Name …… Index Number ……/…….

121/1

MATHEMATICS ALT A

Candidate's Signature ……

Date: ……

Paper 1

July/August 2018

2 ½ hours

Instructions to candidates

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of the examination in the spaces provided above.
(c) This paper consists of two sections: **Section I** and **Section II.**
(d) Answer all the questions in Section I and **only five** questions from Section II.
(e) Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
(f) Marks may be given for correct working even if the answer is wrong.
(g) Non-programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.
(h) This paper consists of 14 printed pages
(i) Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.
(j) Candidate should answer the questions in English

For Examiner's 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** the questions in this section in the spaces provided.*

1. Evaluate (3 marks)

$$\frac{-36 \div (6) \times 4 - (-3)}{-6 - 8 \div 2 + 17}$$

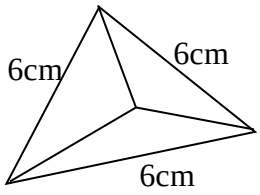
2. Use reciprocal tables to evaluate (4 marks)

$$\frac{2}{0.346} - \frac{400}{79.6}$$

3. Solve for x in the following equation.

$2 \sin (2x + 30^0) - 1 = 0$ for $0^0 \leq x \leq 270^0$ (3 marks)

4. The figure below shows a solid regular tetra pack of sides 6cm.

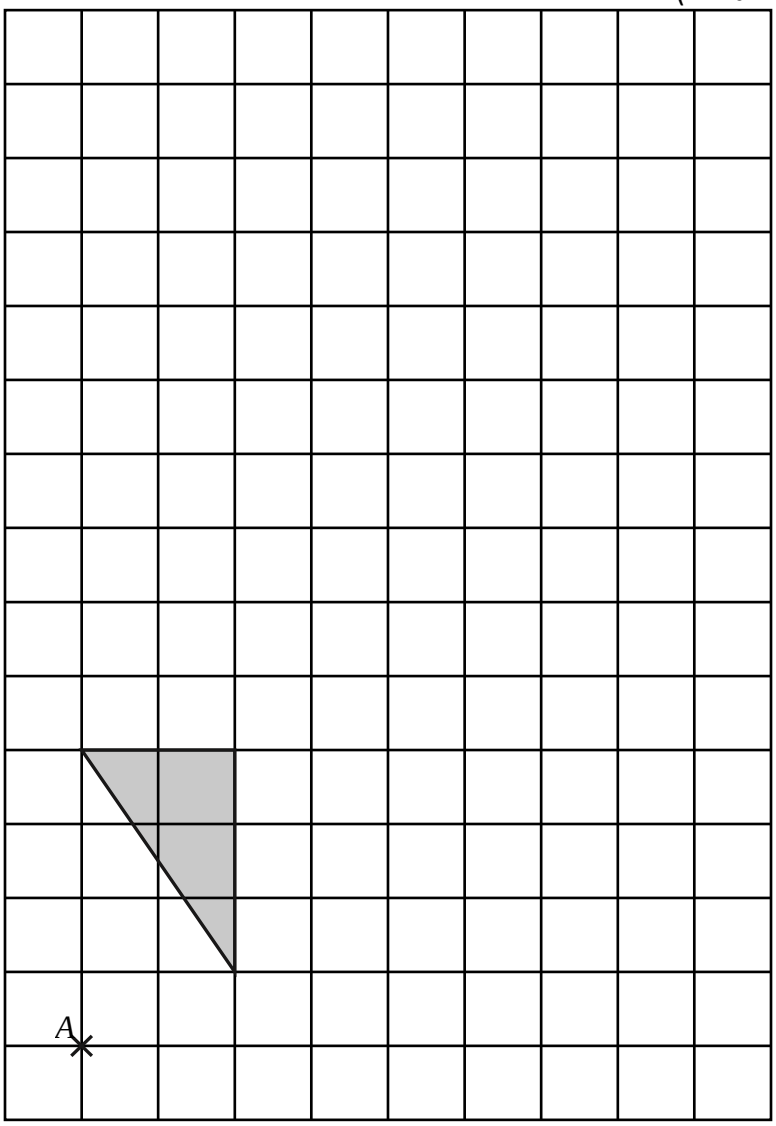


(a) Sketch the net of the solid (1 mark)

(b) Find the surface area of the solid (2 marks)

5. Find the range of value of x which satisfy the inequality below:
$\frac{1}{4}(2x - 1) < \frac{1}{4}(x + 3) < 3(x + 4)$ (3 marks)

