02

Centre Number	Candidate Number

MINISTRY OF EDUCATION AND HUMAN RESOURCE DEVELOPMENT

SOLOMON ISLANDS SCHOOL CERTIFICATE

2019

MATHEMATICS

WEDNESDAY 6th NOVEMBER 9.00 AM **TIME: 3 Hours Plus**
10 Minutes Reading Time

SECTION	CONTENT	MARK
A	Multiple Choice Questions	20
B	Short Answer Questions	20
C	Long Answer Questions	60
	TOTAL	**100**

INSTRUCTIONS TO CANDIDATES

1. Do not open this Booklet until you are told to do so.
2. Make sure both your Centre Number and Candidate Number are written in the spaces provided at the top right hand corner and also on the back-flap at the back of this booklet.
3. Before you answer the questions, read through the instructions carefully.
4. Answer all questions and do all the working out on the spaces provided.
5. Do NOT use correction fluid.
6. Mobile phones are NOT allowed in the Examination room.
7. You are allowed to use a Scientific Calculator and a ruler.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

THIS BOOKLET CONTAINS 24 NUMBERED PAGES.

SECTION A: MULTIPLE CHOICE (20 MARKS)

WRITE THE LETTER OF THE MOST CORRECT ANSWER IN THE BOX PROVIDED IN THE BACK-FLAP. EACH QUESTION (Q1-20) IS WORTH ONE (1) MARK EACH.

1. The wavelength of red light in the visible light region is 0.000000625m. The correct standard form is;

   A. $6.25 \text{ x } 10^{-7}\text{m}$

   B. $6.25 \text{ x } 10^{-9}\text{m}$

   C. $62.5 \text{ x } 10^{-7}\text{m}$

   D. $625 \text{ x } 10^{-9}\text{m}$

2. Make *r* the subject of the equation $v = \frac{1}{3}\pi r^2 h$. The correct expression is;

   A. $r = \sqrt{\frac{3v}{\pi h}}$

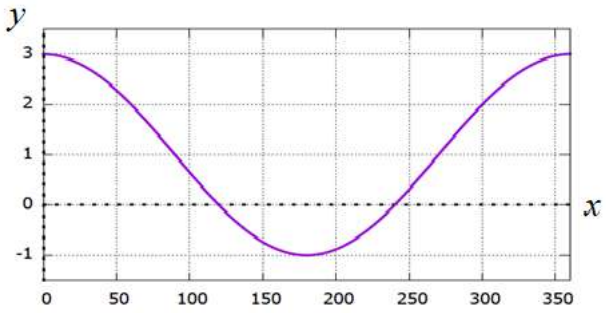
   B. $r = \sqrt{\frac{v}{3\pi h}}$

   C. $r = \sqrt{\frac{\pi h}{3v}}$

   D. $r = \left(\frac{3v}{\pi h}\right)^2$

3. Find the *x*-intercept for the graph $y = 2\cos x + 1, 0 \le x \le 180^0$.

A. 140°
B. 125°
C. 120°
D. 115°



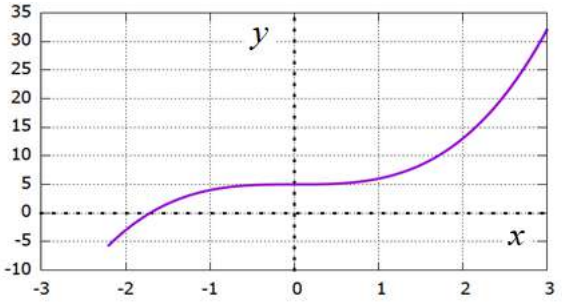
4. The equation of a **cubic function** given is;

A. $y = (x+5)^3$

B. $y = x^3 - 5$

C. $y = x^3 + 2$

D. $y = x^3 + 5$



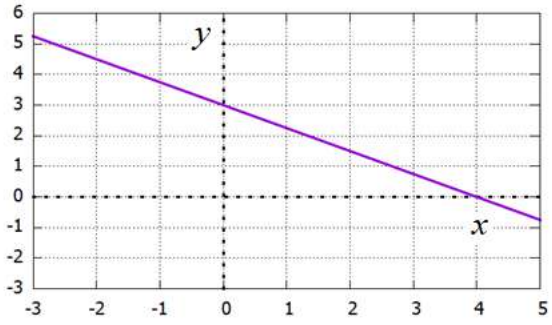
5. The gradient of the given line below is;

A. 4

B. $-\frac{4}{3}$

C. -3

D. $-\frac{3}{4}$



6. The expression $\left(3-4x^2\right)$ when factorized give the factors.

A. $(\sqrt{3}+2x)^2$

B. $(3-2x)(3+2x)$

C. $(\sqrt{3}-2x)(\sqrt{3}-2x)$

D. $(\sqrt{3}-2x)(\sqrt{3}+2x)$

7. The equation of a straight is $y=mx+c$. When (x_1,y_1) is on the line then we have $y_1=mx_1+c$.

$y=mx+c$ ... (1)

$y_1=mx_1+c$ ... (2) (1) – (2)

What is the result when *c* is eliminated?

