

## SATPREP

### Assignment: Algebra: Sequence and Series, Logarithm and Exponent

1. Given that  $p = \log_a 5$ ,  $q = \log_a 2$ , express the following in terms of  $p$  and/or  $q$ .

- (a)  $\log_a 10$
- (b)  $\log_a 8$
- (c)  $\log_a 2.5$

2. Find the sum of the infinite geometric series

$$\frac{2}{3} - \frac{4}{9} + \frac{8}{27} - \frac{16}{81} + \dots$$

3. The first three terms of an infinite geometric sequence are 32, 16 and 8.

- (a) Write down the value of  $r$ .
- (b) Find  $u_6$ .
- (c) Find the sum to infinity of this sequence.

4. Let  $\log_{10} P = x$ ,  $\log_{10} Q = y$  and  $\log_{10} R = z$ . Express  $\log_{10} \left( \frac{P}{QR^3} \right)^2$  in terms of  $x$ ,  $y$  and  $z$ .

5. In an arithmetic sequence,  $u_1 = 2$  and  $u_3 = 8$ .

- (a) Find  $d$ .
- (b) Find  $u_{20}$ .
- (c) Find  $S_{20}$ .

6. Let  $a = \log x$ ,  $b = \log y$ , and  $c = \log z$ .

Write  $\log \left( \frac{x^2 \sqrt{y}}{z^3} \right)$  in terms of  $a$ ,  $b$  and  $c$ .

7. In an arithmetic sequence  $u_{21} = -37$  and  $u_4 = -3$ .

- (a) Find
  - (i) the common difference;
  - (ii) the first term.

(b) Find  $S_{10}$ .

8. Let  $S_n$  be the sum of the first  $n$  terms of an arithmetic sequence, whose first three terms are  $u_1$ ,  $u_2$  and  $u_3$ . It is known that  $S_1 = 7$ , and  $S_2 = 18$ .

- (a) Write down  $u_1$ .
- (b) Calculate the common difference of the sequence.
- (c) Calculate  $u_4$ .