

All solutions are to be placed in the space provided; use proper mathematical notation.

1. Simplify. Express each answer with **positive** exponents. (8 marks)

a)  $\frac{-54t^3}{3t}$

b)  $\left(\frac{a}{2b^2}\right)^{-3}$

c)  $\frac{12x^5y^{-2}z^3}{3x^4y^2z^3}$

d)  $(ab^3)^{-2}(a^6b)^3$

2. Write in simplified EXPONENT form (one exponent only, no radicals). (4 marks)

a)  $\sqrt[3]{7}$

b)  $\sqrt[5]{a^{10}}$

c)  $[\sqrt[3]{m}]^8$

3. Evaluate exactly (leave your answers in FRACTION form if possible). (4 marks)

a)  $32^{\frac{3}{5}}$

b)  $100000^{\frac{4}{5}}$

c)  $81^{\frac{1}{4}}$

d)  $\left(-\frac{1}{8}\right)^{\frac{1}{3}}$

4. Each of the following are transformations of  $h(x) = \left(\frac{1}{2}\right)^x$ . Use words to describe the sequence of transformations in each case. (5 mks)

a)  $g(x) = -\left(\frac{1}{2}\right)^{2x}$

b)  $g(x) = 5\left(\frac{1}{2}\right)^{-(x-3)}$

c)  $g(x) = -4\left(\frac{1}{2}\right)^{3x+9} - 6$

6.  
(6 mks)

Complete the table.

	Function	Exponential Growth or Decay?	Initial Value	Growth or Decay Rate
a)	$V(t) = 20(1.02)^t$			
b)	$P(n) = (0.8)^n$			
c)	$A(x) = 0.5(3)^x$			
d)	$Q(w) = 600\left(\frac{5}{8}\right)^w$			

7.  
(4 mks)

The growth in population of a small town since 1996 is given by the function  $P(n) = 1250(1.03)^n$ .

- What is the initial population? Explain how you know.
- What is the growth rate? Explain how you know.
- Determine the population in the year 2007.
- In which year does the population reach 2000 people?

("n" is the number of years since 1996)

8. Solve the following equations. (16 marks)

1.  $2^x = 128$

2.  $81 = (-3)^x$

3.  $7^{w-2} = 49$

4.  $3^{2y+3} = 3^{y+5}$

5.  $4^t = 8^{t+1}$

6.  $4^{\frac{x}{4}} = \frac{1}{8}$

7.  $36^{t-2} = 216^{-2t}$

8.  $4^{x+3} + 4^x = 260$