A. $y=m(x-x_1)$

B. $y-y_1=m(x-x_1)$

C. $y+y_1=m(x+x_1)$

D. $y-y_1=mx+mx_1$

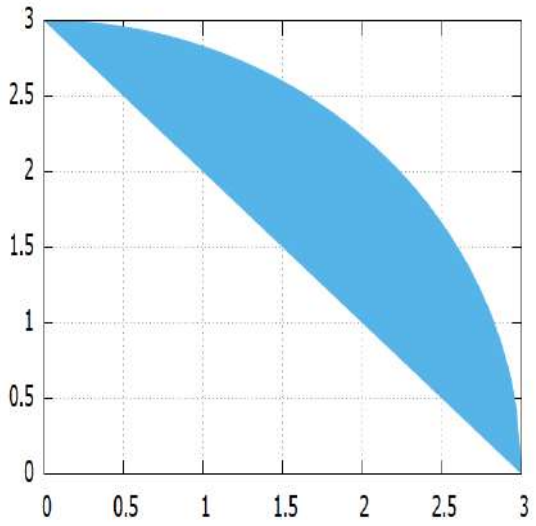
8. What is the area of the **shaded sector** of a circle given in the diagram below? **(Note:** $A=\pi r^2$ **)**

A. $\frac{9\pi}{4}-\frac{9}{2}$

B. $9\pi-\frac{9}{2}$

C. $\frac{3\pi}{4}-\frac{9}{2}$

D. 3π



9. The selling price of a 10 kg bag of rice is $79.00 in March. During the month of April the price has increased to $81.00 due to inflation. What is the **rate of inflation**?

A. 0.25%
B. 2.5%
C. 16%
D. 25%

10. Simplify $\frac{x^2-3x+2}{2x-2}$.

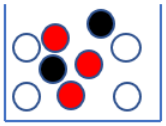
A. $\frac{x-1}{2}$

B. $\frac{x^2-3}{2}$

C. $\frac{x-2}{2}$

D. $x-1$

11. A box contains three red balls, four white balls and two black balls. Pita is asked to pick a ball and replaced it back to the box. What is the probability of Pita picking a **red ball** AND a **black ball** in two successive draws?



A. $\frac{1}{27}$

B. $\frac{2}{27}$

C. $\frac{5}{27}$

D. $\frac{1}{9}$

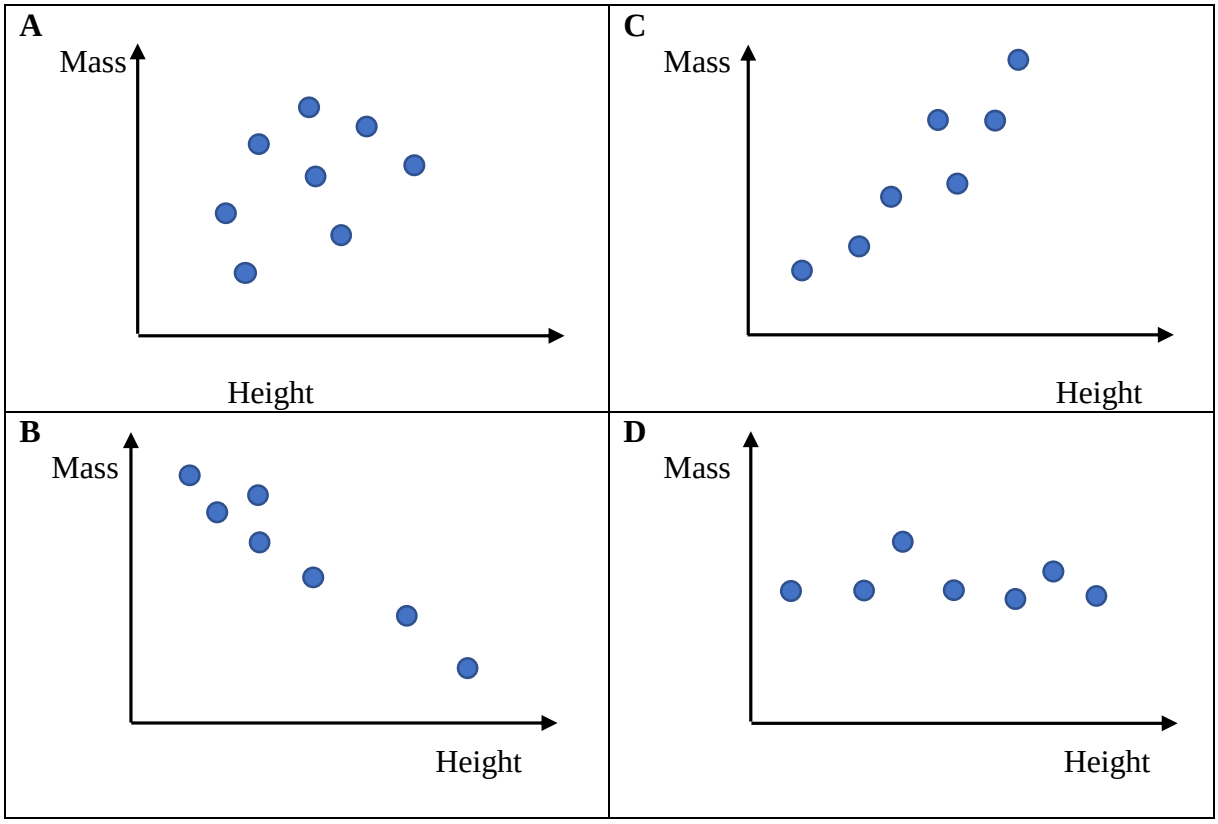
12. Events *A* and *B* are two **mutually exclusive** events. Examples of these two events are;

