



Surname _____

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Centre Number _____

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Candidate Signature _____

Level 3 Certificate/Extended Certificate

APPLIED SCIENCE

**Unit 1 Key Concepts in Science
Section C – Physics**

ASC1/P

Tuesday 11 June 2019 Afternoon

Time allowed: 1 hour 30 minutes. You are advised to spend approximately 30 minutes on this section.

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

[Turn over]



JUN19ASC1P01

For this paper you must have:

- a calculator
- Formulae Sheet.

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.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- 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

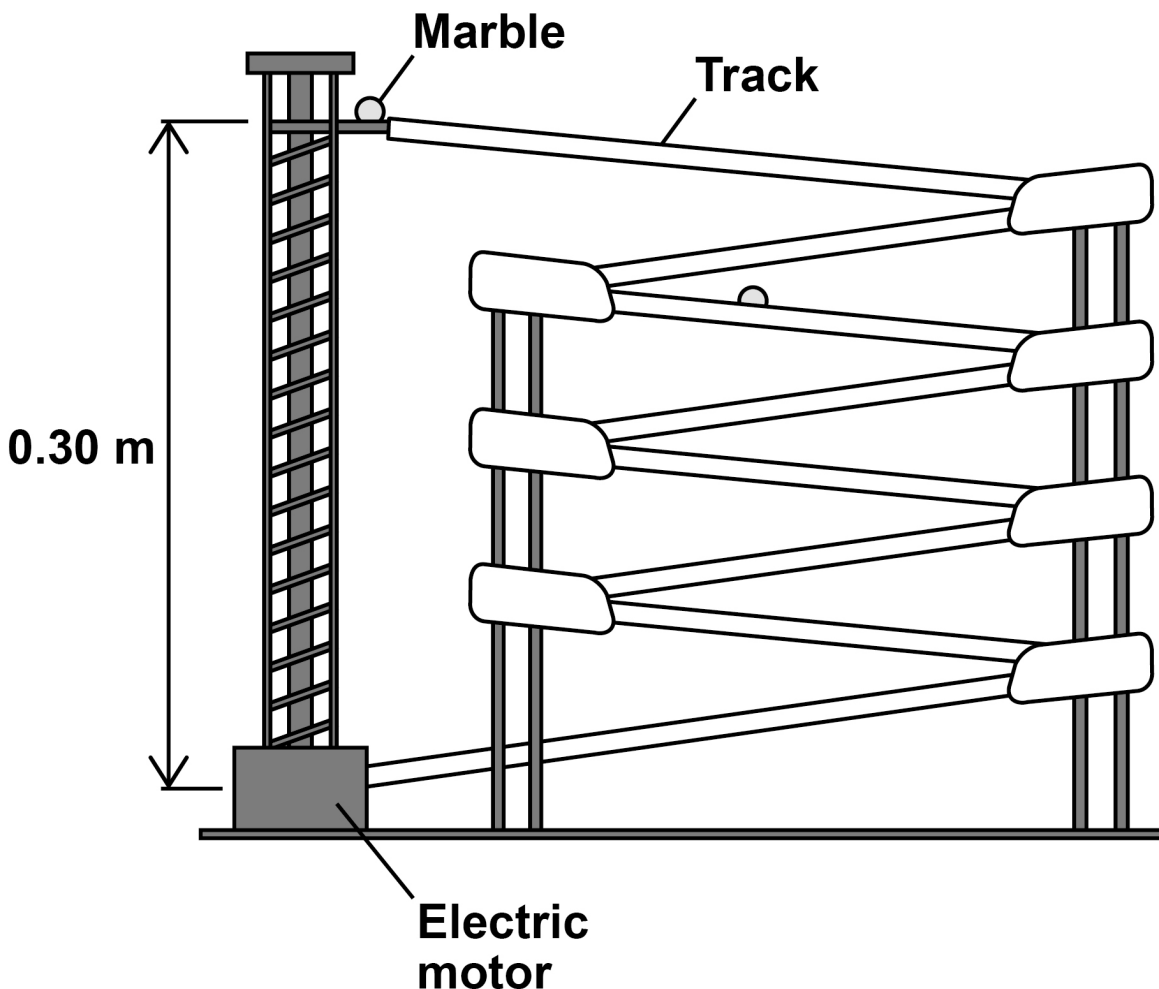
Answer ALL questions in this section.

0 1

A product designer has designed a toy ‘roller coaster’.

