P6 LEAVING NATIONAL EXAMINATIONS OF MATHEMATICS
AND THEIR MARKING GUIDES

FROM 2012 TO 2023

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Top 10 study tips

1. Have all your materials ready before you begin studying: pencils, pens, papers, calculators if necessary etc.
2. Be positive. Make sure your brain holds on to the information you are learning by reminding yourself how important it is to remember the work and get the marks.
3. Take a walk outside. A change of scenery will stimulate your learning. You'll be surprised at how much more you take in after being outside in the fresh air.
4. Break up your learning sections into manageable parts. Trying to learn too much at one time will only result in a tired, unfocused and anxious brain.
5. Keep your study sessions short but effective and reward yourself with short, constructive breaks.
6. Teach your concepts to anyone who will listen. It might feel strange at first, but it is definitely worth reading your revision notes aloud.
7. Your brain learns well with colours and pictures. Try to use them whenever you can.
8. Be confident with the learning areas you know well and focus your brain energy on the sections that you find more difficult to take in.
9. Repetition is the key to retaining information you have to learn. Keep going – don't give up!
10. Sleeping at least 8 hours every night, eating properly and drinking plenty of water are all important things you need to do for your brain. Studying for exams is like strenuous exercise, so you must be physically prepared.

"If you can't explain it simply, you don't understand it well enough".
Albert Einstein

On the day of the exam …

1. Make sure you have all the necessary stationery for your exam, i.e. pens, pencils, eraser, protractor, compass, calculator (with new batteries). Make sure you bring your ID document and examination admission letter.
2. Arrive on time, at least one hour before the start of the exam.
3. Go to the toilet before entering the exam room. You don't want to waste valuable time going to the toilet during the exam.
4. Use the 10 minutes reading time to read the instructions carefully.
5. This helps to 'open' the information in your brain. Start with the question you think is the easiest to get the flow going.
6. Break the questions down to make sure you understand what is being asked. If you don't answer the question properly you won't get any marks for it. Look for the key words in the question to know how to answer it.

Try all the questions. Each question has some easy marks in it so make sure that you do all the questions in the exam.

7. Never panic, even if the question seems difficult at first. It will be linked with something you have covered. Find the connection.
8. Manage your time properly. Don't waste time on questions you are unsure of. Move on and come back if time allows.
9. Check weighting – how many marks have been allocated for your answer? Do not give more or less information than is required.
10. Write big and bold and clearly. You will get more marks if the marker can read your answer clearly.

Source: Alfie Bouwer, Sivalingam Chetty et al; 2014, ***Mind the gap, Life sciences study guide grade 12,*** Department of basic education, Pretoria, South Africa.

Note: Through the questions herein are fully answered, it is highly recommended that you first read and understand the question, make your trials and then compare with what is given in the solution. It is also advisable that you read through the book several times before the final examinations.

I am certain that if a student can answer all these questions in this document with ease, he/she should be able to pass with a distinction in the P6 leaving national examinations of mathematics.

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'' *Everyone is a genius. But if you judge a fish by its ability to climb a tree, it will spend its whole life believing that it is stupid.* ''
Albert Einstein

''*Never say you have failed until you have reached your last attempt, and never say it's your last attempt until you have succeded.* ''
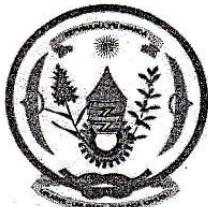
'' *There are no secrets to success. It's all about preparing, hard work and learning from failure.* ''

Mathematics
PMA

06 Nov. 2012   09:00 – 11:00a.m

Pupil's complete index number

Province /City	District	Sector	School	Level	Pupil	Year

Pupil's names

Surname: ....

Other names: ....

NB: PUPIL'S INDEX NUMBER AND NAMES **MUST** BE WRITTEN AS THEY APPEAR ON THE REGISTRATION FORM

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2012

MATHEMATICS

DURATION: Two hours

Marks: | /100 |

INSTRUCTIONS:
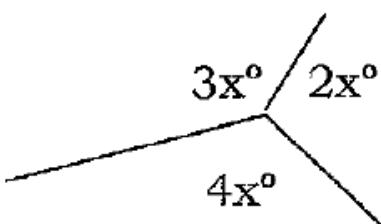
1) Do not open this paper until you are told to do so.
2) *This paper consists 35 questions and 12 pages. Before starting, verify if all pages and all questions are there and are there and are arranged in order.*
3) **Write your complete index number and names in full (as written on your registration form) in the spaces provided above.**
4) Answer **ALL** questions in this paper
5) Read each question carefully before answering it.
6) Answer the questions in the space provided on this question paper.
7) Show your working clearly. Marks will be given for showing steps. All rough work must be done in the space under each question.
8) You must use a blue pen.
9) You are allowed to use a ruler, and a protractor.
10) **You are __NOT__ allowed to use a calculator.**

ATTEMPT ALL QUESTIONS IN THIS PAPER   **(100 MARKS)**

YOU MAY DO ROUGH WORK IN THE SPACE PROVIDED BELOW EACH QUESTION.	GIVE YOUR ANSWER IN THE SPACE PROVIDED IN THIS COLUMN. SHOW THE WORKING STEPS.
1) Find the next two numbers in the following sequence: 4, 7, 10, …. ; …. **(2 marks)**	
2) Calculate: $340 \times 4 : 170 \times 4$ **(2 marks)**	
3) Find the area of a square whose perimeter is 20cm. **(2 marks)**	
4) Simplify: $\frac{1}{3} + \frac{1}{4} + \frac{5}{12}$ **(2 marks)**	
5) Share 7000frw between two students in the ratio of 2:5. **(2 marks)**	
6) Express 140 as a product of its prime factors. **(2 marks)**	

7) Arrange the following in ascending order:
$\frac{2}{5}, \frac{1}{3}, \frac{3}{7}$ **(2 marks)**

8) Calculate the area of a parallelogram whose length is 10cm, height is 4cm and width is 6cm. **(2 marks)**

9) The price of petrol was increased by 2% per litre. Find the new price of 1 litre of petrol if the old price was 990frw. **(2 marks)**

10) Solve the equation: $2x + 4 = 8 - 2x$ **(2 marks)**

11) The perimeter of a rectangle is 36cm. Find it's area if its width is 6cm. **(2 marks)**	
12) Add and give the answer in base two: $1011_{two} + 5_{ten}$ **(2 marks)** **(This question is no longer on the new curriculum)**	
13) Set A = {2, 3, 5, 7, 11} and Set B = {10, 5, 2, 4}. (a) Find A∪B **(1 mark)** (b) Find A∩B **(1 mark)**	
14) Find the value of x in the figure below. **(2 marks)** $3x^o$ / $2x^o$ $4x^o$	
15) Find the area of a semi-circle whose	

diameter is 0.14dm. ($\pi = \frac{22}{7}$)   **(2 marks)**

16) Taxi starts from Kigali at 8:05am and travels at an average speed of 60km/hr until 9:00am. What distance has the taxi travelled?   **(2 marks)**
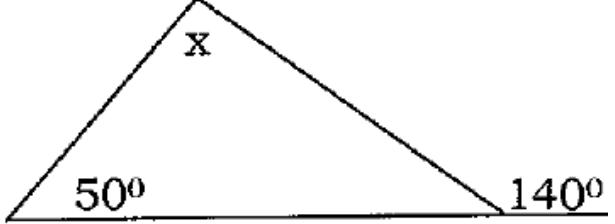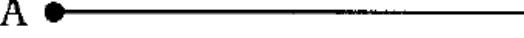
17) In the figure below, find angles m and n.   **(2 marks)**
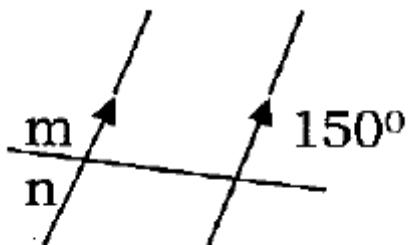
18) Write a pair of:

(a) Complementary angles.   **(1 mark)**

(b) Supplementary angles.   **(1 mark)**

19) There is enough food for 3 people for 12 days. How many days would this food last if there were 9 people? **(2 marks**)	
20) The base of a right-angled triangle is 8cm and the hypotenuse is 10cm. Find the height of the triangle. **(2 marks)**	
21) Find angle x in the figure below. **(2 marks)** 50⁰ ... 140⁰ ... x	
22)Draw an angle of 60° at point A on the line below. Use a ruler, a pair of compasses and a pencil only. **(2 marks)** A ●———————————	A ●———————————
23) A shirt was sold at 20% loss for 8000Frw. What was the cost price? **(2 marks)**	

24) How many lines of symmetry does (a) A rhombus have? **(1 mark)** (b) an isosceles triangle have? **(1 mark)**	
25) The cost of a book is 5000frw. How many books can be bought with 24,000frw? **(2 marks)**	
26) Given that $x = -2, y = 3,$ find the value of $2x^2 + xy - x.$ **(3 marks)**	
27) The perimeter of the base of a cylinder is 31.4cm. Find the volume of the cylinder if the height is 10cm. (π = 3.14) **(3 marks)**	
28) An interior angle of a regular polygon is 150°. How many sides does the polygon have? (3 marks)	

29) A man spent $\frac{1}{8}$ of his salary on fees and $\frac{2}{5}$ of the salary on a car loan. He remains with 380 000frw. What is the man's salary? **(3 marks)**	
30) A Pie chart represents goats, cows and pigs on a farm. The angle representing pigs on the Pie chart is 45°. There are 40 pigs and 120 cows on the farm. How many goats are there on the farm? **(3 marks)**	
31) Kigali is 50km from Rwamagana. A car leaves Kigali for Rwamagana at 7:30am and travels at an average speed of 45km/hr. At the same time, a taxi leaves Rwamagana for Kigali and travels at an average speed of 30km/hr. (a) Find the distance from Kigali where the two vehicles meet. **(5 marks)** (b) At what time do the two vehicles meet? **(2 marks)**	

32) Use quick method to calculate:
   (a) 642×50. **(2 marks)**

   (b) 2225×49. **(2 marks)**

   (c) 16999×99. **(2 marks)**

   (d) 4444×25. **(2 marks)**

33) The table below shows the results of football matches played by a school football team.

Number of goals scored	0	1	2	3	4
Number of matches played	3	2	2	3	0

Complete the frequency table below and calculate the mean number of goals per match. **(7 marks)**

Number of goals x	Frequency f	fx
0		
1		
2		
3		
4		
Total		

Mean goals per match =

34) 90 000frw is kept at 10% p.a compound interest. Find the amount kept after 3 years. **(7 marks)**	
35) The information shows two types of beans and their costs per kilogram. 	Type	Quantity	Cost per kilogram
---	---	---
A	300 kg	300 Frw
B	X kg	400 Frw | What is the value of X which would make the cost of one kilogram of the mixture 340 Frw? **(7 marks)**	

MARKING GUIDE OF P6 MATHEMATICS NATIONAL EXAMINATION 2012

1. 4, (4+3), (7 +3), (10 +3), (13 + 3)

   4, 7, 10, 13, 16

2. $340 \times 4 \div 170 \times 4 = 1360 \div 680 = 2$

3. $4S = 20cm$

   $S = \frac{20cm}{4} = 5cm$

   $A = S \times S = 5cm \times 5cm = 25cm^2$

4. LCD = 12

   $\frac{1}{3} + \frac{1}{4} + \frac{5}{12} = \frac{1 \times 4 + 1 \times 3 + 5 \times 1}{12} = \frac{4+3+5}{12} = \frac{12}{12} = 1$

5. Total ratio = 2 + 5 = 7

   First student $= 7000 Frw \times \frac{2}{7} = 2,000 Frw$

   Second student $= 7000 Frw \times \frac{5}{7} = 5,000 Frw$

6. $140 = 2 \times 2 \times 4 \times 7$

7. $\frac{2}{5} = 0.4$

   $\frac{1}{3} = 0.333$

   $\frac{3}{7} = 0.42$

   $Ascending\ order: \frac{1}{3}; \frac{2}{5}; \frac{3}{7}$

8.

   $A = b \times h = 10cm \times 4cm = 40cm^2$

9. Amount increased $= 990 Frw \times 2\% = 990 Frw \times \frac{2}{100} = 19.8 Frw$

   New price $= 990 Frw + 19.8 Frw = 1009.8 Frw$

10. $2x + 4 = 8 - 2x$

    $2x + 2x = 8 - 4$

    $4x = 4$

$$\frac{4x}{4} = \frac{4}{4}$$

$$x = 1$$

11. $P = 2(L + W)$

$36 = 2(L + 6)$

$36 = 2L + 12$

$36 - 12 = 2L$

$24 = 2L$

$$\frac{24}{2} = \frac{2L}{2}$$

$L = 12cm$

$A = L \times W = 12cm \times 6cm = 72cm^2$

12.

B	N	R
2	5	1
2	2	0
2	1	1
	0	

```
  1 0 1 1two
+   1 0 1two
  1 0 0 0 0two
```

$5_{ten} = 101_{two}$

13. (a) $A \cup B = \{2, 3, 4, 5, 7, 10, 11\}$

   $(b) = A \cap B = \{2, 5\}$

14. $3x + 4x + 2x = 360°$

$9x = 360°$

$$\frac{9x}{9} = \frac{360°}{9}$$

$x = 40°$

15. $D = 0.14\ dm$

$r = \frac{D}{2} = \frac{0.14dm}{2} = 0.07dm$

$A = \frac{1}{2}\pi r^2 = \frac{1}{2} \times \frac{22}{7} \times \frac{7}{100}dm \times \frac{7}{100}dm = \frac{77}{10000}dm^2 = 0.0077dm^2$

16. S = 60km/h

T = 9:00am − 8:05am = 55min = $\frac{55}{60}hr$

$D = S \times T = \frac{60km}{hr} \times \frac{55}{60}hr = 60km$

---

17. Angle n = 150°

Angle m = 180° - 150° = 30°

18. (a) 80° and 10°; 60° and 30°; 55° and 35°

(b) 140° and 40°; 160° and 20°; 145° and 35°

19. 3 people = 12 days

1 person = $(12 \times 3) \, days$

9 people $= \frac{12 \times 3}{9} \, days = 4 \, days$

20. $h = \sqrt{H^2 - b^2} = \sqrt{(10 \times 10) - (8 \times 8)} = \sqrt{100 - 64} = \sqrt{36 cm^2} = 6cm$

21. $x + 50° = 140°$

$x = 140° - 50° = 90°$

22.
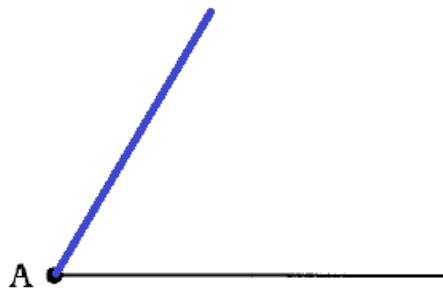
23. The loss is equal to 20%

8,000Frw is equal to 80% of the cost price

The cost price $= 100\% = \frac{8000 \times 100}{80} = 10,000 Frw$

24. (a) A rhombus has 2 lines of symmetry

(b) An isosceles triangle has 1 line of symmetry.

25. 1 book costs 5,000Frw

Number of books sold $= \frac{24,000 Frw}{5,000} = 4 \, books \, and \, a \, balance \, of \, 4,000 Frw$

26. $2x^2 + xy - x = 2 \times 2^2 + (-2) \times 3 - (-2) = 8 + (-6) + 2 = 8 - 6 + 2 = 4$

27. $D = \frac{C}{\pi} = \frac{31.4}{3.14} = 10cm$

$r = \frac{D}{2} = \frac{10cm}{2} = 5cm$

$V = \pi r^2 h = 3.14 \times 5 \times 5 \times 10 = 785 cm^3$

28. Ext = 180° - int angle

= 180° - 150° = 30°

$$S = \frac{360°}{Ext\ angle} = \frac{360°}{30°} = 12\ sides$$

29. $Fees = \frac{1}{8}$

$Car\ loan = \frac{2}{5}$

$Frw\ remaining = 1 - \left(\frac{1}{8} + \frac{2}{5}\right) = 1 - \left(\frac{4+16}{40}\right) = 1 - \left(\frac{20}{40}\right) = 1 - \frac{1}{2} = \frac{1}{2}$

$Remaining\ Frw = \frac{1}{2} = 380,000Frw$

$Salary = 380,000Frw \times 2 = 760,000Frw$

30. Let the total number be x

$\frac{45}{360} \times x = 40$

$x = \frac{40 \times 360}{45} = 320\ animals$

Number of goats = 320 – (number of pigs + number of cows) = 320 – (40 + 120) = 320 – (40 + 120) = 320 – 160 = 160 goats

31. $T = \frac{D}{S_1 + S_2} = \frac{50km}{\frac{45km}{h} + \frac{30km}{h}} = \frac{50km}{\frac{75km}{hr}} = \frac{2}{3}hr$

$D = S \times T = \frac{45km}{h} \times \frac{2}{3}hr = 30km$

$T = 7:30am + \left(\frac{2}{3} \times 60\right)min = 7:30am + 40min = 8:10am$

32. (a) $642 \times 50 = (652 \times 100):2 = 64,200:2 = 32,100$

(b) $2224 \times 49 = \left(\frac{2,224 \times 100}{2}\right) - 2,224 = \frac{222,400}{2} - 2,224$

$= 111,200 - 2,224 = 108,976$

(c) $16999 \times 99 = (16,999 \times 100) - 16,999 = 1,699,900 - 16,999 = 1,892,901$

(d) $4444 \times 25 = 4,444 \times 100 \div 4 = 444,400:4 = 111,100$

33.

Number of goals (x)	Frequency (f)	fx
0	3	0
1	2	2
2	2	4
3	3	9
4	0	0
	Total (f) = 10	**Total (fx) = 15**

The mean $= \frac{Total\ fx}{total\ f} = \frac{15}{10} = 1.5$

Approximately two goals per match.

34. After one year

$I = \frac{PTR}{100} = \frac{90,000 \times 1 \times 10}{100} = 9,000 Frw$

Amount after one year = 90,000Frw + 9,000Frw = 99,000Frw

After the second year

$I = \frac{PTR}{100} = \frac{99,000 \times 1 \times 10}{100} = 9,900 Frw$

Amount after the second year = 99,000Frw + 9,900Frw = 108,900Frw

After the third year

$I = \frac{PTR}{100} = \frac{108,900 \times 1 \times 10}{100} = 10,890 Frw$

Amount after the third year = 108,900Frw + 10,890Frw = 119,880Frw

35.

	Type A	+	Type B	=	Mixture
Qty	300	+	x	=	$(300 + x)$
Px/kg	300		400		340

Multiply each quantity by its price to form an equation

$(300 \times 300) + (400 \times x) = 340(300 + x)$

$90,000 + 400x = 102,000 + 340x$

$400x - 340x = 102,000 - 90,000$

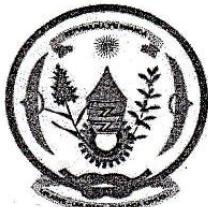$60x = 12,000$

$\frac{60x}{60} = \frac{12,000}{60}$

$x = 200Kg$

The quantity of the second type is 200kg

Mathematics
PMA

22 Oct. 2013   09:00 – 11:00a.m

Pupil's complete index number

Province /City	District	Sector	School	Level	Pupil	Year

Pupil's names

Surname: ....

Other names: ....

