3.10 – Logarithms

Student name: Answers Score: _____

1. Write as a single logarithm.

$$\log 6 + \log 3 - \log 2$$

log 9 ..... [1]

2. **(a)** $3\log 2 + 2\log 3 = \log k$

Find the value of k.

$k =$ 72 ..... [2]

(b) Find the value of $\dfrac{\log 25}{\log 5}$.

2 ..... [1]

3. Simplify.

$\log 9 + 3\log 2 - 2\log 6$

log 2 ..... [3]

4. **(a)** Find the value of $\log_2 8$.

3 ..... [1]

(b) Write the following as a single logarithm.

$3\log 2 - \log 4 + 2\log 5$

log 50 ..... [3]

5. $\log y = 2\log 3 + 5\log 2$

Find the value of y.

288 ..... [3]

6. **(a)** Write as a single logarithm.

$\log 3 + \log 4 - \log 2$

log 6 ..... [1]

(b) Make x the subject of $y = \log_3 x$.

$x =$ 3^y ..... [1]

7. **(a)** Write down the value of

(i) $\log 1000$,

3 ..... [1]

(ii) $\log 0.01$.

-2 ..... [1]

(b) Find p when

$$2\log 5 - \log 2 = \log p \ .$$

$p =$ 12.5 ..... [2]

8. **(a)** Write $2\log(x+1) - \log(x-1)$ as a single logarithm.

$\log\left(\frac{(x+1)^2}{(x-1)}\right)$ ..... [2]

(b) $\log_3 p = 4$ where p is an integer.

Find the value of p.

$p =$ 81 ..... [2]

9. Solve.

$$\log x + \log 5 - \log 25 = \log 10$$

$x =$ 50 ..... [3]

10. Solve the following equations.

(a) $\log x + \log 3 = \log 12$

$x =$ 4 ..... [1]

(b) $\log x = 3$

$x =$ 1000 ..... [1]

(c) $2\log x - \log 5 = \log 20$

$x =$ 10 ..... [3]

11.

$$\log y = 2\log 3 + 3\log 2 - \log 6$$

Find the value of y.

$y =$ 12 ..... [3]

12. **(a)** $3 = \log_p 8$

Write down the value of p.

$p =$ 2 ..... [2]

(b) $\log 12 + \log 9 = q\log 2 + r\log 3$

Find the values of q and r.

$q =$ 2 .....

$r =$ 3 ..... [3]

13. $3\log 2 - 2\log 4 = \log t$

Find the value of t.

$t =$ 0.5 ..... [2]

14. **(a)** Find $\log_2 8$.

3 ..... [1]

(b) Find p when $\log 3 + 2\log 5 = \log p$.

$p =$ 75 ..... [2]

15. **(a)** Find the value of $\log_3\left(\frac{1}{9}\right)$.

-2 ..... [1]

(b) $p = \frac{\log q}{\log 3}$

Find q in terms of p.

$q =$ 3^p ..... [2]

16. Find the value of $\log_9 3$

0.5 ..... [1]

17. Find the value of

(a) $\frac{\log 4}{\log 8}$,

$\frac{2}{3}$ ..... [2]

(b) $\log_4 8$.

1.5 ..... [1]

18. **(a)** $2\log 3 = \log k$

Find the value of k.

$k =$ 9 ..... [2]

(b) $\log 5 - \log 2 = \log p$

Find the value of p.

$p =$ 2.5 ..... [2]

19. **(a)** Find $\log_5 25$.

2 ..... [1]

(b) $2\log 3 - \log 5 = \log p$

Find p.

$p =$ $\frac{9}{5}$ ..... [2]

20. Find the value of x when $5\log 2 - \log 8 = \log x$.

$x =$ 4 ..... [2]

21. Simplify.

$$2\log 3 - 3\log 2 + 2\log\frac{2}{3}$$

$\log\frac{1}{2}$ ..... [3]

22. **(a)** Write down the value of $\log_9 3$.

$\frac{1}{2}$ ..... [1]

(b) $2\log 2 + \log 11 = \log x$.

Find the value of x.

$x =$ 44 ..... [2]

23. **(a)** Solve $3\log 2 - 2\log 5 = \log x$.

$x =$ 0.32 or $\frac{8}{25}$ ..... [3]

(b) Solve $\log_y 4 = \frac{1}{3}$.

$y =$ 64 ..... [1]

24. **(a)** Find the value of $\log_{25} 5$.

$\frac{1}{2}$ ..... [1]

(b) Simplify $\log 63 - 2\log 3$.

$\log 7$ ..... [2]

25. **(a)** $2\log x = 3\log 4$

Find the value of x.

$x =$ 8 ..... [2]

(b) $\log x + \log u - \log v = \log p$

Find p in terms of x, u and v.

$p =$ $\frac{xu}{v}$ ..... [1]

26. $3\log y = 2\log x - \log w$

Find y in terms of x and w.

$y =$ $\sqrt[3]{\frac{x^2}{w}}$ ..... [3]

27. Solve.

(a) $\log_x 9 = 2$

$x =$ 3 ..... [1]

(b) $2\log x - \log 4 = \log 9$

$x =$ 6 ..... [2]

28. $2\log p = 3\log x - \log y$

Find p in terms of x and y.

$p =$ $\sqrt{\frac{x^3}{y}}$ [3]

29. Solve.

$$2\log 3 - \log 2 = \log p$$

$p =$ 4.5 or $\frac{9}{2}$ [2]

30. Solve.

$$\log x = 1 + \log 9 - \log 8 + 2\log\frac{2}{3}$$

$x =$ 5 [3]

31. (a) $\log k = 2\log 3 - 5\log 2$

Find the value of k.

$k =$ $\frac{9}{32}$ [2]

(b) $\log_2 p = -1$

Find the value of p.

$p =$ 0.5 [1]

32. (a) Find the value of n when $\log 5 + \log 3 - \log 2 = \log n$.

7.5 [1]

(b) Find $\log_3(3^{1.4})$.

1.4 [1]

33. Solve the equation.

$$3\log x - \log 4 = 4\log 2$$

$x =$ 4 [3]

34. (a) Find $\log_3\left(\frac{1}{9}\right)$.

–2 [1]

(b) Solve $\log x + 2\log 5 = \log 15$.

$\frac{15}{25}$ or $\frac{3}{5}$ or 0.6 [2]

35. Find the value of

$$\log_5 125.$$

3 [1]

36. $\log x = 2\log 3 - 5\log 2$

Find the value of x.

$x =$ $\frac{9}{32}$ [2]

37. Solve.

(a) $\log_3 x = 4$

$x =$ 81 [1]

(b) $2\log x - 3\log 2 = \log 50$

$x =$ 20 [3]

38. $\log 48 + \log 18 - 2\log 24 = \log t$

Find the value of t.

$t =$ $\frac{3}{2}$ or $1\frac{1}{2}$ or 1.5 [3]

39. Solve.

$$\log 2x = 5$$

$x =$ 50 000 [2]

40. $4\log y + 3\log x = 2$

Find y in terms of x.

$y = [\pm]\sqrt[4]{\frac{100}{x^3}}$ [3]

41. $\log y = \log h + \log p - \log x$

Find y in terms of h, p and x.

$y =$ $\frac{hp}{x}$ [1]