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## Unit: Logarithmic Functions

Section A: Selected Response: Place the letter of your response in the space at the right. (15 marks)

1. What is the exact value of $\mathrm{x}: 3=2^{x+1}$ $\qquad$
A) $\log \left(\frac{3}{2}\right)-1$
B) $\frac{\log 3}{\log 2}-1$
C) $\log \left(\frac{3}{2}\right)+1$
D) $\frac{\log 3}{\log 2}+1$
2. Solve for x : $\log _{4}(3 x)+\log _{4}(x-2)=\log _{4} 24$ $\qquad$
A) $x=-4$
B) $x=4$
C) $x=-2$
D) $x=2$
3. What is the domain of $y=-\log _{5}(6-x)$ ?
4. $\qquad$
A) $x>-6$
B) $x<-6$
C) $x>6$
D) $x<6$
5. What is the equivalent logarithmic form of $3^{y}=x+1$ ? $\qquad$
A) $y=\log _{3}(x-1)$
B) $y=\log (3 x+1)$
C) $y=\log _{3}(x+1)$
D) $y=\log (3 x-1)$
6. What is the equation of the graph shown? $\qquad$
A) $y=\log _{2}(x-4)$
B) $y=-\log _{2}(x-4)$
C) $y=-\log _{2}(x+4)$
D) $y=\log _{2}(x+4)$

7. Solve for $\mathrm{x}: \log _{2}\left(\log _{x} 64\right)=1$
A) $x=8$
B) $x=4$
C) $x=16$
D) $x=32$
8. Which expression is equivalent to $\log \frac{A^{3}}{\sqrt{B} C^{4}}$ ?
A) $3 \log A-\frac{1}{2} \log B+4 \log C$
B) $3 \log A-\frac{1}{2} \log B+2 \log C$
C) $3 \log A-\frac{1}{2} \log B-2 \log C$
D) $3 \log A-\frac{1}{2} \log B-4 \log C$
9. Solve for $\mathrm{x}: \log _{6}(5 x+2)=\frac{1}{2} \log _{6} 64+\log _{6} 3$
A) $x=\frac{94}{5}$
B) $x=\frac{22}{5}$
C) $x=\frac{26}{5}$
D) $x=\frac{9}{5}$
10. Write as a single logarithm $3[\log A+\log B]-\log C$. $\qquad$
A) $\log \frac{A B}{C^{3}}$
B) $\log \left(\frac{A B}{C}\right)^{3}$
C) $\log \frac{(A B)^{3}}{C}$
D) $\log \frac{A B^{3}}{C}$
11. What is the value of $\log _{2}(4 x)$ if $\log _{2} x=3$ ?
12. $\qquad$
A) 5
B) 6
C) 7
D) 12
13. If $\log _{2} 9=x$, then $\log _{2} \sqrt[5]{9^{3}}$ is equivalent to which expression?
14. $\qquad$
A) $x^{\frac{3}{5}}$
B) $x^{\frac{5}{3}}$
C) $\frac{3 x}{5}$
D) $\frac{5 x}{3}$
15. What is the $x$-intercept of $y=\log _{2}(x+7)$ ?
16. $\qquad$
A) 1
B) -6
C) 8
D) -7
17. What is the inverse of $y=4^{x}$ ?
18. $\qquad$
A) $y=\log _{x} 4$
B) $y=\log _{4} x$
C) $x=\log _{4} y$
D) $x=\log _{y} 4$
19. $\$ 3500$ is invested in an account that pays $5.5 \%$ interest compounded quarterly. What is the balance after 8 years? $\qquad$
A) $\$ 5418.21$
B) $\$ 8338.47$
C) $\$ 3904.05$
D) $\$ 10836.42$
20. Solve for x : $4^{x+1}=5\left(3^{2 x}\right)$ $\qquad$
A) $\frac{\log 5-\log 4}{1-2 \log 3}$
B) $\frac{\log 5-\log 4}{\log 4-2 \log 3}$
C) $\frac{-\log 4}{\log 4-2 \log 15}$
D) $\frac{-\log 4}{1-2 \log 15}$

Section B: Constructed Response. Be sure to show all workings in order to receive full marks. (17 marks)
16. Solve for $\mathrm{x}: \log _{8}(6 x+2)+\log _{8}(x-3)=2$
(5 marks)
17. The half life of plutonium- 238 is 88 years. Suppose that a sample of plutonium has a mass of 65 grams. Write an exponential function and determine the time needed for the sample to decay to a mass of 20 grams. $\left[A(t)=A_{o}\left(\frac{1}{2}\right)^{\frac{t}{h}}\right]$
18. One used car costs $\$ 6000$ and depreciates in value at $5 \%$ every 3 years, while another used car costs $\$ 9000$ and depreciates in value at a rate of $8 \%$ every 2 years. If both cars were purchased at the same time, when will the value of both be the same?
(5 marks)
19. The intensity level $\beta$ in decibels of a sound is defined by $\beta=10(\log I+12)$ where $I$ is the intensity of the sound in watts per square metre. A fire truck siren has a decibel level of 118 dB. City traffic has a decibel level of 85 dB . How many times as loud as city traffic is the fire truck siren?

