

# Exponential Expressions and Equations

## Level 1 – 2

1. Complete the following by writing on the dotted line

a)  $4^x = 2^{\dots\dots}$

b)  $\frac{1}{6^x} = 6^{\dots\dots}$

c)  $5^{\dots\dots} = 1$

d)  $7^x \cdot 7^2 = 7^{\dots\dots}$

e)  $3^2 \div 3^x = 3^{\dots\dots}$

f)  $(2^x)^3 = 2^{\dots\dots}$

g)  $3^{\dots\dots} \cdot 4^x = 12^x$

h)  $2^x + 2^x = 2^{\dots\dots}$

i)  $\frac{1}{4^x} = 2^{\dots\dots}$

2. Expand and simplify

a)  $3^x(3^{x+1} - 1)$  .....

b)  $3^x(3^{-x} - 3)$  .....

c)  $(3^x - 2)(3^x + 1)$  .....

## Level 3 – 4

3. Simplify the following

a)  $4^x + 2^{2x}$  .....

b)  $3^{6x} + 9^{3x} + 27^{2x}$  .....

4. Solve the following

a)  $3^{x+1} = 27$  .....

b)  $2^x = 1/4$  .....

c)  $7^{2-x} = 1$  .....

5. Factorise the following

a)  $3^{x+2} + 3^x$  .....

b)  $2^x - 4^x$  .....

c)  $5^{3x+2} + 5^{2x+1} + 5^{x+1}$  .....

*Level 5 – 6*

6. Factorise the following

a)  $25^x - 9^x$  .....

b)  $1 - 4^x$  .....

c)  $3^{2x} + 5 \cdot 3^x - 14$  .....

7. Simplify the following

a)  $\frac{2^x - 4^x}{1 - 2^x}$  .....

b)  $\frac{3^{x+1} - 3^{x-1}}{3^x + 3^{x+1}}$  .....

c)  $\frac{7^{x+1} - 21^x}{7^x}$  .....

8. Solve the following

a)  $3^{x+1} = 9^{2-x}$  .....

b)  $4^x = 2 \cdot 8^x$  .....

c)  $\left(\frac{1}{5}\right)^{1-x} = 25^x$

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Level 7 – 8

9. Solve the following

a)  $16^x + 2^{2x+1} - 24 = 0$

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b)  $6^x - 2^{x+1} - 3^x - 2 = 0$

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c)  $2^x + 2^{-x} = \frac{5}{2}$

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10. For the following cases what can you say about the values of  $A$  and  $B$ ? Clearly justify your answers.

a)  $4^x + A \cdot 2^x + B = 0$  has no solutions

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b)  $4^x + A \cdot 2^x + B = 0$  has one solution

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c)  $4^x + A \cdot 2^x + B = 0$  has two solutions

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