1 Index laws

1.1 Index laws

1. Simplify, and express all answers with non-negative indices

(i) $\dfrac{x^4x^3}{x^2x^8}$ (ii) $\frac{5x^3y^{-1}}{x^{-2}y^4}$ (iii) $\left(\dfrac{3x^{-2}}{y}\right)(2x^3y^{-4})$

(iv) $\left(\dfrac{x^2}{xy^{-2}}\right)^3$ (v) $\frac{x^{-2}+2x^{-4}}{x-3x^{-3}}$ (vi) $\dfrac{7x^2}{x^3+4x^{-1}}$.

2. Simplify, and express all answers with non-negative indices

(i) $\dfrac{x^6x^3}{x^2x^9}$ (ii) $\frac{6x^{-4}y}{x^{-2}y^{-3}}$ (iii) $\left(\dfrac{x^{-2}}{4y^2}\right)(2x^5y^{-2})$

(iv) $\left(\dfrac{x^2}{xy^{-2}}\right)^3$ (v) $\frac{x^{-2}+2x^{-4}}{x-3x^{-3}}$ (vi) $\dfrac{7x^2}{x^3+4x^{-1}}$.

1.2 Fractional indices

1. Simplify, and express all answers with non-negative indices

(i) $\dfrac{x^{4/3}x}{x^{-2/3}}$ (ii) $\dfrac{(x^{2/3})^{3/4}}{x^{-5/2}}$.

2. Simplify

(i) $(5+2\sqrt{6})(5-2\sqrt{6})$ (ii) $\sqrt{x}\left(3\sqrt{x}-\sqrt{4x}\right)$.

3. Simplify, and express all answers with non-negative indices

(i) $\dfrac{x^{7/4}x^{-1}}{x^{-1/4}}$ (ii) $\dfrac{(x^{5/3})^{3/4}}{x^{-3/4}}$.

4. Simplify

(i) $(8+5\sqrt{11})(8-5\sqrt{11})$ (ii) $3\sqrt{x}\left(6\sqrt{x}-\sqrt{9x}\right)$.