Pearson Edexcel International Advanced Level

Friday 08 May 2026

Afternoon (Time: 1 hour 30 minutes)

Paper reference **WPH11/01A**

Physics

International Advanced Subsidiary/Advanced Level

UNIT 1: Mechanics and Materials

Question Paper

You must have:
Scientific calculator, ruler and answer book (sent separately).
Do not return this question paper with the answer book.

- The list of data, formulae and relationships is printed at the end of this booklet.

Turn over ▶

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P:1/1/1/1/1/

P 8 7 9 0 3 A

Pearson

SECTION A

Answer ALL questions.

For questions 1-10, in Section A, select one answer from A to D and put a cross in the box ☒. If you change your mind, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Which of the following is a vector quantity?

A mass

B momentum

C temperature

D time

(Total for Question 1 = 1 mark)

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2 Which of the following is a correct unit for acceleration?

A $kg\,m\,s^{-1}$

B $kg\,m\,s^{-2}$

C $N\,kg^{-1}$

D $N\,m\,s^{-1}$

(Total for Question 2 = 1 mark)

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3 A student determines a value for the acceleration due to gravity by dropping a steel ball from rest through the air. The student ignored air resistance.

Which of the following are the only two quantities required?

A diameter of the ball and viscosity of the air

B distance the ball falls and time taken

C final velocity of the ball and viscosity of the air

D mass of the ball and the final velocity of the ball

(Total for Question 3 = 1 mark)

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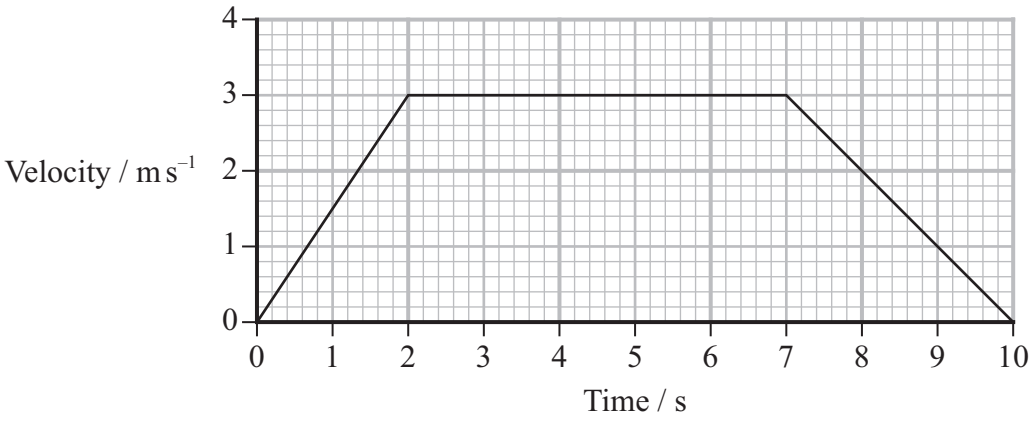
4 The graph below shows the motion of a person of mass 80 kg walking a short distance.



Which of the following is equal to the resultant force, in N, acting on the person between a time of 2 s and 7 s?

A 80 g

B 0

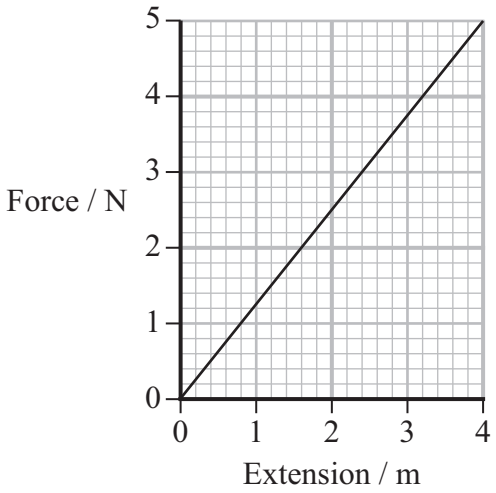
C $0.5 \times (10 + 5) \times 3$

D 3

(Total for Question 4 = 1 mark)

Questions 5 and 6 refer to the following information.

The graph shows how force varies with extension for a spring.



