

MARKER CODE				



Student Enrolment Number									

TONGA FORM SIX CERTIFICATES 2016

MATHEMATICS

QUESTION AND ANSWER BOOKLET

Time allowed: 2 ½ Hours

INSTRUCTIONS

1. This examination has **TWO COMPULSORY SECTIONS:**

SECTION A: Short Answers

15 Skill Level

SECTION B: Five Questions worth a total of

55 Skill Level

2. All your answers for **SECTION A** and **SECTION B** must be written in the spaces provided for each question in this booklet. **SHOW ALL YOUR WORKING.**
3. Write your **Student Enrolment Number (SEN)** on the top right hand corner of this page and on the last page of this booklet. Write the Marker Code in the box at the top left hand corner of this page.
4. If you use extra sheets of paper be sure to show clearly the question being answered. Write your **SEN** on the top right hand corner of each sheet, and tie it securely at the appropriate place in this booklet.

NOTE: (i) There should be a **Mathematics Formulae Sheet (No. 8/3)** with this booklet.
(ii) Non-programmable calculators only are allowed into the examination room.
(iii) Unless stated, diagrams are not drawn to scale.

Check that this booklet contains pages 2-14 in the correct order and that page 15 has been deliberately left blank..

**YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR BEFORE YOU LEAVE
THE EXAMINATION ROOM.**

SECTION A:**SHORT ANSWERS****(15 SKILL LEVEL)**

Answer **ALL FIFTEEN** (15) questions. You should not spend more than 20 minutes in this section. Write the answers **ONLY** in the space provided for each question.

1. Identify the Common Difference in the sequence 6, 11, 16, ...

Skill level 1	
1	
0	
NR	

2. For the sequence 4, 2, 1, $\frac{1}{2}$... State the common ratio.

Skill level 1	
1	
0	
NR	

3. Saia was asked by his Maths Teacher to find the sum of the first 20 terms of the sequence -8, -3, 2, 7, ... State the formula that he was using and substitute the required information that enabled him to calculate this sum. **DO NOT** work out the answer.

Skill level 1	
1	
0	
NR	

4. Simplify the following equation: $2x - 16 - x - 4 + 2y + 4$

Skill level 1	
1	
0	
NR	

5. Identify the radius of the circle centred at the origin and goes through (-5, 2).

Skill level 1	
1	
0	
NR	

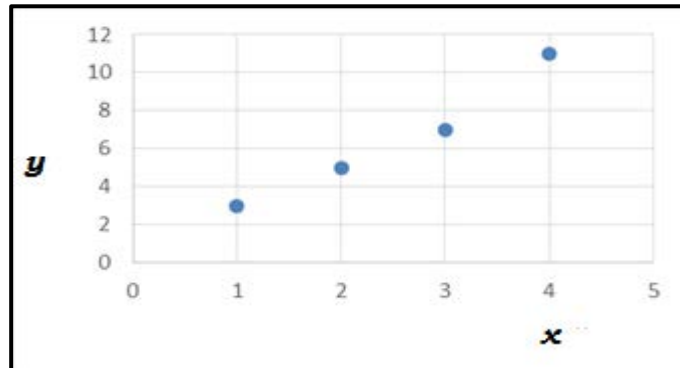
6. State the “**Factor Theorem**”.