A. Singing and clapping of hands.
B. A number 4 and 6 appears in one roll of a die.
C. A number 4 and 6 appears in two successive rolls of a die.
D. A Jack and a diamond appears in one cut from a deck of cards.

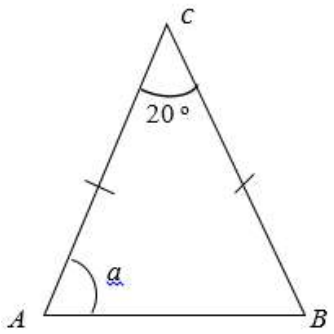
13. The given set of data is for mass of four college students: **49 54 59 60**. If one more student is included their mean mass is 56.8. The mass of the fifth student is;

A. 55.5
B. 56
C. 59
D. 62

14. In a survey of a group of college students there is a positive correlation between their masses and heights. Which of the scatter diagram BEST represents this relationship?



15. The triangle ABC is an isosceles. What is the size of **angle *a*** in degrees? (see diagram).



A. 10°
B. 70°
C. 80°
D. 160°

16. A bird is flying at a constant altitude of 40m above the edge of a reef and see a fish swimming. The distance from the bird's eye and the fish is 80m. What is the **angle of depression** of the bird?

A. 45°
B. 60°
C. 30°
D. 90°

17. The expression $\frac{1}{\sqrt{3}}$ when rationalizing the denominator becomes;

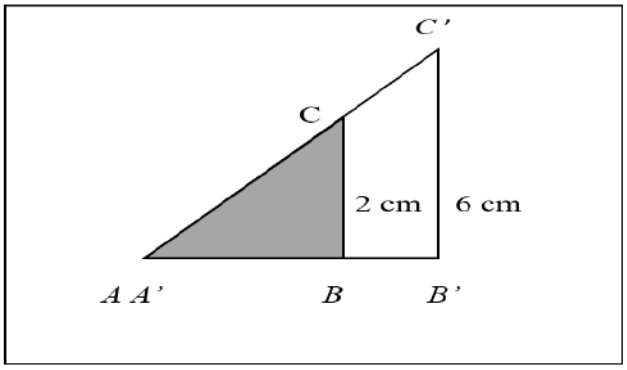
A. $\frac{1}{3}$
B. $\frac{3}{\sqrt{3}}$
C. 3
D. $\frac{\sqrt{3}}{3}$

18. Two fishing boats with coordinates *A* and *B* respectively are *x* miles apart in the Pacific Ocean. Fishing boat *A* reads a bearing 030^0 to her counterpart fishing boat ***B***. What is the **bearing** of *B* to *A*?

A. 030°
B. 180°
C. 210°
D. 270°

19. The triangle $A'B'C'$ is an enlargement of $\angle ABC$. The ratio of the area of ΔABC to $\Delta A'B'C'$ is;

A. 9:1
B. 1:3
C. 12:1
D. 1:9



20. Vector $\tilde{c}$ is the result of adding $\tilde{a}+\frac{1}{2}\tilde{b}=\tilde{c}$. Given $\tilde{a}=\begin{pmatrix}1\\2\end{pmatrix}$ and $\tilde{b}=\begin{pmatrix}6\\-2\end{pmatrix}$, what is $\tilde{c}$?

