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**BIOLOGY****0610/53**

Paper 5 Practical Test

**October/November 2017**

MARK SCHEME

Maximum Mark: 40

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**Published**

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This document consists of **6** printed pages.

**Mark schemes will use these abbreviations**

- ; separates marking points
- / alternatives
- **I** ignore
- **R** reject
- **A** accept (for answers correctly cued by the question, or guidance for examiners)
- AW alternative wording (where responses vary more than usual)
- AVP any valid point
- **ecf** credit a correct statement / calculation that follows a previous wrong response
- **ora** or reverse argument
- ( ) the word / phrase in brackets is not required, but sets the context
- underline actual word given must be used by candidate (grammatical variants excepted)
- max indicates the maximum number of marks that can be given

| Question              | Answer                                                                                                                                                                                                                                                                                                                                               | Marks           | Guidance             |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|-----------------------|-------------------------------------|----------------------|-------------------------------------|--------------------|----------------------------|---|---|---|----------------------------------------------------------------------------------|
| 1(a)(i)               | three named fruits <u>and</u> three volumes;                                                                                                                                                                                                                                                                                                         | 1               |                      |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |
| 1(a)(ii)              | table drawn with (ruled) lines, appropriate columns and (heading) underlined ;<br><br>suitable headings ;<br><br>six colours recorded ;<br><br>colour change recorded for at least one fruit ;                                                                                                                                                       | 4               |                      |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |
| 1(a)(iii)             | Benedict's (reagent) ;                                                                                                                                                                                                                                                                                                                               | 1               |                      |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |
| 1(a)(iv)              | fruit(s) that show colour change from table in <b>1(a)(ii)</b> ;                                                                                                                                                                                                                                                                                     | 1               |                      |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |
| 1(a)(v)               | idea of looking for colour change (as the starting colour may not be blue) ;                                                                                                                                                                                                                                                                         | 1               |                      |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |
| 1(b)                  | <table><tr><td><i>variable</i></td><td><i>controlled by</i></td></tr><tr><td>volume of fruit juice</td><td>measuring 2 cm<sup>3</sup> for all</td></tr><tr><td>volume of Benedict's</td><td>measuring 2 cm<sup>3</sup> for all</td></tr><tr><td>time in water-bath</td><td>five minutes in water-bath</td></tr><tr><td>;</td><td>;</td></tr></table> | <i>variable</i> | <i>controlled by</i> | volume of fruit juice | measuring 2 cm <sup>3</sup> for all | volume of Benedict's | measuring 2 cm <sup>3</sup> for all | time in water-bath | five minutes in water-bath | ; | ; | 2 | one mark for the variable, one mark for method of controlling which must related |
| <i>variable</i>       | <i>controlled by</i>                                                                                                                                                                                                                                                                                                                                 |                 |                      |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |
| volume of fruit juice | measuring 2 cm <sup>3</sup> for all                                                                                                                                                                                                                                                                                                                  |                 |                      |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |
| volume of Benedict's  | measuring 2 cm <sup>3</sup> for all                                                                                                                                                                                                                                                                                                                  |                 |                      |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |
| time in water-bath    | five minutes in water-bath                                                                                                                                                                                                                                                                                                                           |                 |                      |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |
| ;                     | ;                                                                                                                                                                                                                                                                                                                                                    |                 |                      |                       |                                     |                      |                                     |                    |                            |   |   |   |                                                                                  |

