**Name**………………………………………………..…Index No:……………………………..

121/2 Candidate’s Signature …………..……………….

**MATHEMATICS** Date: ………….…………………

PAPER 2

MAY/JUNE 2016

**Time: 2 ½ Hours**

**EKSIKA JOINT EVALUATION TEST**

***Kenya Certificate of Secondary Education (K.C.S.E.)***

**Mathematics**

PAPER 2

**Time: 2 ½ Hours**

**INSTRUCTIONS TO CANDIDATES**

* Write your **name** and **index number** in the spaces provided at the top of the page.
* The paper contains two sections; section I and II.
* Answer ***all*** the questions in section I and only five questions from section II.
* All answers and working **must** be written on the question paper in the spaces provided below each question.
* Non- programmable silent electronic calculators and **KNEC** mathematical tables may be used **except** where stated otherwise.
* Marks may be given for correct working even if the answer is wrong.

**For Examiners Use Only**

**SECTION I**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Marks |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**SECTION II**

GRAND TOTAL

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Question | 19 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Marks |  |  |  |  |  |  |  |  |

*This paper consists of 16 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

**SECTION I( 50 MARKS)**

**Answer all the questions in this section in the spaces provided**

1. Point A(1,4), B(3,1), C(5,1) and D(7,4) have images A1(-4,1), B1(-1,3) C1(-1,5) and D1(-4,7) under a transformation. Find the matrix of transformation 3mks
2. Three pegs R, S, and T are on the vertices of a triangular plain field. R is 300m from S on a bearing of 300° and T is 450m directly south of R
3. Using a scale of 1cm to represent 60m, draw a diagram to show the positions of the pegs 2mks
4. Use the scale drawing to determine
5. The distance between T and S in metres 1mk
6. The bearing of T from S 1mk
7. Find in radians the value of x in the interval 0c ≤ x ≤ 2πc for which 2cos2x-sinx=1 (leave your answer in terms of π) 4mks
8. a) Expand (1-x)5 1mk

b) Use the expansion in (a) up to the term in x3 to approximate the value of (0.98)5 2mks

T2

T2- P2

5. Make P the subject of the formula in Q= 3mks

6. The figure below represents a triangular prismABCDEF. X is a point on BC

8cm .x

D

B

C

F

E

4cm

3cm

5cm

A

1. Draw a net of the prism 2mks
2. Find the surface area of the prism 2mks

7. Given that the circle whose equation is x2+y2-7x+2y+c=0 passes point A (7,1)

a) If AB is the diameter of the circle, find the value of C 1mk

b) State the coordinates of the center of the circle and the radius of the circle 3mks

8. Find the inequalities representing the region R shown below 3mks

L1

L2

L3

R

7

6

5

4

3

2

 1

1

1 2 3 4 5 6 7

9. Four bells ring at interval 24 seconds, 27 seconds, 30 seconds and 36 seconds. If four bells rang simultaneously at 7:00 am at what time will they ring together again 2mks

10. X and Y are two places on the earth’s surface. if X is (8°S,31°E) and Y is (23°N, 31°E), find the distance between the two places in kilometers . Take radius of the earth as 6370km 3mks

11. Given that log3=0.4771 and log8=0.9085, evaluate log 72 without using a calculate or a mathematical tables 3mks

12. a) simplify (1+√5) (1-√5) 1mk

1+ 5

1

b) Hence evaluate correct to 3 significant figure given that √5=2.236 2mks

13. Given that the equation of a curve is y=2x3-3x+2 find the equation of the tangent at point P(1,1) 3mks

14. The figure below BT is a tangent to the circle at point B. AXT and BXD are straight lines AX=6cm, CT=8cm,BX=4.8 cm and XD=5cm. find XC 2mks

B

C

D

T

X

A

15. a) By correcting each number to one significant figure approximate the value of

566x 0.004 1mk

b) Hence calculate the percentage error arising from this approximation 2mks

16. Find the compound interest on ksh 24321 for 11/2 year at 7% per annum interest being added half yearly to four significant figures 3mks

