Aakash

Medical | IIT-JEE | Foundations

KNOWLEDGE BYTES

MAY 2025

CLASS 9

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

Triangles

Triangles in day to day Life

1. Bridges

Supporting structures for bridges are constructed in triangular shapes as they evenly distribute the weight without changing the proportions. Earlier bridges were used to be very weak and could not hold much weight before triangular shapes were incorporated in their structure.

2. Sailing ships

Triangular sail design helps to travel against the wind using a technique known as tacking. Tacking allows the ship to travel forward with the wind at right angles to the boat.

3. Roofs of houses

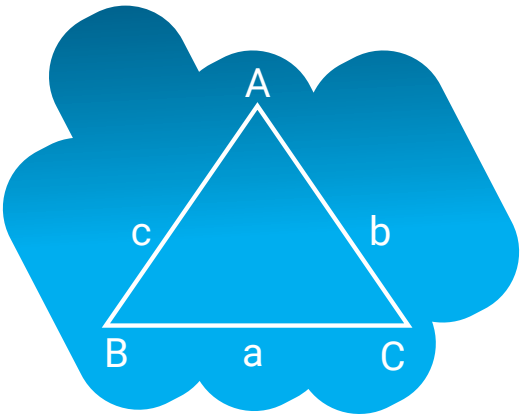
The roof of house is an obtuse-angled triangle. The roof truss is constructed because it doesn't let water or snow to stand on the roof for a longer time.

4. Finding heights of buildings

The concept of right angle comes in usage whenever we have to find the angle of elevation or the height of a tower or a mountain. Moreover, we can also calculate the distance of the ship from the particular tower.

Area of Triangle using Trigonometry

When two sides of the triangle and included angle between them is given let's find the area of a triangle.



If Δ be the area of a triangle ABC, Prove that:

(i) Δ = ½ ab sin C

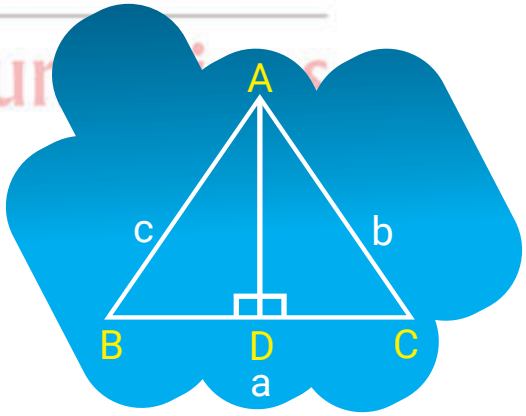
(ii) Δ = ½ ca sin B

(iii) Δ = ½ bc sin A

PROOF(i)

Let ABC is an acute angled triangle. Lengths of sides are given as AB = c, AC = b, BC = a

Construction: Draw perpendicular AD as height of triangle ABC



In Δ ADC:

$$\sin C = \frac{AD}{AC} \quad \left[\sin\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}}\right]$$

$$\Rightarrow \sin C = \frac{AD}{b}$$

$$\Rightarrow AD = b \sin C$$

$$\Delta = \text{area of triangle ABC}$$

$$= \frac{1}{2} \text{ base} \times \text{altitude}$$

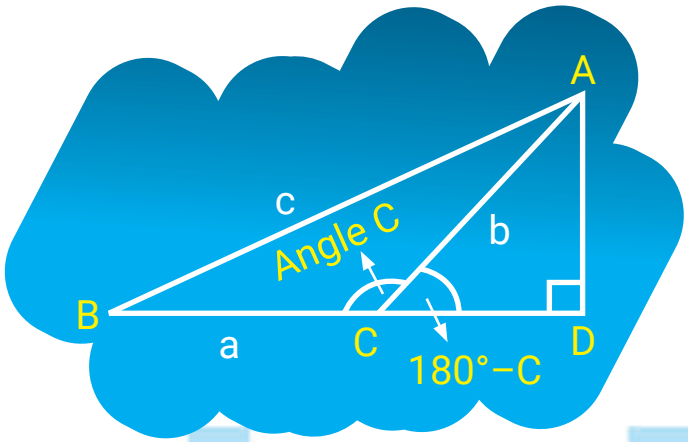
$$= \frac{1}{2} \cdot BC \cdot AD$$

$$\therefore \quad \Delta = \frac{1}{2} ab \sin C$$

Other Case

Triangle ABC is an obtuse angled triangle. Produce BC and draw perpendicular AD.

In Δ ADC:



$$\sin(180° - C) = \frac{AD}{AC}$$

$$\Rightarrow \sin C = \frac{AD}{AC}, \text{ [Since, } \sin(180° - \theta) = \sin\theta]$$

$$\Rightarrow \sin C = \frac{AD}{b}$$

$$\Rightarrow AD = b \sin C$$

Δ = area of triangle ABC

$$= \frac{1}{2} \text{ base} \times \text{altitude}$$

$$= \frac{1}{2} \cdot BC \cdot AD$$

$$\therefore \quad \mathbf{\Delta = \frac{1}{2} ab \sin C}$$

2D to 3D

Many 2D triangles can combine to form 3D platonic solids.

How tetrahedron is made?

1. Regular Octahedron

A platonic solid composed of 8 equilateral triangles (12 edges and 6 vertices).

Volume and Surface Area

Volume $= \left(\left(\sqrt{2}\right)/3\right) \times (\text{Edge Length})^3$

Surface Area $= 2 \times \left(\sqrt{3}\right) \times (\text{Edge Length})^2$

- It has 8 faces
- It has 12 edges
- At each vertex 4 edges meet
- Each face is an equilateral triangle
- It has 6 vertices (corner points)
- It is one of the platonic solids

2. Regular Icosahedron

A platonic solid whose faces are 20 equilateral triangles.