A. $\begin{pmatrix}2\\-3\end{pmatrix}$
C. $\begin{pmatrix}3\\-2\end{pmatrix}$
B. $\begin{pmatrix}1\\4\end{pmatrix}$
D. $\begin{pmatrix}4\\1\end{pmatrix}$

TOTAL MARKS FOR SECTION A:

20

SECTION B: SHORT ANSWER QUESTIONS (20 MARKS)

WRITE THE ANSWER TO EACH QUESTION IN THE SPACES PROVIDED. IT IS IMPORTANT THAT YOU SHOW ALL YOUR WORKING OUT AS SOME MARKS ARE AWARDED FOR APPROPRIATE METHODS AND PARTIALLY CORRECT ANSWERS.

Question 21: Write the surds below in its **simplest form**. Leave answer in surds.

$2\sqrt{27} - \frac{\sqrt{3}}{2}$

Answer: _____

(2 marks)

Question 22: Solve the equation $y = 4x^2 - 4$

Answer: _____

(2 marks)

Question 23: Find the coefficients *a*, *b* from the **quadratic equation**

$y = 2x^2 + 3x + 1$

Answer: _____

(2 marks)

Questions 24: A father is 6 times plus 3 years older than his son. If the father is 45 years old now. How old is his son?

Answer: _____

(2 marks)

Question 25: Solve the in-equalities $3n+2>4(n-3)+1$

Answer: _____

(2 marks)

Question 26: Table of arrivals for returning residents for non-Solomon Islanders in 2015

Gender	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Male	9	14	14	15
Female	5	3	6	9

(Source: SINSO).

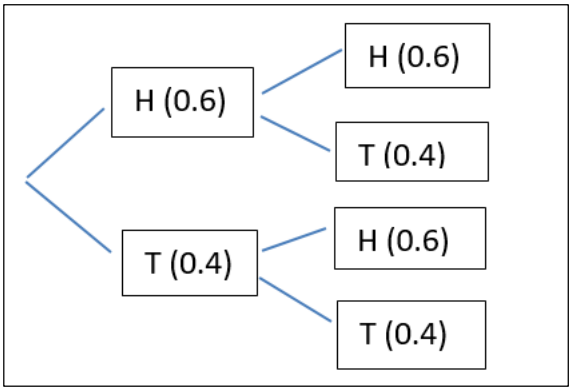
Calculate the **mean** for male and **median** for female.

Mean arrivals for male: _____

Median arrivals for female: _____

(2 marks)

Question 27: A biased coin is tossed twice. The chance of getting a head is 0.6. Calculate the **probability** of getting two tails (see tree diagram).

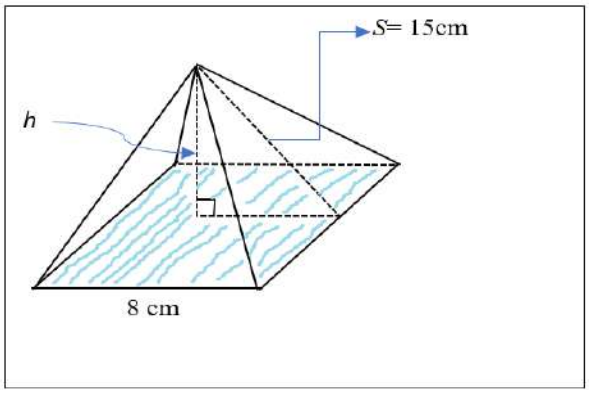


Answer: _____

(2 marks)

Question 28. Each side of the square-base pyramid shown below measures 8cm. The slant height, *S*, of the pyramid measures 15cm. *(Leave answer in surds)*.

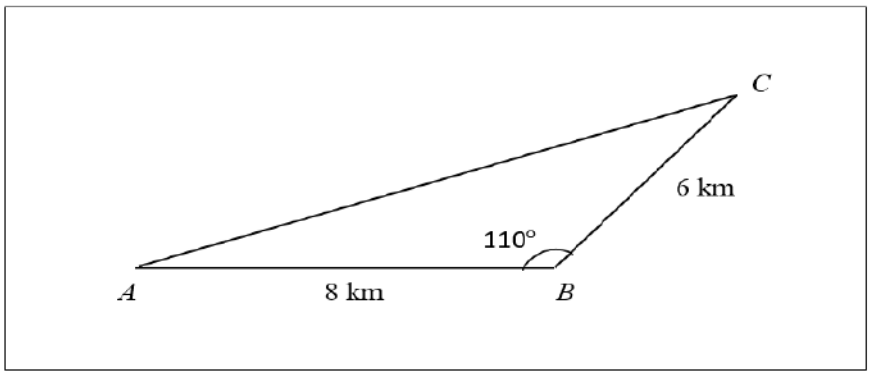
Calculate the height *h* of the pyramid.



Height: _____cm

(2 marks)

Three villages *A*, *B* and *C* are given on the diagram. The distance $\overline{AB}$ is 8 km and $\overline{BC}$ is 6 km. The size of angle *B* is 110°. *Use this diagram to answer Questions (29 and 30)*.