Skill level 1	
1	
0	
NR	

7. State the gradient of the line $y - 4 - 3x = 0$.

Skill level 1	
1	
0	
NR	

8. Below is a graph of a relation, state whether it is a function or not a function.



Skill level 1	
1	
0	
NR	

9. Convert the angle 3.4 radians into degrees.

Skill level 1	
1	
0	
NR	

10. Statisticians use many different methods for collecting samples. State any **TWO** (2) of the sampling methods.

i. _____

ii. _____

Skill level 1	
1	
0	
NR	

11. Events **A** and **B** are said to be independent. Define the term “**independent**”.

Skill level 1	
1	
0	
NR	

12. A fair coin is tossed twice. Draw a probability tree to show the four possible outcomes

Skill level 1	
1	
0	
NR	

Skill level 1

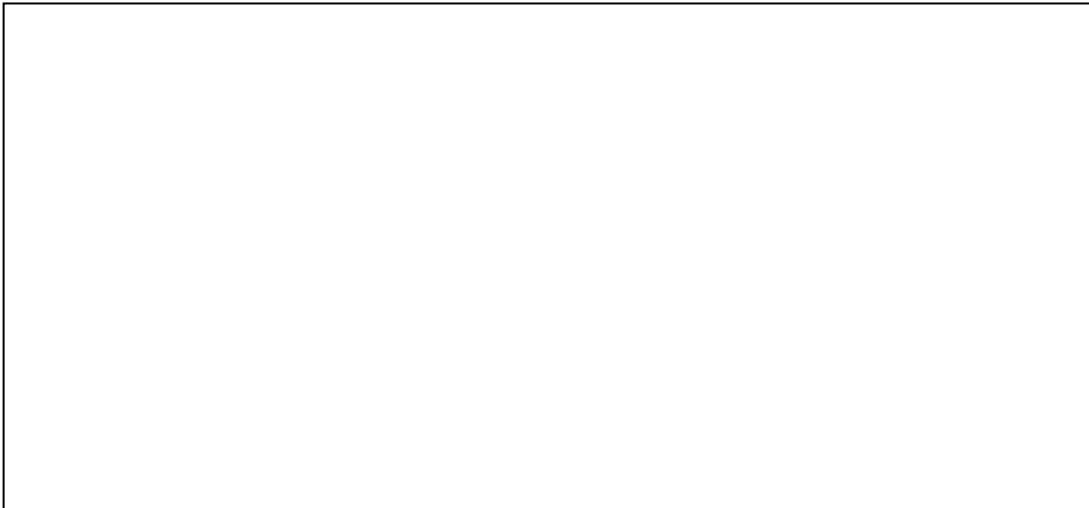
13. Consider the function $y = f(x)$. Define the “**gradient**” of the function in terms of rate of change.
-

1

0

NR

14. For the function of $y = 4 - 2x$ find the gradient when $x = -2$.



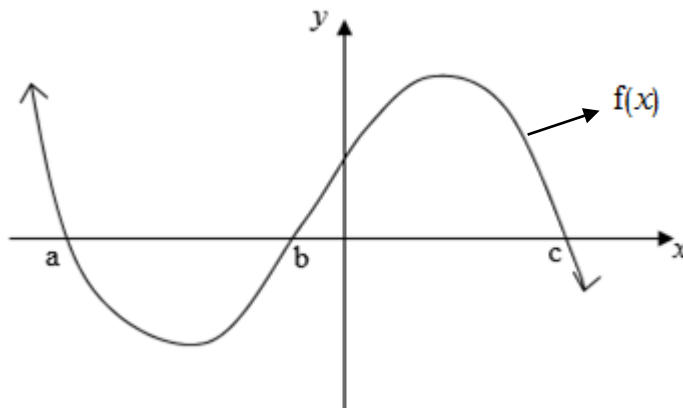
Skill level 1

1

0

NR

15. Shade the total area (or region) bounded by the graph of $y = f(x)$ and the x -axis.



Skill level 1

1

0

NR

SECTION B:**LONG ANSWERS****(55 SKILL LEVEL)****ANSWER ALL FIVE (5) QUESTIONS IN THIS SECTION.**

Write the answer to each question in the spaces provided.

It is for your best interest to **SHOW ALL YOUR WORKING**, as some marks are allocated for correct methods and partially correct answers.

Each question is worth a total of 11 skill levels.

QUESTION ONE

1. State the general term for this for this sequence 2, 2.1, 2.2, 2.3, ...

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Skill level 1	
1	
0	
NR	

2. Find the sum of the first ten (10) terms of the sequence 2, 2.1, 2.2, 2.3, ...

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Skill level 2	
2	
1	
0	
NR	

3. Find the first term of the geometric series with a common ratio 4 and the ninth term is 786432.

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Skill level 3	
3	
2	
1	
0	
NR	

4. Find the point(s) of intersection (if they exist) for the line $y + x = 3$ and the parabola $y = x^2 - 2x + 6$.

Skill level 3	
3	
2	
1	
0	
NR	

5. Find the co-ordinates of the midpoints of the line segments joining these points as simply as possible: $(4f + 5, 2g - 1)$ and $(6f - 1, -12g + 3)$.

