

**A2.A.19: Properties of Logarithms 3: Apply the properties of logarithms to rewrite logarithmic expressions in equivalent forms**

- 1 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
  - 1)  $2(\log I - \log T)$
  - 2)  $\log I - \log T$
  - 3)  $2 \log I - \log T$
  - 4)  $\log 2 + \log I - \log T$
- 2 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  $\log v$ ?
  - 1)  $1087 + \frac{1}{2} \log T - \log 273$
  - 2)  $1087\left(\frac{1}{2} \log T - \frac{1}{2} \log 273\right)$
  - 3)  $\log 1087 + \frac{1}{2} \log T - \frac{1}{2} \log 273$
  - 4)  $\log 1087 + 2 \log(T + 273)$
- 3 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
  - 1)  $2 \log G + \log M - \log 2c$
  - 2)  $\log 2G + \log M - \log 2c$
  - 3)  $\log 2 + \log G + \log M - 2 \log C$
  - 4)  $2 \log GM - 2 \log C$
- 4 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?
  - 1)  $x \log P + \log(1+r)$
  - 2)  $\log P + x \log(1+r)$
  - 3)  $\log P + x \log 1+r$
  - 4)  $\log P + \log x + \log(1+r)$
- 5 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,  $\ell$  represents the length of the pendulum, in feet, and  $g$  equals  $32 \text{ ft/sec}^2$ . How is this equation expressed in logarithmic form?
  - 1)  $\log T = \log 2 + \log \pi + \log \sqrt{\ell - 32}$
  - 2)  $\log T = \log 2 + \log \pi + \frac{1}{2} \log \ell - \frac{1}{2} \log 32$
  - 3)  $\log T = \log 2 + \log \pi + \frac{1}{2} \log \ell - \log 16$
  - 4)  $\log T = 2 + \log \pi + \frac{1}{2} \log \ell - 16$

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1	ANS: 4	PTS: 2	REF: 060102b
2	ANS: 3	PTS: 2	REF: 010611b
3	ANS: 3	PTS: 2	REF: 010717b
4	ANS: 2	PTS: 2	REF: 080911b
5	ANS: 2	PTS: 2	REF: 080709b