Volume and Surface Area

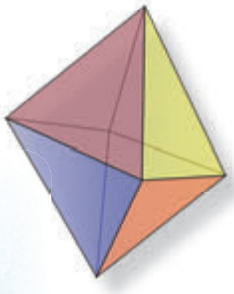
Volume $= \left(5 \times (3 + \sqrt{5})/12\right) \times (\text{Edge Length})^3$

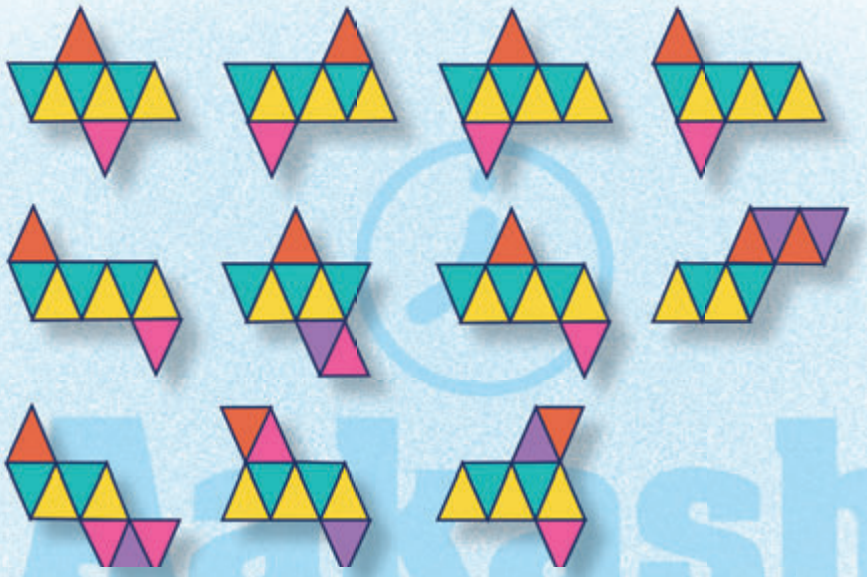
Surface Area $= 5 \times \left(\sqrt{3}\right) \times (\text{Edge Length})^2$

- It has 20 faces
- It has 30 edges
- At each vertex 5 edges meet
- Each face is an equilateral triangle
- It has 12 vertices (corner points)
- It is one of the platonic solids

Origami (Net)

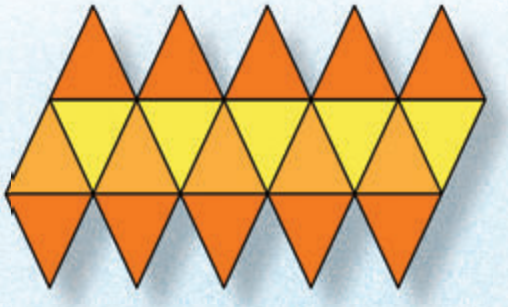
1. Regular Octahedron





Join the nets to form 3D shapes.

2. Regular Icosahedron



Join the nets to form 3D shapes.

Some More Interesting Facts

20-Sided Dice?

Yes ! An icosahedron that has 20 equal faces has an equal chance of landing on any face.

In fact, you can make fair dice out of all of the platonic solids.

Soccer Ball

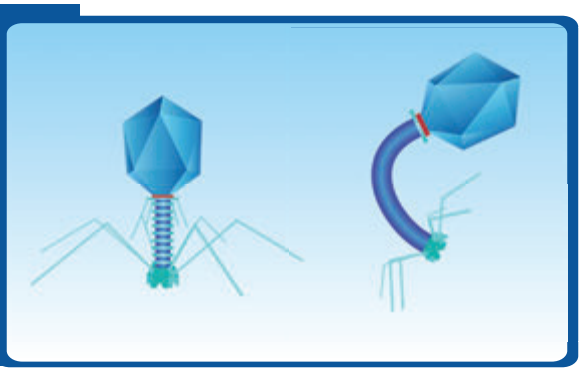
A soccer ball is related to an icosahedron :

It is a truncated icosahedron (truncated means it has bits chopped off it)

It has 12 pentagons and 20 hexagons

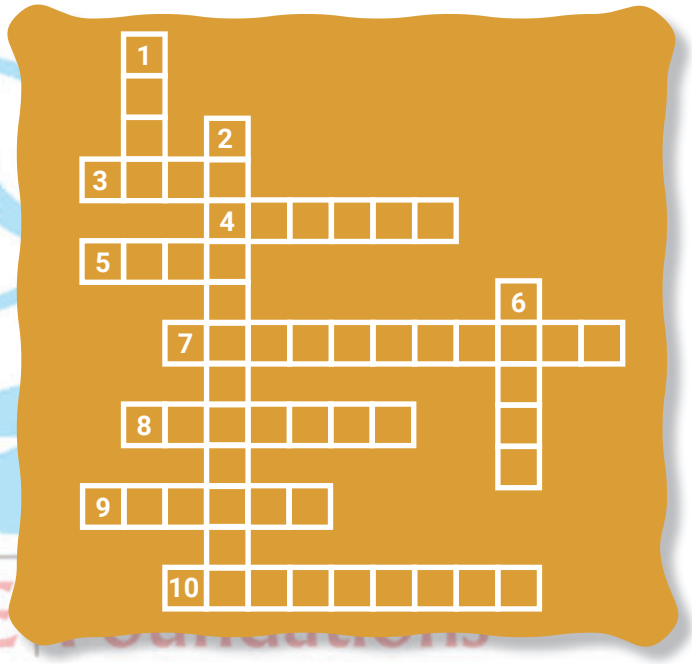
Bacteriophage

The head of a bacteriophage (a virus that targets bacteria) is an icosahedron



Gravitation

Crossword



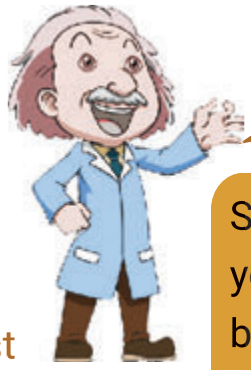
Across

3. Value of acceleration due to gravity at the centre of the earth.
4. Scientist who gave law of gravitation.
5. Gravitational force depends upon.
7. Force by which all the bodies having mass attract each other.
8. Force of attraction by the earth on other object.
9. Gravitational force does not depend upon.
10. Value of g _____ with increase in depth below the earth's surface.

