DEPARTMENT OF EDUCATION

UPPER SECONDARY SCHOOL CERTIFICATE EXAMINATIONS

GENERAL MATHEMATICS

Paper 1

Monday

15th October 2012

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 **10** printed pages in the question booklet.
3. An Electronic Answer Sheet, **2** pages Section B Answer Booklet and a 1 page formula sheet are also inserted in the centre.
4. There are two sections in this paper. Answer all questions.

   Section A: Multiple Choice 30 marks
   This section will be electronically marked.
   All answers to the Multiple Choice Section MUST be answered on the Electronic Answer Sheet.
   Carefully following the instructions, fill in your Candidate Information and Subject Information.

   Section B: Short Answers 20 marks
   Write down your name, your school name and your10 digit candidate number on the Section B Answer Sheet Provided.
5. You are required to only write the correct answer in the space provided.
6. Calculators may be used.
7. Answers written on the question paper will not be marked. Write answers neatly in spaces as allocated on the answer sheet. Answer **ALL** questions.
8. Correction Fluid is not allowed on the answer sheet. If you decide to change an answer, make sure it is absolutely clear to the marker what your final answer is.
9. 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.

SECTION 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 or D. If you make a mistake, rub it out completely using an eraser and shade the correct answer on the Electronic Answer Sheet.

QUESTION 1

The recurring decimal $0.\dot{1}$ is exactly equivalent to the fraction

A. $\frac{1}{11}$ B, $\frac{1}{9}$

C. $\frac{1}{6}$ D. $\frac{1}{3}$

QUESTION 2

If $3^x = \frac{1}{27}$ what is the value of x ?

A. 2 B. -2

C. 3 D. -3

QUESTION 3

John's net pay is K1, 200 per fortnight, and his total deduction is K381.
What is his gross pay?

A. K819 B. K719

C. K1, 581 D. K581

QUESTION 4

The product $1.20\times10^{-10}\times0.6\times10^{8}$ is equal to the decimal number?

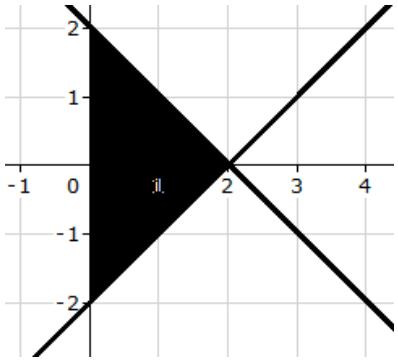
A. 0.72 B. 0.072

C. 0.0072 D. 0.00072

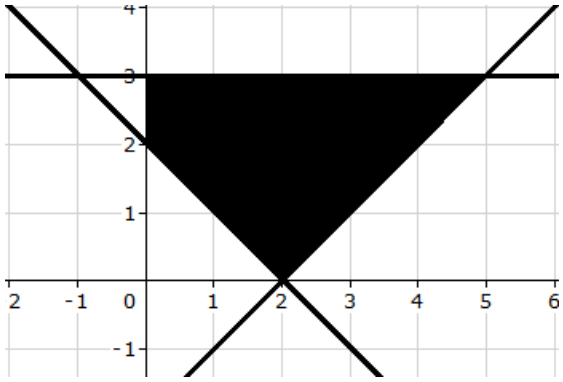
QUESTION 5

Which of the choices below correctly shows the region bounded by the following inequalities?
$x+y\le 2$, $x-y\le 2$, $x\ge 0$, $y\ge -2$

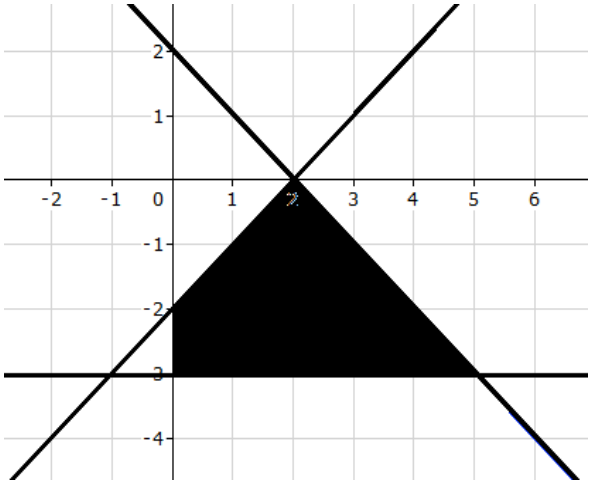
A.