NB: PUPIL'S INDEX NUMBER AND NAMES **MUST** BE WRITTEN AS THEY APPEAR ON THE REGISTRATION FORM

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2013

MATHEMATICS

DURATION: Two hours
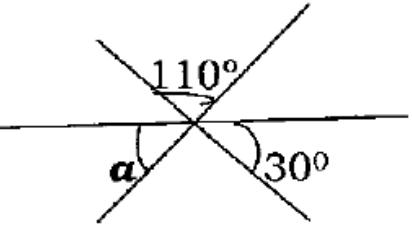
Marks: /100

INSTRUCTIONS:

1) Do not open this paper until you are told to do so.
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8) You must use a blue pen.
9) You are allowed to use a ruler, and a protractor.
10) **You are NOT allowed to use a calculator.**

ATTEMPT ALL QUESTIONS IN THIS PAPER　　　　　　**(100 MARKS)**

YOU MAY DO ROUGH WORK IN THE SPACE PROVIDED BELOW EACH QUESTION.	GIVE YOUR ANSWER IN THE SPACE PROVIDED IN THIS COLUMN. SHOW THE WORKING STEPS.
1) Add: 2,045 + 1,055 + 900　　**(2 marks)**	
2) Write in words: 3,005　　**(2 marks)**	
3) Add: 200g + 0.04kg = ... dag **(2 marks)**	
4) Find the size of angle a in the figure below:　　**(2 marks)**	
5) Calculate: 0.84×25　　**(2 marks)**	
6) Simplify completely: $\frac{3}{7} \div \frac{9}{14}$　　**(2 marks)**	

7) Find the value of m in the equation: 3m – 4 = 5 **(2 marks)**	
8) Write the next two numbers in the following sequence: **(2 marks)** 1, 4, 9, ... , ...	
9) Divide 10,000Rwf in the ratio 3:7 **(2 marks)**	
10) Decrease 200kg by 20% **(2 marks)**	
11) The perimeter of the rectangle below is 40cm. Find x. **(2 marks)** 12cm x cm	

12) The cost of 2kg of beans is 620Rwf. Find the cost of 8kg of the beans. **(2 marks)**	
13) A number is increased by 20%. If the new number is 2,400, find the original number. **(2 marks)**	
14) Find and fill in the missing numbers in the table below. **(2 marks)** 	4	7	6		 9		13	21	
15) The solid below is of a cube with a mass of 200g. Find its density. **(2 marks)** 5cm 5cm 5cm	
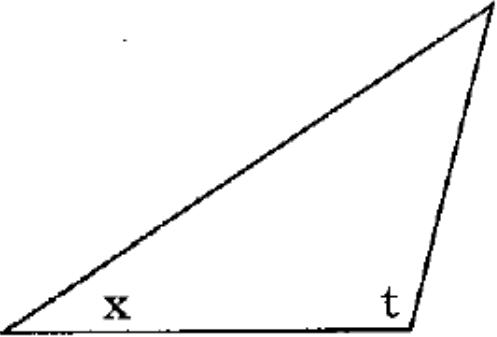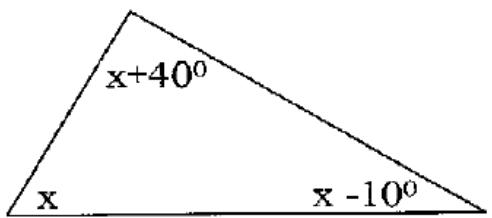
Table for 14:

4	7	6	
9		13	21

Second table (answer box for 14):

4	7	6	
9		13	21
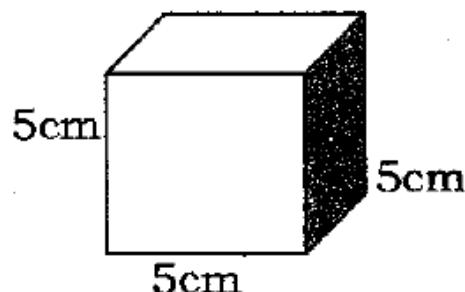
16) Find the highest common factor (HCF) of 12, 15 and 21. **(2 marks)**	
17) Using a protractor measure angle x and t. (a) Angle x = **(1 mark)** (b) Angle t = **(1 mark)** 	
18) A man buys a car at 3,000,000Rwf and sells it at 3,900,000Rwf. What is the percentage profit? **(2 marks)**	
19) Simplify completely: $1\frac{1}{4} \times 1\frac{1}{15}$ **(2 marks)**	
20) Find the circumference of a circle whose	

radius is 5cm and $\pi = 3.14$ **(2 marks)**	
21) If a = -1, b = 2 and c = -3, find the value of: ab + 2ac **(2 marks)**	
22) How many lines of symmetry does a square have? **(1 mark)** Draw the lines of symmetry in the square on the right? **(1 mark)**	
23) Calculate: 2h 12 min – 1h 50min **(2 marks)**	
24) How many 500ml bottles can be filled from 2 litres of water? **(2 marks)**	
25) Electricity poles are fixed 50m apart	

along a distance of 4,500m. How many poles are fixed? **(2 marks)**

26) The sum of three consecutive odd numbers is 39. Find the three numbers. **(3 marks)**

27) Calculate and express the answer in base ten: $111_{two} + 102_{three}$ **(3 marks)**

(This question is no longer on the new program)

28) Six (6) men complete working in 4 days. How many days will 8 men complete the same work? **(3 marks)**

29) Arrange the following in ascending order: **(3 marks)**

$$\frac{3}{7} ; \frac{5}{14} ; \frac{13}{28}$$

30) Set E = {2, 3, 4, 6, 7} and set F = {1, 3, 5, 7, 8}. Represent set E and set F on a Venn diagram showing the members of the different subsets. **(3 marks)**	
31) a) Solve: $\frac{2x}{4} - \frac{x+1}{3} = 2$ **(3 marks)** b) Find the size of each angle in the figure below: **(4 marks)** 	
32) (a) Simple interest of 20,000Rwf was made for two years at 10% profit per year. Find the capital. **(3 marks)** (b) 8kg of beans costing 250Rwf per kilogram are mixed with 12kg of another type of beans.	

If the cost of the mixed beans is 280Rwf per kilogram, find the cost of 1kg of the second type of beans. **(4 marks)**

33) Town **A** and **B** are 300km apart. A car leaves town **A** at 8:00am for town **B**. At the same time a bus leaves town **B** for town **A**. The speed of the car is 90km/hr. And the speed of the bus is 60km/hr.

(a) At what distance in km from town **A** will the car meet the bus? **(5 marks)**

(b) At what time do the two vehicles meet? **(2 marks)**

34) The following are the coordinates of points: (0,0), (1,2) and (3,6).

(a) On the graph paper, draw y-axis and x-axis (graduate the axes). **(2 marks)**

(b) Plot those points on the graph and join them with a line. **(4 marks)**

(c) If A (x, 3) is a point on the graph, find x. **(1 mark)**
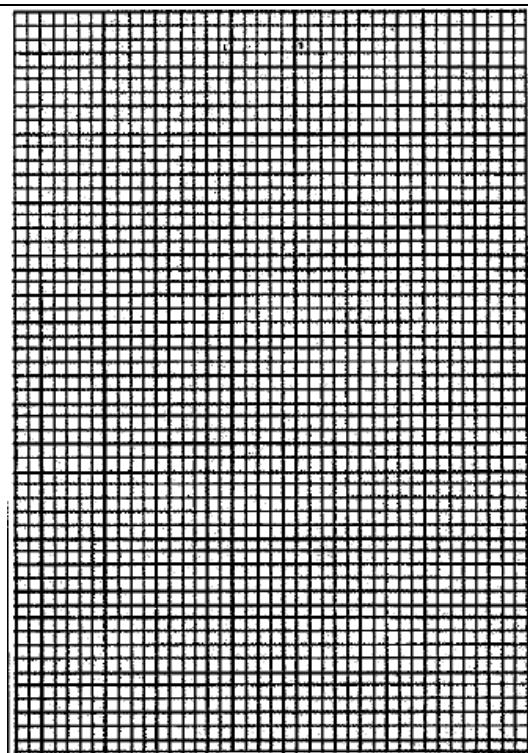
35) The following are ages of 10 people: 35, 35, 33, 36, 42, 33, 35, 40, 33, 40, 33.

Make a frequency table and calculate the mean age. **(7 marks)**

1. $2{,}045 + 1{,}055 + 900 = 4{,}000$

2. Three thousand and five

3. $200g = 20dag$

   $0.04kg = 4dag$

   $200g + 0.04kg = 20dag + 4dag = 24dag$

4. Angle a $= 180° - (110° + 30°) = 180° - 140° = 40°$

5. $0.84 \times 25 = \frac{84}{100} \times 25 = \frac{84}{4} = 21$

6. $\frac{3}{7} \div \frac{9}{14} = \frac{3}{7} \times \frac{14}{9} = 3 \times \frac{2}{9} = \frac{2}{3}$

7. $3m - 4 = 5$

   $3m = 5 + 4$

   $3m = 9$

   $\frac{3m}{3} = \frac{9}{3}$

   $m = 3$

8. $1 \times 1; \; 2 \times 2; \; 3 \times 3; \; 4 \times 4$

   The following two numbers are

   $1; \; 4; \; \mathbf{9}; \; \mathbf{16}$

9. Total ratio $= 3 + 7 = 10$

   First number $10{,}000 \times \frac{3}{10} = 3{,}000Rwf$

   Second number $10{,}000 \times \frac{7}{10} = 7{,}000Rwf$

10. $100\% - 20\% = 80\%$

    80% of $200kg = 200kg \times 80\% = 160kg$

11. $P = 2(L + W)$

    $40cm = 2(12 + x)$

    $40cm = 24cm + 2x$

    $2x = 40cm - 24cm$

    $2x = 16cm$

    $\frac{2x}{2} = \frac{16cm}{2}$

    $x = 8cm$

12. $2kg\ cost\ 620Rwf$

$1kg\ costs\ \frac{620}{2}Rwf = 310Rwf$

$8kg\ will\ cost\ 310 \times 8 = 2,480Rwf$

13. The new number is 2,400 = 120%

The first number = $2,400 \times \frac{100}{120} = 2,000$

14.

4	7	6	**10**
9	**15**	13	21

15. $Volume\ of\ the\ solid = 5cm \times 5cm \times 5cm = 125cm^3$

$Mass\ of\ the\ solid = 200g$

$$Density\ of\ the\ solid = \frac{mass}{volume} = \frac{200g}{125cm^3} = 1.6g/cm^3$$

16. $12 = 3 \times 4$

$15 = 3 \times 5$

$21 = 3 \times 7$

The HCF = 3

17. a) $Angle\ x = 33.5°$

   b) $Angle\ t = 105°$

18. Profit = 3,900,000Rwf – 3,000,000Frw = 900,000Rwf

Percentage profit = $\frac{900,000}{3,000,000} \times 100 = 30\%$

19. $1\frac{1}{4} \times 1\frac{1}{15} = \frac{5}{4} \times \frac{16}{15} = \frac{4}{3} = 1\frac{1}{3}$

20. $C = 2\pi \times r = 2 \times 3.14 \times 5 = 31.4$cm

21. $ab + 2ac = -1 \times 2 + 2 \times (-1) \times (-3) = -2 + 6 = 6 - 2 = 4$

22. A square has 4 lines of symmetry
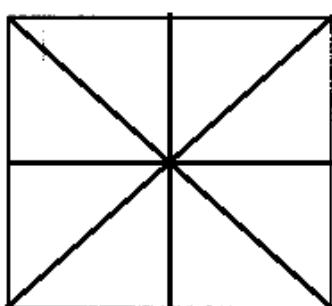
23. $2h12\min - 1h50min = 132min - 110min = 22min$

24. $2l = 2,000ml$

Number of bottles $= \frac{2000ml}{500ml} = 4$

25. Number of poles to be fixed $= \frac{4,500m+50m}{50m} = \frac{4550m}{50m} = 91$

26. Let x be the $first$ $number$

$x + 2$ be the $second$ $number$

$x + 4$ be the $third$ $number$

$x + x + 2 + x + 4 = 39$

$3x + 6 = 39$

$3x = 59 - 6$

$3x = 33$

$x = 11$

The first number is 11

The second number is 13

The third number is 15

27. $111_{two} + 102_{three}$

$111_{two} = 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 = 4 + 2 + 1 = 7_{ten}$

$102_{three} = 1 \times 3^2 + 0 \times 3^1 + 2 \times 3^0 = 9 + 0 + 2 = 11_{ten}$

$111_{two} + 102_{three} = 7_{ten} + 11_{ten} = 18_{ten}$

28. 4 men = 4 days

1 man = 4×6 $days$

8 men $= \frac{4 \times 6}{8} days = 3$ $days$

29. Lowest common denominator is 56

$\frac{3}{7} = \frac{24}{56}$

$\frac{5}{14} = \frac{20}{56}$

$\frac{13}{28} = \frac{26}{56}$

Ascending order is $\frac{5}{14} ; \frac{3}{7} ; \frac{13}{28}$

30.
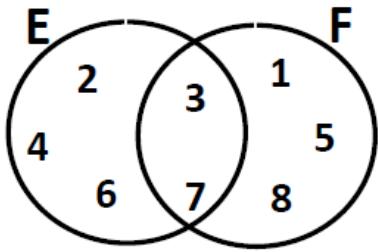
31. (a) $\frac{2x}{4} - \frac{x+1}{3} = 2$

$\frac{2x \times 3}{12} - \frac{4(x+1)}{12} = \frac{24}{2}$

$\frac{6x - 4x - 4}{12} = \frac{24}{12}$

$2x - 4 = 24$

$2x = 24 + 4$

$2x = 28$

$\frac{2x}{2} = \frac{28}{2}$

$x = 14$

(b) $x + x + 40° + x - 10° = 180$

$3x - 30° = 180°$

$3x = 180° - 30°$

$3x = 150°$

$\frac{3x}{3} = \frac{150°}{3}$

$x = 50°$

$x + 40° = 50° + 40° = 90°$

$x - 10° = 50° - 10° = 40°$

32. (a) $P = \frac{I \times 100}{T \times R} = \frac{20,000 \times 100}{2 \times 10} = 100,000 Frw$

(b)

	1st		2nd		Mix
Qty	8	+	12	=	20
Px/kg	250		x		280

$(250 \times 8) + (12 \times x) = (280 \times 20)$

$2,000 Frw + 12x = 5,600 Frw$

$12x = 5,600 Rfw - 2,000 Rwf$

$12x = 3,600 Rfw$

$\frac{12x}{12} = \frac{3,600Rwf}{12}$

$x = 300Rwf$

The cost of the second type is 300Rfw per kg.

33. (a) Time taken by each car to meet another $= \frac{D}{S_1+S_2} = \frac{300km}{\frac{90km}{h}+\frac{60km}{h}} =$

$\frac{300km}{150km/h} = 2\ hours$

$D = S \times t = \frac{90km}{h} \times 2hr = 180km$

(b) 8:00am + 2hr = 10:00am

34. (a) and (b) on the graph below
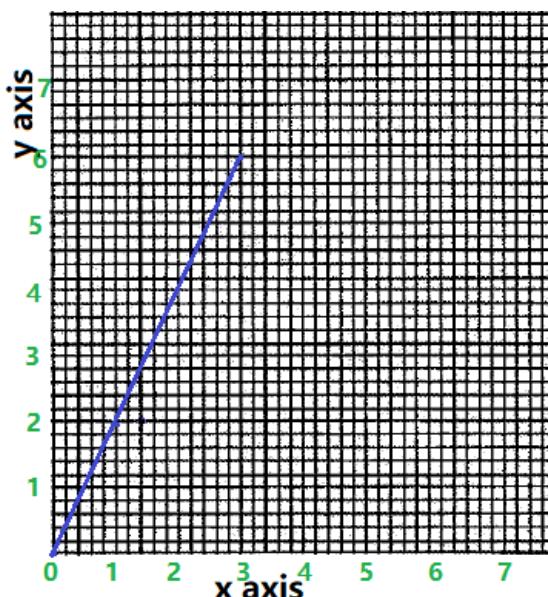
(c)

0	1	3	x
0	2	6	3

$2x = y$

$2x = 3$

$\frac{2x}{2} = \frac{3}{2}$

$x = 1.5$

35. (a)

Ages (x)	Frequency (f)	fx
33	4	132
35	2	70
36	1	36
40	2	80
42	1	42
	Total $(f) = 10$	Total $(fx) = 360$

The mean $= \dfrac{Total\ fx}{total\ f} = \dfrac{360}{10} = 36$

Mathematics PM

21 Oct. 2014   09:00 – 11:00AM

Rwanda Education Board

Pupil's complete index number

Province /City	District	Sector	School	Level	Pupil	Year

Pupil's names

Surname: ....

Other names: ....

NB: PUPIL'S INDEX NUMBER AND NAMES **MUST** BE WRITTEN AS THEY APPEAR ON THE REGISTRATION FORM

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2014

MATHEMATICS

DURATION: Two hours

Marks: /100

INSTRUCTIONS:

1) Do not open this paper until you are told to do so.
2) This paper consists of 35 questions and 12 pages. Before starting, verify if all pages and all questions are there and are arranged in ascending order.
3) Answer **ALL** questions in this paper
4) Read each question carefully before answering it.
5) Answer the questions in the space provided on this question paper.
6) Show your working clearly. Marks will be given for showing steps. All rough work must be done in the space under each question.
7) You must use a blue or black ink pen.
8) You are allowed to use a ruler, and a protractor.
9) **You are NOT allowed to use a calculator.**

ATTEMPT ALL QUESTIONS IN THIS PAPER   **(100 MARKS)**

YOU MAY DO ROUGH WORK IN THE SPACE PROVIDED BELOW EACH QUESTION.	GIVE YOUR ANSWER IN THE SPACE PROVIDED IN THIS COLUMN. SHOW THE WORKING STEPS.
1) Add: 563,091 + 36,909 **(2 marks)**	
2) (a) What is the place value of 0 (zero) in the figure 460,123? **(1 mark)** (b) Write in figures: Six million, eight hundred thousand, twenty six. **(1 mark)**	
3) What is the square root of 2.25? **(2 marks)**	
4) Subtract: $0.2hm^2 - 4dam^2 = ... m^2$ **(2 marks)**	
5) Add and express the answer in binary: $101_{two} + 10_{three}$ **(2 marks)**	
6) Calculate: 2h 30min – 1h 45min **(2 marks)**	

7) In the figure below, find the value of x. **(2 marks)**	
8) Find the mean of: 9, 3, 1, 8, 4 and 5. **(2 marks)**	
9) How many lines of symmetry does; (a) a rectangle have? **(1 mark)** (b) a square have? **(1 mark)**	
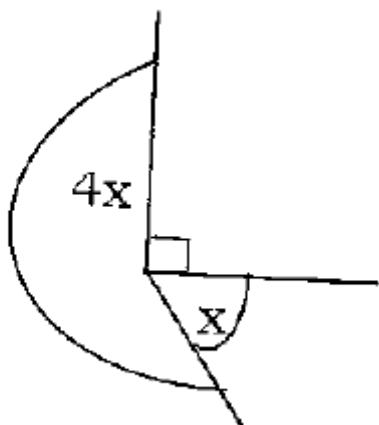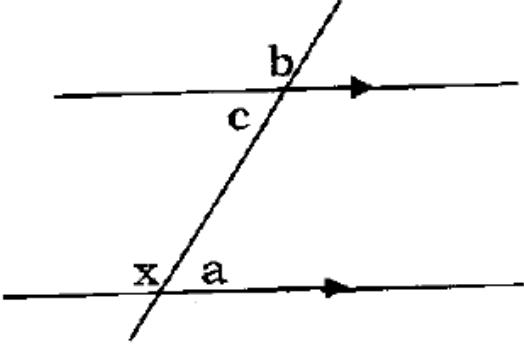
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10) In the figure below, which of the angles a, b or c is equal (a) to angle x? **(1 mark)** (b) to angle a? **(1 mark)** 	
11) Find the area of a square whose perimeter is 18cm. **(2 marks)**	
12) Express 105 as a product of its prime factors. **(2 marks)**	
13) Solve for x: $2x - 1 = 2 - x$ **(2 marks)**	

14) Calculate the Highest Common Factor (HCF) of 9, 12 and 15. **(2 marks)**	
15) In a class of 40 pupils, the ratio of boys to girls is 2:3. Find the; (a) number of girls in the class. **(1 mark)** (b) number of boys in the class. **(1 mark)**	
16) In a school of 1,200 pupils, 60% weigh 40kg or more. How many pupils weigh less than 40kg? **(2 marks)**	
17) (a) Six books cost 2,400Frw altogether. How many similar books can be bought with 5,000Frw? **(1.5 marks)** (b) How much money will remain? **(0.5 mark)**	
18) A pupil scored 28 marks out of 40.	

Express the pupil's marks as a percentage. **(2 marks)**	
19) A water tank contains 6,000litres of water. If a tap is opened and releases water at 20 litres per minute, how long will it take the tank to become completely empty? **(2 marks)**	
20) Simplify completely: $\left(\frac{3}{5} \div \frac{4}{5}\right) \times \frac{4}{9}$ **(2 marks)**	
21) Evaluate: $\frac{4mp+3n}{n}$ $when\ m = -3, n = 6\ and\ p = -2.$ **(2 marks)**	
22) Set A = {all prime numbers between 0 and 14}. Set B = {all odd numbers between 0 and 14}. (a) List the elements of A∩B. **(1 mark)** (b) Represent the information in a Venn diagram showing elements in each set. **(1 mark)**	
23) (a) Measure the acute angle below and write its size. **(1 mark)**	(a)
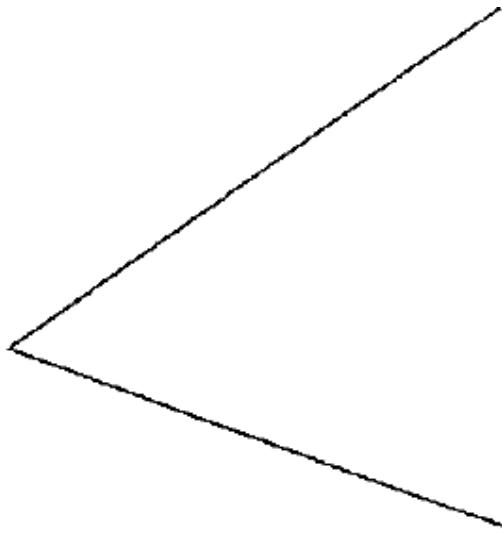
(b) Using a pair of compasses and ruler, bisect the acute angle above. **(1 mark)**

(b)

24) Find the percentage profit on a bicycle bought at 55,000Frw and sold at 66,000Frw. **(2 marks)**

25) The total surface area of a sphere is 5,544cm². Find its volume. $\left[\pi = \frac{22}{7}\right]$ **(2 marks)**

26) In the triangle ABC, $\overline{AD}$ is perpendicular

to $\overline{BC}$, $\overline{AB} = \overline{AC}$ and angle ABC = 45°.