Down

1. On the surface of the earth the value of acceleration due to gravity is maximum at.
2. Gravitational force is a/an _____ force.
6. Gravitational force is also known as _____ force.

Acceleration of Freely Falling Body



Mr. Scientist

Mr. Computer, why are we falling downwards?

Sir, earth's gravitational field is pulling you downward, it always attracts any body having mass, this is also known as universal law of gravitation.
Any body having mass will attract other bodies having mass . The force of attraction is given by

$$F = \frac{Gm_1m_2}{d^2}$$

Mr. Computer

Mr. Scientist

Ohhh really...!!! That sounds interesting but why my speed is increasing during my fall?

Sir, as gravitational force is acting on you, which produces an acceleration on freely falling body, known as acceleration due to gravity (g), given by $g = \frac{GM}{R^2}$ (value of which is taken as 9.8 m/sec^2) at the surface of the earth.

Mr. Computer

Mr. Scientist

Thanks Mr. computer for the information, but right now just switch on the parachute and save me.

Acceleration Due to Gravity (g)

Mr. Scientist

Hey Mr. Physicist, can you tell me something more about 'g'?

Do not disturb me, otherwise I will really get too angry

Mr. Physicist

Mr. Scientist

But please help

Okay, 'g' is not constant it may change with...

Mr. Physicist

- Shape of the earth- 'g' at poles is more as compared to 'g' on equators.
  $g_p > g_e$ (as the earth is not a perfect sphere, radius of equator is larger than radius of pole)
- Height from the surface of the earth- 'g' decreases with height, given by

$$g_h = g\left(\frac{R_e}{R_e + h}\right)^2$$

And for small heights $<< R_e$

Below formula can be used

$$g' = g\left[1 - \frac{2h}{R_e}\right]$$

- Depth from the surface of the earth- 'g' decreases with depth, given by

$$g_d = g\left[1 - \frac{d}{R_e}\right]$$

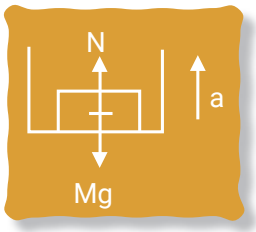
And at the centre of the earth acceleration becomes " Zero".

Facts

Fact-1

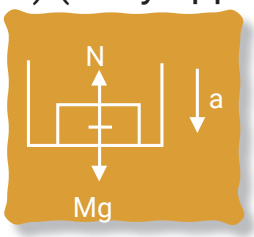
With movement of lift, value of normal reaction on body changes, hence weight of an object changes in an accelerating lift.

Case 1 : Lift moves up with an acceleration 'a'



$N - Mg = Ma$

$N = M(g + a)$ (Body appears heavier)



Case 2 : Lift moves down with an acceleration 'a'

$Mg - N = Ma$

$N = M(g - a)$ (Body appears lighter)

Fact-2

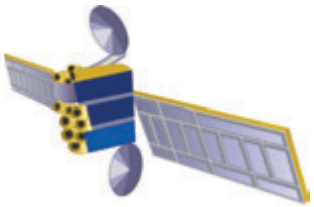
In order to move out of the earth's gravity any spacecraft will require an escape velocity of 11.2 km/sec. Similarly, other planets will also have their own escape velocities.

Fact-3

Satellites launched in the different orbits have different orbital velocities with which they are projected.

Geostationary satellites are launched in the orbit at a height of 36000 km from the surface of the earth having a time period of 24 hrs.

Polar satellites are in the orbit at a height of 500 km – 800 km with a time period of 100 minutes.



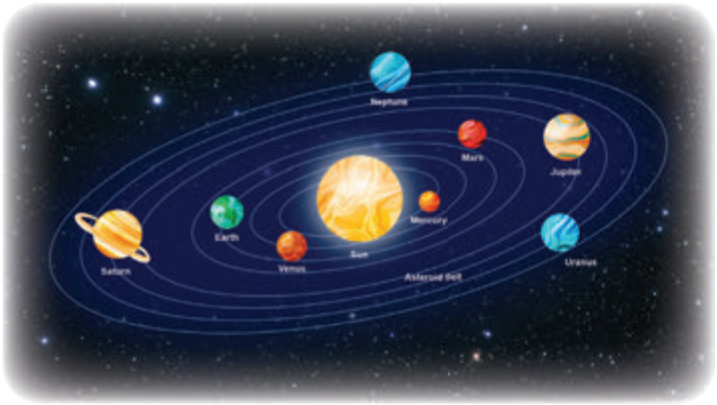
DID YOU KNOW?

During free fall, you are in the condition of weightlessness as there is no normal force acting on the body.

Weight of the sky divers is considered to be zero during their free fall motion.

DID YOU KNOW?

(1) The law of orbits : Every planet moves around the sun in an elliptical orbit with the sun at one of the foci.



(2) The law of areas : The line joining the sun to the planet sweeps out equal areas in equal intervals of time. i.e. areal velocity is constant. According to this law, planet will move slowly when it is farthest from the sun and move rapidly when it is nearest to the sun. It is similar to the law of conservation of angular momentum.

