

Indices

1. Simplify fully:

(a) $x^2 \times x^3 \times x^5$.

x^{10}

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

$36x^{-3}$

(b) $2 \times (x^2)^3$.

$2x^6$

(g) $\frac{(3x^2)^3}{3x^{-2}}$.

$9x^8$

(c) $(x^{-3})^{-5}$.

x^{15}

(h) $\frac{12x^8}{6x^4} + 6x^4$.

$8x^4$

(d) $(3x^2)^3$.

$27x^6$

(i) $2x^5(2x^5 + 2x^5)$.

$8x^{10}$

(e) $(12x^9) \div (4x^3)$.

$3x^6$

2. Simplify fully:

(a) $\frac{(2x^{-2})^3 \times (2x^3)^2}{6^2 \times x^{-4}}$.

$\frac{8x^4}{9}$

(h) $\frac{(4m^7n)^3}{8n^3m^{-7}}$.

$8m^{28}$

(b) $\frac{2x^8 \times (2x)^8}{2x \times (2x)^5}$.

$8x^{10}$

(i) $\frac{(uv)^2(2u^2v)^3}{(u^3v^8)^2(uv^{-1})^4}$.

$\frac{8}{u^2v^7}$

(c) $\frac{(3x^{-1})^3 \times (2x^{-2})^4}{(6x^2)^3}$.

$\frac{2}{x^{17}}$

(j) $\frac{3x(x^4y^8)^3}{x^3(3x^5y)^2}$.

$\frac{y^{22}}{3}$

(d) $\frac{3x^3(2xy)^2}{6x^5y^2}$.

2

(k) $\frac{6u^2v^3}{3u^{-2}v^5} \times \frac{4(u^3v^4)^2}{2uv^{-1}}$.

$4u^9v^7$

(e) $\frac{a^3b^7}{a^{-2}b^4}$.

a^5b^3

(l) $\frac{(2x^3)^3y}{3x^{-2}y^3} \div \frac{4(xy)^{-8}}{(3x^{-4})^2}$.

$6x^{11}y^6$

(f) $\frac{64(x^{-3}y^7)^2x^6y}{(4x^4y^2)^2}$.

$\frac{4y^{11}}{x^8}$

(m) $\frac{4x^3y}{7xy^2} \div \frac{8x(yz)^2}{14zx^2y^3}$.

$\frac{x^3}{z}$

(g) $\frac{7pq^{-1}(2pq^3)^3}{14p(2p^2q)^2}$.

$\frac{q^6}{p}$

(n) $\frac{\frac{6x}{y^2}}{(3xy^3)}$.

$\frac{2}{y^5}$

3. Evaluate without a calculator:

(a) 3^{-1} .

$\frac{1}{3}$

(i) $(\frac{1}{2})^{-2}$.

4

(b) 5^{-2} .

$\frac{1}{25}$

(j) $(0.6)^{-2}$.

$\frac{25}{9}$

(c) 4^{-3} .

$\frac{1}{64}$

(k) $(\frac{2}{3})^{-1} + (\frac{5}{2})^{-1}$.

$\frac{19}{10}$

(d) 7^0 .

1

(l) $(\frac{3}{2})^{-2} + (\frac{3}{2})^2$.

$\frac{97}{36}$

(e) $(\frac{2}{3})^{-1}$.

$\frac{3}{2}$

(m) $(\frac{1}{5})^{-2} - (\frac{2}{7})^{-1}$.

$\frac{43}{2}$

(f) $(\frac{4}{3})^{-2}$.

$\frac{9}{16}$

(n) $(2\frac{1}{2})^{-3} + (3\frac{2}{3})^{-1}$.

$\frac{463}{1375}$

(g) $(2\frac{1}{3})^{-1}$.

$\frac{3}{7}$

(o) $(0.4)^{-2} - (0.2)^{-1}$.

$\frac{5}{4}$

(h) $(1\frac{3}{4})^{-3}$.

$\frac{64}{343}$

4. Evaluate without a calculator:

(a) $\frac{2^8 \times 2^{-3}}{2^4}$.

2

(c) $27^3 \div 9^4$.

3

(b) $8^4 \div 4^6$.

1

(d) $\frac{64^2}{8 \times 16}$.

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5. Solve for x

(a) $2^x = 8.$

(b) $3^x = 81.$

$x = 3$

$x = 4$

(c) $5^x = \frac{1}{25}.$

(d) $3^{-x} = \frac{1}{27}.$

$x = -2$

$x = 3$