Exponential and logarithmic functions - Practice test 1

Name: _____ Date: _____

10 questions | 47 marks | 70 minutes

Build from exact powers and radicals to graph features, logarithmic equations and contextual model checks.

A scientific calculator may be used.

1. Evaluate and simplify. State any given restriction when using a variable. [4 marks]

(a) Evaluate $16^{\frac{3}{4}}$ and $25^{-\frac{1}{2}}$. [2 marks]

(b) Simplify $\frac{(x^3)^2}{x^4}$ for $x \neq 0$. [2 marks]

2. Give exact answers. [5 marks]

(a) Simplify $\sqrt{75} - \sqrt{12}$. [2 marks]

(b) Rationalise $\frac{4}{\sqrt{3}+1}$. [3 marks]

3. A material has mass 60 g, 72 g and 86.4 g at the ends of days 0, 1 and 2. [4 marks]

Observed mass

Time (days)	0	1	2
Mass (g)	60	72	86.4

(a) Show that an exponential model fits these values. [2 marks]

(b) Write a model and predict the mass on day 3. [2 marks]

4. Consider $f(x) = 2^{x-2} + 3$. [5 marks]

(a) State the transformations from $y = 2^x$ and the horizontal asymptote. [2 marks]

(b) Find the y-intercept and explain whether there is an x-intercept. [3 marks]

5. A quantity is 50 at $t=0$ and 98 at $t=2$. Assume $y=Ab^t$ with b positive. [4 marks]

(a) Find A and b. [2 marks]

(b) Predict y at $t=3$. [2 marks]

6. 2000 dollars is invested at 5% yearly for 4 years. Ignore fees and tax. [5 marks]

(a) Find the compound-interest balance, rounded to cents. [2 marks]

(b) Compare it with simple interest at the same stated rate. [3 marks]

7. Read each logarithm as an exponent. [5 marks]

(a) Evaluate $\log_4 64$. [2 marks]

(b) Find $\log 0.02$ to five decimal places and explain its sign. [3 marks]

8. Solve $\log(x+1)+\log(x-1)=\log 8$. [5 marks]

(a) State the original domain and form a polynomial equation. [3 marks]

(b) Find and check the valid solution. [2 marks]

9. A model is $N(t) = 6(1.1)^t$. [5 marks]

(a) Find the real time when $N = 10$, to three decimals. [3 marks]

(b) If t counts completed years, state the first year when N exceeds 10. [2 marks]

10. A culture is observed for 0 to 5 hours. A model $N(t) = 100(1.6)^t$ is fitted. The container holds at most 1500 cells. [5 marks]

(a) Use the model to predict the count at 8 hours. [2 marks]

(b) Explain two reasons to question this prediction. [3 marks]