F.BF.B.5: Properties of Logarithms 1b

1 Which expression is *not* equivalent to $\log_b 36$?
1) $6\log_b 2$
2) $\log_b 9 + \log_b 4$
3) $2\log_b 6$
4) $\log_b 72 - \log_b 2$

2 The expression $\log 12$ is equivalent to

3 The expression $\log 4x$ is equivalent to

4 The expression $\log 4m^2$ is equivalent to

5 If $A = \pi r^2$, $\log A$ equals

6 If $2x^3 = y$, then $\log y$ equals

7 If $L = \frac{x^2}{k}$, then $\log L$ is equal to

8 The expression $\log \frac{b^3}{a}$ is equivalent to

9 If $u = \frac{x}{y^2}$, which expression is equivalent to $\log u$?

10 If $T = \frac{10x^2}{y}$, then $\log T$ is equivalent to

11 The expression $\log \sqrt{xy}$ is equivalent to

12 If $x = (8^2)(\sqrt{5})$, which expression is equivalent to $\log x$?

13 If $x = \frac{a\sqrt{b}}{c}$, then $\log x$ is equal to

14 $\text{Log}\frac{\sqrt{xy}}{z}$ is equal to

15 The expression $\log \frac{\sqrt{xy}}{w}$ is equivalent to

16 $\text{Log}\sqrt{\frac{a}{b}}$ is equivalent to

17 The expression $\log\left(\frac{x^n}{\sqrt{y}}\right)$ is equivalent to

18 The expression $\log\left(\frac{x^2y^3}{\sqrt{z}}\right)$ is equivalent to

19 The expression $\log\frac{\sqrt{x^2y^3}}{z}$ is equivalent to

20 The expression $\log\frac{\sqrt[3]{a}}{b}$ is equivalent to

21 If $r=\sqrt[3]{\frac{A^2B}{C}}$, then $\log r$ can be represented by

22 The equation $N=\frac{\sqrt[4]{x^2y}}{z}$ is equivalent to

23 The expression $\log\sqrt[4]{\frac{a^2}{b}}$ is equivalent to

24 If $\log x^2-\log 2a=\log 3a$, then $\log x$ expressed in terms of $\log a$ is equivalent to

25 $\operatorname{Log}\cot A$ is equivalent to

26 The magnitude (R) of an earthquake is related to its intensity (I) by $R=\log\left(\frac{I}{T}\right)$, where T is the threshold below which the earthquake is not noticed. If the intensity is doubled, its magnitude can be represented by

27 The speed of sound, v, at temperature T, in degrees Kelvin, is represented by the equation $v=1087\sqrt{\frac{T}{273}}$. Which expression is equivalent to $\log v$?

28 A black hole is a region in space where objects seem to disappear. A formula used in the study of black holes is the Schwarzschild formula, $R=\frac{2GM}{c^2}$. Based on the laws of logarithms, $\log R$ can be represented by

29 Banks use the formula $A=P(1+r)^x$ when they compound interest annually. If P represents the amount of money invested and r represents the rate of interest, which expression represents $\log A$, where A represents the amount of money in the account after x years?

30 The equation used to determine the time it takes a swinging pendulum to return to its starting point is $T=2\pi\sqrt{\frac{\ell}{g}}$, where T represents time, in seconds, ℓ represents the length of the pendulum, in feet, and g equals $32\ \text{ft}/\text{sec}^2$. How is this equation expressed in logarithmic form?

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Answer Section

1 ANS: 1

$6 \log_b 2$

$\log_b 2^6$

$\log_b 64 = \log_b 36$

REF: 010208b

2 ANS:

$\log 3 + 2\log 2$

REF: 060029siii

3 ANS:

$\log 4 + \log x$

REF: 080022siii

4 ANS:

$\log 4 + 2\log m$

$\log 4m^2 = \log 4 + \log m^2 = \log 4 + 2\log m$

REF: 061321a2

5 ANS:

$\log \pi + 2\log r$

REF: 010220siii

6 ANS:

$\log 2 + 3\log x$

$\log 2x^3 = \log 2 + \log x^3 = \log 2 + 3\log x$

REF: 061426a2

7 ANS:

$2\log x - \log k$

REF: 068529siii

8 ANS:

$3\log b - \log a$

REF: 060319siii

9 ANS:

$\log x - 2\log y$

REF: 089315siii

10 ANS:
$(1 + 2\log x) - \log y$

$\log T = \log \frac{10x^2}{y} = \log 10 + \log x^2 - \log y = 1 + 2\log x - \log y$