An electric motor lifts marbles up to the top of the ‘roller coaster’. The marbles are released at the top and travel back down to the bottom along a track.

FIGURE 1 shows the toy design.

FIGURE 1

0 1 . 1 The electric motor is powered by a battery.

Describe how energy is transferred usefully by the battery and electric motor. [3 marks]

[Turn over]

- 01.2** The voltage across the electric motor is 1.50 V. The current in the electric motor is 0.20 A.

Calculate the power of the electric motor.
[1 mark]

Power of the electric motor =

_____ W

- 01.3** It takes 4.50 s for a marble to be lifted from the bottom of the 'roller coaster' to the top.

Calculate the energy transferred by the electric motor. [1 mark]

Energy transferred = _____ J



01.4 The mass of a marble is 0.015 kg.

Calculate the change in gravitational potential energy of the marble as it is lifted from the bottom of the 'roller coaster' to the top.

Use $g = 9.8 \text{ m s}^{-1}$

Use information from FIGURE 1, on page 4.
[2 marks]

Change in gravitational potential energy =
_____ J

01.5 Calculate the efficiency of the electric motor. [2 marks]

Efficiency = _____



01.6 Give **ONE** reason why it is important for the efficiency of a system to be maximised.
[1 mark]



01.7 When a marble approaches the bottom of the roller coaster, it is moving at a constant speed.

Name the property of the marble which means it has a tendency to continue in its state of uniform motion. [1 mark]

Tick (✓) ONE box.

Action and reaction

Inertia

Momentum

Resistance

[Turn over]

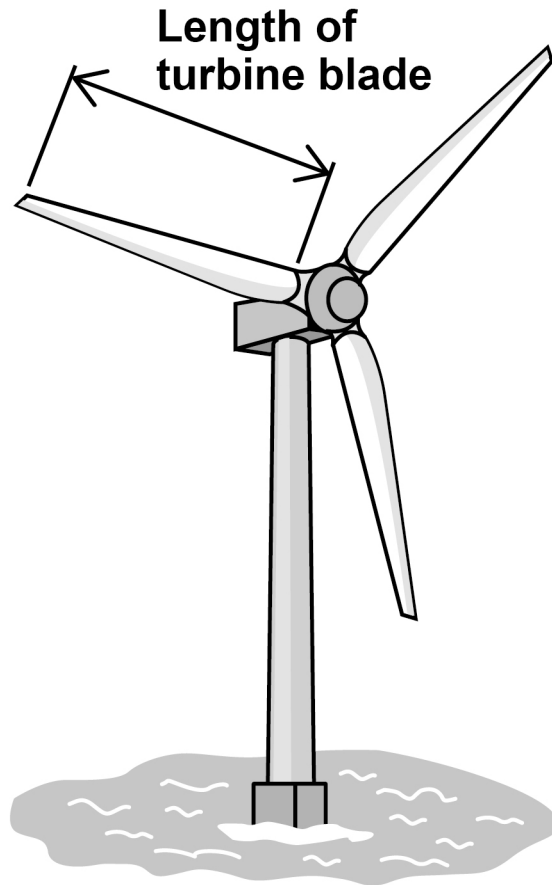
11



02

FIGURE 2 shows an offshore wind turbine.

FIGURE 2



02.1

At a wind speed of 12 m s^{-1} the mass of air passing through the turbine blades each second is $3.0 \times 10^5 \text{ kg}$.

Calculate the kinetic energy of the air passing through the turbine blades each second. [2 marks]



Kinetic energy of the air =

_____ J

- 0 2 . 2** Give ONE advantage and ONE disadvantage of using wind power compared with fossil fuels. [2 marks]

Advantage _____

Disadvantage _____

[Turn over]



0 2 . 3 TABLE 1 shows how the power output of a wind turbine changes with the length of the turbine blades.

TABLE 1

Length of turbine blades / m	10	20	30	40	50	60
Power output of wind turbine / MW	0.08	0.32	0.72	1.28	2.00	2.88

