

Name.....

Index No...../.....

School.....

Candidate's Signature.....

Date

121/2
MATHEMATICS
Paper 2
July/August 2010
2 ½ Hours

BUNGOMA JOINT EVALUATION TEST - 2010
Kenya Certificate of Secondary Education (K.C.S.E)

Instructions to candidates

1. Write your name and index number in the spaces provided above.
2. The paper contains two sections: **Section I** and **Section II**.
3. Answer **All** the questions in **section I** and **strictly any five** questions from **Section II**.
4. All answers and working must be written on the question paper in the spaces provided below each question
5. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
6. Non-programmable silent electronic calculators and **KNEC** mathematical tables may be used, except unless stated otherwise.

FOR EXAMINERS USE ONLY.

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

Section II

17	18	19	20	21	22	23	24	Total

Grand Total

SECTION I: (50 MARKS)

Answer ALL questions in this section

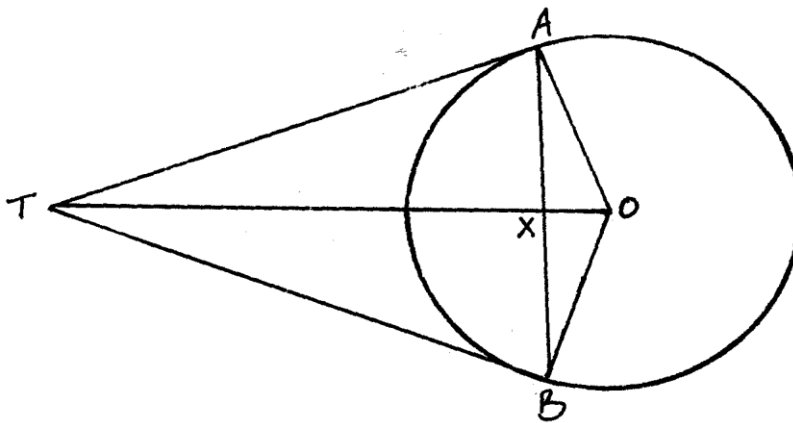
1. Without using logarithms table or calculator, solve for x in:

$$\log 5 - 2 + \log(2x + 10) = \log(x - 4) \quad (3\text{mks})$$

2. The initial salary of Mr. Kiptum is Sh. 42,000 per annum. His salary increases by 13% each year. Determine his total earnings after 15 years. Give your answer to the nearest thousands. (3mks)

3. Evaluate $\frac{\sin 420^\circ \cos 330^\circ}{\tan 570^\circ \sin 765^\circ}$ leaving your answer in surd form. (3mks)

4. In the figure below, O is the centre of the circle and TA and TB are tangents to the circle at A and B respectively. Given that angle ATO = 39° ; calculate angle TBX. (2mks)



5. Given the calculation 8.70×2.4 , Ronoh obtains an approximate value by rounding off the given values to the nearest whole number. Determine the percentage error in the calculation arising from the approximation. (3mks)
6. For a lifting machine, the effort E required to lift a load L is partly constant and partly varies as L . Given that $L = 2$ when $E = 5.5$ and $L = 6$ when $E = 6.5$, Write an equation connecting E and L . (3mks)
7. Draw a line $PQ = 7.2\text{cm}$ and on one side of the line, use a ruler and pair of compasses only to draw the locus of a point A such that $\angle PAQ = 60^\circ$ and on it mark point A such that $PA = QA$. (3mks)

8. Mrs. Nandi bought a television set on hire purchase by paying a down payment of Ksh. 5000 and Monthly installments of Ksh. 1250 for 2 years. If the interest rate charged was 12% p.a what is the carrying charge to the nearest hundreds? (3mks)
9. A ball is dropped from the top of a building and its height h , metres above the ground at any time t , seconds is given by $h = 350 + 65t - t^2$.
- i) Find the velocity of the ball when $t = 2$ secs (2mks)
- ii) State the time when the ball hits the ground. (2mks)
10. Use matrix method to solve the simultaneous equations. (4mks)
- $$x + 3(y - \frac{3}{4}) = \frac{1}{2}$$
- $$x = \frac{1}{3}y + \frac{1}{4}$$
- $$x = \frac{y}{3} + \frac{1}{4}$$
11. Atieno is now four times as old as her daughter and six times as old as her son. Twelve years from now, the sum of the ages of her daughter and son will differ from her age by 9 years. What is Atieno's present age? (3mks)

