Manipulating Indices
Write as powers of 2

1) 8

$$
=2^{3}
$$

2) $\frac{1}{4}$

$$
=\frac{1}{2^{2}}=2^{-2}
$$

3) $2 \sqrt{2}$

$$
=2^{1} \times 2^{\frac{1}{2}}=2^{3 / 2}
$$

4) $\sqrt{32}=(32)^{\frac{1}{2}}=\left(2^{5}\right)^{\frac{1}{2}}=2^{5 / 2}$
5) $\frac{1}{\sqrt{2}}=\frac{1}{2^{1 / 2}}=2^{-\frac{1}{2}}$

$$
3^{a}=\frac{1}{9} \quad 3^{b}=9 \sqrt{3} \quad 3^{c}=\frac{1}{\sqrt{3}}
$$

(b) Work out the value of $a+b+c$

$$
\begin{aligned}
& \frac{1}{9}=\frac{1}{3^{2}}=3^{-2} \Rightarrow a=-2 \\
& 9 \sqrt{3}=3^{2} \times 3^{\frac{1}{2}}=3^{5 / 2} \Rightarrow b=5 / 2 \\
& \frac{1}{\sqrt{3}}=\frac{1}{3^{1 / 2}}=3^{-\frac{1}{2}} \Rightarrow c=-\frac{1}{2} \\
& a+b+c=-2+\frac{5}{2}-\frac{1}{2}=0
\end{aligned}
$$