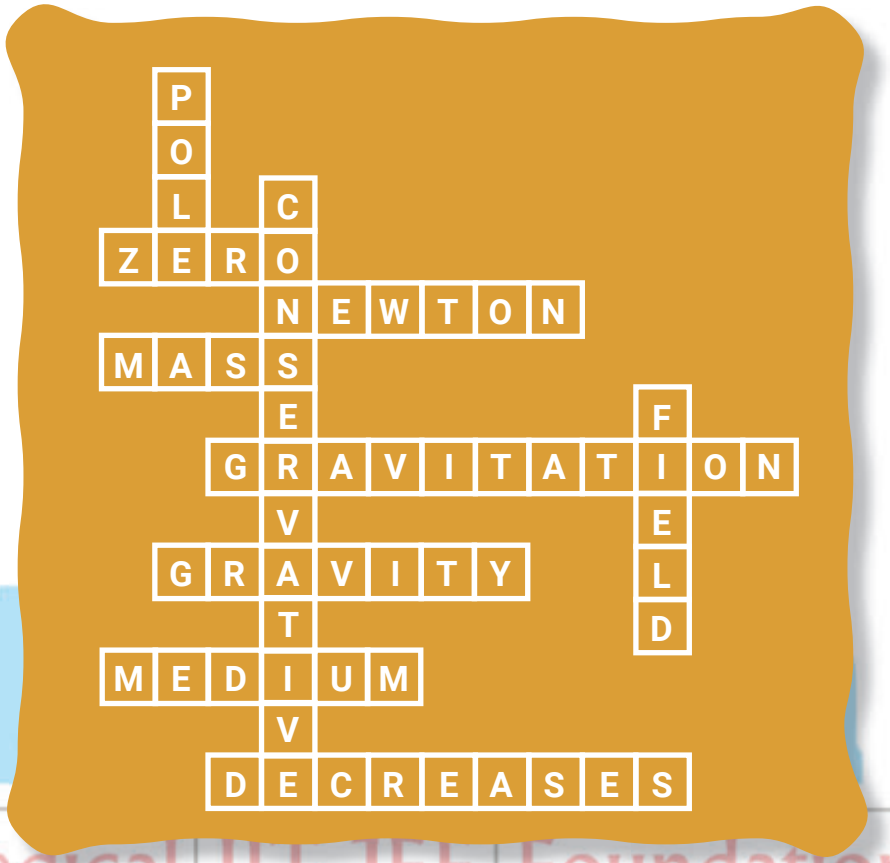
(3) The law of periods : The square of the time period of revolution of any planet around sun is directly proportional to the cube of the semi-major axis of the orbit.

$$T^2 \propto a^3$$

Time period of revolution of the earth is 365 days.

If its radius of orbit is reduced to half then time period of revolution becomes approx 129 days.

Answer (Crossword)



Is Matter Around Us Pure ?

Fun Time

Want to hear a joke about sodium, bromine and oxygen ?

NaBrO.

Sure enough, the chemical symbols of sodium (Na), bromine (Br) and oxygen (O) combine to form a casual way to tell someone you're not interested in hearing a joke.

Two chemists walk into a cafe.

One says, "I'll have H_2O." The other says, "I'll have H_2O, too." The second chemist dies.

H_2O_2 is the chemical formula for hydrogen peroxide, which you can't drink without grievous consequences.

If H_2O is water and H_2O_2 is hydrogen peroxide, what is H_2O_4 ?

Drinking, bathing and lots of other daily activities.

Get it? What is it 4?

Riddles

Who I am?? What I am, a mixture or a pure substance?

1. I am invisible and present everywhere. You breathe one of my component.

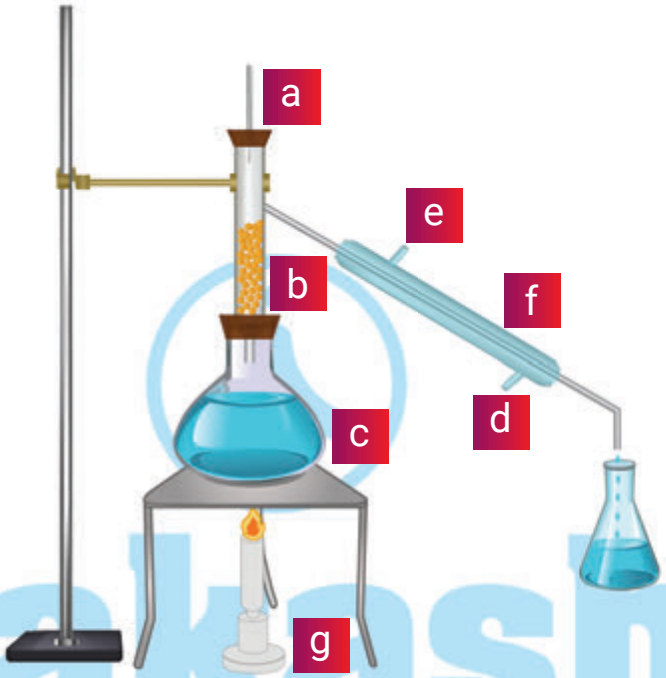
2. I am tasteless and odourless yet very important for you. You drink me everyday.

3. I am very costly, not everyone can afford me. Golden yellow is my colour and you wear my ornaments.

4. Trees have their roots in me. I provide them support, nutrients and my colour is brown.

5. I am white and very healthy. You may or may not like me but your mom will always like me. You drink me.

What's My Name? My Name is_____ .



