Assam Academy of Mathematics
Assam Mathematics Olympiad 2024
Category II (Classes VII - VIII)
1st September 2024

Full marks : 100 Time : 3 hours

There are 18 questions. Questions 1 to 5 carry 2 marks each. Questions 6 to 13 carry 5 marks each. Questions 14 to 18 carry 10 marks each.

ইয়াত 18 টা প্ৰশ্ন আছে। 1 ৰ পৰা 5 লৈ প্ৰতিটো প্ৰশ্নত 2 নম্বৰকৈ আছে। 6 ৰ পৰা 13 লৈ প্ৰতিটো প্ৰশ্নত 5 নম্বৰকৈ আছে। আৰু 14 ৰ পৰা 18 লৈ প্ৰতিটো প্ৰশ্নত 10 নম্বৰকৈ আছে।

There may be various other ways of solutions than those shown here. Queries or suggestions regarding the solutions can be mailed to mail@aamonline.in

ইয়াত দেখুওৱা ধৰণবিলাকৰ বাহিৰেও প্ৰশ্নবোৰৰ সমাধানৰ আন বিভিন্ন উপায় থাকিব পাৰে। সমাধানবোৰৰ বিষয়ে কিবা প্ৰশ্ন বা পৰামৰ্শ থাকিলে mail@aamonline.in লৈ মেইল কৰিব পাৰে।

1. Find the greatest common multiple of 3, 4 and 7 that is less than 2024.

   3, 4 আৰু 7ৰ এনেকুৱা গৰিষ্ঠ সাধাৰণ গুণিতকটো উলিওৱা যিটো 2024তকৈ সৰু।

   Ans : LCM of 3, 4 and 7 is 84. Any common multiple of 3, 4 and 7 is a multiple of 84. So, we need to find the greatest multiple of 84 that is less than 2024. This can be found by dividing 2024 by 84. We have $2024 = 84 \times 24 + 8 = 2016 + 8$. So the number is 2016.

2. A pair of prime numbers (p, q) is called a pair of twin primes if p and q differ by 2. For example, $(3, 5)$ is a pair of twin primes and so is $(17, 19)$. Find all pairs of twin primes less than 100.

   এযোৰ মৌলিক সংখ্যা (p, q)ক যুগ্ম মৌলিক সংখ্যা বুলি কোৱা হয় যদিহে p আৰু qৰ পাৰ্থক্য 2 হয়। উদাহৰণস্বৰূপে, $(3, 5)$ এযোৰ যুগ্ম মৌলিক সংখ্যা আৰু তেনেদৰে $(17, 19)$। 100 তকৈ সৰু আটাইবোৰ যুগ্ম মৌলিক সংখ্যা বিচাৰি উলিওৱা।

   Ans : The required pairs of twin primes less than 100 are $(3, 5)$, $(5, 7)$, $(11, 13)$, $(17, 19)$, $(29, 31)$, $(41, 43)$, $(59, 61)$ and $(71, 73)$.

3. A park is in the shape of a right angled triangle with sides of integer length, the longest side being 17 metres. Find the cost of covering the entire park with grass if the cost per square metre is Rs. 200.

   সমকোণী ত্ৰিভুজাকৃতিৰ এখন উদ্যানৰ প্ৰতিটো বাহুৰ দৈৰ্ঘ্য অখণ্ড সংখ্যা আৰু ইয়াৰে দীৰ্ঘতম বাহুটোৰ দৈৰ্ঘ্য 17 মিটাৰ। যদি প্ৰতি বৰ্গমিটাৰত ঘাঁহেৰে পূৰোৱাৰ খৰছ 200 টকা হয়, তেন্তে গোটেই উদ্যানখন ঘাঁহেৰে পূৰোৱাৰ খৰছ নিৰ্ণয় কৰা।

   Ans : Since the sides are integer and $17^2 = 8^2 + 15^2$, so by Pythagoras theorem, the perpendicular sides are 8 and 15. So, the area is $\frac{1}{2} \times 8 \times 15 = 60$. Required cost is Rs. 12000.

