THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

ENTRANCE EXAMINATIONS – 2015

MA 002 – SCIENCE MATHEMATICS

For candidates applying for Agriculture, Applied Science, Forestry or Surveying/GIS
[If you are applying for Architecture and Building, Business Studies, Communication for Development or Property Studies, you should be taking MA 001- Basic Mathematics]

[If you are applying for Applied Physics, Computer Science or Engineering, you should be taking MA 003- Engineering Mathematics]

TIME ALLOWED: 2 HOURS

INFORMATION FOR CANDIDATES

1. Print and sign your name below, and tick a box to indicate the type of course for which you are applying.
2. There are Eight (8) questions. Answer ALL questions.
3. All answers must be written in this booklet.
4. Show your workings where required.
5. Do not use red ink or pencil to write this exam.
6. **Calculators are *not* allowed in the examination room.**

Surname: _____ First name: _____

Signature: _____

Tick the type of course for which you are applying.

[ ] Agriculture
[ ] Applied Science
[ ] Forestry
[ ] Surveying/GIS

Question 1 **[Each mark is worth 2 marks]**

Simplify, if possible, each of the following expressions.

(a) $\dfrac{32-192x}{8} =$ Ans: _____

(b) $\sqrt{4^6 w^{20}} =$ Ans: _____

(c) $(4k)^{-4} =$ Ans: _____

(d) $(6/y)^{-3} =$ Ans: _____

(e) $(h^3 h^2)^4 =$ Ans: _____

(f) $55^2 - 45^2 =$ Ans: _____

(g) $3xy^2z - 12yx + 7zxy^2 + 3(4xy) =$ Ans: _____

(h) $(2a-3)(2+3a) - 6a^2 =$ Ans: _____

Question 2 **[Each mark is worth 2 marks]**

Factorize each of the following mathematical expressions.

(a) $16m^2 - 1 =$

Ans: _____

(b) $(3r^2 - 6r) - r + 2 =$

Ans: _____

(c) $3m^2n + 9mt - 4mnt - 12t^2$

Ans: _____

Question 3 **[Each mark is worth 2 marks]**

(a) Find the value of x that satisfies the equation : $3x - 4 = 14 - 5x$

Ans: _____

(b) Make j the subject of the formula: $u = 14 + 5jk - 8jz^4$

Ans: _____

Question 4 **[8 marks]**

The width of a rectangular shaped field is 12 metres less than the length. If the perimeter of the field is 76 metres, find:

(a) the actual measure of the length (L) and width (W) of the field.

Ans: L=_____; W = _____

(b) the area of the field using the values found in part (a).

Ans: _____

Question 5 [Each mark is worth 2 marks]

(a) After a person has read 65 percent of a book, it was found that he has read in total 325 pages. Find the total number of pages in this book.

Ans: _____

(b) On a building plan, the length of a 20m long building is scaled to be 5.5 cm. Another building on the same plan has a scaled length of 66mm. What is the actual length of the building?

Ans: _____

Question 6 [4 +5 +3 =12 marks]

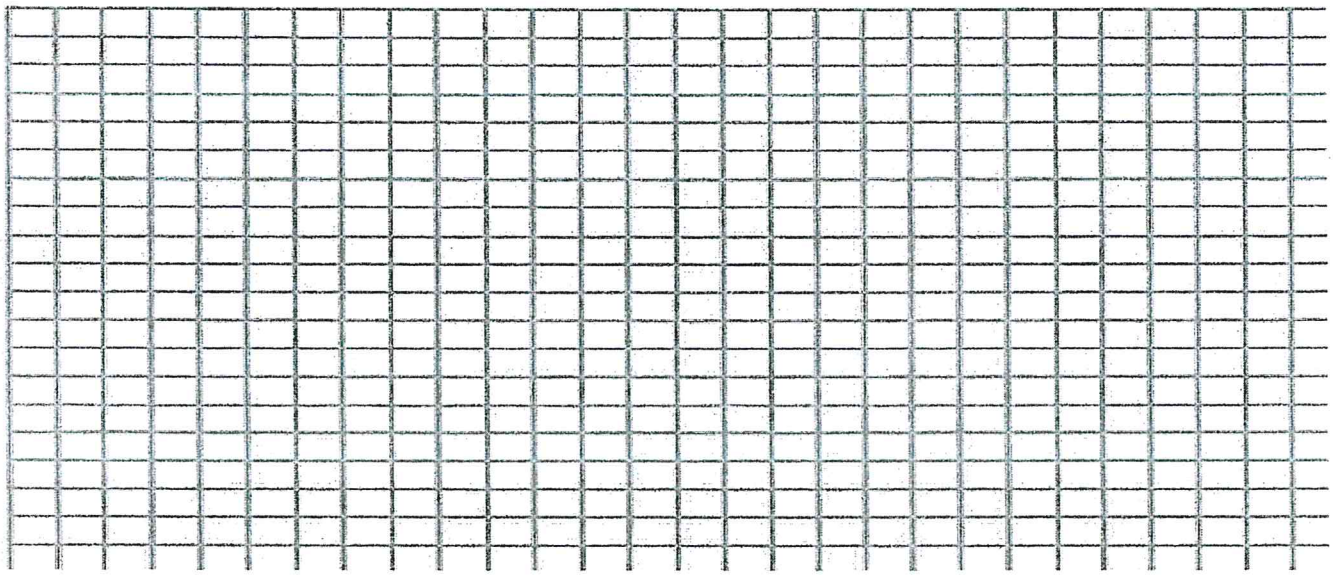
The following table of values is to be used to draw a graph.

x	-4	-3	-2	-1	0	1	2
y	-5	2	-1	0	3	-4	6

(a) Draw and mark the axes on the graph paper provided below so that this data can be entered onto the graph.

