2020 O' Levels 6093/3 – Recommended Answers

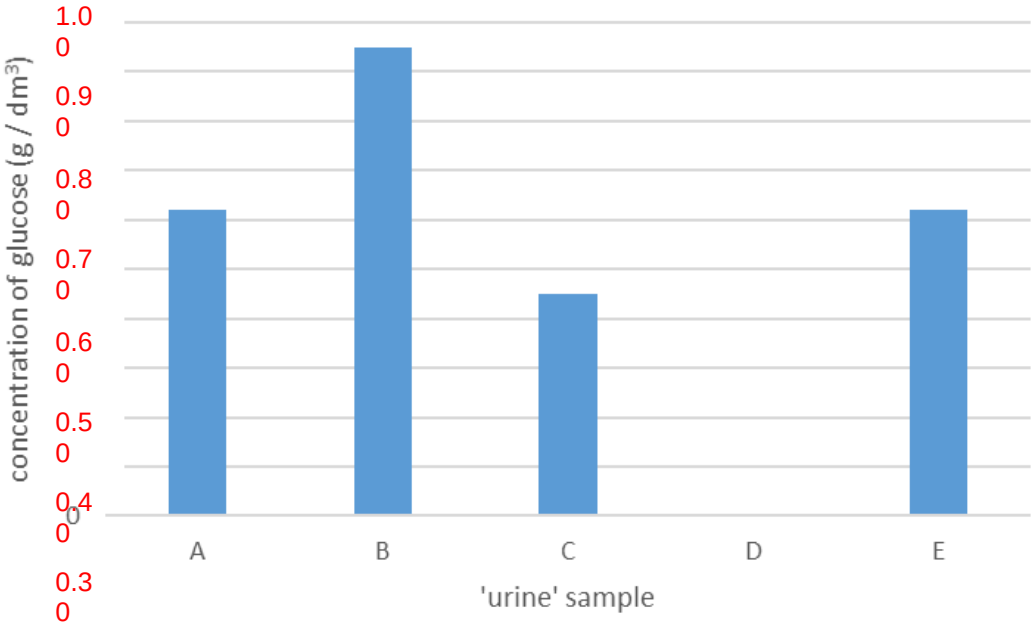
1a. test tube 1 – final colour: brick-red [1]. Time taken for colour change to first occur: 19s [1]
test tube 2 – final colour: blue [1].

1b. Correct headings [1]
Correct unit [1]
Column for time taken is on the left of final colour and concentration of glucose [1]
Time taken for sample D is >120 s & Time taken for sample B is the shortest [1]
Correct concentration recorded based on time taken [1]

'Urine' sample	Time taken for colour change to first occur/ s	Final colour	Concentration of glucose/ g/ dm^3
A	34	**Red** (ppt)	0.62
B	26	**Red** (ppt)	0.95
C	42	Red ppt in blue solution	0.45
D	>120	**Blue** (solution)	0
E	34	**Red** (ppt)	0.62

[Note: 0 need not be in 2 dp]

1c. [1] each. Total: [4]
- Vertical axis labelled "concentration of glucose/ g / dm^3" & horizontal axis labelled 'urine' sample (R: sample)
- Scale: Appropriate, easy to read and graph occupies at least ½ of grid.
  All values on the vertical axis are in 2 dp
- All bars plotted in accurately
- Bars are of equal width, with equal spacing in between each bar



1d. variable: volume of 'urine' sample [1]
explanation: to ensure that concentration of glucose is the only independent variable [1]

1e. Sample D is from a healthy person and Samples A, B, C and E are taken from unhealthy people [1].
Healthy people (where sample D is collected) do not have glucose in their urine [1].
Unhealthy people (where samples A, B, C and E are collected) are **unable to reabsorb all** the **glucose from the glomerular filtrate** at the **kidneys** [1].

1f. Any 2 sets of the following. Max: [4]

source of error [1] [P: if impact on results not discussed]	Improvement [1]
It is difficult to determine the exact time when the first sign of colour change occurs, hence the reading may be higher or lower than expected.	Repeat the experiment to obtain an average time taken for first sign of colour change to improve the reliability of result.
With the lack of instruction to wash the syringes, contamination of urine samples may occur, hence the reading may be higher or lower than expected. **OR** With limited number of syringes, dilution may occur when syringes are washed but cannot be completely dry, hence the reading may be lower than expected.	Wash and dry the syringe after each use before using the syringe to collect the other urine samples.
Use of the 10 cm^3 syringe to collect 2 cm^3 of Benedict's solution may result in inaccurate volumes collected, hence the reading may be higher or lower than expected.	Use the 5 cm^3 syringe to collect Benedict's solution.

