

1.

A virus called RSV causes severe respiratory disease.

(a) Suggest **two** precautions that a person with RSV could take to reduce the spread of the virus to other people.

1. _____

2. _____

(2)

(b) One treatment for RSV uses monoclonal antibodies which can be injected into the patient.

Scientists can produce monoclonal antibodies using mice.

The first step is to inject the virus into a mouse.

Describe the remaining steps in the procedure to produce monoclonal antibodies.

(3)

(c) Describe how injecting a monoclonal antibody for RSV helps to treat a patient suffering with the disease.

(2)

A trial was carried out to assess the effectiveness of using monoclonal antibodies to treat patients with RSV.

Some patients were given a placebo.

(d) Why were some patients given a placebo?

(1)

A number of patients had to be admitted to hospital as they became so ill with RSV.

The results are shown in the table below.

Treatment received by patient	% of patients within each group admitted to hospital with RSV
Group A : Monoclonal antibody for RSV	4.8
Group B : Placebo	10.4

The trial involved 1 500 patients.

- Half of the patients (group **A**) were given the monoclonal antibodies.
- Half of the patients (group **B**) were given the placebo.

(e) Calculate the total number of patients admitted to hospital with RSV during the trial.

Total number of patients admitted to hospital = _____

(2)

(f) Evaluate how well the data in the table above supports the conclusion:

‘monoclonal antibodies are more effective at treating RSV than a placebo’.

(2)

(Total 12 marks)

2.

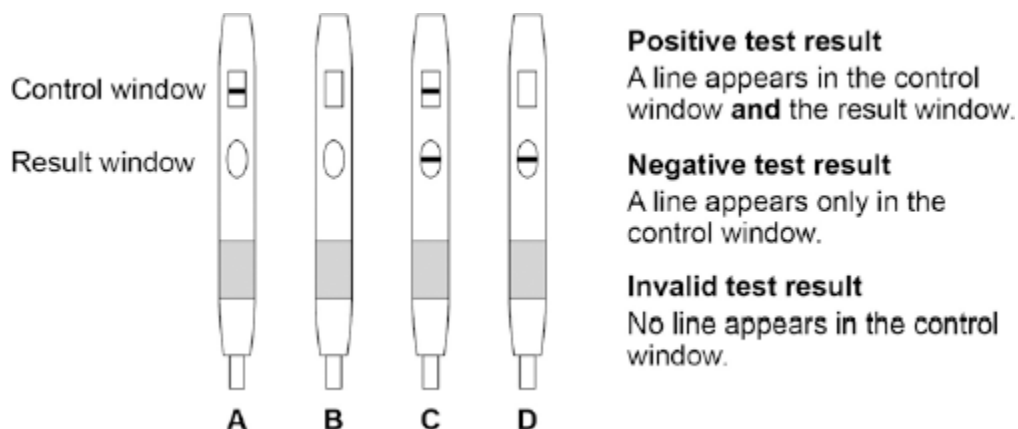
Monoclonal antibodies are used to measure the levels of hormones in the blood.

Pregnant women produce the hormone HCG.

HCG is excreted in urine.

Figure 1 shows four pregnancy test strips.

Figure 1



(a) Which test strip shows a negative test result?

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

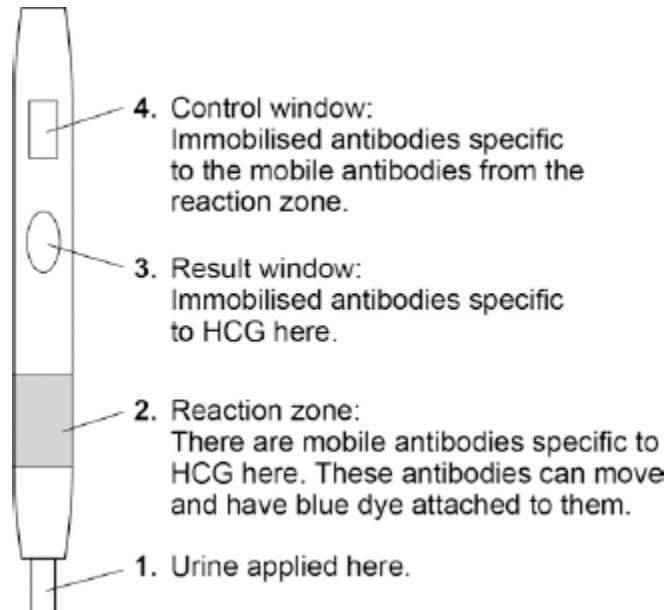
(b) Monoclonal antibodies are used for pregnancy testing.

Give **one other** use of monoclonal antibodies.

(1)

(c) **Figure 2** shows the parts of a pregnancy test strip.

Figure 2



The pregnancy test strip will show a positive test result when a woman is pregnant.

Explain how the pregnancy test strip works to show a positive result.

(6)

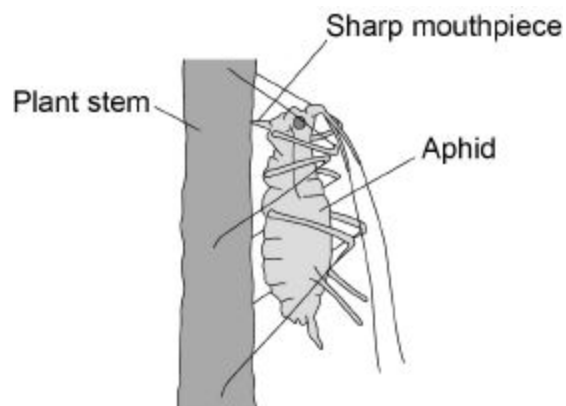
(Total 8 marks)

3.

Plants can be infected by fungi, viruses and insects.

Aphids are small insects that carry pathogens.

The diagram below shows an aphid feeding from a plant stem.



- (a) An aphid feeds by inserting its sharp mouthpiece into the stem of a plant.

Give the reason why the mouthpiece of an aphid contains a high concentration of dissolved sugars after feeding.

(1)

(b) Plants infected with aphids may show symptoms of magnesium deficiency.

Magnesium deficiency symptoms include:

- yellow leaves
- stunted growth.

Explain how a deficiency of magnesium could cause these symptoms.

(5)

- (c) A farmer thinks a potato crop is infected with potato virus Y (PVY).

The farmer obtains a monoclonal antibody test kit for PVY.

To make the monoclonal antibodies a scientist first isolates the PVY protein from the virus.

Describe how the scientist would use the protein to produce the PVY monoclonal antibody.

(4)

(Total 10 marks)