A-Level Mathematics

Paper 4

Unsolved Topical

Past Papers with Examiner Report

All Variants

2014-2021

Title A-LEVEL TOPICAL Mathematics PAPER 4

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PREFACE

Excellence in learning cannot be claimed without application of concepts in a dexterous way. In this regard one of the logical approach is to start in chunks; like chapter wise learning and applying the concept on exam based questions.

This booklet provides an opportunity to candidates to practice topic wise questions from previous years to the latest. Extensive working of Team MS Books has tried to take this booklet to perfection by collaborating with top of the line teachers.

We have added answer key / marks scheme at the end of each topic for the candidate to compare the his/her answer to the best.

MS Books strives to maintain actual spacing between consecutive questions and within options as per CAIE format which gives students a more realistic feel of attempting question.

Review, feedback and contribution in this booklet by various competent teachers of a subject belonging to renowned school chains make it most valuable resource and tool for both teachers and students.
With all belief in strength of this resource material I can confidently claim that it is worth in achieving brilliance.

Our sincere thanks and gratification to Mr. Zafar Iqbal who took out special time to help compile and manage this booklet. We would also like to appreciate Mathematics faculty for reviewing and indorsing it.

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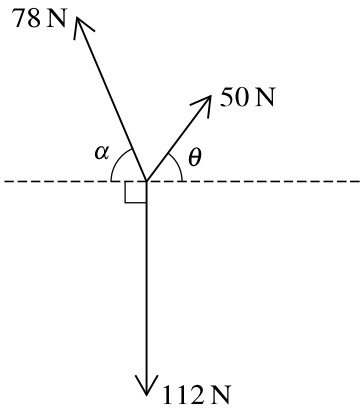
Force & Equilibrium

Q1/41/M/J/19

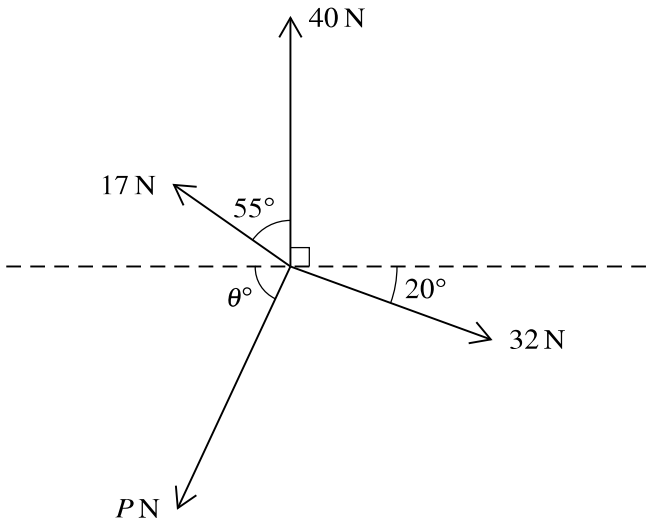
1



Given that $\tan\alpha = \frac{12}{5}$ and $\tan\theta = \frac{4}{3}$, show that the coplanar forces shown in the diagram are in equilibrium. [3]

Q1/42/M/J/19

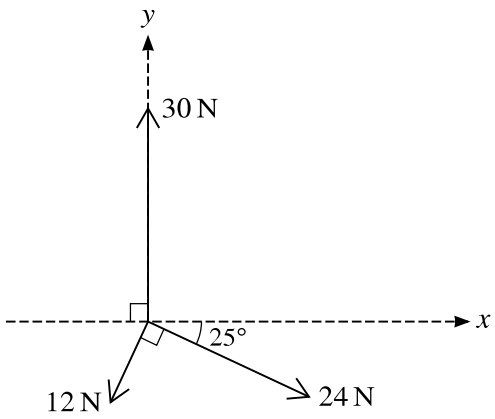
2



Coplanar forces of magnitudes 40 N, 32 N, P N and 17 N act at a point in the directions shown in the diagram. The system is in equilibrium. Find the values of P and θ. [6]

Q2/43/M/J/19

3



Coplanar forces of magnitudes 12 N, 24 N and 30 N act at a point in the directions shown in the diagram.

(i) Find the components of the resultant of the three forces in the *x*-direction and in the *y*-direction. [4]

Component in *x*-direction.....

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Component in *y*-direction.....