6. Using the triangle shown on the grid, enlarge the object by a scale factor of 2, centre A.
(2 marks)



7. Find the value of t in the equation: (3 marks)

$$\left(\frac{1}{64}\right)^{t} \times (512)^{\frac{10}{9}} = 4096$$

8. Solve the following simultaneous equations (4 marks)

$x^2 + y^2 = 16$

$y = 2x + 1$

9. A Kenyan bank buys and sells foreign currencies at the exchange rates shown below.

	Buying (Kshs)	Selling (Kshs)
1Euro	148.56	149.00
1U.S Dollar	94.22	94.50

An American arrived in Kenya with 20,000 Euros. He converted all the Euros into Kenyan Shillings at the bank. He spent Kshs.2, 510,200 while in Kenya and converted the remaining Kenya shillings into U.S Dollars at the bank. Find the amount in dollars that he received. (4marks)

10. Solve for y in the equation. (3 marks)

$$\frac{6y-4}{3} - \frac{2y-1}{2} = \frac{6-5y}{6}$$

11. A number is formed by finding the difference between the products of prime numbers between 20 and 30 and that of prime numbers between 1 and 15. Find the number formed. Write the number in words. (3 marks)

12. Find **OB** and the coordinates of **B** given that $OA = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $AB = \begin{pmatrix} -7 \\ 4 \end{pmatrix}$ (3marks)

13. Work out and give your answer in a simplified form.

$\frac{2}{7}$of $1\frac{3}{4}\left(\frac{6}{11} \times \frac{21}{12}\right) - 3\frac{1}{4} \div 2\frac{1}{2}$ (3 marks)

14. Three trees M, N and O are such that N is the south M and to the East of O. How far is M from O given that form M to N is 1.7 m and from N to O is 4.6 m. (3 marks)

15. Factorise $h^2 - k^2$, hence evaluate $3282^2 - 3272^2$ (3marks)

16. A curve whose gradient function is $3x^2 - 3$ has its two stationary points,one at point (-1, 8) and the other at point (1, b). Find its equation and the value of b. (3 marks)

SECTION II (50 marks)

Answer any Five (5) questions only in this section.

17. A house is to be sold either on a cash basis or through a loan. The cash price is sh1,750,000. The loan conditions are as follows: there is to be a down payment of 10% of the cash price and the rest of the money is to be paid through a loan at 10% per annum compound interest.

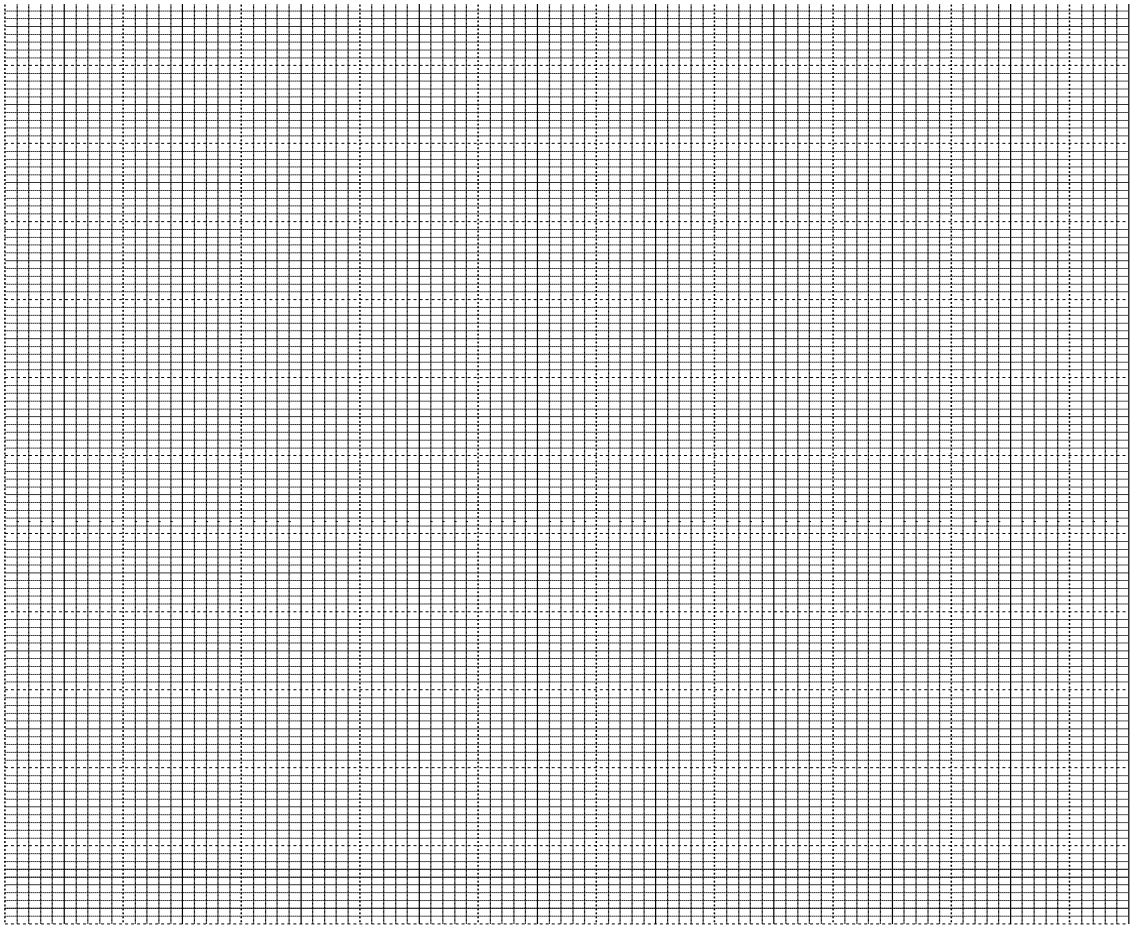
A customer decided to buy the house through a loan.