Answers (Riddles)

1. Air - Mixture
2. Water-Pure substance
3. Gold - Pure substance
4. Soil - Mixture
5. Milk - Mixture

Answers (What's My Name? My Name is_____)

a. Thermometer
b. Fractionating column
c. Round bottom flask
d. Water inlet
e. Water outlet
f. Water condenser
g. Burner

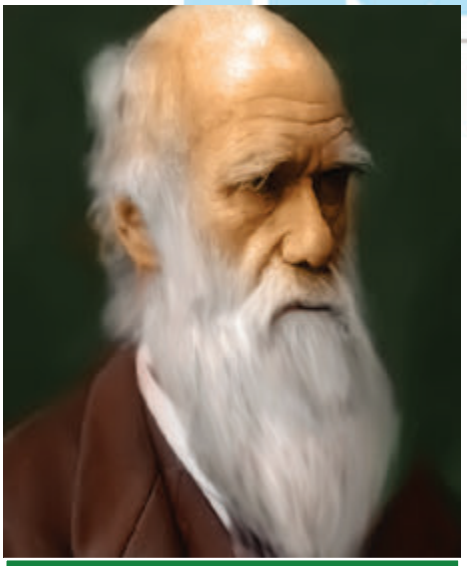
Diversity in Living Organisms

Interesting Facts

Aristotle : Father of Biology, "In the 4th century BC the Greek philosopher **Aristotle** travelled to Lesvos, an island in the Aegean sea then as now, with wildlife. His fascination with what he found there, and his painstaking study of it, led to the birth of a new science-biology.

Aristotle also taught **Alexander** and his friends about medicine, philosophy, morals, religion, logic, and art.

Aristotle



Charles Darwin

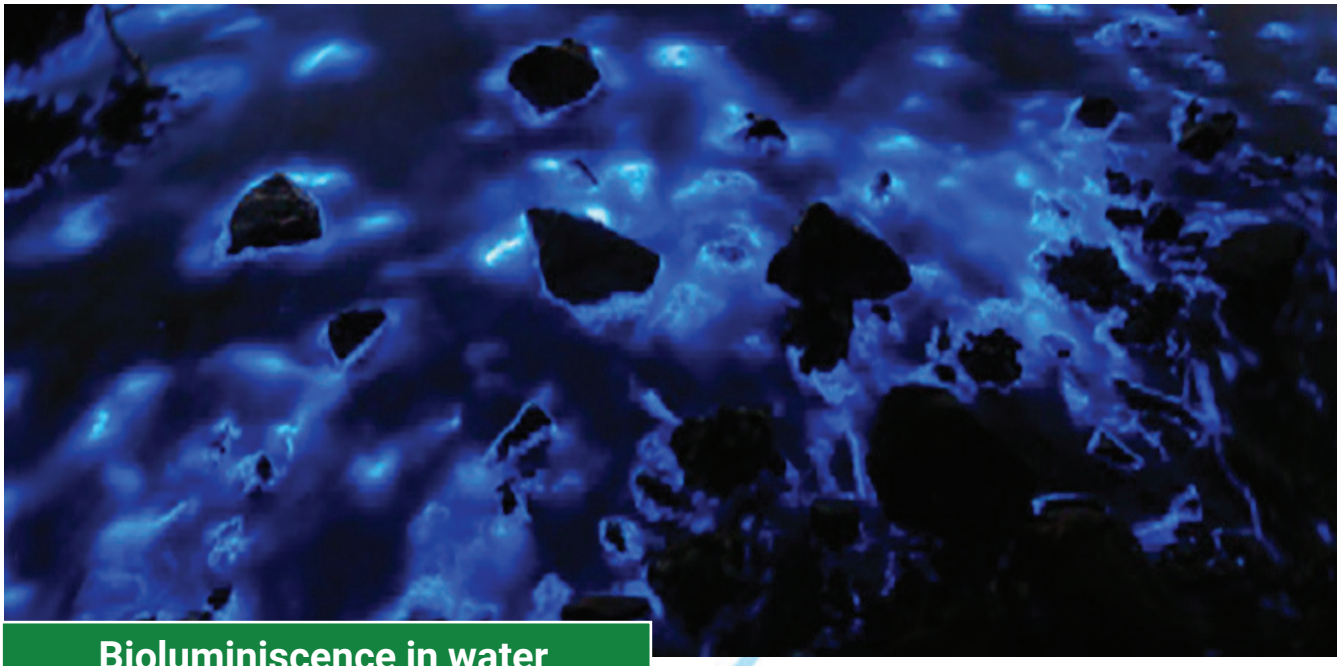
After 126 years that Darwin died, the church apologized to him.

For Darwin's 25th birthday, the captain of the Beagle, named a mountain in Tierra del Fuego in his honor.

Darwin almost didn't get picked to go on the voyage, because the captain didn't like his nose.

Darwin wanted to be a doctor, but he could not stand the sight of blood.

A less well-known fact about the 19th-century scientific explorer is that he had an equally adventurous palate. He eagerly ate many of his specimens—including iguanas, armadillos, and rheas.



Bioluminiscence in water

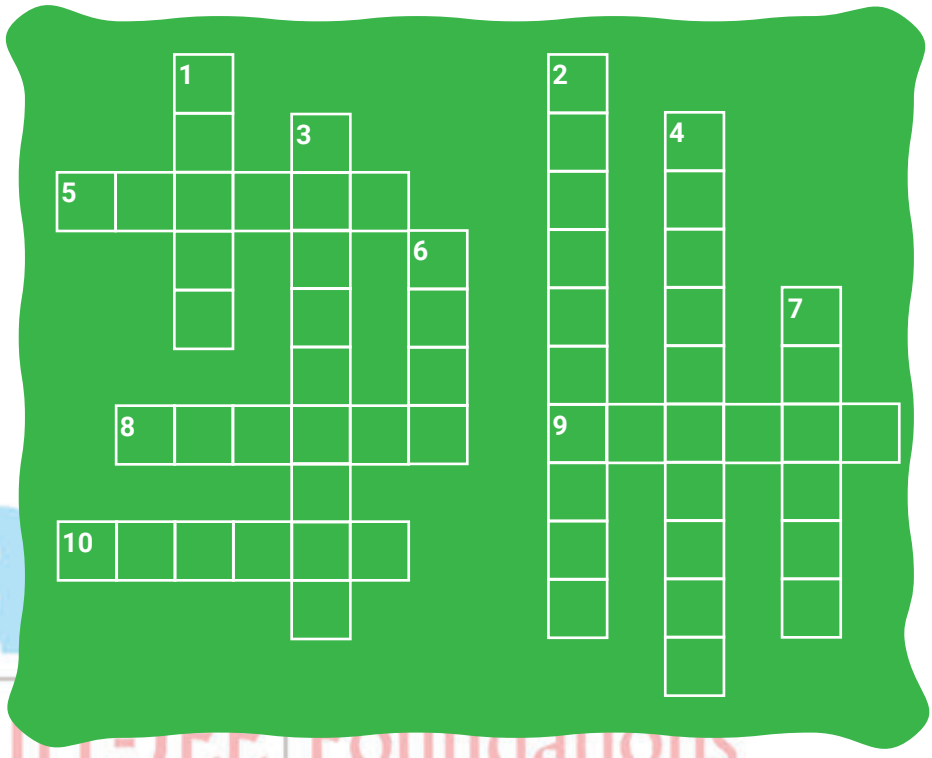
One type of bioluminescent algae is a dinoflagellate called *Noctiluca*, or sea sparkle. *Noctiluca* are so small that thousands of them can fit in a single drop of water.