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(ii) Hence find the direction of the resultant. [2]

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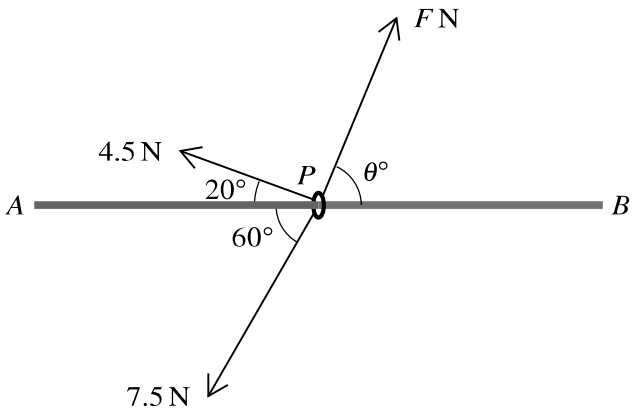
Q5/41/O/N/19

4



A small ring P is threaded on a fixed smooth horizontal rod AB. Three horizontal forces of magnitudes 4.5 N, 7.5 N and F N act on P (see diagram).

(i) Given that these three forces are in equilibrium, find the values of F and θ. [6]

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(ii) It is given instead that the values of F and θ are 9.5 and 30 respectively, and the acceleration of the ring is $1.5\ \text{m s}^{-2}$. Find the mass of the ring. [2]

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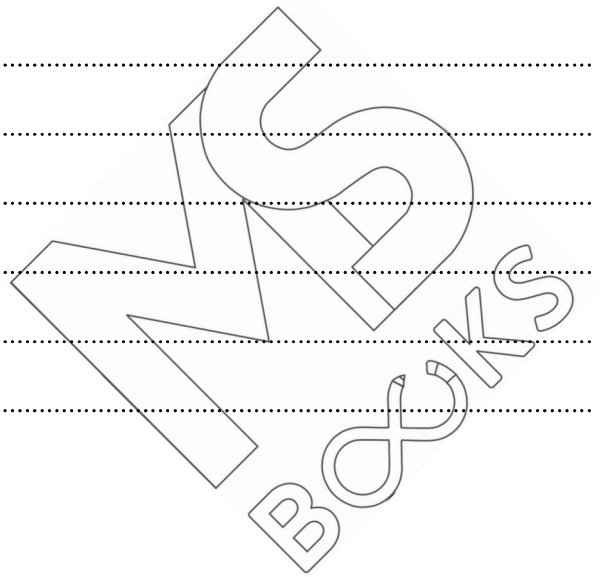

Q1/41/M/J/19

Question 1

Most candidates made a reasonable attempt at this question. The main errors here were to approximate the angles rather than to use the given information to find the sine and cosine of α and θ so that all calculations were exact. It was then impossible to produce an accurate value of the forces and these forces could not be shown to be in equilibrium due to rounding errors. Most candidates attempted to resolve forces horizontally and vertically, and attempted to demonstrate the state of equilibrium.

Q1/42/M/J/19

Question 2

This was a standard problem on force systems and the most straightforward approach was to resolve forces horizontally and vertically. This was the method used by the majority of candidates. Most candidates performed well on this question. Errors were seen due to the mixing up of sine and cosine particularly when evaluating components of the 17 N force. Another error often seen was accuracy being lost because of premature rounding. Candidates should again be reminded that in questions such as this they should keep all intermediate calculations to 4 or 5 decimal places in order to produce a final answer correct to 3sf. It was not possible to use Lami's theorem in this problem since there were 4 forces acting.

Q2/43/M/J/19

Question 3

(i) The great majority of candidates resolved the forces and calculated both components accurately. The *y*-component (8.98) was sometimes seen as 9.0 or 9, either due to the approximation of each component before combining or due to a final answer corrected to two instead of the three significant figures required. A few candidates found *x*- and *y*-components for each force without combining them. Other errors included a miscalculation of 65^{o} as 75^{o} and a sine/cosine mix.

(ii) Most solutions made use of the components found in **part (i)** to calculate a relevant angle. A clear statement of the direction was expected but was sometimes missing. The use of a diagram was sometimes helpful in clarifying an incomplete description. A number of candidates calculated the magnitude of the resultant rather than the direction of the resultant. A few found the resultant and then used sin or cos instead of tan in a lengthier method to obtain the angle, sometimes losing accuracy through premature approximation.