FORM 5   MATHEMATICS (Non Calculator Paper – Option A) TIME: 20 minutes

Name: _____   **Class:** _____

Mark

INSTRUCTIONS TO CANDIDATES

- **Answer all questions. There are 20 questions to answer.**

- **Each question carries 1 mark.**

- **Calculators, rulers, protractors and other mathematical instruments are not allowed.**

- **You are not required to show your working. However space for working is provided if you need it.**

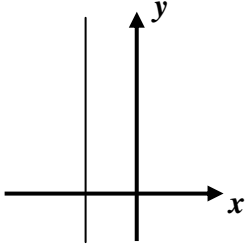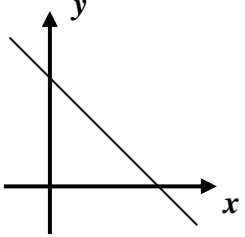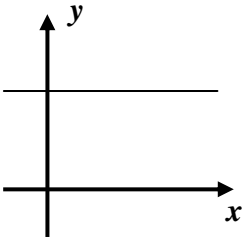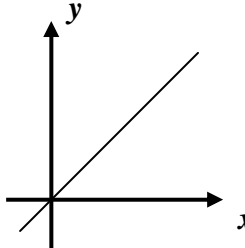| No.	Question	Space for Working
1	Write down the value of $1-\left(\dfrac{1}{4}\times3\right)$. **Answer:** _____	
2	What is 30% of Lm2? **Answer:** _____ cents	
3	Write $\mathbf{3^{-2}}$ as a **fraction**. **Answer**: _____	
4	Write down the **Least Common Multiple** of **9** and **12**. **Answer:** _____	
5	$\mathbf{24 = 2^{p} \times 3^{q}}$. What is the value of $(p + q)$? **Answer:** _____	
6	$\mathbf{25^{2} = 625}$. Write down the value of $\sqrt{\mathbf{6.25}}$. **Answer:** _____	
7	The **best estimate** for the **diagonal** of the square is: **A)** 5 cm **C)** 7 cm **B)** 6 cm **D)** 8 cm 5 cm (side) 5 cm (side) **Answer:** _____cm	
8	The reciprocal of 2 is $\dfrac{1}{2}$ and the reciprocal of 4 is $\dfrac{1}{4}$. Write the **reciprocal** of 10 as a **decimal**. **Answer**: _____	

No.	Question	Space for Working
9	Work out the **gradient** of a line passing through the points A(−3, 4) and B(2, −6). **Answer:** _____	
10	Taking $\pi \approx 3$, find an approximation for the **area of a circle** having a radius of 2 cm. **Answer:** _____cm^2	
11	A number P is **increased** by 10%. The result is Q. Q is then **decreased** by 10%. The result is R. Which statement is correct? **A)** $P = R$ **B)** $P > R$ **C)** $P < R$ **Answer:** _____	
12	$x = \mathbf{1.5 \times 10^2}$. Write the value of $\mathbf{2x}$ in **standard form**. **Answer:** _____	
13	Given that **1 gallon $\approx$ 4.55 litres**, change 10 gallons to litres. **Answer:** _____litres	
14	Mary bought 12 files at Lm1**.**50 each and 12 pens at 50 cents each. How much did she spend **altogether**? **Answer:** Lm_____	
15	Work out the size of each **exterior** angle of a **regular hexagon**. **Answer:** _____	
16	Write an equation in x (other than $x = 3$) whose solution is 3. **Answer**: _____	

No.	Question	Space for Working
17	The **diameter** of the circle is 10 cm. What is the **perimeter** of the **regular hexagon**? **Answer:** _____cm	
18	O is the centre of the circle. Find the value of *x*. 53° **O** *x* **Answer:** _____	
19	A bag contains 5 blue discs and a number of red discs. The probability of choosing a blue disc is $\frac{1}{4}$. What is the **total** number of discs in the bag? **Answer:** _____	
20	Which **one** of the following shows the graph of $y = 5 - x$? A) B) C) D) **Answer:** _____	

