CANDIDATE NAME: _____

NORTHERN EDUCATION DIVISION

2026 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK EXAMINATION

MATHEMATICS – MARKING KEY

Subject Number: M131/II

Thursday, 21 March

Time Allowed: 2h 30min 8:00 - 10:30 am

PAPER II

(100 marks)

Instructions:

1. **This paper contains 16 printed pages.**

   Please check.
2. Answer **all** the **six** questions in Section **A** and any **four** questions in section **B.**
3. The maximum number of marks for each answer is indicated against each question
4. Write your answers in the spaces provided on the question paper.
5. Scientific calculators may be used.
6. The graph paper and blank answer sheet at the end of the question paper can be used if required. Do **not** tear them off.
7. **All working must be clearly shown.**
8. Write your **Examination number** at the top of every page

Question Number	Tick if answered	Do not write in these columns	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

1. a. Without using a calculator, simplify $\frac{12\sqrt{5}}{2\sqrt{5}-4}$, leaving your answer with a rational denominator.

$\frac{6\sqrt{5}(\sqrt{5}+2)}{(\sqrt{5}-2)(\sqrt{5}+2)}$ M1

$\frac{30+12\sqrt{5}}{(\sqrt{5})^2-(2)^2}$ M1M1

$30+12\sqrt{5}$ A1

b. Simplify $\frac{3x^3}{3x^2-6xy}+\frac{4y^3}{2y^2-xy}$

$\frac{3x^3}{3x(x-2y)}+\frac{4y^3}{-y(-2y+x)}$ M1

$\frac{x^2}{x-2y}-\frac{4y^2}{x-2y}$ M1

$\frac{x^2-4y^2}{x-2y}$ M1

$\frac{(x-2y)(x+2y)}{x-2y}$ M1

$x+2y$ A1

2. a. Two similar cylinders **A** and **B** have heights of $4\,cm$ and $6\,cm$respectively. If the volume of the cylinder **A** is $50\,cm^3$, find the volume of the cylinder **B.**

$(\frac{6}{4})^3$ M1M11

$B=50\times 1.5^3$ M1

$Volume\ of\ B=168.75\,cm^3$ A1

b. Given that $\mu=\{1,2,3,4,5,6,7,8,9.10\}$. **A**¿$\{$perfect squares$\}$, **B**¿$\{$multiples of 3$\}$ and **C**¿$\{$prime numbers$\}$. Find $(A\cup B\cup C)'$

$A=\{1,4,9\}$ *M1*

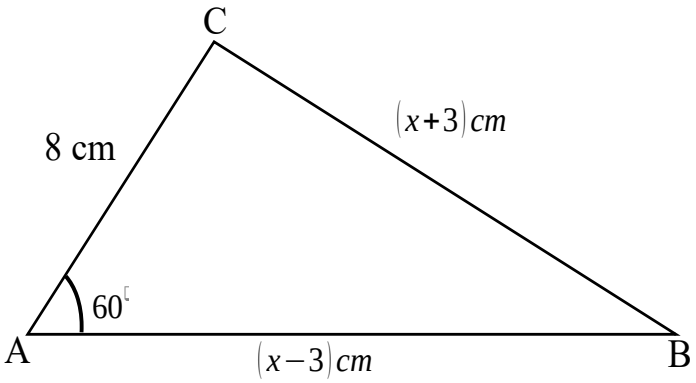
$B=\{3,6,9\}$ *M1*

$C=\{2,3,5,7\}$ *M1*

$A \cup B \cup C=\{1,2,3,4,5,6,7,9\}$ M1

$(A \cup B \cup C)'=\{8,10\}$ A1

3. a. **Figure 5** shows a triangle **ABC** such that $AB=(x-3)cm, BC=(x+3)cm, AC=8cm$ and angle $BAC=60^0$.



Find the value x.