4. Use appropriate symbol (< or >) to compare the following fractions :

   তলৰ ভগ্নাংশসমূহ তুলনা কৰিবলৈ উপযুক্ত চিহ্ন (< বা >) ব্যৱহাৰ কৰা:

   (a) $\frac{1011}{2024} \cdots\cdots \frac{2101}{4202}$ (b) $\frac{2000}{999} \cdots\cdots \frac{3000}{1501}$.

   Ans : Observe that $\frac{1011}{2024} < \frac{1012}{2024} = \frac{1}{2}$ and $\frac{2101}{4202} = \frac{1}{2}$. Hence, $\frac{1011}{2024} < \frac{2101}{4202}$.
   Also, $\frac{2000}{999} > \frac{2000}{1000} = 2$ and $\frac{3000}{1501} < \frac{3000}{1500} = 2$. Hence, $\frac{2000}{999} > \frac{3000}{1501}$.

5. Let $p = 666\ldots6$ and $q = 888\ldots8$ where p and q have 2024 digits each. If $n^2 = p^2 + q^2$, what is the value of n?

   ধৰা হ'ল $p = 666\ldots6$ আৰু $q = 888\ldots8$ য'ত p আৰু q ৰ প্ৰতিটোতেই 2024টাকৈ অংক আছে। যদি $n^2 = p^2 + q^2$, তেন্তে nৰ মান কিমান?

   Ans : $n^2 = 666\ldots6^2 + 888\ldots8^2 = 6^2 \times 111\ldots1^2 + 8^2 \times 111\ldots1^2$. So, $n^2 = (6^2 + 8^2) \times 111\ldots1^2$ i.e. $n^2 = 10^2 \times 111\ldots1^2$ i.e. $n = 111\ldots10$ i.e. 2024 ones followed by 0.

6. Let x, y, z be real numbers such that $x + y + z = 20$ and $x + 2y + 3z = 16$. What is the value of $x + 3y + 5z$?

   ধৰা হ'ল x, y, z তিনিটা বাস্তৱ সংখ্যা যাতে $x + y + z = 20$ আৰু $x + 2y + 3z = 16$। তেন্তে $x + 3y + 5z$ৰ মান কিমান?

   Ans : $x + y + z = 20$, $x + 2y + 3z = 16$. Subtracting, $(x + 2y + 3z) - (x + y + z) = 16 - 20$ i.e. $y + 2z = -4$. Let $x + 3y + 5z = k$. Again, subtracting, $(x + 3y + 5z) - (x + 2y + 3z) = k - 16$ i.e. $y + 2z = k - 16$. Thus, $k - 16 = -4$ i.e. $k = 12$. Hence, $x + 3y + 5z = 12$.

7. If a, b, c are positive real numbers such that $a + b + ab = b + c + bc = c + a + ca = 35$, then find the value of $(1 + a)(1 + b)(1 + c)$.

   যদি a, b, c তিনিটা ধনাত্মক বাস্তৱ সংখ্যা যাতে $a + b + ab = b + c + bc = c + a + ca = 35$, তেন্তে $(1 + a)(1 + b)(1 + c)$ৰ মান নিৰ্ণয় কৰা।

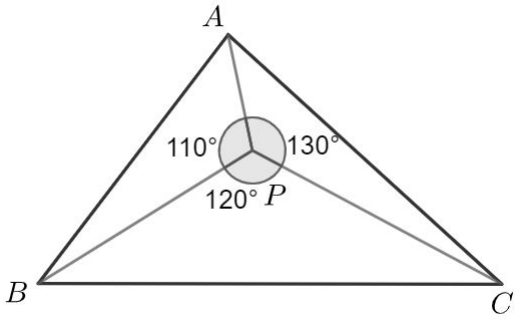
   Ans : Observe that

$$\begin{aligned}
&1 + a + b + ab = 1 + b + c + bc = 1 + c + a + ca = 36 \\
\Rightarrow &(1 + a)(1 + b) = (1 + b)(1 + c) = (1 + c)(1 + a) = 36 \\
\Rightarrow &(1 + a)(1 + b)(1 + b)(1 + c)(1 + c)(1 + a) = 36 \times 36 \times 36 \\
\Rightarrow &[(1 + a)(1 + b)(1 + c)]^2 = 6^2 \times 6^2 \times 6^2 \\
\Rightarrow &(1 + a)(1 + b)(1 + c) = 6 \times 6 \times 6 = 216.
\end{aligned}$$

8. Let P be the incenter of the triangle ABC. If $\angle APB = 110^\circ$ and $\angle BPC = 120^\circ$, then find the angles of the triangle ABC.