JUNIOR LYCEUM & SECONDARY SCHOOL ANNUAL EXAMINATIONS 2007

Educational Assessment Unit – Education Division

FORM 5   **MATHEMATICS (Main Paper − Option A)**   **TIME: 1h 40min**

1	2	3	4	5	6	7	8	9	10	11	12	13	Total Main	Non Calculator	GLOBAL MARK

DO NOT WRITE ABOVE THIS LINE

Name: _____   **Class:** _____

> **CALCULATORS ARE ALLOWED BUT ALL NECESSARY WORKING MUST BE SHOWN.**
> **ANSWER ALL QUESTIONS.**

1. a) Write the following numbers correct to **1 significant figure** to give an **estimate** for **P**.

$$P = \sqrt{\frac{47.8 \times 4.2}{1.9}}$$

                                               estimate = _____

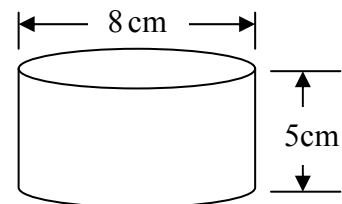   b) Use your calculator to work out the value of **P** correct to **1 decimal place**.

                                                   P = _____

    c) Write down the **difference** between the answer in a) and the answer in b).

                                       difference = _____

                                                           (3 marks)

2. The formula for finding the volume of a cylinder is $V = \pi r^2 h$.

    a) Work out the **volume** of the cylinder shown.
       Give your answer correct to **1 decimal place**.

                                    volume = _____ cm³
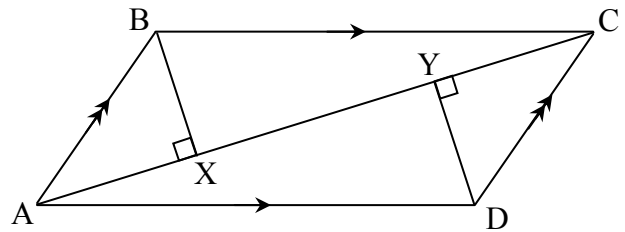
    b) Make **r** the subject of the formula.

                                                   r = _____

                                                           (4 marks)

3. a) Complete this set of LOGO commands given to the turtle to draw a **regular pentagon**.

PD REPEAT _____ [FD 70 RT _____]

b) ABCD is a **parallelogram**.
BX and DY are drawn perpendicular
to AC.
Prove that triangles ABX and CDY
are **congruent.**

_____(5 marks)

4. The figure shows two semi-circular arcs.
The radii of the two arcs are 6 cm and 10 cm.
Work out the **area** of the **shaded region**.
Give your answer correct to **3 significant
figures**.

6 cm

10 cm
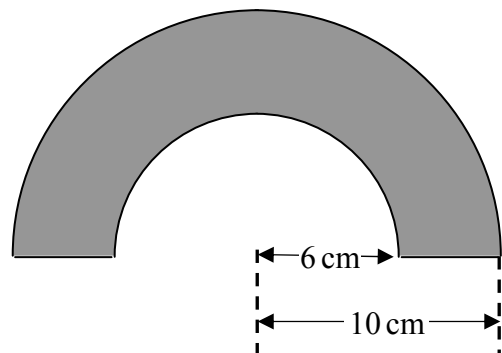
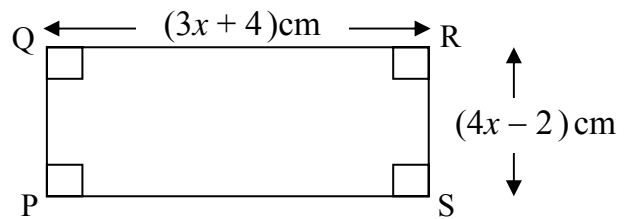**shaded area** = _____ cm^2

_____(5 marks)

5. PQRS is a rectangle.
   a) Write, **in terms of *x***, an expression
      for the **perimeter** of the rectangle.

perimeter = _____ cm

   b) The perimeter of the rectangle is 32 cm. Find the value *x*.

x = _____

_____(4 marks)

6. Joe is using a spreadsheet to help him work out how much he spends at the stationer's.
   VAT is charged at 18%.

	A	B	C	D	
1	**Item**	**Price (Lm)**	**Quantity**	**Total (Lm)**	
2	File	0.90	3	2.70	
3	Copybook	0.24	5		
4	Total all items (excluding VAT)				
5	Total VAT (18%)				
6	Total all items (including VAT)				

   a) What **formula** did Joe type in cell **D2**? _____

   b) What **amount** did Joe obtain in cells **D3, D4, D5** and **D6**? (Give answers
      correct to the **nearest cent**).