(a) Find the size of angle CAD.   **(2 marks)**
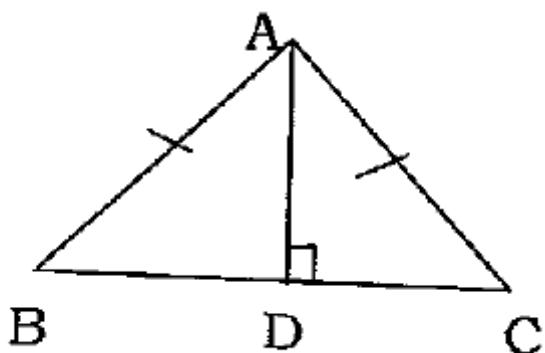
(b) What is the name given to the triangle ABC?   **(1 mark)**

27) Arrange the following fractions in ascending order: 0.42, $\frac{11}{25}$, $\frac{12}{30}$, 0.41 **(3 marks)**

28) A rectangular flower garden is represented by a scale drawing below with a scale 1cm representing 10m.
Calculate:
(a) the actual length of the garden.
(b) the actual width of the garden.
(c) the surface area of the garden.   **(3 marks)**
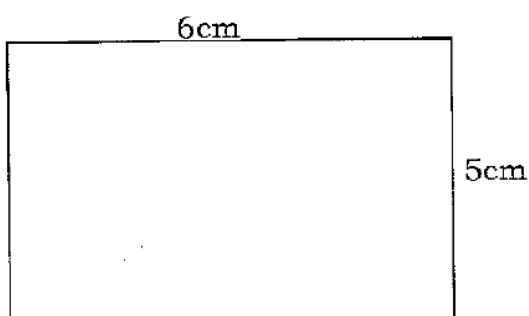
29) An interest of 20,000Frw was made after 2 years at a simple interest rate of 10% per

year. Find the amount of money invested. **(3 marks)**	
30) The figure below is a trapezium. Find its area. **(3 marks)** 14 cm 4cm 6cm	
31) (a) If a = ⁻1, b = 2 and c = 3, find the value of $2a^2b - ac$. **(2 marks)** (b) Observe the figure below and answer the questions that follow. (3x+1) cm (3x-7) cm (x+9) cm (i) Name the figure. **(1 mark)** (ii) Calculate the value of x. **(2 marks)** (iii) Calculate the perimeter and the surface area of the figure. **(2 marks)**	
32) A sum of 3,000,000Frw is invested for 2 years at a compound interest of 5% per	
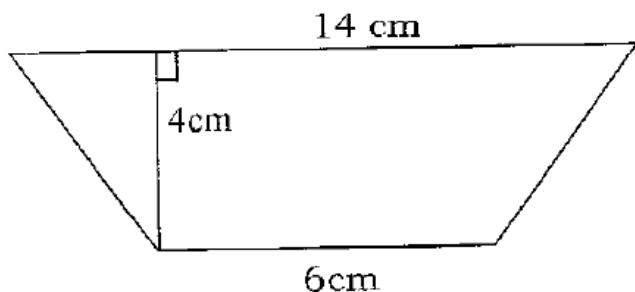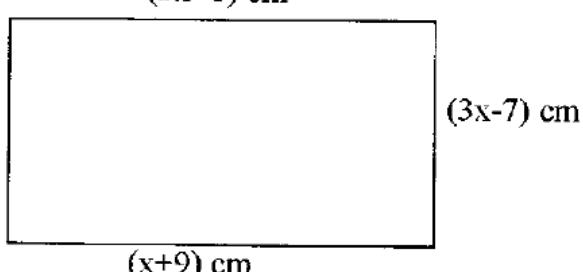
year. What is the (a) interest after 2 years? **(5 marks)** (b) Amount of money after 2 years? **(2 marks)**	
33) The height of a cylinder is 10cm and its base circumference is 44cm. ($\pi = \frac{22}{7}$). Find the (a) Volume of the cylinder. **(3 marks)** (b) Total surface area of the cylinder. **(4 marks)**	
34) The figure below shows the development (net) of a certain prism.	

5cm

25cm

12cm
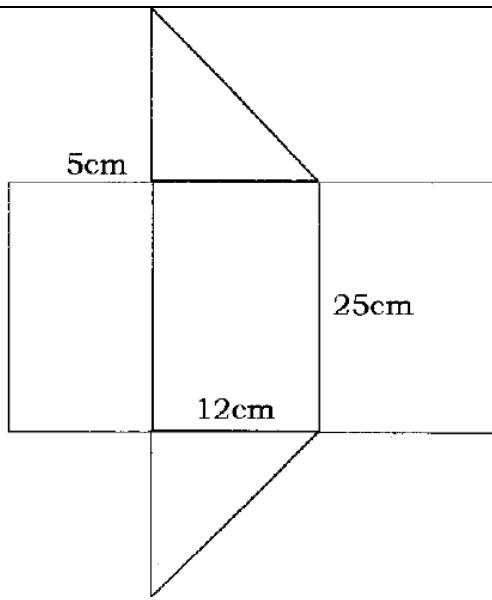
(a) Calculate the volume of the prism. **(2 marks)**

(b) Calculate the total surface area of the prism. **(5 marks)**

35) Below are marks scored by 20 pupils in a Mathematics test marked out of 20 marks.

10	11	12	15	8
11	16	10	12	10
11	12	8	10	16
10	8	10	8	12

(a) Complete the frequency table below. **(4 marks)**

(b) Find the mode mark. **(1 mark)**

(c) Calculate the mean mark. **(2 marks)**

(a) Frequency table

Marks, x	Frequency, f	f × x
	Total, f=	Total, f×x=

(b) The mode mark =

(c) The mean mark =

MARKING GUIDE OF P6 MATHEMATICS NATIONAL EXAMINATION 2014

1. $563{,}091 + 36{,}909 = 600{,}000$

2. (a) Thousands

   (b) $7{,}800{,}026$

3. $Square\ root\ of\ 2.25 = \sqrt{\frac{225}{100}} = \frac{15}{10} = 1.5$

4. $0.2\ hm^2 = 2{,}000 m^2$

   $4\ dam^2 = 400 m^2$

   $0.2\ hm^2 - 4\ dam^2 = 2{,}000 m^2 - 400 m^2 = 1600\ m^2$

5. $101_{two} = 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 5 + 1 = 5$

   $10_{three} = 1 \times 3^1 + 0 \times 3^0 = 3$

   $101_{two} + 10_{three} = 5 + 3 = 8_{ten} = 1000_{two}$

6. $2h\ 30min - 1h\ 45min = 150\ min - 105\ min = 45\ min$

7. $4x + x = 360° - 90° = 270$

   $5x = 270°$

   $x = \frac{270°}{5} = 54°$

8. $Mean = \frac{Sum\ of\ items}{Number\ of\ items} = \frac{9+3+1+8+4+5}{6} = \frac{30}{6} = 5$

9. (a) A rectangle has 2 lines of symmetry

   (b) A square has 4 lines of symmetry

10. (a) $x = b\ (corresponding\ angles)$

    (b) a = c

11. $Side = \frac{Perimeter}{4} = \frac{18cm}{4} = 4.5\ cm$

    $Area = side \times side = 4.5cm \times 4.5cm = 20.25cm^2$

12. $105 = 3 \times 5 \times 7$

13. $2x - 1 = 2 - x$

    $2x + x = 2 + 1$

    $3x = 3$

    $\frac{3x}{3} = \frac{3}{3}$

    $x = 1$

14. Factor of:

9 = 3×3.

12 = 2×2×3.

15= 3×5.

HCF of 9, 12,15 will be 3.

15. Total ratio = 2 +3 = 5

(a) Number of girls $= 40 \times \frac{2}{5} = 16$

(b) Number of boys $= 40 \times \frac{3}{5} = 24$

16. Number of students who weigh less than 40 kg = 100% - 60% = 40%

Number of students who weigh less than 40 kg = 1,200 × 40% = 480

17. (a) The cost of one book $= \frac{2,400}{6} = 400 Frw$

Number of books that can be bought with 5,000

$= \frac{5000}{400} = 12\ books\ and\ 200 Frw\ will\ remain.$

(b) Amount of money that will remain = $5,000 - (12 \times 400)$

$= 5,000 - 4,800 = 200 Frw$

18. Pupil's mark as a percentage $= \frac{28}{40} \times 100 = 70\%$

19. Number of litres released per minute = 20 litres

Time required to empty the tank $= \frac{6,000}{20} = 300\ minutes$

20. $\left(\frac{3}{5} \div \frac{4}{5}\right) \times \frac{4}{9} = \frac{3}{5} \times \frac{5}{4} \times \frac{4}{9} = \frac{3}{9} = \frac{1}{3}$

21. $\frac{4mp+3n}{n} = \frac{4 \times -3 \times -2 + 3 \times 6}{6} = \frac{24+18}{6} = \frac{42}{6} = \mathbf{7}$

22. Set A = {2, 3, 5, 7, 11, 13}

Set B = {1, 3, 5, 7, 9, 11, 13}

(a) $A \cap B = \{3, 5, 7, 11, 13\}$

(b) Venn diagram
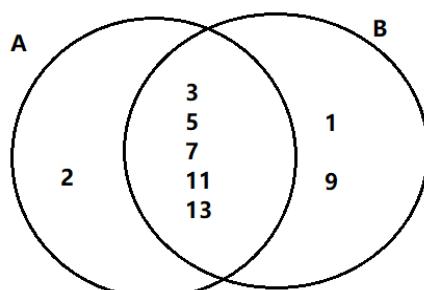
23. (a) 55°

(b)
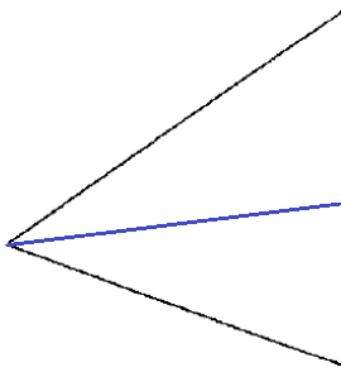
24. Profit = 66,000Frw – 55,000Frw = 11,000Frw

Percentage profit $= \frac{11,000}{55,000} \times 100 = 20\%$

25. Total surface area of a sphere = 5,544cm²

TSA $= 4\pi r^2$

$5544 = 4\pi r^2$

$r^2 = \frac{5544}{4\pi} = \frac{5544 \times 7}{4 \times 22} = \frac{38,808}{88} = 441$

$r = \sqrt{441} = 21cm$

$V = \frac{4}{3}\pi r^3 = \frac{4}{3} \times \frac{22}{7} \times 21 \times 21 \times 21 = 38,808 \, cm^3$

26. (a) Angle $A\hat{B}C$ = angle $A\hat{C}B$ = 45°

Angle $C\hat{A}D$ = 180° - $(C\hat{D}A + A\hat{C}D)$ = 180° – (90° + 45°)

= 180° – 135° = 45°

(b) Triangle ABC is an isosceles triangle

27. $\frac{11}{25} = 0.44$

$\frac{12}{30} = 0.4$

Ascending arder is $\frac{12}{30}; 0.41; 0.42; \frac{11}{25}$

28. On the scale, 1cm represents 10m

(a) Actual length of the garden = 6×10 = 60m

(b) Actual width of the garden = 5×10 = 50m

(c) The surface area of the garden = $50m \times 60m = 3,000m^2$

29. $P = \frac{I \times 100}{T \times R} = \frac{20,000 \times 100}{2 \times 10} = 100,000 \: Frw$

30. $A = \frac{h}{2}(a+b) = \frac{4cm}{2}(14cm + 6cm) = 2cm \times 20cm = 40cm^2$

31. (a) $2a^2b - ac = 2(-1)^2 \times 2 - 1 \times 3 = 4 + 3 = 7$

    (b) (i) Rectangle

      (ii) Length = length

      $3x + 1 = x + 9$

      $3x - x = 9 - 1$

      $2x = 8$

      $\frac{2x}{2} = \frac{8}{2}$

      $x = 4$

    Length $= (4 + 9)cm = 13cm$

    $Width = (3 \times 4 - 7)cm = (12 - 7)cm = 5cm$

    (iii) Perimeter = 2(L +W) = 2(13 + 5) = 2 × 18 = 36cm

      Area $= L \times W = 13cm \times 5cm = 65cm^2$

32. (a) Interest after one year =
    $I = P \times \frac{R}{100} \times T = \frac{3,000,000 \times 1 \times 5}{100} = 150,000$
    Principal after one year = 3,000,000 + 150,000 = 3,150,000Frw
    Interest in the second years =
    $I = P \times \frac{R}{100} \times T = \frac{3,150,000 \times 1 \times 5}{100} = 157,500$
    Principal after one year = 3,000,000 + 150,000 = 3,150,000Frw
    Interest after two years = 150,000Frw + 157,500Frw = 307,500Frw
    (b) Amount of money after two years = Principal + compound interest
      = 3,000,000Frw + 307,500Frw = 3,307,500Frw

33. $C = 2\pi r \quad r = \frac{c}{2\pi} = \frac{44cm}{2 \times \frac{22}{7}} = \frac{44cm \times 7}{44} = 7cm$

    $V = \pi r^2 h = \frac{22}{7} \times 7 \times 7 \times 10 = 1,540cm^3$

$$TSA = 2\pi r^2 + 2\pi rh = \frac{2\times22\times7\times7}{2} + \frac{2\times22\times7\times10}{7}$$

$$= 308cm^2 + 440cm^2 = 748cm^2$$

34. (a) $\text{Vol} = \frac{b\times h}{2} \times L = \frac{12cm\times5cm}{2} \times 25cm = 750cm^3$

(b) Hypotenuse (H) $= \sqrt{b^2 + h^2} = \sqrt{(5\times5) + (12\times12)}$

$$= \sqrt{25cm^2 + 144cm^2} = \sqrt{169cm^2} = 13cm$$

$$TSA = (b\times h) + L(b + h + H) = (12\times5)cm^2 + 25(5 + 12 + 13)cm^2$$

$$= 60cm^2 + (25\times30)cm^2 = 60cm^2 + 750cm^2 = 810cm^2$$

35. (a)

Marks x	Frequency f	$f \times x$
8	4	32
10	6	60
11	3	33
12	4	48
15	1	15
16	2	32
	Total $f = 20$	Total, $fx = 220$

(b) The mode mark = 10

(c) The mean mark $= \frac{Total\ fx}{total\ f} = \frac{220}{20} = 11$

Mathematics
PM

03/11/2015   09AM – 11AM

REB

Rwanda Education Board

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2015

MATHEMATICS

DURATION: Two hours
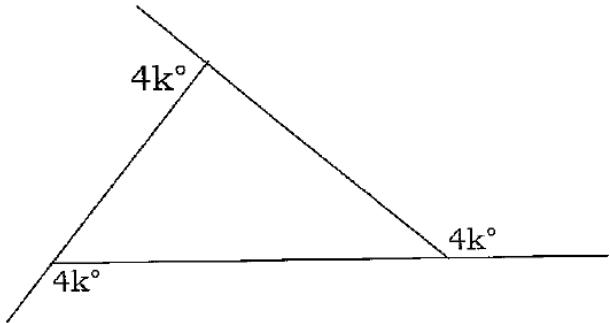
Marks: /100

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2) *This paper consists of 35 questions written on 12 pages. Before starting, verify if all pages and all questions are there and are arranged in ascending order.*
3) Answer **ALL** questions in this paper
4) Read each question carefully before answering it.
5) Answer the questions in the space provided on this question paper.
6) Show your working clearly. Marks will be given for showing steps. All rough work must be done in the space under each question.
7) You must use a blue or black ink pen.
8) You are allowed to use a ruler, and a protractor.
9) **You are NOT allowed to use a calculator.**

ATTEMPT ALL QUESTIONS IN THIS PAPER   (100 MARKS)

YOU MAY DO ROUGH WORK IN THE SPACE PROVIDED BELOW EACH QUESTION.	GIVE YOUR ANSWER IN THE SPACE PROVIDED IN THIS COLUMN. SHOW THE WORKING STEPS.
1) Write the following number in the figures: Seven hundred and seventy million, eight hundred and eighteen thousand, five hundred and fifty five. **(1 mark)**	
2) Evaluate: $9^3 + 4^5 =$ **(1 mark)**	
3) Find the value of: $a^3 + 3b^2$; when $a = 2$ and $b = -2$. **(2 marks)**	
4) Workout 16h15sec – 8h25min55sec = **(2 marks)**	
5) What are the place values of 3 and 6 in	

the number 235.6? **(2 marks)**	
6) Find the next two terms in this progression: 1, 6, 36; .... ; .... **(2 marks)**	
7) The difference of two numbers is 6 and their sum is 20. Find the two numbers. **(2 marks)**	
8) Find the value of k degrees in the figure below. **(2 marks)** 4k° 4k° 4k°	
9) How many decasteres of wood can be obtained in a stack of firewood	

measuring 10m by 4m by 2m? **(2 marks)**	

10) Alice will be 17 years in 4 years.
 	
(a) How old was she 3 years ago?
                  (2 marks)
 	
(b) How old will she be 6 years from now?
                  (1 mark)	

11) 100 pupils have enough food for 36 days. How long would this food last if the number of pupils was 80? **(3 marks)**	
12) (a) Calculate 60% of 200. **(1 mark)**	

(b) Write 0.36 as a fraction. Give your answer in the lowest terms. **(2 marks)**

13) A circle has a diameter of 100cm.

(a) Calculate the area of the circle in cm^2. Use $\pi = 3.14$ **(2 marks)**

(b) Write your answer in part (a) in m^2. **(1 mark)**

14) Simplify: $\frac{4}{6} \times \left(\frac{6}{8} : \frac{2}{6}\right) =$ **(3 marks)**

15) The distance between two towns is 8km. A map on which these towns are shown has a scale of 1:50 000. Calculate the distance between the two towns on the map. Give your answer in centimeters. **(2 marks)**

16) The ratio of boys and girls in a school is 2:7. If the total number of pupils in this school is 720. How many boys and how many girls are there? **(2 marks)**	
17) (a) Change: 8_{ten} to base five. **(2 marks)** (b) Add: $110_{two} + 11_{two} = \cdots\ldots_{two}$ **(2 marks)** **(This question is no longer on the new program)**	
18) In the figure below, find: (a) The length of AC. **(2 marks)**	

(b) The perimeter of the triangle ABC.

(1 mark)
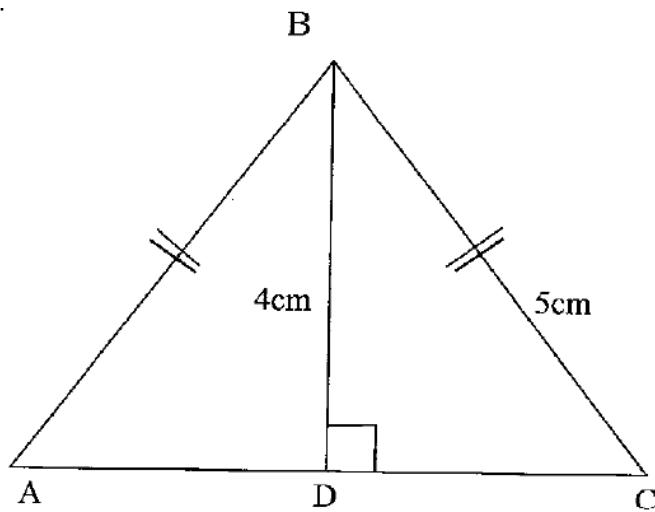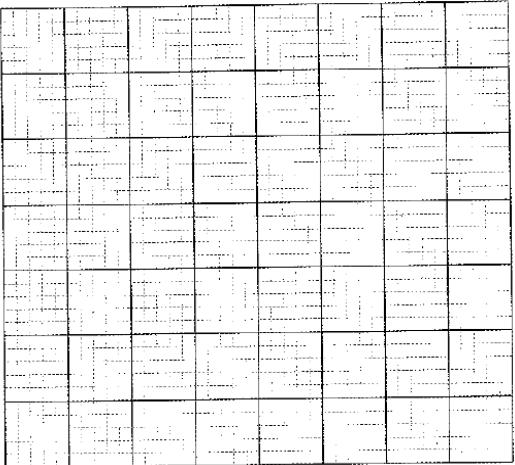
19) A car covered a journey from town A to town B at a speed of 30km/hr in 6 hours and it took 4 hours to return through the same distance.

(a) Calculate the distance from town A to town B. **(1 mark)**

(b) Calculate the average speed of the whole journey. **(2 marks)**

20) A man spent $\frac{1}{2}$ of his salary on school fees, $\frac{1}{3}$ of the remaining on food and saved the remainder which is equal to 100 000Frw. Calculate the man's salary. **(3 marks)**	
21) The sum of two numbers is 18 and their quotient is 2. Find the two numbers. **(3 marks)**	
22) Mucuruzi mixed 40kg of beans which cost 300Frw per kg with 60kg of beans of a different type. Find the unit price of the second type if the mixture cost 180Frw per kg.**(3 marks)**	
23) The mass of solid X is 20g and its volume is 25cm³. The mass of solid Y is 30g and its volume is 40cm³. Which solid has greater density?	

(3 marks)	
24) The diagonals of a rhombus are 16cm and 30cm. Calculate the perimeter and the area of the rhombus. **(2 marks)**	
25) A trader banked some money for 3 years at a simple interest rate of 10% per year. If the interest is 90,000Frw, how much money did he bank? **(3 marks)**	
26) A wall separating two houses is 20m wide and 2.5m tall. One side of the wall is to be painted. The paint is applied at a rate of 0.095 litres per square metre. The cost of one litre of paint is 3,000Frw. Find the cost of the paint needed to complete the job if 5% of paint is wasted. **(7 marks)**	

27) Given the following coordinates:
 	
 (1, 0), (2, 1), (3, 2), (4, 3);
 	
   (a) Form the equation of the line passing through the points. **(2 marks)**
 	
   (b) Indicate the points and sketch the line passing through the points.
 	
                   (5 marks)
 	
 (This question is no longer on the new program)
	(a)
	
	 (b)

28) A woman invests 2,000,000Frw for 3 years at a compound interest rate of 4% per year.
 	
 Calculate:
 	
   a) Interest earned after 3 years. **(5 marks)**
 	
   b) Total amount of money after 3 years.   **(2 marks)**
 	
 (This question is no longer on the new	

program)

---

29) The list below shows the marks scored by 29 pupils in an English test marked out of 10 marks.

