

CANDIDATE NUMBER: _____



CENTRAL EAST EDUCATION DIVISION

2023 MALAWI SCHOOLS CERTIFICATE OF EDUCATION MOCK EXAMINATIONS

ADDITIONAL MATHEMATICS

Subject Number: M132/II

Friday, 10th March

Time Allowed: 2h 30min

(1.30 – 4.00pm)

PAPER II

(100marks)

Instructions

1. This paper contains eleven printed pages. Please check.
2. Answer all the six questions in Section A and any two questions from section B.
3. Section A carries 60 marks and Section B 40 marks
4. All answers should be written in the spaces provided after every question.
5. Calculators may be used.
6. All necessary working should be shown and any numerical expressions being evaluated by calculators must be clearly stated; otherwise marks for method may be lost.
7. The final answer to a question requiring the use of calculators should normally be given to three significant figures.
8. The final answer to a question requiring the use of calculators should normally be given to three significant figures.
9. Write your examination number on top of each page of your question paper.

	Tick if answered	Do not write in these columns	
1			
2			
3			
4			
5			
6			
7			
8			
9			

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Section A (60marks)

Answer all the six questions in this section

1. (a) Calculate the probability that if two cards are selected from a pack of playing cards at once, they are a club and a queen
(5marks)

- (b) The forces $\underline{F} = (\underline{i} - 2\underline{j})$, $\underline{G} = (2\underline{i} + \underline{j})$ and $\underline{H} = (\underline{i} + 3\underline{j})$ are applied to mass of 10kg. Find the magnitude of the resulting acceleration.
(5marks)

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2. (a) Figure 1 below shows a velocity time graph OABCD of a train.

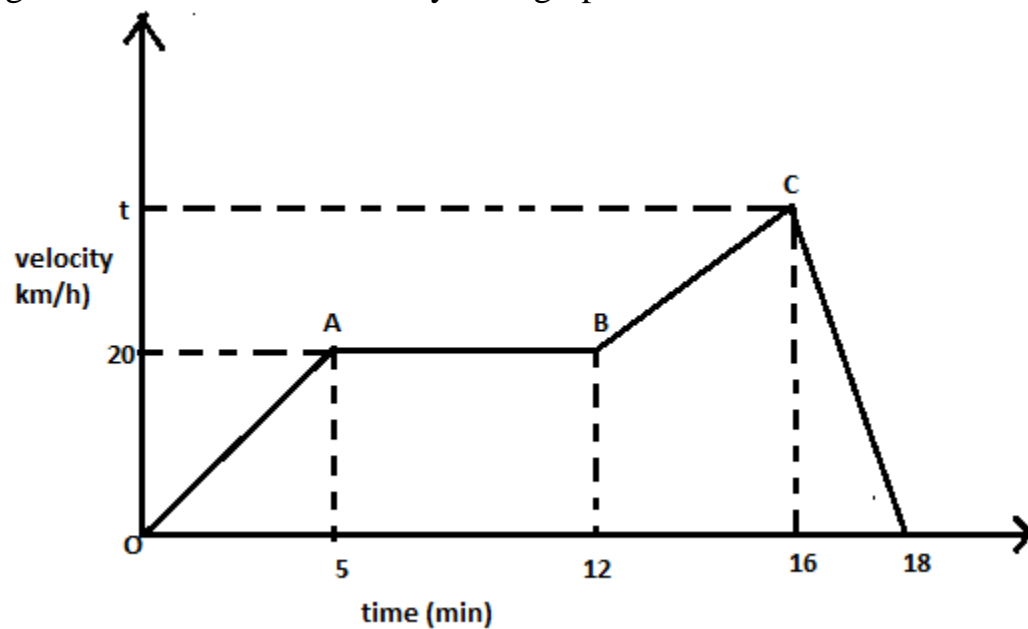


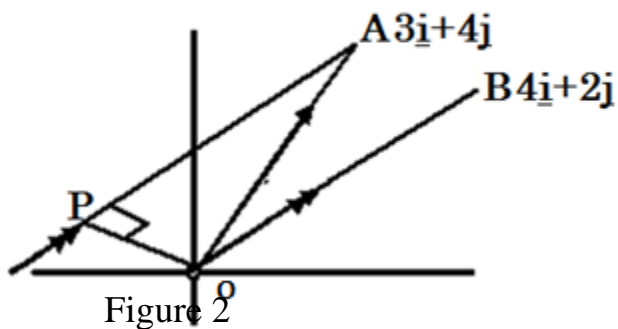
Figure 1

Given that the train covered 220Km in the last 6 seconds of its journey, calculate the deceleration of the train.