      D3 = _____,   **D4** = _____,   **D5** = _____,   **D6** = _____
_____(5 marks)

7. The maximum weight a van can carry is given as 1000 kg, correct to the nearest 100 kg. The weight of a bag of cement is given as 50 kg, correct to the nearest kg.

   a) Complete the following inequalities to show the **lower** and **upper** bounds of each weight.

   (i) _____ kg $\leq$ maximum carrying weight of van $<$ _____ kg

   (ii) _____ kg $\leq$ weight of bag of cement $<$ _____ kg

   b) What is the **greatest** number of **bags** of cement the van can **safely** carry at one time to be sure that the **maximum** carrying weight is **not exceeded**?

   _____ **bags**

   _____(6 marks)

8. For the function $f(x) = 3x - 1$

   a) (i) Find the **range of values of x** for which $-4 < f(x) < 8$

   _____

   (ii) Write down the **largest integer** that satisfies the inequality in (i).

   $x =$ _____

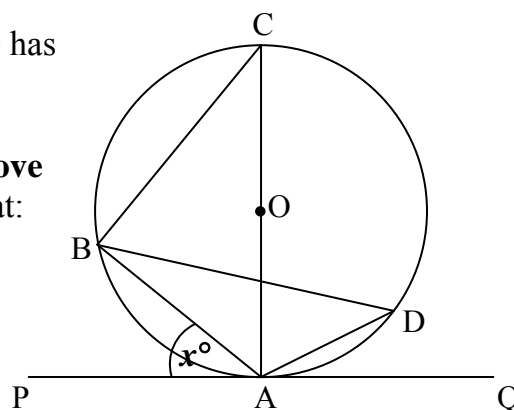   b) Find $f^{-1}(x)$

   $f^{-1}(x) =$ _____

   _____(6 marks)

9. a) In the diagram, the circle through A, B, C and D has centre O. PAQ is a tangent at A and AC is a diameter. Angle BAP = $x°$.
Answer the following questions **correctly** to **prove** the **alternate segment** theorem, which states that:

"*The angle between a tangent and a chord drawn at the point of contact is equal to any angle in the alternate segment*."

No marks will be awarded unless valid reasons are given.

(i) The size of ∠**CAP** is _____   reason: (_____)

(ii) The size of ∠**CAB** in terms of x is _____

(iii) The size of ∠**ABC** is _____   reason: (_____)

(iv) **Use triangle ABC** to **work out** the size of ∠**ACB** in terms of x.
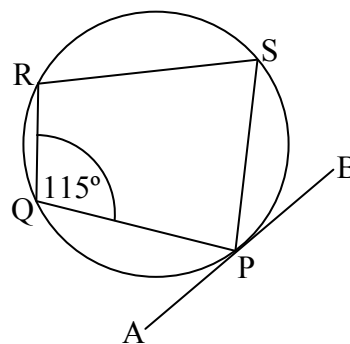**Show ALL your working**.

        ∠**ACB** = _____   reason: (_____)

(v) **Use this value for ∠ACB** to write down the size of ∠**ADB** in terms of x.

        ∠**ADB** = _____   reason: (_____)
----

b) In the diagram P, Q, R and S lie on a circle.
APB is a tangent at P. ∠PQR = 115°.
Work out the size of ∠**APR**.

Show all your working and give reasons for your answers.

_____(8 marks)

10. The force of attraction, F, between two objects is **inversely** proportional to the **square** of the distance, d, between them.

   a) Write down a **formula** connecting F and d. (Use k for the constant of proportionality).