(a) (i) Calculate the amount of money loaned to the customer. (2 marks)

(ii) The customer paid the loan in 3 years. Calculate the total amount paid for the house. (4 marks)

(b) Find how long the customer would have taken to fully pay for the house if she paid a total of sh 1, 891,750. (4 marks)

18. a) Draw the graph of $2x^2 + 3x - 6$ for the values of x from -3 to 3. (5 marks)



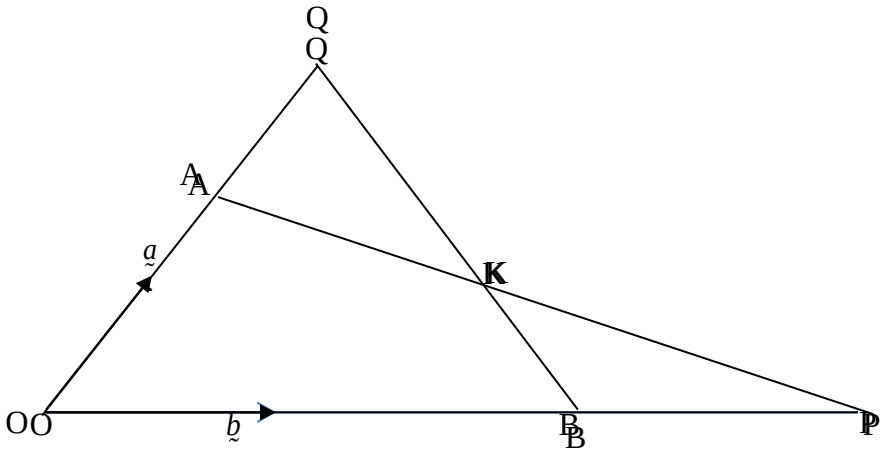
b) Use the graph to solve the equation:

i) $2x^2 + 3x - 6 = 0$ (1 mark)

ii) $2x^2 + 3x - 3 = 0$ (1 mark)

a) Solve the equation $2x^2 + x - 7 = 0$ using the graph. (2 marks)

19. In the figure below, vector **OA** = $\underset{\sim}{a}$ and **OB**= $\underset{\sim}{b}$. **OP** = 2 $\underset{\sim}{b}$ and **OQ** = **OA** = 3: 2.



(a) Express the following vectors in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$.

(i) **QB** **(2 marks)**

(ii) **AP** **(1 mark)**

(b) The line QB and AP intersect at K. Given that **QK**=m **QB** and **AK**=n A**P** where m and n are scalars, by expressing OK in two different ways, find the ratio AK: KP. **(7 marks)**

20. Three villages **R**, **S** and **T** are such that **S** is 3km on a bearing of N30^0E from **R** and **T** is 4km on a bearing of 120^0 from **S**.

