Indices

Simplify: $a^3 \times a^4$

$a^3 \times a^4 = (a \times a \times a) \times (a \times a \times a \times a)$

so

$a^3 \times a^4 = a^7$

When multiplying indices add the powers

Simplify: $3x^3 \times 4x^5$

$3x^3 \times 4x^5 = (3 \times x \times x \times x) \times (4 \times x \times x \times x \times x \times x)$

which is the same as:

$3 \times 4 \times x \times x \times x \times x \times x \times x \times x \times x$

so:

$3x^3 \times 4x^5 = 12x^8$

Simplify: $(3a^2)^3$

$(3a^2)^3 = 3a^2 \times 3a^2 \times 3a^2$

which means...

$(3 \times a \times a) \times (3 \times a \times a) \times (3 \times a \times a)$

$(3a^2)^3 = 27a^6$

Simplify: $a^7 \div a^3$

$$\frac{a \times a \times a \times a \times \cancel{a} \times \cancel{a} \times \cancel{a}}{\cancel{a} \times \cancel{a} \times \cancel{a}}$$

so

$a^7 \div a^3 = a^4$

When dividing indices subtract the powers