   formula _____

   b) Given that for two objects, $d = 25$ when $F = 0.004$, find the value of k.
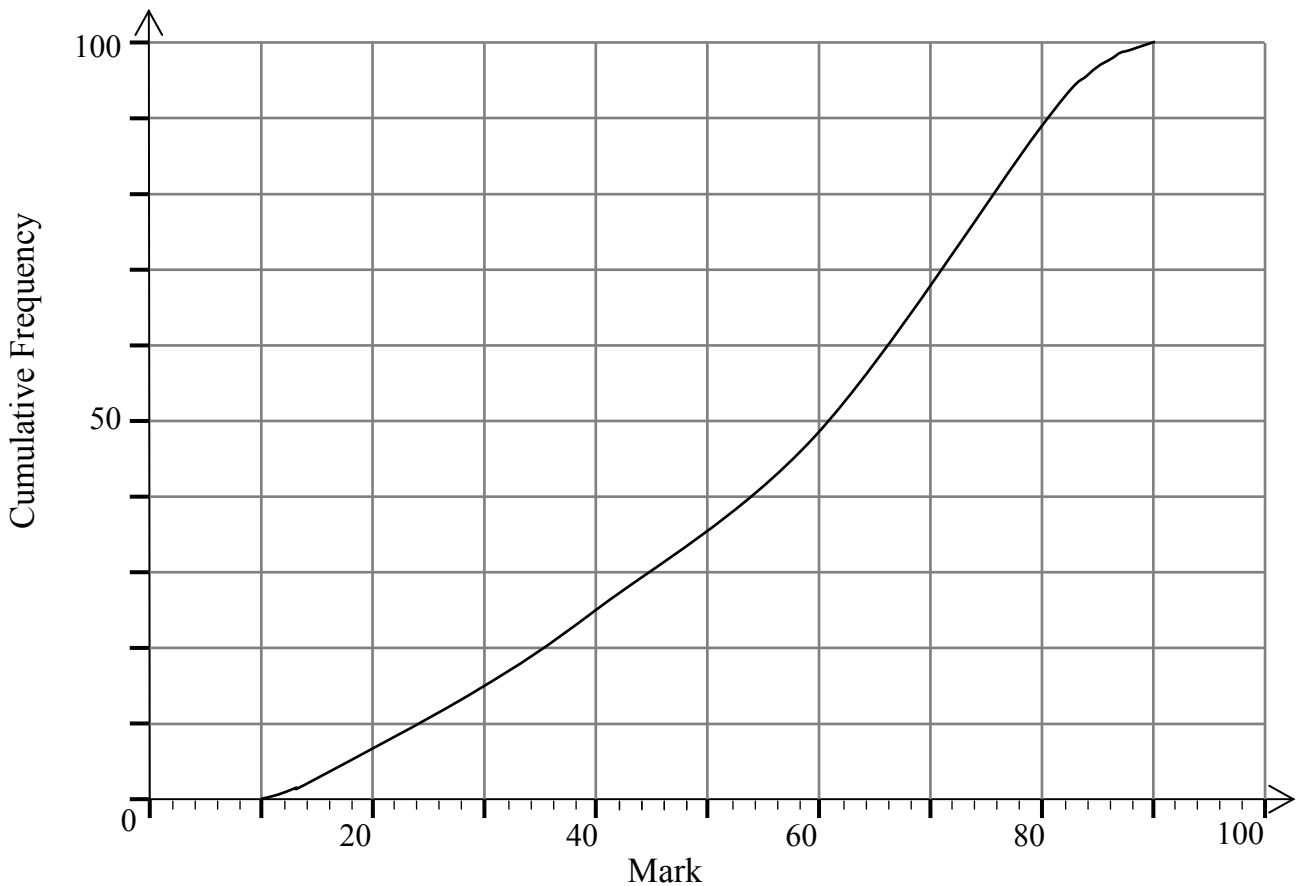
   $k =$ _____

   c) Work out the distance between these two objects when $F = 0.001$.

   $d =$ _____

   _____(6 marks)

11. a) The diagram shows the cumulative frequency graph for the distribution of marks obtained by 100 students sitting for an exam.

Cumulative Frequency vs Mark

(i)   Use the cumulative frequency curve to write down an **estimate** for the:

lower quartile	upper quartile	median	interquartile range	range
_____	_____	_____	_____	_____

(ii) To which **one** of the **above**, does each of the following statements apply?

" The _____ tells how spread out the central half of

the data is."

" The _____ is the middle number, which cuts off

the top half of the data from the bottom half."

" The _____tells how spread out the data is but it is

badly affected by extreme high or low values."

(iii) Grade **A** is awarded to the **top 10%** of the students. Write down an **estimate** for the
lowest mark needed to obtain grade **A**.

_____

11. b) Two groups of students in class A and class B sat for the **same** exam. The box plots below show the results.