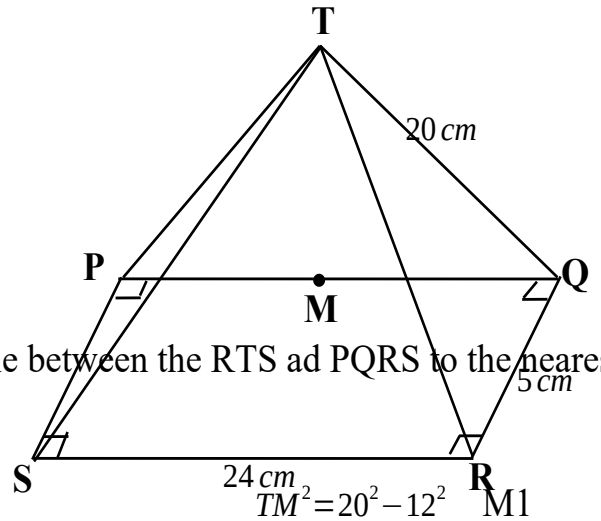
. $(x+3)^2=8^2+(x-3)^2-2x8(x-3)\cos 60^0$ M1

$x^2+6x+9=64+x^2-6x+9-8x+24$ M1M1

$20x=88$ M1

$x=4.4$ A1

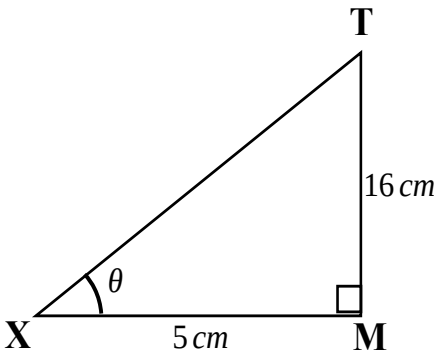
b. **Figure 8** shows a rectangular based pyramid **PQRST** with vertex **T** vertically above the midpoint **M** of the side **PQ.** $SR=24cm, QR=5cm$ and $TQ=20cm$.



Calculate the angle between the RTS ad PQRS to the nearest degree.

$TM^2=20^2-12^2$ M1

$TM = 16\,cm$ M1



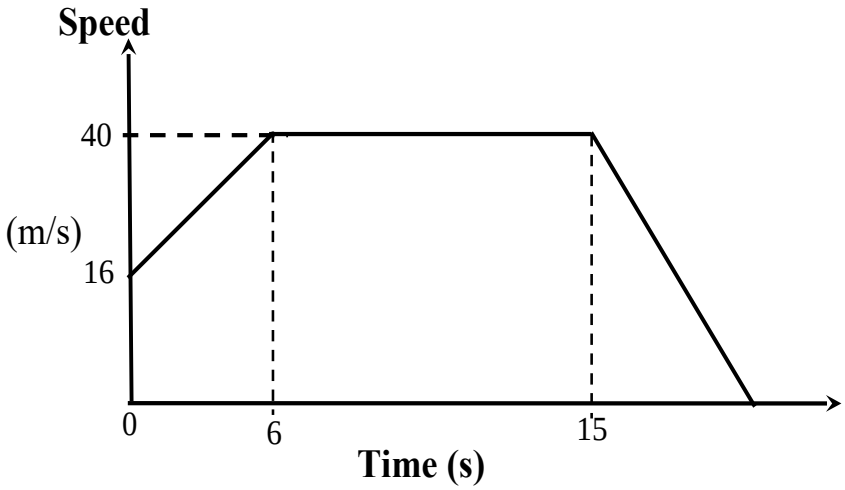
X is the midpoint of **SR**

$\tan\theta = \frac{16}{5}$ M1

$\theta = \tan^{-1}(3.2)$ M1

$\theta = 73^0$ A1

4. a. **Figure 9** shows the speed-time graph of a moving object. Given that the rate at which the object decelerates after $t = 15\,seconds$ is equal to half the rate at which it accelerates during the first 6 seconds.



Calculate the time at which it stops.

