## Answers to Exercise 8.4

Drawing Resonance Structures
1.
(a)

(b)

2.
(a) $\quad \mathrm{NO}_{2}^{-} \quad$ bond order $=\frac{2+1}{2}=1 \frac{1}{2}$
$\mathrm{NO}_{3}^{-} \quad$ bond order $=\frac{2+1+1}{3}=1 \frac{1}{3}$
(b) The N-O bond order is greater for $\mathrm{NO}_{2}^{-}$. As such, the $\mathrm{N}-\mathrm{O}$ bonds in $\mathrm{NO}_{2}^{-}$are shorter than the $\mathrm{N}-\mathrm{O}$ bonds in $\mathrm{NO}_{3}^{-}$.
3.
(a)

plus one more electron pair shared by the two oxygen atoms
(b)

plus two more electron pairs shared by the three oxygen atoms

