

In order to plan the best use of your time, read through all the questions on this paper carefully before starting work.

- 1 Enzymes are used in the fruit juice industry to help with the extraction of juice from fruit.

You are going to investigate the extraction of juice from some crushed apple.

You are provided with two beakers of crushed apple, a solution of an enzyme, two measuring cylinders, two filter funnels and some filter paper.

Use the following method:

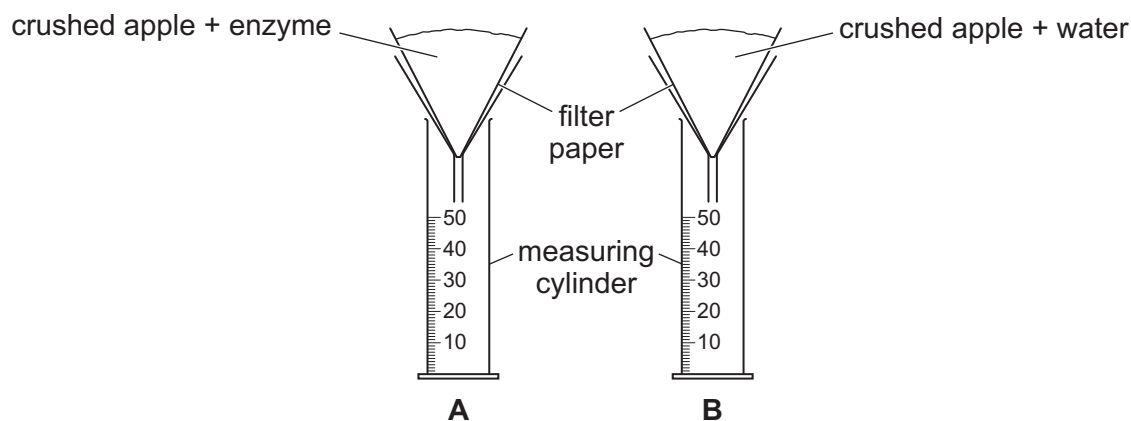
- label one beaker of crushed apple **A** and the other beaker of crushed apple **B**
- label one measuring cylinder **A** and the other measuring cylinder **B**
- place a filter funnel with filter paper in the top of each of the measuring cylinders
- use a syringe to add 2 cm³ enzyme solution to beaker **A**
- use a clean syringe to add 2 cm³ distilled water to beaker **B**
- use a stirring rod to mix the contents of beaker **A**
- clean the stirring rod and then use it to mix the contents of beaker **B**
- leave the beakers for five minutes.

Whilst waiting you can continue with (a)(i) and (g).

After the beakers of crushed apple have been left for five minutes, fill the filter paper in measuring cylinder **A** with crushed apple from beaker **A** and the filter paper in measuring cylinder **B** with crushed apple from beaker **B** as shown in the diagram. Start timing (this is 0 minutes).

Any apple juice extracted will drip through the filter paper into the measuring cylinder.

You are going to measure and record the volume of juice in each of the measuring cylinders every 2 minutes for 10 minutes.



- (a) (i) Complete the table headings by inserting the units. [1]
- (ii) Record in the table the volume of juice in measuring cylinders **A** and **B** every 2 minutes for 10 minutes. [4]

time /	total volume of juice collected /	
	A	B
0	0.0	0.0
2		
4		
6		
8		
10		

- (b) Use your results to suggest why the use of this enzyme is an advantage in the fruit juice industry.

.....

.....

.....

..... [3]

- (c) Suggest reasons for:

- (i) stirring the contents of beakers **A** and **B**

.....

..... [1]

- (ii) using a clean stirring rod to stir the contents of beaker **B**.

.....

..... [1]

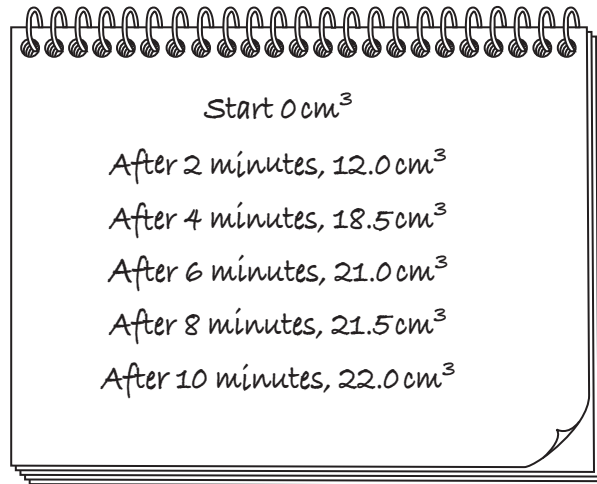
- (d) Explain how the contents of beaker **B** act as a control.