12. Solve for θ in the equation $\sin(3\theta + 120^\circ) = \frac{\sqrt{3}}{2}$ for $0 \leq \theta \leq 180^\circ$. (3mks)
13. A two digit number is such that the square of the unit digit is equal to one less than the tens digit and that the unit digit raised to power four and add three times the tens digit is equal to seven. Find the number. (3mks)
14. i) Expand $\left(5 + \frac{x}{2}\right)^6$ up to the term in x^3 . (2mks)
- ii) Use your expansion to estimate the value of $\left(\frac{11}{2}\right)^6$. Correct to one decimal place. (2mks)
15. A line segment joining two points P(0,7) and S (2, 3.8) is divided externally by point Q in the ratio 7:3. Find the co-ordinates of point Q. (3mks)

16. The velocity of a particle, V m/s moving in a straight line after t seconds is given by $V = 3t^2 - 3t - 6$. Find the distance covered by the particle between $t = 1$ and $t = 4$ seconds. (3mks)

SECTION II: (50 MARKS)

Answer any Five questions.

17. The probability that Hilda, Lucy and Caroline will be late for breakfast on any one morning are $\frac{1}{4}$, $\frac{1}{3}$ and $\frac{1}{5}$ respectively on any one morning.
- a) Using a probability tree diagram find the probability that:-
- i) none of them will be late (2mks)

 - ii) Only one of them will be late (3mks)

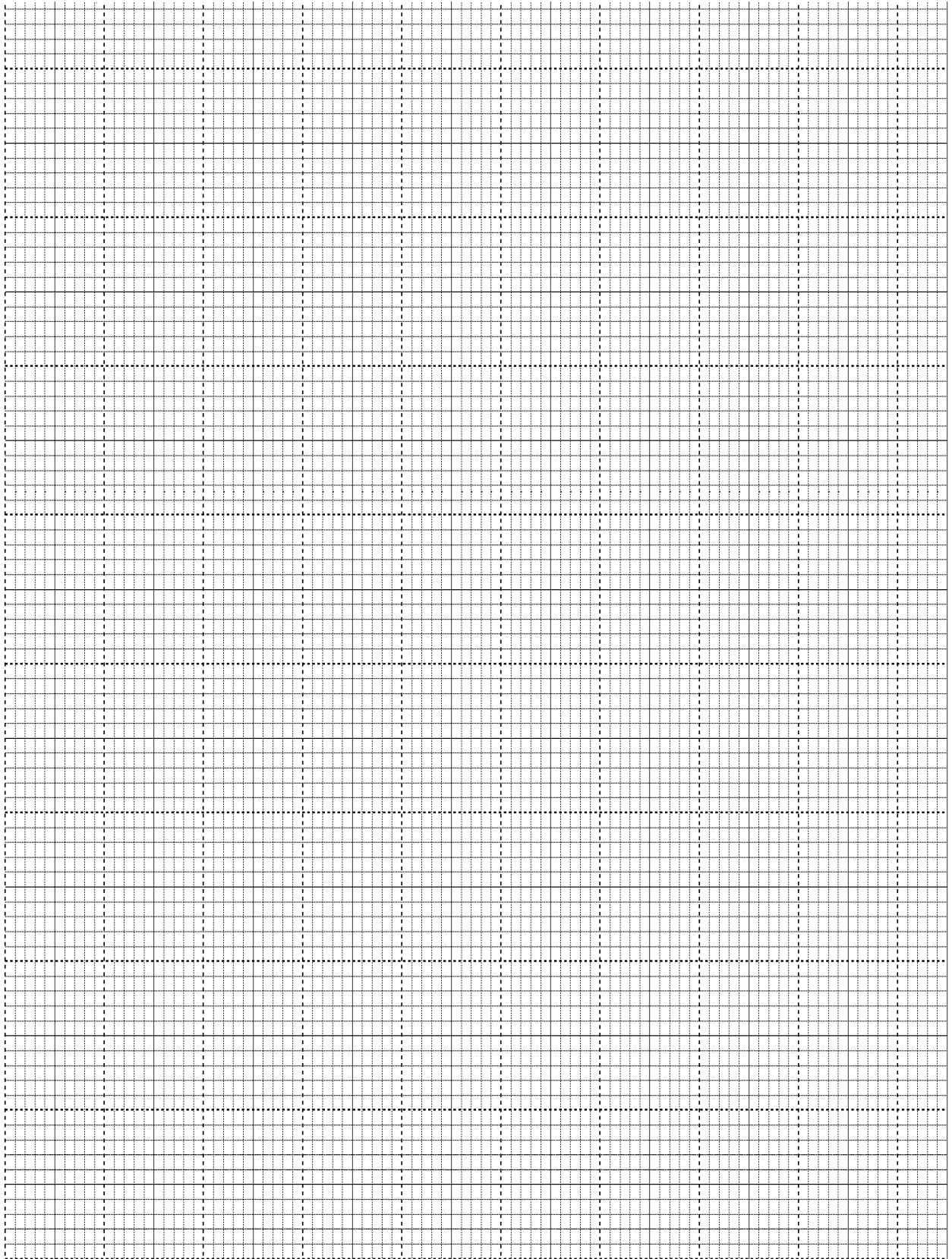
 - iii) at least one of them will be late (3mks)

