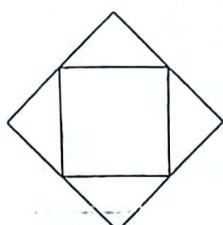




NATIONAL MATHEMATICS CONTEST, 2019, PRIMARY-LEVEL PAPER 1

SECTION A : 5 marks each

1. Suppose $a + b = 1$, $c + d = 2$, $e + f = 3$ and $b + c + d + e + f = 5$. What is the value of a ?
2. James knows that one of his feet smells more than the other. So he changes his sock on one foot every two days and on the other foot every three days. He washes the socks every after 24 days. How many socks does he wash after 24 days?
3. At break time yesterday, Ruth bought 3 cakes and 3 pancakes for Shs. 1,170. Today, she bought 6 cakes and 4 pancakes for Shs. 2,060. How much will 3 cakes and one pancake cost her tomorrow?
4. What is the next number in this sequence: 1, 2, 3, 6, 11, 20, 37, 68, ____?
5. A cleaner earns Shs. 125,000 per week, a teacher earns Shs. 200,000 per week and a headteacher earns Shs. 250,000 per week. Suppose each one of them needs Shs. 25,000 per week to pay the basic costs of living. If they all take away the basic costs of living from their salaries, which of the following ratios (cleaner:teacher:headteacher) best describes the money they are left with for other spending? (Circle the right answer).
A. 125 : 200 : 250 B. 5 : 8 : 10 C. 1 : 1 : 1 D. 4 : 7 : 9 E. 150 : 225 : 275
6. Each of the midpoints of the edges of a large square is joined to form a smaller square. The area of the smaller square is 20cm^2 . What is the area of the large square?





7. The parking fees at some mall in Kampala that opens from 8am to 6pm are as follows:

- one hour or less: free
- first hour: Shs. 3,000
- additional hour (or extra minutes): Shs. 1,000
- whole day: Shs. 10,000

How much does someone pay if the person enters the parking at the mall at 8 : 23am and leaves at 4 : 55pm?

8. How many whole numbers between 1 and 1000 have at least two 8's appearing side-by-side?

9. Given that the operation $*$ is such that $a * b = a(a - b)$. Find the value of $(4 * 1) + (3 * 1)$.

10. The product $60 \times 60 \times 24 \times 7$ gives (*Circle the right answer*):

- A. the number of minutes in seven weeks
- B. the number of hours in sixty days
- C. the number of seconds in one week
- D. the number of minutes in twenty-four weeks
- E. the number of seconds in seven hours

SECTION B : 10 marks each

11. A certain primary school has two branches. In one branch with 400 students, the ratio of boys to girls is 3 : 2. In another branch with 600 students, the ratio of boys to girls is 2 : 3.

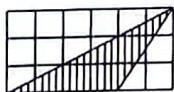
(a) If students in both branches are combined, what will be the ratio of boys to girls?

(b) How many girls must be moved from one branch to another to attain the same number of girls in each branch?



NATIONAL MATHEMATICS CONTEST, 2019, PRIMARY-LEVEL PAPER 1

12. What fraction of the rectangle is shaded?

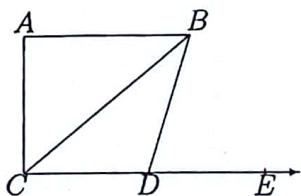


13. A bicycle travels at a constant speed of 15km/h. A bus starts 195km behind the bicycle and catches up to the bicycle in 3 hours. What is the average speed of the bus in km/h?

14. Annet, Jane, Sarah, Mika and Tina are sitting in a row of five seats. Annet is not beside Jane. Sarah is beside Mika. Who cannot be sitting in the middle seat?

15. In the figure below, AB is perpendicular to AC , AB is parallel to CD , angle CBD is 28 degrees, and angle BDE is 65 degrees. Find the value of

- (a) angle ACB
- (b) angle ABC





NATIONAL MATHEMATICS CONTEST, 2019, PRIMARY PAPER 1 SOLUTION

NATIONAL MATHEMATICS CONTEST
PRIMARY-LEVEL PAPER 1 SOLUTIONS.

