Aakash

Medical | IIT-JEE | Foundations

KNOWLEDGE BYTES

APRIL 2025

CLASS 8

Aakash

Medical | IIT-JEE | Foundations

Edition: 2025-26

PREFACE

What is Knowledge Bytes?

Knowledge Bytes is a collection of riddles, interesting facts, mnemonics and puzzles that will make your learning fun and engaging.

We want you to be delighted about studying. Knowledge Bytes helps you to know more about the subject in a fun, motivating and educational way and helps to implement what you learn in a creative way.

Benefits


Saves Time

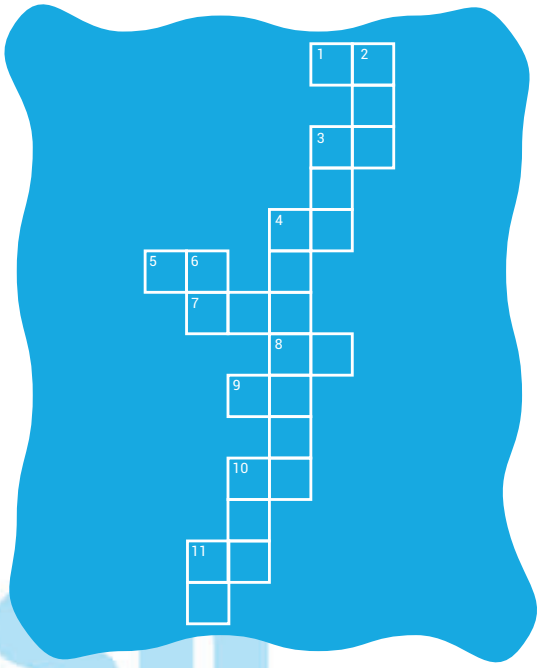

Develops Learning Skills


Stimulates Interest


Leads to Increased Comprehension

EXPLORE

Crossword Cubes and Cube Roots



Across

1. _____ is the cube root of 1728.
3. $3^3 + 9 =$ _____.
4. 2197 is the cube of _____.
5. $3^3 + 3^3 + 3^3 =$ _____.
7. 6 less than cube of 9 is _____.
8. If $(6859000)^{1/3} = 190$, then $(6859)^{1/3}$ equals
9. If the cube root of 512 × 27 is 24, then the cube root of 512 × 125 is _____.
10. $4^3 + 3^3 + 2^3 + 1$ is the square of _____.
11. If 42875 = 343 × 125, then cube root of 42875 is _____.

Down

2. Cube of 6 is _____.
3. $(7)^3 =$ _____.
4. If $(1331)^{1/3} = 11$, then the cube of 110 is
6. If $(4913000)^{1/3} = 170$, then the cube root of 4913 is _____.
10. $7^3 - 6^3 =$ _____ + 2
11. $512^{(1/3)} \times 4913^{(1/3)} / 64^{(1/3)} =$ _____.

Fastest and universal way to calculate square of a number

$(a + b)^2 = a^2 + 2ab + b^2$

Let 'b' be units digit and 'a' be the remaining number, then

$(a + b)^2 = a^2 + 2ab + b^2$

$((1)(5))^2 = 1^2 \quad 2 \times 1 \times 5 \quad 5^2$

a = 1, b = 5

$1 \quad 10 \quad 25$

$(15)^2 = \overset{+1}{2} \quad \overset{+2}{12} \quad 5$

$2 \quad 2 \quad 5$

$(15)^2 = 225$

Fastest and universal way to calculate cube of a number

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

Let 'b' be units digit and 'a' be the remaining number, then

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$((1)(4))^3 = 1 \quad 3 \times 1 \times 4 \quad 3 \times 1 \times 4^2 \quad 4^3$

a = 1, b = 4

$1 \quad 12 \quad 48 \quad 64$

$(14)^3 = \overset{+1}{2} \quad \overset{+5}{17} \quad \overset{+6}{54} \quad 4$

$2 \quad 7 \quad 4 \quad 4$

$(14)^3 = 2744$

Cubes and Cube Roots

$0^3 = 0$	$4^3 = 64$	$8^3 = 512$
$1^3 = 1$	$5^3 = 125$	$9^3 = 729$
$2^3 = 8$	$6^3 = 216$	$10^3 = 1000$
$3^3 = 27$	$7^3 = 343$	

Interesting Facts

i. Last digit of a perfect cube is same as that of the last digit of its cube root except that

2 becomes 8 8 becomes 2 and

3 becomes 7 7 becomes 3

ii. Difference between cubes of two consecutive numbers is 1 more than 3 times their product

Eg: $5^3 - 4^3 = 3 \times (5 \times 4) + 1 = 61$

Or $m^3 - (m - 1)^3 = [3m (m - 1) + 1]$

Given $14^3 = 2744$, find 15^3.