   ধৰা হ'ল P হৈছে ত্ৰিভুজ ABCৰ অন্তৰ্বিন্দু। যদি $\angle APB = 110^\circ$ আৰু $\angle BPC = 120^\circ$, তেন্তে ত্ৰিভুজ ABCৰ কোণসমূহৰ মান নিৰ্ণয় কৰা।

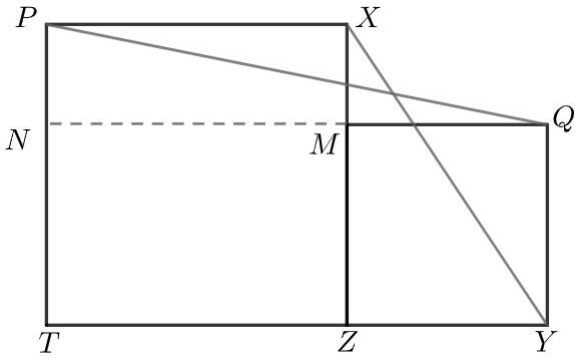
   Ans :



   Ans : By angle sum property in ΔBPC, we have $\angle BPC + \frac{\angle B}{2} + \frac{\angle C}{2} = 180^\circ$. So, $120^\circ + \frac{180^\circ - \angle A}{2} = 180^\circ$ which gives $\angle A = 60^\circ$. Similarly, $\angle B = 80^\circ$ and $\angle C = 40^\circ$.

9. In the figure, $PTZX$ and $ZYQM$ are squares. Also, N, M, Q are collinear points. Find the ratio $\frac{PQ}{XY}$.

   চিত্ৰত $PTZX$ আৰু $ZYQM$ বৰ্গ। লগতে N, M, Q বিন্দুকেইটা হৈছে একেৰেখীয়। তেন্তে $\frac{PQ}{XY}$ অনুপাতটোৰ মান নিৰ্ণয় কৰা।

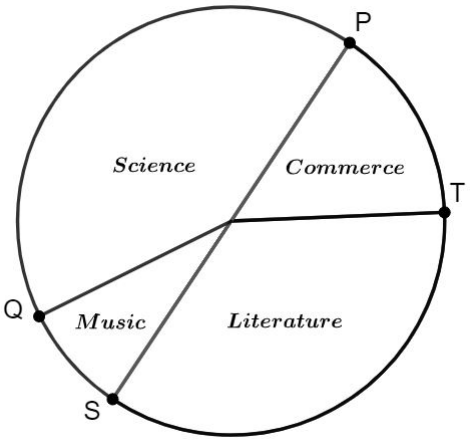


Sol.

Let $TZ = a$ and $ZY = b$. Then, $PN = a-b$ and $NQ = a+b$. So, $PQ = \sqrt{(a-b)^2 + (a+b)^2} = \sqrt{2(a^2+b^2)}$. Again $XY = \sqrt{a^2+b^2}$. So $\frac{PQ}{XY} = \sqrt{2}$.

10. The distribution of books in a library is shown in the following pie chart. PS is a diameter. T divides the arc PTS in the ratio $3:7$ and Q divides the arc PQS in the ratio $5:1$. If there are 12000 books in the library, find the number of books in each category.