NAMES: _____ DATE OF BIRTH: _____

SCHOOL/INSTITUTION: _____

CLASS: _____ GENDER: _____ DISTRICT: _____

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PLEASE, NOTE CAREFULLY:

1. **WRITE YOUR ANSWERS IN THE SPACES PROVIDED. MORE SPACE IS AVAILABLE AT THE BACK OF EACH PAGE.**
2. Date: Saturday, 6th April, 2019.
3. Time: Exactly 2 hours and 15 Minutes (from 9 : 00am to 11 : 15am)
4. Type:
 - (a) This paper consists of two sections and each section carries 50 marks.
 - (b) Attempt as many questions as you can. The total marks scored from all the questions you attempt will be your final score.
 - (c) No marks will be awarded for an answer if a clear and logical layout of the working is not shown.
5. All diagrams/figures in this contest are not to scale.
6. Immediately the paper is done, the answer script(s) must be forwarded to:

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Contest Coordinator, Uganda Mathematical Society,
c/o Department of Mathematics, Makerere University,
P.O. Box 7062, Kampala.
Telephone contact: +256 – 414 – 540692.

Answer scripts should be received latest, Monday 8th April, 2019.

7. **ALL participants who qualify for Paper 2 are cordially invited to the certificate and prize giving ceremony on Saturday 27th July, 2019 at NOON at Makerere University, Kampala.**
8. National Mathematics Contest 2019 Paper 2 will be done on 29th June, 2019 at various centres.
9. **UGANDA MATHEMATICAL SOCIETY** wishes you success in this year's contest.



SECTION A : 5 marks each

1. Using $c + d = 2$, $e + f = 3$

$$\begin{aligned} b + c + d + e + f &= 5 \\ b + (c + d) + (e + f) &= 5 \\ b + (2) + (3) &= 5 \\ b + 5 &= 5 \\ \Rightarrow b &= 0 \\ \text{But } a + b &= 1 \Rightarrow a = 1 \end{aligned}$$

2. On one foot he changes $\frac{24}{2} = 12$ times. On the other foot he changes $\frac{24}{3} = 8$ times. Total number of socks in 24 days is $12 + 8 = 20$.

3.

$$\begin{array}{r} 6c + 4p = 2,060 \\ - 3c + 3p = 1,170 \\ \hline 3c + 1p = 890 \end{array}$$

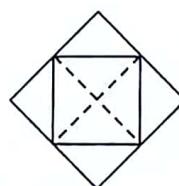
Therefore, 3 cakes and one pancake $3c + 1p = 890$. Therefore, it costs 890

4. After first three terms/numbers, each number is a sum of the previous three terms/numbers. So the next number is $20 + 37 + 68 = 125$
5. After paying the basic costs of living

$$\begin{array}{r} 100 : 175 : 225 \\ 4 : 7 : 9 \end{array}$$

Therefore, part D.

6. After adding diagonals to a smaller square,



then the area of a large square is twice the area of the smaller square, that is 40cm^2

Alternatively, The four pieces outside the smaller square (in each of the corners) has the same area as the smaller square. Therefore, the area of the larger square is area of these four pieces plus the smaller square, hence equal to $20\text{cm}^2 \times 2 = 40\text{cm}^2$

7. Total duration at the parking is $4 : 55\text{pm} - 8 : 23\text{am} = 8\text{hrs } 32\text{min}$

$$\text{First hour } 3,000 \times 1 = 3,000$$



NATIONAL MATHEMATICS CONTEST, 2019, PRIMARY PAPER 1 SOLUTION

$$\begin{array}{rcl} 7 \text{ hours} & 1,000 \times 7 & = 7,000 \\ 32 \text{ minutes} & 1,000 \times 1 & = 1,000 \end{array}$$

$$Shs. \quad \underline{\hspace{2cm}} \quad 11,000$$

Alternatively: Will be charged for 9 hours, which is $(1 \times 3,000) + (8 \times 1,000) = 11,000$