1g. [1] each. Total: [4]

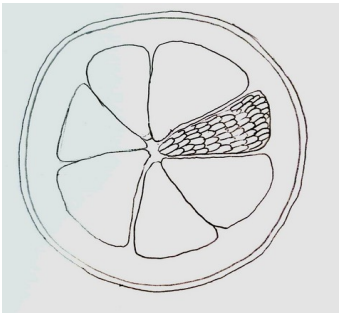
- independent variable – temperature of water bath + dependent variable – time taken for the first sign of colour change
- ≥ two constant variables, e.g. volume of glucose solution/ deionized water, duration of incubation
- apparatus and precautions – manner of maintaining temperature in water bath
- interpretation and prediction of results – relate time recorded with concentration of glucose solution and rate of diffusion

1. Place 5 cm^3 of glucose solution in the Visking tubing. Rinse the surface of the Visking tubing in case of contact with the glucose solution.
2. Dry the surface of the Visking tubing and immerse it into a large test tube containing 20 cm^3 of deionised water as shown in Fig. 1.2.
3. Immerse the set-up in a beaker of water bath at 10˚C and start the stopwatch immediately.
4. Maintain the temperature of water bath using a thermometer and a mixture of hot and cold water.
5. At the end of 30 minutes, collect 2 cm^3 of the liquid from the large test tube to carry out a Benedict's test. Note the time taken for the first sign of a colour change at the top of the liquid with a stopwatch.
6. Repeat the above steps with beaker of water bath at varying temperatures: 20˚C, 30˚C, 40˚C, 50˚C, 60˚C.
7. The shorter the time taken for the colour change to occur, the higher the concentration of glucose in the liquid which indicates a higher rate of diffusion of glucose in that temperature. [A: Reverse argument] (The higher the temperature, the higher the rate of diffusion.)

2a. i. [1] each. Total: [4]

- Proportion of the two rings of tissues: green fruit skin and white tissue under it
  Size: At least half of space provided occupied
- Quality of lines: Drawing done using free hand to produce clean & continuous lines (P: Broken & overlapped lines)
- Resemblance: Details of the sectors. Details of juicy pulp for at least one sector

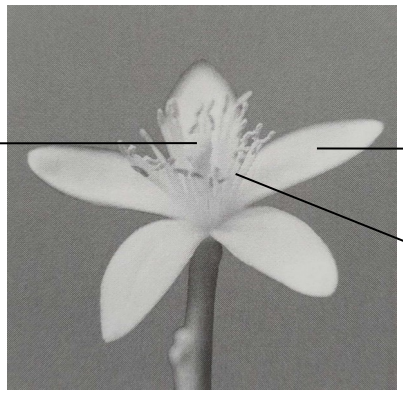
- Title: Transverse Section of lime fruit [A: T.S]



Transverse Section of lime fruit

ii. [1m for realistic length. 1m for units included in both recordings (in cm / mm)]
iii. [1m for working. 1m for answer in 2 sf]
Magnification = length of drawing / length of actual

2b. i. [1m for each correct annotation with adaptations of parts described)
Note: annotations include short notes; it is not simply a label]



2b. ii. [Any 3 differences; 1m for each difference]

Flowers of *Citrus*	**Flowers of *Bromus***
Stamen is non-pendulous	Stamen is pendulous.
Stigma is non-feathery	Stigma is feathery
Stamens are not protruding out of the flower	Stamens are protruding out of the flower
Anthers are enclosed within the flower	Anthers are hanging outside the flower

2c. Pollen grains of *Hibiscus* is adapted for insect pollination while pollen grains of *Pinus* is adapted for wind pollination [1].
Pollen grains of *Hibiscus* have a rough surface with spikes, which will help to cling onto the body of insects [1].
Pollen grains of *Pinus* are relatively smoother, allowing them to be easily blown away by wind [1].
Pollen grains of *Pinus* are smaller in size (about 0.07mm as opposed to 0.17mm of the Hibiscus) hence they are easily carried by the wind [1].