

Commentary on candidate evidence

The candidate evidence has achieved the following marks for each section of the assignment.

Candidate 1

1 Aim

The candidate was awarded **1 out of 1 mark** because a suitable aim has been stated.

2 Underlying physics

The candidate was awarded **1 out of 3 marks** because they have demonstrated a limited understanding of the physics involved.

3 Data collection and handling

The candidate was awarded **5 out of 6 marks**. The marks were awarded as follows:

3(a) **1 out of 1 mark** was awarded because the candidate has summarised the experiment. The candidate has identified what is to be changed and what is being measured.

3(b) **1 out of 1 mark** was awarded because sufficient data has been included to answer the aim. Repeated measurements have been recorded.

3(c) **0 out of 1 mark** was awarded because although data has been presented in a table, the final 'average' column is missing correct heading and units, as the overarching heading only covers results 1, 2, and 3.

3(d) **1 out of 1 mark** was awarded because the mean values have been calculated correctly.

3(e) **1 out of 1 mark** was awarded because data relevant to the experiment from an internet source has been included.

3(f) **1 out of 1 mark** was awarded because a reference for the source has been included directly beneath the source.

4 Graphical presentation

The candidate was awarded **3 out of 4 marks**. The marks were awarded as follows:

4(a) **1 out of 1 mark** was awarded because the candidate has drawn a scatter graph that is appropriate for this experiment.

4(b) **1 out of 1 mark** was awarded because the axes have suitable linear scales.

4(c) **1 out of 1 mark** was awarded because the axes have suitable labels and units.

4(d) **0 out of 1 mark** was awarded because the candidate has incorrectly plotted the point at 55 degrees Celsius.

5 Analysis

The candidate was awarded **0 out of 1 mark** because they have not made a valid comparison. They have not indicated which aspect of the graphs is similar.

6 Conclusion

The candidate was awarded **0 out of 1 mark** because they have made a vague statement that does not clearly answer their aim. The statement made is ambiguous.

7 Evaluation

The candidate was awarded **0 out of 2 marks** because they have not identified a factor that has a significant effect on their results. The second mark cannot be accessed unless an appropriate factor is identified.

8 Structure

The candidate was awarded **2 out of 2 marks**. The marks were awarded as follows:

8(a) **1 out of 1 mark** was awarded because the candidate has given the report a suitable title.

8(b) **1 out of 1 mark** was awarded because the report is clear and concise.

Overall

The candidate was awarded a total of **12 out of 20 marks**.

Candidate 2

1 Aim

The candidate was awarded **1 out of 1 mark** because a suitable aim has been stated.

2 Underlying physics

The candidate was awarded **2 out of 3 marks** because the candidate has demonstrated a reasonable understanding of physics. The candidate has included the underlying physics at the end of the report, which is acceptable.

3 Data collection and handling

The candidate was awarded **6 out of 6 marks**. The marks were awarded as follows:

3(a) **1 out of 1 mark** was awarded because the candidate has provided a brief summary of their experiment. The candidate has identified what is to be changed and what is being measured.

3(b) **1 out of 1 mark** was awarded because sufficient data has been included to answer the aim.

3(c) **1 out of 1 mark** was awarded because the candidate has provided a table with correct headings and units.

3(d) **1 out of 1 mark** was awarded because average values have been calculated correctly.

3(e) **1 out of 1 mark** was awarded because data relevant to the experiment from an internet source has been included.

3(f) **1 out of 1 mark** was awarded because a reference has been included below the source. The reference is a google hosted site and is therefore the source of the data.

4 Graphical presentation

The candidate was awarded **3 out of 4 marks**. The marks were awarded as follows:

4(a) **1 out of 1 mark** was awarded because the candidate has drawn a scatter graph which is appropriate for this experiment.

4(b) **1 out of 1 mark** was awarded because the axes have suitable linear scales.

4(c) **1 out of 1 mark** was awarded because the axes have suitable labels and units.

4(d) **0 out of 1 mark** was awarded because the best fit curve is incomplete over the data range. The line does not extend to cover the complete range of values.

5 Analysis

The candidate was awarded **0 out of 1 mark** because the candidate makes a number of incorrect statements in their comparison. The statement that 'the graph from the internet has a straight line going through the origin' is incorrect. The candidate's claim that their data shows that the resistance is ohmic is incorrect as the resistances have been changed. Also, the candidate's claim that if they had plotted the resistance against the inverse current then a straight line through the origin would have been produced, is unsubstantiated.