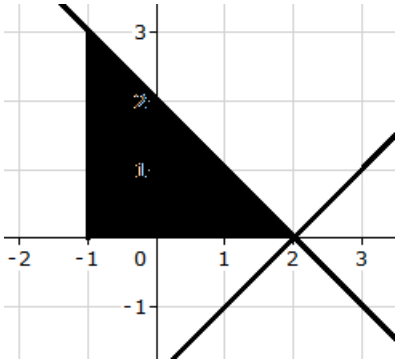
B.



C.



D.



QUESTION 6

On a particular day, PGK1.00 buys US$0.45 (US Dollars). How much is PGK500 in US Dollars?

A. 450 B. 45

C. 225 D. 500

QUESTION 7

What is the logarithm equivalent of the exponential form $e^3 = x$?

A. $\ln x = 3$ B. $\ln 3 = x$

C. $\log 3 = x$ D. $x = \log 3$

QUESTION 8

The frequency distribution shows the test scores of a Math course.

Score	Frequency
0-10	10
11-20	12
21-30	25
31-40	20
41-50	15
51-60	8
61-70	2

How many students are with the score that is greater than 30?

A. 45 B. 25

C. 10 D. 23

QUESTION 9

Nani's hourly pay is K10.50 and his standard number of hours per week is 40. In one particular week he worked 10 overtime hours at the rate of double his normal hourly pay.
What is his gross pay during this particular week?

A. K420 B. K630

C. K210 D. K530

QUESTION 10

A frequency distribution has the following classes 1-5, 6-10, 11-15, 16-20. The corresponding frequencies are 14, 20, 35 and 11.
What is the modal class?

A. 1-5 B. 6-10

C. 11-15 D. 16-20

QUESTION 11

What is the point of intersection for the lines $x - y + 2 = 0$ and $2x + y - 5 = 0$?

A.(1, 3) B. (-3, 1)

C. (3, -1) D. (-3, -1)

QUESTION 12

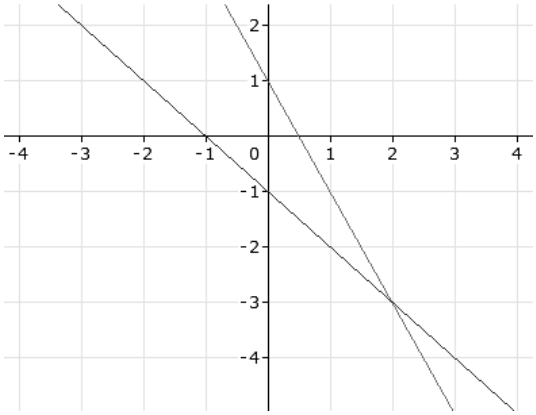
A plane flies 50 km in 15 minutes. How long does it take to fly 300 km?

A. 15 mins B. 30 mins

C. 60 mins D. 90 mins

QUESTION 13

Which pair of linear simultaneous equations does the following graph represent?



A. $\begin{matrix} 2x + y = 0 \\ x - y = 1 \end{matrix}$ B. $\begin{matrix} 2x + y = -1 \\ x + y = 1 \end{matrix}$

C. $\begin{matrix} 2x + y = 1 \\ x + y = -1 \end{matrix}$ D. $\begin{matrix} x + y = 1 \\ x - y = 1 \end{matrix}$

QUESTION 14

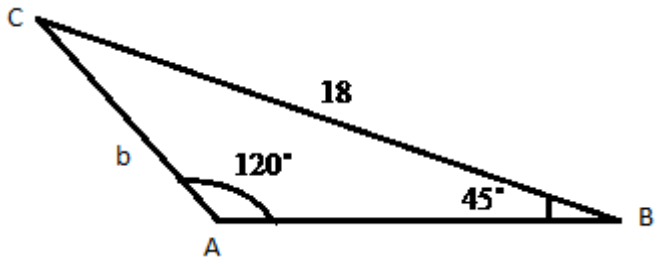
Given the data set {3, 5, 9, 12, 10, 8, 4, 9}, what is the median?