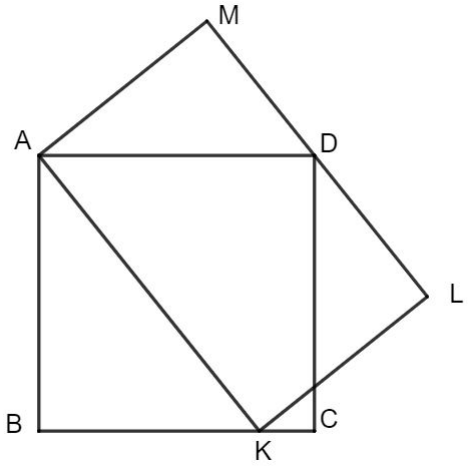
এটা পুথিভঁৰালত থকা কিতাপসমূহৰ বিতৰণ তলৰ পাই চিত্রটোত দেখুওৱা হৈছে। PS এডাল ব্যাস। T বিন্দুৱে PTS চাপটোক $3:7$ অনুপাতত বিভক্ত কৰিছে, Q বিন্দুৱে PQS চাপটোক $5:1$ অনুপাতত বিভক্ত কৰিছে। যদি পুথিভঁৰালটোত মুঠ 12000 খন কিতাপ আছে, তেন্তে প্রতিটো ভাগত থকা কিতাপৰ সংখ্যা নির্ণয় কৰা।



Ans : We find the fraction of the circle represented by each sectors. The diameter PS divides the circle into two equal parts. Given, $PT : TS = 3:7$. So, the sector described by PT is $\frac{3}{10} \times \frac{1}{2}$ of the whole circle and the sector described by TS is $\frac{7}{10} \times \frac{1}{2}$ of the whole circle. So, number of Commerce books is $\frac{3}{20} \times 12000 = 1800$. Number of Literature books is $\frac{7}{20} \times 12000 = 4200$. Also, $PQ : QS = 5:1$. So, number of Science books is $\frac{5}{6} \times \frac{1}{2} \times 12000 = 5000$ and number of Music books is $\frac{1}{6} \times \frac{1}{2} \times 12000 = 1000$.

11. Show that the rectangles $ABCD$ and $AKLM$ have the same area.

দেখুওৱা যে $ABCD$ আৰু $AKLM$ আয়ত দুটাৰ কালি সমান।



Ans : Join KD. Then area of triangle AKD is half of that of rectangle $ABCD$. Also, area of triangle AKD is half of that of rectangle $AKLM$. Thus, the result follows.

12. For any real numbers a, b, c with $(a+b)(b+c)(c+a) \neq 0$, show that

$$\frac{a-b}{a+b}+\frac{b-c}{b+c}+\frac{c-a}{c+a}+\frac{(a-b)(b-c)(c-a)}{(a+b)(b+c)(c+a)}=0$$

ধৰা হ'ল a, b, c বাস্তৱ সংখ্যা যাতে $(a+b)(b+c)(c+a) \neq 0$। দেখুওৱা যে

$$\frac{a-b}{a+b}+\frac{b-c}{b+c}+\frac{c-a}{c+a}+\frac{(a-b)(b-c)(c-a)}{(a+b)(b+c)(c+a)}=0$$

Ans :

$$\begin{aligned}
&\frac{a-b}{a+b}+\frac{b-c}{b+c}+\frac{c-a}{c+a} \\
&\quad=\frac{a-b}{a+b}+\frac{b-c}{b+c}-\frac{(a-b)+(b-c)}{c+a} \\
&\quad=(a-b)\left(\frac{1}{a+b}-\frac{1}{c+a}\right)-(b-c)\left(\frac{1}{c+a}-\frac{1}{b+c}\right) \\
&\quad=\frac{(a-b)(c-b)}{(a+b)(c+a)}-\frac{(b-c)(b-a)}{(c+a)(b+c)} \\
&\quad=\frac{(a-b)(b-c)}{(a+b)(b+c)(c+a)}(-(b+c)+(a+b)) \\
&\quad=\frac{-(a-b)(b-c)(c-a)}{(a+b)(b+c)(c+a)}
\end{aligned}$$

13. There are two vessels each containing one litre of water. Half of the water in the first vessel is transferred to the second and then one third of the resulting water in the second vessel is transferred to the first. Again, one fourth of the water in the first vessel is transferred to the second and so on. How much water will remain in each vessel after carrying out the transfers 1729 times ?

