# Geometric Sequence - Answer Key

1. Is $-2, 2, -2, 2, ....$ a geometric sequence? Give reasons.
   Yes, with first term $-2$ and common ratio $r = -1$.

2. Is $\frac{1}{3}, 1, \frac{1}{9}, 3, \frac{1}{27}, 9, ...$ a geometric sequence? Give reasons.
   No, there is no common ratio.

3. If $a_3 = 9$ and $a_7 = 81$ for a geometric sequence $\{a_n\}$, find the common ratio $r$.
   $r = \sqrt{3}$.

4. If $a_1 = 8$ and the common ratio is $r = \frac{1}{2}$, find $n$ for which $a_n = r$.
   5.

5. If $a_n = \alpha$ and $a_m = \beta$ for an arithmetic sequence $\{a_n\}$, the common ratio $r$ and the first term.
   $r = \sqrt[n-m]{\frac{\alpha}{\beta}}$ and $a_1 = \sqrt[n-m]{\frac{\beta^{n-1}}{\alpha^{m-1}}}$ .

6. Find the first term and common ratio of the sequence $\{\alpha e^{kn}\}$.
   $a_1 = \alpha e^k$ and $r = e^k$.

7. If the $m$ th tern of the sequence $\{\alpha e^{kn}\}$ is equal to twice the first term, find the value of $k$.
   $k = \frac{\ln 2}{m-1}$.

8. Bill throws a ball from the terrace of a 60 m building. In each bounce the ball attains a vertical height that is $25\%$ of the previous height. Find the distance travelled by the ball after the 2nd bounce.
   $60 + 2 \times 60 \times 0.25 + 2 \times 60 \times (0.25)^2 = 105$ m.

9. A pendulum swings through an arc of 4 meters, where on each successive swing the length of the arc is 0.82 of the previous length. Find the length after 6 swings.
   $4(0.82)^6 = 1.22$ meters.

10. A population of bacteria doubles in number every 3 hours. If initially the population is 1000 bacteria, when does it become 5000?
    7.8 hrs (7.5 hrs is also an acceptable answer.)