A.

(a) 

(b) 

B.

intermediate V

+ H₂O intermediate W

H₂O intermediate X
A. (a) 

\[ \text{KMnO}_4 \rightarrow \text{NaOH, H}_2\text{O} \]

(b) [Chemical reaction and mechanism diagram]

(c) a single achiral molecule

B. (a) major product

\[
\begin{align*}
\text{Br} & \quad \text{C(CH}_3\text{)}_3 \\
\text{Ph} & \quad \text{OCH}_3 \\
\end{align*}
\]

minor product

\[
\begin{align*}
\text{Ph} & \quad \text{C(CH}_3\text{)}_3 \\
\text{Br} & \quad \text{OCH}_3 \\
\end{align*}
\]

(b) [Chemical structure diagram]
A.

(a) [Diagram of a compound with tert-butyl groups]

(b) [Radioactive button options:]
- alone, as a single product
- with a diastereomer
- with an enantiomer
- with >1 other stereoisomer

(c) [Diagram of a compound with bromine and tert-butyl groups]

(d) [Diagram of a compound with multiple bonds and stereocenters]

(e) \((1R,2S)-1,2\text{-dibromo-1-(tert-butyl)-3,3-dimethylcyclohexane}\)

B.

(a) optically inactive product

(b) optically inactive product

Optically active product

Optically active product
The result allows you to say whether it is the methyl group (yes) or the phenyl group (no) that undergoes the 1,2-shift.