Dead Ant

Dead ants emit a chemical that tells other ants to move the body to a sort of burial ground. If this chemical is sprayed on a live ant, others will treat it as a dead ant, regardless of what the live/dead ant does.

A study found that each year arthropods (like millipedes, spiders and ants) eat over 2,100 pounds of junk food discarded in New York City's Broadway/ West St. corridor in Manhattan. That's the equivalent of 60,000 hot dogs.

Crossword



Across

5. Prokaryotes belong to this group.
8. Common name for *Paphiopedilum*.
9. Genus of sparrow.
10. Fruit trees, roses, and daisies belong to the class.

Down

1. Group of organisms with a cell wall and heterotrophic nutrition.
2. Plant with flowers such as sunflower.
3. Amphibians of plant kingdom.
4. Plant which has naked seeds.
6. A group of fungi that grows on bread.
7. Body cavity in most of the animals.

What My Name

1. I can fly.
I am not a bird.
I sleep during the day.
I am black.

2. I have four legs.
I live on the farm.
I bleat.
I give milk.

3. I live in china.
I am a kind of bear.
I am black and white.
I eat bamboo.

4. I have four legs.
I live in field.
I am cunning or sly.
I love chickens.

5. I can swim.
I have eight arms.
I have a soft body.
I can change colour.

6. I have two legs.
I lay eggs.
I live on the farm
I cluck.

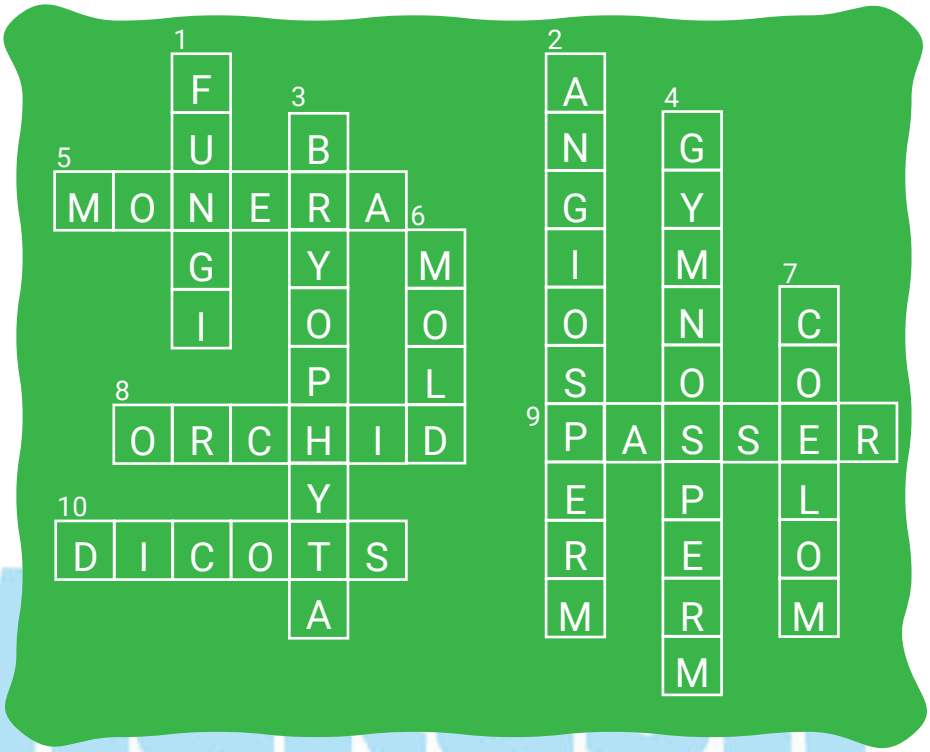
7. I can swim.
I have a hard shell.
I move sideways.
I have eight legs.

8. I eat grass.
I live in Africa.
I am black and white.
I look like a horse.

9. I live in forest.
I eat grass.
People hunt me.
I have antlers.

10. I have no legs.
I can swim very well.
I look like a snake
I am slippery.

Answers (Crossword)



Answers (What My Name)