5 Which of the following gives the stiffness of the spring?

A $5\,\text{N} \times 4\,\text{m}$

B $\frac{5\,\text{N}}{4\,\text{m}}$

C $\frac{4\,\text{m}}{5\,\text{N}}$

D $0.5 \times 5\,\text{N} \times 4\,\text{m}$

(Total for Question 5 = 1 mark)

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6 A force of 5 N is applied to the spring.

Which of the following gives the energy stored, in J, in the spring?

A $5\,\text{N} \times 4\,\text{m}$

B $\frac{5\,\text{N}}{4\,\text{m}}$

C $\frac{4\,\text{m}}{5\,\text{N}}$

D $0.5 \times 5\,\text{N} \times 4\,\text{m}$

(Total for Question 6 = 1 mark)

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7 A ball of weight 8 N falls through the air. A horizontal wind exerts a force of 15 N on the ball.

Which of the following is the magnitude of the resultant force on the ball?
You should ignore air resistance.

A 7 N

B 13 N

C 17 N

D 23 N

(Total for Question 7 = 1 mark)

8 In certain circumstances, Stokes' law can be applied when an object is falling.

Which of the following conditions is required for Stokes' law to apply?

A The object should **not** be spherical in shape.

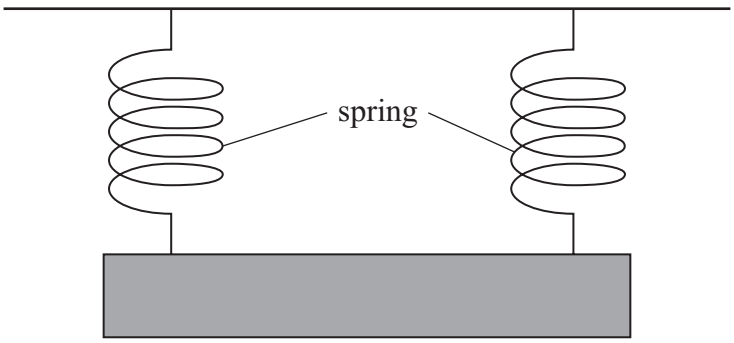
B The object must be falling through a liquid.

C The object should be moving quickly.

D The object should be in a laminar flow.

(Total for Question 8 = 1 mark)

9 Two springs each with stiffness k are arranged next to each other, as shown



Which of the following is the stiffness of the combined system?

A $2k$

B k

C $\frac{k}{2}$

D k^2

(Total for Question 9 = 1 mark)

10 A car is travelling at a velocity v. The car brakes with a constant force and comes to rest after a distance x.

The same car is now travelling at $2v$. The car brakes with the same force and comes to rest.

Which of the following is the distance the car now travels while braking?

A $\sqrt{2x}$

B $2x$

C $4x$

D $\frac{x}{\sqrt{2}}$

(Total for Question 10 = 1 mark)

TOTAL FOR SECTION A = 10 MARKS

SECTION B

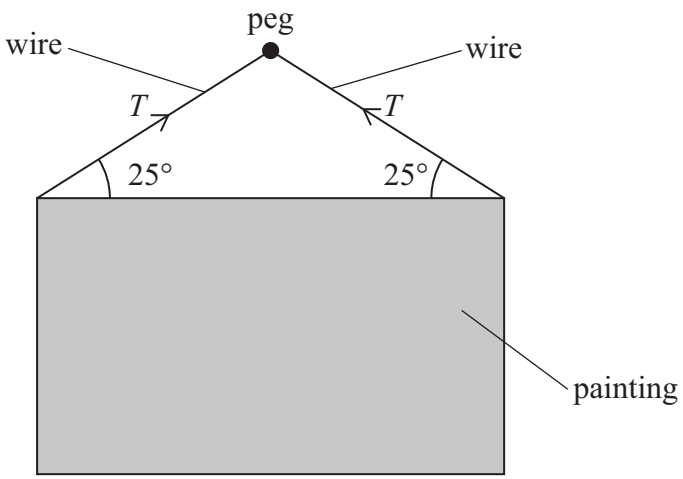
Answer ALL questions in the spaces provided.

11 A man drives his car along a road at a constant speed. The road has many bends.

Explain how the speed of the car can be constant but the velocity of the car changes.

