Section A

1. What is the name of the functional group found in carboxylic acids?
   Tick (✓) **one** box.

   A. Hydroxyl ☐

   B. Carboxyl ☐

   C. Ethanoxyl ☐

2. What is the formula of the functional group found in alcohols?

   Tick (✓) **one** box.

   A. OH ☐

   B. OCO ☐

   C. COOH ☐

3. A polyester can be made from the reaction between molecules of ethandiol and hexanedioic acid.

   a. How many carbon atoms would be found in hexanedioic acid?

   _____

   b. Complete the displayed formula for a molecule of ethandiol.

   C C

   c. Name the type of reaction that would occur when many molecules of ethandiol reacted with many molecules of hexanedioic acid.

   _____

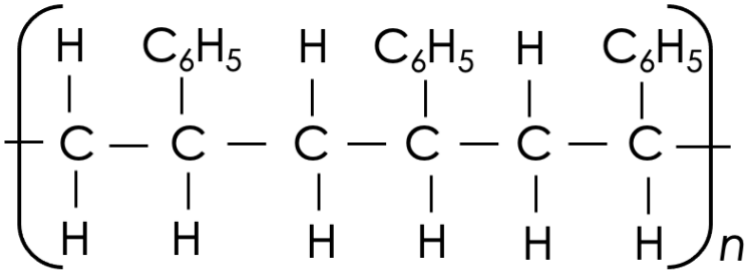
   d. Name the other product that would be formed in this reaction.

   _____

Section B

4. The picture below shows a surfboarder. Surfboards are made from different polymers.

The core of a surfboard is made from poly(styrene). A section of the displayed formula of poly(styrene) is shown below.

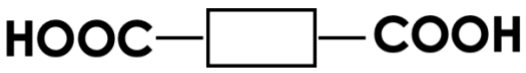


a. Complete the displayed formula to show the monomer that poly(styrene) is made from.

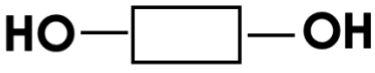
C C

The outer layer of a surfboard is made from a polyester. This polyester is made from two different monomers, X and Y, which are shown in simplified forms below.

Monomer X



Monomer Y



b. Name the functional group in monomer Y.

_____

c. The reaction between monomer X and monomer Y produces a polyester and a small molecule.

State the formula of this small molecule.

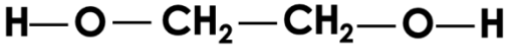
_____

d. The polyester used for the outer layer is much more expensive than poly(styrene). Suggest **two** reasons why it is used.

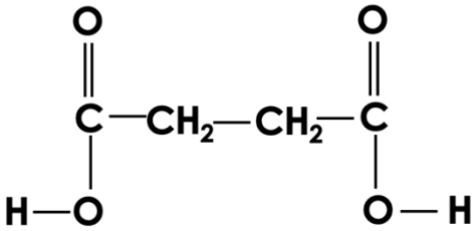
_____
_____
_____
_____

5. The formulae below show different monomers; P, Q and R.

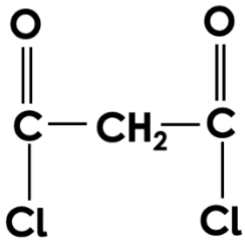
Monomer P



Monomer Q



Monomer R



Monomer P can react with either monomer Q or monomer R. In each case, a polymer is produced and a small molecule.

Complete the table to show the small molecules produced in these reactions.

Reactants	**Formula of small molecule produced**
P and Q	
P and R	

Section C

6. Proteins are naturally occurring polymers formed from amino acids.
   a. Proteins are synthesised from amino acids through condensation polymerisation reactions. What does this show about the structure of amino acids?
   b. Name the organelle where proteins are synthesised.
   c. Give two functions of proteins in the body.
   d. Explain the effect of a DNA mutation on protein synthesis.