8. Those that end with 88 are

$$88, 188, 288, 388, 488, 588, 688, 788, 888, 988 \quad i.e \quad 10$$

Those that begin with 88 are

$$88, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889 \quad i.e \quad 11$$

But 88 and 888 appears twice, so $10 + 11 - 2 = 19$

9. Given that the operation $*$ is such that $a * b = a(a - b)$. Find the value of $(4 * 1) + (3 * 1)$.

$$\begin{aligned} (4 * 1) + (3 * 1) \\ 4(4 - 1) + 3(3 - 1) \\ 4(3) + 3(2) \\ 12 + 6 = 18 \end{aligned}$$

10. It is 60 seconds in a minute, 60 minutes in an hour, 24 hours in a day, and 7 days in a week.
Therefore, part C).

SECTION B : 10 marks each

11. (a) In the first branch, second branch and combined respectively;

400		600		Combined	
B	: G	B	: G	B	: G
3	: 2	2	: 3	480	: 520
240	: 160	240	: 360	12	: 13

- (b) There are $160 + 360 = 520$ girls in both branches. To have equal number of girls in each branch, each branch will have $\frac{520}{2} = 260$ girls. Thus branch 1 with 160 girls will need $260 - 160 = 100$ girls to be moved from branch 2.

12. Let the regions be A, B, C



Area of the rectangle is $6 \times 3 = 18$ squares

Area of the triangle A is half of the rectangle $\frac{1}{2} \times 18 = 9$ squares or it is a triangle $\frac{1}{2} \times 6 \times 3 = 9$ squares



NATIONAL MATHEMATICS CONTEST, 2019, PRIMARY PAPER 1 SOLUTION

Area of $B\&C$ is half of the rectangle $\frac{1}{2} \times 18 = 9$ squares

Area of C , is area of the triangle $\frac{1}{2} \times 2 \times 3 = 3$ squares

Hence area of B (shaded region) is $9 - 3 = 6$ squares. Therefore, the fraction of the shaded region is $\frac{6}{18} = \frac{1}{3} = 1 : 3$

13. At 15km/h in 3hrs, a bicycle has travelled $3 \times 15 = 45$ km. Bus started when bicycle was 195km ahead of bus. To catch up the bicycle, bus must travel $195 + 45 = 240$ km in 3hrs. Therefore, the average speed must be $\frac{240}{3} = 80$ km/hr.

14. *Many ways to get to the answer Tina:*

Eliminate 4 people who can be sitting in the middle seat. If Sarah and Mike (side by side) are in seats 1, 2 or 2, 1, then since Annet and Jane are not beside each other, either Annet is in seat 3 (middle), Jane is in seat 5 or vice versa. Thus Annet and Jane can each be sitting in the middle (eliminated).

Next, assume Sarah and Mike are in seats 2, 3 or 3 and 2, that is either Sarah is in 3 or Mike is. either case, seats 1, 4, 5 are empty, allowing either Annet or Jane to choose seat 1 (not next to each other), so Sarah and Mike can each be sitting in the middle (3).

All are eliminated except Tina.

15. (a)

$$\begin{aligned} 28^\circ + \angle BCD &= 65^\circ \\ \Rightarrow \angle BCD &= 37^\circ \end{aligned}$$

Also $AB \parallel CD$, which imply that $\angle ACD = 90^\circ$ and $\angle BAC + \angle ACD = 180^\circ$, such that

$$\begin{aligned} \angle ACB + 37^\circ &= 90^\circ \\ \Rightarrow \angle ACB &= 53^\circ \end{aligned}$$

- (b)

$$\begin{aligned} \angle ABC + 53^\circ &= 90^\circ \\ \Rightarrow \angle ABC &= 37^\circ \end{aligned}$$



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