| Question                                      | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Marks | Guidance                                                                                                                                                                                                                                                                                                                                               |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------|-----------------------|-------------------------------|------------------------------|--------------------------------------|-----------------------------------------------|----------------------------|-------------------------|--------------------------------------------------------|----------------------|----------------------|--------------------------|--------------------|---|---------------------------------------------------------------|
| 1(c)                                          | <table><tr><td>error</td><td>improvement</td></tr><tr><td>temperature of water-bath</td><td>any method of keeping the temperature the same</td></tr><tr><td>judging colour by eye</td><td>colour standard / colorimeter</td></tr><tr><td>idea of age of fruit differs</td><td>use fruit of the same age / ripeness</td></tr><tr><td>Benedict's and juice mixed at different times</td><td>test each fruit separately</td></tr><tr><td>no replicates / repeats</td><td>at least <u>two</u> more, replicates / repeats, needed</td></tr><tr><td>method of extraction</td><td>use blender / juicer</td></tr><tr><td>more than one fruit used</td><td>use only one fruit</td></tr></table> | error | improvement                                                                                                                                                                                                                                                                                                                                            | temperature of water-bath | any method of keeping the temperature the same | judging colour by eye | colour standard / colorimeter | idea of age of fruit differs | use fruit of the same age / ripeness | Benedict's and juice mixed at different times | test each fruit separately | no replicates / repeats | at least <u>two</u> more, replicates / repeats, needed | method of extraction | use blender / juicer | more than one fruit used | use only one fruit | 4 | one mark for error, one mark for improvement which must match |
| error                                         | improvement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                                                                                                                                                                                                                                                                                                                                                        |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |
| temperature of water-bath                     | any method of keeping the temperature the same                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |                                                                                                                                                                                                                                                                                                                                                        |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |
| judging colour by eye                         | colour standard / colorimeter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                                                                                                                                                                                                                                                                                                                                                        |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |
| idea of age of fruit differs                  | use fruit of the same age / ripeness                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                                                                                                                                                                                                                                                                                                                        |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |
| Benedict's and juice mixed at different times | test each fruit separately                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |                                                                                                                                                                                                                                                                                                                                                        |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |
| no replicates / repeats                       | at least <u>two</u> more, replicates / repeats, needed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                                                                                                                                                                                                                                                                                                                                        |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |
| method of extraction                          | use blender / juicer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                                                                                                                                                                                                                                                                                                                        |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |
| more than one fruit used                      | use only one fruit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |                                                                                                                                                                                                                                                                                                                                                        |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |
| 1(d)                                          | add biuret ;<br><br>(blue) to lilac / mauve / purple / violet for positive test ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2     |                                                                                                                                                                                                                                                                                                                                                        |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |
| 1(e)                                          | <i>any six from:</i><br><br>1 at least two temperatures / or stated temperatures ;<br>2 use of water-bath ;<br>3 same volume juice ;<br>4 same fruit used ;<br>5 same time / stated time ;<br>6 add DCPIP ;<br>7 measure number of drops of DCPIP ;<br>8 control (no vitamin C / water) ;<br>9 repeats ;<br>10 safety ;                                                                                                                                                                                                                                                                                                                                                                | 6     | <b>A</b> iodine titration method if independent variable is time heated:<br><br>1 stated temperature > 80°C<br>2 use of water-bath ;<br>3 time intervals (at least two) ;<br>4 same volume juice ;<br>5 same fruit used ;<br>6 add DCPIP ;<br>7 measure number of drops of DCPIP ;<br>8 control (no vitamin C / water) ;<br>9 repeats ;<br>10 safety ; |                           |                                                |                       |                               |                              |                                      |                                               |                            |                         |                                                        |                      |                      |                          |                    |   |                                                               |

| Question | Answer                                                                                                                                                          | Marks | Guidance |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|
| 1(f)     | <b>O</b> single clear lines with no shading ;<br><b>S</b> at least 80 mm in diameter ;<br><b>D1</b> inner star shape shown ;<br><b>D2</b> 8–16 segments shown ; | 4     |          |

| Question  | Answer                                                                                                                                                                                                 | Marks | Guidance                                                           |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------|
| 2(a)(i)   | 18.4 ;;                                                                                                                                                                                                | 2     | working $\frac{18 + 17 + 19 + 20 + 18}{5} / \frac{92}{5} = 1$ mark |
| 2(a)(ii)  | 5 circled on Table 2.1 ;<br>12.8 ;                                                                                                                                                                     | 2     | <b>ecf</b> if incorrect result circled<br><b>A</b> 12.7            |
| 2(a)(iii) | <b>A</b> (xes) – labelled with units ;<br><b>S</b> (cale) – even scales on both axes;<br><b>P</b> (lot) – all points plotted accurately $\pm$ half a small square ;<br><b>L</b> (ines) – line ;        | 4     |                                                                    |
| 2(a)(iv)  | low concentrations increase root growth ;<br>high concentrations decrease root growth ;<br>0.4% identified as the concentration that produces longest root growth ;<br>correct data quote with units ; | 3     | <b>ecf</b> for incorrect graph                                     |

| Question | Answer                                               | Marks | Guidance                             |
|----------|------------------------------------------------------|-------|--------------------------------------|
| 2(b)     | (length of <b>MN</b> ) $30 \pm 1$ mm ;<br>0.25 mm ;; | 3     | <b>ecf</b> for incorrect measurement |