Solutions

Marking: **M1** a correct method, **A1** the correct answer.

Each answer shows the steps, then the **result**.

2.1

- $(3a^2)^3 = 3^3a^6$
- $\mathbf{27a^6}$

2.2

- $10 \div 2 = 5$, $x^6 \div x^2 = x^4$
- $\mathbf{5x^4}$

2.3

- $a^4 \times a^{-7} = \mathbf{a^{-3}}$ (or $\dfrac{1}{a^3}$)

2.4

- a negative index means "one over": $\boldsymbol{x^{-3}}$

2.5

- multiply the indices: $\frac{1}{2} \times 4 = 2$, so $\boldsymbol{x^2}$

3.1

- $(2x^2y)^3 = 2^3x^6y^3$
- $\mathbf{8x^6y^3}$

3.2

- $\dfrac{15}{5} = 3$, $a^7 \div a^3 = a^4$, $b^2 \div b^2 = 1$
- $\mathbf{3a^4}$

3.3

- $81 = 3^4$
- $3^x = 3^4$ so $\mathbf{x = 4}$

3.4

$3x^{-3}y^4$ by dividing coefficients and subtracting exponents, giving $3y^4/x^3$. Since $16 = 2^4$, $n + 1 = 4$ and $n = 3$; $2^{3+1} = 16$ checks the result.

3.5

(a)

- the power $\frac{1}{2}$ applies to both parts: $16^{\frac{1}{2}} = 4$ and $(x^8)^{\frac{1}{2}} = x^4$

$$= \mathbf{4}\boldsymbol{x^4}$$

(b)

- $27^{\frac{2}{3}} = \left(\sqrt[3]{27}\right)^2 = 3^2 = 9$ and $(a^6)^{\frac{2}{3}} = a^4$

$$= \mathbf{9}\boldsymbol{a^4}$$

(c)

- write both sides as powers of 2: $4^x = (2^2)^x = 2^{2x}$ and $8 = 2^3$
- $2x = 3$

$$x = \mathbf{\frac{3}{2}}$$