(b) Enter the data in the table onto the graph.

(c) Draw a smooth curve through the points that you have plotted.



Question 7 [2 + 3+ 3 + 2 = 10 marks]

For the graph below, answer the following questions.

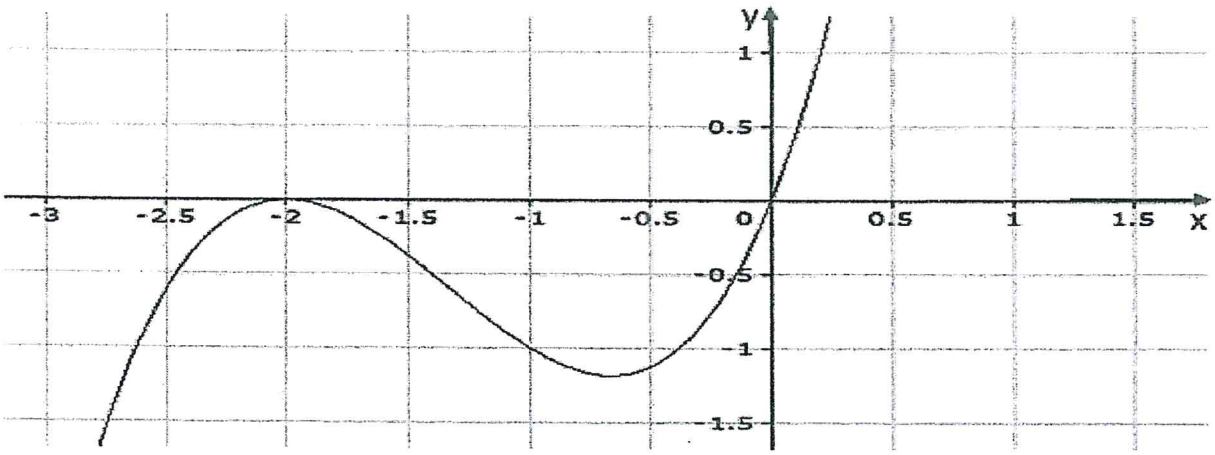
(a) What is the value of y when x = -1? Ans: _____

(b) Where does the graph cut the x –axes? Ans: _____

(c) What are the values of x when y = 0? Ans: _____

(d) What are the coordinates of the point where the graph has a local maximum value?

Ans: _____



Question 8 [Each mark is worth 2 marks]

[This question is multiple – choice. For each part write the letter of the correct answer (A,B,C,D or E) in the box provided. Each correct answer is worth 2 marks. However, **2 marks will be deducted for each incorrect answer. If you are unsure of an answer, leave the box blank.**]

(a) In a x -y plane, the points A(3,-2), B(-3,2), C(5,9) and D(7,4) can be connected to form line segments. Which two segments have the same length?

(A) AB and AC; (B) AB and BC; (C) AB and AD; (D) BC and CD; (E) AC and CD

(b) A diagonal of a rectangle forms an angle of 45^0 with each of the two shorter sides of the rectangle. If the length of a longer side of the rectangle is 6, what is the length of a shorter side?

(A) $2\sqrt{2}$; (B) 4; (C) $4\sqrt{2}$; (D) $\sqrt{2}$; (E) $4/\sqrt{2}$

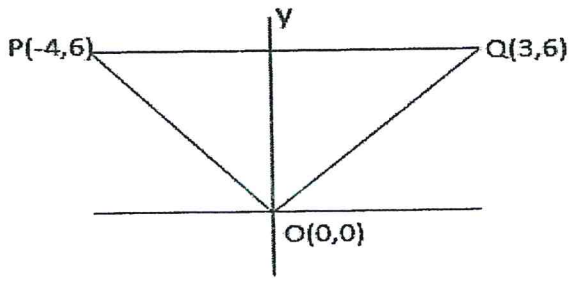
(c) What is the total surface area of a closed box with width 25cm, length 40cm and height 16cm?

(A) 4,000cm^2; (B) 8,400cm^2; (C) 8,040cm^2; (D) 4,080cm^2; (E) 2,040cm^2

(d) Two points, R and T, are to be placed on a line on opposites sides of a point, S, so that RT = 6TS. What will be the value of the ratio RS/TS?

(A) 7/5; (B) 5/7; (C) 6/7; (D) 7/6; (E) 1/7

(e) In the diagram given below, what is the area of ΔPOQ?



(A) 12; (B) 21; (C) 42; (D) 24; (E) 20.5

..... **The End** .....