



# **GCSE Physics 3**

**Higher Tier**

**Physics 3H**

## **SPECIMEN MARK SCHEME**

**Version 1.0**

## Quality of Written Communication and levels marking

In Question 3 candidates are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Candidates will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

### Level 1: basic

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

### Level 2: clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

### Level 3: detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

In order to attain a mark within a certain level, **both** the science **and** the QWC must be of a standard appropriate to that level.

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**COMPONENT NAME: GCSE Physics 3H**

**STATUS: Specimen V1.0**

| <b>question</b> | <b>answers</b>  | <b>extra information</b> | <b>mark</b> |
|-----------------|---|--------------------------|-------------|
| <b>1(a)</b>     | ciliary muscle  |                          | 1           |
|                 | cornea  |                          | 1           |
| <b>1(b)(i)</b>  | moved further (from his eyes)   |                          | 1           |
| <b>1(b)(ii)</b> | rays between lens and eye converging  |                          | 1           |
|                 | rays inside eye focus on the retina   |                          | 1           |
| <b>1(c)</b>     | any <b>two</b> from: <ul style="list-style-type: none"> <li>• both use a converging lens</li> <li>• image formed is real</li> <li>• image is inverted</li> <li>• image in eye formed on retina, image in camera formed on film / CCDs</li> <li>• amount of light entering eye and camera can be controlled</li> </ul> |                          | 2           |
| <b>Total</b>    |   |                          | <b>7</b>    |

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| question     | answers   | extra information  | mark     |
|--------------|---|--|----------|
| 2(a)         | so the results can be compared fairly   | fair test is insufficient  | 1        |
| 2(b)         | <b>J L M</b>  | all 3 required and no other  | 1        |
| 2(c)(i)      | for a given current the number of paper clips increases by the same factor as the number of turns   |  | 1        |
|              | plus a mathematical explanation using the data<br>eg a current of 1 A with 10 turns picks up 3 clips, a current of 1 A with 20 turns picks up 6 clips |  | 1        |
| 2(c)(ii)     | 30  | allow <b>1</b> mark for showing correct use of figures eg<br>$20 \text{ turns} \times 5 = 100$ | 2        |
| 2(c)(iii)    | check the new data / repeat the experiment  |  | 1        |
|              | to identify any anomalous results   |  | 1        |
|              | and reconsider the prediction / hypothesis in the light of new evidence   |  | 1        |
| <b>Total</b> |   |  | <b>9</b> |

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| <b>3</b>   |   |  |  |
|--|---|--|--|
| Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 2.   |   |  |  |
| <b>0 marks</b>   | <b>Level 1 (1-2 marks)</b>  | <b>Level 2 (3-4 marks)</b>   | <b>Level 3 (5-6 marks)</b>   |
| No relevant content.   | There is a brief explanation of how a current is caused to flow in the starter motor circuit. | There is some explanation of how a current is caused to flow in the starter motor circuit. | There is a clear and detailed explanation of how a current is caused to flow in the starter motor circuit. |
| <b>examples of the physics points made in the response</b><br><br>current flows through the coil / electromagnet<br><br>magnetic field produced<br><br>(short side of) iron bar attracted to electromagnet<br><br>contacts pushed together (by iron bar)<br><br>starter motor circuit completed<br><br>current flows through starter motor<br><br><b>or</b><br><br>p.d. across starter motor |   | <b>extra information</b><br><br><br><br>accept electromagnet switches on                   |  |
| <b>Total</b>   |   |  | <b>6</b>   |

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| <b>question</b> | <b>answers</b>   | <b>extra information</b> | <b>mark</b> |
|-----------------|--|--------------------------|-------------|
| <b>4(a)</b>     | X-rays are ionising<br><b>or</b><br>X-rays kill / damage cells | accept cause cancer      | 1           |
|                 | any stray X-rays are absorbed by the screen                    |                          | 1           |
|                 | which reduces the radiation dose to the radiographer           |                          | 1           |
| <b>4(b)</b>     | medical records / X-ray records                                |                          | 1           |
|                 | of people with cancer  |                          | 1           |
| <b>4(c)</b>     | a CT scan gives a 3D image                                     |                          | 1           |
|                 | therefore the image can be observed from different directions  |                          | 1           |
| <b>Total</b>    |  |                          | <b>7</b>    |

