

Indices - Lesson 4

Indices - Expanding Brackets

LI

- Expand brackets with indices.

SC

- Rules of Indices.
- Expanding brackets (inc. using FOIL).

Some Reminders

$$a^m \times a^n = a^{m+n}$$

$$a^0 = 1$$

Example 1

Expand and simplify fully :

$$a^2(a^4 + 1)$$

$$a^2(a^4 + 1)$$

$$= a^2 \times a^4 + a^2 \times 1$$

$$= a^{2+4} + a^2$$

$$= a^6 + a^2$$

Example 2

Expand and simplify fully :

$$x^{-3} (x^4 + x^{-2})$$

$$x^{-3} (x^4 + x^{-2})$$

$$= x^{-3} x x^4 + x^{-3} x x^{-2}$$

$$= x^{-3+4} + x^{-3+(-2)}$$

$$= x^1 + x^{-5}$$

$$= x + x^{-5}$$

Example 3

Expand and simplify fully :

$$2 p^{1/4} (p^{7/4} - 9)$$

$$2 p^{1/4} (p^{7/4} - 9)$$

$$= 2 p^{1/4} \times p^{7/4} - 2 p^{1/4} \times 9$$

$$= 2 p^{1/4 + 7/4} - 18 p^{1/4}$$

$$= 2 p^{8/4} - 18 p^{1/4}$$

$$= 2 p^2 - 18 p^{1/4}$$

Example 4

Expand and simplify fully :

$$(n^2 - 3)^2$$

$$(n^2 - 3)^2$$

$$= (n^2 - 3)(n^2 - 3)$$

$$= n^4 - 3n^2 - 3n^2 + 9$$

$$= n^4 - 6n^2 + 9$$

Expand and simplify fully :

1)a $a^2(a^3 + 1)$

b $x^{-4}(x^2 + x^{-1})$

c $y^3(y^{-2} + y^{-3})$

d $m^3(m^{-5} - 4)$

e $5a^2(2a^{-2} - 7a^3)$

2)a $p^{\frac{1}{2}}(p + 3)$

b $t^{\frac{1}{2}}(t + t^{-\frac{1}{2}})$

c $3z^{\frac{1}{3}}(z^{\frac{5}{3}} + 2)$

d $b^{-\frac{1}{4}}(b^{\frac{3}{4}} - b^{-\frac{1}{2}})$

e $y^{\frac{4}{5}}(y^{-\frac{4}{5}} + 3y^{\frac{1}{5}})$

f $c^{-\frac{1}{2}}(c^{\frac{1}{2}} - c^{\frac{1}{3}})$

3)a $(t^2 - 4)^2$

b $(y^5 + 2)(y^{-3} - 1)$

c $(x^{\frac{1}{2}} + 3)^2$

d $(m^3 + 1)(m^3 - 1)$

e $(c^{\frac{2}{3}} + 3)(c^{\frac{2}{3}} - 3)$

f $(5 - m^{\frac{1}{4}})(m^{\frac{1}{2}} + 2)$

Answers

1) a $a^5 + a^2$	2) a $p^{\frac{3}{2}} + 3p^{\frac{1}{2}}$	3) a $t^4 + 16 - 8t^2$
b $x^{-2} + x^{-5}$	b $t^{\frac{3}{2}} + 1$	b $y^2 - y^5 + 2y^{-3} - 2$
c $y + 1$	c $3z^2 + 6z^{\frac{1}{3}}$	c $x + 9 + 6x^{\frac{1}{2}}$
d $m^{-2} - 4m^3$	d $b^{\frac{1}{2}} - b^{-\frac{3}{4}}$	d $m^6 - 1$
e $10 - 35a^5$	e $1 + 3y$	e $c^{\frac{4}{3}} - 9$
	f $1 - c^{\frac{1}{6}}$	f $5m^{\frac{1}{2}} + 10 - m^{\frac{3}{4}} - 2m^{\frac{1}{4}}$