Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

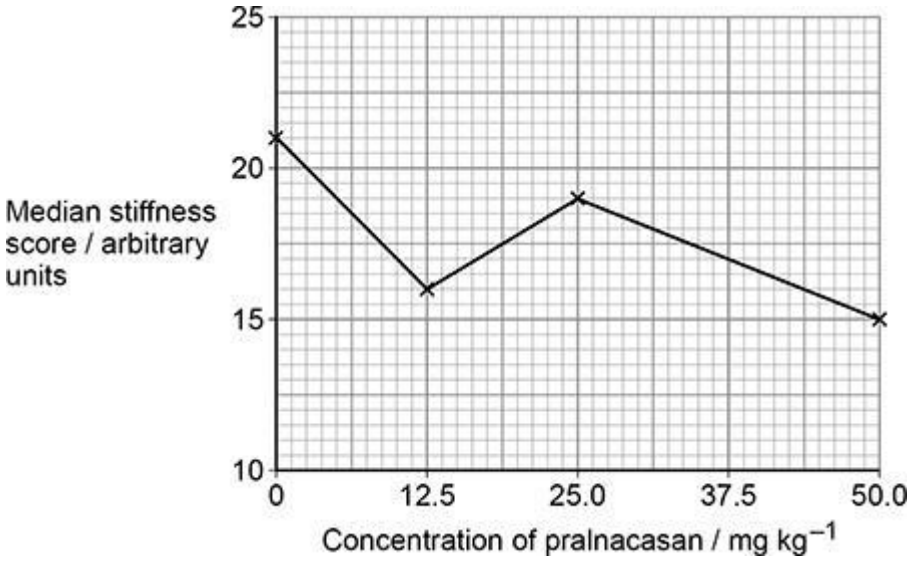
Osteoarthritis (OA) is a disease resulting in joint damage which causes stiffness.

Scientists investigated the use of a drug called pralnacasan to treat OA in 80 mice.

The scientists:

- injected the knee joints of mice with an enzyme to cause joint damage
- split the mice randomly into 4 equal groups
- fed each group with food containing a different concentration of pralnacasan
- after 6 weeks, assessed the stiffness of the knee joints of the mice and scored them using an arbitrary scale.

The graph below shows their results.



(a) Describe how the scientists determined the median of the stiffness scores.

_____

_____

_____

(1)

(b) Using all the information, evaluate the use of pralnacasan as an effective treatment for OA in humans.

_____

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(5)
(Total 6 marks)

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Q2.

(a) Describe the primary structure of all proteins.

_____

_____

_____

_____

_____

_____

(2)

(b) This question is about the genetic code.

Define **universal**, **non-overlapping** and **degenerate**.

Universal _____

_____

_____

Non-overlapping _____

_____

_____

Degenerate _____

_____

_____

(3)

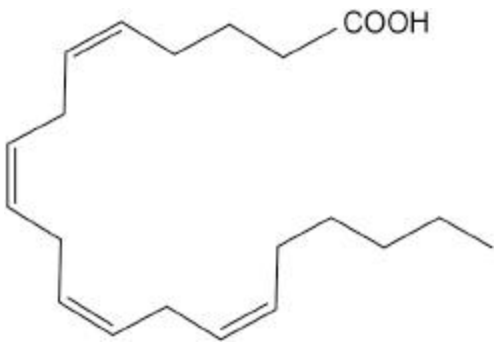
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Q3.

(a) **Figure 1** shows a fatty acid that contains 20 carbon atoms and four double bonds.

Figure 1

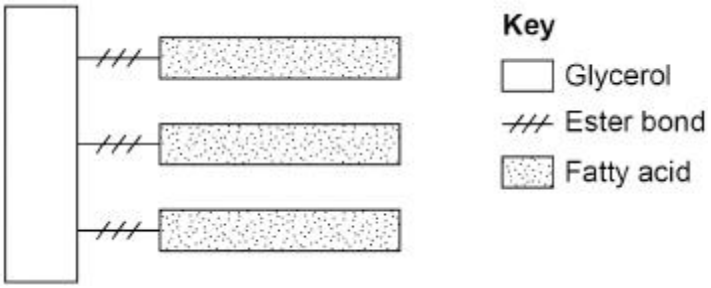


On **Figure 1**, draw a box around the R group of the fatty acid.

(1)

(b) **Figure 2** shows a triglyceride.

Figure 2



Describe **two** differences between the structure of the triglyceride shown in **Figure 2** and a phospholipid.

1 _____

_____

2 _____

_____

(2)

(c) Explain why phospholipids can form a bilayer but triglycerides cannot.

_____

_____

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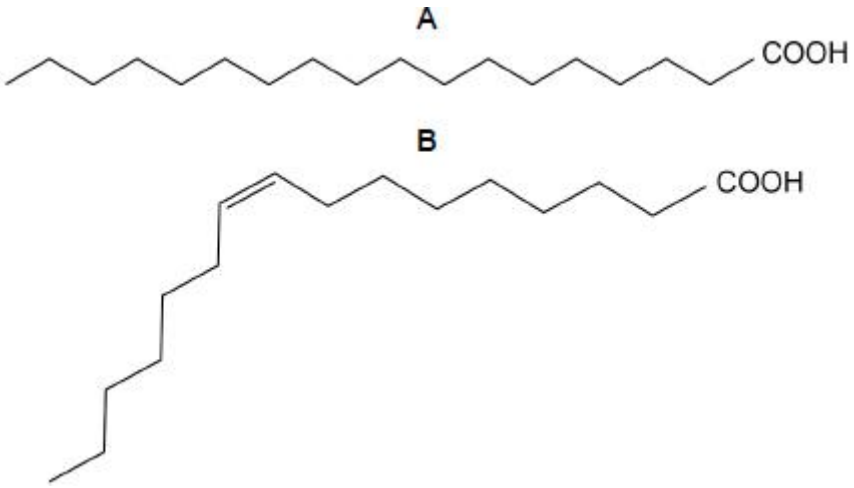
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(3)

(d) **Figure 3** shows two fatty acids, **A** and **B**.

Figure 3



Scientists fed rats a diet with added fish oil for 4 months.

They obtained samples of red blood cells from the rats before starting this diet (0 months) and after 4 months on this diet.

For each red blood cell sample, they separated the cell-surface membranes and measured:

- the percentage of phospholipids containing each of the fatty acids **A** and **B**
- the fluidity of the membrane.

The table below shows the scientists' results.

Time sample of red blood cells obtained / months	**Mean percentage of phospholipids containing fatty acid A**	**Mean percentage of phospholipids containing fatty acid B**	**Mean fluidity of the membrane / arbitrary units**
0	19.8	1.7	31
4	11.7	9.0	97

Suggest why the fluidity of the membrane was higher after 4 months.

Use all the information provided in the question.

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_____

_____

_____

_____

_____

_____

_____

(3)

(Total 9 marks)

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