(Total for Question 11 = 2 marks)

12 A painting is hung from a peg on a wall using two identical wires, as shown.

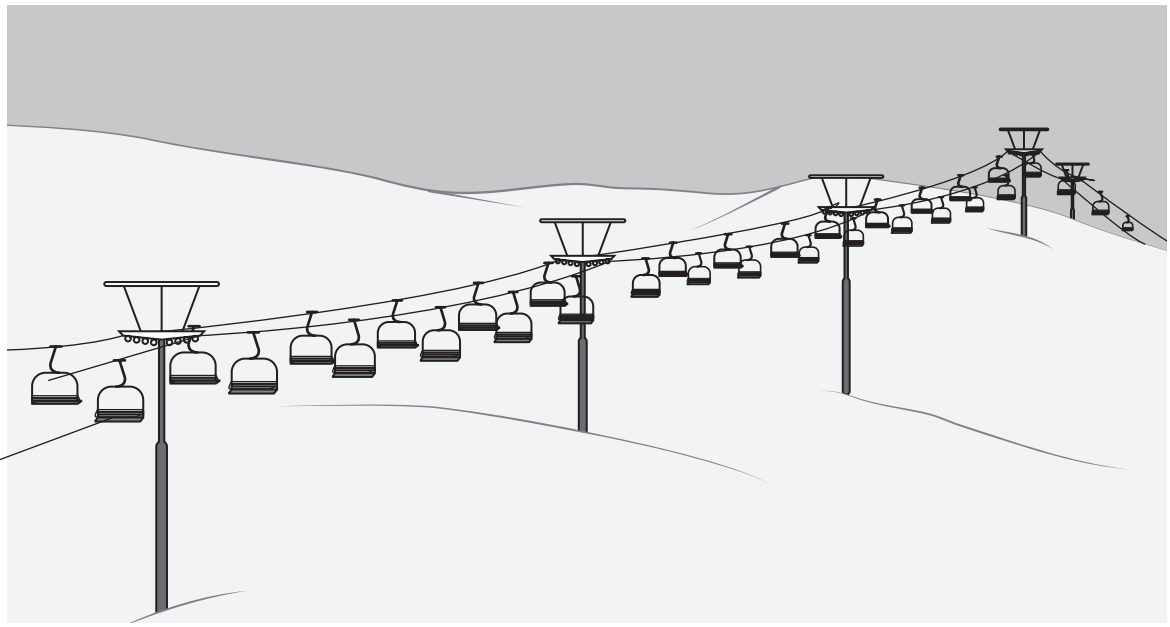


Calculate the tension T in each of the wires.

mass of the painting = 1.8 kg

(Total for Question 12 = 3 marks)

13 A ski lift takes skiers from the base of a mountain to its top, as shown.



The ski lift moves carriages through a vertical height of 200 m.

13 (a) Each carriage has a maximum passenger capacity of 300 kg and there are 50 carriages moving upwards at any instant on the ski lift.

13 (a) (i) Show that the maximum work done lifting the 50 carriages through the vertical height of 200 m is about 4×10^7 J.

mass of empty carriage = 120 kg

(3)

13 (a) (ii) The ski lift engine has an output power of 135 kW. It takes 8 minutes for all 50 carriages to move through the vertical height of 200 m.

Determine the work done against resistive forces.

Ignore the descending carriages.

(3)

13 (a)(iii) Calculate the efficiency of the ski lift.

(2)

13 (b) Explain how lubricating all the moving parts could improve the efficiency of the ski lift.

(2)

(Total for Question 13 = 10 marks)

14 A ball is dropped from rest and falls towards the ground. It hits the ground and bounces three times before coming to rest.

Assume air resistance is negligible throughout this question.

14 (a) Explain why the height of each bounce is less than the height of the previous bounce.

(2)

14 (b) The ball falls to the ground from a height of 2.0 m.

14 (b) (i) Show that the velocity of the ball, as it hits the ground, is about $6\,m\,s^{-1}$.

(2)

14 (b)(ii) Show that the time taken for the ball to fall to the ground is about 0.6 s.

(2)

14 (b)(iii) Sketch a velocity-time graph to show the motion of the ball from when it is dropped to when it comes to rest after bouncing three times.

