

**A2.A.19: Properties of Logarithms 4: Apply the properties of logarithms to rewrite logarithmic expressions in equivalent forms**

- 1 If  $\log_b x = y$ , then  $\log_b x^2$  is
- |            |            |
|------------|------------|
| 1) $y + 2$ | 3) $y - 2$ |
| 2) $2y$    | 4) $y$     |
- 2 If  $\log a = x$  and  $\log b = y$ , then  $\log \sqrt{ab}$  is equivalent to
- |                         |                    |
|-------------------------|--------------------|
| 1) $\frac{1}{2}x + y$   | 3) $\frac{1}{2}xy$ |
| 2) $\frac{1}{2}(x + y)$ | 4) $\frac{1}{4}xy$ |
- 3 If  $\log a = x$  and  $\log b = y$ , what is  $\log a\sqrt{b}$ ?
- |              |                      |
|--------------|----------------------|
| 1) $x + 2y$  | 3) $\frac{x + y}{2}$ |
| 2) $2x + 2y$ | 4) $x + \frac{y}{2}$ |
- 4 If  $\log x = a$ ,  $\log y = b$ , and  $\log z = c$ , then  $\log \frac{x^2 y}{\sqrt{z}}$  is equivalent to
- |                             |                             |
|-----------------------------|-----------------------------|
| 1) $42a + b + \frac{1}{2}c$ | 3) $a^2 + b - \frac{1}{2}c$ |
| 2) $2ab - \frac{1}{2}c$     | 4) $2a + b - \frac{1}{2}c$  |
- 5 If  $\log 3 = a$  and  $\log 5 = b$ , then  $\log 45$  is equal to
- |              |            |
|--------------|------------|
| 1) $a^2 + b$ | 3) $2ab$   |
| 2) $2a + b$  | 4) $a^2 b$ |
- 6 If  $\log 5 = a$ , then  $\log 250$  can be expressed as
- |             |              |
|-------------|--------------|
| 1) $50a$    | 3) $10 + 2a$ |
| 2) $2a + 1$ | 4) $25a$     |
- 7 If  $\log 2 = a$  and  $\log 3 = b$ , the expression  $\log \frac{9}{20}$  is equivalent to
- |                 |                       |
|-----------------|-----------------------|
| 1) $2b - a + 1$ | 3) $b^2 - a + 10$     |
| 2) $2b - a - 1$ | 4) $\frac{2b}{a + 1}$ |

8 Given:  $\log_b 2 = x$  and  $\log_b 3 = y$

Express in terms of  $x$  and  $y$ :  $\log_b 18$

$$\log_b \frac{9}{16}$$

9 Given:  $\log 7 = x$  and  $\log 3 = y$

Express in terms of  $x$  and  $y$ :  $\log \sqrt{\frac{3}{7}}$

$$\log 63$$

10 Given:  $\log 2 = x$  and  $\log 3 = y$

Express in terms of  $x$  and  $y$ :  $\log \frac{\sqrt{2}}{9}$

$$\log \sqrt[3]{6}$$

11 Given:  $\log_b 3 = p$  and  $\log_b 5 = q$

Express in terms of  $p$  and  $q$ :  $\log_b \frac{9}{5}$

$$\log_b \sqrt[3]{15}$$

12 Given:  $\log 2 = x$  and  $\log 3 = y$

Express in terms of  $x$  and  $y$ :  $\log \frac{2}{3}$

$$\log 12$$

13 Given:  $\log 2 = a$  and  $\log 13 = b$

Express in terms of  $a$  and  $b$ :  $\log 26$

$$\log \frac{8}{\sqrt{13}}$$

14 Given:  $\log 2 = x$  and  $\log 11 = y$

Express in terms of  $x$  and  $y$ :  $\log \sqrt[3]{\frac{2}{11}}$

$$\log 44$$

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## **Answer Section**

- |    |   |                 |                 |
|----|---|-----------------|-----------------|
| 1  | ANS: 2  | PTS: 2          | REF: 089620siii |
| 2  | ANS: 2  | PTS: 2          | REF: 069026siii |
| 3  | ANS: 4  | PTS: 2          | REF: 060510b    |
| 4  | ANS: 4  | PTS: 2          | REF: 010409b    |
| 5  | ANS: 2  | PTS: 2          | REF: 088419siii |
| 6  | ANS: 2  | PTS: 2          | REF: 080110b    |
| 7  | ANS: 2  | PTS: 2          | REF: 011326a2   |
| 8  | ANS:<br>$x + 2y, 2y - 4x$                       |                 |                 |
|    | PTS: 4  | REF: 010439siii |                 |
| 9  | ANS:<br>$\frac{1}{2}(y - x), x + 2y$            |                 |                 |
|    | PTS: 4  | REF: 019637siii |                 |
| 10 | ANS:<br>$\frac{1}{2}x - 2y, \frac{1}{3}(x + y)$ |                 |                 |
|    | PTS: 4  | REF: 069640siii |                 |
| 11 | ANS:<br>$2p - q, \frac{1}{3}(p + q)$            |                 |                 |
|    | PTS: 4  | REF: 069838siii |                 |
| 12 | ANS:<br>$x - y, 2x + y$                         |                 |                 |
|    | PTS: 5  | REF: 010041siii |                 |
| 13 | ANS:<br>$a + b, 3a - \frac{1}{2}b$              |                 |                 |
|    | PTS: 4  | REF: 060140siii |                 |
| 14 | ANS:<br>$\frac{1}{3}(x - y), 2x + y$            |                 |                 |
|    | PTS: 4  | REF: 060339siii |                 |