FOUNDATION & HIGHER

HIGHER EXTENDS

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

N6: Powers and roots

Reason with powers, roots and estimates of them

20 marks · 25 minutes · Non-calculator

1) Show that $2^5 + 2^5 = 2^6$

[Question 1: 2 marks]

2) Lily says $3^2 \times 3^2 = 9^4$. Explain her mistake.

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[Question 2: 2 marks]

3) Explain why $\sqrt{50}$ lies between 7 and 8

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[Question 3: 2 marks]

4) Show that $4^3 = 8^2$

[Question 4: 2 marks]

5) Is $(-3)^4$ positive or negative? Explain.

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[Question 5: 1 marks]

6) Which is bigger, 3^4 or 4^3? Show how you decide.

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[Question 6: 2 marks]

7) Explain why $\sqrt[3]{-8}$ has a real value but $\sqrt{-4}$ does not.

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[Question 7: 2 marks]

8) Show that 2^{10} is close to 10^3. Use this to estimate 2^{20}.

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[Question 8: 2 marks]

9) Raj says $\sqrt{36 + 64} = 14$. Explain his mistake.

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[Question 9: 1 marks]

10) Estimate $\sqrt{200}$ to 1 decimal place. Justify your estimate.

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[Question 10: 2 marks]

11) Show that $5^3 - 5^2 = 100$

[Question 11: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Shown	2×2^5 (M1); $= 2^6$ (C1).
2	$3^4 = 81$	Added indices but also multiplied bases (C1); correct value 3^4 (B1).
3	Explanation	$7^2 = 49$ and $8^2 = 64$ (M1); 50 lies between (C1).
4	Shown	64 and 64 (M1); conclusion (C1).
5	Positive	An even number of negatives multiplied (C1).
6	3^4	81 and 64 (M1); conclusion (C1).
7	Explanation	$(-2)^3 = -8$ (C1); no real number squares to a negative (C1).
8	About 10^6	$2^{10} = 1024$ (M1); $2^{20} = (2^{10})^2 \approx 10^6$ (C1).
9	$\sqrt{100} = 10$	C1.
10	14.1	$14^2 = 196$, $15^2 = 225$ (M1); 14.1 with reason (C1).
11	Shown	$125 - 25$ (M1); 100 (C1).