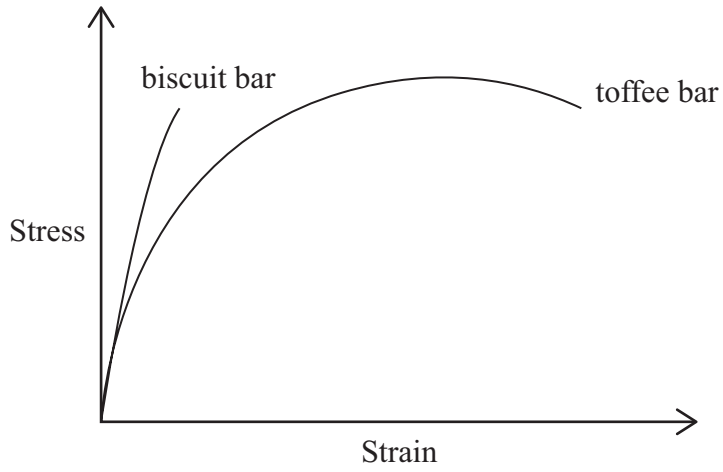
Sketch the graph using the grid provided in the Answer Book.
You do not need to make further calculations.

(4)

(Total for Question 14 = 10 marks)

15 A food technician investigated the material properties of a biscuit bar and a toffee bar.

He took some measurements for each bar and plotted the stress-strain graph shown.



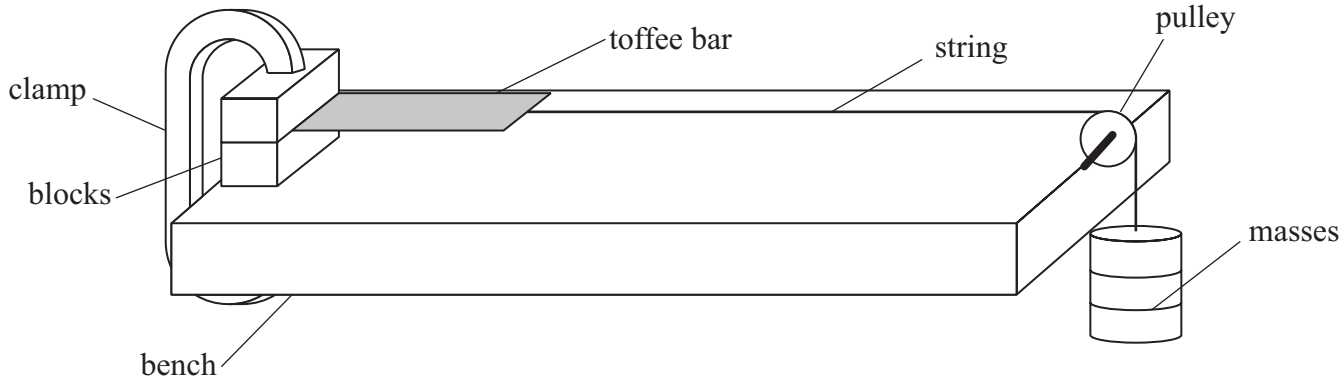
15 (a) Compare and contrast the stress-strain graph for each bar.

(4)

15 (b) State what is meant by elastic deformation.

(1)

15 (c) The food technician determined the Young modulus of the toffee bar. He used the equipment shown.