6 Conclusion

The candidate was awarded **1 out of 1 mark** because they have made a valid conclusion which is supported by all the data in their report.

7 Evaluation

The candidate was awarded **2 out of 2 marks** because they have identified a factor (using quoted resistance values for the resistors) that has a significant effect on results and suggested an improvement (measure resistance with an ohmmeter to get more accurate results).

8 Structure

The candidate was awarded **2 out of 2 marks**. The marks were awarded as follows:

8(a) **1 out of 1 mark** was awarded because the candidate has given the report a suitable title.

8(b) **1 out of 1 mark** was awarded because the report is clear and concise.

Overall

The candidate was awarded a total of **17 out of 20 marks**.

Candidate 3

1 Aim

The candidate was awarded **1 out of 1 mark** because a suitable aim has been stated.

2 Underlying physics

The candidate was awarded **0 out of 3 marks** because they have demonstrated no understanding of the physics involved in the study of projectiles.

3 Data collection and handling

The candidate was awarded **4 out of 6 marks**. The marks were awarded as follows:

3(a) **0 out of 1 mark** was awarded because the candidate has not mentioned what they are changing (that is, the angle).

3(b) **1 out of 1 mark** was awarded because sufficient data has been included to answer the aim.

3(c) **1 out of 1 mark** was awarded because headings and units have been provided for all the data in the tables.

3(d) **0 out of 1 mark** was awarded because the average calculated for the 40 degrees is not rounded correctly.

Note: the use of the recurrence dot in the averages for the 30 and 40 degree angles are also not acceptable as it would imply an infinite number of significant figures.

3(e) **1 out of 1 mark** was awarded because data relevant to the experiment has been included.

3(f) **1 out of 1 mark** was awarded because a reference is included below the source (a full URL).

4 Graphical presentation

The candidate was awarded **3 out of 4 marks**. The marks were awarded as follows:

4(a) **1 out of 1 mark** was awarded because the candidate has drawn a scatter graph that is appropriate for this experiment.

4(b) **1 out of 1 mark** was awarded because the axes have suitable linear scales.

4(c) **1 out of 1 mark** was awarded because the axes have suitable labels and units.

4(d) **0 out of 1 mark** was awarded because the candidate has not drawn a suitable best fit curve (multiple lines have been drawn).

5 Analysis

The candidate was awarded **1 out of 1 mark** because they have made a valid comparison between the graphs ('similar trend').

6 Conclusion

The candidate was awarded **0 out of 1 mark** because their conclusion is not supported by all the data as it does not recognise the contradiction between their value of optimal angle (40 degrees) and the value from the second source (45 degrees).

7 Evaluation

The candidate was awarded **2 out of 2 marks** because they have identified a factor (determining how far the ball travelled) that has a significant effect on results and explained a suitable solution (how using a sand pit would improve the experiment).

8 Structure

The candidate was awarded **2 out of 2 marks**. The marks were awarded as follows:

8(a) **1 out of 1 mark** was awarded because the candidate has given the report a suitable title.

8(b) **1 out of 1 mark** was awarded because the report is clear and concise.

Overall

The candidate was awarded a total of **13 out of 20 marks**.

Candidate 4

1 Aim

The candidate was awarded **1 out of 1 mark** because the aim states what is to be investigated. Note, where a candidate is attempting to find a relationship, they are expected to determine the quantitative relationship between the variables.

2 Underlying physics

The candidate was awarded **1 out of 3 marks** because they have demonstrated a limited understanding of relevant physics.

3 Data collection and handling

The candidate was awarded **4 out of 6 marks**. The marks were awarded as follows:

3(a) **0 out of 1 mark** was awarded because the candidate has not summarised the method but has provided a detailed step-by-step list of instructions, which is not a summary.

3(b) **1 out of 1 mark** was awarded because sufficient raw data from the candidate's experiment is included.

3(c) **1 out of 1 mark** was awarded because correct headings and units of measurement are included in the table.

3(d) **1 out of 1 mark** was awarded because all the mean values are calculated and rounded correctly within an acceptable range of significant figures.