1	3	0	1	2	1	3
1	0	6	1	2	1	4
6	4	0	3	1	2	0
1	2	1	2	1	2	5
1						

a) Complete the frequency table across. **(4 marks)**

b) Calculate the mean mark. **(2 marks)**

c) Find the mode mark. **(1 mark)**

(a)

Marks x	Frequency f	$f \times x$
0		
1		
2		
3		
4		
5		
6		
	Total $f =$	Total $f \times x =$

(b) The mean mark =

(c) The mode mark =

30) From the Venn diagram below, list the elements of the sets following:
(7 marks)
 	
A   B
        1
i   5 t   n
0
  6   j   d   3
     a 4
   m   f
    e   g
     k   C
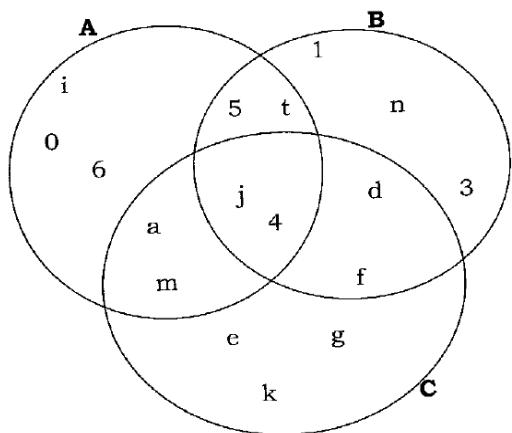 	
(a)   Set A
 	
(b)   Set C
 	
(c)   Set $A \cap B$
 	
(d)   Set $A \cup B$
 	
(e)   Set $B \cap C$
 	
(f)   Set $A \cap (B \cap C)$
 	
(g)   Set $A \cap (B \cup C)$
 	
(This question is no longer on the new program)	

MARKING GUIDE OF P6 MATHEMATICS NATIONAL EXAMINATION 2015

ATTEMPT ALL QUESTIONS IN THIS PAPER

1. 770,818,555

2. $9^3 + 4^5 = 9 \times 9 \times 9 + 4 \times 4 \times 4 \times 4 \times 4 = 729 + 1,024 = 1,753$

3. $a^3 + 3b^2 = 2^3 + 3(-2)^2 = 8 + 3 \times 4 = 8 + 12 = 20$

4. 16h15sec − 8h25min55sec $= (16 \times 3600 + 15) - (8 \times 3600 + 55 \times 60 + 55)$

   $= (57,600 + 15) - (28,800 + 3,300 + 55) = 57,615 - 31,355 = 26,260 sec$

5. The place value of 3 is tens

   The place value of 6 is tenths

6. $1; 6; 36 \times 6; 216 \times 6$

   $1; 6; 216; 1296$

7. $x - y = 6$ (i)

   $x + y = 20$ (ii)

   Adding the two equations we get $2x = 26$

   $x = \frac{26}{2}$

   $x = 13$

   $x + y = 20$

   $y = 20 - x = 20 - 13 = 7$

8. 4K° + 4K° + 4K° = 360°

   12K° = 360°

   $K° = \frac{360°}{12} = 30°$

9. $V = 10m \times 4m \times 2m = 80m^3$

   $1m^3 = 10\, decasteres$

   $V = 80m^3 = 80 \times 10\, decasteres = 800\, decasteres$

10. $x + 4 = 17$

    $x = 17 - 4 = 13$

    (a) 3 years ago, she had 13 − 3 = 10 years

    (b) Her age 6 years from now $= x + 6 = 13 + 6 = 19\, years$

11. 100 pupils → 36 days

   1 pupil → $36 \times 100 \; days$

   80 pupils → $\frac{36 \times 100}{80} \; days = 45 \; days$

12. (a) 20 % of 200 $= 200 \times \frac{20}{100} = 40$

   (b) $0.36 = \frac{0.36 \times 100}{100} = \frac{36}{100} = \frac{9}{25}$

13. (a) $Radius = \frac{D}{2} = \frac{100cm}{2} = 50cm$

   $A = \pi r^2 = 3.14 \times 50 \times 50 = 7,850cm^2$

   (b) $A = \pi r^2 = 3.14 \times 50 \times 50 = 7,850cm^2 = \frac{7,850cm^2}{10,000} = 0.785m^2$

14. $\frac{4}{6} \times \left(\frac{6}{8} : \frac{2}{6}\right) = \frac{4}{6} \times \left(\frac{6}{8} \times \frac{6}{2}\right) = \frac{4}{6} \times \frac{36}{16} = 2 \times \frac{6}{8} = \frac{12}{8} = \frac{3}{2}$

15. 1 : 50,000 means that every centimeter on the map represents 50,000cm or 500 meters on the ground.

   50,000 cm are represented by 1cm on the map

   1 cm is represented by $\frac{1}{50,000}$

   8 km = 8,000m = 800,000cm

   800,000cm are represented by $\frac{1 \times 800,000}{50,000} = 16cm \; on \; the \; map$

16. Number of boys $= 720 \times \frac{2}{9} = 160$

   Number of girls $= 720 \times \frac{7}{9} = 560$

17. (a)

```
5   8 │Remainder
5   1 │ 3  ↑
5   0 │ 1  ↑
```

   $8_{ten} = 15_{five}$

   (b)

```
    1
  1 1 0
+   1 1
───────
1 0 0 1
```

18. Let x be the length DC.

   $x^2 + 4^2 = 5^2$

   $x^2 = 5^2 - 4^2 = 25 - 16 = 9$

$x = \sqrt{9} = 3cm$

The distance DC = 3cm

The distance AC $= DC \times 2 = 3cm \times 2 = 6cm$

(b) The length of the side AB is equal to the length of the side BC.

Perimeter $= 5cm + 5cm + 6cm = 16cm$

19. (a) Distance $= V \times t = \frac{30km}{h} \times 6h = 180km$

(b) Velocity $2 = \frac{180km}{4h} = 45km/h$

Average speed of the whole journey $= \frac{Total\ distance}{speed\ 1 + speed\ 2} = \frac{180km \times 2}{\frac{30km}{h} + \frac{45km}{h}}$

$$= \frac{360km}{75km/h} = 4.8km/h$$

20. School fees $= \frac{1}{2} = \frac{3}{6}$

Food $= \frac{1}{2} - \frac{1}{3} = \frac{3}{6} - \frac{2}{6} = \frac{1}{6}$

The remainder which is equal to 100,000Frw $= \frac{6}{6} - \frac{3}{6} - \frac{1}{6} = \frac{2}{6}$

The man's salary $= 100,000Frw \times \frac{6}{2} = 300,000Frw$

21. $x + y = 18$

$\frac{x}{y} = 2$

$x = 2y$

$2y + y = 18$

$3y = 18$

$y = \frac{18}{3}$

$\boldsymbol{y = 6}$

$x = 2y = 2 \times 6 = 12$

$\boldsymbol{x = 12}$

22. Price of the mixed beans $= 100 \times 180Frw = 18,000Frw$

Price of the first type $= 40 \times 300 = 12,000Frw$

Price of the second type $= 16,000 - 12,000 = 4,000Frw$

Price of one kg of the second type $= \frac{6,000Frw}{60kg} = 100Frw\ per\ kg$

23. Density of solid X $= \frac{Mass}{Volume} = \frac{20g}{25cm^3} = \frac{\frac{4}{5}g}{cm^3} = 0.8g/cm^3$

Density of solid Y $= \frac{Mass}{Volume} = \frac{30g}{40cm^3} = \frac{\frac{3}{4}g}{cm^3} = 0.75g/cm^3$

Solid X has greater density than solid Y.

24. Given: Diagonals AC = 30 cm and DB = 16cm.

Since the diagonals of the rhombus bisect at right angle to each other.
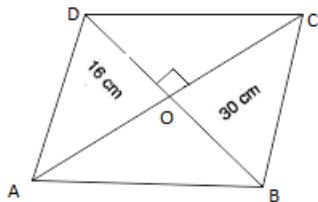
Therefore, OD= $\frac{BD}{2}$ = $\frac{16}{2}$ =8 cm

And, OC = $\frac{AC}{2}$ = $\frac{30}{2}$ = 15 cm.

Now, in right angle triangle DOC, (DC)² =(OD)²+(OC)²

⇒ (DC)² = (8)²+ (15)²

⇒ (DC)2 = 64 + 225 = 289

⇒ DC= $\sqrt{289}$ = 17 cm

Perimeter of rhombus = 4 × side = 4 × 17 = 68cm

Thus, the perimeter of rhombus is 68cm.

Area of the rhombus = $\frac{d_1 \times d_2}{2}$ = $\frac{30 \times 16}{2}$ = $240 cm^2$

25. $I = P \times \frac{R}{100} \times T$

$P = \frac{I \times 100}{R \times t} = \frac{90,000 \times 100}{10 \times 3} = 300,000 Frw$

26. Area of the wall = $20m \times 2.5m = 500m^2$

Amount of paint applied to the wall = $500 \times 0.095 \, litres = 47.5 \, l$

Paint wasted = $47.5 \, l \times \frac{5}{100} = 2.375 \, l$

Total paint = $2.375 \, l + 47.5 \, l = 49.875 \, l$

Cost = $49.875 \, l \times \frac{3,000}{l} = 149,625 Frw$

27. (a) $A \, (1,0) \, and \, B \, (2,1)$

$y - y_A = m(x - x_A)$

$m = \frac{y_B - y_A}{x_B - x_A} = \frac{1-0}{2-1} = \frac{1}{1} = 1$

$y - 0 = x - 1$

$y = x - 1$

(b)
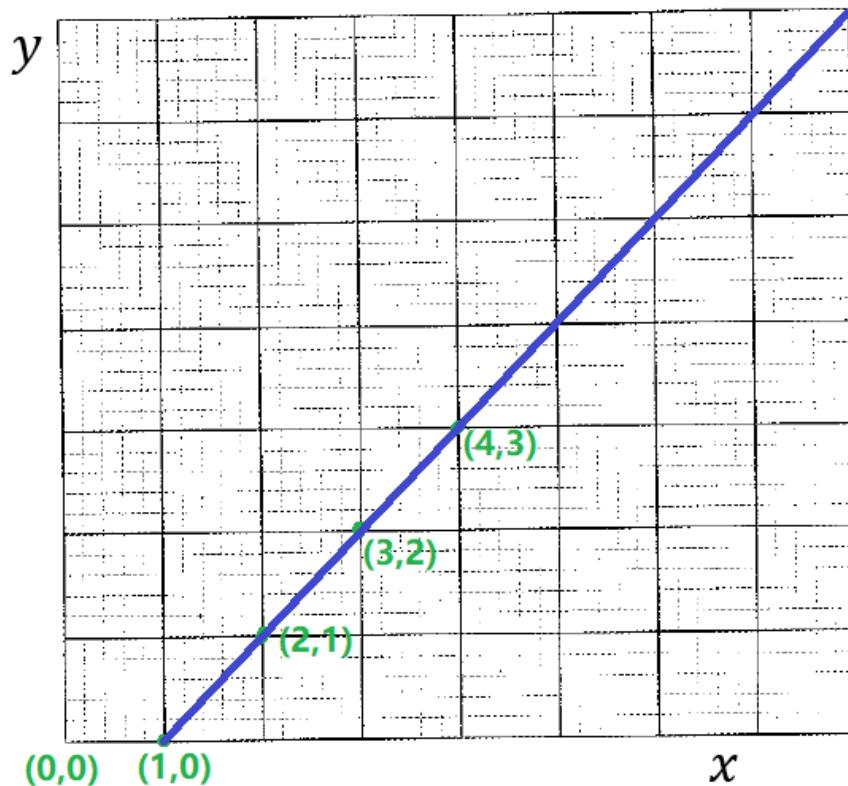
28. Interest after one year $I = P \times \frac{R}{100} \times T = 2{,}000{,}000 \times \frac{4}{100} \times 1 = 80{,}000 Frw$

Principal after one year $= 2{,}000{,}000 Frw + 80{,}000 Frw = 2{,}080{,}000 Frw$

Interest after 2 years $I = P \times \frac{R}{100} \times T = 2{,}080{,}000 \times \frac{4}{100} \times 1 = 83{,}200 Frw$

Principal after the second year $= 2{,}080{,}000 Frw + 83{,}200 Frw$

$$= 2{,}163{,}200 Frw$$

Interest after the third year

$I = P \times \frac{R}{100} \times T = 2{,}163{,}200 \times \frac{4}{100} \times 1 = 86{,}528 Frw$

(a) Interest earned after 3 years $= 80{,}000 + 83{,}200 + 86{,}528 = 249{,}728 Frw$

(b) Total amount after three years $= 2{,}000{,}000 + 249{,}728 = 2{,}249{,}728 Frw$

29. (a)

Marks x	Frequency f	$f \times x$
0	4	0
1	11	11
2	6	12
3	3	9
4	2	8
5	1	5
6	2	23
	Total f = 29	**Total $f \times x$ = 57**

(b) The mean mark $= \frac{57}{29} = 1.96$

(c) The mode mark $= 1$

30.

(a) Set A $= 0; 4; 5; 6; a; i; j; m; t$

(b) Set C $= 4; a; d; e; f; g; j; k; m$

(c) Set $A \cap B = 4; 5; j; t$

(d) Set $A \cup B = 1; 3; 4; 5; 6; a; d; f; i; j; l; n; o; t$

(e) Set $B \cap C = b; 4$

(f) Set $A \cap (B \cap C) = j; k$

(g) Set $A \cap (B \cup C) = 4; a; j; m$

Mathematics

PM

01/11/2016   09:00–11:00AM

Pupil's complete index number

Province/ City	District	Sector	School	Pupil	Year

Pupil's names

Surname: ....

Other names: ....

NB: PUPIL'S INDEX NUMBER AND NAMES **MUST** BE WRITTEN AS THEY APPEAR ON THE REGISTRATION FORM.

REB

Rwanda Education Board

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2016

MATHEMATICS

DURATION: Two hours

Marks: | /100 |

INSTRUCTIONS:

1) Do not open this paper until you are told to do so.
2) *This paper consists of 12 pages and 35 questions. Before starting, check if all pages and all questions are there and are arranged in ascending order.*
3) Answer **ALL** questions in this paper
4) Read each question carefully before answering it.
5) Answer the questions in the space provided on this question paper.
6) Show your working clearly. Marks will be given for showing steps. All rough work must be done in the space under each question.
7) You must use a blue or black ink pen.
8) You are allowed to use a ruler, and a protractor.
9) **You are __NOT__ allowed to use a calculator.**

ATTEMPT ALL QUESTIONS IN THIS PAPER. **(100 MARKS)**

YOU MAY DO ROUGH WORK IN THE SPACE PROVIDED BELOW EACH QUESTION.	GIVE YOUR ANSWER IN THE SPACE PROVIDED IN THIS COLUMN. SHOW THE WORKING STEPS.
1) Round off 594,740 to the nearest thousand. **(2 marks)**	
2) Write the following number in words: 540,032 **(2 marks)**	
3) Compare the numbers below, using the sign $<, >$ *or* $=$ **(2 marks)** $\dfrac{5}{11}$ ☐ 0.677	

4) Find the missing number to make the statement correct: **(2 marks)** $$39 \times (82 + \cdots) = 39 \times 100$$	
5) Add: 2.4263 + 3.02 = **(2 marks)**	
6) Find the next two missing numbers: 2, 4, 16; .... ; .... **(2 marks)**	
7) Express 5% as a fraction in the lowest terms. **(2 marks)**	
8) Evaluate $\frac{a^2 \div b}{c-d}$, if $a = 3; b = -3; c = 2$ and $d = 5$. **(2 marks)**	

9) Convert: (a) 43,000g = …… kg **(1 mark)** (b) 5.5 tons = …… kg **(1 mark)**	
10) Find the circumference of a circle whose radius is 5cm. (use $\pi = 3.14$) **(2 marks)**	
11) Express the number $1\frac{1}{5}$ as a percentage. **(2 marks)**	
12) Use a quick multiplication to calculate the product 84×49. **(2 marks)**	
13) If angles k and 70° are supplementary,	

find the size of angle k. **(2 marks)**	
14) Solve the equation to find the value of x: $3(x + 2) = 21$ **(2 marks)**	
15) Is the number 835,879 divisible by 11? Show how you arrive at the answer? **(2 marks)**	
16) Find the highest common factor (H.C.F) of 112 and 168. **(2 marks)**	
17) Find the average age of four children whose respective ages are 4 years, 6 years, 8 years and 10 years. **(2 marks)**	
18) BWUZU bought a shirt at 6,000Frw. He sold it at 7,200Frw. What was his	

percentage profit? **(2 marks)**	

19) Given the number 500.073, what is the place value:
 	
  (c) Of 5? **(1 mark)**
 	
  (d) Of 7 **(1 mark)**	

20) The cost of 5 bottles of orange juice is 4,000Frw. What is the cost of 3 bottles of the same juice? **(2 marks)**	
21) Arrange the following fractions in descending order: $\frac{3}{8}$; 0.25; $\frac{5}{12}$ **(2 marks)**	
22) Find the volume of firewood in a stack of 3m by 2m by 3m in decisteres (dst). **(2 marks)**	

23) Add: 7hours 25 minutes + 1 hour 45 minutes **(2 marks)**	
24) Draw the following angles: (a) Reflex angle **(1 mark)** (b) Right angle **(1 mark)**	
25) Calculate: $\frac{1}{2} + \frac{1}{4} - \frac{1}{5}$ **(2 marks)**	
26) Find the lowest common multiple (LCM) of 48 and 64. **(3 marks)**	

27) Change 25_{ten} to base three. **(3 marks)** **(This question is no longer on the new program)**	
28) If 0.20 of a number is 40, what is the number? **(3 marks)**	
29) Calculate the volume of a cone whose radius is 6cm and height is 10cm. (Use $\pi = 3.14$) **(3 marks)** **(This question is no longer on the new program)**	

30) Calculate the sum of interior angles of a regular hexagon. **(3 marks)**	
31) The figure below is a rectangular prism whose length is 5cm, width 4cm and height 3cm. 3cm 4cm 5cm Calculate: (a) The total surface area. **(5 marks)** (b) The volume **(2 marks)**	
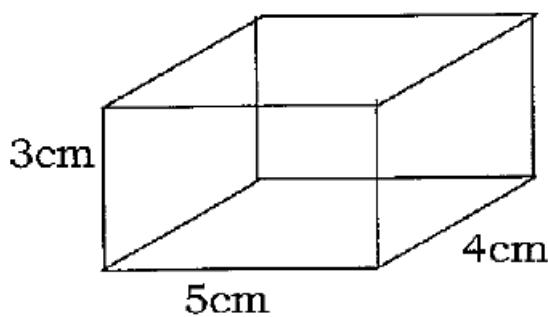
32) The table below shows how primary six (P6) class scored in English Test marked out of 100. | Marks	60	40	70	35	10	15 | | Frequency | 8 | 1 | 3 | 4 | 5 | 4 | (a) Complete the table across. **(4 marks)** (b) How many pupils are in P6? **(1 mark)** (c) Find the average mark of the class? **(2 marks)**	(a) | Marks (x)	Frequency (f)	(fx) | |---|---|---| | 70 | 3 | | | | | | | | | | | | | | | | | | | | | | | | Sum of (f)= | Sum of (fx)= | (b) (c)
33) In a class of 16 pupils, 8 pupils like English, 10 pupils like Mathematics and x pupils like both subjects. Each pupil likes at least one of the subjects. (a) Represent this information on a Venn diagram. **(3 marks)** (b) Find, x, the number of pupils who like both subjects. **(4 marks)**	

34) A man spent $\frac{1}{3}$ of his money on buying food, and $\frac{1}{6}$ the remainder on communication. (a) What fraction of his money was he left with? **(5 marks)** (b) If he was left with 15,000Frw, how much did he have at the beginning? **(2 marks)**	
35) A trader borrowed 600,000Frw from a bank at an interest rate of 6% per year. (a) How much interest must he pay after five (5) months? **(5 marks)** (b) What amount will the trader pay altogether? **(2 marks)**	

MARKING GUIDE OF P6 MATHEMATICS NATIONAL EXAMINATION 2016

1. 595,000

2. Five hundred forty thousand, thirty two

3. $\frac{5}{11} = 0.45 < 0.677$

   $Therefore; \frac{5}{11} < 0.677$

4. $39 \times (82 + x) = 39 \times 100$

   $\frac{39 \times (82+x)}{39} = \frac{39 \times 100}{39}$

   $82 + x = 100$

   $x = 100 - 82$

   $x = 18$

5. 5.4463

6. $2 \times 2 = 4$

   $4 \times 4 = 16$

   $16 \times 16 = 256$

   $256 \times 256 = 65,536$

   $2; 4; 16; \mathbf{256}; \mathbf{65,536}$

7. $\frac{5 \div 5}{100 \div 5} = \frac{1}{20}$

8. $\frac{a^2 \div b}{c - d}$, if $a = 3; b = -3; c = 2$ and $d = 5$.