এক লিটাৰকৈ পানী থকা দুটা পানীৰ পাত্ৰ আছে। প্ৰথম পাত্ৰটোৰ আধা পানী দ্বিতীয় পাত্ৰটোলৈ স্থানান্তৰ কৰা হ'ল আৰু তাৰ পাছত দ্বিতীয় পাত্ৰত জমা হোৱা মুঠ পানীৰ এক তৃতীয়াংশ পুনৰ প্ৰথম পাত্ৰটোলৈ স্থানান্তৰ কৰা হ'ল। আকৌ, প্ৰথম পাত্ৰত জমা হোৱা মুঠ পানীৰ এক চতুৰ্থাংশ পুনৰ দ্বিতীয় পাত্ৰলৈ নিয়া হ'ল আৰু এই প্ৰক্ৰিয়াটো অব্যাহত ৰখা হ'ল। এইদৰে মুঠ 1729 বাৰ পানী স্থানান্তৰ কৰাৰ পাছত প্ৰতিটো পাত্ৰত কিমান কিমান পানী থাকিব?

Ans : After 1st transfer, water in first vessel is $\frac{1}{2}$ litres and that in second vessel is $\frac{3}{2}$ litres. In the 2nd transfer, one third of $\frac{3}{2}$ i.e. $\frac{1}{2}$ litres is transferred back to the first vessel. So, each vessel come to their original state with each containing 1 litre water. After the 3rd transfer, first vessel has $\frac{3}{4}$ litres and second has $\frac{5}{4}$ litres. After the 4th transfer, both vessels again contain 1 litre each. Observing the pattern, we see that after even number of transfers, both vessels are in their original state of 1 litre each. So, after 1728 transfers, each vessel has 1 litre water. In the 1729th transfer, $\frac{1}{1730}$ litres is transferred to the second vessel from the first. So, the first vessel has $\frac{1729}{1730}$ litres and the second vessel has $\frac{1731}{1730}$ litres.

14. Each of the letters F, I, V, E in the following multiplication stands for a different digit. Find the values of the letters and hence complete the multiplication.

তলৰ পূৰণটোত F, I, V, E এই আখৰকেইটাৰ প্ৰতিটোৱে একোটাকৈ পৃথক অংকক বুজাইছে। আখৰকেইটাৰ মান নিৰ্ণয় কৰা আৰু পূৰণ অংকটো সম্পূৰ্ণ কৰা।

				F	I	V	E
			×	F	I	V	E
			*	*	*	*	F
		*	*	*	*	I	
	*	*	*	*	V		
*	*	*	*	E			
*	*	*	*	*	*	*	*

Ans : Observe that the unit digit of $E \times E$ should be F and the unit digit of $F \times E$ should be E. Since the digits F, I, V, E are distinct, so by trial and error we get $E = 4$ and $F = 6$ or $E = 9$ and $F = 1$. But $F = 1$ is not possible as it is given that there are 5 digits in the last step of the multiplication. So, $E = 4$ and $F = 6$. Now, unit digit of $V \times E$ is I and that of $I \times E$ is V. Since E is even so both V and I must be even. If V is 0 then I has to be 0 but that's not possible as V and I are distinct. So, the only possibilities are $V = 2$, $I = 8$ or $V = 8$, $I = 2$. So, the number $FIVE$ is either 6284 or 6824. The complete multiplication is

					×	6	2	8	4						
						6	2	8	4						
						2	5	1	3	6					
					5	0	2	7	2						
				1	2	5	6	8							
			3	7	7	0	4								
			3	9	4	8	8	6	5	6					

or

					×	6	8	2	4						
						6	8	2	4						
						2	7	2	9	6					
					1	3	6	4	8						
				5	4	5	9	2							
			4	0	9	4	4								
			4	6	5	6	6	9	7	6					

15. You are given 2025 consecutive integers, each written on a card and the cards are arranged in ascending order. The sum of the integers on the cards is 24300.

(a) What is the integer on the first card ?

(b) What is the integer on the last card ?

(c) Is there any card with the integer 0 ? If yes, what is the serial number of that card ?

(Hint : Consider the integers as $a, a+1, a+2, \ldots\ldots, a+2024$ and let the sum be S. Write S in two different ways as $S = a+(a+1)+\ldots+(a+2024)$ and $S = (a+2024)+(a+2023)+\ldots+a$ and add them.)