**SECTION II (50 MARKS)**

**Answer any FIVE questions in this section in the spaces provided**

17. Bag A contains 4 red balls and 3 white balls. Another bag contains 3 red balls and 5 white balls. A bag is picked at random and a ball is picked from it at random, its colour is noted and the ball is not returned. Then another ball is picked at random and its colour noted. If the probability of picking bag A is2/3 and that of picking bag B is 1/3

a) draw a possibility space for the possible outcome 2mks

b) Find the probability of picking balls of the same colour 3mks

c) Find the probability that the first ball picked is red and the second ball is white 2mks

d) Find the probability that two balls picked are of different colours 3mks

18. A tank has two inlet taps P and Q and an outlet tap R. when empty the tank can be filled by tap P alone in 4 hours or by tap Q alone in 3 hours. When thefull tank can be emptied in 2hours by tap R

a) The tank is initially empty. Find how long it would take to fill up the tank

i) If tap R is closed and taps P and Q are opened at the same time 2mks

ii) If all the three taps are opened at the same time 2mks

b) The tank is initially empty and three taps are opened as follows

P, at 8:00 am, Q, at 8:45 am and R at 9:00 am

1. Find the fraction of the tank that would be filled by 9:00 am 3mks
2. Find the time the tank would be fully filled up 3mks

19. Three quantities R,S and T are such that R varies directly as S and inversely as the square root of T

a) Given that R=480, when S=150 and T=25.Write an equation connecting R,S and T 4mks

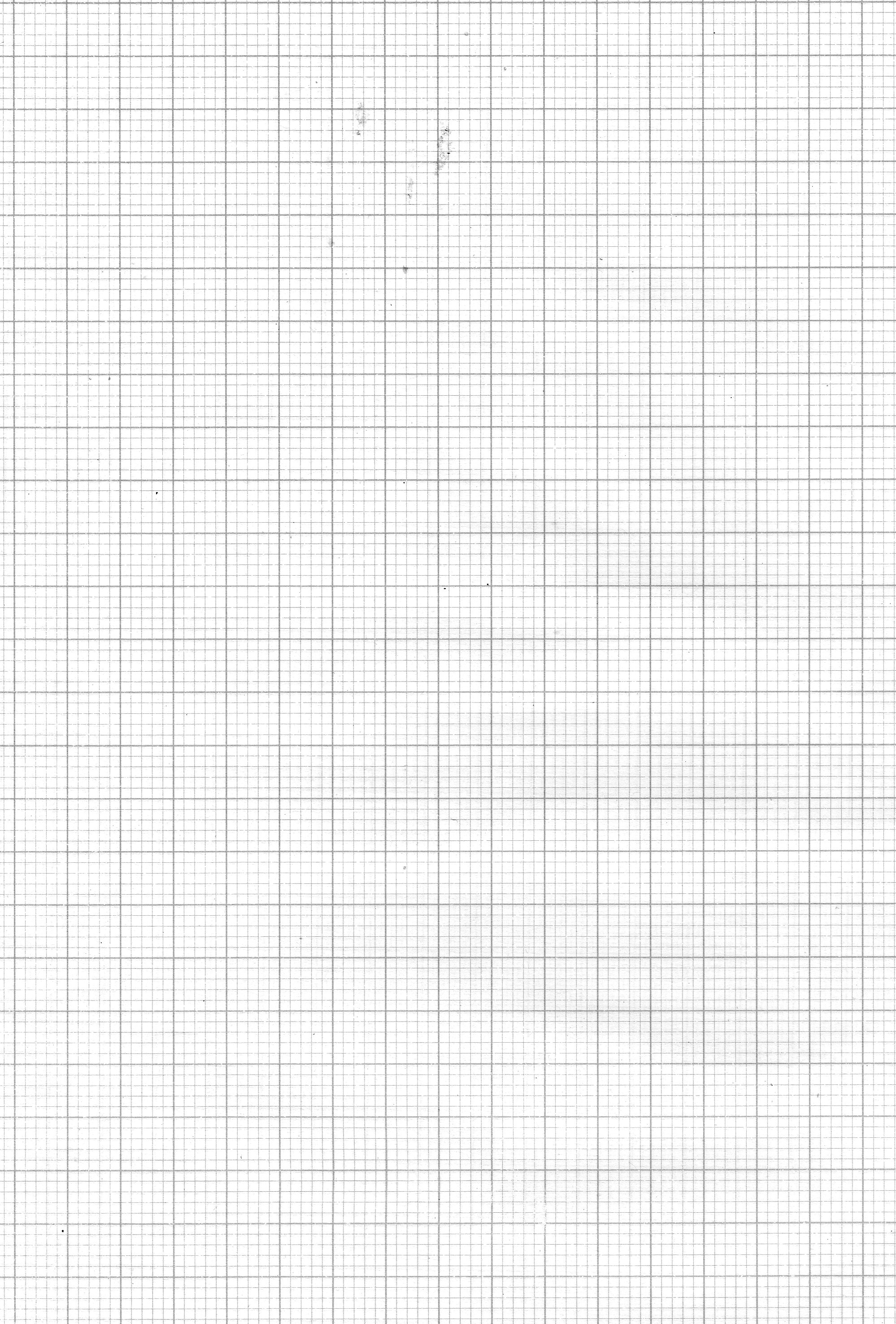
b) i) Find the value of R when S=360 and T=2.25 2mks