   $\frac{a^2 \div b}{c - d} = \frac{3 \times 3 \div -3}{2 - 5} = \frac{9 \div -3}{-3} = \frac{-3}{-3} = 1$

9. (a) $43,000g = \frac{43,000}{1,000} kg = 43kg$

   (b) 5.5 tons $= 5.5 \times 1000kg = 5,500kg$

10. $D = r \times 2 = 5cm \times 2 = 10cm$

    $C = \pi \times D = 3.14 \times 10 = 31.4cm$

11. $1\frac{1}{5} = \frac{5+1}{5} = \frac{6}{5} = \frac{6}{5} \times 100 = 120\%$

12. $84 \times 49 = 84 \times (50 - 1) = 4200 - 84 = 4,116$

13. k = 180° - 70° =110°

14. $3(x + 2) = 21$

    $3x + 6 = 21$

$$3x = 21 - 6$$

$$3x = 15$$

$$x = \frac{15}{3}$$

$$x = 5$$

15. Yes, it divisible by 11. Reason: the sum of numbers in even places should be equal to the sum of numbers in odd places.

$$8 + 5 + 7 = 3 + 8 + 9$$

$$20 = 20$$

16. The highest common factor (H.C.F) of 112 and 168 is $2^3 \times 7 = 56$

17. The average age of the four children $= \frac{4+6+8+10}{4} = \frac{28}{4} = 7 \ years$

18. Profit $= 7,200 - 6,000 = 1,200 Frw$

   $Percentage \ profit = \frac{1,200}{6,000} \times 100 = 20\%$

19. (a) The place value of 5 is hundreds

   (b) The place value of 7 is hundredths

20. 5 bottles cost 4,000Frw

   1 bottle costs $\frac{4,000Frw}{5} = 800Frw$

   3 bottles will cost $800Frw \times 3 = 2,400Frw$

21. $\frac{3}{8} = \mathbf{0.375}; \mathbf{0.25}; \frac{5}{12} = 0.416$

   $Descending \ order: \frac{5}{12}; \frac{3}{8}; 0.25$

22. $V = 3m \times 2m \times 3m = 18m^3$

   $1m^3 = 10 decisteres$

   $V = 18m^3 = 18 \times 10 decisteres = 180 \ decisteres$

23. 7 hours 25 minutes $= 7 \times 60 + 25min = 445min$

   1 hour 45 minutes $= 1 \times 60 + 45min = 105min$

   7 hours 25 minutes + 1hour 45 minutes = 530minutes

   = 9 hours 10 minutes

24. (a) Reflex angle
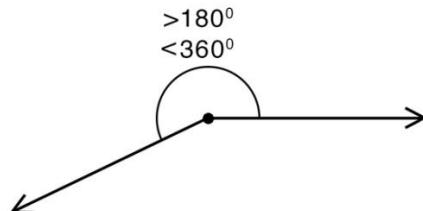
(b) Right angle
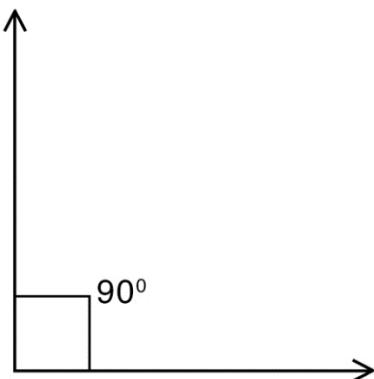
25. $\frac{1}{2} + \frac{1}{4} - \frac{1}{5} = \frac{10+5-4}{20} = \frac{11}{20}$

26. $48 = 2^4 \times 3$

$64 = 2^6$

The LCM of 48 and 64 is $2^6 \times 3 = 192$

27.

3	25	Remainder
3	8	1
3	2	2
	0	2

$25_{ten} = 221_{three}$

28. 0.20 is 40

20% is 40

The number is $= 40 \times \frac{100}{20} = 200$

29. Volume of a cone $= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times 3.14 \times 6^2 \times 10 = 376{,}8cm^3$

30. In n-sided polygon, sum of interior angles = (n − 2) × 180°

A hexagon has 6 side (n = 6). The sum of interior angles of a hexagon = (6−2) × 180°= 720°

31. (a) The total surface area $= 2 \times (5 \times 5) + 2 \times (4 \times 4) + 2 \times (3 \times 3)$

$= 2 \times 25 + 2 \times 16 + 2 \times 9 = 50 + 32 + 18 = 100cm^2$

(b) $V = L \times W \times h = 5 \times 4 \times 3 = 60cm^3$

32. (a) Frequency table

Marks (x)	Frequency (f)	(fx)
70	3	210
60	8	480
40	1	40
35	4	140
15	4	60
10	5	50
	Sum of (f) = 25	Sum of (fx) = 980

(b) Number of pupils in P6 = 25

(c) Average mark of the class $= \frac{980}{25} = 39.2\%$

33. (a)
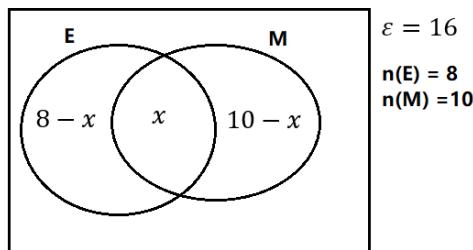
(b) $8 - x + x + 10 - x = 16$

$18 - x = 16$

$-x = 16 - 18$

$-x = -2$

$x = 2$

34. (a) Fraction of the money left $= 1 - \frac{1}{3} - \frac{1}{6} = \frac{6}{6} - \frac{2}{6} - \frac{1}{6} = \frac{3}{6}$

(b)   Amount   of   money   that   he   had   at   the   beginning

$= 15,000 Frw \times \frac{6}{3} = 30,000 Frw$

35. (a) $I = P \times \frac{R}{100} \times T = 600,000 \times \frac{6}{100} \times \frac{5}{12} = 15,000 Frw$

(b) Total amount of money that the trader will pay

$= 600,000 Frw + 15,000 Frw = 615,000 Frw$

Mathematics PM	Pupil's complete index number

Mathematics

PM

13/11/2017   09:00–11:00AM

REB

Rwanda Education Board

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2017

MATHEMATICS

DURATION: Two hours

Marks: /100

INSTRUCTIONS:

1) Do not open this paper until you are told to do so.
2) *This paper consists of 12 pages and 35 questions. Before starting, check if all pages and all questions are there and are arranged in ascending order.*
3) Answer **ALL** questions in this paper
4) Read each question carefully before answering it.
5) Answer the questions in the space provided on this question paper.
6) Show your working clearly. Marks will be given for showing steps. All rough work must be done in the space under each question.
7) You must use a blue or black ink pen.
8) You are allowed to use a ruler, and a protractor.
9) **You are __NOT__ allowed to use a calculator.**

ATTEMPT ALL QUESTIONS IN THIS PAPER.   **(100 MARKS)**

YOU MAY DO ROUGH WORK IN THE SPACE PROVIDED BELOW EACH QUESTION.	GIVE YOUR ANSWER IN THE SPACE PROVIDED IN THIS COLUMN. SHOW THE WORKING STEPS.
1) Calculate: 146,391 + 43,609 **(2 marks)**	
2) Use a scale of 1:1,500,000 to find the actual length of the line below: **(2 marks)** ├────────────────────┤ 10cm	
3) Complete the following sentences with: even, frequency, odd or ratio. **(2 marks)** a) .... number can divided exactly by 2. b) .... Is the number of times that something appears.	
4) Calculate the volume of a rectangular tank measuring 6m long, 5m wide and 4m high. (Give the answer in litres) **(2 marks)**	

5) A bus left Huye on Tuesday at 8:00pm and arrived in Rubavu the next day at 2:00am. What time did the journey take? **(2 marks)**	
6) Two complementary angles are t° and 43°. What is the value of angle t°? **(2 marks)**	
7) Calculate: **246 × 99** **(2 marks)**	
8) Calculate the average of numbers 61, 52, 48, 21 and 58. **(2 marks)**	
9) Write: seven million, seven hundred thousand and seven in figures. **(2 marks)**	

10) Calculate: $8 \times 10^3 + 5 \times 10^5$ **(2 marks)**	
11) What are the next two numbers in the sequence? **(2 marks)** $-23; -17; -11; \ldots\ldots; \ldots\ldots\ldots$	
12) Increase 850Frw by 20%. **(2 marks)**	
13) Calculate: $(250 + 45 \times 4) - 15 \div 3$ **(2 marks)**	
14) Solve: $3x - (5x - 2) = 0$ **(2 marks)**	

15) Write the first four prime numbers. **(2 marks)**	
16) Express 0.25 hectares into are. **(2 marks)**	
17) Add and leave the answer in base two (binary): $11_{two} + 11_{two}$ **(2 marks)** **(This question is no longer on the new program)**	
18) Calculate the number of sides of a regular polygon whose exterior angle is 20°. **(2 marks)**	
19) Fill in the missing figures: **(2 marks)** 3720seconds = ...hours......minutes	
20) Set $A = \{3, 7, 9, 11, 15, 17, 27, 37\}$ and	

Set B $= \{3, 11, 27\}$ **(2 marks)** a) List the members of $A \cap B$ b) Describe the relationship between set A and set B. **(2 marks)** **(This question is no longer on the new program)**	
21) A child sold a hen at 4,299Frw. How much did he/she buy if he made a loss of 16%? **(2 marks)**	
22) Write in words: 75.27 **(2 marks)**	
23) Find the Lowest Common Multiple (LCM) of 624 and 208. **(2 marks)**	
24) Find the area of a square garden whose perimeter is 164m. **(2 marks)**	

Set B $= \{3, 11, 27\}$

25) Workout: $6 - 2.174$ **(2 marks)**	
26) Calculate: $\frac{12}{36} \times \frac{6}{9} + \frac{25}{50}$ **(2 marks)**	
27) Find the area of the figure below. **(3 marks)**	

28) There are 235 guests at a wedding. What is the least number of circular tables needed to seat all the guests if each table seats exactly 8 people? **(3 marks)**	
29) The distance from the first to the last pole is 5,540 metres. If the interval between two consecutive poles is 20m. **(3 marks)** a) How many intervals are there? b) How many poles are there?	

30) Fifteen pupils were to pay a sum of 4,500Frw. Some of them were unable to pay their shares and each pupil of the rest must pat 75Frw more. How many pupils were unable to pay? **(3 marks)**	
31) A radius of a cone is 6cm and its slanting side g is 10 cm. Using $\pi = 3.14$, calculate: a) The total surface area. **(5 marks)** b) The volume of the cone. **(2 marks)** **(This question is no longer on the new program)**	
32) Tap A takes 3 minutes to fill a tank and tap B takes 4 minutes to draw water from the tank. How many minutes will it take to fill the tank if both taps are left open. **(7 marks)**	
33) A businessman sold 9kg of two types of	

mixed beans at 500Frw per kg but 4kg of one type costs 300Frw per kg. What is the cost of each kg of the second type?

(7 marks)

34) At a speed of 60km/hr a car covered a journey from town A to town B in 3 hours and it took 2 hours to return to town A.

   a)   Calculate the distance from town A to town B. **(3 marks)**

   b)   Calculate the average speed for the whole journey. **(4 marks)**

35) A businesswoman got a loan of 180,000Frw from a bank at 10% per annum

compound interest.

a) How much interest did the businesswoman pay after 2 years?
                                    (5 marks)

b) What is the total amount that she returned to the bank?   **(2 marks)**

(This question is no longer on the new program)

MARKING GUIDE OF P6 MATHEMATICS NATIONAL EXAMINATION 2017

1. 190,000

2. On the scale, 1cm represents 15km

   10cm represent 15km x 10

   10cm represent 150km

3. (a) even

   (b) frequency

4. $V = L \times W \times H = 6m \times 5m \times 4m = 120m^3 = (120 \times 1,000) litres = 120,000l$

5. T = (12:00 – 8:00) + 2hr = 4hrs + 2hrs = 6hrs

6. Complementary angles add up to 90°.

   t° = 90° - 43° = 47°

7. $246 \times 99 = 246 \times (100 - 1) = 24,600 - 246 = 24,354$

8. $Average = \frac{Sum\ of\ items}{Number\ of\ items} = \frac{61+52+48+21+58}{5} = \frac{240}{5} = 48$

9. 7,700,007

10. $8 \times 10^3 + 5 \times 10^5 = 8 \times 1,000 + 5 \times 100,000 = 8,000 + 500,000 = 508,000$

11. $-5; +1$

12. 850 increased by 20% $= 850 + \left(850 \times \frac{20}{100}\right) = 850 + 170 = 1,020$

13. $(250 + 45 \times 4) - 15 \div 3 = (250 + 180) - 5 = 430 - 5 = 425$

14. $3x - (5x - 2) = 0$

    $3x - 5x + 2 = 0$

    $-2x + 2 = 0$

    $-2x = -2$

    $2x = 2$

    $x = \frac{2}{2} = 1$

15. Prime numbers are numbers with only two factors i.e. one and itself.

    The four prime numbers are 2, 3, 5 and 7.

16. $1\ ha = 100\ a$

    $0.25\ ha = \frac{25}{100} \times 100\ a = 25\ ares$

17.

$$\begin{array}{r} +\quad 1\quad 1_{two} \\ \underline{\quad\quad 1\quad 1_{two}} \\ 1\quad 1\quad 0_{two} \end{array}$$

18. $n = \dfrac{360°}{ext.angle} = \dfrac{360°}{20°} = 18\ sides$

19. $3720 sec = \dfrac{3720}{60} min = 62\ min\ 0 sec = 1hr\ 2min$

20. (a) $A \cap B = \{3,11,27\}$

    (b) Set B is a subset of set A

21. $(100 - 16)$ % corresponds to 4,300Frw

    84% correspond to 4,200

    1% corresponds to $\dfrac{4,200}{84}$

    100% corresponds to $\dfrac{4,200 \times 100}{84} = 5,000 Frw$

22. Seventy-five and twenty-seven hundredths

23. The Lowest Common Multiple (LCM) of 624 and 208 is $2^3 \times 3 \times 13 = 624$

24. Perimeter = 164cm

    $Side = \dfrac{Perimeter}{4} = \dfrac{164m}{4} = 41m$

    $Area = S \times S = 41m \times 41m = 1,681m^2$

25. 3.826

26. $\dfrac{12}{36} \times \dfrac{6}{9} + \dfrac{25}{50} = \dfrac{6}{12} + \dfrac{1}{2} = \dfrac{1}{2} + \dfrac{1}{2} = \dfrac{2}{2} = 1$

27. Side a = 15m

    Side b = (15m + 6m) = 21m

    $A = \dfrac{(a+b) \times h}{2} = \dfrac{(15+21) \times 8}{2} = 4 \times 36 = 144m^2$

28. 8 guests will sit on 1 table

    1 guest will sit on $\dfrac{1}{8} table$

    235 guests will sit $\dfrac{1 \times 235}{8} = 29\dfrac{3}{8}$

    235 guests will sit on 29 tables and the 30th will be occupied by 3 guests.

The least number of circular tables is equal to 30.

29. (a) Number of intervals $= \frac{5,540m}{20m} = 277$

(b) Number of poles = 277 + 1 = 288

30. Amount of money that was to be paid by everyone $= \frac{4,500}{15} = 300$

Amount of money paid by students who paid more = 300 + 75 = 375

Number of pupils who paid more $= \frac{4,500}{375} = 12$

Number of pupils who were unable to pay = 15 − 12 = 3

31. (a) $TSA = \pi r(r + l) = 3.14 \times 6(6 + 10) = 18.84 \times 16 = 301.44 cm^2$

(b) $V = \frac{1}{3}\pi r^2 h$

$h = \sqrt{H^2 - b^2} = \sqrt{10^2 - 6^2} = \sqrt{100 - 36} = \sqrt{64} = 8cm$

$V = \frac{1}{3}\pi r^2 h = \frac{1}{3} \times 3.14 \times 6 \times 6 \times 8 = 301.44 cm^3$

32. $T = \frac{Production\ of\ time}{Difference\ in\ time} = \frac{4 \times 3}{4 - 3} = \frac{12}{1} hrs = 12\ hours$

33. Price of the mixed beans = 500Frw x 9 = 4,500Frw

Price of the first type = 300Frw x 4 = 1,200Frw

Price of the second type = 4,500 – 1,200 = 3,300Frw

Cost of each kg of the second type $= \frac{3,300Frw}{5} = 660Frw$

34. (a) Distance from town A to town B $= speed \times time = \frac{60km}{h} \times 3h = 180km$

(b) The average speed $= \frac{Total\ distance}{Total\ time\ taken} = \frac{180km + 180km}{3hr + 2hr} = \frac{360km}{5h} = 72km/h$

35. (a) First year

$I = \frac{PTR}{100} = \frac{180,000 \times 1 \times 10}{100} = 18,000 Frw$

$A = P + I = 180,000 + 18,000 = 198,000$

Second year

$I = \frac{PTR}{100} = \frac{198,000 \times 1 \times 10}{100} = 19,800 Frw$

$Compound\ interest = 18,000 + 19,800 = 37,800 Frw$

(b) Amount = Principal + Compound interest

= 180,000Frw + 37,800Frw = 217,800Frw

Mathematics

PM

12/11/2018   09AM–11AM

REB

Rwanda Education Board

Pupil's complete index number

Province/City	District	Sector	School	Pupil	Year
☐☐	☐☐	☐☐	☐☐	☐☐☐	☐☐☐☐

Pupil's names

Surname: ....

Other names: ....

NB: PUPIL'S INDEX NUMBER AND NAMES **MUST** BE WRITTEN AS THEY APPEAR ON THE REGISTRATION FORM.

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2018

MATHEMATICS

DURATION: Two hours

Marks: | /100

INSTRUCTIONS:

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9) You are **NOT** allowed to use a calculator.

ATTEMPT ALL QUESTIONS IN THIS PAPER.   **(100 MARKS)**

YOU MAY DO ROUGH WORK IN THE SPACE PROVIDED BELOW EACH QUESTION.	GIVE YOUR ANSWER IN THE SPACE PROVIDED IN THIS COLUMN. SHOW THE WORKING STEPS.
1) Subtract: 867,523 – 374,238 **(2 marks)**	
2) Test whether 298 is divisible by 9. **(2 marks)**	
3) If $a + b = 20$ and b = 8, **(2 marks)** Find the value of a	
4) Write in figures: Four hundred forty million, five hundred eighty four thousand and four hundred nine. **(2 marks)**	

5) Round off 412928.92 to the nearest whole number. **(2 marks)**	
6) What is the place value of 7 in the figure 75 325 961? **(2 marks)**	
7) Workout out: $3 \times (15 + 5) - 7 =$ **(2 marks)**	
8) How many millilitres of water does a bottle of five litres have? **(2 marks)**	
9) Find the value of $-3a - 4b \; if \; a = 2 \; and \; b = -3$ **(2 marks)**	

10) Arrange in ascending order $\frac{3}{10}; \frac{5}{12}; 0.75; \frac{2}{15}$ **(2 marks)**	
11) Solve for x the following equation $x - 7 = -2x - 1$ **(2 marks)**	
12) Work out $\frac{0.72 \times 0.24}{0.48}$ **(2 marks)**	
13) Simplify the expression: $2(a - 3) + 4b - 2(a - b - 3) + 5$ **(2 marks)**	
14) The interior angle of a regular polygon is 145°. Find the size of the exterior angle	

of the polygon. **(2 marks)**	
15) Find the area of a regular pentagon whose side is 4cm and apothem is 2cm. **(2 marks)**	
16) Calculate $3\frac{5}{7} + 2\frac{2}{3}$ **(2 marks)**	
17) The circumference of a circle is 314cm. Find its diameter in cm (use $\pi = 3.14$). **(2 marks)**	
18) If two numbers have a difference of 381 and a quotient of 4. Determine these numbers. **(2 marks)**	
19) A man's step is 80cm. How many such steps can he make in a distance of 40dm? **(2 marks)**	

20) Share 170 notebooks among 9 pupils. Give your answer as a mixed fraction. **(2 marks)**	
21) A motorcyclist rides 15km in one hour. How many hours does he take to ride 45km? **(2 marks)**	
22) Find the area of a circle whose diameter is 28m. **(2 marks)**	
23) Given that the total number of pupils in P6 class is 32 and the difference between the number of boys and that of	

girls in the class is 10.

(a) Calculate the number of boys in the class. **(1 mark)**

(b) Calculate the number of girls in the class. **(1 mark)**

24)   Calculate 12% of 280,000.   **(2 marks)**

25)   Dora has 10,000Frw. She took $\frac{3}{5}$ of that money to buy shoes. Calculate the sum of money she spent on shoes.   **(2 marks)**

26)   A man's salary increased in the ratio 2:3. If he was earning 70,000Frw. Calculate his new salary.   **(2 marks)**

27) The cost of a Science book and a bag is 75,000Frw altogether. The book costs 15,000Frw more than the bag.
 	
Find:
 	
  (a) The cost of the bag.   **(2 marks)**
 	
  (b) The cost of the book. **(2 marks)**	

28) A woman deposited 600,000Frw in the Bank for 2 years at an interest rate of 4% per year. (a) Calculate the interest she got after the second year. **(2 marks)** (b) Calculate the total amount she got after 2 years. **(1 mark)**	

29) (a) Name the regular polygon which has 12 sides. **(1 mark)**

(b) What is the interior angle of a regular octagon? **(1 mark)**

30) The area of a rectangle is 15 square decimeters and its length is 50 centimeters. Find the width of the rectangle. Give your answer in centimetres. **(3 marks)**

31) Manu, Ally and Eden are friends. They

contributed money for paying the insurance of the old people in their cell in 3 to 4 to 5 parts respectively. Manu contributed 40,000Frw.

(a) How much did Ally contribute?
(3 marks)

(b) How much did Eden contribute?
(2 marks)

(c) Calculate the total contribution of the three members. **(1 mark)**

32) In a Conference hall, $\frac{2}{6}$ of seats are filled by women, $\frac{1}{5}$ by men and $\frac{1}{3}$ by children.