Sol. $15^3 = 14^3 + [3 \times 15 \times 14 + 1]$
$= 3375$

Puzzle

On a particular day in a village of Sonbhadra, which is very underdeveloped district of U.P., a shepherd found a gold cubical block of side 60 cm and the district administration recovered it from the shepherd. Then each year, they divide the gold block into smaller identical cubical gold blocks and distribute them among poor persons just for one year and at the end of the year, all the blocks were recovered and moulded to form the original gold block, this process was continued for 6 years.

No person gets benefited for more than one time. If for the first year, the identical distributed blocks were of 1 cm side, in second year they were of 2 cm side, in third year they were of 3 cm side and so on for 6 years, then how many total persons were benefited?

Sol.:- **For 1st year :-** Side of each block = 1 cm

$$\text{Number of smaller blocks} = \frac{60}{1} \times \frac{60}{1} \times \frac{60}{1} = 60^3$$

For 2nd year :- Side of each block = 2 cm

$$\text{Number of smaller blocks} = \frac{60}{2} \times \frac{60}{2} \times \frac{60}{2} = 30^3$$

For 6th year :- Side of each block = 6 cm

$$\text{Number of smaller blocks} = \frac{60}{6} \times \frac{60}{6} \times \frac{60}{6} = 10^3$$

Total number of benefited persons = $60^3 + 30^3 + 20^3 + 15^3 + 12^3 + 10^3$

= 257103

Approximation of cube root of perfect cube number

$\sqrt[3]{262144}$

make the pair of 3-digits from right

2 6 2	1 4 4
↓	↓
Tenth place digit should be 6	Unit digit must be 4

6^3 is the nearest perfect cube to 262.

So, $\sqrt[3]{262144} = 64$

$\sqrt[3]{300\ 763}$

300	763
↓	↓
6	7

Because 7^3 will give us units digit as 3.

$\because$ 6^3 is the nearest perfect cube to 300.

So, $\sqrt[3]{300763} = 67$

$\sqrt[3]{135\ 005\ 697}$

135	005	697
↓	↓	↓
5	x (say)	3

$= 5 \times 3$

We can find the unit digit and first digit by approximation method other digit can be determined by taking the help of options or by doing complete calculation. The value of x can be any digit.

$\sqrt[3]{1\ 824\ 793\ 048}$

1	824	793	048
↓	↓	↓	↓
1	x	y	2

[$\because$ 2^3 gives units digit as 8]

So, $\sqrt[3]{1824793048}$ will be of the form $\overline{1\ x\ y\ 2}$ where tenth place and hundredth place digits can be any digit.

Sum of cubes of first n-natural numbers

$$1^3 + 2^3 + 3^3 + 4^3 + 5^3 + \ldots\ldots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$$

? Find the sum of $1^3 + 2^3 + 3^3 + \ldots\ldots + 12^3$.

Sol.:- We know that,

$$1^3 + 2^3 + 3^3 + \ldots\ldots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$$

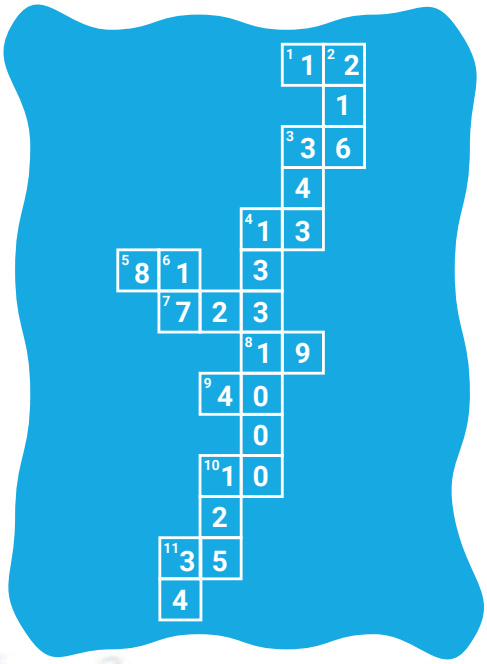
So, $1^3 + 2^3 + 3^3 + \ldots\ldots + 12^3$

$$= \left[\frac{12(12+1)}{2}\right]^2 \quad [\because n = 12]$$

$= 6084$

Answer (Crossword)

