A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

Level 3 Certificate / Extended Certificate

APPLIED SCIENCE

Unit 1 Key concepts in science
Section C – Physics

ASC1P

Monday 11 June 2018 **Afternoon**

Time allowed: 1 hour 30 minutes.

You are advised to spend approximately 30 minutes on this section.

For this paper you must have:
- **a calculator**
- **formulae sheet.**

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

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INSTRUCTIONS

- **Use black ink or black ball-point pen.**
- **Answer ALL questions in each section.**
- **You must answer the questions in the spaces provided. Do not write on blank pages.**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**

INFORMATION

- **You will be provided with a copy of the formulae sheet.**
- **There are three sections in this paper:**

  SECTION A – Biology
  SECTION B – Chemistry
  SECTION C – Physics.

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 60 and the maximum mark for this section is 20.**

ADVICE

Read each question carefully.

DO NOT TURN OVER UNTIL TOLD TO DO SO

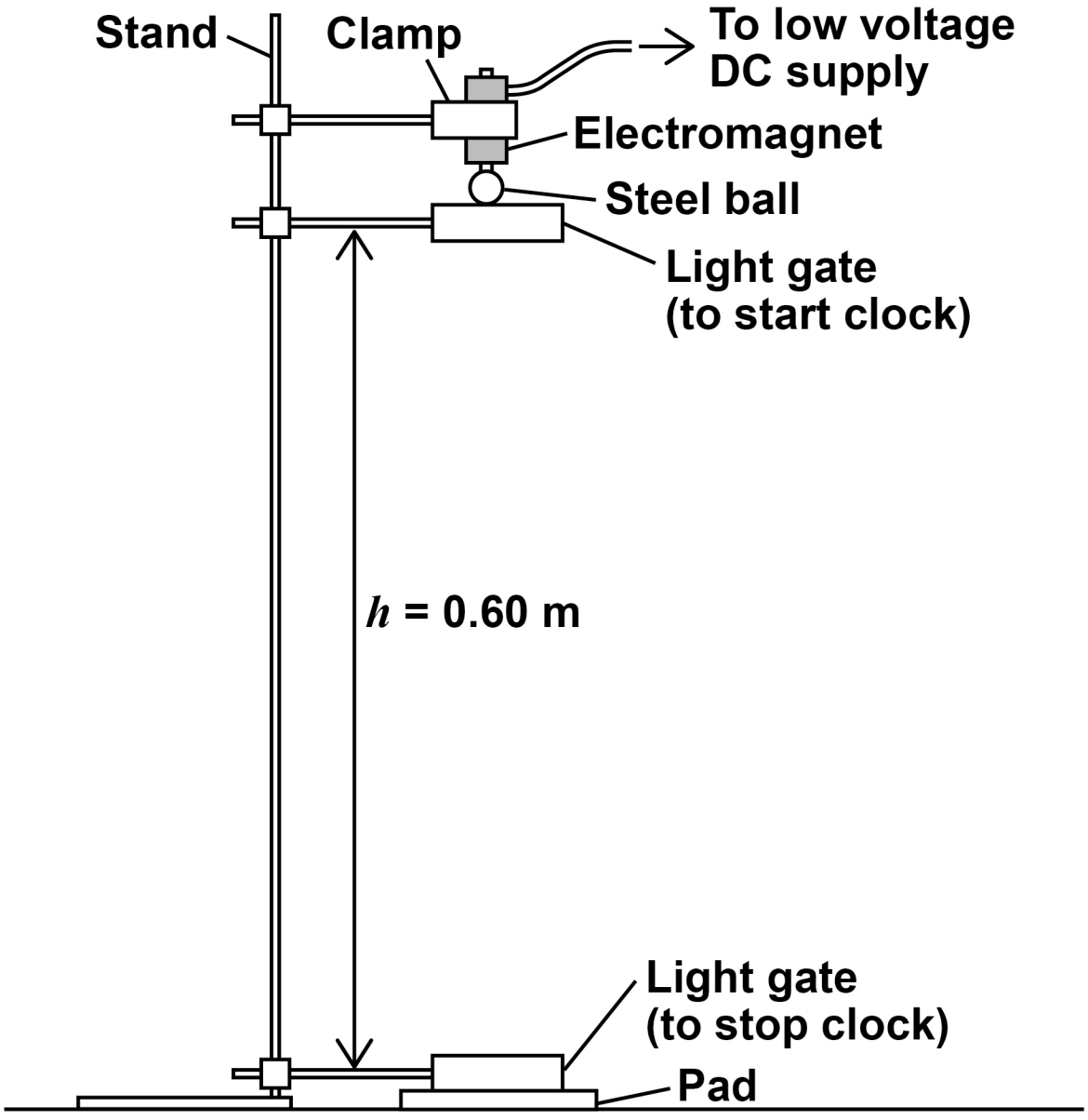
SECTION C – PHYSICS

Answer ALL questions in this section.

A student wants to measure the acceleration due to gravity of a steel ball.

FIGURE 1 shows the equipment the student plans to use.

FIGURE 1



0 1 . 1 **Name the energy the steel ball has before it is released. [1 mark]**

0 1 . 2 **Explain why the steel ball remains stationary before it is released.**
In your explanation, include the forces involved. [2 marks]

[Turn over]

0 1 . 3 The distance between the light gates, h, is 0.60 m.

The time taken for the steel ball to fall between the light gates was 0.351 s.

Calculate the AVERAGE speed of the steel ball as it travelled between the light gates. [1 mark]

Average speed = _____ m s^{-1}

0 1 . 4 Calculate the acceleration due to gravity of the steel ball.
Assume the speed of the steel ball at the first light gate is 0 m s^{-1}
State the correct unit in your answer. [3 marks]

Acceleration due to gravity = _____

Unit = _____

0 1 . 5 **Give TWO ways the student could reduce the effect of errors in the results. [2 marks]**

1 _____

_____

_____

2 _____

_____

_____

[Turn over]

0 1 . 6 **The student calculates the speed of the steel ball to be 3.7 m s^{-1} just before it hits the pad.**

The mass of the steel ball is 0.060 kg.