ii) Find the percentage change in R if S increases by 5% and T decrease by 20% 4mks

20. The table below shows the distribution of marks scored by 70 students in a test

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| marks | 16-20 | 21-25 | 26-30 | 31-35 | 36-40 | 41-45 | 46-50 |
| Frequently | 2 | 10 | 12 | 17 | 15 | 9 | 5 |

On the grid provided draw an ogive curve that represents the above information (scale 1cm for 5 unit on both axes) 4mks



b) Use the curve to estimate

i) The median 1mk

ii) The quartile deviation 3mks

iii) In order to pass the test a student has to score 35 marks. Calculate the percentage of students who failed 2mks

21. The nth term of a sequence is given by 2n+5

a) Write down the first terms of the sequence 2mks

b) Find the sum of the first 20 terms of the sequence 2mks

c) If the third, the fifth and the eighth terms of another sequence which is an A.P forms the first three consecutive terms of a geometric sequence. If the common difference of the A.P is 3, find

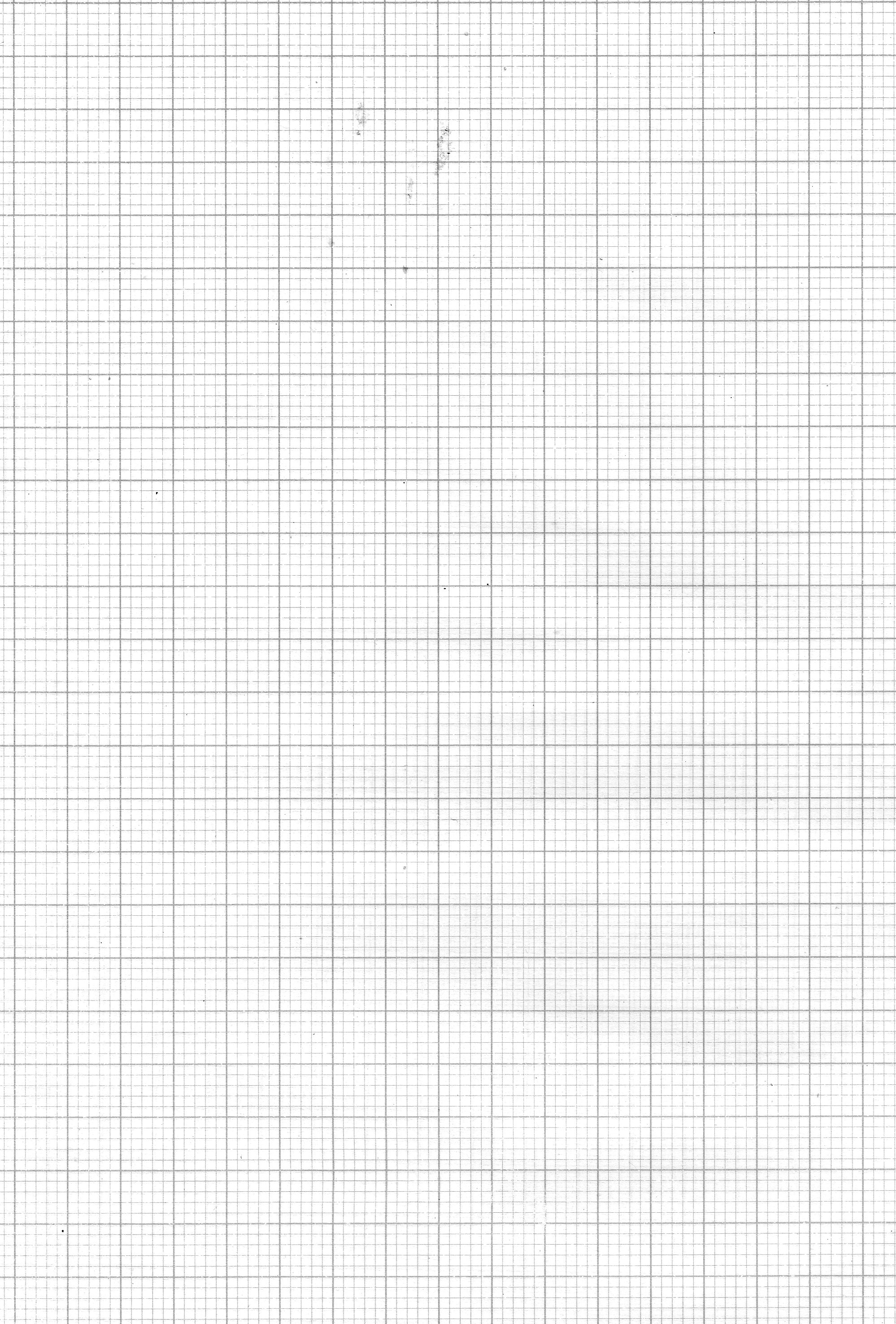
i) The first three terms of the GP 4mks

ii) The sum of the first 8 terms of the G.P to four decimal places 2mks

22. a) complete the table below for the function y=3cos2x

