 12 = 0$$
$$(k-4)(k+3) = 0$$
$$k = 4 \quad \text{or} \quad k = -3$$

b) Sequences

$k = 4$

$r = \dfrac{6}{3} = 2, \quad u_1 = k-1 = 3$

$$u_n = 3(2)^{n-1}$$

$$U_4 = 3(2)^3 = 24$$

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$k = -3$

$r = \dfrac{6}{-4} = -\dfrac{3}{2}, \quad u_1 = k-1 = -4$

$$U_n = -4\left(-\dfrac{3}{2}\right)^{n-1}$$

$$U_4 = -4\left(-\dfrac{3}{2}\right)^3$$

$$= -4 \times \frac{-27}{8}$$

$$= -\frac{27}{2} = -13\frac{1}{2}$$

11.

Find the general term,

u_n of the geometric sequence which has

$$u_3 = 8 \quad, \quad u_6 = -1$$

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

$$8 = u_1 r^2 \quad ①$$
$$-1 = u_1 r^5 \quad ②$$

$$\frac{②}{①} \quad \frac{u_1 r^5}{u_1 r^2} = \frac{-1}{8}$$

$$r^3 = -\frac{1}{8}$$

$$r = \sqrt[3]{-\frac{1}{8}} = -\frac{1}{2}$$

$$u_1 = \frac{8}{r^2} = \frac{8}{\left(-\frac{1}{2}\right)^2}$$

$$= 8 \times \frac{4}{1} = 32$$

$$u_n = 32\left(-\frac{1}{2}\right)^{n-1}$$