 - iv) at most one of them will be late (2mks)

18. a) A figure whose co-ordinates are A(-2, -2), B(-4, -1), C(-4, -3) and D (-2, -3) undergoes successive transformations ERS; where E, R and S are transformations represented by the matrices,

$$E = \begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}, \begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix} \text{ and } R = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

On the grid provided, show the figure ABCD and its image under the successive transformations ERS. (6mks)



- b) Find the matrix representing the single transformation mapping the image found in (a) above back the object figure ABCD. (2mks)
- c) Triangle PQR has vertices at P(2, 2), Q(4, 1) and R(6, 4). On the same grid, show the image of triangle PQR under a shear with line $y = 2$ invariant and point R(6, 4) is mapped onto R'(2, 4). (2mks)

19. The positions of two towns on the earth's surface are A (40°S , 45°W) and B (40°S , 135°E)
- a) Calculate;
The difference in distance between two towns A and B along the parallel of latitude and along the great circle. (in Nm). (4mks)
- b) Two planes X and Y left town A at 8.00am flying at 758 knots each towards town B. If plane X flies along the parallel of latitude and plane Y along the great circle; then determine the position of one of the planes when the other lands at town B. (4mks)

- c) What is the local time at town B when the second plane lands. (2mks)

20. The table below shows the distribution of wages in a week for a number of employees in a certain factory.

Wage	800 – 899	900 – 999	1000 – 1099	1100 – 1199	1200 – 1399	1400 – 1599
No. of employees	3	10	23	9	3	2

- a) Using Kshs. 1049.50 per week as the assumed mean wage, calculate:-

- i) the mean for the group wages. (4mks)

- ii) the standard deviation. (4mks)

- b) The week that followed, every employee earned Ksh. 100 as wage increment. Determine:

