DEPARTMENT OF EDUCATION

UPPER SECONDARY SCHOOL CERTIFICATE EXAMINATIONS

GENERAL MATHEMATICS

Paper 1

Monday

14th October 2013

Time allowed:

2 hours and 30 minutes

(8:00am – 10:30 am)

NO EXTRA TIME

(NO OTHER TIME)

Candidates are advised to fully utilise the allocated time

MG1

INSTRUCTIONS TO CANDIDATES

To be read by the external invigilator to all candidates.

1. The code for General Mathematics is **4**
2. There are **8** printed pages in the question booklet and **2 printed** pages in the Part B answer booklet. A **1 page** formula sheet is also inserted in the centre.
3. There are two parts in this paper.

   Part A: Multiple Choice Questions - 30 marks
   This section will be electronically marked.
   Electronic Answer Sheets will be distributed by your external invigilator. All answers to the Multiple Choice Part MUST be answered on this Answer Sheet.
   Carefully following the instructions, fill in your Candidate Information and Subject Information.

   Part B: Short Answer Questions - 20 marks
   Write down your name, your school name and your10 digit candidate number on the Part B Answer Sheet Provided.

4. Answer all questions on the answer sheet. Answers on any other paper including rough work paper and the question paper **will not be marked**.
5. ALL working must be shown step by step to get full marks. Students may lose marks for writing down final answers only.
6. Calculators may be used.
7. Correction Fluid is not allowed on the answer sheet. Where you have made an error, cross out all the working and start on a new line.
8. Graphical Calculators are not permitted.

Penalty For Cheating Or Assisting To Cheat In National Examinations Is Non-Certification.

DO NOT TURN OVER THE PAGE AND DO NOT WRITE UNTIL YOU ARE TOLD TO START.

PART A: MULTIPLE CHOICE (QUESTIONS 1 to 30) 30 MARKS

Answer each question by shading in with HB pencil, the circle directly under the correct alternative A, B, C, D or E. If you make a mistake, rub it out completely using an eraser rubber and shade the correct answer on the Electronic Answer Sheet.

QUESTION 1

The value of the expression $\frac{5}{4-\sqrt{17}}$ is less than:

A. $\frac{5}{4+\sqrt{17}}$ B. $\frac{5}{\sqrt{17}}$

C. 0 D. $\frac{\sqrt{17}}{4}$

QUESTION 2

The number of significant figures in 0.001302 is:

A. 7 B. 6 C. 4 D. 3

QUESTION 3

If the time of 4 hours and 37 minutes is recorded as 4.5 hours, the relative error is:

A. 0.6167 B. 0.1167

C. 61.7 percent D. 2.5 percent

QUESTION 4

The expression $\frac{50}{\sqrt[3]{5}}$ may be simplified to:

A. 10 B. $2\left(5^{5/3}\right)$

C. $2\left(5^{7/3}\right)$ D. $5\sqrt{5}$

QUESTION 5

Philip sells computers on commission. If he sells less than K20, 000 worth of computers in a month, his commission rate is 5 percent, but if he sells K20, 000 or more, his commission rate is 7 percent. Last month, he received K1, 540.00 commission.

What was the value of the computers that he sold?

A. K21, 000 B. K22, 000

C. K18, 500 D. K25, 000

QUESTION 6

Jack is paid a wage at the rate of K4.00 per hour and his usual fortnightly wage is K320.00. If he works overtime, he is paid at the rate of 1.5 for the extra hours of work. Last fortnight, he worked a total of 92 hours. How much was his overtime pay?

A. K16.00 B. K18.00

C. K80.00 D. K100.00

QUESTION 7

David bought a CD player with a price tag showing K200, but he had to pay additional goods and services tax (GST).

If he paid K212 in total, what was the GST rate?

A. 6 percent B. 10 percent

C. 5.7 percent D. 5 percent

QUESTION 8

What is the range of the dataset (4, 18, 12, 26, 11, 22, 7, 7, 12, 15)?

A. 26 B. 11 C. 22 D. 12

QUESTION 9

If the 30^{th} and 40^{th} percentiles of a dataset of 200 values are 72 and 96 respectively, an estimate of the 35^{th} percentile is:

A. 84 B. 70

C. 35 D. 100

QUESTION 10

If the frequencies of the first to sixth classes of a frequency distribution are 27, 41, 58, 78, 111 and 153 respectively, what is the cumulative frequency of the third class?