3(e) **1 out of 1 mark** was awarded because relevant data from an internet source has been included in the report (relative stopping distances infographic).

3(f) **0 out of 1 mark** was awarded because although two full URLs are given in the sources section, neither is clearly cited or linked to the corresponding piece of data.

4 Graphical presentation

The candidate was awarded **3 out of 4 marks**. The marks were awarded as follows:

4(a) **1 out of 1 mark** was awarded because the candidate has drawn a scatter graph that is appropriate for this experiment.

4(b) **1 out of 1 mark** was awarded because the axes have suitable linear scales.

4(c) **1 out of 1 mark** was awarded because the axes have suitable labels and units.

4(d) **0 out of 1 mark** was awarded because the accuracy of the plotting of the data points cannot be determined due to a lack of gridlines and the size of the data markers. In addition, the 4th point is clearly incorrect.

5 Analysis

The candidate was awarded **0 out of 1 mark** because they have not made a valid comparison. They have not indicated which aspect of the results is similar.

6 Conclusion

The candidate was awarded **0 out of 1 mark** because they have not addressed the aim in establishing a relationship between braking/stopping distance and the mass of the vehicle – they have only stated the effect of mass on braking/stopping distance.

7 Evaluation

The candidate was awarded **0 out of 2 marks** because they have not identified a factor that would have a significant effect on the reliability, accuracy or precision of the experiment.

8 Structure

The candidate was awarded **2 out of 2 marks**. The marks were awarded as follows:

8(a) **1 out of 1 mark** was awarded because an informative title is included.

8(b) **1 out of 1 mark** was awarded because a clear and concise report has been produced.

Overall

The candidate was awarded a total of **11 out of 20 marks**.

Candidate 5

1 Aim

The candidate was awarded **1 out of 1 mark** because their aim states what is to be investigated.

2 Underlying physics

The candidate was awarded **1 out of 3 marks** because they have demonstrated a limited understanding of the relevant physics.

3 Data collection and handling

The candidate was awarded **4 out of 6 marks**. The marks were awarded as follows:

3(a) **1 out of 1 mark** was awarded because the candidate has given a brief description of the approach used to collect experimental data.

3(b) **1 out of 1 mark** was awarded because sufficient raw data from the candidate's experiment is included.

3(c) **0 out of 1 mark** was awarded because the final column 'averages (ohms)' is insufficient. The word 'resistance' should have been included or the overarching heading should have been covered in this column.

3(d) **0 out of 1 mark** was awarded because the final mean value in the table has been rounded incorrectly and there is an arithmetic error in the sample calculation below the table ('0.556').

3(e) **1 out of 1 mark** was awarded because relevant data (graph) has been included from an internet source.

3(f) **1 out of 1 mark** was awarded because the full URL is included beside the graph.

4 Graphical presentation

The candidate was awarded **3 out of 4 marks**. The marks were awarded as follows:

4(a) **1 out of 1 mark** was awarded because the candidate has drawn a scatter graph that is appropriate for this experiment.

4(b) **1 out of 1 mark** was awarded because the axes have suitable linear scales.

4(c) **1 out of 1 mark** was awarded because the axes have suitable labels and units.

4(d) **0 out of 1 mark** was awarded because several of the data points have been plotted incorrectly (for example, 10, 30 and 60 degrees).

Note, had all data points been plotted correctly, the candidate would still not have gained this mark as the line of best fit is not drawn to an appropriate standard.

5 Analysis

The candidate was awarded **1 out of 1 mark** because they have made a valid comparison of the experimental data with the data from the internet source.

6 Conclusion

The candidate was awarded **1 out of 1 mark** because they have made a valid conclusion that addresses the aim and is supported by all the data in the report.

7 Evaluation

The candidate was awarded **0 out of 2 marks** because they have not identified a factor which had a significant effect on the experiment. Had the candidate identified the large variation in the measurements as a factor and explained how repeated measurements and calculating an average could have addressed this factor, marks could be awarded.

8 Structure

The candidate was awarded **2 out of 2 marks**. The marks were awarded as follows:

8(a) **1 out of 1 mark** was awarded because an informative title is included.

8(b) **1 out of 1 mark** was awarded because the candidate has produced a clear and concise report.

Overall

The candidate was awarded a total of **13 out of 20 marks**.