A. 12 B. 8.5

C. 3.5 D. 11

QUESTION 15

Given the triangle below, the exact value of side b is given by the expression

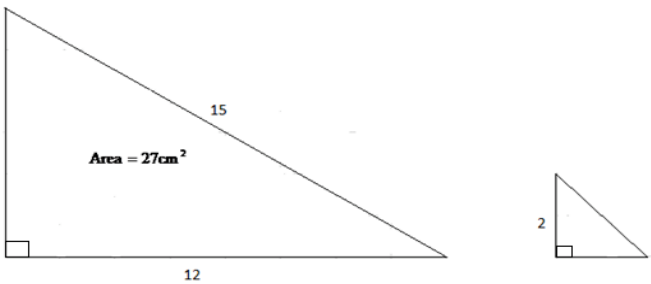


A. $\frac{18\sin 45}{\sin 120}$ B. $\frac{18\sin 120}{\sin 45}$

C. $\frac{\sin 45}{18\sin 120}$ D. $\frac{\sin 120}{18\sin 45}$

QUESTION 16

The two triangles below are similar



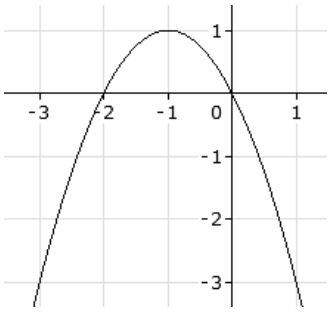
The area of the small rectangle in cm^2 is?

A. $\frac{27}{2}$ B. $\frac{16}{3}$ C. $\frac{8}{3}$ D. 3

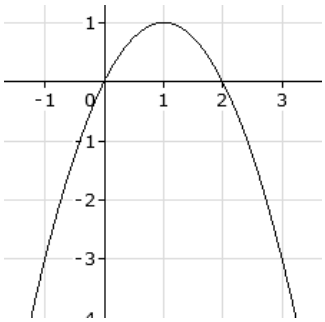
QUESTION 17

Which of the following graphs is that of the quadratic equation $y = x^2 - 2x$?

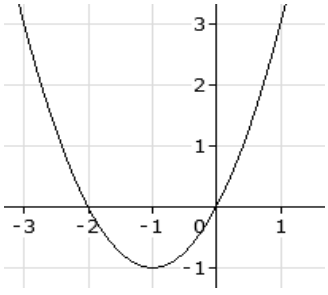
A.



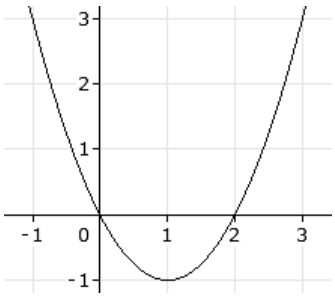
B.



C.



D.



QUESTION 18

If the cost of Ox & Palm rises by 1% every month, what will be the cost of Ox & Palm in six months? The current price is K9.50.

A. K1.06 B. K11.14

C. K8.44 D. K10.08

QUESTION 19

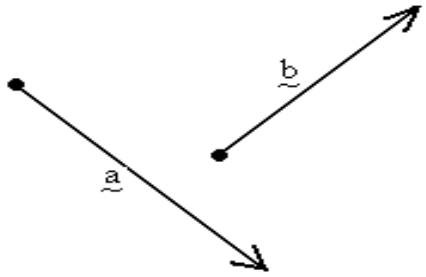
What is $\frac{\pi}{3}$ radians equal to in degrees?

A. 60° B. 45°

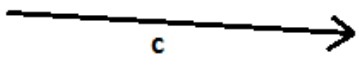
C. 30° D. 15°

QUESTION 20

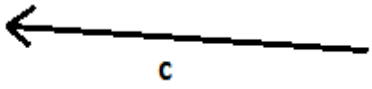
Given the vectors a and b as shown below, which of the following vector diagrams best shows the resultant vector $\mathsf{c} = \mathsf{a} + \mathsf{b}$



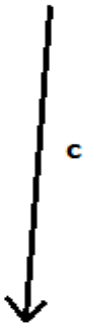
A.



