# 1.9 Log laws

**1.** *[7 marks]*

Solve .



**2.** *[7 marks]*

Solve the simultaneous equations



.



**3a.** *[2 marks]*

Let *b* = log*a* , where *a* > 0 . Write down each of the following expressions in terms of *b*.

log*a*



**3b.** *[2 marks]*

log8*a*



**3c.** *[2 marks]*

log*a*



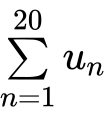
**4a.** *[2 marks]*

An arithmetic sequence has  and , where  and .

Show that .



**4b.** *[6 marks]*

Let  and . Find the value of .



**5.** *[6 marks]*

Solve .



**6a.** *[2 marks]*

Show that  where .



**6b.** *[5 marks]*

It is given that .

Express  in terms of . Give your answer in the form , where *p* , *q* are constants.



**7.** *[5 marks]*

Solve the equation .



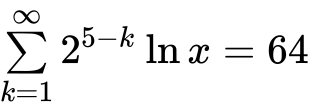
**8a.** *[3 marks]*

The first three terms of a geometric sequence are , , , for .

Find the common ratio.



**8b.** *[5 marks]*

Solve .



**9a.** *[2 marks]*

The first two terms of an infinite geometric sequence, in order, are

, where .

Find .



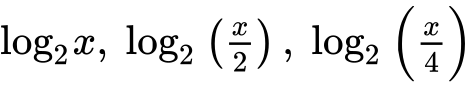
**9b.** *[2 marks]*

Show that the sum of the infinite sequence is .



**9c.** *[4 marks]*

The first three terms of an arithmetic sequence, in order, are

, where .

Find , giving your answer as an integer.



**9d.** *[2 marks]*

Let  be the sum of the first 12 terms of the arithmetic sequence.

Show that .



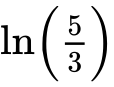
**10.** *[5 marks]*

Solve the equation .



**11a.** *[2 marks]*

Let  and . Write the following expressions in terms of  and .

.



**11b.** *[4 marks]*

.



**12.** *[4 marks]*

Find integer values of  and  for which





**13.** *[6 marks]*

An arithmetic sequence has the first term  and a common difference .

The 13th term in the sequence is . Find the value of .



**14a.** *[2 marks]*

Given that  and , write down the value of  and of .



**14b.** *[4 marks]*

Hence or otherwise solve .



**15a.** *[3 marks]*

Write the expression  in the form , where .



**15b.** *[3 marks]*

Hence or otherwise, solve .

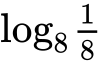


**16a.** *[1 mark]*

Write down the value of

(i)     ;

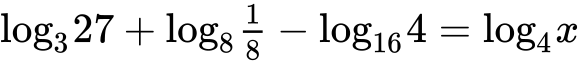
**16b.** *[1 mark]*

(ii)     ;

**16c.** *[1 mark]*

(iii)     .

**16d.** *[3 marks]*

Hence, solve .

**17a.** *[2 marks]*

Find the value of each of the following, giving your answer as an integer.



**17b.** *[2 marks]*



**17c.** *[3 marks]*



**18.** *[5 marks]*

Consider . Given that , find the value of *a*.

**19.** *[5 marks]*

Solve the equation . Express your answer in terms of  and .

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