$\frac{40}{t-15} = \frac{1}{2}\left(\frac{40-16}{6}\right)$ M1M1

$\frac{40}{t-15} = \frac{24}{12}$ M1

$2(t-15)=40$ M1

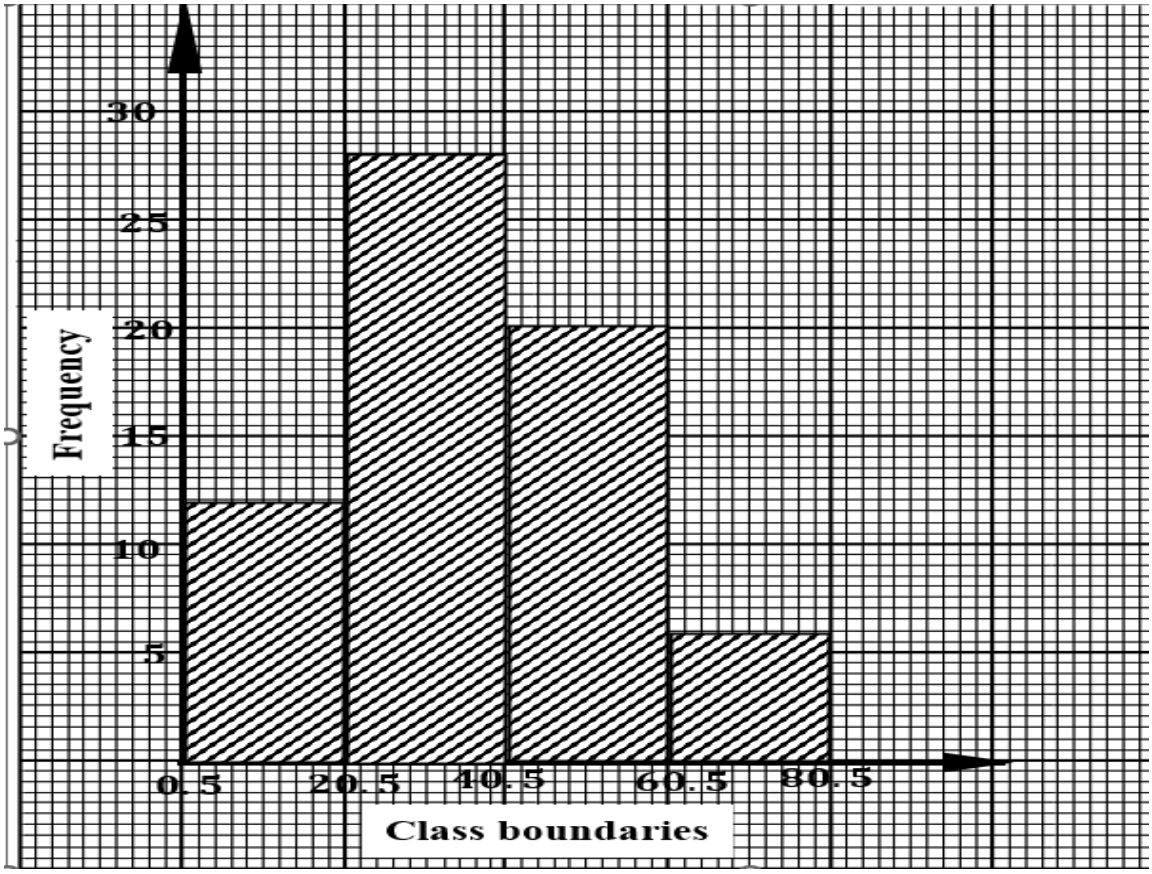
$t-15=20$

$t=35\,seconds$ A1

b. Table below shows class intervals of scores and their frequencies

Scores	1−20	21−40	41−60	61−80
Frequency	12	28	20	6

Using a scale of 2 cm to represent 5 units in both axes, draw a histogram to represent this information.