ACROSS		DOWN	
1.	12	2	216
3.	36	3.	343
4.	13	4.	1331000
5.	81	6.	17
7.	723	10.	125
8.	19	11.	34
9.	40		
10.	10		
11.	35		



Latest info on Sound Waves

A Revolutionary Nebuliser

Using sound wave technology, scientist have designed a revolutionary nebuliser called 'Respite' that can administer the next generation of drugs, such as immunotherapies, with precise doses to patients with debilitating lung conditions.

Cell Re-Engineering

The sound wave technology has also been used in the emerging medical field of cell engineering, which has recently seen considerable success, particularly in treating some forms of cancer.

The new technique used the force of sound to push against the cell walls, allowing drugs to enter the cells more efficiently than current approaches.

Facts About Sound

1. A human baby cries at about 115 decibels, which is louder than a car horn.

2. Scientists have used sound waves to manipulate objects. Using focussed sound waves and ultrasonic waves, objects have been levitated into the air and moved around.

3. The eruption of a volcano at Krakatoa in the western Pacific Ocean is the loudest natural sounds ever generated on the planet earth.

4. Most animals, like dogs, are capable of detecting sound at higher frequencies.

5. If a human being could yell for 8 years, 7 months and 6 days straight, it would produce enough sound energy to warm up a cup of coffee.

6. Birds create sound maps to navigate their migration and travel through the air. It is thought that birds can use both the beak magnetite and the eye sensors to travel long distances over areas that do not have many landmarks, such as the ocean.

7. The blue whale produces one of the loudest sounds within the animal kingdom measuring around 188 decibels.

8. If you tried to recite the letters of the alphabet without moving your tongue or lips, every letter would sound exactly the same.

9. A digital recording of our voice is exactly how other people hear how we sound.

10. People who suffer from melophobia have fear of music and people with acousticophobia has a fear of noises.

Word Search

Metals and Non-metals

1. Identify the metal which is used for construction of bridges. This metal is also found in our body.

2. Identify the important non-metal present in hydrocarbons.

3. Identify the non-metal that is yellow in colour.

A	X	T	M	S	P	K	L	G
X	T	S	U	L	P	H	U	R
I	L	R	H	M	N	D	I	L
C	I	R	O	N	S	E	J	K
A	L	U	M	I	N	I	U	M
R	M	U	Q	T	R	S	T	U
B	N	P	C	O	P	P	E	R
O	X	Y	G	E	N	V	W	X
N	Y	Z	T	A	B	G	H	K

4. Identify the metal used for making foil for wrapping food.

5. Identify the metal used for making vessels for storing water in old days.

6. Identify the non-metal which we inhale during breathing.

Quiz

Q.1 The metals Na and K are stored in

(1) Water (2) Kerosene

(3) Alcohol (4) Ether

Q.2 All of the following metals are solid at room temperature, except

(1) Sodium (2) Calcium

(3) Mercury (4) Copper

Q.3 The non-metal which is liquid at room temperature, is

(1) Oxygen (2) Bromine

(3) Chlorine (4) Sulphur

Q.4 The metals which are soft and can be cut with a knife are

(1) Sodium and potassium (2) Barium and calcium

(3) Sodium and mercury (4) Potassium and calcium

Q.5 When non-metals are added to water, generally

(1) Hydrogen gas is evolved

(2) Carbon dioxide gas is evolved

(3) No reaction takes place

(4) Hydroxide is formed

Answer (Word Search) Metals and Non-metals

1. Iron
2. Carbon
3. Sulphur
4. Aluminium
5. Copper
6. Oxygen

A	X	T	M	S	P	K	L	G
X	T	S	U	L	P	H	U	R
I	L	R	H	M	N	D	I	L
C	I	R	O	N	S	E	J	K
A	L	U	M	I	N	I	U	M
R	M	U	Q	T	R	S	T	U
B	N	P	C	O	P	P	E	R
O	X	Y	G	E	N	V	W	X
N	Y	Z	T	A	B	G	H	K

(Answer) Quiz

Q.1 (2) Q.2 (3) Q.3 (2)
Q.4 (1) Q.5 (3)

Word Search (Cell-Structure and Functions)

A	P	Q	F	N	O	L	Y	W
D	D	E	L	C	P	Y	G	O
N	U	C	L	E	U	S	P	T
A	V	Y	F	L	K	O	K	E
F	M	T	O	L	Y	S	B	N
K	A	O	N	W	P	O	L	X
P	T	P	P	A	Z	M	E	S
Z	A	L	Q	L	G	E	N	E
W	E	A	T	L	O	P	S	R
A	F	S	B	N	O	Q	L	W
A	Q	M	C	O	A	F	N	Z

Find Them ?