Skill level 2	
2	
1	
0	
NR	

QUESTION TWO

1. Solve $(x^2 - 64)(3x - 4) = 0$.

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Skill level 1	
1	
0	
NR	

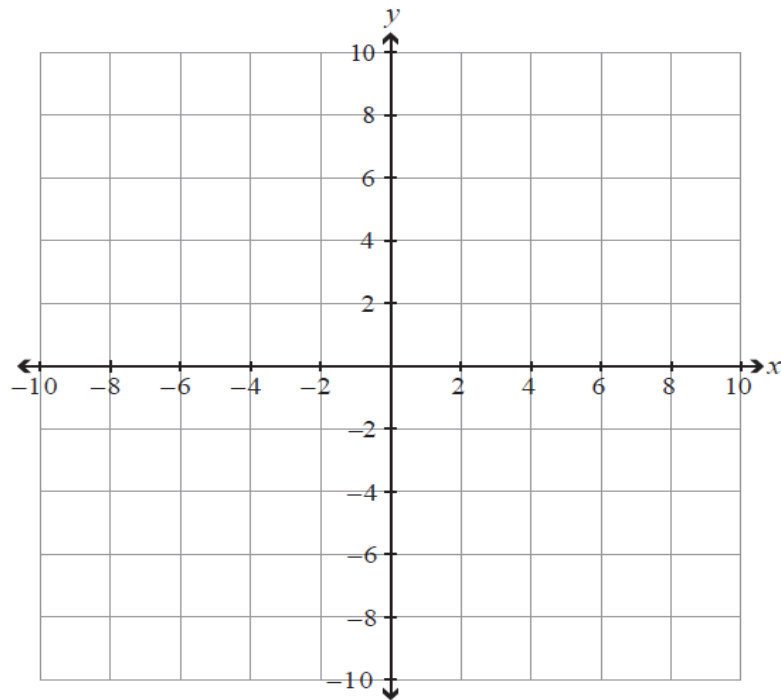
2. The perimeter of a circular garden is represented by the equation $x^2 + y^2 = 16$. A gardener wants to put a drain through the garden. The path of the drain is represented by the equation $y = 3x + 4$.

Find the x -coordinates of the point where the drain meets the perimeter of the garden.

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Skill level 4	
4	
3	
2	
1	
0	
NR	

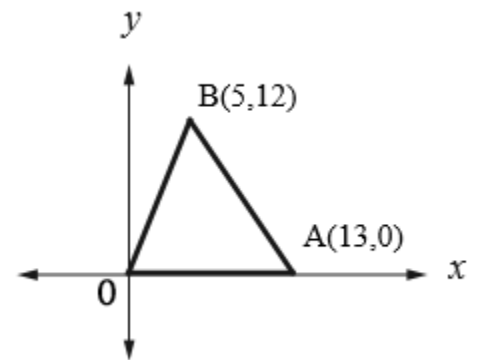
3. Sketch the line $y = -3x + 1$ on the axis below.



Skill level 2	
2	
1	
0	
NR	

4. Kase and Siosi want to put the fourth vertex of a kite (as on the diagram below), but they know it is on the line through O perpendicular to AB.

Find the equation of this line.