M1 setting class boundaries

M1 correct scale

M1M1M1 Construction of the histogram

5. a. Solve the equation $8x2^{2y}=\frac{2^{5y+1}}{4^{-y}}$

$$2^3x2^{2y}x4^{-y}=2^{5y+1} \quad M1$$

$$2^3x2^{2y}x2^{-2y}=2^{5y+1} \quad M1$$

$$2^{3+2y-2y}=2^{5y+1} \quad M1$$

$$2^3=2^{5y+1} \quad M1$$

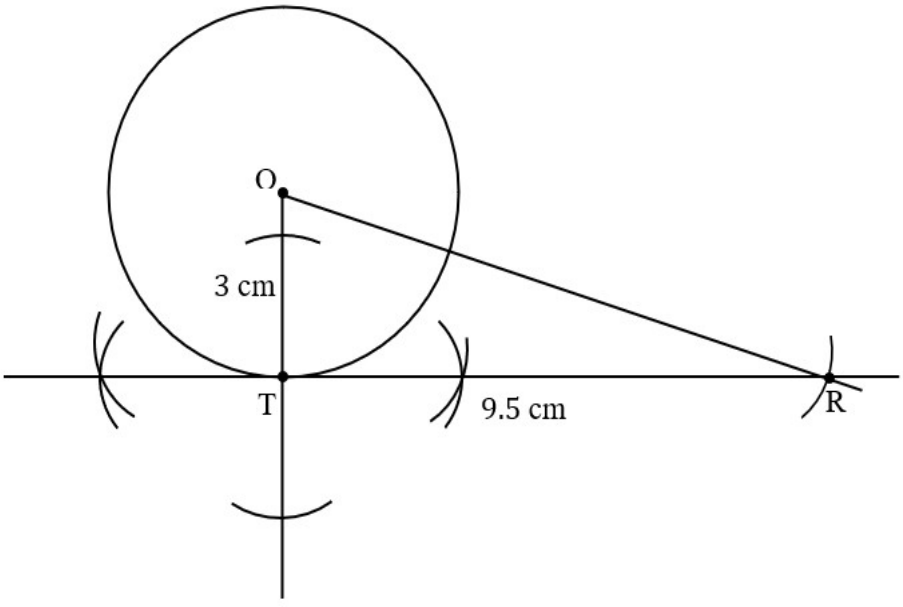
$$5y+1=3 \quad M1$$

$$5y=2$$

$$y=\frac{2}{5} \quad A1$$

b. Using a ruler and a pair of compasses only, construct in the same diagram:

- a circle centre O of radius $3cm$
- a point R outside the circle such that ¿$=10cm$.
- a tangent TR to the circle at **R.**
- Measure and state the length of TR



TR = 9.5 cm

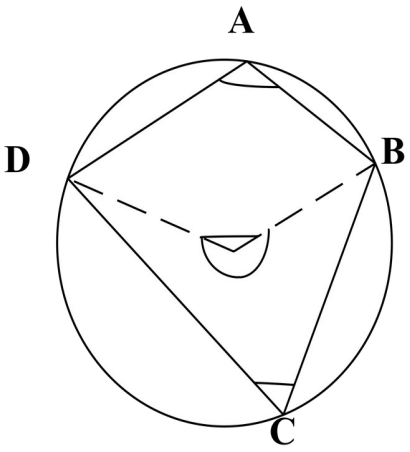
M1 Circle of radius 3cm

M1Point R such that OR = 10 cm

M1M1M1 Construction of the tangent

M1 TR = 9.5 cm

6. a. Prove the theory which states that opposite angles of a cyclic quadrilateral are supplementary. (5 mark)



Let $\angle DAB = y$ and $\angle DCB = x$

$\therefore$ *Reflext* $\angle DOB = 2y$ ($\angle$ at centre twice angle at circumference) M1

$\angle DOB = 2x$ ($\angle$ at centre twice angle at circumference) M1

But *Reflecx* $\angle DOB + \angle DOB = 360^o$ (angles at a Point) M1

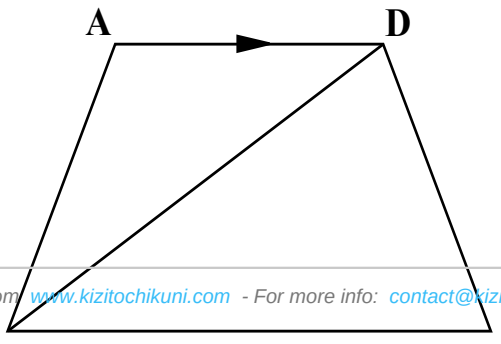
Therefore, $2y + 2x = 360^o$

$2(x + y) = 360^o$ M1

$x + y = 180^o$ M1

$\therefore \angle DCB \wedge \angle DAB$ are supplementary

b. **Figure 4** shows a trapezium **ABCD** where **AD** is parallel to **BC**. $\overrightarrow{BD} = 5\underline{a} + \underline{b}$, $\overrightarrow{DC} = \underline{a} - 10\underline{b}$ and $\overrightarrow{AD} = 4\underline{a} + k\underline{b}$.



$4\underline{a} + k\underline{b}$

$\underline{a} - 10\underline{b}$

$5\underline{a}+\underline{b}$

B **C**

Find the value of k.