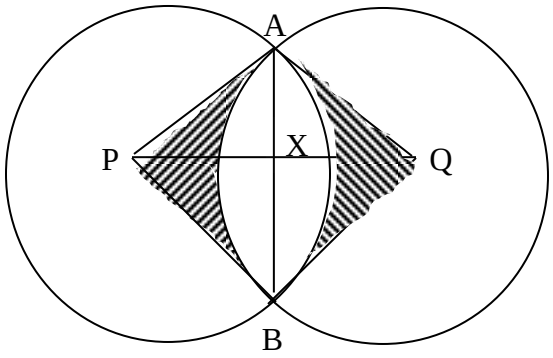
(a) (i) Using a scale of cm to represent 0.5km, draw a diagram to show the relative position of villages R, S and T (3 marks)

(ii) Find the distance and bearing of village **R** from T (2 marks)

(b) A straight main road runs from village **R** to **T**. Find the length of the shortest path from village **S** to the main road. (2 marks)

(c) After walking for 2.2km from the junction on**RT** along the path towards village **S**, a student notices that the angle of elevation to the top of a tree in the village is 22^0. Estimate the height of the tree in metres. (3 marks)

21. Two equal circles with centres P and Q and radius 7cm intersect at points A and B as shown in the figure below. Given that the distance between P and Q is 10cm. Line AB meets line PQ at X.



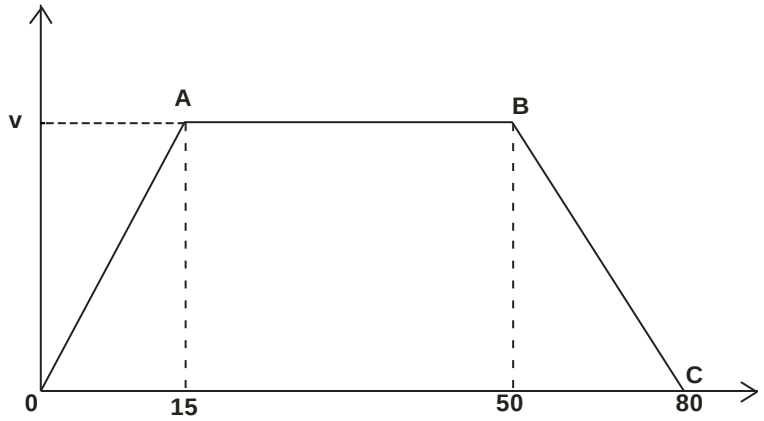
Calculate:

(a) The length of the chord AB correct to 2d.p (2 marks)

(b) The angle APQ hence angle APB (2 marks)

(c) The area of the shaded region. (6 marks)

22. The figure below is the speed – time graph of a journey



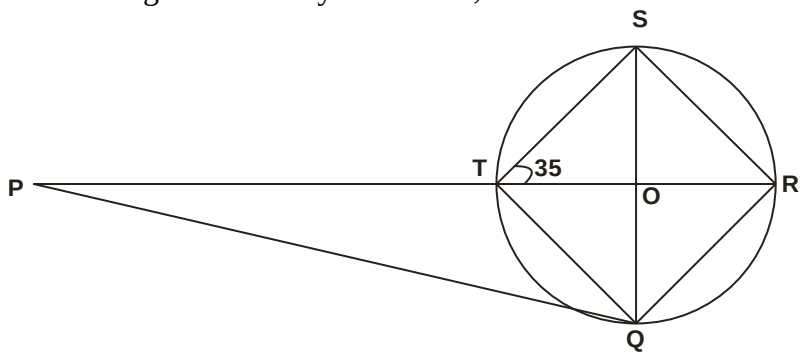
If the total distance travelled in the 80 seconds is 920m, calculate:

a) The value of V. (4 marks)

b) The acceleration during the first 15 seconds (3 marks)

c) The distance travelled in the final 40 seconds. (3 marks)

23. The diagram below a circle, centre O. PQ is a tangent to the circle at Q and PTOR is a straight line. QRST is a cyclic quadrilateral in which angle RTS = 350 and RT and QS are diameters. Giving reasons for your answer, find the size of:



a) Acute angle ROS. (2 marks)

b) Angle RQS. (2 marks)

c) Angle PQR. (2 marks)

d) Angle QPT. (2 marks)

e) Angle PQT. (2 marks)

24. The table below shows a field book with measurements of a rice field. (AG = 250m)

a) Make a sketch drawing of the rice field. (3 marks)

	G	
	200	F 70
E 60	130	
	100	D 80
C 40	60	
	40	B 50
	A	

b) Find the area of the rice field in hectares. (7 marks)