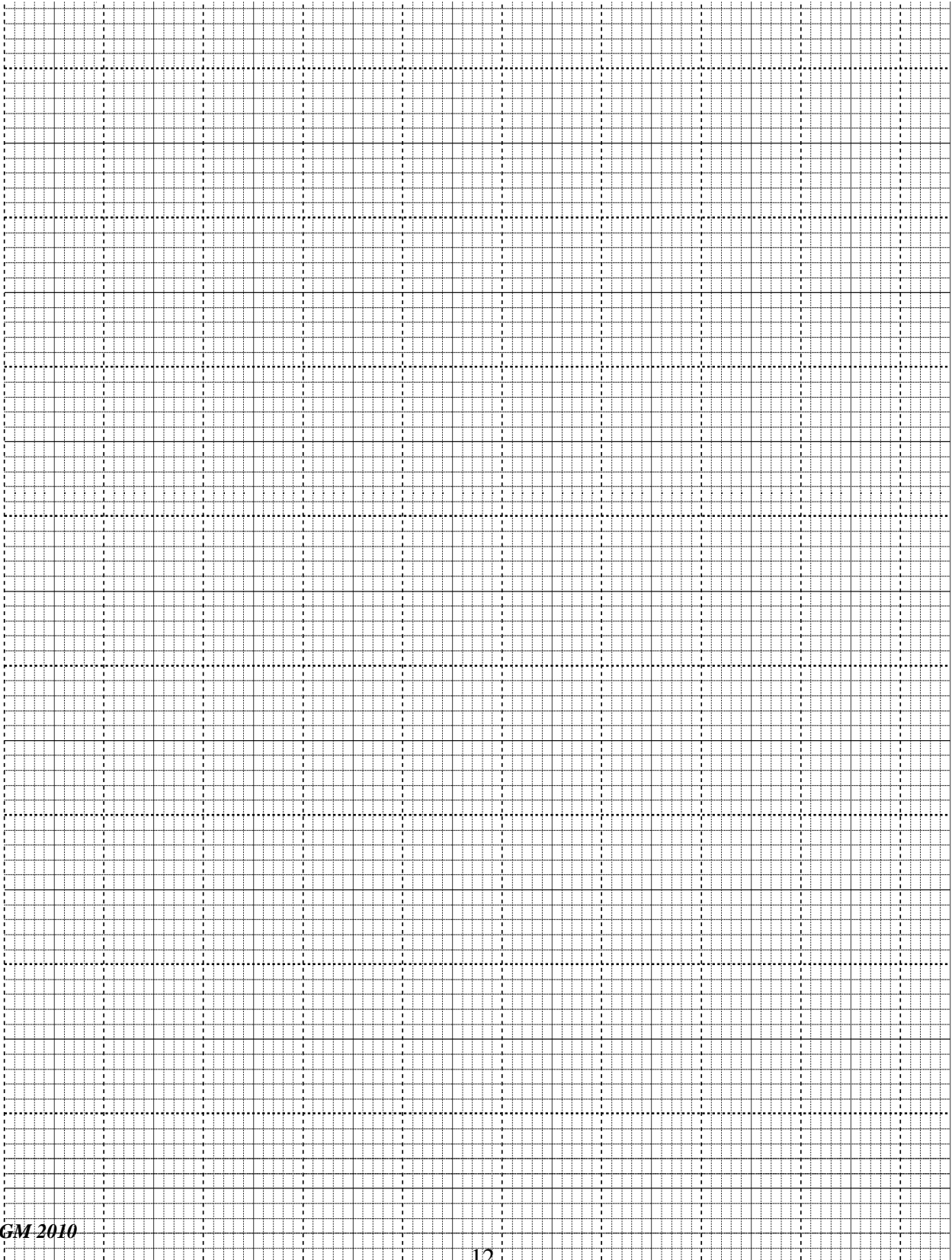
- i) the new mean for the group wage. (1mk)

- ii) the new standard deviation (1mk)

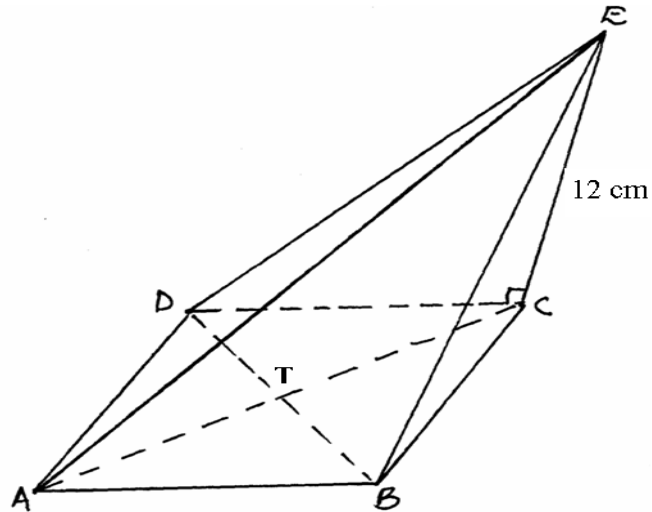
21. The table below shows the corresponding values of X and Y which are connected by a relation of the form $y = ab^x - 10$, where a and b are constants.

X	1	2	3	4	5
Y	-6.5	4.1	47.5	197.5	947.5

Draw a suitable line graph and find the appropriate numerical values of a and b. Use the grid below. (10mks)



22. The figure below is a solid in which the base ABCD is a rhombus. $AC = 16\text{cm}$, $BD = 12\text{cm}$ and $CE = 12\text{cm}$.



Calculate:-

- a) the length of line BC (2mks)

- b) the angle between the planes EBD and ABCD (4mks)

- c) the angle between the planes ECB and ECD (2mks)

- d) the length of line AE (2mks)

