Unit 9 · Indices

HARDER WORKSHEET

Full marks 25

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 25

1 Two bases at once [3]

Solve. Show your working.

$2^{x+2} \times 3^{x-1} = 48$

Answer: _____

2 An index with a fraction [3]

Solve. Show your working.

$2^{\frac{6}{x}} = 4^{x-2}$

Answer: _____

3 Hidden quadratic [3]

Solve. Show your working.

$2^{x} + 2^{3-x} = 9$

Answer: _____

4 Work backwards [3]

Answer the following question. Show your working.

$x = 1$ is one root of $4^x - k \times 2^x + 8 = 0$. Find k and the other root.

Answer: _____

5 A real setting [3]

Solve the following problem. Show your working.

A bacteria culture doubles every 20 minutes. It starts with 500 bacteria. After how long will it have 32,000 bacteria? And how many were there 40 minutes before the start, had it been growing the same way?

Answer: _____

6 Spot the error [3]

Find the mistakes in the working and correct them.

Asha solved $3^{x+1} + 3^x = 36$ like this: $3^{2x+1} = 36$, "so $2x + 1 = 12$ and $x = 5.5$".

7 Is the claim true? [2]

Answer the following question. Give a reason.

Ravi says $5^x + 5^{-x} = 1$ has a solution "somewhere between 0 and 1". Is he right?

8 Show it [3]

Answer the following question.

If $x = 2^{1/3} + 2^{-1/3}$, show that $2x^3 - 6x = 5$.

9 Make your own [2]

Answer the following question.

Write an exponential equation whose solutions are $x = 1$ and $x = 2$, using 3^x. Show that both values satisfy it.