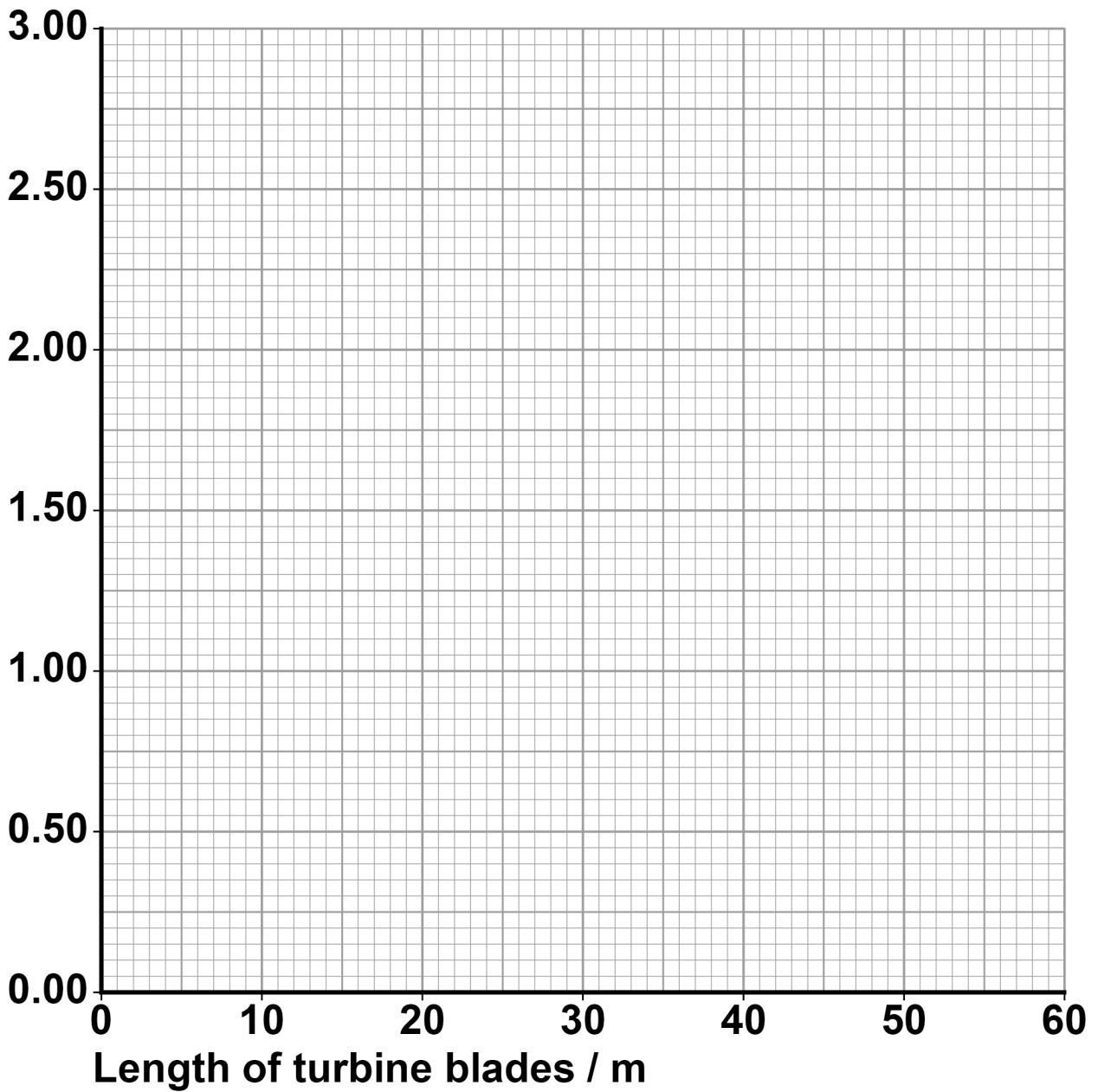
Plot the data from TABLE 1 on FIGURE 3, on the opposite page.

Draw a line of best fit. [2 marks]



FIGURE 3

**Power
output
of wind
turbine /
MW**



[Turn over]



Repeat of TABLE 1

Length of turbine blades / m	10	20	30	40	50	60
Power output of wind turbine / MW	0.08	0.32	0.72	1.28	2.00	2.88



02.4 Describe the relationship between the power output of the wind turbine and the length of the turbine blades.

Use FIGURE 3, on page 13, and data from TABLE 1 in your answer. [3 marks]

END OF QUESTIONS

9



Additional page, if required.

Write the question numbers in the left-hand margin.

Lined writing area with a vertical margin line on the left and horizontal lines for text entry.



Additional page, if required.

Write the question numbers in the left-hand margin.



Additional page, if required.

Write the question numbers in the left-hand margin.

A vertical line on the left side of the page is connected to 18 horizontal lines that create a series of blank rows for writing.



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For Examiner's Use	
Question	Mark
1	
2	
TOTAL	

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