. $\overrightarrow{BC}=5\underline{a}+\underline{b}+\underline{a}-10\underline{b}$ M1

$¿6\underline{a}-9\underline{b}$ M1

$¿3(2\underline{a}-3\underline{b})$

$\overrightarrow{AD}=2(2\underline{a}+\frac{k}{2}\underline{b})$ M1

$\frac{k}{2}=-3$ M1

$k=-6$ A1

SECTION B (40 marks)

Answer any four questions from this section

7. Solve the following equations simultaneously.

$y=2x+3$

$xy+20=5y$ (10 marks)

$x(2x+3)+20=5(2x+3)$ M1

$2x^2+3x+20=10x+15$ M1

$2x^2-7x+5=0$ M1

$2x^2-2x-5x+5=0$ M1

$2x(x-1)-5(x-1)=0$ M1

$(2x-5)(x-1)=0$ M1

$x=2.5\vee 1$ M1

$y=8\vee 5$ M1M1

Coordinates are $(2,5,8)\wedge(1,8)$ A1

8. Solve the equation $x^3-3x^2-4x+12=0$ (10 marks)

$$
\begin{array}{r|l}
 & x^2-5x+6 \\
\hline
x+2 & x^3-3x^2-4x+12 \\
 & -(x^3+2x^2) \\
\hline
 & -5x^2-4x \\
 & -(-5x^2-10x) \\
\hline
 & 6x+12 \\
 & -(6x+12) \\
\hline
 & 0
\end{array}
$$

$$(x+2)(x-3)(x-2)=0$$

$$x=-2 \text{ or } 3 \text{ or } 2$$

M1 identifying the first factor
M1M1M1M1 identifying x^2-5x+6 using long division
M1M1 factorizing the quadratic expression
M1 equating product of all factors to 0
M1A1 solving for solutions and everything correct

9. The cost of plating articles of a given shape is the sum of two parts. One is fixed, and the other part varies as the square of the height of the article. It costs K370, 000 to plate a $10\,cm$ high article and K1,120,000 to plate a $20\,cm$ high article. How high will the article be if it costs K480, 000? (10 marks)

$C=a+bh^2$ M1

$370{,}000=a+100b$ M1

$1{,}120{,}000=a+400b$ M1

$-750{,}000=-300b$ M1

$b=2{,}500$ M1

$370{,}000=a+250{,}000$ M1

$a=120{,}000$ M1

$480{,}000 = 120{,}000 + 2{,}500\,h^2$ M1

$360{,}000 = 2{,}500\,h^2$

$144 = h^2$ M1

$h = 12\,cm$ A1

10. A small bag contains 4red and n yellow sweets. Two of the sweets are chosen without replacement from this bag one at a time. If the probability that two red sweets are chosen is $\frac{2}{15}$, find the value of n. (10 marks)

$P(R_1) = \frac{4}{4+n}$ M1

$P(R_2) = \frac{3}{3+n}$ M1

$P(R_1 R_2) = \frac{4}{4+n} x \frac{3}{3+n}$ M1

$\frac{4}{4+n} x \frac{3}{3+n} = \frac{2}{15}$ M1

$\frac{12}{12+7n+n^2} = \frac{2}{15}$ M1

$2(n^2+7n+12) = 180$ M1

$n^2+7n+12 = 90$ M1

$n^2+7n-78 = 0$ M1

$(n+13)(n-6) = 0$ M1

$n = 6$ A1

11. The manager of a football team has K120,000,000 to spend on buying new players. He can buy defenders at K6,000, 000 each and forwards at K8,000,000 each. There must be at least 4 defenders and at least 3 forwards. To cover for injuries, he must buy at least 10 players altogether.

a. Taking x to represent number of defenders and y to represent number of forwards, write down **four** inequalities in x and y. (4 marks)