Exam mark
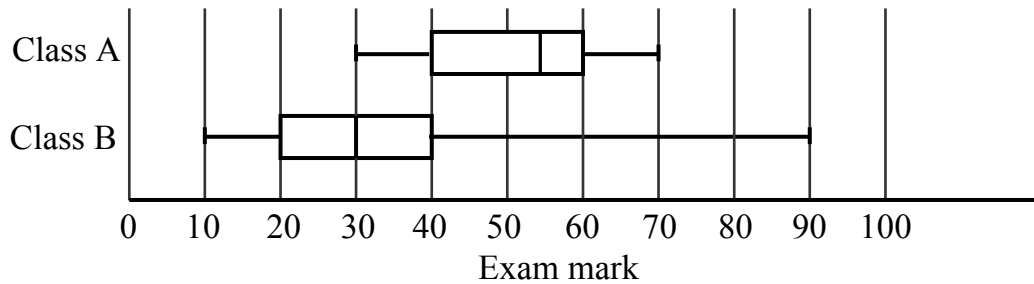
(i) Give an **estimate** for the **percentage** of students in **class A** who obtained a mark of over 60.

_____

(ii) **First prize** is awarded to the student who obtains the **highest** mark in the exam.

The **winner** of the **first prize** was from class _____ and the **highest** mark obtained was _____.

(iii) "**On the whole** the marks for class A are **higher** than those for class B."
Do you agree with the above statement? **Give reasons**.

_____(11 marks)

12. The graph of $y = 3 - x^3$ is shown on the next page.

a) For the line with equation $y = x - 2$:

(i) Write down the value of y when $x = 0$ **and** the value of x when $y = 0$.

when $x = 0$, $y =$ _____ **and** $x =$ _____ , when $y = 0$

(ii) Hence or otherwise draw, on the same axes, the graph of $y = x - 2$.

b) (i) Write down an estimate, correct to **one decimal place**, for the value of x at the **point of intersection** of the two graphs.

$x =$ _____

(ii) Find the **cubic equation** whose solution is the value of x found in (i). Simplify your equation. **Show your working.**
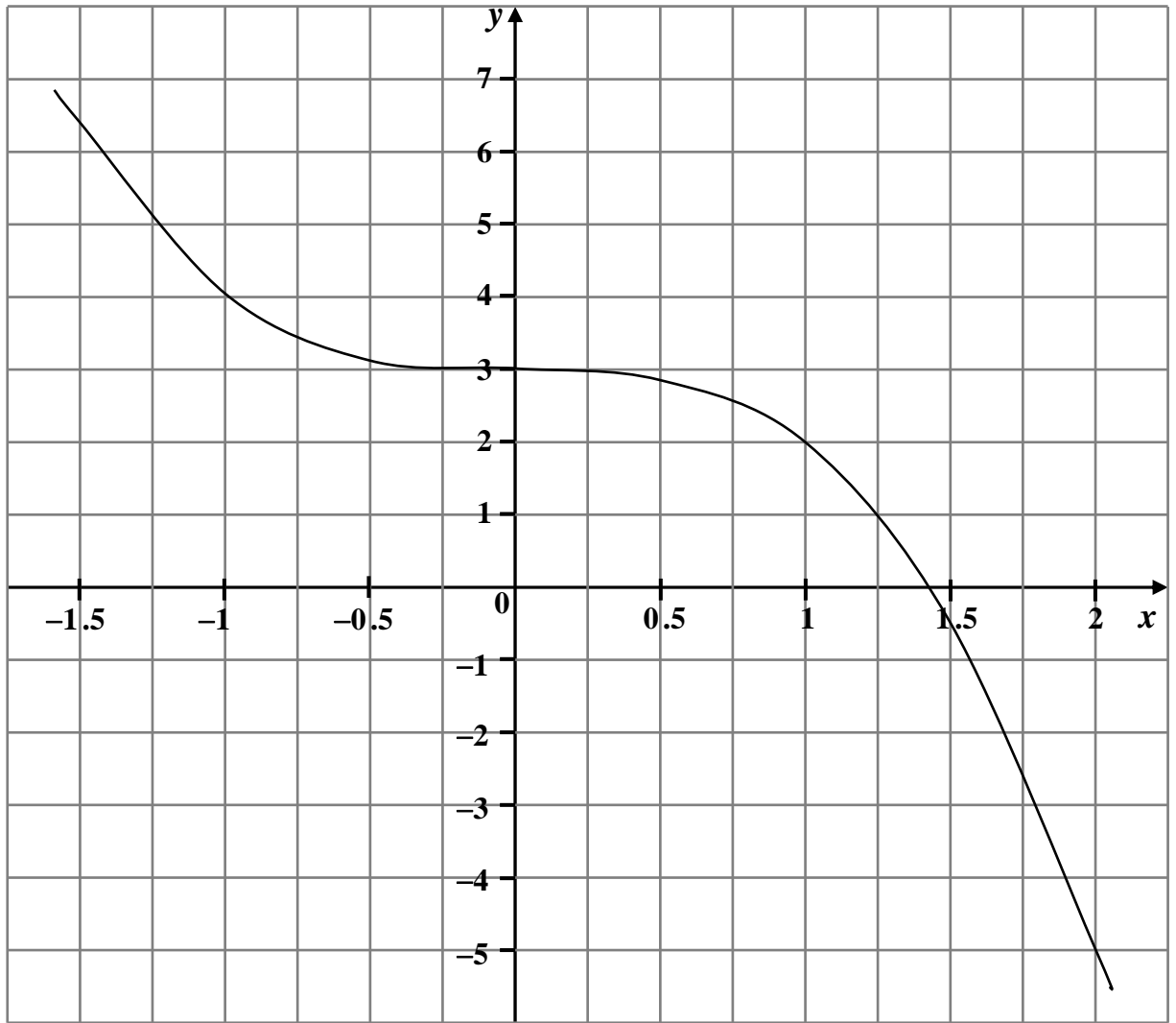
c) *In this part of the question use your answers to part* (b)
Use the method of **trial and improvement** to work out, correct to **two decimal places**, an estimate for the value of *x* for which $x^3 + x = 5$.

