Exponents and Logarithms Revision (Year 10)

Key revision questions from core concepts associated with logarithms and exponents.

NAME: _____

1. Simplify the following exponents and logarithms

a)
$$\frac{\sqrt[4]{2}}{\sqrt{2}}$$

b)
$$(5^{2/3})5^{4/3}$$

c)
$$\frac{\sqrt{q}}{q^2}$$

(2)
$$(b^4)^{\frac{1}{2}} + \left(\frac{2}{3}a^{\frac{2}{3}}\right)^5$$

e)
$$\log(8) + 2\log(6)$$

f)
$$\log(3^3) - \frac{2}{3}\log(6)$$

g)
$$\log_4(13) + 5\log_4(3)$$

h)
$$\log_5(12^2)$$

i)
$$\log_a 3 - \log_a 2$$

2. Determine an exact value for x, if
$$\log_2 64 = x$$

[2]

- 3. Convert the following numbers into surd form
- a) $5^{7/3}$
- b) $16^{4/6}$
- c) $p^{9/3}$
- 4. Convert the following surds into exponents
- a) $\sqrt{17}$
- b) $\sqrt[8]{94}$
- c) $^{14/4}\sqrt{788}$
- d) $3\sqrt[5]{13}$

5. Answer the following question through use of your graphics calculator for the function $f(x) = 3 \log(x)$ a) Find the value of y when x=2 and write to three significant figures [1] b) Find the value of y when x=3 and write to three significant figures [1] c) Find the value of y when x=4 and write to three significant figures [1] d) Find the value of y when x=100 and write to three significant figures [1] e) What is the x intercept of the function? [2] f) Define any asymptotes [2] g) Describe the behavior of the function as $x \to +\infty$ [2] 6. Describe the affect that changing the value of a has on the function $f(x)=a \log(x)$

7.	A function $f(x)$ passes through the points (0,3) and (1,6). Determine the function in the form of ab^x	orm
8.	A poster is 15cm in height. The height of the poster is to be as close to 200cm as possil however cannot be greater than this length. The height of a poster is given by P=15*1.5 where x is the number of enlargements. Hence, determine how many times the poster needs to be enlarged to fulfill the requirements.	[3] ble ;×
	needs to be enlarged to fulfill the requirements.	
9. a)	The graph of $y=2*3*$ where $x>0$, is a form of exponential growth What is meant by the term "aggrandizing rate of change"?	[4]
b)	What is the value of y when x=0?	[2]
		[1]

c)	Algebraically determine the value of x when y=10 and write to three significant figures	
		[3]
d)	Describe the behavior of the function as $x \to +\infty$	[2]
10.	The number of students attending the Australian Spelling and Music School is a form of exponential growth. In 2001, 50 students graduated. Principal Ryde has since determine that the number of students graduating increases by a factor of 1.2 each year.	ed
a)	Determine a function that can be used to calculate the number of people graduating t years after 2001 in the form of exponential growth ab*.	
b)	Hence, determine how many people would graduate this year (2013)	[4]
		[2]

c) Determine how many people would graduate in either 2005 or 2006

- d) Determine how many people would graduate in the year 2050 based on this model
- 11. A population of bacteria in a culture increases according to the model $p = 195(4.7)^{0.01}t$, where t is the number of hours and t = 0 corresponds to 10:00 a.m.
- a) Use this model to estimate the number of bacteria at 12.30pm algebraically.

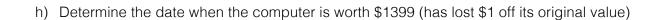
b) Determine the increase in the number of bacteria between 1.00pm and 2.00pm

[2]

[3]

c)	Show that the number of bacteria that started in the culture is equal to the value of a for an exponential growth function in the form of ab ^x
	[3]
12	. You purchase a new computer on January 10 th 2009 for the price of \$1400. After one year it is worth \$1200. When answering these questions, write answers in the form of t, unless a date is specified.
a)	Write an exponential decay model for the value of the computer in the form of ab^t , where t is the number of years after the computer was purchased
b)	[3] Graph the model for the interval 0 <x<10 all="" clearly="" interval<="" on="" showing="" td="" this="" values=""></x<10>
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c)	Use the model to estimate the value after 10 years	
d)	Algebraically determine when the computer will be worth \$500	[2]
e)	Algebraically determine the value of the computer 2044 days after you purchased it	[3]
f)	Algebraically determine the value of the computer on January 10 th 2020	[4]
g)	Using your calculator, find when the computer will be worth 10% of what was paid for it.	[2]
		[1]



a)
$$2^x = 14$$

b)
$$2^{x-5}=3^x$$

[3]

[2]

c) $14^{x-7}=8^{x+2}$	
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15. When 13 is raised to some power, x, the result is 7. Determine x to four significant figures.

16. A rollercoaster accelerates down a hill. Using exponential growth modeling, the velocity of the carriage in ms^{-1} can be modeled by $v(t) = 5(1.6)^t$, for the interval 0 < t < 4 seconds.

a) Determine the time when the rollercoaster was travelling at ½ of the maximum velocity.

[5]

[3]

b)	If Usain Bolt can run with a velocity of 11.2 ms ⁻¹ , determine when the rollercoaster has a velocity greater than what the world's fastest man can run at.
c)	What is the velocity change between t=2 and t=3 seconds?
	The rollercoaster then travels up another hill. Assuming that $t=0$ when the carriage begins to climb the second hill, the rollercoaster's velocity can be modeled by $v(t) = 6(0.72)^t$ ms ⁻¹ . If the rollercoasters velocity drops below 1ms ⁻¹ , then it will be unable to continue and make
-11	it over the hill.
a)	An engineer wants to build this hill so that it takes 7 seconds for the carriage to make it up the hill. Based on the conditions specified, would the rollercoaster be able to make it over the hill?