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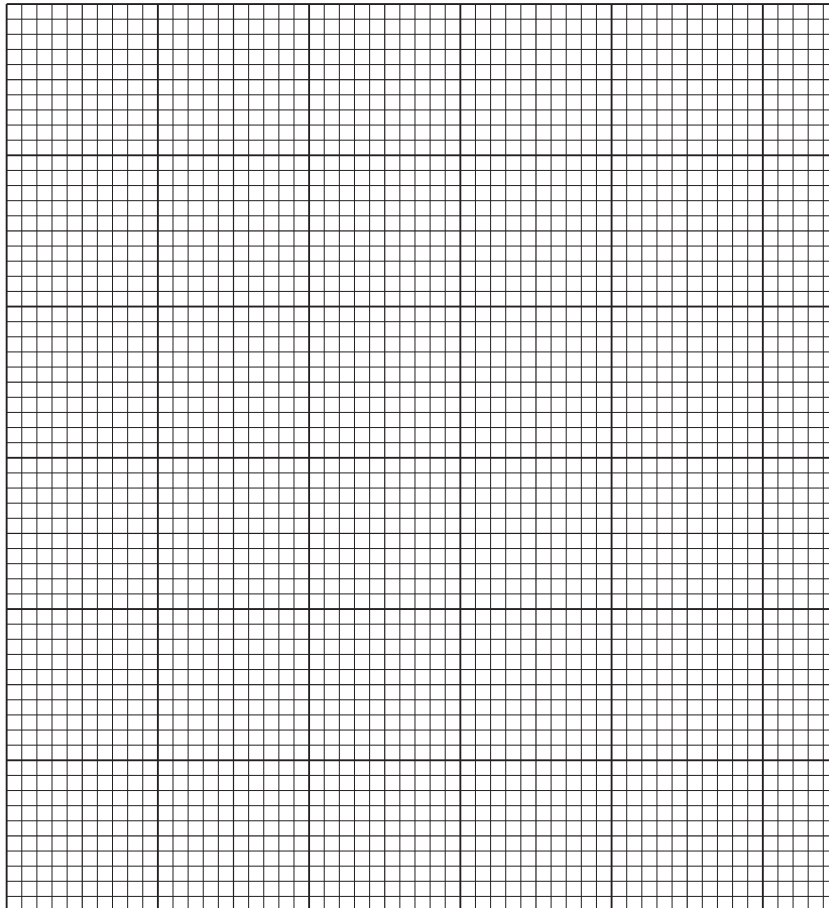
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..... [2]

- (e) (i) Some other students did a similar experiment to extract some juice from pears. Their results were:



Use the students' results to construct a line graph. Join your points with ruled, straight lines.

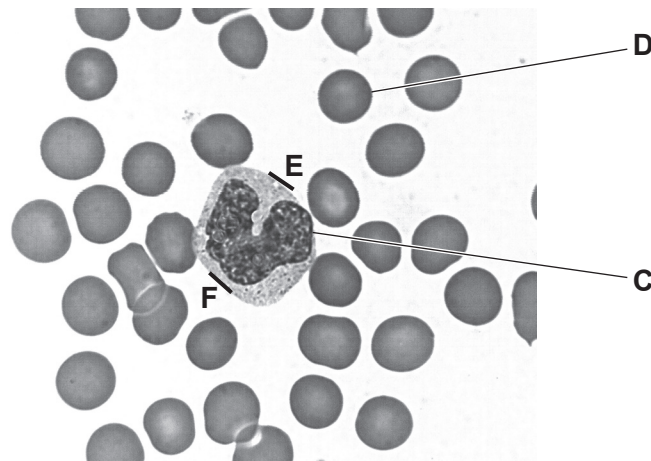


[4]

- (ii) Use your graph to estimate the volume of juice collected at five minutes. Show your working on your graph.

volume of juice collected at five minutes [3]

2 The photomicrograph shows some human blood cells.



(a) In the space below make a large drawing of the cell labelled **C** as it appears in the photomicrograph.

[4]

(b) Complete the table by describing **three visible** differences between cell **C** and cell **D**.

	cell C	cell D
1		
2		
3		

[3]

(c) (i) Draw a straight line on the photomicrograph to join **E** and **F**.

Measure and record the length of this line.

length of line **E–F** mm [1]

(ii) On your drawing, draw a straight line at the same location as the line **E–F**.

Measure and record the length of this line.

length of line on drawing mm [2]

(iii) Use your measurements in (i) and (ii) to calculate the magnification of your drawing compared to the photomicrograph. Give your answer to 1 decimal place.

Space for working.

magnification \times [2]

[Total: 12]

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