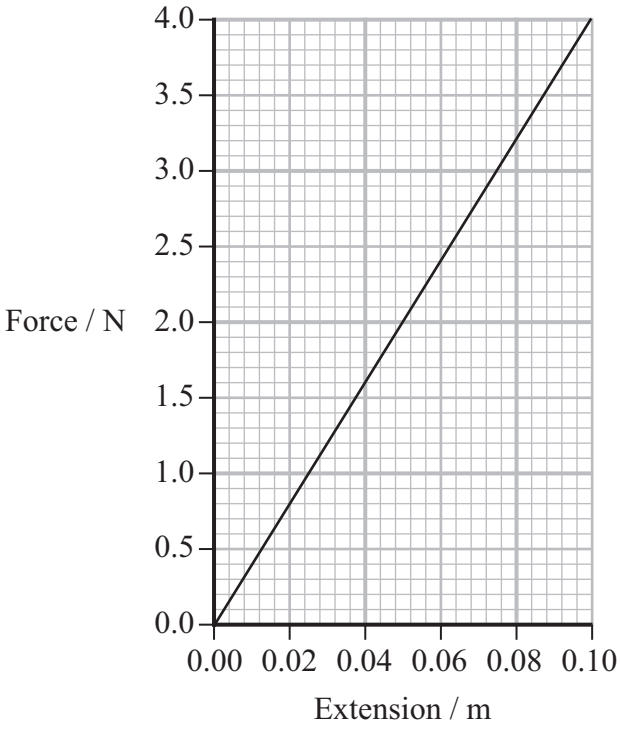


15 (c) (i) Explain how the equipment shown should be used to determine the extension of the toffee bar for a range of masses.

You should include the use of a suitable piece of measuring equipment.

(3)

15 (c)(ii) The food technician plotted a force-extension graph for the toffee bar, as shown.



Determine the Young modulus of the toffee bar.

cross-sectional area of toffee bar = $1.27 \times 10^{-4}\,m^2$
initial length of toffee bar = 15.5 cm

(4)

(Total for Question 15 = 12 marks)

16 A white ball, mass $2m$, on a snooker table is moving with a velocity of $2.1\,m\,s^{-1}$. This white ball collides with a stationary green ball of mass m.

After the collision, both balls move in the same direction as the white ball was originally moving.
After the collision, the white ball moves with a velocity of $0.6\,m\,s^{-1}$.

16 (a) Calculate the velocity of the green ball after the collision.

(3)

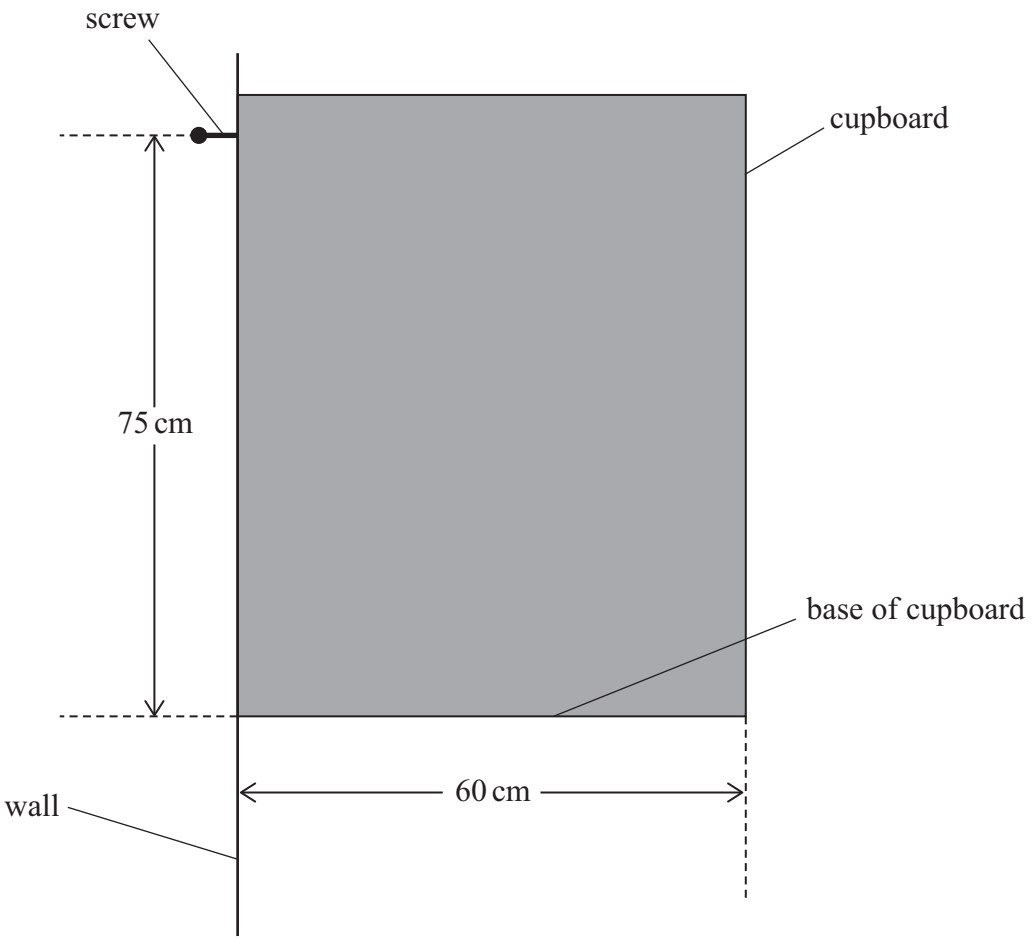
***16** (b) Discuss how momentum is conserved in this collision.