Calculate the kinetic energy of the steel ball just before it hits the pad. [2 marks]

Kinetic energy = _____ J

0 1 . 7 **The steel ball exerts a force on the pad when it hits it.**

Explain why.

Use ONE of Newton's Laws of Motion in your explanation. [2 marks]

0 2 **A product design engineer measures the temperature of a hot drink as it cools in a cup.**

TABLE 1 shows the engineer's results.

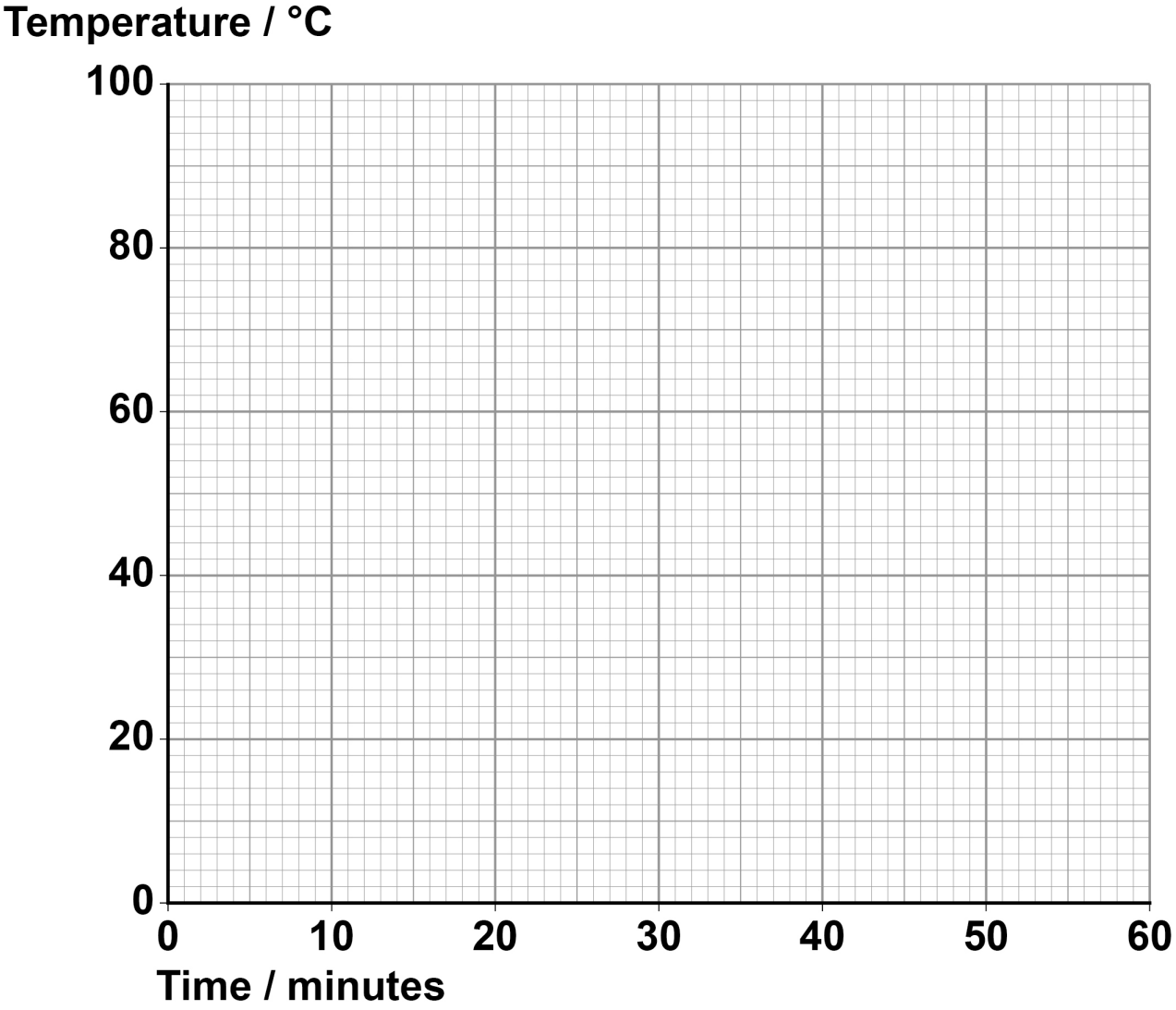
TABLE 1

Time / minutes	0	10	20	30	40	50	60
Temperature / °C	88	54	39	30	24	23	23

0 2 . 1 **Plot a graph of the values in TABLE 1 on FIGURE 2.**

Draw a line of best fit. [2 marks]

FIGURE 2



[Turn over]

0 2 . 2 **The engineer wants to calculate the U-value of the material the cup is made from.**

State what is meant by the term U-value of a material. [1 mark]

0 2 . 3 **When the hot drink has a temperature of 88 °C, the drink loses 58 J of heat in 1 second.**

The temperature of the room is 23 °C.

The total surface area of the cup is 0.050 m^2

Calculate the U-value of the material the cup is made from. [2 marks]

U-value = _____ W m^{-2} $°C^{-1}$

[Turn over]

0 2 . 4 **The engineer designed the cup to minimise thermal transfer.**

Suggest TWO examples where thermal transfer should be maximised. [2 marks]

1 _____

_____

_____

2 _____

_____

_____

7

END OF QUESTIONS

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For Examiner's Use	
Question	Mark
1	
2	
TOTAL	