DNA, SER, Gene, Cell Wall, Lysosome, Cytoplasm, Nucleus

Fact

WE GOT MITOCHONDRIA FROM OUR MOTHER:

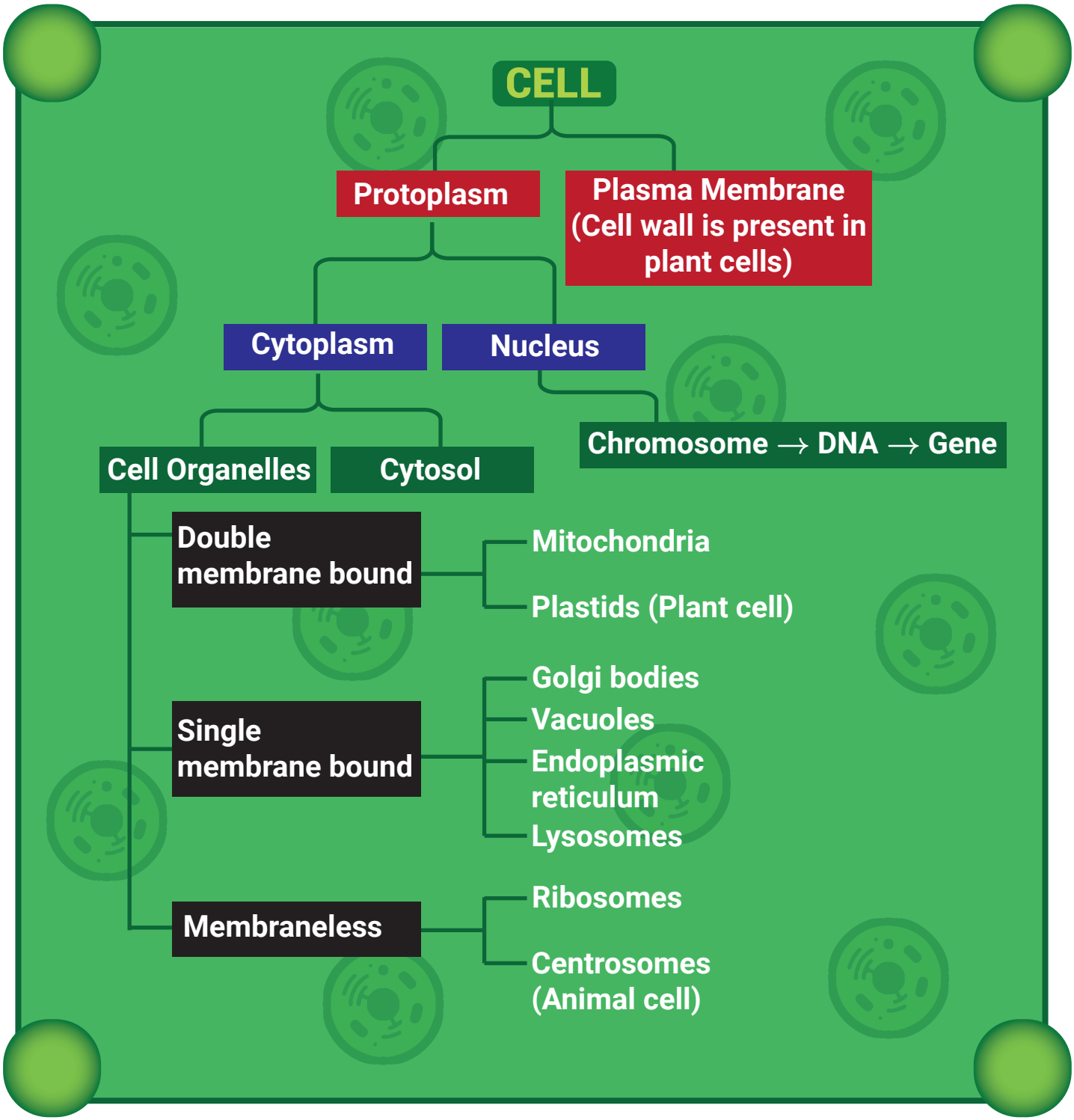
Yes, we got almost all mitochondria present in each of our cells from our mother. About 200,000 of mitochondria are present in human ovum while only about 5 are present in the sperm. So, basically they get diluted after fertilization. So, chronologically we take the mitochondria from an ancient mother ancestor, scientist called her "Mitochondrial Eve".