$$6{,}000{,}000\,x + 8{,}000{,}000\,y \leq 120{,}000{,}000$$

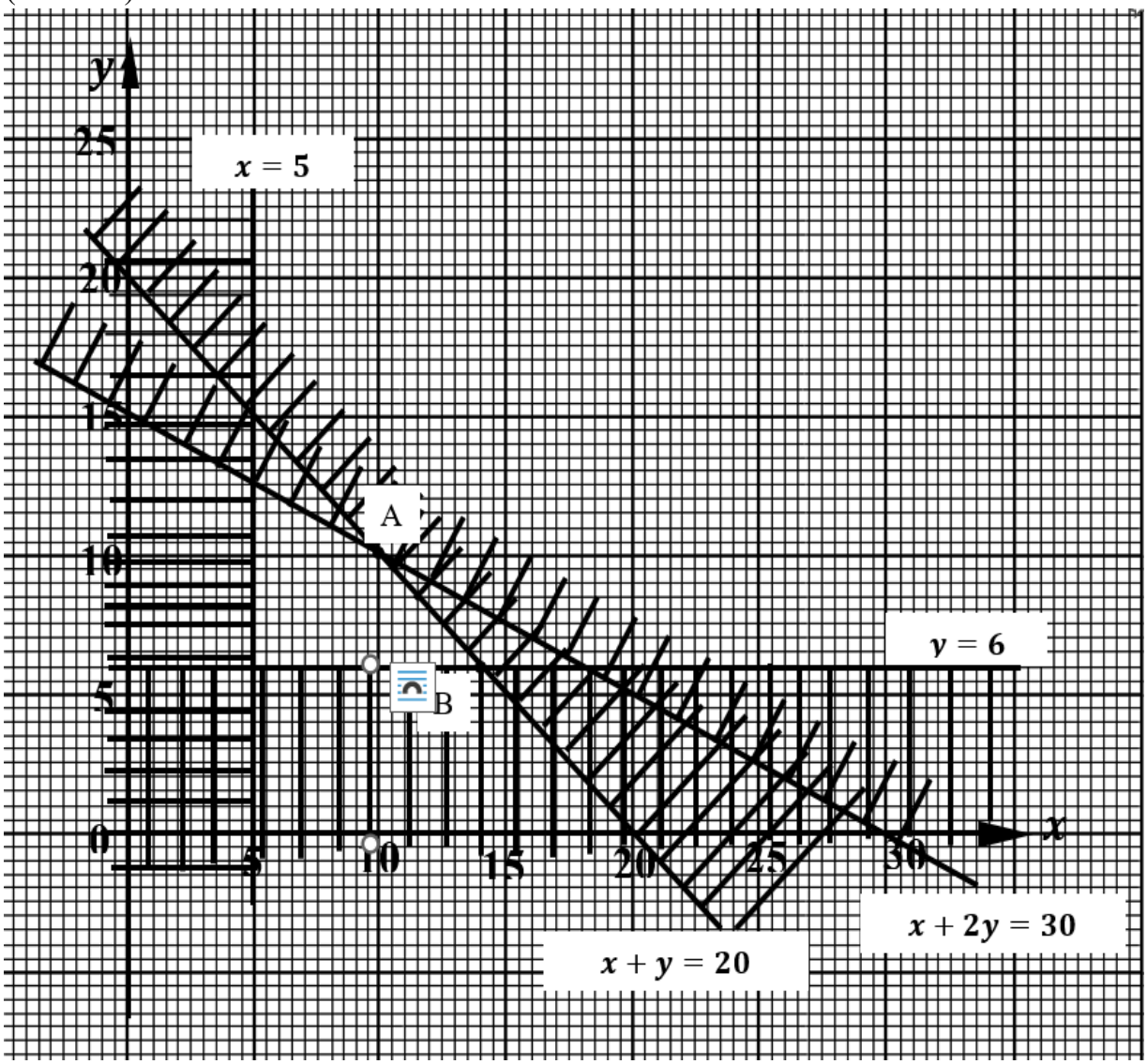
$3x + 4y \leq 60$ M1

$x \geq 4$ M1

$y \geq 3$ M1

$x + y \geq 10$ M1

b. Using a scale $2\,cm$ to represent 5 units on both axes, draw graphs to show the region represented by the inequalities by shading the unwanted region.
(4 marks)



M1 for each correct line and shading

c. If the wages are K10,000,000 per month for each defender and K20,000,000 per month for each forward, what is the combination of players which will give lowest wage bill?
(2 marks)