Skill level 4	
4	
3	
2	
1	
0	
NR	

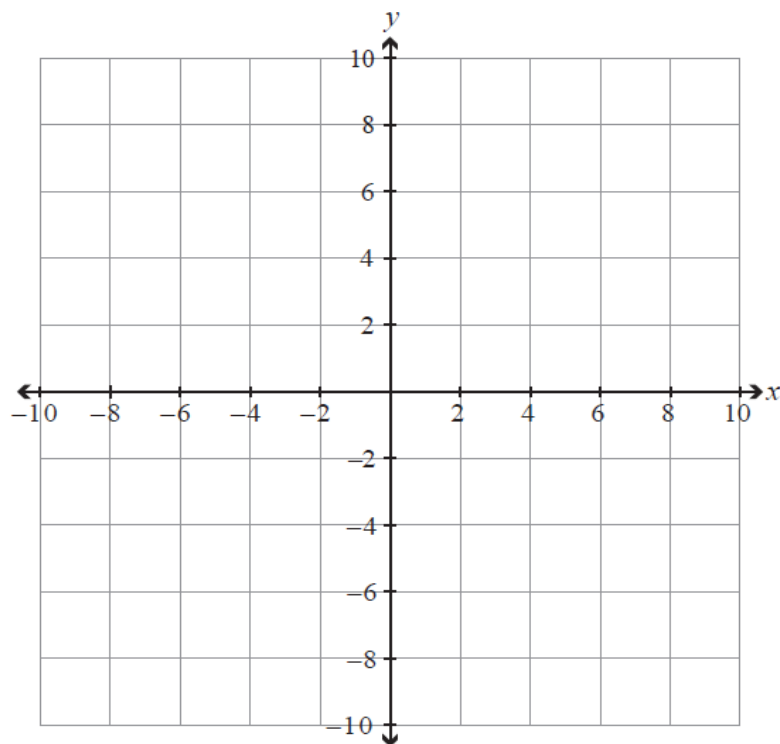
QUESTION THREE

1. Identify the co-ordinates of the centre and the radius of the circle $(x + 1)^2 + (y - 3)^2 = 16$.

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Skill level 1	
1	
0	
NR	

2. Sketch the graph of the circle $(x + 1)^2 + (y - 3)^2 = 16$ on the axis below.



Skill level 3	
3	
2	
1	
0	
NR	

3. Find the acute angle formed when the line joining (8, -1) and (-3, 4) cuts the x - axis.

Skill level 3	
3	
2	
1	
0	
NR	

4. Consider the following arithmetic sequences.

$\langle 1, 5, 9, 13, \dots \dots \dots n^{th} \text{ term} \rangle$

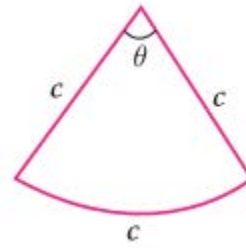
$\langle 2, 5, 8, 11, \dots \dots \dots n^{th} \text{ term} \rangle$

Find n if the sums of the first n terms of the above sequences are equal.

Skill level 4	
4	
3	
2	
1	
0	
NR	

QUESTION FOUR

1. The diagram shows a sector where the arc length is equal to the radius. State the size of the centre angle, in degrees.



Skill level 1	
1	
0	
NR	

2. Differentiate the function $y = 2(3x - 4)^5$ using the Chain Rule. Simplify your answer.

Skill level 3	
3	
2	
1	
0	
NR	

3. Use integration to find the area bounded by the curve $y = x^2 + 2$, the x -axis and the lines $x = 3$ and $x = -3$.

Skill level 3	
3	
2	
1	
0	
NR	

4. Prove that $\operatorname{Cosec}\theta - \frac{\cos^2\theta}{\sin\theta} = \sin\theta$.

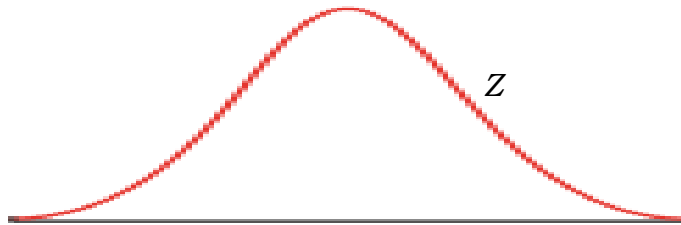
Skill level 4	
4	
3	
2	
1	
0	
NR	

QUESTION FIVE

1. Identify and state the formula for finding the probability of an event using the **Long-Run Relative Frequency Approach**.

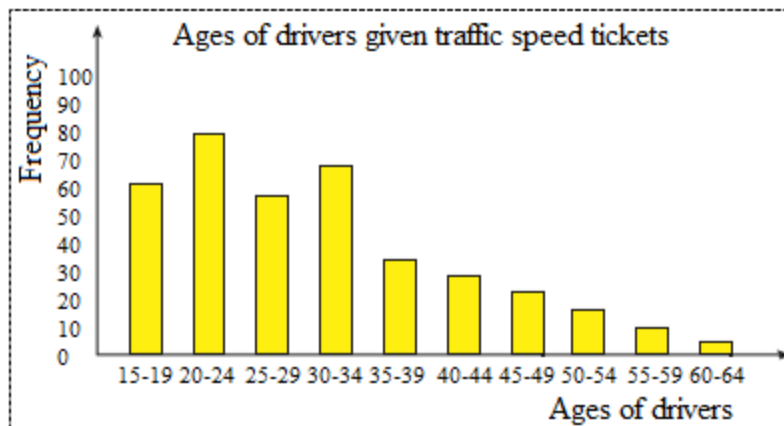
Skill level 1	
1	
0	
NR	

2. On the normal curve below, locate the position of Z that defines the probability $P(-1.13 < Z < -0.07)$.



Skill level 2	
2	
1	
0	
NR	

3. A local police station represented the data collected (bar graph below) about the ages of vehicle drivers that were given traffic speed tickets in the first quarter of the year. Determine the trend(s) shown by this presentation.



Skill level 2	
2	
1	
0	
NR	

4. A land developer is planning a subdivision before removing the topsoil. Here are the areas in m^2 for 16 sections:

634, 750, 853, 668, 1098, 947, 677, 689, 837, 792, 694, 810, 754, 763, 798, 747.

- i. Calculate the mean.

- ii. Calculate the median.

- iii. What feature of the data makes the mean higher than the median?

Skill level 3	
3	
2	
1	
0	
NR	

5. Solve the equation $\sin(x) = -0.83$ for $0 \leq x \leq 360^\circ$.

Skill level 3	
3	
2	
1	
0	
NR	