

CANDIDATE
NAME

--

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

MATHEMATICS

9709/41

Paper 4 Mechanics 1 (M1)

October/November 2018

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: List of Formulae (MF9)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES

Answer **all** the questions in the space provided. If additional space is required, you should use the lined page at the end of this booklet. The question number(s) must be clearly shown.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

Where a numerical value for the acceleration due to gravity is needed, use 10 m s^{-2} .

The use of an electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total number of marks for this paper is 50.

This document consists of **12** printed pages.

- Kambridge Math & Physics
kbridgemp.com

- A high-speed train of mass 490 000 kg is moving along a straight horizontal track at a constant speed of 85 m s^{-1} . The engines are supplying 4080 kW of power.

[1]

(ii) The train comes to a hill inclined at an angle θ° above the horizontal, where $\sin \theta^\circ = \frac{1}{200}$. Given that the resistance force is unchanged, find the power required for the train to keep moving at the same constant speed of 85 m s^{-1} . [3]

(ii) The train comes to a hill inclined at an angle θ° above the horizontal, where $\sin \theta^\circ = \frac{1}{200}$. Given that the resistance force is unchanged, find the power required for the train to keep moving at the same constant speed of 85 m s^{-1} . [3]

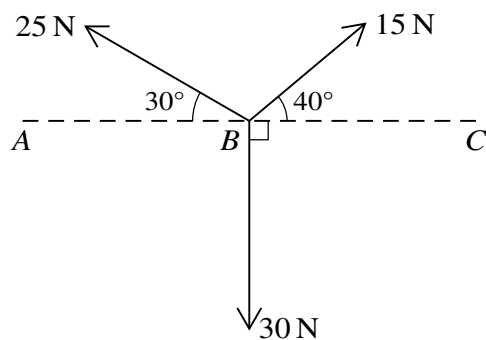
This image shows a blank sheet of white paper designed for handwriting practice. It features multiple sets of horizontal lines. Each set consists of three lines: two solid black lines forming the top and bottom boundaries, and a dashed black line running diagonally from the top-left towards the bottom-right, serving as a guide for letter height. A large, light gray watermark is printed across the upper portion of the page, reading "Cambridge Math & Science" in a bold sans-serif font, with the website address "kambridgemp.com" written below it in a smaller font. The watermark is oriented diagonally, matching the slant of the dashed lines. The rest of the page is left blank for writing practice.

- Kambridge Math & Physics
kambridgemp.com

- (i) Find the tension in the string during the motion before A reaches the ground. [4]

Cambridge Math & Physics
kamdridgemp.com

- [illegible]



Coplanar forces, of magnitudes 15 N, 25 N and 30 N, act at a point B on the line ABC in the directions shown in the diagram.

- (i) Find the magnitude and direction of the resultant force. [6]

Cambridge Math & Physics

Cambridge Math & Physics

kambridgemp.com

- Cambridge Math & Physics
- kambridgemp.com

Kambridge Math & Physics
kbridgemp.com

- 7 A particle moves in a straight line starting from rest from a point O . The acceleration of the particle at time t s after leaving O is $a \text{ m s}^{-2}$, where

$$a = 5.4 - 1.62t.$$

- (i) Find the positive value of t at which the velocity of the particle is zero, giving your answer as an exact fraction. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (ii) Find the velocity of the particle at $t = 10$ and sketch the velocity-time graph for the first ten seconds of the motion. [3]

.....

.....

[5]

Cambridge Math & Physics

kambridgemp.com

Kambridge Math & Physics

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.