Question 29: Find the distance between village *A* and *C. (Round answer to nearest whole number).*

Answer: _____km

(2 marks)

Question 30: If the length of $\overline{AC}$ is 12km, calculate the size of angle *A* using the equation.
(*Round answer to the nearest whole number- use the sine rule*)

$$\frac{\sin A}{a} = \frac{\sin 110^o}{b}$$

Answer: _____

(2 marks)

TOTAL MARKS FOR SECTION B ____ **20**

SECTION C: LONG ANSWER QUESTIONS (60 MARKS)

WRITE THE ANSWER TO EACH QUESTION ON THE SPACES PROVIDED. IT IS IMPORTANT THAT YOU SHOW ALL YOUR WORKING OUT AS SOME MARKS ARE AWARDED FOR APPROPRIATE METHODS AND PARTIALLY CORRECT ANSWERS.

Question 31: Statistics and probability **(12 marks)**

Grella counts the number of leaves in 24 small banana plants and recorded in the frequency table below.

a) i) Complete the frequency table. (6 marks)

Number of Leaves (*x*)	**Frequency (f)**	fx	$(x-\mu)^2$	$f(x-\mu)^2$
4	2		4	
5	6		1	
6	8		0	
7	5		1	
8	3		4	
	$\sum f = 24$	$\sum fx =$ _____		$\sum f(x-\mu)^2 =$ _____.

ii) $\mu = \dfrac{\sum fx}{\sum f}$ (*Round answer to 1 dp*).

Mean:_____

(1 mark)

iii) Calculate the standard deviation using $\sigma = \sqrt{\dfrac{\sum f(x-\bar{x})^2}{\sum f}}$ (*Round to 1 dp*).

Standard Deviation:

_____

(1 mark)

b) i) Calculate the probability of picking a banana plant that has **greater than or equal** to 7 leaves.

Probability: _____

(2 marks)

---

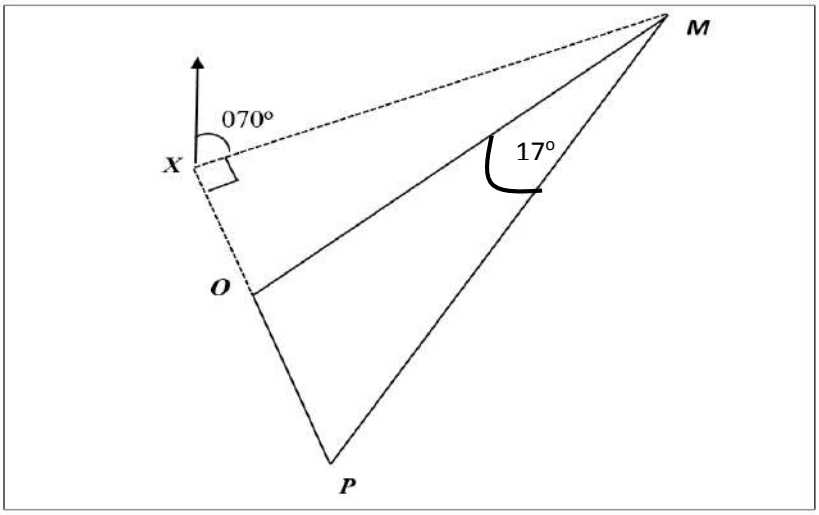
ii) What is the chance of picking a banana plant that has **at least** 7 leaves in the first and second draw **without replacement**?

Probability: _____

(2 marks)

Question 32: Trigonometry (**12 marks**)

a) Solomon Islands was hit by three tropical cyclones this year. Cyclones Oma (***O***), Penny (***P***) and Mona (***M***). The position of the three cyclones with respect to our National Meteorology Service Observation Centre (***X***) is given on the diagram below.



<u>Other information</u>

Distance $\overline{OP} = 800$ km

Distance $\overline{OM}$ = 1800 km

Angle $\angle OMP$ =17°

i) Show that $\angle OPM = 41^o$

Answer: _____

(3 marks)

ii) Point *X*, *O* and *P* forms a straight line angle. Calculate the distance $\overline{XM}$ (*To the nearest whole number).*

Answer:_____

(3 marks)

iii) (a) Find distance $\overline{OX}$ if the $\angle$XOM is 58^{o}.

Distance: _____Km

(2 marks)

(b) Which cyclone is far away from Solomon Islands?