(a) What fraction of the conference hall is occupied? **(2 marks)**

(b) What fraction of the conference hall is not occupied? **(1 mark)**

(c) How many people are in the conference hall if the whole conference room contains 9000 seats? **(1 mark)**

(d) Calculate the number of men who are present. **(1 mark)**

(e) Calculate the number of women who are present. **(1 mark)**

33) (a) What is the volume of a cylinder

which is 4cm high and whose circular face has a diameter of 2cm? **(2 marks)**

(b) Three friends Lorina, Langa and Lona contributed to start a business. Lorina paid $\frac{4}{10}$ of the total contribution, Lariga contributed $\frac{3}{10}$ of the total contribution.

(i) What fraction did Lona contribute?
(2 marks)

(ii) If Lona contributed 60,000 Frw, what was their total contribution? **(3 marks)**

34) The table below shows how primary four (P4) class scored in English Test out of 100.

a) Complete the table across with the above information (the first row was completed for you) **(3 marks)**

Marks	50	30	40	42	80	70
Frequency	2	5	8	10	6	4

Marks(x)	Frequency(f)
30	5
$\sum x = \ldots$	$\sum f = \ldots$

b) How many pupils are in P4? **(1 mark)**

c) Find the highest marks in the class. **(1 mark)**

d) What is the mark obtained by many students? **(1 mark)**

e) How many pupils obtained the lowest marks? **(1 mark)**

35) A bicyclist covered a journey from

Centre A to Centre B in 3hours at a speed of 20km/h and he took 1hour to return through the same distance.

(a) Calculate the distance from A to B.
(2 marks)

(b) Calculate the total distance of the whole journey. **(1 mark)**

(c) Calculate the total time used to cover the whole journey. **(2 marks)**

(d) Calculate the average speed used for the whole journey. (Write the answer in m/s) **(2 marks)**

1. 493,285

2. 2 + 9 + 8 = 19

    19 is not a multiple of 9

    So, 198 is not divisible by 9

3. $a + b = 20$ and $b = 8$

    $a + 8 = 20$

    $a = 20 - 8$

    $a = 12$

4. 445,584,409

5. 412,929

6. 7 is ten millions

7. $3 \times (15 + 5) - 7 = 3 \times 20 - 7 = 60 - 7 = 53$

8. $5l = 5,000$ ml

9. $-3a - 4b$ if $a = 2$ and $b = -3$

    $-3 \times 2 - 4 \times (-3) = -6 + 12 = +6$

10. $\frac{3}{10} = 0.3; \frac{5}{11} = 0.41; \frac{2}{15} = 0.1$

    $Ascending$ $order: \frac{2}{5}; \frac{3}{5}; \frac{5}{12}; 0.75$

11. $x - 7 = -2x - 1$

    $x + 2x = -1 + 7$

    $3x = 6$

    $x = \frac{6}{3}$

    $x = 2$

12. $\frac{0.72 \times 0.24}{0.48} = \frac{72}{100} \times \frac{24}{100} \div \frac{48}{100} = \frac{72}{100} \times \frac{24}{100} \times \frac{100}{48} = \frac{36}{100} = 0.36$

13. $\mathbf{2(a - 3) + 4b - 2(a - b - 3) + 5 = 2a - 6 + 4b - 2a + b + 6}$

    $\mathbf{= 4b + 2b + 6 = 6b + 6}$

14. Exterior angle = 180° - 145° = 35°

15. $A = \left(\frac{4cm \times 2cm}{2}\right) \times 5 = 20cm^2$

16. $3\frac{5}{7} + 2\frac{2}{3} = \frac{3 \times 7 + 5}{7} + \frac{2 \times 3 + 2}{2} = \frac{26}{7} + \frac{8}{3} = \frac{26 \times 3 + 8 \times 7}{21} = \frac{78 + 56}{21} = \frac{134}{21} = 6\frac{8}{21}$

17. $Circumference = D \times 3.14$

   $D = \dfrac{D}{\pi} = \dfrac{314\ cm}{3.14} = 100cm$

18. Difference = 4 -1 = 3

   1st number = 381 ÷ 3 = 127

   2nd number = 127 × 4 = 508

19. $80cm = 8dm\ Number\ of\ steps = \dfrac{40\ dm}{8\ dm} = 5\ steps$

20. Number of books for each pupil $= \dfrac{170}{9} = 18\dfrac{8}{9}$

21. $Time = \dfrac{distance}{speed} = \dfrac{45km}{15km/h} = 3\ hours$

22. $Diameter = 28m$

   $r = \dfrac{D}{2} = \dfrac{28m}{2} = 14m$

   $A = \pi r^2 = \dfrac{22}{7} \times 14 \times 14 = 616m^2$

23. (a) Number of boys $= \dfrac{32+10}{2} = 21$

   (b) Number of boys $= \dfrac{32-10}{2} = 11$

24. 12% of 280,000 $= 280,000 \times \dfrac{12}{100} = 33,600Frw$

25. Money spent on buying shoes $= 10,000 \times \dfrac{3}{5} = 6,000Frw$

26. His new salary $= \dfrac{70,000 \times 3}{2} = 105,000Frw$

27. (a) Cost of the bag $= \dfrac{75,000-15000}{2} = 30,000Frw$

   (b) Cost of the book $= \dfrac{75,000+15000}{2} = 45,000Frw$

28. (a) Interest $= P \times \dfrac{R}{100} \times T = 600,000 \times \dfrac{4}{100} \times 2 = 48,000Frw$

   (b) The total amount the got from the bank $= 600,000 + 48,000$

   $$= 648,000Frw$$

29. (a) dodecagon

   (b) $(8 - 2) \times 180° = 1080°$

   Interior angle $= \dfrac{1080°}{8} = 135°$

30. Area of rectangle $= 15\ dm^2 = 5,000cm^2$

   $Length = 50cm$

   $Width\ of\ rectangle = \dfrac{A}{L} = \dfrac{1,500cm^2}{50cm} = 30cm$

31. Total part = 3 + 4 + 5 = 12

(a) All's contribution $= \frac{4}{3} \times 40{,}000 = 53{,}333 Frw$

(b) Eden's contribution $= \frac{5}{3} \times 40{,}000 = 66{,}667 Frw$

(c) Total contribution $= \frac{12}{3} \times 40{,}000 = 140{,}000 Frw$

32. (a) Fraction of the conference that is occupied $= \frac{2}{6} + \frac{1}{5} + \frac{1}{3}$

$= \frac{2\times5+1\times6+1\times10}{30} = \frac{10+6+10}{30} = \frac{26}{30} = \frac{13}{15}$

(b) Fraction of the conference that is not occupied $= 1 - \frac{13}{15} = \frac{15}{15} - \frac{13}{15} = \frac{2}{15}$

(c) People in the conference hall $= 9{,}000 \times \frac{13}{15} = 7{,}800$

(d) Number of men who are present $= 9{,}000 \times \frac{1}{5} = 1{,}800$

(e) Number of women who are present $= 9{,}000 \times \frac{2}{6} = 3{,}000$

(f) Number of children who are present $= 9{,}000 \times \frac{1}{3} = 3{,}000$

33. (a) Radius $= \frac{D}{2} = \frac{2cm}{2} = 1cm$

Volume $= \pi r^2 h = \frac{22}{7} \times 1^2 \times 4 = 12.57 \ cm^2$

(b) (i) Lona contribution $= 1 - \frac{4}{10} - \frac{3}{10} = \frac{10}{10} - \frac{7}{10} = \frac{3}{10}$

(ii) Contribution of Lorina and Lariga $= \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$

Contribution of Lorina and Lariga $= \frac{10 \times 60{,}000}{3} = 200{,}000 Frw$

34. (a)

Marks (x)	Frequency (f)
30	5
40	8
42	10
50	2
70	4
80	6
$\sum x = 312$	$\sum f = 35$

(b) Number of pupils in P4 = 35

(c) Highest mark in the class = 80

(d) The mark obtained by many students = 42

(e) Number of students that obtained the lowest marks = 5

35. (a) Distance from A to B $= Speed \times time = \frac{20km}{h} \times 3h = 60km$

(b) Total distance of the whole journey $= 60km \times 2 = 120km$

(c) Total time for the whole journey = 3h + 1h = 4 hours

(d) Average for the whole journey $= \frac{distance}{time} = \frac{120km}{4hours} = \frac{30km}{h} = \frac{30 \times 1000m}{3,600s}$

$= \frac{30,000m}{36000s} = \frac{300m}{36s} = \frac{25m}{3s} = 8\frac{1}{3}m/s$

| Mathematics |
| PM |
| 4/11/2019 |
| 09AM – 11AM |

Pupil's complete index number

Province/City District Sector School Pupil Year

Pupil's names

Surname: ....

Other names: ....

NB: PUPIL'S INDEX NUMBER AND NAMES **MUST** BE WRITTEN AS THEY APPEAR ON THE REGISTRATION FORM.

REB

Rwanda Education Board

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2019

MATHEMATICS

DURATION: Two hours

Marks: /100

INSTRUCTIONS:

1) Do not open this paper until you are told to do so.
2) *This paper consists of 12 pages and 35 questions. Before starting, check if all pages and all pages and all questions are there and are arranged in ascending order.*
3) Answer **ALL** questions in this paper
4) Read each question carefully before answering it.
5) Answer the questions in the space provided in this paper.
6) Show your working clearly. Marks will be given for showing steps. All rough work must be done in the space under each question.
7) You are allowed to use a ruler, and a protractor.
8) **You are __NOT__ allowed to use a calculator.**
7) You must use a **blue** or **black** ink pen.

ATTEMPT ALL QUESTIONS IN THIS PAPER.   **(100 MARKS)**

Do rough work below each question	Show the working steps and final answer in this column
1) Write the biggest number of 8 digits formed by the digits below: 2; 3; 8; 5; 4; 7; 1; 9 **(2 marks)**	
2) Arrange the following integers from the lowest to the highest. $-8; -1; +7; +1; +2; -4$ **(2 marks)**	
3) Write the place value of digit 1 in the following: 18,526,739 **(2 marks)**	
4) Write in words the following number: 277,818,599 **(2 marks)**	

5) If $b = 4$, calculate: $48 - (15 + b) =$ **(2 marks)**	
6) Find 5% of 45000Frw **(2 marks)**	
7) Solve for x in the following equation: $2(x - 1) = x - 3$ **(2 marks)**	
8) Round off 76,948 to the nearest thousands. **(2 marks)**	
9) Express the following fraction as a decimal to 2 decimal places. $2\frac{5}{6}$ **(2 marks)**	

10) Calculate: $4^3 - \sqrt{100}$ **(2 marks)**	
11) Workout the calculation below and simplify the answer. $\dfrac{4.28+63.12}{0.02}$ **(2 marks)**	
12) Find the next two numbers in the digits below: 2; 5; 11; 23; ------; ----- **(2 marks)**	
13) Workout the fraction below and simplify the answer. $\left(\dfrac{1}{5} + 3\dfrac{2}{3}\right) : \dfrac{8}{6} =$ **(2 marks)**	
14) 10,500 English books are shared	

among 50 students. Find the number of books shared by each student. **(2 marks)**

15) Calculate: $(9) \times (-6) =$ **(2 marks)**

16) Write in words the following number:

21, 892, 045 **(2 marks)**

17) Evaluate: $6^6 - 4^4 =$ **(2 marks)**

18) Find GCF or Greatest Common Factor of 120 and 96. **(2 marks)**

19) Find the size of the exterior angle of a regular polygon if its interior angle is 80°.

(2 marks)	
20) Find the perimeter of the figure below **(2 marks)**	
21) A man has 12 notes of 5000frw; 20 notes of 1000frw and 40 notes of 500frw. Find the total amount of money the man has. **(2 marks)**	
22) There are 24 hours in one day, and there are 60 minutes in one hour. How	
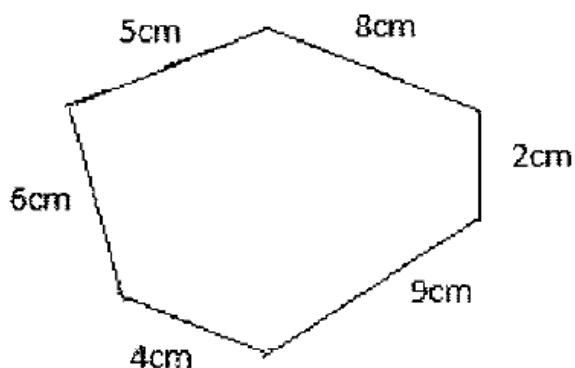
many minutes are there in one day?

(2 marks)

---

23) Calculate $3\frac{2}{5} + \frac{3}{4} =$ **(2 marks)**

---

24) Find the circumference of a circular garden whose radius is 36cm.

(Use $\pi = 3.14$) **(2 marks)**

---

25) Write the following in descending order:

$0.05; 0.12; \frac{1}{2}; 0.55; \frac{2}{5}$ **(2 marks)**

26) Find the number whose square roots is 12. **(2 marks)**

27) In the figure below:

24cm

90⁰

7cm

y
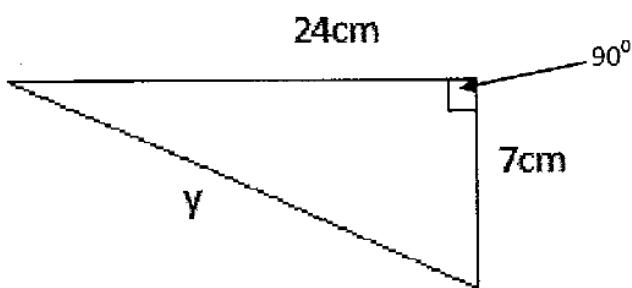
(c) Find the length of the side marked by the letter y. **(1 mark)**

(d) Calculate the area of the figure above. **(2 marks)**

28) If an English Exam started at 8:30 a.m. and took $3\frac{1}{2}$ hours, at which time did it end? **(3 marks)**

29) Joana spends 160,000FRW on school fees. This is 10% of her monthly salary. How much is her salary? **(3 marks)**	
30) A water tank has a radius of 4,4m and a height of 8m. Find its volume. (Use $\boldsymbol{\pi} = \mathbf{3.14}$) **(3 marks)**	
31) a) A shopkeeper borrowed 240,000FRW for 6 months at an interest rate of 20% per annum. (i) Calculate the interest he should pay after 6 months. **(2 marks)** (ii) Calculate the total amount of money he will pay to the bank. **(2 marks)** (b) Benita bought a radio at 45,000frw and sold it at 32,000frw. (i) Find the loss Benita made. **(1 mark)**	

(ii) Calculate the percentage of the loss.
(2 marks)

32) A woman went to the market and bought the following items:

10kg of rice at 1,000Frw/1kg

20kg of meat at 3,000Frw/1kg

5litres of oil at 1,500Frw/1kg

1kg of Irish potatoes at 300Frw/1kg

(i) Complete the table below showing the budget she spent. **(5 marks)**

Item n°	Unit price	Quantity	Total amount
1. Rice	1000Frw	10kg	1000Frw x 10 = 10,000Frw
2.	……..	……..	………..
3.	……..	……..	………..
4.	……..	……..	………..
			Total: ….. Frw

(ii) On what item did she spend most money? Why? **(1 mark)**

(iii) What was her balance after spending the money if she had 92,000Frw in her pocket before buying? **(1 mark)**

33) Alan left City A for City B in his car at 10:00 a.m. moving at a speed of 30km/hr. At the same time Norah left city B for City A in a new car at a speed of 15km/hr. The distance from City A to B is 480km. (i) At what time did the two meet? **(2 marks)** (ii) What distance had Alan covered before meeting Norah? **(2 marks)** (iii)What distance had Norah covered before meeting Alan? **(2 marks)**	
34) a) If a Kinyarwanda examination at a certain school started at 8.30 a.m. and ended at 11 a.m., how long did the examination take? **(3 marks)** b) Find the surface area of a cube with a	

side length of 3 cm. **(2 marks)**

c) If the total surface area of a cube equals 96 cm², what is the length of one side of the cube? **(2 marks)**

35) The table below shows how primary six (P6) class scored Kinyarwanda Test out of 100 marks.

Marks	50	20	45	30	70	65
Frequency	2	4	6	7	5	9

a) Complete the table below: **(2 marks)**

Marks(x)	Frequency(f)
30	7
$\sum x = ...$	$\Sigma f = ...$

b) Answer the following questions:

(i) How many pupils are in P6?

(1 mark)

....

(ii) What is the mode of the class?

(1 mark)

....

(iii)Find the modal frequency

(1 mark)

....

(iv)Calculate the range marks

(1 mark)

....

(v) Find the mean marks   **(1 mark)**

....

MARKING GUIDE OF P6 MATHEMATICS NATIONAL EXAMINATION 2019

1. 98,754,321

2. $-8; -4; -1, +1; +2; +7$

3. The place value of digit 1 is ten millions

4. Two hundred seventy-seven million, eight hundred eighteen thousand five hundred ninety-nine.

5. $48 - (15 + 4) = 48 - 19 = 29$

6. $5\% \ of \ 45,000Frw = 45,000Frw \times \frac{5}{100} = 2250Frw$

7. $2(x - 1) = x - 3$

   $2x - 2 = x - 3$

   $2x - x = -3 + 2$

   $x = -1$

8. 77,000

9. $2\frac{5}{6} = \frac{2\times6+5}{6} = \frac{17}{6} = 2.83$

10. $\mathbf{4^3 - \sqrt{100} = 4 \times 4 \times 4 - 10 = 64 - 10 = 54}$

11. $\frac{\mathbf{4.28 + 63.12}}{\mathbf{0.02}} = \frac{67.4}{0.02} = 3,370$

12. 47, 95 (Note: the following number is equal to $2x + 1$)

13. $\left(\frac{1}{5} + 3\frac{2}{3}\right) : \frac{8}{6} = \left(\frac{1}{5} + \frac{3\times6+2}{6}\right) \times \frac{6}{8} = \left(\frac{1}{5} + \frac{20}{6}\right) \times \frac{6}{8} = \left(\frac{6+100}{30}\right) \times \frac{6}{8} = \frac{106}{30} \times \frac{6}{8}$

    $= \frac{53}{15} \times \frac{6}{8} = \frac{318}{120} = \frac{159}{60} = \mathbf{2\frac{39}{60}}$

14. Number of books shared by each student $= \frac{10,500 \ books}{50} = 210 \ books$

15. $(9) \times (-6) = -54$

16. Twenty one million eight hundred ninety two thousands forty five

17. $6^6 - 4^4 = 6 \times 6 \times 6 \times 6 \times 6 \times 6 - 4 \times 4 \times 4 \times 4 = 46,656 - 256 = 46,400$

18. $120 = 2^3 \times 3 \times 5$

    $96 = 2^3 \times 3$

    GCF of 120 and 86 is $2^3 \times 3 = 24$

19. 180° - 80° = 100°

20. The perimeter of the figure = 6cm + 5cm + 8cm + 2cm + 9cm+ 4cm = 34 cm

---

21. The total amount of money the man has $= 5,000 \times 12 + 1,000 \times 20 + 500 \times 40 = 60,000 + 20,000 + 20,000 = 100,000 Frw$

22. Number of minutes in one day $= 60 \times 24 = 1,440 sec$

23. $3\frac{2}{5} + \frac{3}{4} = \frac{3\times5+2}{5} + \frac{3}{4} = \frac{17}{5} + \frac{3}{4} = \frac{17\times4+3\times5}{20} = \frac{68+15}{20} = \frac{83}{20} = 4\frac{3}{20}$

24. Circumference = Diameter $\times \pi$

    $D = 36cm \times 2 = 72cm$

    $C = 72cm \times 3.14 = 226.08cm$

25. $0.55; \frac{1}{2}; \frac{2}{5}; 0.12; 0.05$

26. That number is $12 \times 12 = 144$

27. (a) $y^2 = 7^2 + 24^2$

    $y^2 = 49 + 576$

    $y^2 = 625$

    $y = \sqrt{625} = 25cm$

    (b) The area of the figure $= \frac{24cm \times 7cm}{2} = 84cm^2$

28. 8 : 30 + 3: 30 = 12 : 00 noon

29. 10% of her salary $= 160,000 Frw \times \frac{10}{100} = 16,000 Frw$

    Her salary is 100% $= \frac{160,000 Frw \times 100}{10} = 1,600,000 Frw$

30. Its volume $= \pi r^2 h = 3.14 \times 4.4 \times 4.4 \times 8 = 486.3232 cm^3$

31. (a) Interest after two months

    P = 240,000Frw

    Time = 6 months = 0.5 year

    $I = P \times \frac{R}{100} \times T = 240,000 \times \frac{20}{100} \times 0.5 = 24,000 Frw$

    (b) (i) The loss Benita made $= 45,000 - 32,000 = 13,000 Frw$

    (ii) Percentage of the loss $= \frac{13,000 \times 100}{45,000} = 28.8\%$

32. (i)

Item n°	Unit price	Quantity	Total amount
1. Rice	1,000Frw	10kg	1000Frw x 10 = 10,000Frw
2. Meat	**3,000Frw**	**20**	**3,000Frw x 20 = 60,000Frw**
3. Oil	**1,500Frw**	**5**	**1,500Frw x 5 = 7,500Frw**
4. Potatoes	**300Frw**	**15**	**300Frw x 15 = 4,500Frw**
			Total: **82,000Frw**

(ii) She spent much money on meat because it is expensive.