তোমাক 2025 টা ক্রমিক অখণ্ড সংখ্যা দিয়া হৈছে, যিসমূহ একোখনকৈ কার্ডত লিখা আছে আৰু কার্ডসমূহ উর্ধক্রমত সজোৱা হৈছে। কার্ডসমূহত থকা অখণ্ড সংখ্যাসমূহৰ যোগফল 24300।

(a) প্রথম কার্ডখনত থকা অখণ্ড সংখ্যাটো কি?

(b) শেষৰ কার্ডখনত থকা অখণ্ড সংখ্যাটো কি?

(c) অখণ্ড সংখ্যা 0 টো থকা কোনো কার্ড আছেনে? যদি আছে, কার্ডখনৰ ক্রমিক নম্বৰ কিমান?

(ইংগিত: ধৰি লোৱা যে অখণ্ড সংখ্যাসমূহ হ'ল $a, a+1, a+2, \ldots\ldots, a+2024$ আৰু সিহঁতৰ যোগফল হ'ল S। S তলত দেখুওৱাৰ নিচিনাকৈ পৃথক পৃথক ধৰণে লিখা $S = a + (a+1) + \ldots + (a+2024)$ আৰু $S = (a+2024) + (a+2023) + \ldots + a$ আৰু তাৰ পাছত যোগ কৰা।)

Ans :

$$S = a \qquad +(a+1) + \ldots \quad +(a+2024)$$
$$S = (a+2024) \quad +(a+2023) + \ldots \qquad +a$$

Adding, $2S = (2a+2024) + (2a+2024) + (2a+2024) + \ldots (2a+2024)$ (2025 terms). So, $2S = 2025 \times 2 \times (a+1012)$ i.e. $24300 = 2025(a+1012)$ i.e. $a+1012 = 12$ which gives $a = -1000$. Thus, integer on the first card is -1000. Integer on the last card is $-1000 + 2024 = 1014$. The card with integer 0 will be th card with the number $-1000 + 1000$ i.e. serial number 1001.

16. The numbers 2^{2024} and 5^{2024} are expanded and written on a page consecutively. How many total digits have been written on the page ?

2^{2024} আৰু 5^{2024} সংখ্যাদুটা বিস্তাৰিত কৰা হ'ল আৰু ক্রমাগতভাৱে এটা পৃষ্ঠাত লিখা হ'ল। সেই পৃষ্ঠাটোত মুঠ কিমানটা অংক লিখা হৈছে?

Ans : Let 2^{2024} has m digits and 5^{2024} has n digits. Observe that 10^k is the smallest number with $k+1$ digits. So, $10^{m-1} < 2^{2024} < 10^m$ and $10^{n-1} < 5^{2024} < 10^n$. Multiplying, $10^{m+n-2} < (2 \times 5)^{2024} < 10^{m+n}$ i.e. $10^{m+n-2} < 10^{2024} < 10^{m+n}$. 10^{m+n-2} is the smallest number with $m+n-1$ digits and 10^{m+n} is the smallest number with $m+n+1$ digits. The only power of 10 that lies between 10^{m+n-2} and 10^{m+n} is 10^{m+n-1}. So, $m+n-1 = 2024$ i.e. $m+n = 2025$. So, there are 2025 digits written on the page.

17. Three possible ways of arranging the letters V, I and B in three different boxes are shown :

V	I	B

I	V	B

B	I	V

(a) Write all possible ways of arranging the letters V, I and B in three different boxes. How many such ways are there ?

(b) Write all possible ways of arranging the letters V, I, B and G in four boxes. You should get 24 ways of arrangement.

(c) How many ways can the letters V, I, B, G and Y be arranged in five different boxes ?

(d) How many ways can the letters V, I, B, G, Y and O be arranged in six different boxes ?

(e) How many ways can the letters V, I, B, G, Y, O and R be arranged in seven different boxes ?

