Exponential and logarithmic functions - Practice test 2

Name: _____ Date: _____

10 questions | 46 marks | 70 minutes

Interpret tables, transformed curves and inverse relationships before analysing two competing models.

A scientific calculator may be used.

1. Use exact forms before decimal approximations. [4 marks]

(a) Evaluate $64^{\frac{2}{3}}$ and $81^{-\frac{3}{4}}$. [2 marks]

(b) Simplify $\sqrt{48}+2\sqrt{27}$. [2 marks]

2. Decide whether each claim is valid and justify it. [4 marks]

(a) $\sqrt{x^2}=x$ for every real x. [2 marks]

(b) $\log(2x)=\log 2+\log x$ for $x>0$. [2 marks]

3. Use the equally spaced observations in the table. [4 marks]

Daily observations

t (days)	0	1	2
Amount	160	120	90

(a) Find a suitable exponential rule. State the daily percentage change. [2 marks]

(b) Find the predicted amount at $t = 4$. [2 marks]

4. Consider $g(x) = 7 - 3(2^{x+1})$. [6 marks]

(a) Find its y-intercept, asymptote and range. [3 marks]

(b) Find its x-intercept to three decimals. [3 marks]

5. An exponential model passes through $(2, 45)$ and $(5, 151.875)$. [4 marks]

(a) Find its one-unit multiplier. [2 marks]

(b) Find the initial value and the rule. [2 marks]

6. A 320 mg sample has a 6-hour half-life. [5 marks]

(a) Write a model with t in hours and find its mass after 18 hours. [2 marks]

(b) Find the time when 100 mg remains, to two decimals. [3 marks]

7. Work with logarithmic statements. [4 marks]

(a) Write $\log_5 z = -2$ in exponential form and find z. [2 marks]

(b) Find the domain of $\log(8 - 2x)$. [2 marks]

8. Use log laws and check restrictions. [5 marks]

(a) Combine $3\log a + \log b - \log c$ for positive a, b, c. [2 marks]

(b) Solve $\log(x + 6) - \log x = \log 4$. [3 marks]

9. An amount obeys $Q(t) = 90(0.92)^t$. [5 marks]

(a) Solve $Q(t) < 30$ for real t. [3 marks]

(b) If measured yearly, state the first completed year satisfying it. [2 marks]

10. Two proposed sales models are $L(t) = 100 + 20t$ and $E(t) = 100(1.15)^t$, with t in months. [5 marks]

(a) Compare their predictions after two months. [2 marks]

(b) Explain what extra evidence is needed to choose between the models. [3 marks]