_____(8 marks)

13. Maria drives to the office in Valletta during the morning rush hour. On her way she drives past the Gzira and Msida roundabouts. At this time the probability that the traffic is slow moving at the Gzira roundabout is **0.8** and the probability that the traffic is slow moving at the Msida roundabout is **0.9**.

a) Use the following probability tree diagram to work out the probability that:

P (Slow) = 0.8

P (Fast) = 0.2

P (Slow) = 0.9

P (Fast) = 0.1

P (Slow) = 0.9

P (Fast) = 0.1

Gzira Roundabout   Msida Roundabout
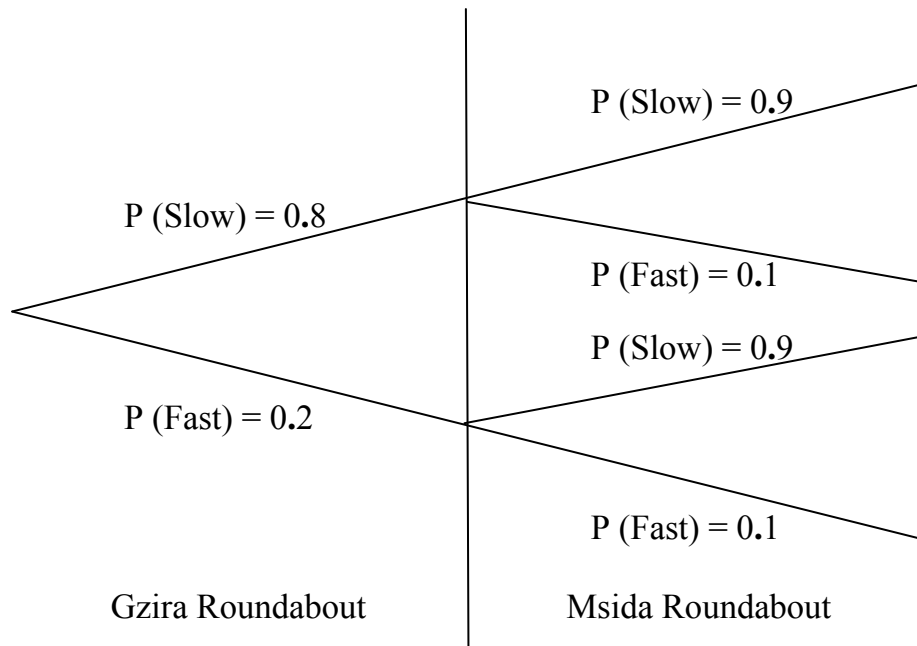
(i) The traffic is **slow** moving at **both** roundabouts.

_____

(ii) The traffic is **slow** moving at one roundabout and **fast** moving at the other.

_____

(iii) The traffic is **fast** moving **at least** at one of the roundabouts.

_____

b) Maria drives to the office **200** times in a year. How many times could she expect to find **fast** moving traffic at **both** roundabouts? (**Show your working**).

_____

(9 marks)

END OF PAPER