V, I আৰু B আখৰকেইটা তিনিটা পৃথক বাকচত সজোৱাৰ তিনিটা সম্ভৱপৰ ধৰণ চিত্রত দেখুওৱা হৈছে:

V	I	B

I	V	B

B	I	V

(a) V, I আৰু B আখৰকেইটা তিনিটা পৃথক বাকচত সজোৱাৰ সকলো সম্ভৱপৰ ধৰণ লিখি উলিওৱা। তেনেকুৱা কিমানটা সম্ভৱপৰ ধৰণ আছে?

(b) V, I, B আৰু G আখৰকেইটা চাৰিটা পৃথক বাকচত সজোৱাৰ সকলো সম্ভৱপৰ ধৰণ লিখি উলিওৱা। এনেকুৱা টা সাজোন আছে।

(c) V, I, B, G আৰু Y আখৰকেইটা পাঁচটা পৃথক বাকচত কিমানধৰণে সজাব পাৰি?

(d) V, I, B, G, Y আৰু O আখৰকেইটা ছয়টা পৃথক বাকচত কিমানধৰণে সজাব পাৰি?

(e) V, I, B, G, Y, O আৰু R আখৰকেইটা সাতটা পৃথক বাকচত কিমানধৰণে সজাব পাৰি?

Ans : All possible ways of arranging the letters V, I and B in three different boxes are

VIB	VBI	BIV	BVI	IBV	IVB

There are 6 possible ways.

All possible ways of arranging the letters V, I, B and G in three different boxes are

GVIB	GVBI	GBIV	GBVI	GIBV	GIVB
VIBG	VIGB	VBIG	VBGI	VGIB	VGBI
IVBG	IVGB	IBVG	IBGV	IGBV	IGVB
BGVI	BGIV	BVIG	BVGI	BIGV	BIVG

Observe that keeping first letter G, the remaining three letters can be arranged in 6 ways. Similarly, keeping first letter V, the remaining three letters can be arranged in 6 ways. There are 4 such options for the first letter. Total number of arrangements is $4 \times 6 = 24$.

Next, for arranging 5 letters, keeping one fixed at the first place, the remaining 4 letters can be arranged in 24 ways as shown above. There are 5 options for the first place. So, total number of arrangements is $5 \times 24 = 120$.

For arranging 6 letters, keeping one fixed at the first place, the remaining 5 letters can be arranged in 120 ways as shown above. There are 6 options for the first place. So, total number of arrangements is $6 \times 120 = 720$.

For arranging 7 letters, keeping one fixed at the first place, the remaining 6 letters can be arranged in 720 ways as shown above. There are 7 options for the first place. So, total number of arrangements is $7 \times 720 = 5040$.

18. (a) In how many parts can two distinct lines divide a plane ? Draw each possible case.

(b) In how many parts can three distinct lines divide a plane ? Draw each possible case.

(c) In how many parts can four distinct lines divide a plane ? Draw each possible case.

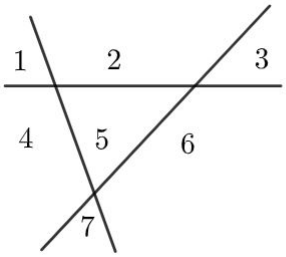
For example, one possible case is three distinct lines dividing a plane into 7 parts. Also, one possible case for four distinct lines is dividing the plane into 10 parts.

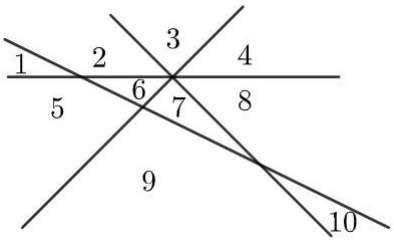
(a) দুডাল পৃথক ৰেখাই এখন সমতলক কিমানটা ভাগত ভগাব পাৰে ? প্ৰতিটো সম্ভাব্য ঘটনা অংকন কৰা।

(b) তিনিডাল পৃথক ৰেখাই এখন সমতলক কিমানটা ভাগত ভগাব পাৰে ? প্ৰতিটো সম্ভাব্য ঘটনা অংকন কৰা।