What is "Cell Eating" and "Cell Drinking" ?

Pinocytosis is also called cell drinking process, as fluid materials such as proteins, fats, etc having high molecular weight in the form of globules of fluid enter the cytoplasm by invagination of plasma membrane.

Phagocytosis is bulk intake of large sized solid particles by cell using plasma membrane. It is also called cell eating process.

Flow Chart:


CELL
Protoplasm
Plasma Membrane (Cell wall is present in plant cells)
Cytoplasm
Nucleus
Cell Organelles
Cytosol
Chromosome → DNA → Gene
Double membrane bound
Mitochondria
Plastids (Plant cell)
Single membrane bound
Golgi bodies
Vacuoles
Endoplasmic reticulum
Lysosomes
Membraneless
Ribosomes
Centrosomes (Animal cell)

Puzzle (Cell-Structure and Functions)

Find the words using hints.

1

Hint: Organelle involved in protein synthesis : ORBIOEMS

2

Hint: Brain of the cell : ULENSCU

3

Hint: An additional layer in plants : LACWELLL

4

Hint: DNA is an example of : ULCANCEIIDC

5

Hint: Digest cellular macromolecules : YSOLSOEM

6

Hint: Cell having a true nucleus : CRAEKYTUOI

7

Hint: Energy currency is synthesized by : MITCRANIDOOH

After solving all the above given puzzles,let us now solve the final puzzle by arranging the alphabets in the encircled boxes of the above puzzles.

?

Region in the prokaryotic cell, that contains the genetic material.

What's My Name ?

1. I am the cell organelle that sort proteins and other cellular materials and put them into structures known as vesicles. What am I?

2. I am the cell's transport system. I am of two types : Rough and Smooth. When I am rough, it is actually ribosome which is responsible. What am I?'

3. I am the brain of the cell and so they say I regulate activities from day to day. What am I?

4. I am flexible and thin, I control what gets out and what comes in. What am I?

Answer (Word Search)

A	P	Q	F	N	O	L	Y	W
D	D	E	L	C	P	Y	G	O
N	U	C	L	E	U	S	P	T
A	V	Y	F	L	K	O	K	E
F	M	T	O	L	Y	S	B	N
K	A	O	N	W	P	O	L	X
P	T	P	P	A	Z	M	E	S
Z	A	L	Q	L	G	E	N	E
W	E	A	T	L	O	P	S	R
A	F	S	B	N	O	Q	L	W
A	Q	M	C	O	A	F	N	Z

Answer (Puzzle)

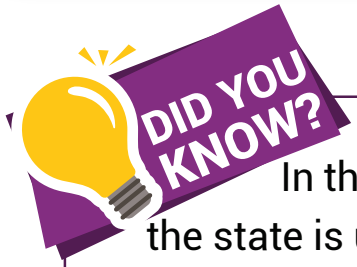
1. RIBOSOME
2. NUCLEUS
3. CELLWALL
4. NUCLEICACID
5. LYSOSOME
6. EUKARYOTIC
7. MITOCHONDRIA

NUCLEOID

Answer (What's My Name ?)

1. Golgi Bodies
2. Endoplasmic Reticulum
3. Nucleus
4. Cell membrane

Models of Secularism



In the American model of secularism, separation of religion and the state is understood as mutual exclusion i.e. the state will not intervene in the affairs of religion and in the same manner, religion will not interfere in the affairs of the state.

Indian secularism works on the strategy of intervention as well as non-intervention in the religion. There is no strict separation of religion and the state.

Northern and Southern Lights

Most of us get fascinated when we look at the sky, especially at night. We see many sources of light like stars but how many of you have heard about the Northern Lights/Southern Lights or Aurora Borealis/ Aurora Australis? Let's learn about it.

Where do they occur ?

