## Indices - Expanding Brackets

LI

- Expand brackets with indices.

SC

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


## Some Reminders

$$
\begin{aligned}
a^{m} \times a^{n} & =a^{m+n} \\
a^{0} & =1
\end{aligned}
$$

## Example 1

Expand and simplify fully :

$$
\begin{aligned}
& a^{2}\left(a^{4}+1\right) \\
& a^{2}\left(a^{4}+1\right) \\
= & a^{2} \times a^{4}+a^{2} \times 1 \\
= & a^{2+4}+a^{2} \\
= & a^{6}+a^{2}
\end{aligned}
$$

## Example 2

Expand and simplify fully :

$$
\begin{aligned}
& x^{-3}\left(x^{4}+x^{-2}\right) \\
& x^{-3}\left(x^{4}+x^{-2}\right) \\
= & x^{-3} \times x^{4}+x^{-3} \times x^{-2} \\
= & x^{-3+4}+x^{-3+(-2)} \\
= & x^{1}+x^{-5} \\
= & x+x^{-5}
\end{aligned}
$$

## Example 3

Expand and simplify fully :

$$
\begin{aligned}
& 2 p^{1 / 4}\left(p^{7 / 4}-9\right) \\
& 2 p^{1 / 4}\left(p^{7 / 4}-9\right) \\
= & 2 p^{1 / 4} \times p^{7 / 4}-2 p^{1 / 4} \times 9 \\
= & 2 p^{1 / 4+7 / 4}-18 p^{1 / 4} \\
= & 2 p^{1 / 4+7 / 4}-18 p^{1 / 4} \\
= & 2 p^{2}-18 p^{1 / 4}
\end{aligned}
$$

Example 4
Expand and simplify fully:

$$
\begin{aligned}
& \left(n^{2}-3\right)^{2} \\
& \left(n^{2}-3\right)^{2} \\
= & \left(n^{2}-3\right)\left(n^{2}-3\right) \\
= & n^{4}-3 n^{2}-3 n^{2}+9 \\
= & n^{4}-6 n^{2}+9
\end{aligned}
$$

## Questions

Expand and simplify fully :

Answers

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