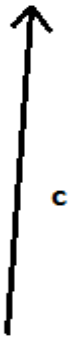
B.



C



D.



QUESTION 21

A sphere has a diameter of 30 cm.
What is its volume in cm^3?

A. 3 600 B. 4 500

C. 3 600 π D. 4 500 π

QUESTION 22

On a map with scale $1:100000$ the distance between two signal buoys out at sea is shown as being 10 cm apart.

How many kilometres in actual distance between the buoys is this?

A. 1000 km B. 100km

C. 10 km D. 1 km

QUESTION 23

The surd expression $\frac{1}{\sqrt{3}} - \frac{\sqrt{3}}{2}$ is equivalent to

A. $-\frac{1}{2}$ B. $\frac{1-\sqrt{3}}{\sqrt{3}}$

C. $\frac{1-\sqrt{3}}{2}$ D. $\frac{1-\sqrt{3}}{2\sqrt{3}}$

QUESTION 24

If the interquartile range is 41 and the lower quartile range is 75, what is the value of the upper quartile range of the data set?

A. 41 B. 34

C. 116 D. 75

QUESTION 25

A car-hire company charges fixed daily rate of K420 for a Land cruiser, K400 for a bus and K300 for a station wagon. How much will it cost to hire 2 Land cruisers for 5 days, 5 buses for 5 days and 3 station wagons for 10 days?

A. K4, 200 B. K14, 000

C. K23, 200 D. K18, 000

QUESTION 26

What is the solution to the equation
$6(x - 3) = 24x + 54$?

A. -4 B. $\frac{1}{4}$

C. 4 D. 8

QUESTION 27

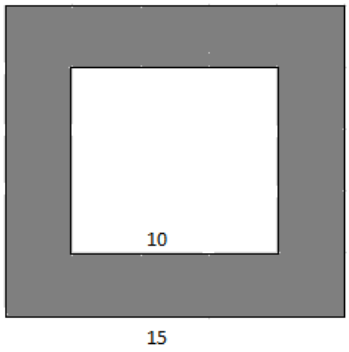
If the sum of the interior angles of a regular polygon measures up to 1440 degrees, how many sides does the polygon have?

A. 12 B. 10

C. 9 C. 8

QUESTION 28

The area of the shaded region of the square tile below in cm^2 is



A. 325 B. 225

C. 125 D. 100

QUESTION 29

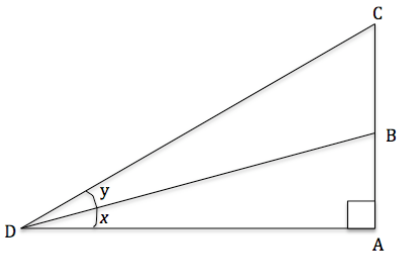
Suppose Joe gets a personal loan of K5, 000 at an annual interest rate of 10% , and the loan is to be paid in 2 years, how much will he repay every month?

A. K250 B. K600

C. K500 D. K350

QUESTION 30

Only one of the alternatives is true based on the diagram below.



A. $Tan\ \ x = \frac{AC}{AD}$

B. $Cos\ \ y = \frac{BD}{CD}$

C. $Sin\ \left(x + y\right) = \frac{AC}{AD}$

D. $Tan\ \left(x + y\right) = \frac{AC}{AD}$

SECTION B: SHORT ANSWERS

(QUESTIONS 31 TO 50) 20 MARKS

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

QUESTION 31

Solve the equation $e^x = 100$

QUESTION 32

What is the distance between the points $(-1,-2)$ and $(3,-1)$?

QUESTION 33

Joyce pays K254 in tax from her Income.
If her Income is K1, 220, what is the approximate percentage of her tax?

QUESTION 34

If two fair dies are tossed, what is the probability that the numbers 2 and 5 will appear?

QUESTION 35

Find the horizontal asymptote of the hyperbola

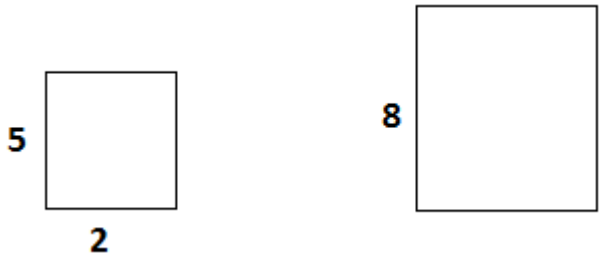
$$y = 3 - \frac{3}{x-1}$$

QUESTION 36

Convert $100km^2$ *to* m^2.

