Unit 9 · Indices

WORKSHEET

Full marks 33.5

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 33.5

1 Key words [2.5]

Match each word or expression in Column A with its meaning in Column B. Write the letter in the box. One meaning in Column B is not needed. Each match carries 0.5 mark.

Column A		Column B
1. index	☐	**a.** an equation with the unknown in the index
2. exponential equation	☐	**b.** the nth root of a
3. a^0	☐	**c.** $-a^n$
4. a^{-n}	☐	**d.** 1, for any base $a > 0$
5. $a^{1/n}$	☐	**e.** $\frac{1}{a^n}$
		f. the number that shows how many times the base is multiplied

2 Multiple choice [5]

Choose the correct option for each of the following questions.

i. What is 4^{-2}? [1]

a. -8 **b.** -16

c. $\frac{1}{16}$ **d.** $\frac{1}{8}$

ii. What is $27^{2/3}$? [1]

a. 18 **b.** 9

c. 3 **d.** 6

iii. Which is equal to 2^{x+3}? [1]

a. $2^x + 3$ **b.** $2^x + 8$

c. 8×2^x **d.** 6×2^x

iv. If $3^{x-2} = 1$, what is x? [1]

a. 0 **b.** 1

c. 2 **d.** 3

v. Solving $4^x - 3 \times 2^x - 4 = 0$ with $2^x = a$ gives $a = 4$ or $a = -1$. What is x? [1]

a. 2 only **b.** 2 or -1

c. 2 or 0 **d.** 4 or -1

3 Very short answers [3]

Write very short answers to the following questions.

a. Write the rule that lets you solve $a^x = a^y$. [1]

b. Solve $5^x = \frac{1}{125}$. [1]

c. Solve $9^x = 27$. [1]

4 Short answers [6]

Write short answers to the following questions.

a. Bikash wrote $2^x = 16 \Rightarrow x = 8$, "because $16 \div 2 = 8$". Find his mistake and solve it. [2]

b. Explain why $2^0 = 1$, using the pattern of powers of 2. [2]

c. Solve $3^{x+1} - 3^x = 54$. [2]

5 Problems [15]

Solve. Show your working.

a. Solve $2^{x+1} + 2^{x+2} + 2^{x+3} = 448$. [3]

Answer: _____

b. Solve $4^x + \frac{1}{4^x} = 16\frac{1}{16}$. [3]

Answer: _____

c. Solve $4 \times 3^{x+1} - 9^x = 27$. [3]

Answer: _____

d. Solve $3^{2x+1} - 10 \times 3^x + 3 = 0$. [3]

Answer: _____

e. If $x = 3^{1/3} + 3^{-1/3}$, prove that $3x(x^2 - 3) = 10$. [3]

Answer: _____

6 Think [2]

Think, then answer.

A piece of charcoal has $\frac{1}{32}$ of the carbon-14 of a living tree. Carbon-14 halves every 5,730 years.

How old is the charcoal? What does your answer mean?

7 Activity: Folding paper (not marked)

Fold a sheet of paper in half again and again. After each fold, count the layers and write the fraction of the sheet that each layer is.

folds	layers	one layer's share
0		
1		
2		
3		
4		
5		

Write the layers and the share as powers of 2. How many folds would give a layer $\frac{1}{256}$ of the sheet?