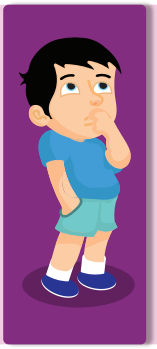
It is a natural phenomenon that commonly occurs at higher northern and southern latitudes that is, the North Pole and the South Pole. It is usually a milky greenish color light, however, can also show red, blue, violet, pink, and white colors.

Why do they occur ?

1. The protective magnetic field around Earth shields us from most of the energy and particles.
2. During solar storms, the sun throws out electrified gas that can travel through space at high speeds.
3. When a solar storm comes towards earth, some of the energy and small particles can travel down the magnetic field lines at the north and south poles into the upper Earth's atmosphere.
4. This leads to the creation of Aurora.

In Northern Polar region, it is known as Aurora Borealis and in Southern Polar region, it is known as Aurora Australis.

Conjunctions



What are Conjunctions?

We can understand a conjunction with one word that is a bridge. Just as a bridge connects two places, similarly a word which connects two words, two clauses, two phrases and two sentences is called a conjunction.

Conjunctions are of types:

- Correlative conjunction
- Coordinating conjunction
- Subordinating conjunction

Let's talk about coordinating conjunction.

1. Cumulative conjunction (add) - Ram and Shyam are going to market.
2. Alternative conjunction (choice) - Give me a pen or a pencil.
3. Adversative conjunction (contrast) - She is a good girl but doesn't help others.
4. Illative conjunction (result) - She is 88 years old. So she can't walk.

For Example:

Q1. He does not enjoy eating vegetables, _____ does he enjoy eating fruit.

(or/nor)

Q2. The class was difficult, _____ everyone ended up receiving a passing grade.

(yet/but)

Explanation: Q1

In the given sentence, to present negative choice we use 'nor'.

Explanation: Q2

In the given sentence, to show contrast we use 'but'.

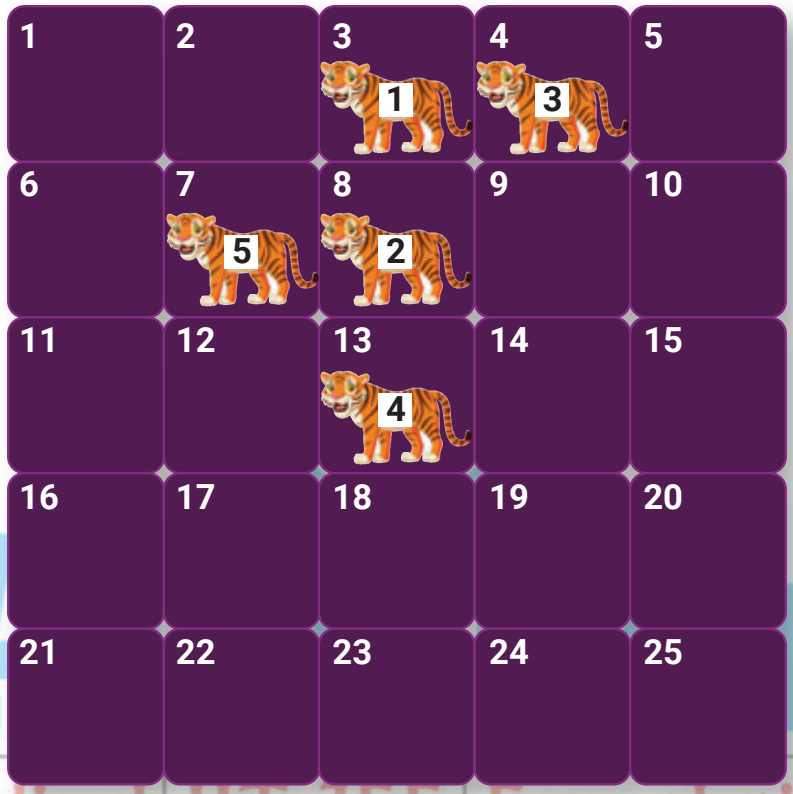
The seven chief coordinating conjunctions are: For, And, Nor, But, Or, Yet, So. They can be remembered using the acronym FANBOYS.

Fill in the blanks with appropriate coordinating conjunctions.

1. She bought a mango, _____ she was hungry.
2. Desiree lives in Alaska, _____ she is a park ranger at the National Forest there.
3. We can see a horror movie, _____ we can see an action movie.
4. The test was difficult, _____ everyone received higher than a "C" grade.
5. I was broke all week, _____ I had to eat Top Ramen noodles for every meal.

