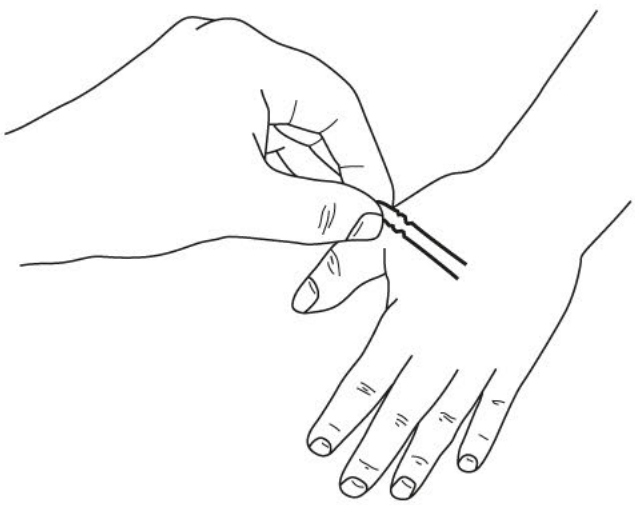
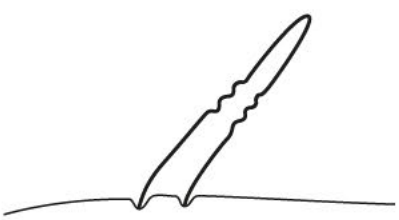
1 Students carried out a simple investigation to show how the sensitivity of the skin differs on the finger tips, the back of the hand and the wrist.

- Students worked in pairs.
- The two prongs of a hairpin were fixed 0.5 cm apart.
- This hairpin was then used by one student to touch the skin of another student, who was looking away.
- The first student used both prongs or one prong as a stimulus.
- The second student then indicated whether he thought both prongs or just one prong was used.
- His response was recorded as correct (✓) or incorrect (✗).
- This was repeated 10 times for each area of the skin.

The procedure was then repeated using prongs 1 cm apart and 2 cm apart.

Students could then identify the most sensitive area of the skin.





stimulus with two prongs



stimulus with one prong

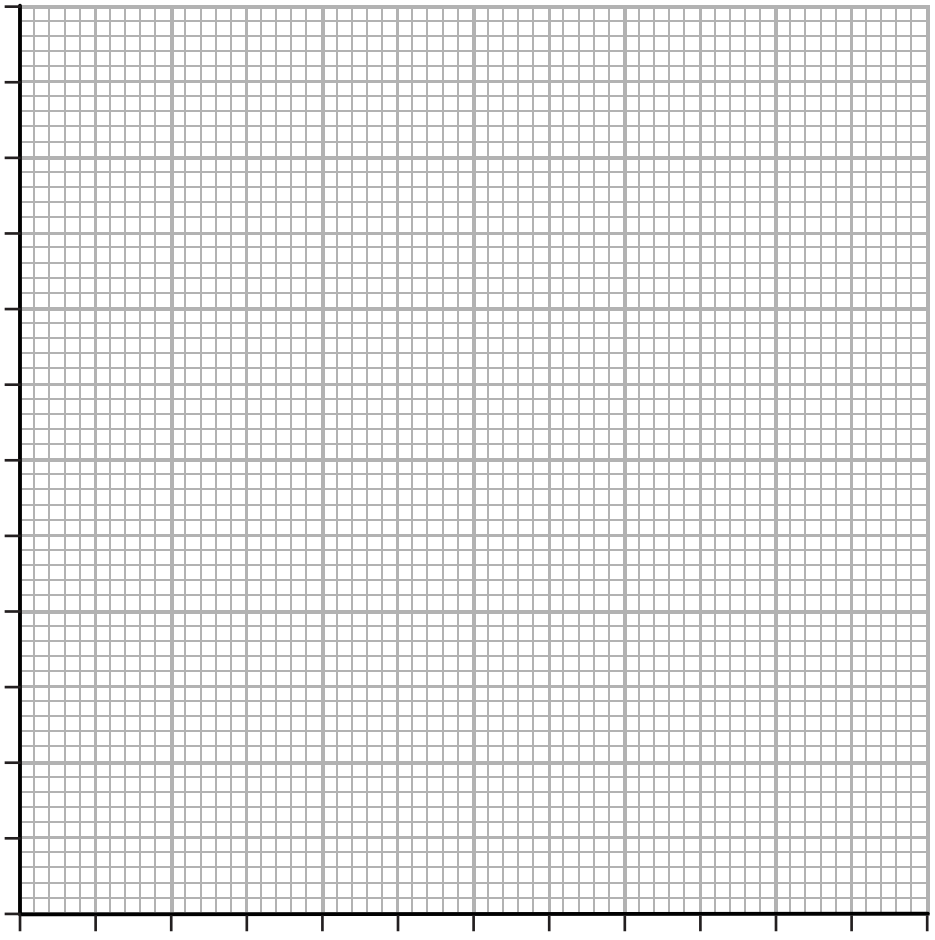
(a) Some of the percentages of correct responses at each distance have been recorded in the table. Complete the table by writing in the missing percentages.