(iii) Balance = 92,000Frw – 82,000Frw = 10,000Frw

33. (i) The time when the two drivers meet $= \dfrac{480km}{30^{km}/_h + 15^{km}/_h} = \dfrac{480km}{45^{km}/_h}$

$= 10.666 \; hours = 640min = 10h40min$

They meet at $10:00am + 10h40min = 20:40pm$

(ii) Distance covered by Alan $= \dfrac{30km}{h} \times \dfrac{640min}{60min} = 320km$

(iii) Distance covered by Norah $= \dfrac{15km}{h} \times \dfrac{640min}{60min} = 160km$

34. (a) The exam took 11 : 00 – 8 : 30 = 2h30

(b) The surface area of a cube with a side length of 3cm

$= 3cm \times 3cm \times 6 = 54cm^2$

(c) The area of one side $= \dfrac{Total \; surface \; area}{6} = \dfrac{96 \; cm^2}{6} = 16cm^2$

(d) The length of one side $= \sqrt{16} = 4cm$

35. (a)

Marks (x)	Frequency (f)	
20	**4**	**80**
30	7	**210**
45	**6**	270
50	**2**	100
65	**9**	**585**
70	**5**	**350**
$\sum x = 280$	$\sum f = 33$	1595

(b) (i) Number of pupils in P6 = 33

(ii) Mode marks = 65

(iii) The modal frequency = 9

(iv) The range of marks = 50

(iv) The mean marks = $\frac{1595}{33}$ = 48.3

Mathematics
PM
12/07/2021 09:00 AM–11:00 AM

NESA | NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2021

MATHEMATICS

DURATION: Two hours

Marks: | /100 |

INSTRUCTIONS:

1) Do not open this paper until you are told to do so.
2) ***This paper consists of 12 pages and 35 questions. Before starting, check if all pages and all questions are there and are arranged in ascending order.***
3) Answer **ALL** questions in this paper
4) Read each question carefully before answering it.
5) Answer the questions in the space provided on this question paper.
6) Show your working clearly. Marks will be given for showing steps. All rough work must be done in the space under each question.
7) You must use a blue or black ink pen.
8) You are allowed to use a ruler, and a protractor.
9) **You are NOT allowed to use a calculator.**

ATTEMPT ALL QUESTIONS IN THIS PAPER   (100 MARKS)

Do rough work below each question	Show the working steps and final answer in this column
1) Write the following number in words 29 802 604 **(2 marks)**	
2) Write the place value of digit 6 in the number 4567891 **(2 marks)**	
3) Round off 86948 to the nearest thousands. **(2 marks)**	

4) Workout without using a number line.
 	
   a) (+4) x (-8)   **(1 mark)**
 	
   b) (+12) : (+3) **(1 mark)**	

5) Find the Least Common Multiple of	

numbers 6; 12 and 18 **(2 marks)**

6) Workout $\left(\frac{2}{3} \times \frac{15}{4}\right) : \frac{5}{6} =$ **(2 marks)**

7) Calculate the value of $3x^2y - xz$ if
   $x = -2, y = -1$ and $z = 4$ **(2 marks)**

8) Calculate the price of *12kg* of beans if
   6kg cost *2760frw*. **(2 marks)**

9) Decrease 4000 by 14% **(2 marks)**

10) Convert $9\frac{2}{5}$ into decimals **(2 marks)**

11) Workout 23hg + 50kg = ….g = …..mg

	(2 marks)	
12) Simplify **(2 marks)** $9a^4b^3 : 3a^2b =$		
13) Find the two missing fractions in the sequence below: **(2 marks)** $\frac{1}{2}; \frac{1}{4}; \frac{1}{8}; \frac{1}{16}; \ldots.; \ldots \ldots$		
14) Use quick arithmetic to work out the following: **(2 marks)** $84 \times 25 =$		
15) Express 72 as a product of its prime factors. **(2 marks)**		
16) Subtract: $3\frac{1}{4} - 2\frac{3}{8} =$ **(2 marks)**		
17) A school library has 120 shelves with 98 books each. How many books are there		

in the library? **(2 marks)**	
18) Eric has 5 notes of 2000frw, 2 notes of 5000frw and 20 notes of 500frw. Calculate the total amount of money he has. **(2 marks)**	
19) Find the circumference of a circular garden whose radius is 24cm. (Use Π =3.14) **(2 marks)**	
20) Find the number whose square root is 16. **(2 marks)**	
21) Find the complement of 60°. **(2 marks)**	

22) Evaluate $5^2 + 4^2 =$ **(2 marks)**	
23) Convert 18000 sec = ...hours....mn **(2 marks)**	
24) Workout $\frac{\sqrt{400}+\sqrt{625}}{\sqrt{100}} =$ **(2 marks)**	
25) Solve the equation **(3 marks)** $(2x - 1) = 5(x - 2)$	
26) The height of the right angle triangle is 3cm and its hypothenuse is 5cm. (a) Calculate the length of the 3rd side of the triangle in cm. **(2 marks)** (b) Calculate the area of the triangle. **(1 mark)**	
27) 20% of a number is 60. What is the	

number? **(2 marks)**	
28) In a class there are 60 children. The ratio of boys to girls is 2:3 respectively. d) How many boys are in the class? **(2 marks)** e) How many girls are in the class? **(1 mark)**	
29) Mary spends 125,000FRW on buying food. This is 5% of her monthly salary. How much is her salary? **(2 marks)**	
30) A car took 6 hours to cover a distance. It moved at a speed of 90km/hr. Calculate the distance it covered. **(2 marks)**	
31) a) Find the interior angle sum of a pentagon. **(3 marks)** b) How many sides does a hexagon have? **(1 mark)** c) Find the centre of a regular hexaxon? **(3 marks)**	
32) a) An amount of money gained an interest of 144,000FRW. It was invested for	

9 years. If the simple interest rate is 6%, calculate the principal amount. **(5 marks)**	
b) Convert 8.09 into a fraction and show your working. **(2 marks)**	

33) a) Kamana bought a bicycle at 60000frw and after a short period of time sold it at 50000frw.
 	
  (i) Calculate his loss. **(1 mark)**
 	
  (ii) Calculate the percentage loss. **(2 marks)**	

34) Fifi mixed 4kg of yellow maize flour with an unknown quantity of white maize	

flour. The cost price of the mixture was 800Frw per kg.

Yellow maize flour cost 900 Frw per kg and the white maize flour costs 700 Frw per kg when not mixed.

Find the quantity in kilograms of the white maize flour used.

Show your working. **(7 marks)**

35) The data below shows the marks obtained (out of 100) by pupils in an English test:

88 56 56 76 23 10 89 90 43 23 50 12
54 76 23 22 43 54 29 74 66 43 12 64

a) Represent this data in a table of two columns (Column 1: Marks, Column 2: Number of pupils obtaining those marks)   **(3 marks)**

b) How many pupils did the test?
                                   (1 mark)

c) How many pupils scored 76% marks?
                                   (1 mark)

d) How many pupils got less than 50% marks?   **(1 mark)**

e) What was the highest mark scored?
                                   (1 mark)

MARKING GUIDE OF P6 MATHEMATICS NATIONAL EXAMINATION 2021

1. Twenty-nine million eight hundred and two thousand six hundred four

2. The place value of 6 is ten thousands

3. 87,000

4. Workout without using a number line.

   a) (+4) x (-8) = - 32

   b) (+12) : (+3) = + 4

5. LCM = $2 \times 2 \times 3 \times 3 = 36$

6. $\left(\frac{2}{3} \times \frac{15}{4}\right) : \frac{5}{6} = \frac{30}{12} : \frac{5}{6} = \frac{30}{12} \times \frac{6}{5} = \frac{180}{60} = \frac{18}{6} = 3$

7. $3x^2y - xz = 3(-2)^2 \times (-1) - (-2) \times 4 = +12 - (-8)$

   $= -12 + 8 = -4$

8. 6kg cost 2760

   1 kg costs 460Frw

   12kg will cost 460Frw x 12 =5,520Frw

9. 18% of $8000 = 800 \times \frac{14}{100} = 1120$

   8000 decreased by $14\% = 8000 - 1120 = 6880$

10. $9\frac{2}{5} = \frac{9 \times 5 + 2}{5} = \frac{45 + 2}{5} = \frac{47}{5} = 9.4$

11. 23hg + 50kg = 52,300 g = 52,300,000 mg

12. $9a^4b^3 : 3a^2b = 3a^2b^2$

13. $\frac{1}{32}; \frac{1}{64}$

14. $84 \times 25 = \frac{84 \times 100}{4} = \frac{8400}{4} = 2100$

15. $72 = 2^3 \times 3^2$

16. $3\frac{1}{4} - 2\frac{3}{8} = \frac{3 \times 4 + 1}{4} - \frac{2 \times 8 + 3}{8} = \frac{13}{4} - \frac{19}{8} = \frac{26}{8} - \frac{19}{8} = \frac{7}{8}$

17. Number of books in the library $= 120 \times 98 = 11,760 \: books$

18. Total amount of money that Eric has $= 5 \times 2,000 + 2 \times 5,000 + 20 \times 500 = 10,000 + 10,000 + 10,000 = 30,000 Frw$

19. Circumference $= Diameter \times \pi$

    $Diameter = radius \times 2 = 24cm \times 2 = 48cm$

    $Circumference = D \times \pi = 48cm \times 3.14 = 150.72cm$

---

20. The number whose square root is $16 = 16 \times 16 = 256$

21. The complement of $60° = 90° - 60° = 30°$

22. $5^2 + 4^4 = 25 + 4^2 \times 4^2 = 5 \times 5 + 4 \times 4 \times 4 \times 4 = 25 + 16 \times 16$

   $= 25 + 256 = 281$

23. $1 \text{ hour} = 60 \times 60 = 3600 sec$

   $18000 sec = \frac{18000}{3600} = 5 \ hours = 5 \times 60 = 300 \ min$

   $18000 sec = \frac{18000}{3600} = 5 \ hours \ 0 \ min$

24. $\frac{\sqrt{400}+\sqrt{625}}{\sqrt{100}} = \frac{20+25}{10} = \frac{45}{10} = \mathbf{4.5}$

25. $\mathbf{(2x - 1) = 5(x - 2)}$

   $2x - 1 = 5x - 10$

   $2x - 5x = -10 + 1$

   $-3x = -9$

   $3x = 9$

   $x = \frac{9}{3}$

   $x = 3$

26.
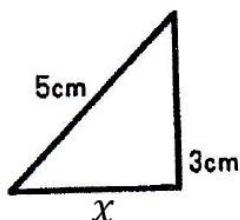
   (a) The length of the third side $= x$

   $x^2 + 3^2 = 5^2$

   $x^2 + 9 = 25$

   $x^2 = 25 - 9$

   $x^2 = 16$

   $x = \sqrt{16}$

   $x = 4cm$

   (b) The area of the triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 4cm \times 3cm$

   $= \frac{1}{2} \times 20cm^2 = 6cm^2$

27. 20% of a number = 60

That number = $100\% = \frac{60 \times 100}{20} = 300$

28. (a) Number of boys $= \frac{2}{5} \times 60 = 24$

(b) Number of girls $= \frac{3}{5} \times 60 = 36$

29. 5% of her salary = 125,000Frw

Her salary = $100\% = \frac{125,000Frw \times 100}{5} = 2,500,000Frw$

30. Distance covered by the car $= speed \times time = \frac{90km}{h} \times 6h = 540km$

31. (a) The interior angle sum of a pentagon = (5 -2) × 180°

= 3 × 180° = 540°

(b) A hexagon has 6 sides

(c) The centre angle of a regular hexagon $= \frac{360°}{6} = 60°$

32. (a) Interest = 6%

Time = 9 years

Simple interest = 144,000Frw

$Principal = \frac{SI \times 100}{R \times T} = \frac{144,000 \times 100}{6 \times 9} = \frac{14,400,000}{54} = 266,666.6 \, Frw$

(b) $8.09 = \frac{8.09 \times 100}{100} = \frac{809}{100} = 8\frac{9}{100}$

33. (a) (i) Loss of Kamana = 60,000Frw – 50,000Frw = 10,000Frw

(ii) Percentage loss $= \frac{10,000Frw}{60,000Frw} \times 100 = 16.6\,\%$

(b) Time $= 3months = \frac{3}{12}year$

$SI = P \times \frac{R}{100} \times T = 48,000,000Frw \times \frac{6}{100} \times \frac{3}{12} = 720,000Frw$

34. 1kg of the mixture cost 800Frw

Selling the yellow maize flour alone causes a loss of (900 – 100) = 100 Frw per kilogram.

Selling 4kg results in a loss of $100 \times 4 = 400Frw$

Selling the white maize flour alone results in a gain of (800 – 700) = 100 Frw per kilogram.

The number of kilograms for the second type is also equal to 4kg.

35. (a)

Marks	Number of pupils obtaining those marks
10	1
12	2
22	1
23	3
29	1
43	3
50	1
54	2
56	2
64	1
66	1
74	1
76	2
88	1
89	1
90	1
Total	**24**

(b) 24 pupils have done the test

(c) 2 pupils scored 76%

(d) The number of students who got less than 50% is equal to 11.

(e) The highest mark scored was 90%

Mathematics

PM

18/07/2022 09:00 AM–11:00 AM

NESA | NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2021-2022

MATHEMATICS

DURATION: Two hours

Marks: /100

INSTRUCTIONS:

1) Do not open this paper until you are told to do so.

2) Answer **ALL** questions in this paper

3) Read each question carefully before answering it.

4) Answer the questions in the space provided on this question paper.

5) Show your working clearly. Marks will be given for showing steps. All rough work must be done in the space under each question.

6) You must use a **blue** or **black** pen.

7) You are allowed to use a ruler, and a protractor.

8) **You are __NOT__ allowed to use a calculator.**

ATTEMPT ALL QUESTIONS IN THIS PAPER   **(100 MARKS)**

| Do rough work below each question	Show the working steps and final answer in this column
1) Write the following number in figures: Nine million nine thousand eighty seven. **(2 marks)**	
2) Write the place value of digit 7 in the number 180,493.27 **(2 marks)**	
3) Arrange the following numbers from the lowest to the highest. $\frac{2}{3}; -1; 0.5; 100; -100; 0.82; -1; 5$ **(2 marks)**	
4) Convert 432,000 sec=....days....hours **(2 marks)**	

5) Find the next two numbers in the following sequence. $3; 9; 27; 81; \ldots; \ldots$ **(2 marks)**	
6) Use the divisibility test method to check if 23,760 is divisible by 11. **(2 marks)**	
7) Solve of $4x - 8 = 10x - 20$ **(2 marks)**	
8) Workout $\frac{3}{4} \times \left(\frac{2}{5} + \frac{3}{7}\right) =$ **(2 marks)**	
9) Calculate $4.5kg + 113dag = \ldots kg$ **(2 marks)**	

10) 4% of the learners in P5 are boys. If there are 45 boys in the class, how many learners are in the class? **(2 marks)**	
11) Simplify $\frac{\sqrt{225}+\sqrt{169}}{\sqrt{16}}$ **(2 marks)**	
12) Calculate the sum of 524,321 and 17,674,329 **(2 marks)**	
13) One Mathematics book costs 5,200Frw. How much do 8 similar books cost? **(2 marks)**	
14) Multiply 896,327 by 121. **(2 marks)**	

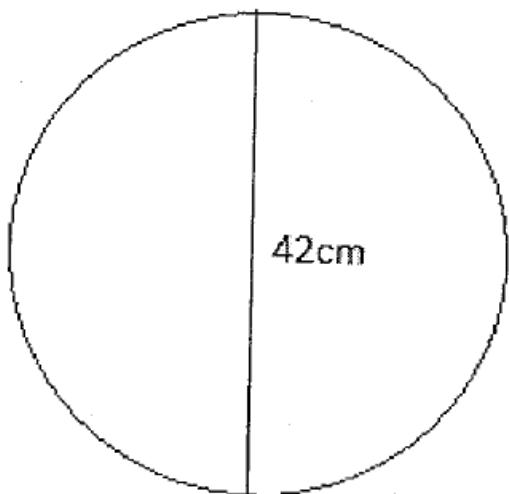|	
15) Use quick multiplication to calculate **625 × 99 =** **(2 marks)**	

16) Workout the following without using a
number line
 	
  a) $(-6) + (+2) =$ **(1 mark)**
 	
  b) $(+12) \times (-8) =$ **(1 mark)**	

17) Find the greatest common Factor (GCF) of 24; 36 and 40. **(2 marks)**	
18) A class has 56 pupils. There are 14 boys in the class. Find the ratio of boys to girls in the class. **(2 marks)**	

19) Gakire has 12 notes of 2,000Frw, 20 notes of 5,000Frw, 15 notes of 500Frw and 10 coins of 100Frw. Calculate the total amount of money that Gakire has. **(2 marks)**	
20) Round off 4,620,850 to the nearest hundred thousands. **(2 marks)**	
21) Simplify $5^6 \times 5^2 \div 5^3 =$ **(2 marks)**	

22) Find the size of angle t in the figure below. **(2 marks)**	
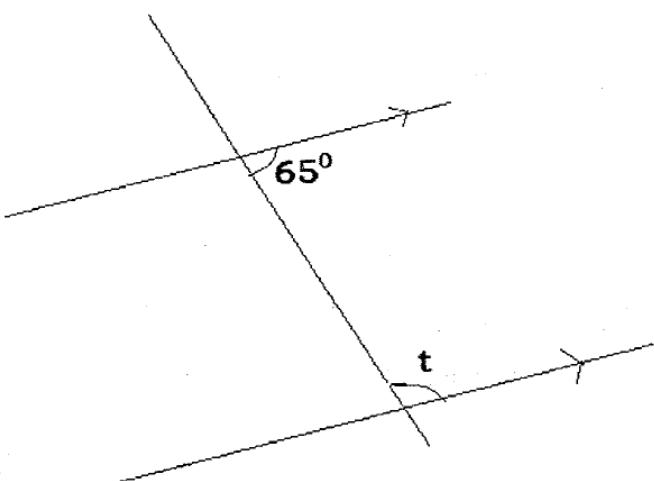
|	
23) Convert $\frac{10}{16}$ into a decimal number. **(2 marks)**	
24) During COVID-19 Lockdown, a certain cell volunteers distributed equally 7,827,831 kg of beans among 333 families. How many kilograms did each family get? **(2 marks)**	

25) Use measurement table to convert the following: a) $26dm^3 = \cdots \ldots hg$ **(1 mark)** b) $9,700 \, l = \cdots \ldots m^3$ **(1 mark)**	
26) Calculate the circumference of the figure below (use $\pi = \frac{22}{7}$) **(3 marks)** 42cm	
27) Electric poles are fixed 20 metres apart. Find the distance from the first to the 101th **(3 marks)**	

28) A man covered 120 km of a journey. This is only ¾ of the whole journey. Calculate the total distance covered for the whole journey. **(3 marks)**	
29) A trader bought a Radio at 950,000 Frw. He later sold it to a customer at 1,250,000Frw. What was his percentage profit? **(3 marks)**	
30) The LCM of two numbers is 40. One of the numbers is 20. If their GCF is 5, find the second number. **(2 marks)**	

31) (a) The area of a rectangular table is $160m^2$. If its width is 8m. Find the length of the table. **(3 marks)**	
(b) A wooden box has a volume of 9,000,000cm³. If its length is 2 m and width 1.5 m.	
(i) Find its area. **(2 marks)**	
(ii) Find its height. **(2 marks)**	

32) Study the graph below which shows the potatoes in kg sold at a shop in 5 months and answer the questions that follow.
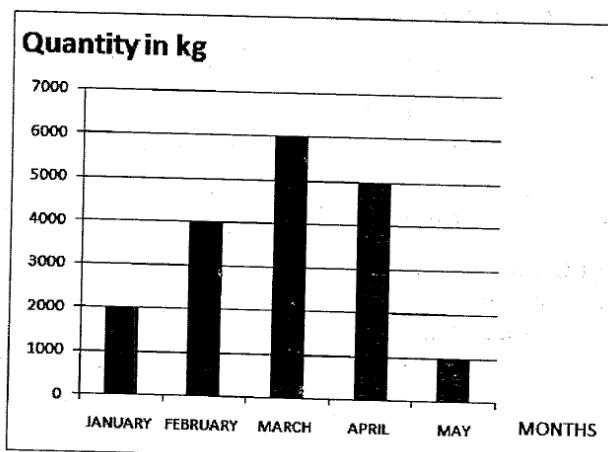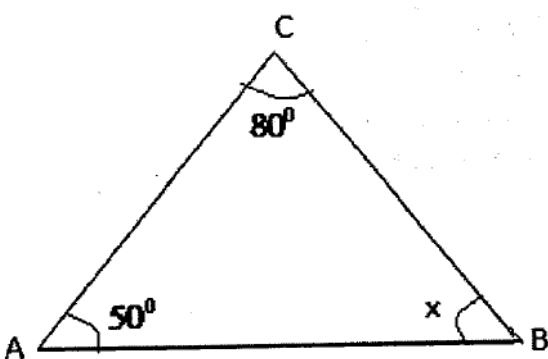

(a) In which month did the shopkeeper sell the highest quantity of potatoes?
(1 mark)

(b) In which month did the shopkeeper sell the smallest quantity of potatoes?
(1 mark)

(c) Find the total kilograms of potatoes sold in all the five months. **(2 marks)**

(d) If one kg of potatoes costs 550Frw, how much money did the shopkeeper get from the sale of potatoes in all five months? **(3 marks)**

33) A P6 pupil was sent to the market with 30,000frw to buy the items shown in the table below.

a) Complete the table. **(5 marks)**

Items	Price / cost per item	Total amount
3kg of beans	...../kg	3,000frw
6kg of sugar	1,500frw/kg	....
5kg of meat	....../kg	15,000frw
.... Loaves of bread	800frw /loaf	2,400frw
Total expenditure ....Frw		

b) Find the balance. **(2 marks)**

34) (a) Find the value of angle X in the triangle CAB below. **(3 marks)**

(b) Two vehicles A and B moved towards each other. They started moving at 9:00 am and met at 11:00am. Their speeds were 60 km/hr and 55 km/hr respectively. What distance had each covered by the time they met? **(4 marks)**

35) (a) By using the following digits 8; 0; 5; 7; 1; 6. Write the biggest whole number formed by these digits. **(2 marks)**	
(b) A businesswoman has 300 kg/600kg of mixed beans which she sells at 280Frw/kg. If the mixture contains 200kg of the first type which cost 360Frw/kg. Find the price of one kg of the second type. **(5 marks)**	

MARKING GUIDE OF P6 MATHEMATICS NATIONAL EXAMINATION 2022

1. 9,009,087

2. 7 is hundredths

   1 is hundred thousands

3. $-100; -1; 0.5; \frac{2}{3}; 0.82; 1; 5; 100$

4. 5 days and 0 hours

   $432,000 \text{ sec} = \frac{432,000}{60} = 7200min = \frac{7200}{60} = 120hours = \frac{120}{24} = 5days$

5. 243; 729

6. To check if 23,760 is divisible by 11.

   $2 + 7 + 0 = 8 \quad and \quad 3 + 6 = 9; \quad 9 - 9 = 0$

   Yes 23,760 is divisible by 11.

