FOUNDATION & HIGHER

HIGHER EXTENDS

Name ..... Class .....

N7: Indices

Solve problems with integer and fractional indices

20 marks · 25 minutes · Non-calculator

1) Solve $2^x = 8^{x-1}$

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[Question 1: 3 marks]

2) Find n when $9^n \times 27 = 3^{11}$

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[Question 2: 3 marks]

3) Show that $4^5 + 4^5 + 4^5 + 4^5 = 2^{12}$. Write 2^{12} as a power of 8

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[Question 3: 3 marks]

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4) Work out $\left(25^{\frac{1}{2}} \times 125^{\frac{1}{3}}\right)^2$

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[Question 4: 2 marks]

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5) The number of bacteria after t hours is 100×2^t. After how many hours are there 3200 bacteria?

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[Question 5: 2 marks]

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6) Solve $16^x = \frac{1}{64}$

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[Question 6: 3 marks]

7) Write these in order, smallest first. Two are equal: 2^{-3}, 4^{-1}, $8^{\frac{1}{3}}$, $16^{-\frac{1}{2}}$

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[Question 7: 2 marks]

8) $a = 2^x$ and $b = 2^y$. Write $8^x \times 4^y$ in terms of a and b.

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[Question 8: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	1.5	$8^{x-1} = 2^{3x-3}$ (P1); $x = 3x - 3$ (P1); A1.
2	4	$3^{2n} \times 3^3$ (P1); $2n + 3 = 11$ (P1); A1.
3	8^4	$4 \times 4^5 = 4^6$ (P1); $= 2^{12}$ (P1); 8^4 (A1).
4	625	$5 \times 5 = 25$ (P1); A1.
5	5	$2^t = 32$ (P1); A1.
6	-1.5	$2^{4x} = 2^{-6}$ (P1, P1); A1.
7	$2^{-3}, 4^{-1} = 16^{-\frac{1}{2}}, 8^{\frac{1}{3}}$	Evaluates 0.125, 0.25, 2, 0.25 (P1); A1.
8	a^3b^2	$2^{3x} \times 2^{2y}$ (P1); A1.