(2)

Record of response of second student			
Area of skin	Distance prongs apart in cm		
	0.5 cm	1.0 cm	2.0 cm
Finger tips	✓ ✓ ✓ ✓ ✗ ✓ ✓ ✓ ✗ ✗	✓ ✓ ✓ ✓ ✓ ✓ ✗ ✓ ✓ ✗	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
Percentage correct		80%	100%
Back of hand	✓ ✗ ✓ ✓ ✗ ✗ ✗ ✗ ✓ ✗	✓ ✓ ✗ ✓ ✗ ✓ ✗ ✓ ✓ ✗	✓ ✓ ✓ ✓ ✓ ✓ ✗ ✓ ✗ ✓
Percentage correct	40%		80%
Wrist	✗ ✗ ✗ ✓ ✗ ✗ ✗ ✗ ✗ ✗	✓ ✗ ✓ ✗ ✓ ✓ ✗ ✓ ✓ ✗	✗ ✓ ✗ ✓ ✓ ✗ ✓ ✓ ✓ ✓
Percentage correct		60%	

(b) On the grid provided, plot a bar graph to show how sensitivity changes with each area of the skin.

(5)



(c) Which area of the skin is the most sensitive? Explain your answer.

(3)

(d) Suggest a reason for the difference in sensitivity between the areas of the skin.

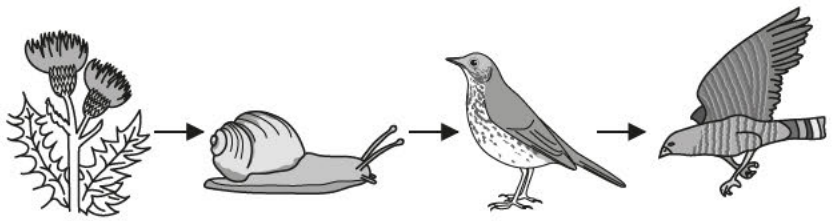
(2)

(e) The teacher told the students to touch the skin with the prongs using the same pressure each time. Suggest a reason for this.

(1)

(Total for Question = 13 marks)

2 The diagram shows a food chain.



(a) (i) Name the producer in this food chain.

(1)

.....

(ii) Name the secondary consumer in this food chain.

(1)

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(b) The sparrowhawk uses its eyes to see its prey. The photograph shows a sparrowhawk's eye.



(i) Name the parts labelled A and B.

(2)

A .....

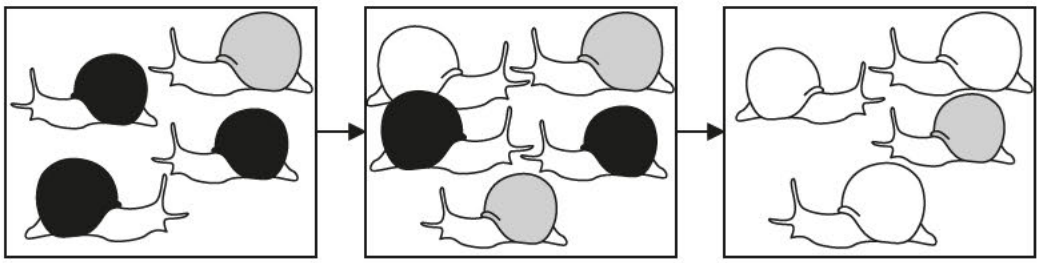
B .....

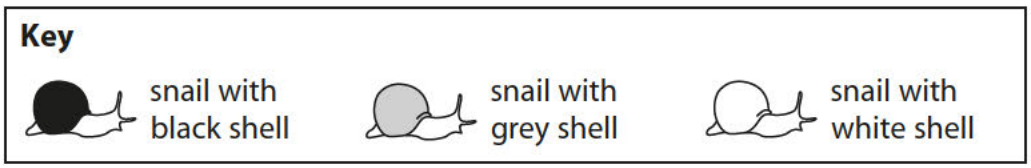
(ii) The table describes other parts of the eye.
Complete the table by naming each part that is described.

(3)

Description	Name of part of eye
the tough protective outer layer	
the nerve from the eye to the brain	
focuses light onto the retina	

(c) A student put these drawings in her book to help her understand how natural selection affects shell colour in a snail population.





(i) What is meant by the term **population**?

(1)

.....

.....

(ii) Use the information in the drawings to explain the process of natural selection.

(5)

(Total for Question = 13 marks)

3 (a) Describe the stages that are used to genetically modify a bacterium that is able to manufacture human growth hormone.

(5)

(b) BST is a hormone that increases milk yield in cows.

(i) Explain what is meant by the term **hormone**.

(2)

(ii) In some countries BST from genetically modified bacteria has been injected into cows to improve milk production.

In other countries selective breeding has been used to improve milk production.

Describe how selective breeding could be used to increase milk production.

(3)

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(Total for Question = 10 marks)