Cyclone: _____

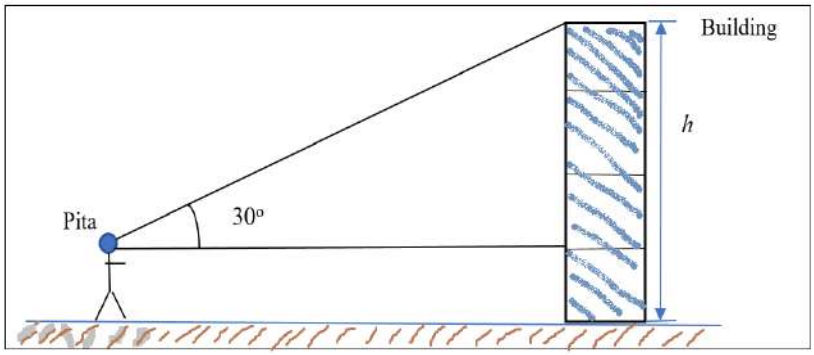
(1 mark)

iv) If the bearing of *X* to *M* is 070^{o}. What is the bearing of *X* to *O*?

Bearing: _____

(1 mark)

b) Pita whose height is 1.55m measures the height of a building using a clinometer. The distance from the building to Pita is 15m and the angle of elevation is 30^o (See diagram). Calculate the height, h of the building. (*Round answer to 2 dp*).



Height: _____m

(2 marks)

Question 33: Algebra **(12 marks)**

a) i) A ball is kicked up in the air and its height (*s* metres) above the ground at any time (*t* seconds) is given by the formula $s = 30t - 5t^2$. At what times will it reach a height of 40m?

Time: _____ seconds

(4 marks)

ii) Comment on why you have two answers for a (i) above.

_____

_____

(1 mark)

b) Solve the quadratic $2x^2 + 4x - 1$ using the formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

(*Leave answer in surds)*.

Answer: _____

(4 marks)

c) Solve the two equations simultaneously: $-2x + y = 1$ and $3x - y = 4$

Answer: x =_____ y =_____

(3 marks)

Question 34: Algebra **(12 marks)**

a) Simplify $\dfrac{x^2-5x+6}{x-3}\times\dfrac{x-1}{x^2-4}$

Answer: _____

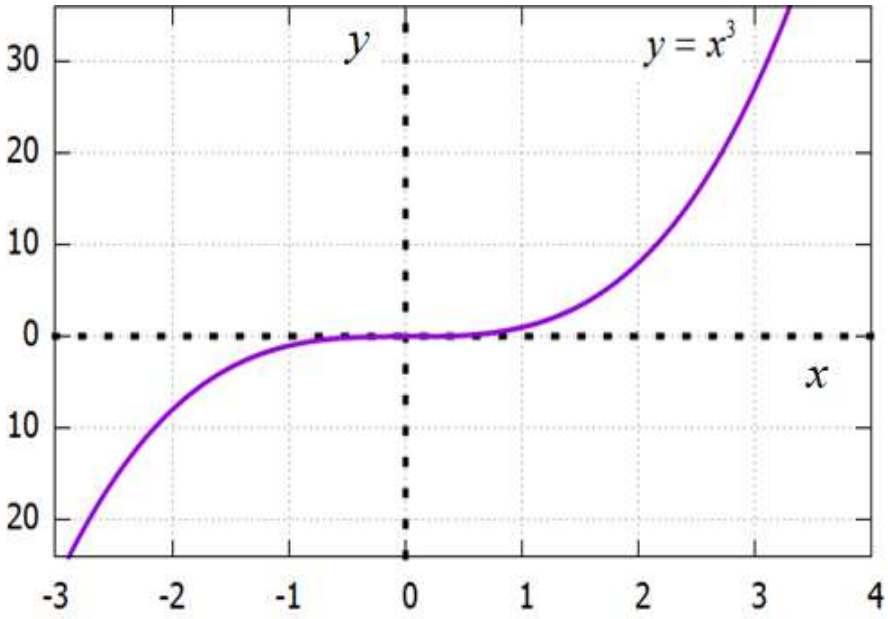
(3 marks)

b) i) **Complete the table**

x	-2	-1	0	1	2	3
$y=x^3$	-8	-1	0	1	8	27
$y=(x-1)^3+10$	----	-----	------	------	-------	-------

(3 marks)

ii) Plot the cubic function $y=(x-1)^3+10$ below using the grid given.
Y = x^3 is given on the graph.