1. Bat	**2.** Goat	**3.** Panda	**4.** Fox
5. Octopus	**6.** Chicken/Hen	**7.** Crab	**8.** Zebra
9. Deer	**10.** Eel		

Islands and Their Types

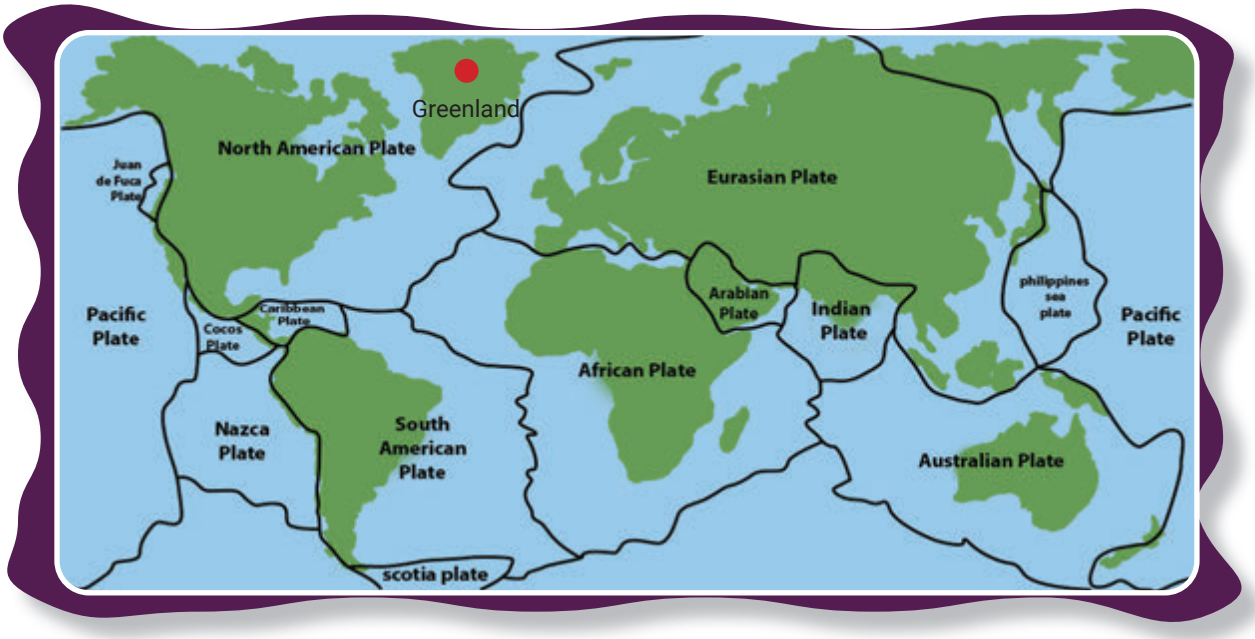
Introduction

Islands are the uplifted landmasses surrounded by water. These have been a home to variety of flora, fauna as well as certain civilizations.

Types of Island

1. Continental Island

The Island formed when there is a subsidence of some part of land or submergence of lower areas into ocean of the mainland. The resulted landmass looks detached from the mainland, hence, forming an island.
eg. Greenland; it is a part of North American plate and a part of the continent.



2. Oceanic Island

These are the small islands located in the middle of the ocean.

eg. Japan

DID YOU KNOW?

Japan is made up of 6,852 islands

3. Coral Island

These islands are formed by small microscopic organism known as Coral polyps. These islands are the popular tourist destination of the world.

eg. Maldives, Lakshadweep, Andaman Islands etc...

DID YOU KNOW?

Coral reefs are also knows as the rainforest of the ocean

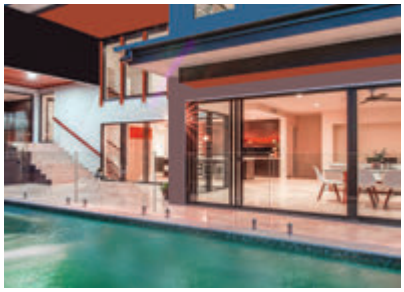
4. Artificial Islands

These are the man made islands.

eg. Dubai Palm Island

Major Factors Leading to Shortages in Supply of Fresh Water

- Increasing population
- Rising demands for food and cash crops
- Increasing urbanisation
- Rising standards of living



Editing

Editing is an important skill among many others learnt while learning a language, like reading, writing etc.

Let's have a look at some of the tips and tricks one requires to master the editing skills.

1. Read the passage thoroughly and check for anything unusual or unsuitable in the lines.

2. Knowledge of parts of speech is important as-

   (a) It helps you check if the word written does the function it's supposed to do.

   (b) Check if its placement is correct.

   Example- A beauty woman is standing there. Here we see that 'beauty' is a noun and 'woman' is also a noun. A noun cannot be placed in the position of an adjective to describe another noun.

   Correct- A beautiful woman is standing there. (an adjective is placed before a noun to describe it.)

   (c) Other errors could be regarding appropriate use of determiners/ articles. Always check if they are used on the basis of number or quantity of the noun.

3. Sometimes the errors we find might be based on tenses or verb forms. So read the passage and check for some keywords like:

   (a) yesterday, ago, last year, those days, once upon a time etc,- **indicators of past tense**- choose past verbs in such cases.

   (b) these days, currently, now a days etc,- **indicators of present tense**- use present verb forms in such cases.

4. Check for the spellings or unnecessary words in phrases or phrasal verbs.

5. Check use of conjunctions as per their function. Also check whether they correlate or coordinate.

6. Brush up your knowledge of other vital topics of grammar like reported speech, voice or clauses.

The following passage has not been edited. There is one error in each line. Write the error along with its correction in the space provided.

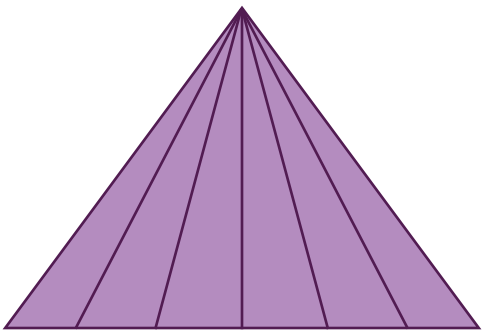
		Incorrect	Correct
I had to went out despite the	(a)		
heavy rain outside to got some medicines.	(b)		
Although the symptoms was not as	(c)		
pronounced as they were at the morning,	(d)		
the doctor had instructs me to	(e)		
be regular with mine dosage.	(f)		

ANSWERS

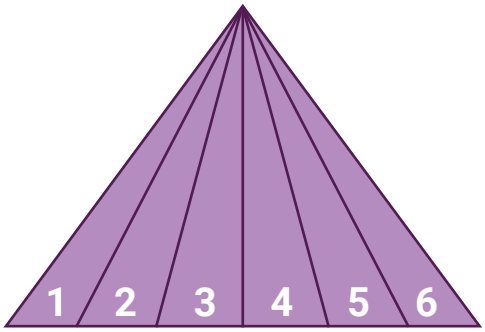
	(a)	(b)	(c)	(d)	(e)	(f)
Incorrect	went	got	was	at	instructs	mine
Correct	go	get	were	in	instructed	my

Diagrammatic Puzzles

How many triangles are there in the following figure?