You should refer to Newton's laws of motion in your answer.

(6)

(Total for Question 16 = 9 marks)

17 A cupboard is attached to a wall using a screw, as shown.



17 (a) (i) State the **two** conditions necessary for the cupboard to be in equilibrium.

(2)

17 (a) (ii) State what is meant by the centre of gravity of an object.

(1)

17 (b) The maximum force the screw can withstand is 200 N.

It is suggested that a box with a mass of 50 kg can be safely placed anywhere on the base of the cupboard.

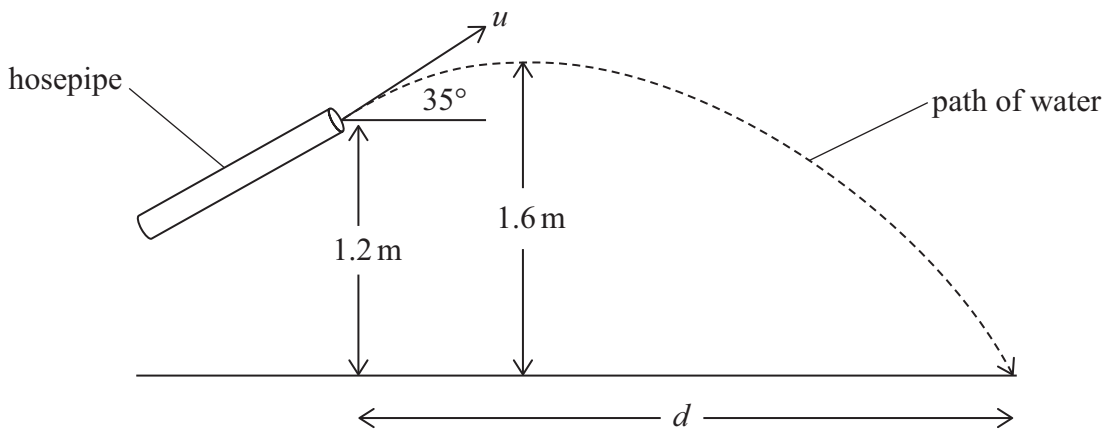
The weight of the cupboard is 80 N and the cupboard can be assumed to be uniform.

Deduce whether this suggestion is correct.

(5)

(Total for Question 17 = 8 marks)

18 A gardener sprays water on his plants using a hosepipe. The water leaves the hose at a velocity u at an angle of 35° to the horizontal, as shown.



The end of the hosepipe is 1.2 m above the ground and the maximum height the water reaches is 1.6 m above the ground.

You should ignore the effects of air resistance in the following questions.

18 (a) Show that u is about $5\,m\,s^{-1}$

(3)

18 (b) Determine the horizontal distance d.

(5)

(Total for Question 18 = 8 marks)

19 An iceberg is a large mass of ice that floats in seawater. Most of the volume of an iceberg is below the surface of the seawater.

19 (a) A book about icebergs claims that 70% of the mass of an iceberg is below the surface of the seawater.

Deduce whether this claim is correct.

density of ice = $917\,kg\,m^{-3}$
density of seawater = $1025\,kg\,m^{-3}$

(5)

19 (b) An iceberg is near the North Pole where it is very cold.

The iceberg moves away from the North Pole and the temperature of the seawater increases slightly. The iceberg does not melt and the density of the surrounding seawater decreases.

Explain what happens to the volume of the iceberg, under the surface of the seawater, as it moves away from the North Pole.