$W = 10{,}000{,}000\,x + 20{,}000{,}000\,y$ M1

$A(7,3), W = 10{,}000{,}000(7) + 20{,}000{,}000(3)$

$W = K\,130{,}000{,}000$

$B(4,6), W = 10{,}000{,}000(4) + 20{,}000{,}000(6)$

$W = K\,160{,}000{,}000$

Combination for lowest wage bill is $(7,3)$ A1

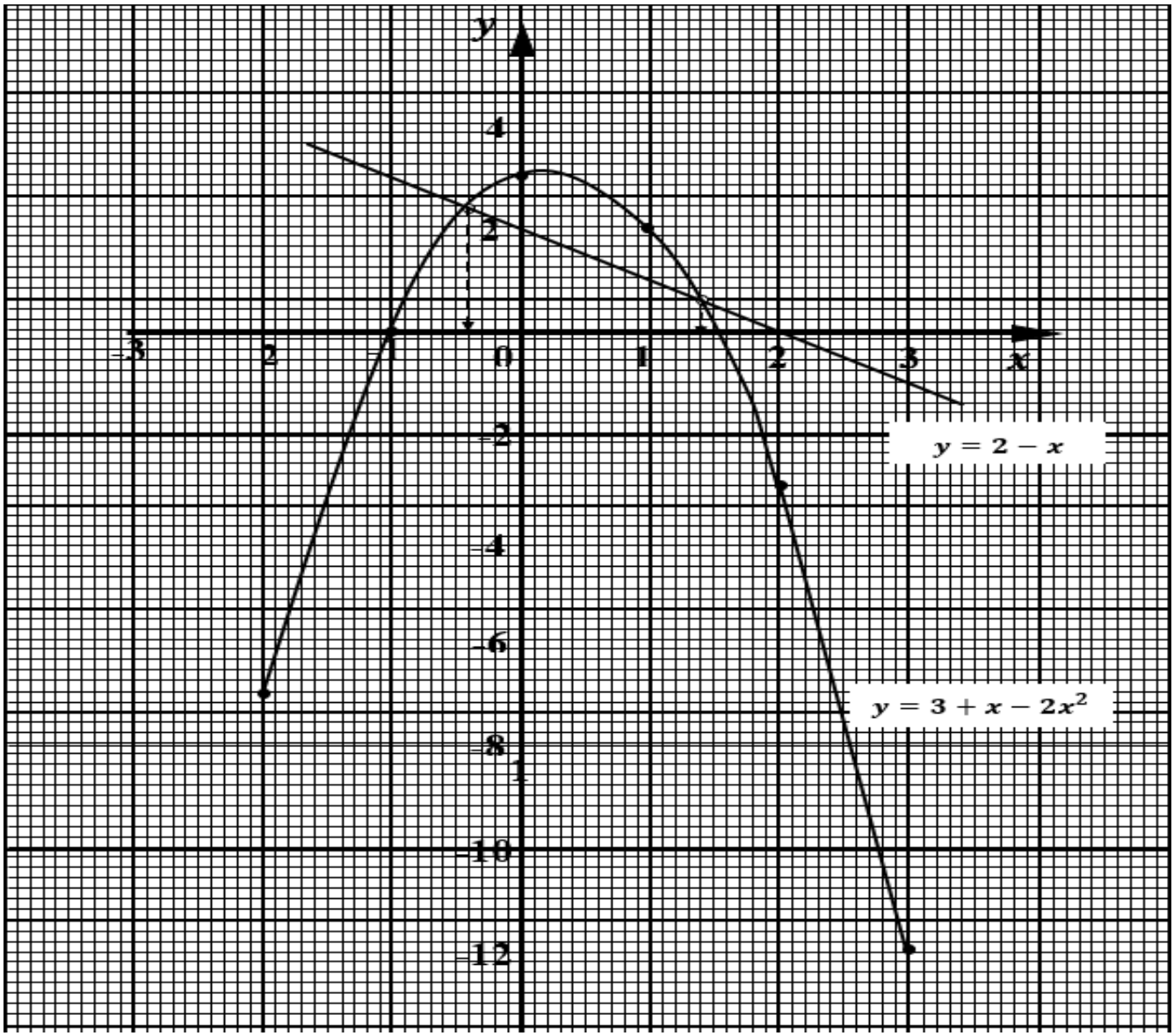
12. Table 1 shows some values of x and y for the equation $y = 3 + x - 2x^2$

x	-2	-1	0	1	2	3
y	-7	**0**	3	2	-3	-12

Table 1 (M1M1)

a. Complete the table of values. (2 marks)

b. Using a scale of $2\,cm$ to represent 1 unit on $x-$¿axis and $2\,cm$ to represent 2 units on $y-$¿axis, draw the graph of $y = 3 + x - 2x^2$. (4 marks)



M1M1 correct scale

M1 correctly plotted points

M1 graph plotted using free hand

c. Use your graph to solve the equation $1+2x-2x^2=0$ (4 marks)

$y=3+x-2x^2$

$0=1+2x-2x^2$ M1

$y=2-x$ M1 M1(for graphing)

$x = -0.4 \vee 1.4$ A1

END OF MARKING KEY

NB: This paper contains 14 printed pages.