Sol.: To find the number of triangles formed by such figure, first we write the number of blocks and after that we used the following formula.



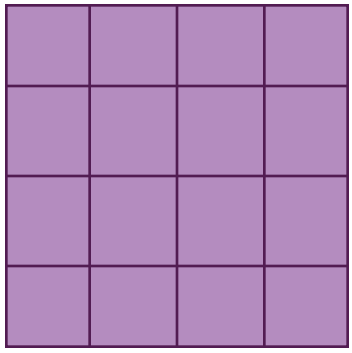
$$\text{Number of triangles} = \frac{n(n+1)}{2}$$

Where n is total number of block in this figure

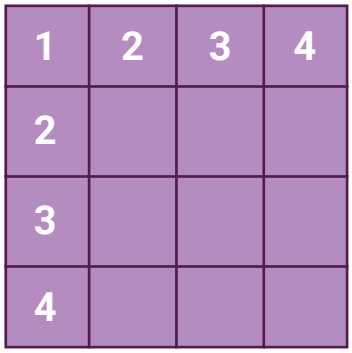
Therefore n = 6

$$\text{Therefore total number of triangles} = \frac{6(6+1)}{2} = \frac{6 \times 7}{2} = 21 \text{ triangles}$$

How many squares are there in the following figure?



Sol.:

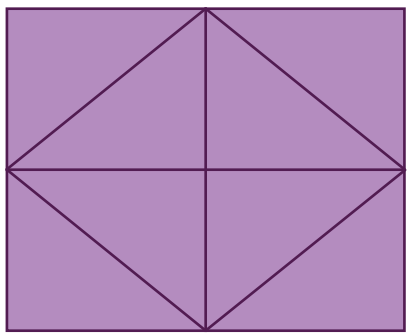


Total no. of squares = $1^2 + 2^2 + 3^2 + 4^2$

$1 + 4 + 9 + 16 = 30$ squares

Practice Questions

Q.1 How many number of triangles are there in the given figure?



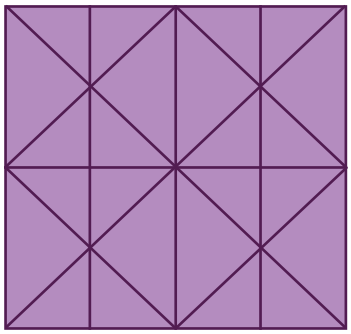
(1) 8

(2) 10

(3) 12

(4) 14

Q.2 How many lines are there in the given diagram?



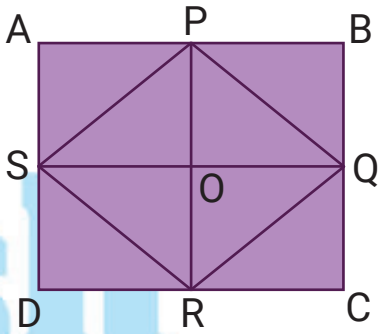
(1) 14 (2) 16

(3) 18 (4) 12

Answers

1. (3) Now names of the triangles are:

APS, PBQ, QCR, RDS, POS, POQ, ROQ, ROS, PQS, RSQ, PRS, PRQ. Hence there are twelve triangles in this figure.



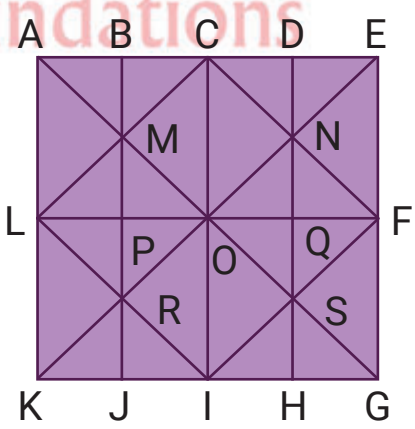
2. (1) Horizontal lines - AE, LF, KG = 3

Vertical lines - AK, BJ, CI, DH, EG = 5

Slanting lines - LC, KE, IF, LI, AG, CF = 6

Therefore, Total numbers of lines

= 3 + 5 + 6 = 14



NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE

Happy Birthday

Ronald Ross

Born - 13 May 1857
Died - 16 Sep 1932

> ***"Science is the Differential Calculus of the mind. Art the Integral Calculus; they may be beautiful when apart, but are greatest only when combined."***

Ronald Ross was born on May 13, 1857, in Almora, India. At the age of 14, Ross won a prize in mathematics and was presented the book *Orbs of Heaven*, which sparked his interest in the field of mathematics. Ross is known for his outstanding research work on malaria-causing parasites in mosquitoes. He discovered malarial parasites in the salivary glands of mosquitoes.

Nobel Prize in Physiology or Medicine (1902), The James Tait black Memorial Prize - Biography (1923).

OUR RESULTS 2024

AIR 1

NEET (UG) 2024

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

899 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...

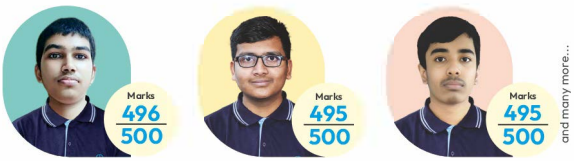
Board Exam Results 2024

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...