QT Laws of Indices

A Level Introduction

1. Write in index form $2^8 \times 8^2$ (2 marks)

$2^8 \times (2^3)^2$

$2^8 \times 2^6$

$= 2^{14}$

2. Write in index form $(4^4 \times 16)^3$ (2 marks)

$(4^4 \times 4^2)^3$

$(4^6)^3 = 4^{18}$

3. Write in index form $\frac{25^2}{5^3} \times 5^{-2}$ (2 marks)

$\frac{(5^2)^2}{5^3} \times \frac{1}{5^2}$

$\frac{5^4}{5^5} = 5^{-1}$ or $\frac{1}{5}$

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4. Simplify $8^{0} \div \sqrt[3]{8}$ (2 marks)

$1 \div 8^{\frac{1}{3}}$

$1 \div 2$

$\frac{1}{2}$

5. Write in index form $(16^{6} \div 4^{5}) \times 4^{-3}$ (3 marks)

$((4^2)^6 \div 4^5) \times 4^{-3}$

$(4^{12} \div 4^5) \times 4^{-3}$

$4^7 \times 4^{-3}$

4^4

6. Write in index form $(4 \times 64^{2})^{2} \div 4^{5}$ (3 marks)

$(4 \times (4^3)^2)^2 \div 4^5$

$(4 \times 4^6)^2 \div 4^5$

$(4^7)^2 \div 4^5$

$4^{14} \div 4^5$

4^9

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7. Write in index form $\sqrt[8]{6} \div \sqrt[3]{6}$ (3 marks)

$6^{\frac{1}{8}} \div 6^{\frac{1}{3}}$

$6^{\frac{1}{8}-\frac{1}{3}}$

$6^{-\frac{5}{24}}$

$\frac{1}{8}-\frac{1}{3}$

$\frac{3}{24}-\frac{8}{24}$

$-\frac{5}{24}$

8. Write in index form $\frac{1}{3^3} \times \frac{1}{\sqrt{3}}$ (3 marks)

$3^{-3} \times 3^{-\frac{1}{2}}$

$3^{-3.5}$ or $3^{-\frac{7}{2}}$

9. Write the following *as a whole number* $36^{\frac{3}{2}}$ (2 marks)

$(36^{\frac{1}{2}})^3$

$(6)^3$

216

$6 \times 6 = 36$

$\times 6$

216

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10. Write the following *as a fraction* $8^{-\frac{4}{3}}$ (2 marks)

$\frac{1}{(8^{\frac{1}{3}})^4} = \frac{1}{2^4}$

$= \frac{1}{16}$

11. Write the following *as a mixed number* $16^{\frac{3}{2}} \div 125^{\frac{2}{3}}$ (3 marks)

$(16^{\frac{1}{2}})^3 \div (125^{\frac{1}{3}})^2$

$4^3 \div 5^2$

$64 \div 25 = 2\frac{14}{25}$

12. Write the following *as a fraction* $49^{\frac{1}{2}} \times 343^{-\frac{2}{3}}$ (4 marks)

$7 \times \frac{1}{(343^{\frac{1}{3}})^2}$ $\quad 7 \times 7 = 49$, $49 \times 7 = 343$

$7 \times \frac{1}{(7)^2}$

$\frac{7}{49} = \frac{1}{7}$