A. 189 B. 58

C. 68 D. 126

QUESTION 11

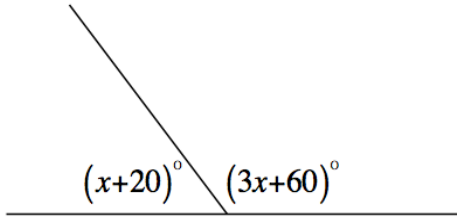
The diameter of the first circle is x cm. If the diameter of the second circle is $\frac{1}{4}$ of x, what is the radius of the second circle?

A. x cm B. $\frac{1}{8}x$ cm

C. $2x$ cm D. $\frac{1}{2}x$ cm

QUESTION 12

What is x in the diagram?



A. 25 B. 60 C. 20 D. 4

QUESTION 13

What is the gradient of a line that is perpendicular to the line joining the points A (-10, 3) and B (4, 5)?

A. $-\frac{1}{7}$ B. 7

C. -7 D. $\frac{1}{7}$

QUESTION 14

Joyce invested K8, 000 at an interest rate of 7.5% compounded annually. What is her approximate investment value after 5 years?

A. K8, 600 B. K17, 200

C. K6, 000 D. K11, 485

QUESTION 15

Sai is offered a salary package of K30, 800 per year. It includes the following deductions:

- 30% Tax
- 8% Superannuation
- 10% Medical Insurance
- 5% Housing

What is his monthly net salary?

A. K1, 206.33 B. K1, 360.33

C. K16, 324 D. K14, 476

QUESTION 16

The inflation rate over each of the next 2 years is predicted to be 1.5% and 2% respectively.

What will be the cost of an item which currently costs K10.50 after 2 years if the cost of the item rises at the same rate as inflation?

A. K10.87 B. K10.66

C. K10.71 D. K11.20

QUESTION 17

Which of these is not a value of the correlation coefficient?

A. 0.95 B. -1.12

C. -1 D. 0

QUESTION 18

Which of these is not a value of probability?

A. 0.0025 B. 1.002

C. 0 D. 1

QUESTION 19

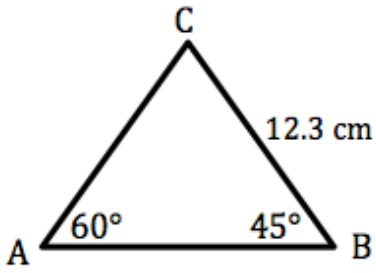
A set of equally likely outcomes of an experiment is:
$S = \{1,2,3,4,5,6,7,8\}$ and event $A = \{3,4,5\}$

What is probability of A?

A. $\frac{5}{8}$ B. $\frac{1}{2}$ C. $\frac{3}{8}$ D. $\frac{1}{4}$

QUESTION 20

What is the approximate length of AB?

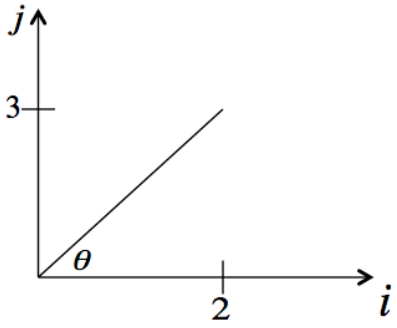


A. 13.7 cm B. 12.7 cm

C. 14.7 cm D. 20 cm

QUESTION 21

Vector $\mathbf{a} = 2\mathbf{i} + 3\mathbf{j}$ is shown below.



Angle θ is made by **a** and the positive *x*-axis.

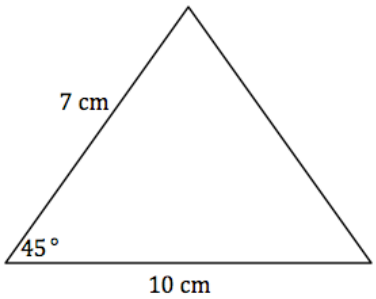
Angle θ is:

A. 41.1° B. 56.3°

C. 33.7° D. 48.2°

QUESTION 22

The area of the triangle given is:



A. $70\sqrt{2}$ cm^2 B. $\frac{70\sqrt{2}}{2}$ cm^2

C. $35\sqrt{2}$ cm^2 D. $\frac{35\sqrt{2}}{2}$ cm^2

QUESTION 23

Which statement is TRUE about these two linear systems?