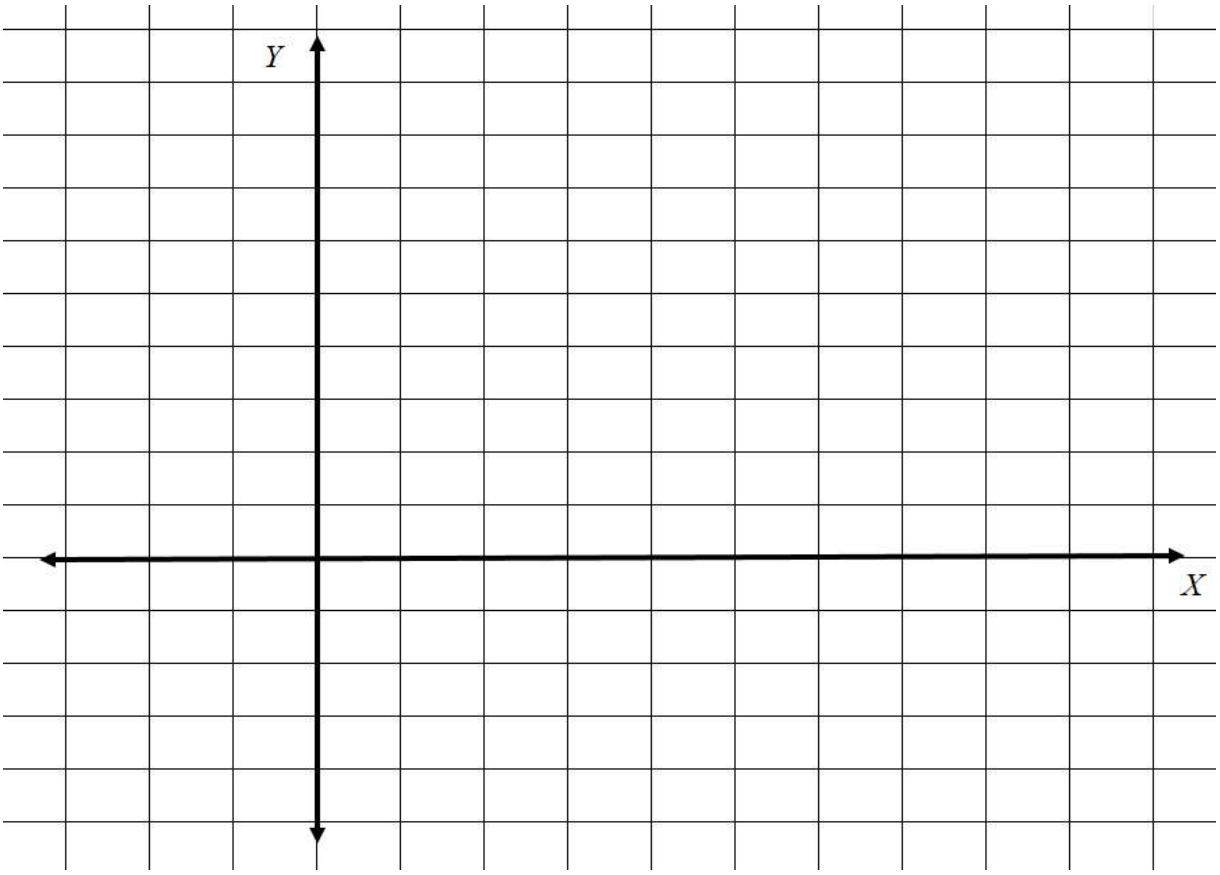


Answer: _____

(3 marks)

c. Shade the area enclosed by the given in-equations on the grid paper provided below.

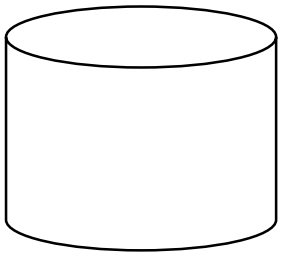
$x \geq 0, \quad y \leq x+3, \quad y > 2x$



(3 marks)

Question 35: Geometry and Numbers **(12 marks)**

a) The cylindrical aluminum water tank holds 3 028 litres of water. The tank has a height of 150cm.



i) Convert 3 028 litres (L) to cubic centimeter (cm^3).

V=_____cm^3

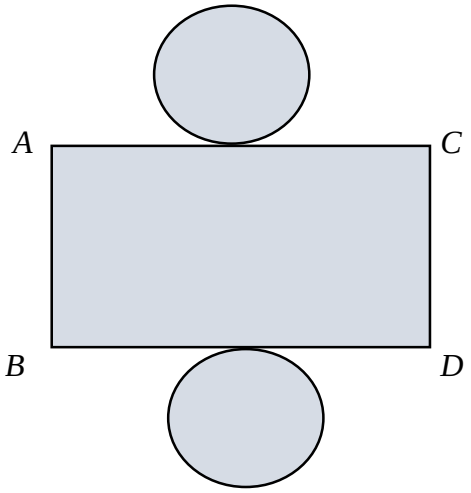
(2 marks)

ii) Show that the radius of the tank is 80.18cm. (Use: $V = \pi r^2 h$; $\pi = 3.14$).

