

Non-calculator

Q1 Fully simplify, expressing your answer with a positive power:

a) $\frac{x^2 \times x^5}{x^3}$

b) $\frac{x \times x^5}{x^8}$

c) $\frac{x^3 \times x^{-5}}{x^4}$

d) $\frac{3x^{-3} \times 4x^7}{2x^3}$

e) $\frac{6x^2}{3x^{-2} \times 3x^6}$

f) $\frac{x^{-3} \times 2x^4}{4x^5 \times x^{-1}}$

Q2 Fully simplify, expressing your answer with no brackets or negative powers:

a) $(xy)^3$

b) $(4x^2y)^3$

c) $\left(\frac{2}{3}x^2y^4\right)^3$

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

e) $(x^{-4})^2 \times x^{-2}$

f) $x^{-6} \times (x^3)^2$

g) $(2x^3)^2 \times (3x^{-4})^2$

h) $(x^3 \times x^{-5})^{-3}$

i) $(x^{-4} \div x^{-1})^2$

Q3 Express each of these expressions in the form x^n .

a) \sqrt{x}

b) $\sqrt[3]{x}$

c) $(\sqrt[3]{x})^5$

d) $\frac{1}{\sqrt{x}}$

e) $\frac{1}{\sqrt[3]{x}}$

f) $\left(\frac{1}{\sqrt[3]{x}}\right)^2$

Q4 Evaluate:

a) $9^{\frac{1}{2}}$

b) $9^{-\frac{1}{2}}$

c) $8^{\frac{1}{3}}$

d) $8^{-\frac{1}{3}}$

e) $16^{\frac{3}{2}}$

f) $27^{-\frac{4}{3}}$

g) $16^{\frac{3}{4}}$

h) $64^{-\frac{2}{3}}$

i) $100^{-\frac{3}{2}}$

j) $\left(\frac{1}{4}\right)^{\frac{3}{2}}$

k) $\left(\frac{25}{9}\right)^{-\frac{1}{2}}$

l) $\left(\frac{27}{64}\right)^{-\frac{2}{3}}$

Q5 Expand and simplify:

a) $x^2(x^2 + 3)$

b) $x^2(x^{-4} + x^{-2})$

c) $2x^2\left(\frac{1}{x} + \frac{1}{2}x^{-2}\right)$

d) $x^{\frac{1}{2}}\left(x^{\frac{1}{2}} - 5x^{-\frac{1}{2}}\right)$

e) $2x^{-\frac{1}{2}}\left(x^{\frac{3}{2}} - 3x^{-\frac{1}{2}}\right)$

f) $3x^{-\frac{1}{4}}\left(x^{\frac{9}{4}} + 2x^{\frac{1}{2}}\right)$