**Q1.** (a) Given that $log\_{a}x=3 log\_{a}6- log\_{a}8$

where $a$ is a positive constant, show that $x = 27$.

**(3)**

(b) Write down the value of:

(i) $log\_{4}1$ ;

**(1)**

(ii) $log\_{4}4$ ;

**(1)**

(iii) $log\_{4}2$ ;

**(1)**

(iv) $log\_{4}8$ .

**(1)**

**(Total 7 marks)**

**Q2.** Find the value of $log\_{a}\left(a^{3}\right)+log\_{a}\left(\frac{1}{a}\right)$

 **(Total 2 marks)**

**Q3.** (a) Given that $log\_{a}x=2log\_{a}6-log\_{a}3$

show that $x = 12$.

**(3)**

(b) Given that $log\_{a}y+log\_{a}5=7$

express$ y$in terms of $a$*,* giving your answer in a form not involving logarithms.

**(3)**

**(Total 6 marks)**

**Q4.** (a) Write down the value of:

(i) $log\_{a}1$ ;

 **(1)**

(ii) $log\_{a}a$ .

**(1)**

(b) Given that $log\_{a}x=log\_{a}5+log\_{a}6-log\_{a}1.5$

find the value of *x*.

**(3)**

**(Total** **5** **marks)**

**Q5.** (a) It is given that $n$ satisfies the equation

$log\_{a}n=log\_{a}3+log\_{a}(2n-1)$

Find the value of $n$.

 **(3)**

(b) Given that

$log\_{a}x=3$ and $log\_{a}y-3log\_{a}2=4$

(i) express $x$ in terms of $a$;

**(1)**

(ii) express $xy$ in terms of $a$.

**(4)**

**(Total 8 marks)**

**Q6.** (a) Given that

$log\_{a}x=log\_{a}16-log\_{a}2$

write down the value of $x$.

**(1)**

(b) Given that

 $log\_{a}y=2log\_{a}3+log\_{a}4+1$

express $y$ in terms of $a$, giving your answer in a form **not** involving logarithms.

**(3)**

**(Total** **4** **marks)**

**Q7.** (a) (i) Find the value of *p* for which $\sqrt{125}= 5^{p}$.

**(2)**

(ii) Hence solve the equation $5^{2x}=\sqrt{125}$.

**(1)**

(b) Use logarithms to solve the equation $3^{2x-1}= 0.05$

giving your value of $x$ to four decimal places.

**(3)**

(c) It is given that

 $log\_{a}x=2\left(log\_{a}3+log\_{a}2\right)-1$

Express $x$ in terms of $a$, giving your answer in a form not involving logarithms.

**(4)**

**(Total 10 marks)**

**Q8.** (a) Write each of the following in the form $log\_{a}k$, where $k$

is an integer:

(i) $log\_{a}4+log\_{a}10$ ;

**(1)**

(ii) $log\_{a}16-log\_{a}2$ ;

 **(1)**

(iii) $3log\_{a}5$ .

**(1)**

(b) Use logarithms to solve the equation $(1.5)^{3x}=7.5$ ,

giving your value of $x$ to three decimal places.

**(3)**

(c) Given that $log\_{2}p=m$ and $log\_{8}q=n$, express $pq$ in the

form $2^{y}$, where $y$ is an expression in $m$ and $n$.

**(3)**

**(Total 9 marks)**

**Q9.** (a) Find the value of $x$ in each of the following:

 (i) $log\_{9}x=0$ ;

**(1)**

(ii) $log\_{9}x=\frac{1}{2}$ .

**(1)**

(b) Given that

 $2log\_{a}n=log\_{a}18+log\_{a}(n-4)$

find the possible values of $n$.

**(5)**

**(Total 7 marks)**

**Q10.** Given that

 $log\_{a}N-log\_{a}x=\frac{3}{2}$

express $x$ in terms of $a$ and $N$, giving your answer in a form

not involving logarithms.

**(Total 3 marks)**

**Q11.** (a) Given that $log\_{a}b=c$ , express $b$ in terms of $a$ and $c$.

**(1)**

(b) By forming a quadratic equation, show that there is

only one value of $x$ which satisfies the equation

$2log\_{2}\left(x+7\right)-log\_{2}\left(x+5\right)=3$

 **(6)**

**(Total 7 marks)**

**Q12.** (a) Given that

$2log\_{k}x-log\_{k}5=1$ ,

express $k$ in terms of $x$. Give your answer in a form not

involving logarithms.

**(4)**

(b) Given that $log\_{a}y=\frac{3}{2}$ and that $log\_{4}a=b+2$ , show

that $=2^{p}$ , where $p$ is an expression in terms of $b$.

**(3)**

**(Total 7 marks)**