

## Exponents and Logarithms

### Pre-IB Revision:

1. Basics from prior learning are important to recall. Simplify the following:

a)  $4a^2 \times 2a^4$

b)  $\frac{15b^6}{3b^2}$

c)  $(2ab^2)^3$

d)  $(2x)^{-2}$

e)  $5x^{-2}$

f)  $\left(\frac{3xy^{-2}}{z}\right)^{-2}$

g)  $(25r)^{1/2}$

h)  $(16y)^{3/4}$

2. Recognizing a common base is important for solving problems. Write each value **as an exponent**, therefore finding the common base. The first has been started for you.

a) 9 and 27

b) 4 and 16

$$9 = 3^2, 27 =$$

Therefore \_\_\_ is the common base

c) 25 and 125

d) 2 and  $1/8$

e) 4 and 0.25

f) 1 and 100

3. Using a common base, solve the following.

a)  $3^x = 9^{x+2}$

b)  $4^{x-4} = 8^{x+2}$

c)  $4^{x-2} = 0.5$

d)  $2^{x-1} = 0.25$

4. Write the formulas converting exponential form to logarithmic form.

5. Rewrite the above formulas using natural logarithms.

6. Using the formulas in Q4 and Q5, **solve** each of the following:

a)  $\log 100 = x$

b)  $\log_x 64 = 6$

c)  $\log_x \left(\frac{1}{81}\right) = -4$

d)  $\log(.01) = x$

e)  $\log_2 1 = x$

f)  $\ln x = 1$

7. Write the 3 formulas for the laws of logarithms.

8. Using the formulas from Q7 **simplify** the following:

a)  $\log_2 3 + \log_2 4$

b)  $\log_3 30 - \log_3 6$

c)  $\frac{1}{3} \log_2 5^3$

d)  $\log_2 12 - \log_2 6 + \log_2 7$

9. Using the formulas from Q6, **solve** the following (DO NOT use a calculator):

a)  $\log 5 + \log 20$

b)  $\log_6 9 + \log_6 4$

c)  $\log_4 2 - \log_4 8$

d)  $\log_2 4^3$

e)  $2\log_2 10 - 2\log_2 5$

f)  $5\log_4 2 - \log_4 2$

10. Using the formulas from Q7, **decompose** the following to create an expression containing  $\log_a x$ . Simplify where possible.

a)  $\log 10x$

b)  $\log \frac{100}{x}$

c)  $\log(0.1x)$

d)  $\log_2 \left(\frac{4x}{5}\right)$

11. Write the formula for change of base.

12. Using the formula above, convert  $\log_2 3$  and  $\log_2 8$  to a logarithm in base 8.

13. Use your knowledge of logarithms to solve for  $x$ . Use a calculator only when necessary.

a)  $2(5^x) = 250$

b)  $10(3.2^x) = 250$

Exam-like question:

1. For the following,  $a = \log_2 6$  and  $b = \log_2 3$ . Rewrite each of the following in terms of  $a$  and or  $b$ .

a)  $\log_2 18$

b)  $\log_2 0.5$

c)  $\log_2 27$