1. Copy and complete each of these laws of indices.

a) $a^m \times a^n =$ b) $a^m \div a^n =$ c) $(a^m)^n =$ d) $(ab)^m =$ e) $a^{\frac{m}{n}} =$ f) $a^0 =$ g) $a^{-m} =$

2. Simplify each of these expressions:

a) $a^3 \times a^5$ b) $p^2 \times p^6$ c) $x^3 \times x^4$ d) $v^6 \div v^4$ e) $s^9 \div s^6$ f) $t^4 \times t$ g) $d^{-4} \times d^5$

h) $p^{-3} \div p^6$ i) $k^{-2} \div k^{-3}$ j) $m^4 \div m^{-1}$ k) $3a^3 \times 5a^2$ l) $6a^{-4} \times 2a^3$ m) $t^{-3} \times t^3$

n) $3c^2 \times 7c^7 \times 2c^{-3}$ o) $5t^6 \times 3t \times 2t^{-2}$ p) $2v^2 \times 6v^5 \times 3u$ q) $4x^{-4} \times 3x^2 \times 4x$

3. Simplify each of these expressions:

a) $\dfrac{w^2 \times w^6}{w^5}$ b) $\dfrac{2x^3 \times 6x^4}{4x^5}$ c) $\dfrac{8a^5 \times 6a^{-2}}{4a^4}$ d) $\dfrac{6p^2 \times 3p^4}{2p}$ e) $\dfrac{5a^4 \times 10a^{-2}}{2a^5}$ f) $\dfrac{8p^2 \times 3p^6}{6p}$

4. Write each of these expressions without brackets and simplify where possible:

a) $(ab)^3$ b) $(pq)^4$ c) $(pqr)^5$ d) $(a^2 b)^4$ e) $(2x^3 y^4)^2$ f) $(3vw^3)^2$ g) $(4s^2 t^3)^2$

5. Simplify

$$\frac{n^5 \times 10n}{2n^2}$$

   SQA 2014 Paper 2   3 marks

6. Evaluate each of these:

a) $8^{\frac{2}{3}}$ b) $16^{\frac{3}{4}}$ c) $81^{-\frac{1}{4}}$ d) $27^{-\frac{2}{3}}$ e) $8^{-\frac{1}{3}}$ f) $9^{-\frac{3}{2}}$ g) $16^{\frac{1}{4}}$ h) $16^{\frac{5}{4}}$ i) $125^{-\frac{2}{3}}$

7. Evaluate

$$8^{\frac{5}{3}}$$

   SQA 2015 Paper 1   2 marks

8. Simplify and express each of these with positive indices:

a) $p^{-7} \times p^4$ b) $x^2 \times x^{-9}$ c) $a^4 \times a^{-8}$ d) $(n^3)^{-3} \times n^6$ e) $q^{-4} \times 3q^3$