QUESTION 37

Given that the following figures are similar rectangles find the scale factor. (The units are all in cm).



QUESTION 38

Nathan invested K2, 500 at a bank at an interest rate of 5% per six months.
How much interest did he receive at the end of two years?

QUESTION 39

Event A with probability 0.25 and event B with probability 0.42 are two not mutually exclusive events.
If probability of A or B is 0.15, what is the probability of A and B?

QUESTION 40

A car is listed by the owner at K4, 200. A buyer bought the car for K3, 900.
What is discounted percentage?

QUESTION 41

Solve the equation $x - \frac{5}{x} = 16$.

QUESTION 42

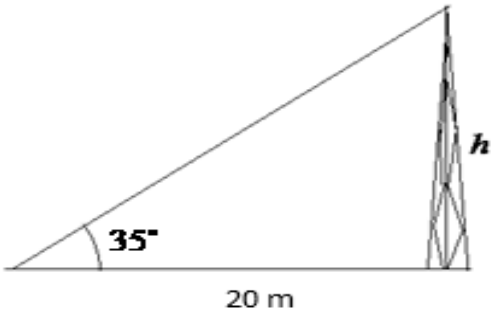
Determine the surface area of a regular pentagon with side 8 cm.

QUESTION 43

Jeff imports a car from Japan that costs K15, 000. He must pay 20% customs duty and 8% of the cost to the clearance agent before he can receive his car.
How much will he pay in total?

QUESTION 44

An observer measures the angle of elevation to the top of a tower from a distance of 20 m from the base as 35°.
Calculate the height h of the tower in meters as indicated below in the diagram?



QUESTION 45

The equation of the line of best fit is $y = a + bx$,

where $a = \bar{y} - b\bar{x}$ and $b = \dfrac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left[\sum x\right]^2}$.

Calculate the rate at which x changes given the following sums of variables x and y.

$\sum x = 46, \quad \sum y = 68, \quad \sum x^2 = 638,$

$\sum xy = 860, \quad n = 4$

QUESTION 46

Find the volume of a sphere with radius 14 cm.

QUESTION 47

An investment of K2, 200 is made at an annual interest rate of 12%.
What is the compound interest after 5 years?

QUESTION 48

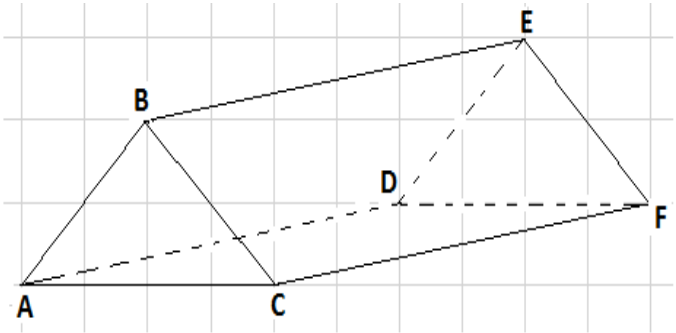
Suppose you want to successively select two balls randomly without replacement from a box containing 4 red balls and 6 blue balls, what is the probability that you will select two blue balls?

QUESTION 49

A retail shop bought a 20x1kg bale rice at a cost price of K75. The retail shop sold each 1kg rice at K6.50.
How much profit did the retail shop make?

QUESTION 50

Determine the angle AEC in the following diagram, which is drawn to scale.



END OF EXAMINATION

GENERAL MATHEMATICS - PAPER 1
SECTION B - ANSWER BOOKLET

Write your 10-digit candidate number, your name and your school name in the spaces provided below.

Year		Province		School			Candidate No		
1	2								

Candidate Name: _____

School Name: _____

This answer booklet is for you to write the answers to section 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: _____

SECTION B– ANSWERS TO SECTION 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	$A = \frac{1}{2}\ r^2(\theta^c - \sin\theta^c)$