F.BF.B.5: Properties of Logarithms 3

1 If $\log_b x = y$, then $\log_b x^2$ is
   1) $y + 2$
   2) $2y$
   3) $y - 2$
   4) y

2 If $\log a = x$ and $\log b = y$, then $\log(ab^2)$ equals
   1) $\frac{1}{2}(x + y)$
   2) $x + \frac{1}{2}y$
   3) $x + 2y$
   4) $2x + 2y$

3 If $\log a = x$ and $\log b = y$, then $\log \sqrt{ab}$ is equivalent to
   1) $\frac{1}{2}x + y$
   2) $\frac{1}{2}(x + y)$
   3) $\frac{1}{2}xy$
   4) $\frac{1}{4}xy$

4 If $\log a = x$ and $\log b = y$, what is $\log a\sqrt{b}$?
   1) $x + 2y$
   2) $2x + 2y$
   3) $\frac{x + y}{2}$
   4) $x + \frac{y}{2}$

5 If $\log x = a$, $\log y = b$, and $\log z = c$, then $\log \frac{x^2 y}{\sqrt{z}}$ is equivalent to
   1) $42a + b + \frac{1}{2}c$
   2) $2ab - \frac{1}{2}c$
   3) $a^2 + b - \frac{1}{2}c$
   4) $2a + b - \frac{1}{2}c$

6 If $\log 3 = a$ and $\log 5 = b$, then $\log 45$ is equal to
   1) $a^2 + b$
   2) $2a + b$
   3) $2ab$
   4) $a^2 b$

7 If $\log 5 = a$, then $\log 250$ can be expressed as
   1) $50a$
   2) $2a + 1$
   3) $10 + 2a$
   4) $25a$

8 If $\log 2 = a$ and $\log 3 = b$, the expression $\log \frac{9}{20}$ is equivalent to
   1) $2b - a + 1$
   2) $2b - a - 1$
   3) $b^2 - a + 10$
   4) $\frac{2b}{a + 1}$

9 If $\log a = 2$ and $\log b = 3$, what is the numerical

value of $\log \dfrac{\sqrt{a}}{b^3}$?

1) 8
2) −8
3) 25
4) −25

10 Given: $\log_b 2 = x$ and $\log_b 3 = y$
Express in terms of x and y: $\log_b 18$

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

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

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

$$\log 63$$

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

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

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

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

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

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

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

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

$$\log 12$$

15 Given: $\log 2 = a$ and $\log 13 = b$
Express in terms of a and b: $\log 26$

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

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

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

$$\log 44$$

17 Given: $\log_b 2 = 0.6931$ and $\log_b 3 = 1.0986$
Find $\log_b \sqrt{12}$

18 Given: $\log_a 5 = 2.32$ and $\log_a 9 = 3.17$
Find: $\log_a \dfrac{25}{9}$ and $\log_a \sqrt{45}$

19 Given: $\log_b R = 0.75$ and $\log_b S = 0.25$
Find: $\log_b R^2 S$ and $\log_b \dfrac{\sqrt[3]{R}}{RS}$

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Answer Section

1 ANS: 2 REF: 089620siii
2 ANS: 3

$\log(ab^2) = \log a + \log b^2 = \log a + 2\log b = x + 2y$

REF: 081618a2
3 ANS: 2 REF: 069026siii
4 ANS: 4

$\log a\sqrt{b} = \log a + \log b^{\frac{1}{2}} = \log a + \frac{1}{2}\log b - x + \frac{y}{2}$

REF: 060510b
5 ANS: 4

$\log \frac{x^2 y}{\sqrt{z}} = \log x^2 + \log y - \log z^{\frac{1}{2}} = 2\log x + \log y - \frac{1}{2}\log z = 2a + b - \frac{1}{2}c$

REF: 010409b
6 ANS: 2 REF: 088419siii
7 ANS: 2

$\log 250 = \log(5^2 \cdot 10) = \log 5^2 + \log 10 = 2\log 5 + \log 10 = 2a + 1$

REF: 080110b
8 ANS: 2

$\log 9 - \log 20$

$\log 3^2 - \log(10 \cdot 2)$

$2\log 3 - (\log 10 + \log 2)$

$2b - (1 + a)$

$2b - a - 1$

REF: 011326a2
9 ANS: 2

$\log \frac{\sqrt{a}}{b^3} = \log a^{\frac{1}{2}} - \log b^3 = \frac{1}{2}\log a - 3\log b = \frac{1}{2}(2) - 3(3) = -8$

REF: 060316b
10 ANS:
$x + 2y, \ 2y - 4x$

REF: 010439siii

11 ANS:

$\frac{1}{2}(y-x), x+2y$

REF: 019637siii

12 ANS:

$\frac{1}{2}x-2y, \frac{1}{3}(x+y)$

REF: 069640siii

13 ANS:

$2p-q, \frac{1}{3}(p+q)$

REF: 069838siii

14 ANS:
$x-y, 2x+y$

REF: 010041siii

15 ANS:

$a+b, 3a-\frac{1}{2}b$

REF: 060140siii

16 ANS:

$\frac{1}{3}(x-y), 2x+y$

REF: 060339siii

17 ANS:
1.2424

REF: 089342siii

18 ANS:
1.47, 2.745

REF: 069441siii

19 ANS:
1.75, −0.75

REF: 019840siii