(3)

(Total for Question 19 = 8 marks)

TOTAL FOR SECTION B = 70 MARKS
TOTAL FOR PAPER = 80 MARKS

List of data, formulae and relationships

Acceleration of free fall	$g = 9.81\ \text{m s}^{-2}$	(close to Earth's surface)
Gravitational field strength	$g = 9.81\ \text{N kg}^{-1}$	(close to Earth's surface)

Unit 1

Mechanics

Kinematic equations of motion

$$s = \frac{(u + v)t}{2}$$

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

Forces

$$\Sigma F = ma$$

$$g = \frac{F}{m}$$

$$W = mg$$

Momentum

$$p = mv$$

Moment of force

$$moment = Fx$$

Work and energy

$$\Delta W = F\Delta s$$

$$E_k = \frac{1}{2}mv^2$$

$$\Delta E_{grav} = mg\Delta h$$

Power

$$P = \frac{E}{t}$$

$$P = \frac{W}{t}$$

Efficiency

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

$$\text{efficiency} = \frac{\text{useful power output}}{\text{total power input}}$$

Materials

Density

$$\rho = \frac{m}{V}$$

Stokes' law

$$F = 6\pi\eta rv$$

Hooke's law

$$\Delta F = k\Delta x$$

Elastic strain energy

$$\Delta E_{el} = \frac{1}{2}F\Delta x$$

Young modulus

$$E = \frac{\sigma}{\varepsilon} \text{ where}$$

$$\text{Stress } \sigma = \frac{F}{A}$$

$$\text{Strain } \varepsilon = \frac{\Delta x}{x}$$

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

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Friday 08 May 2026

Afternoon (Time: 1 hour 30 minutes)

Paper reference **WPH11/01A**

Physics

International Advanced Subsidiary/Advanced Level
UNIT 1: Mechanics and Materials
Answer Book

You must have:
Scientific calculator, ruler and question paper (sent separately)

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Show all your working out** in calculations and **include units** where appropriate.

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- In the question marked with an **asterisk (*)**, marks will be awarded for your ability to structure your answer logically, showing how the points that you make are related or follow on from each other where appropriate.
- The list of data, formulae and relationships is printed at the end of this booklet.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 8 7 9 4 1 A 0 1 1 6

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SECTION A

Answer ALL questions.

For questions 1–10, in Section A, select one answer from A to D and put a cross in the box ☒. If you change your mind, put a line through the box ☒ and then mark your new answer with a cross ☒.

1

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 1 = 1 mark)

2

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 2 = 1 mark)

3

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 3 = 1 mark)

4

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 4 = 1 mark)

5

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 5 = 1 mark)

6

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 6 = 1 mark)

7

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 7 = 1 mark)

8

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 8 = 1 mark)

9

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 9 = 1 mark)

10

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 10 = 1 mark)

TOTAL FOR SECTION A = 10 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

SECTION B

Answer ALL questions in the spaces provided.

11

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.....

(Total for Question 11 = 2 marks)

12

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.....

.....

$T =$ .....

(Total for Question 12 = 3 marks)

13 (a) (i)

(3)

13 (a)(ii)

(3)

Work done = ...

13 (a)(iii)

(2)

Efficiency = ...

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

13 (b)

(2)

.....

.....

.....

.....

.....

(Total for Question 13 = 10 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

14 (a)

(2)

14 (b) (i)

(2)

14 (b)(ii)

(2)