$y = -2x + 5$ and $10x + 5y - 20 = 0$

A. They both represent intersecting lines.

B. They are undefined lines.

C. No value of x or y can satisfy both.

D. All the above are false.

QUESTION 24

Solution to $\frac{x}{2} - \frac{1}{x} = 0$ is:

A. 1 B. -1

C. 2 D. $\pm\sqrt{2}$

QUESTION 25

Which statement about $y = x^2 + x$ is false?

A. Its graph is a curve.

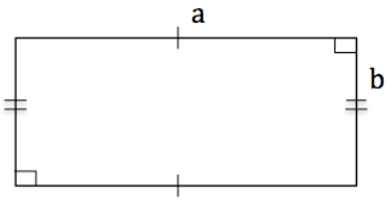
B. The minimum value is at the vertex.

C. The line of symmetry is on the right side of the y-axis.

D. The x-intercepts are -1 and 0.

QUESTION 26

If the rectangle is rolled to form a cylinder, which of the following statements would be TRUE?



A. b becomes the radius.

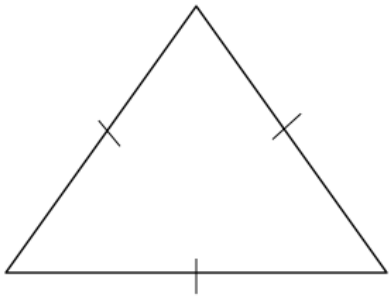
B. a becomes the diameter.

C. either a or b becomes the circumference depending on which way the rectangle is rolled.

D. None of the above.

QUESTION 27

Which statement is TRUE about this figure?



A. It can be half of a rhombus.

B. Joining the mid points will result in an isosceles triangle.

C. This is a non- ridgit shape.

D. None of the above.

Question 28

A rectangle 10 cm by 5 cm is enlarged by a scale factor of 3. The ratio of the old area to the new area is:

A. $1:3$ B. $1:2$

C. $1:5$ D. $1:9$

QUESTION 29

John does a map of his villages. For every 2 km on the ground, he uses 1cm on his map. How far is Mondia from Silma on his map if the two villages are 5 km apart?

A. 10 cm B. 5 cm

C. 2.5 cm D. 1.25 cm

QUESTION 30

The ratio of the base of a right triangle to its height is $3:4$.

The hypotenuse of a similar triangle with base 6 would be:

A. 16 B. 10 C. 18 D. 8

SECTION B: SHORT ANSWERS

Carefully work out your answers and write down your final answers only in the space provided on your Section B Answer booklet.

QUESTION 31

The variables t and u are inversely proportional to each other. When $t = 7$, $u = 3$. What is the value of t when $u = 21$?

QUESTION 32

The distance between two factories is 6.7 km. On a map this distance is shown as 1.34 centimetres. What is the scale of the map?

QUESTION 33

What are the solutions of the equation,
$3t^2 + 3t - 168 = 0$?

QUESTION 34

If one kina is worth 42 US cents and one Australian dollar is worth 96 US cents, what is the value of one kina in Australian dollars?

QUESTION 35

Imelda borrowed some money from a friend on the understanding that she would pay simple interest at the rate of 6 percent per annum. Over three years, she paid a total of K360.00 interest.

How much did she borrow?

QUESTION 36

When Steven wanted to buy a TV set, he was offered a 5 percent discount for paying cash. As a result, he paid only K855.00.

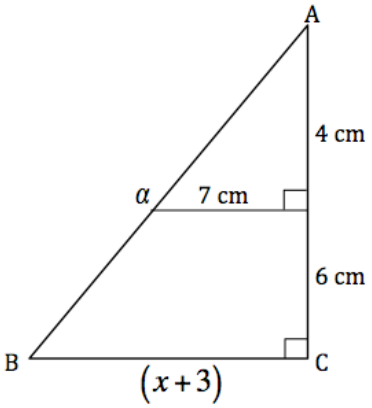
What was the advertised price of the TV set?

QUESTION 37

Amy collected some data and found that the third quartile of the dataset was three times the first quartile and the inter quartile range was 16.5. What was the first quartile?

QUESTION 38

What is the value of x in the diagram?



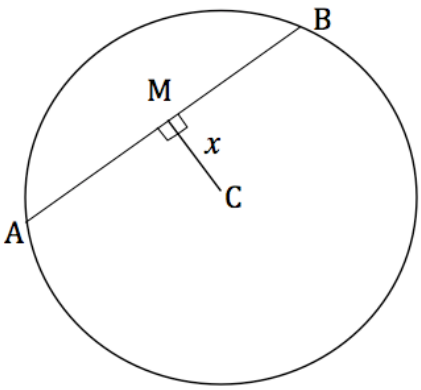
QUESTION 39

The bearing of point B from point A is $250°$ and the bearing of point C from point B is $120°$.