Radius: _____cm

(2 marks)

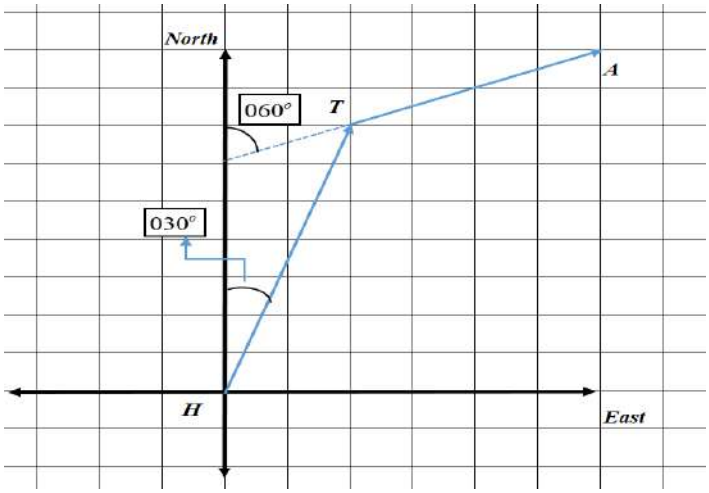
If the tank above was constructed using the diagram below, calculate the length $\overline{AC}$. (*Answer to 2 dp*).



$\overline{AC}$: _____cm

(2 marks)

b. i) A police patrol boat travels from Honiara port (***H***) to Tulagi (***T***) at a bearing of 030^o and then to Auki at a bearing of 060^o as shown in the diagram below. The distance $\overline{HT} = 120km$ and $\overline{TA} = 80\text{km}$.



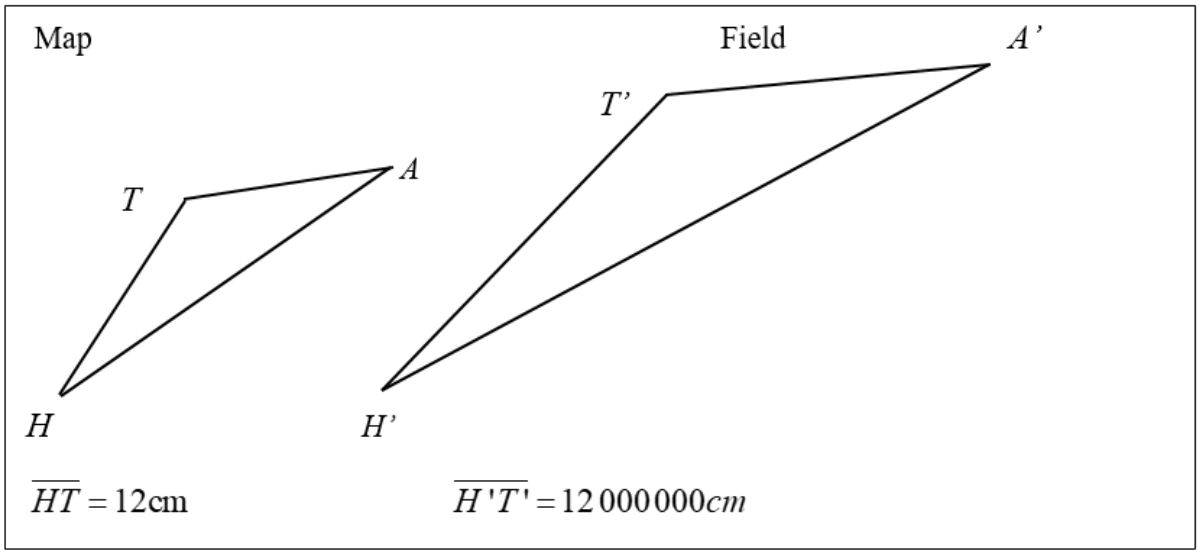
Represent distance $\overline{HA}$ as column vector (***Nearest whole number***).

(**Hint:** $\overrightarrow{HA} = \overrightarrow{HT} + \overrightarrow{TA}$)

$\overrightarrow{HA} = \begin{pmatrix} \cdots\cdots \\ \cdots\cdots \end{pmatrix}$

(4 marks)

ii) Two similar triangles representing situation on b (i) on page 22. Calculate the enlargement ratio.



Enlargement ratio: _____

(2 marks)

TOTAL MARKS FOR SECTION C

60

SISC – MATHEMATICS 2019

CENTRE NUMBER			CANDIDATE NUMBER					

SECTION A
MULTIPLE CHOICE (20 MARKS)

Write the letter of the correct answer in the box provided. Make sure your answer is put alongside the right question number.

Example: If you consider A is the correct answer, write it like this: A

To change your answer from A to C, Cross out A and write the new answer **C** By the box, like this: ~~A~~ C

1		**11**	
2		**12**	
3		**13**	
4		**14**	
5		**15**	
6		**16**	
7		**17**	
8		**18**	
9		**19**	
10		**20**	

FOR MARKERS USE ONLY

SECTION	MARK	MARKER	CHECKER
A	**20**		
B	**20**		
C	**60**		
TOTAL	**100**		
Marker/ Checker Initials			