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 |
| y=sin1/2x | 0.00 | 0.78 | 1.50 |  | 2.60 |  | 3.00 | 2.90 |  | 2.12 |  |  | 0.00 |
| Y=3cos2x | 3.00 | 1.50 |  | -3.00 |  | 1.50 | 3.00 |  | -1.50 | -3.00 | -1.50 |  | 3.00 |

Using a scale of 1cm represents 30° on the horizontal axis and 2cm represents 1 unit on the vertical axis. Draw the graph of y=3sin1/2x and y=3cos2x on the same set of axes 5mks



b) Use your graph to

i) Solve 3sin1/2x -3cos2x=0 2mks

ii) State the period for 3sin1/2x 1mk

iii) State the amplitude of y=3cos2x 1mk

23. Using a a pair of compasses and a ruler only

a) Construct triangle ABC where AB=8.5cm, BC=8.5 and angle ABC=75°

b) Locate the position of P which satisfy the following conditions

i) P is nearer to BC than AC

ii) BP≤CP

iii) PCے6CM

in each case shade out the unwanted regions 10mks

24. the diagram below represents a cuboid ABCDEFGH in which FG=5cm GF=8cm and HC=6cm

C

B

D

E

M

G

F

H

N

5cm

A

Q

8cm

6cm

Calculate

1. The length of FC 3mks
2. i) the size of the angle between lines FC and FH 2mks

ii) The size of the angles between the AB and FH 2mks

1. The size of the angles between the planes ABHE and the plane FGHE 3mks