Draw the bearings.

QUESTION 40

Find x such that the diameter of the circle below is 20 cm and the length of the chord AB is 12 cm. M is the midpoint of AB and C is the centre of the circle.



QUESTION 41

An outboard motor is bought for K11, 400 and sold for K9, 500 after 4 years.

What is its annual rate of depreciation?

QUESTION 42

A particular supermarket discounted all its items by 20% over the Easter weekend.

What was the original price of an item that was sold for K165?

QUESTION 43

If Jeff wants to have K50, 200 to start a business in 5 years time, how much should he invest at the interest rate of 12% compound annually?

QUESTION 44

A box contains 6 red marbles and 9 blue marbles.

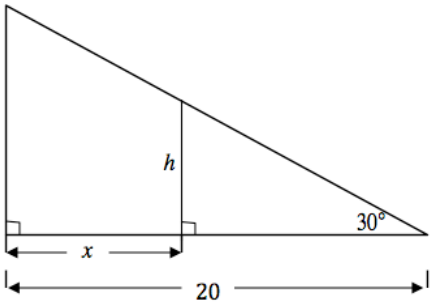
What is the probability of randomly selecting 2 red marbles successively without replacement?

QUESTION 45

Show in diagram form vectors **a** and $-\frac{1}{2}$ **a**

QUESTION 46

Find the expression for h in the diagram.



QUESTION 47

Eslyn walked a distance of 5 km due North and Sherma walked a distance of 4 km due East.

Find the distance between the two girls.

QUESTION 48

Solve $\log\left(2^x\right) = 5$. (*Answer to 1 decimal point*)

QUESTION 49

How many lines of symmetry does a regular octagon have?

QUESTION 50

The equation of the regression line is $y = -2.5x + 8$.

Interpret -2.5 in the equation.

END OF EXAMINATION

GENERAL MATHEMATICS - PAPER 1

PART B - ANSWER BOOKLET

Write your name, your province and school code and your candidate number correctly and clearly in the space provided below.

Year		Province		School			Candidate No		
1	3								

Candidate Name: _____

School Name: _____

This answer booklet is for you to write the answers to Part B only.

All Multiple Choice Answers should be on the Electronic Mark Sheet.

All answers must be written neatly in the appropriate spaces in this booklet. **Answers written elsewhere on the question paper (or any other paper) will not be marked.**

TOTAL SCORE

Recorded by: _____

Checked by: _____

ANSWERS TO PART B ONLY

Question 31	
Question 32	
Question 33	
Question 34	
Question 35	

Question 41	
Question 42	
Question 43	
Question 44	
Question 45	

Question 36	
Question 37	
Question 38	
Question 39	
Question 40	

Question 46	
Question 47	
Question 48	
Question 49	
Question 50	

UPPER SECONDARY SCHOOL CERTIFICATE EXAMINATIONS
FORMULAE SHEET FOR GENERAL MATHEMATICS

MENSURATION

Arc Length	$L = \frac{\theta}{360}\ 2\pi r$
Area of Sector	$A = \frac{\theta}{360}\ \pi r^2$
Surface Area of Cylinder	$A = 2\pi r^2 + 2\pi rh$
Surface Area of Sphere	$A = 4\pi r^2$
Curved Surface Area of Cone	$A = \pi rL$
Volume of Sphere	$V = \frac{4}{3}\ \pi r^3$
Interior Angles of Polygon	$S_n = (n - 2) \times 180^\circ$

INTEREST

Compound Interest	$A = P\left(1 + \frac{r}{100}\right)^n$

ALGEBRA

Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

ANALYTIC GEOMETRY

Distance between two points	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Mid-point of Interval	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
Gradient of a Line	$\frac{y_2 - y_1}{x_2 - x_1} = m = \tan\theta$

TRIGONOMETRY

Sine Rule	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
Cosine Rule	$c^2 = a^2 + b^2 - 2ab\cos C$
Area of Triangle	$A = \frac{1}{2}\ ab\sin C$
Conversion	$\pi^c = 180^\circ$
Arc Length	$L = r\theta^c$
Area of Sector	$A = \frac{1}{2}\ r^2\theta^c$
Area of Minor Segment	$A = \frac{1}{2}\ r^2(\theta^c - \sin\theta^c)$