(6marks)

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(b) In figure 2 below, the position vector of A is $3\mathbf{i} + 4\mathbf{j}$ and that of B is $4\mathbf{i} + 2\mathbf{j}$



Given that point P is such that AP is parallel to OB and OP is perpendicular to PA, find the position vector of point P **(5marks)**

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3(a) In figure 3 below, $\overrightarrow{OA} = \underline{a}$, $\overrightarrow{OB} = \underline{b}$, $\overrightarrow{OM} = p\overrightarrow{OD}$ and $\overrightarrow{BM} = q(\underline{b} + \frac{2}{3}\overrightarrow{OA})$ where p and q are scalars.

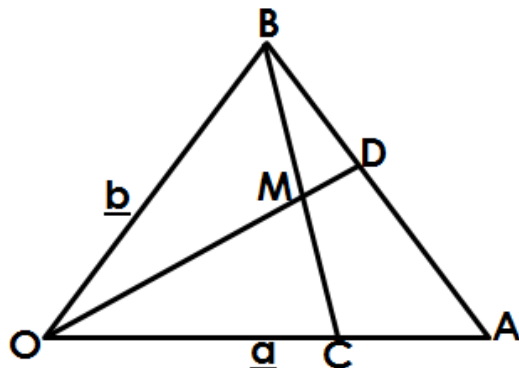


Figure 3

Show that $\overrightarrow{OM} = \underline{b}(1 + q) + \frac{2}{3}q\underline{a}$
(4marks)

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(b) Find the Variance of data below.

(7marks)

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Frequency	3	5	8	10	8	6	4

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- 4 (a) Evaluate $\sum_{k=1}^7 (k - 2)^2$
(5marks)

- (b) A ball is kicked off from a horizontal ground at an angle of θ where $\tan \theta = \frac{4}{3}$. Given that the initial speed of the ball is 25ms^{-1} . Find the time when the ball is at a height of 15m above the ground. (8marks)

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5 The resultant of two forces $2\mathbf{F}\mathbf{N}$ in the direction of 090° and $\mathbf{F}\mathbf{N}$ in the direction of 330°

is $12\mathbf{N}$. When a third force $\mathbf{X}\mathbf{N}$ in the direction 270° is added, the resultant of the system is in the direction 000° . Calculate the values of \mathbf{F} and \mathbf{X} .

(8marks)

6 A straight line passes through $X(1,2)$ and $Y(4, 6)$. Calculate the value of t at the point where this line crosses the line whose equation is $\mathbf{r} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} + t\begin{pmatrix} 6 \\ 2 \end{pmatrix}$.

(7marks)

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Section B(40marks)

Answer any two questions from this section

7. (a) Given the equation of the circle $x^2 + y^2 - 2x - 2y = 7$ and that the diameter of the circle is perpendicular to the line whose equation is $3x + 4y = 7$, find the equation of its diameter of the circle.

(12marks)

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(b) Of 48 pupils, 6 take Additional Mathematics, 8 take Computer Studies and 12 take Agriculture. If these events are independent, what is the probability that the first pupil takes either Additional

Mathematics or Agriculture?

(8marks)

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8. (a) The coordinates of three points are X(3,2), Y(4,2) and Z(6,5). Calculate $|\overrightarrow{YZ} + \overrightarrow{XZ}|$ **(8marks)**

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(b) A car moves along a straight level road, accelerating from rest at a constant rate for 9.6 seconds over a distance of S_1 meters until it reaches a speed of V m/s. It then accelerates at a constant rate of 2.5 m/s^2 over a distance of S_2 meters until it reaches a speed of 25 m/s . Express S_1 and S_2 in terms of V . Given that the total distance travelled is 152 m , calculate the possible values of V **(12marks)**

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9. (a) Given that $A = \begin{bmatrix} 1 & -3 \\ 4 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 5 \\ 0 & -2 \end{bmatrix}$, find the inverse of matrix $A + B$.
(7marks)

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(b) Four forces act on a particle P as shown in figure 4 below.

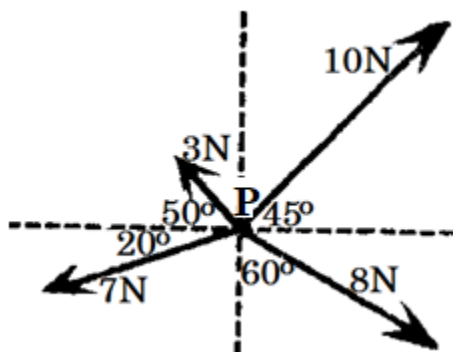


Figure 4

Given that the mass of particle P is 500kg, calculate:

- (i) the acceleration of the particle
- (ii) the direction of the acceleration of the particle.

(13marks)

END OF QUESTION PAPER