DO NOT WRITE IN THIS AREA

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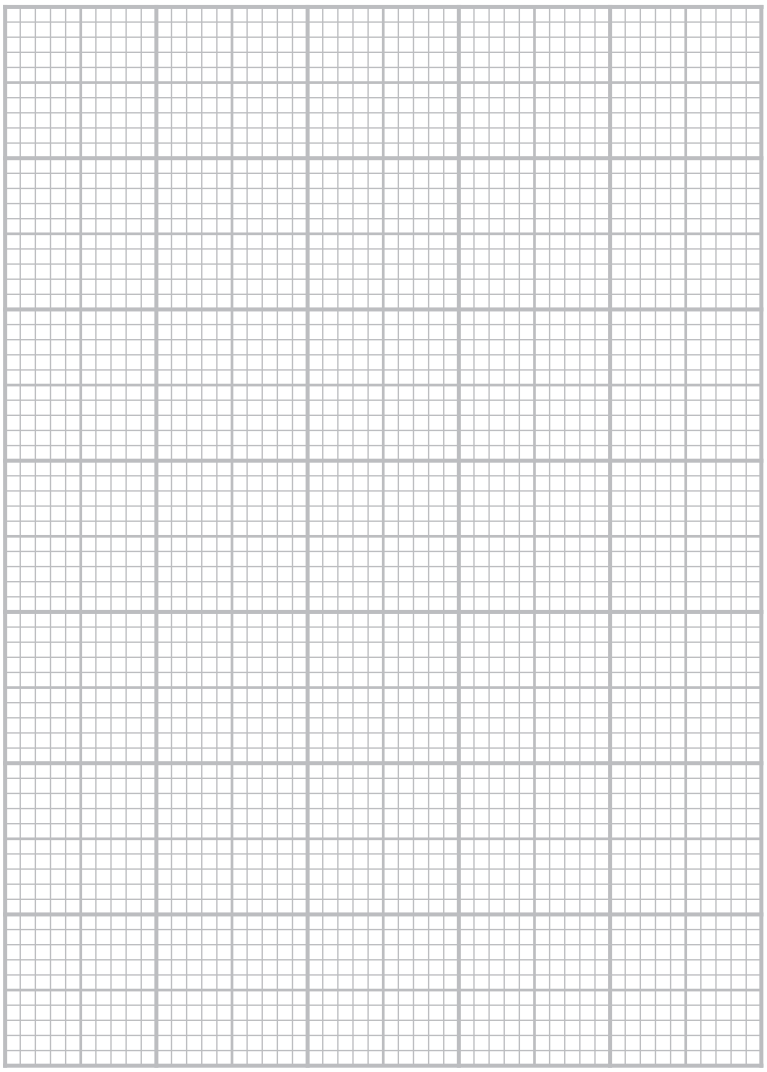
14 (b)(iii)

(4)



(Total for Question 14 = 10 marks)

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DO NOT WRITE IN THIS AREA

15 (a)

(4)

15 (b)

(1)

15 (c) (i)

(3)

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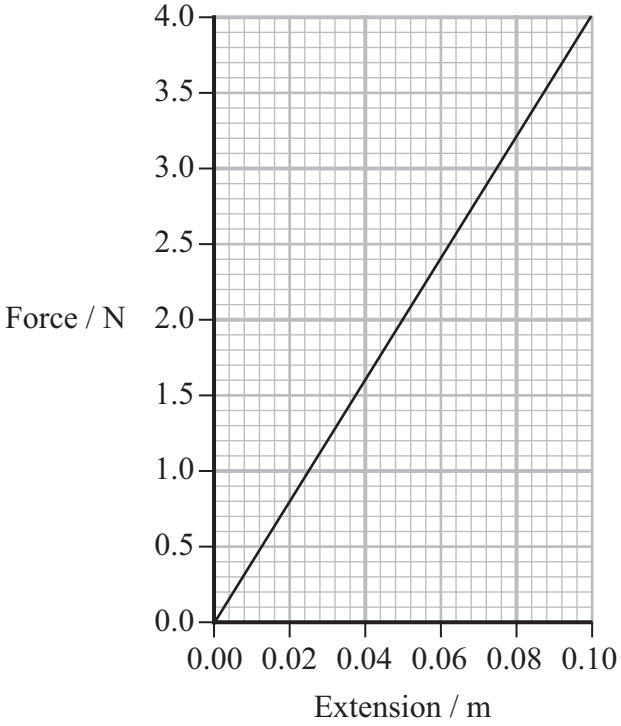
15 (c)(ii)

(4)



Young modulus = ...

(Total for Question 15 = 12 marks)

16 (a)

(3)

Velocity = ...

***16** (b)

(6)

(Total for Question 16 = 9 marks)

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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

17 (a) (i)

(2)

17 (a) (ii)

(1)

17 (b)

(5)

(Total for Question 17 = 8 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

18 (a)

(3)

18 (b)

(5)

$d =$ .....

(Total for Question 18 = 8 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

19 (a)

(5)

19 (b)

(3)

(Total for Question 19 = 8 marks)

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