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| <b>question</b> | <b>answers</b>  | <b>extra information</b> | <b>mark</b> |
|-----------------|---|--------------------------|-------------|
| <b>5(a)</b>     | the direction of the riders is constantly changing                                      |                          | 1           |
|                 | therefore the velocity of the riders is changing  |                          | 1           |
|                 | and because acceleration is the rate of change of velocity the acceleration is changing |                          | 1           |
| <b>5(b)</b>     | to(wards) the centre (of the cylinder / rotor)  |                          | 1           |
| <b>5(c)</b>     | centripetal   |                          | 1           |
| <b>5(d)</b>     | it is reduced   |                          | 1           |
| <b>Total</b>    |   |                          | <b>6</b>    |

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| <b>question</b> | <b>answers</b>  | <b>extra information</b>  | <b>mark</b> |
|-----------------|---|---|-------------|
| <b>6(a)</b>     | 1.59  | accept an answer that rounds to this<br><br>allow <b>1</b> mark for substitution into correct equation<br>ie refractive index = $\frac{\text{sine } 16^\circ}{\text{sine } 10^\circ}$ | 2           |
| <b>6(b)</b>     | 2 lines correctly drawn from the top of the pin through the lens<br><br>position of image correct | allow <b>1</b> mark for each<br><br>image must be upright   | 2<br><br>1  |
| <b>Total</b>    |   |   | <b>5</b>    |



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| <b>question</b> | <b>answers</b>  | <b>extra information</b>   | <b>mark</b> |
|-----------------|---|--|-------------|
| <b>7(a)</b>     | where the mass of the object can be thought to be concentrated  |  | 1           |
| <b>7(b)</b>     | lower the C of M<br><br>and make the wheelbase wider  | accept a practical description of how these changes could be achieved              | 1<br><br>1  |
| <b>7(c)</b>     | the line of action of its weight<br><br>falls inside its wheel base<br><br>therefore there is no resultant / clockwise moment | accept a vertical arrow drawn from <b>X</b><br><br>accept falls between the wheels | 2<br><br>1  |
| <b>Total</b>    |   |  | <b>6</b>    |

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| question     | answers  | extra information   | mark     |
|--------------|--|---|----------|
| 8(a)         | 560  | allow <b>1</b> mark for<br>clockwise (moments) =<br>anticlockwise (moments)   | 4        |
|              | newtons, N   | allow <b>1</b> mark for correct<br>substitution<br>ie $160 \times 1.75 = W \times 0.5$<br><br>allow <b>1</b> mark for correct<br>transformation<br>ie $\frac{160 \times 1.75 = W}{0.5}$ | 1        |
| 8(b)         | the <u>weight</u> of plank which has<br>been ignored   |   | 1        |
|              | causes an anticlockwise moment<br>which has not been considered /<br>included in the calculation |   | 1        |
| <b>Total</b> |  |   | <b>7</b> |

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| question     | answers   | extra information   | mark     |
|--------------|---|---|----------|
| <b>9(a)</b>  | an alternating input / current is supplied to the primary (coil)          |   | 1        |
|              | which produces an alternating magnetic field                              | accept changing magnetic field for alternating magnetic field   | 1        |
|              | in the (iron) core  | if first mark point scores then 'alternating' not required here   | 1        |
|              | this magnetic field links with the secondary coil                         |   | 1        |
|              | which induces an (alternating) voltage / p.d. across the secondary (coil) |   | 1        |
| <b>9(b)</b>  | 0.21  | accept 0.2 or any answer that rounds to 0.21<br><br>allow <b>1</b> mark for correct equation<br>ie power input = power output<br><br><b>or</b><br><br>allow <b>1</b> mark for substitution into correct equation<br>ie $230 \times I_p = 12 \times 4$ | 2        |
| <b>Total</b> |   |   | <b>7</b> |