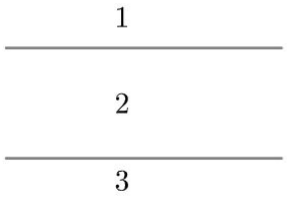
(c) চাৰিডাল পৃথক ৰেখাই এখন সমতলক কিমানটা ভাগত ভগাব পাৰে ? প্ৰতিটো সম্ভাব্য ঘটনা অংকন কৰা।

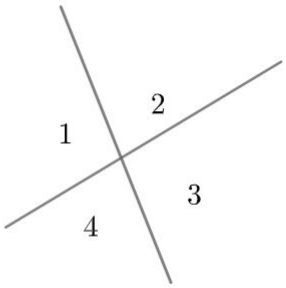
উদাহৰণস্বৰূপে, এটা সম্ভাব্য ঘটনা হ'ল যে তিনিডাল পৃথক ৰেখাই এখন সমতলক 7টা ভাগত ভগাব পাৰে। আকৌ, আন এটা সম্ভাব্য ঘটনা হৈছে যে চাৰিডাল পৃথক ৰেখাই এখন সমতলক 10টা ভাগত ভগাব পাৰে।



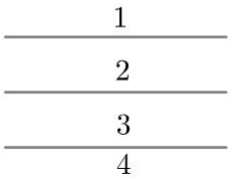


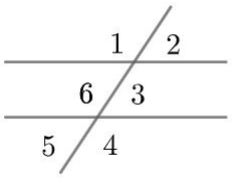
Ans : Two lines can divide a plane in 3 or 4 parts as shown below :

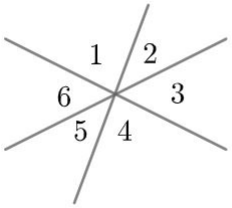


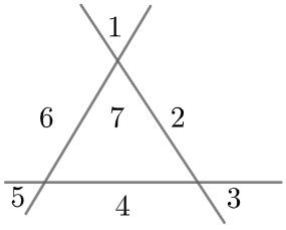


Three lines can divide a plane in 4, 6 or 7 parts in the following ways :

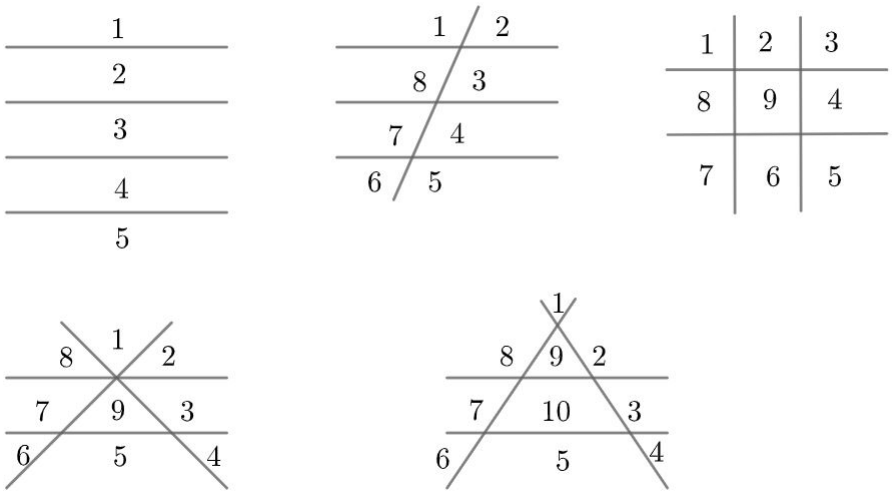








If four lines are all parallel to each other, then the plane is divided into 5 parts. If three of the lines are parallel and the fourth is not then the plane is divided into 8 parts. If two of the lines are parallel, then there are three possibilities. If remaining two lines are parallel to each other, then the plane is divided into 9 parts. If the remaining two lines intersect at a point on one of the two parallel lines, then the plane is divided into 9 parts and if they intersect at a different point then the plane is divided into 10 parts.



If no two lines are parallel, then there are three possibilities. If the lines are collinear then the plane is divided into 8 parts. If three of the lines are collinear, then the plane is divided into 10 parts. If no three lines are collinear, then the plane is divided into 11 parts.