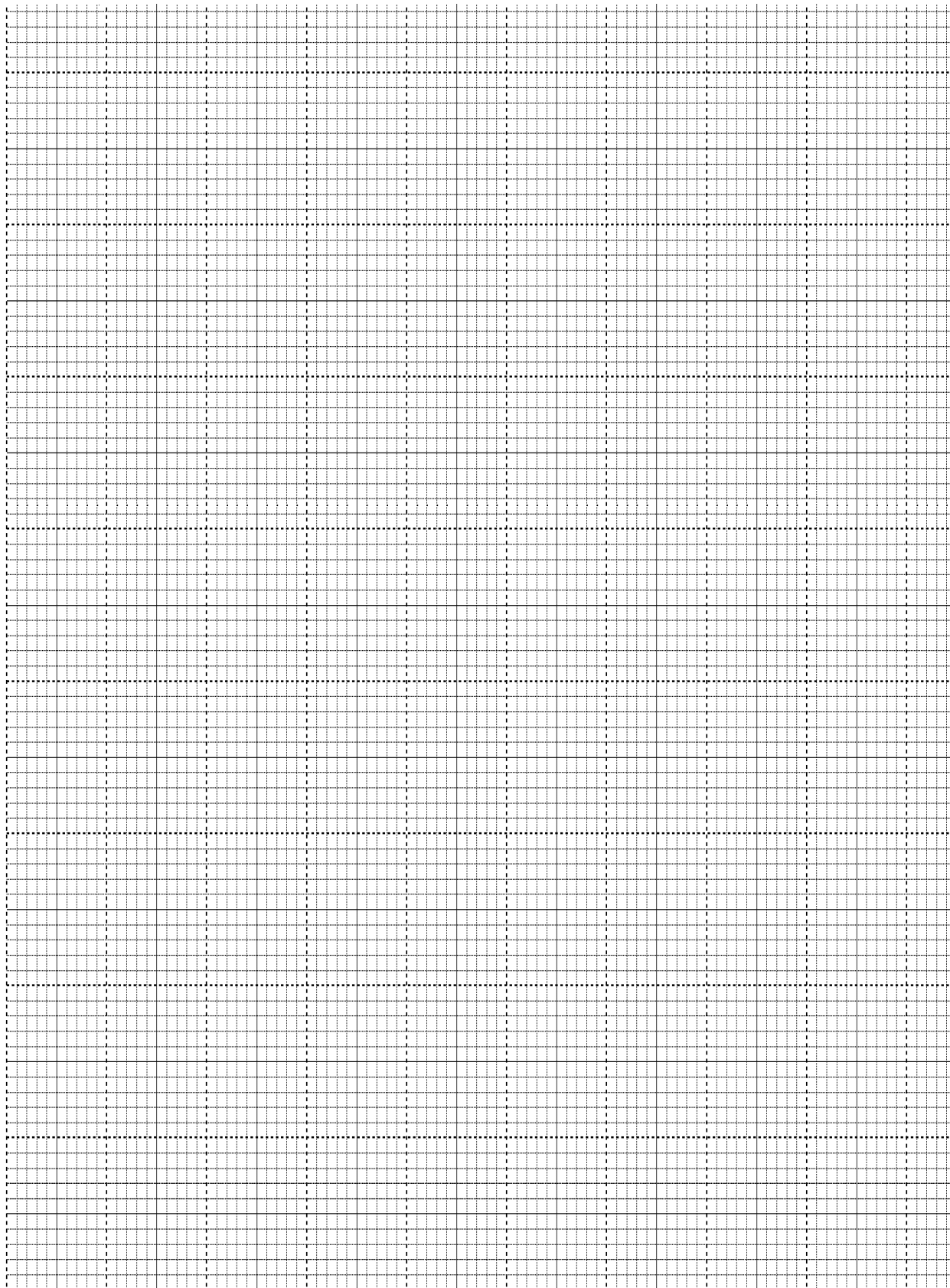
23. The velocity V metres per second of a particle at time, t seconds is given by the equation below;

$$V = 2t^2 - 4t + 15$$

a) Complete the table below for values of V and t (2mks)

t	0	1	2	3	4	5	6	7	8
V	15								111

b) On the grid below, draw the graph of V against t (3mks)



c) i) Using the mid-ordinate rule with seven ordinates estimate the distance covered by the particle between $t = 1$ sec and $t = 8$ sec. (2mks)

ii) Determine the exact distance covered by the particle between $t = 1$ sec and $t = 8$ sec (2mks)

iii) Find the percentage error in the distance covered by the particle when the mid-ordinate rule is used. (1mk)

24. Water is drawn to fill an empty tank whose capacity is 1200litres using two types of buckets. It requires at least 30 type A buckets and 50 type B buckets to fill the tank. Also, two type A buckets are required to fill at most three type B buckets. Each type B bucket has a capacity of not more than 20litres.

a) Taking x litres and y litres to represent the capacity of each type A bucket and each type B bucket respectively; write down 3 inequalities to represent the above information. (3mks)

b) Use graphical method to determine the capacity of each type of bucket.

(7mks)