REF: 011615a2

11 ANS:
$\frac{1}{2}(\log x + \log y)$

REF: 068122siii

12 ANS:
$2\log 8 + \frac{1}{2}\log 5$

REF: 068918siii

13 ANS:
$\log a + \frac{1}{2}\log b - \log c$

REF: 068023siii

14 ANS:
$\frac{1}{2}\log x + \frac{1}{2}\log y - \log z$

REF: 019025siii

15 ANS:
$\frac{1}{2}(\log x + \log y) - \log w$

REF: 010124siii

16 ANS:
$\frac{1}{2}(\log a - \log b)$

REF: 069519siii

17 ANS:
$n\log x - \frac{1}{2}\log y$

REF: 089718siii

18 ANS:
$2\log x + 3\log y - \frac{1}{2}\log z$

REF: 069917siii

19 ANS:

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

REF: 080122siii

20 ANS:

$\frac{1}{3}\log a - \log b$

REF: 068821siii

21 ANS:

$\frac{2}{3}\log A + \frac{1}{3}\log B - \frac{1}{3}\log C$

REF: 061120a2

22 ANS:

$\log N = \frac{1}{4}(2\log x + \log y) - \log z$

REF: 069420siii

23 ANS:

$\frac{1}{4}(2\log a - \log b)$

REF: 019619siii

24 ANS:

$\frac{1}{2}\log 6 + \log a$

$\log x^2 = \log 3a + \log 2a$

$2\log x = \log 6a^2$

$\log x = \frac{\log 6}{2} + \frac{\log a^2}{2}$

$\log x = \frac{1}{2}\log 6 + \frac{2\log a}{2}$

$\log x = \frac{1}{2}\log 6 + \log a$

REF: 011224a2

25 ANS:

$\log\cos A - \log\sin A$

REF: 018625siii

26 ANS:
$\log 2 + \log I - \log T$

$\log \frac{2I}{T} = \log 2 + \log I - \log T$

REF: 060102b

27 ANS:
$\log 1087 + \frac{1}{2}\log T - \frac{1}{2}\log 273$

$\log v = \log 1087\sqrt{\frac{T}{273}}$

$= \log 1087 \cdot (\frac{T}{273})^{\frac{1}{2}}$

$= \log 1087 + \log(\frac{T}{273})^{\frac{1}{2}}$

$= \log 1087 + \frac{1}{2}\log \frac{T}{273}$

$= \log 1087 + \frac{1}{2}\log T - \frac{1}{2}\log 273$

REF: 010611b

28 ANS:
$\log 2 + \log G + \log M - 2\log c$

$\log R = \log \frac{2GM}{c^2} = \log 2 + \log G + \log M - \log c^2 = \log 2 + \log G + \log M - 2\log c$

REF: 010717b

29 ANS:
$\log P + x\log(1 + r)$

$\log A = \log P(1 + r)^x = \log P + \log(1 + r)^x = \log P + x\log(1 + r)$

REF: 080911b

30 ANS:

$\log T = \log 2 + \log \pi + \frac{1}{2}\log \ell - \frac{1}{2}\log 32$

$\log T = \log(2\pi\sqrt{\frac{\ell}{32}})$

$= \log(2\pi(\frac{\ell}{32})^{\frac{1}{2}})$

$= \log 2 + \log \pi + \log(\frac{\ell}{32})^{\frac{1}{2}}$

$= \log 2 + \log \pi + \frac{1}{2}\log \frac{\ell}{32}$

$= \log 2 = \log \pi + \frac{1}{2}(\log \ell - \log 32)$

$= \log 2 + \log \pi + \frac{1}{2}\log \ell - \frac{1}{2}\log 32$

REF: 080709b