

1.

Simplify the following (Leave your answer with positive exponents):

a) $a^{2x} \cdot a^{3x+1}$

b) $2^x \cdot 8^{x+1}$

c) $\frac{3^{2x} \cdot 27^{x-1}}{9^{2x+2}}$

d) $\frac{a^2 b^3 \times a^3 b^4}{(a^3 b^3)^2}$

e) $\frac{(ab^2c)^3}{a^{-1}b^4c^3} \times \frac{(a^{-2}b^3c^5)^0}{a^{-1}b^4c^2}$

f) $\frac{x^a y^{2a}}{x^{2a-1}} \div \frac{(x^2 y)^a}{x^3 + a y^{-1}}$

g) $\frac{18^a \cdot 15^{a+1}}{30^{a-1}} \times \frac{(3^a \cdot 6)^2}{9^{a-1}} \div \frac{36^{a+1}}{18^{a-1}}$

h) $\frac{(ab^2)^{-6} \times (a^3 b^7)^2}{(a^0 b^2)^{-\frac{1}{2}}}$

i) $\frac{3^{a-1} \cdot 6^{(a+2)} \cdot 9^{-a}}{18^{a-1} \cdot 3^a}$

j) $\frac{(xyz^2)^{-1}}{x^2 y^{-1} z^3} \div \left(\frac{x^3 y^2 z^0}{x^4 y^2 z^{-3}} \right)^{-1} \times \frac{xy^2 z^4}{x^{-3} y^2 z^0}$

2.

Simplify the following (leave your answers with positive exponents):

a) $\frac{3^{x+1} - 2 \cdot 3^x}{3^x \cdot 2}$

b) $\frac{2^{2x+3} - 5 \cdot 2^{2x+1}}{4^{x+2}}$

c) $\frac{35^a - 3 \cdot 5^a}{2^{2a} 7^a - 3 \cdot 2^{2a}}$

d) $\frac{3^{a+1} \cdot 4^a + 5 \cdot 3^{a+1}}{4^{2a} - 25}$

e) $\frac{7^a \cdot 49 - 7^{a+2} \cdot 2^{-1}}{2^{-3} \cdot 7^a}$

f) $\frac{2^{3a-1} + \frac{3}{2}}{2^{4a-1} + 3 \cdot 2^{a-1}}$

g) $\frac{-2^3 - 2^5}{5^{a+1} \cdot 2^2}$

h) $\frac{\frac{3}{4^2} + 4^{a-2}}{3 \cdot 4^3 + 4^{a+3}}$

3.

Solve for x :

a) $4 \cdot 3^{3x+2} + 3^{3x+3} = 7$

b) $2^x - 2^{x-2} = 6$

c) $7 \cdot 3^x = 217$ (to two decimal places)

d) $3 \cdot 5^{x+1} = 375$

e) $5^{x-1} - 3 \cdot 5^{x+1} + 10\,000 = 750$

f) $3^2 \cdot 6^{x-1} - 2^3 \cdot 6^{x-1} = \frac{1}{6}$

g) $7^{2x+4} - 5 \cdot 49^{x+1\frac{1}{2}} = 14$

h) $8 \cdot 6^{x-1} = 3\,912$ (to two decimal places)

i) $5 \cdot 2^{2x+1} = 320$

j) $2^3 \cdot 4^{x+2} - 4^{x-1} \cdot 8 = \frac{63}{32}$