7. $4x - 8 = 10x - 20$

   $4x - 10x = -20 + 8$

   $-6x = -12$

   $6x = 12$

   $x = \frac{12}{6}$

   $x = 2$

8. $\frac{3}{4} \times \left(\frac{2}{5} + \frac{3}{7}\right) = \frac{3}{4} \times \left(\frac{2 \times 7 + 3 \times 5}{35}\right) = \frac{3}{4}\left(\frac{14+15}{35}\right) = \frac{3}{4}\left(\frac{29}{35}\right) = \frac{3}{4} \times \frac{29}{35} = \frac{87}{140}$

9. $\mathbf{4.5kg + 113dag = 4.5kg + 1.13kg = 5.63\ kg}$

10. 4 % represents 45

    1 % represents $\frac{45}{4}$

    100 % represents $\frac{45 \times 100}{4} = 1,125\ learners$

11. $\frac{\sqrt{225} + \sqrt{169}}{\sqrt{16}} = \frac{15 + 13}{4} = \frac{28}{4} = 7$

12.

$$\begin{array}{r} \overset{1}{} \quad \overset{1}{} \\ 17\ 674\ 329 \\ +\quad 524\ 321 \\ \hline 18\ 198\ 650 \end{array}$$

13. One book cost 5,200 Frw

   8 similar books cost $5200 Frw \times 8 = 81,600 Frw$

14.

$$\begin{array}{r} \overset{1\,1}{}\quad\overset{1}{} \\ 896\ 327 \\ \times\quad 121 \\ \hline \overset{1\,1}{}\\ {}_{1\,2}896327 \\ +\ 1792654 \\ 896327 \\ \hline 108455567 \end{array}$$

15. $625 \times 99 = 625 \times (100 - 1) = 62500 - 625 = 61,875$

16. Workout the following without using a number line

   a) $(-6) + (+2) = -6 + 2 = -4$

   b) $(+12) \times (-8) = -96$

17. Factors of 24 are **1**, **2**, 3, **4**, 6, 8, 12 and 24.

   Factors of 36 are **1**, **2**, 3, **4**, 6, 9, 12, 18 and 36.

   Factors of 40 are **1**, **2**, **4**, 5, 8, 10, 20 and 40.

   The common factors are 1, 2 and **4**.

   The GCF is 4.

18. A class has 56 pupils. There are 14 boys.

   The number of girls = 56 – 14 = 42

   Ratio of boys to girls is $\frac{14}{14} : \frac{42}{14}$

   The ratio of boys to girls is 1 : 3

19. The total amount of money that Gakire has $= 2000 Frw \times 12 + 20 \times 5000 Frw + 15 \times 500 Frw + 10 \times 100 Frw = 132,500 Frw$

20. 4,600,000

21. $5^6 \times 5^2 \div 5^3 = 5^3 \times 5^2 = 5^5 = 5^2 \times 5^2 \times 5 = 25 \times 25 \times 5 = 3,125$

22. Angle t = 180° - 65° = 115°

23. $\frac{10}{16} = 0.625$

24. Each family got $= \frac{7,827,831\ kg}{333} = 23,507\ kg$

25.

    a) $26dm^3 = 260\ hg$

    b) $9,700\ l = 9.7\ m^3$

26. $C = D \times \frac{22}{7} = 42cm \times \frac{22}{7} = 132cm$

27. $Distance = (101 - 1) \times 20m = 100 \times 20 = 2000m$

28. $\frac{3}{4}$ corresponds to 120 km

    The whole journey corresponds to $\frac{120km \times 4}{3} = 160\ km$

29. Buying price = 950.000Frw

   Selling price = 1,250,000Frw

   Profit = Selling price – Buying price = 1,250,000Frw – 950,000Frw

                                = 300,000Frw

   Percentage profit $= \frac{Profit \times 100}{Selling\ price} = \frac{300,000 \times 100}{950,000} = 31.5\ \%$

30. The second number $= \frac{40 \times 5}{20} = 10$

31. a) The length of the table $= \frac{160\ m^2}{8m} = 20m$

   b) (i) Its area $= 2m \times 1.5m = 3m^2 = 30,000cm^2$

     (ii) Its height $= \frac{9,000,000cm^3}{30,000cm^2} = 300cm = 3m$

32. a) March

   b) May

   c) Total kg of potatoes sold in all the five months $= 2000kg +$ $4000kg + 6000kg + 5000kg + 1000 = 18000kg$

   d) The money the shopkeeper got $= 18000 \times 550 = 9,900,000Frw$

33.

   a) Completed table.

Items	Price / cost per item	Total amount
3kg of beans	**1000frw/kg**	3,000frw
6kg of sugar	1,500frw/kg	**9,000frw**
5kg of meat	**3000frw/kg**	15,000frw
3 Loaves of bread	800frw /loaf	2,400frw
Total expenditure: **29,400 Frw**		

   b) Balance = 30,000Frw – 29,400Frw = 600 Frw

34. a) X = 180° - (80° + 50°) = 50°

   b)   Time = 2 hours (from 9:00 am to 11:00 am)

   Distance covered by A = Speed x time = 60 km/h x 2h = 120 km

   Distance covered by A = Speed x time = 55 km/h x 2h = 110 km

35. a) 876,510

   b) Mixture = 600kg

   2nd type = 600kg – 200kg = 400kg

   Price mixture 280Frw/kg x 600kg = 168,000Frw

   Price of 1st = 360 x 200kg = 72000Frw

   Price of 2nd = 168000 – 72000 = 96000Frw

   Price of one kg of the second type $= \frac{96000Frw}{400} = 240Frw$

Mathematics

PM

17/07/2023 09:00 AM–11:00 AM

NESA | NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

PRIMARY LEAVING NATIONAL EXAMINATIONS, 2022-2023

MATHEMATICS

DURATION: Two hours

Marks: | /100 |

INSTRUCTIONS:

1) Do not open this paper until you are told to do so.

2) Attempt **ALL** questions in this paper

3) Read each question carefully before answering it.

4) Answer the questions in the space provided on this question paper.

5) Show your working clearly. Marks will be given for showing steps.

6) All rough work must be done in the space under each question.

7) You must use a **blue** or **black** pen.

8) You are allowed to use a ruler, and a protractor.

8) **You are __NOT__ allowed to use a calculator.**

ATTEMPT ALL QUESTIONS IN THIS PAPER   **(100 marks)**

YOU MAY DO ROUGH WORK IN THE SPACE PROVIDED BELOW EACH QUESTION.	GIVE YOUR ANSWER IN THE SPACE PROVIDED IN THIS COLUMN. SHOW THE WORKING STEPS.
1) Write the following number in words: 59,648,205 **(2 marks)**	
2) Write the place value of digit 5 and 4 in the number 6,859,174 **(2 marks)**	
3) Add vertically 4,985,678 + 2,378,522 = **(2 marks)**	
4) Use $<, >$ *or* $=$ to compare the following: a) 260,340 [ ] 260.340 **(1 mark)** b) 25,159,0000 [ ] 25159×1000 **(1 mark)**	
5) Round off 14.9781 to the nearest tenths. **(2 marks)**	
6) Find the missing two numbers in the sequence below: (a) 3; 8; 13; 18; ....; ... **(2 marks)**	

7) Define an 'obtuse angle". **(2 marks)**	
8) Define the term "Probability" of an event. **(2 marks)**	
9) Convert 0.54 into fraction and simplify the answer completely. **(2 marks)**	
10) Calculate 20% of 300. **(2 marks)**	
11) Work out the following integers: a) $(-10) - (-8)$ **(1 mark)** b) $(+8) \times (-5)$ **(1 mark)**	

12) Use quick multiplication to calculate the following: $567 \times 99 =$ **(2 marks)**	
13) Find $\frac{2}{3}$ of 21 **(2 marks)**	
14) Write the multiples of 3 between 10 and 17. **(2 marks)**	
15) Find the LCM of the numbers 36, 84 and 75. **(2 marks)**	
16) Workout the following: 4.5 kg + 13.6 dag = ... kg **(2 marks)**	
17) Find the value of angle **p** in the figure below if **p** is the supplementary of 130°. **(2 marks)**	
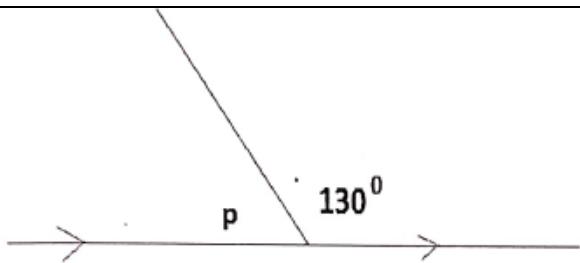
18) The interior angle of a regular polygon is 108°. Find its exterior angle. **(2 marks)**

19) Fill in the missing numbers.

(a) $\frac{2}{3} = \frac{8}{.}$ **(1 mark)**

(b) $\frac{4}{5} = \frac{.}{20}$ **(1 mark)**

20) Workout $\frac{0.1 \times 0.36}{0.09}$ **(2 marks)**

21) The diameter of a circular ring is 21cm. What is its circumference: Take $\pi = \frac{22}{7}$ **(2 marks)**

22) Convert the following units: (a) $14\,m^3 = \cdots dal = \cdots kg$ **(2 marks)**	
23) A rectangular box has 65cm in length, 40cm width and 28cm height. Calculate the volume of the box. **(2 marks)**	
24) Anine and Bollen shared 25 sweets in the ratio 2 : 3 respectively. How many sweets did each get? **(2 marks)**	
25) Arrange the following numbers in ascending order: $5; 0.56; 2; \frac{3}{10}; 0.09$ **(2 marks)**	
26) After increasing a number by 15%, it became 34,400. What is the number? **(3 marks)**	

27) Workout $\left(\frac{3}{5} + \frac{2}{5}\right) \div \frac{1}{2} =$ **(3 marks)**	
28) Solve the following equation: $4 - x = 5x - 8$ **(3 marks)**	
29) A private school has 617 pupils. If one pupil pays 152 800Frw in school fees per term, how much money do they pay altogether in one term? **(3 marks)**	
30) Electric poles are fixed along one side of a 16 km section of a road. This was to light the road. The poles are placed 10 m apart from each other. How many poles are fixed? **(3 marks)**	
31) A father earns a salary of 250 000 Frw in a month. He spends his money as follows: Rent: 30 000 Frw School fees: 55 000 Frw Food: 35 000 Frw	

Transport: 15 000 Frw
He saves the remaining money.

(a) How much money does he spend in total each month? **(3 marks)**

(b) How much does he save each month? **(2 marks)**

(c) Why do you think it is important for the father to save?

32) Bus n°1 travelling at 60km/h left Kigali at 8;30 a.m. Nus n°2 travelling at 80km/h followed it after 1 hour.

(a) When did Bus n°2 overtake Bus n°1? **(5 marks)**

(b) What distance had both Buses covered? **(2 marks)**

33) A business woman borrowed 480,000Frw from UMURENGE SACCO for 2 years. The interest rate offered was 12% per year.

(a) How much interest did she pay back?

(4 marks)

(b) What amount did she pay to
    UMURENGE SACCO?   **(3 marks)**

34) A mixture of yellow maize flour and white
     maize flour costs 400Frw per kg. 20 kg of
     yellow maize flour costs 350Frw per kg.
     Find the kilograms for the white maize
     flour.   **(7 marks)**

35) Study the diagram below which shows
     the number of eggs harvested by a
     company (in trays) for a whole week from
     Monday to Sunday.
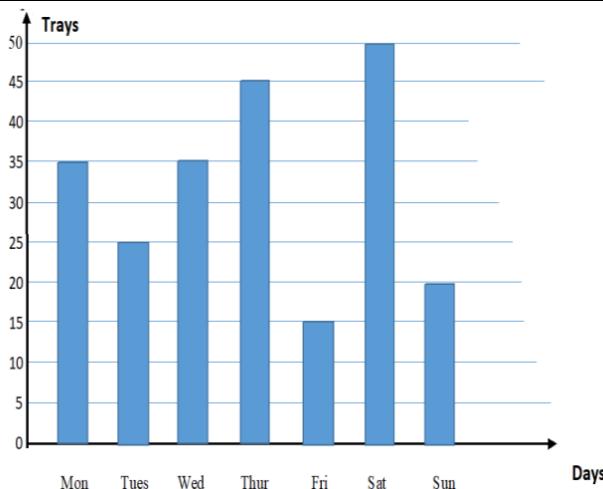
a) How many days are shown on the graph? **(1 mark)**

b) Find the number of trays collected in the whole week? **(1 mark)**

c) On which day did the company collect the smallest number of trays of eggs? **(1 mark)**

d) On which day did the company collect the biggest number of trays of eggs? **(1 mark)**

e) On which day did the company collect the same quantity of trays? **(1 mark)**

f) If one tray of eggs was sold at 4500Frw, how much money did the company get from eggs in a week? **(1 mark)**

MARKING GUIDE OF P6 MATHEMATICS NATIONAL EXAMINATION 2022-2023

1. Fifty-nine million, six hundred forty-eight thousand, two hundreds and five

2. The place value of digit 5 in the number 6,859,174 is ten thousands
   The place value of digit 4 in the number 6,859,174 is ones

3.
```
  1 11 1 11
  4,985,678
+ 2,378,522
_____
  7,364,200
```

4. Use $<, >$ or $=$ to compare the following:

   a) 260,340 $\boxed{>}$ 260.340

   b) 25,159,000 $\boxed{=}$ 26159 × 1000

5. 15,0

6. 3; 3 + 5; 8 + 5; 13 + 5; 18 + 5; 23 + 5
   3; 8; 13; 18; 23; 28

7. An obtuse angle is an angle that is greater than 90 degrees and less than 180 degrees.

8. The probability of an event is the likelihood of an event to happen.

9. $0.54 = \frac{54}{100} = \frac{27}{50}$

10. $20\% \, of \, 300 = 300 \times \frac{20}{100} = 60$

11. a) $(-10) - (-8) = -10 + 8 = -2$

    b) $(+8) \times (-5) = -40$

12. $567 \times 99 = 567 \times (100 - 1) = 56,700 - 567 = 56,133$

13. $\frac{2}{3} \, of \, 21 = 21 \times \frac{2}{3} = 14$

14. The multiples of 3 between 10 and 17 are 12 ($12 = 3 \times 4$) and 15 ($15 = 3 \times 5$).

---

15. LCM of the numbers 36, 84 and 75

$$36 = 2^2 \times 3^2$$
$$84 = 2^2 \times 3 \times 7$$
$$75 = 3 \times 5^2$$

The LCM of the numbers 36, 84 and 75 is equal to $2^2 \times 3^2 \times 5^2 \times 7 = 6,300$

Another way:

	36	**75**	**84**
2	18	75	42
2	9	75	21
3	3	25	7
3	1	25	7
5	1	5	7
5	1	1	7
7	1	1	1

The LCM of the numbers 36, 84 and 75 is equal to $2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 7 = 2^2 \times 3^2 \times 5^2 \times 7 = 6,300$

16. 4.5 kg + 13.6 dag = 4.5 kg + 0.136 kg = 4.635 kg

17. The value of angle p $== 180° - 130° = 50°$

18. The exterior angle $= 180° - 108° = 72°$

19. (a) $\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$

   Another way: $\frac{2}{3} = \frac{8}{x} \Rightarrow x = \frac{8 \times 3}{2} = 12$. So, $\frac{2}{3} = \frac{8}{12}$

   (b) $\frac{4}{5} = \frac{4 \times 4}{5 \times 4} = \frac{16}{20}$

20. $\frac{0.1 \times 0.36}{0.09} = \frac{0.1 \times 0.36 \times 100}{0.09 \times 100} = \frac{0.1 \times 36}{9} = 0.1 \times 4 = 0.4$

   Another way:

   $\frac{0.1 \times 0.36}{0.09} = \frac{\frac{1}{10} \times \frac{36}{100}}{\frac{9}{100}} = \frac{1}{10} \times \frac{36}{100} \times \frac{100}{9} = \frac{36}{90} = \frac{4}{10} = 0.4$

21. $Circumference = Diameter \times \pi = 21cm \times \frac{22}{7} = 3cm \times 22 = 66cm$

22. $14\,m^3 = 1,400\,dal = 14,000\,kg$

23. $Volume = L \times W \times H = 65cm \times 40cm \times 28cm = 72,800\,cm^3$

24. Total ratio = 2 + 3 = 5

Number of sweets that Anine get $= 25 \times \frac{2}{5} = 10$

Number of sweets that Bollen get $= 25 \times \frac{3}{5} = 15$

25. $\frac{3}{10} = 0.3$

The ascending order is $0.09; \frac{3}{10}; 0.56; 2; 5$

26. After increasing a number by 15%, it became 34,500. What is the number?

Let be x that number

So $x + \frac{15}{100}x = 34,500$

$x + 0.15x = 34,500$

Multiply each side by 100

$100x + 15x = 3,450,000$

$115x = 3,450,000$

$\frac{115x}{115} = \frac{3,450,000}{115}$

$x = 30,000$

That number is 30,000

27. $\left(\frac{3}{5} + \frac{2}{5}\right) \div \frac{1}{2} = \left(\frac{5}{5}\right) \div \frac{1}{2} = 1 \div \frac{1}{2} = 2$

28. $4 - x = 5x - 8$

$4 + 8 = 5x + x$

$6x = 12$

$\frac{6x}{6} = \frac{12}{6}$

$x = 2$

29. The money they pay altogether $= 617 \times 154,800 Frw = 94,277,600 Frw$

30. Length of the road = 16km = 16,000 m

The number of poles fixed $= \frac{Length\ of\ the\ road}{ditance\ between\ two\ poles} + 1 = \frac{16,000}{10} + 1 = 1601$

31. (a) Total money that he spends in one month

$= 30,000 + 55,000 + 35,000 + 15,000 = 135,000 Frw$

(b) The amount saved in one month $= 250,000 - 135,000 = 115,000 Frw$

(c) It is important to save in order to increase the economy of the family; paying school fees; being able to start a business; and to solve emergency problems that may arise at any time.

32. (a) Bus n°1 moves at 60km/h and left at 8:30

Bus n°2 moves at 80km/h and left at 9:30

Time in advance: 1h

Distance in advance = 60 km

Time to catch up $= \dfrac{D}{S_2 - S_1} = \dfrac{60\,km}{80\frac{km}{h} - \frac{60km}{h}} = \dfrac{60\,km}{20km/h} = 3\ hours$

Bus n°2 will overtake bus n°1 at 9h30 + 3 hours = 12h30

(b) Distance covered by each bus $= 80\ km \times 3 = 240\ km$

Or $60\ km \times 3 + 60\ km = 240\ km$

Another way:

(a) After one hour, the Bus n°1 will have moved a distance of 60km.

The Bus n°2, makes 20 km more than Bus n°1 each hour.

After 3 hours, the Bus n°2 will overtake the Bus n°1.

(b) The distance covered by both Buses $= V \times t = \dfrac{60km}{h} \times 4hr = 240km$

Or $distance = V \times t = \dfrac{80km}{h} \times 3hr = 240km$

33. (a) Interest after two years =

$I = P \times \dfrac{R}{100} \times T = \dfrac{480,000 \times 12 \times 2}{100} = 115,200\ Frw$

The interest she paid back = 115,200Frw

The amount of money that she paid to UMURENGE SACCO

$= 480,000\ Frw + 115,200Frw = 595,200\ Frw$

34.

	Yellow flour	+	White flour	=	Mixture
Qty	20	+	x	=	$(20 + x)$
Px/kg	450		350		400

Multiply each quantity by its price to form an equation

$(20 \times 450) + (350 \times x) = 400(20 + x)$

$9,000 + 350x = 8,000 + 400x$

$400x - 350x = 9,000 - 8,000$

$50x = 1,000$

$\dfrac{50x}{50} = \dfrac{1,000}{50}$

$x = 20Kg$

The quantity of white flour is 20kg

35. (a) 7 days

(b) Number of trays collected in the whole week
$$= 35 + 25 + 35 + 45 + 15 + 50 + 20 = 225$$

(c) On Friday

(d) On Saturday

(e) On Monday and Wednesday

(f) The amount of money that the company gets from eggs in a week
$$= 225 \times 4,500 Frw = 1,012,500 Frw$$