Answers 1. for 2. and 3. or 4. yet 5. so

MAT Move The Tiger



Each tiger can jump over one or several  but not diagonally. But it can not jump over an empty cell. If a tiger jump from one box to another box then it is called one move. In how many minimum number of moves  (T1) will reach in box 19 ?

Answer (MAT)

Steps				Movement between Boxes	No. of move
I	⇒	T3	:	4 → 2 → 12	2
II	⇒	T5	:	7 → 17	1
III	⇒	T1	:	3 → 18 → 16	2
IV	⇒	T2	:	8 → 18	1
V	⇒	T1	:	16 → 19	1
					7

Happy Birthday

Carl Friedrich Gauss

Carl Friedrich Gauss, original name Johann Friedrich Carl Gauss, (born April 30, 1777, Brunswick [Germany] - died February 23, 1855, Gottingen, Hanover).

German mathematician, generally regarded as one of the greatest mathematicians of all time for his contributions to number theory, geometry, probability theory, geodesy, planetary astronomy, the theory of functions, and potential theory (including electromagnetism).

Along with Archimedes and Newton, Gauss is undoubtedly one of the three geniuses in the history of mathematics.

OUR RESULTS 2024

NEET (UG) 2024

AIR 1

JEE (Advanced) 2024

1430 Students Scored Above MAS

344 Classroom Students Qualified in NSEs* 2023-24

- (Group A & B) 34+30 NSEA*
- 156 NSEB*
- 72 NSEC*
- 23 NSEP*
- 29 NSEJS*

Aakashians Qualified for INO-2024

Diptanshu Sharma	Priyanshu Sarkar	Mridul Garg	Zaman Hussain	Shubhradeep Paul	Samvit Shandilya
NSEB | NSEC | NSEP	NSEB | NSEC | NSEP	NSEB | NSEC | NSEP	NSEA | NSEC | NSEP	NSEA | NSEC | NSEP	NSEA | NSEC | NSEP

and many more...

*NSEA-National Standard Examination in Astronomy | NSEB-National Standard Examination in Biology | NSEC-National Standard Examination in Chemistry
NSEP-National Standard Examination in Physics | NSEJS-National Standard Examination in Junior Science | INO-Indian National Olympiad

Aakashians Qualified for OCSC/IMOTC-2024

32 Classroom Students Qualified in INOs 2024

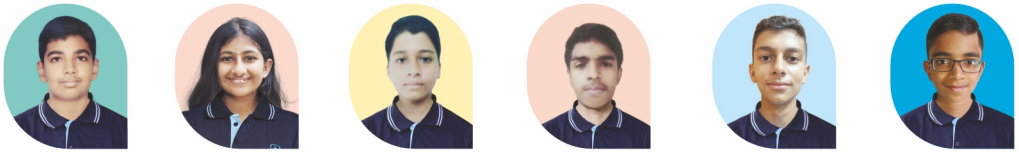
Aneesh Shastri	Sanvi Jain	Mridul M Anand	Zaman Hussain	Sushant Agarwal	Archit Kumar
Qualified INAO	Qualified INChO	Qualified INBO	Qualified INMO	Qualified INJSO	Qualified INAO Jr

OCSCs - Orientation cum Selection Camps | **IMOTC** - International Mathematical Olympiad Training Camp

and many more...

Aakashians Qualified for RMO from Classroom Programs

869 Classroom Students Qualified in IOQM 2024



Class VIII Joish Achyuta	Class VIII Pranava NS	Class VIII Bruteshwar Rajguru	Class VIII Hardik Mishra	Class VIII Hardik Dhariwal	Class IX Dhanush Damu
2 Year Classroom	3 Year Classroom	3 Year Classroom	2 Year Classroom	2 Year Classroom	4 Year Classroom

IOQM - Indian Olympiad Qualifier in Mathematics

and many more...

Board Exam Results 2024

Top Performers from Class X

Devidyuti K Pisharody	P Harini	Jiya Dugar V
Marks 500/500	Marks 499/500	Marks 498/500
CBSE	CBSE	CBSE

and many more...

Top Performers from Class XII

Ananthan R	Ansh Agrawal	Himanshu Agarwal
Marks 496/500	Marks 495/500	Marks 495/500
CBSE	CBSE	CBSE

and many more...

Scan the QR Code to Download Aakash App

GET IT ON Google Play