

TRENDING NEWS:

1 DART hits mission bullseye, sends asteroid off track

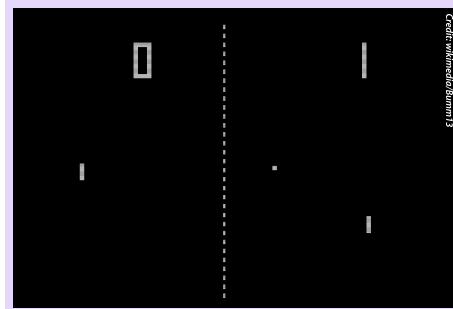
The dinosaurs would have never been extinct if they made it to the 21st century. For the first time in human history, scientists have managed to change the course of a celestial body. NASA's Double Asteroid Redirection Test, aptly abbreviated as DART, rammed into a tiny asteroid named Dimorphos at a speed of 22,500 km per hour.



DART mission ensures that we don't see an asteroid hitting earth in future

This small asteroid orbits around a larger asteroid named Didymos, making up a binary asteroid system. The goal was to nudge the orbiting asteroid closer to the larger asteroid, by bumping DART into it. Neither of the two asteroids brought with it the threat of colliding with Earth, but they were close enough for DART's first take on deflecting an asteroid. The module was launched in November of 2021 and intercepted Dimorphos on 26th September. The recorded data observed a surreal amount of change in the path. The smaller asteroid orbited Didymos every 11 hours and 55 minutes. The impact cut this time down by 32 minutes, to 11 hrs and 23 minutes. The success of DART is proof of humans having the technology to nudge an asteroid off-route if it is Earth-bound. Even a trivial change in the path of an asteroid can amplify manifolds in outer space.

2 Human brain cells in a dish learn to play Pong in real-time



Brain tissues in petri dish plays Pong and improves skills

Pong is a simple game with simple goals — players need to hit a ball with a paddle and avoid missing. This game was one of the first in machine learning. At Cortical Labs,

Melbourne, Australia, scientists designed a system to test how neurons might be the source of inherent intelligence, using Pong. For this, the researchers connected a computer with human and mouse neurons grown in the lab. The system uses a feedback mechanism to signal the neurons if the ball has hit the paddle or not. If this 'brain on a plate' misses hitting the ball, different software analyzes the cause for the miss. This data is then used by the neurons to re-organize and prevent a random response. This would orient the nerve cells to act more efficiently and increase the chances of hitting the ball. Simply put, the brain adapts to its environment by changing either its view of the surroundings or its actions to better fit the world around it.

STEM Around Us

Stroll through sleep

A good night's sleep is a reward for all the hard work throughout the day. During sleep, our body repairs and regrows tissues, builds muscles and bones, and slows our heart rate down. However, sleep is not a uniform process, and there are stages in the sleep cycle.

Broadly, sleep can be classified into non-REM and REM sleep. REM stands for Rapid Eye Movement. During non-REM sleep, a person slowly falls into deeper sleep over a period of ninety minutes.



One can sleep well even while floating in space, the stages still remain same

Non-REM sleep can be classified based on the depth of sleep. With passing time, body temperature drops and heart rate dips. After about an hour and a half, the body dives into REM sleep. In this stage, the eyes move rapidly in every direction, but no visual data is sent back to the brain. Heart rate and breathing are intensified at this stage and brain activity is kicked up by a notch. This is the stage of sleep when we can see dreams.

With passing age, the REM sleep period is trimmed down. An infant spends almost half of its sleep cycle in the REM stage, compared to only 20% in adults.



STEM Challenge/ Science Experiment

Build an Egg-cellent Eggsaver

- **Challenge Criteria:** Your challenge is to make a structure from household materials; or better yet, waste products, or products no more suitable for use. This structure should have enough space to fit an egg. You will need to drop this structure, including the egg, from a considerable height. You will clear the challenge if the egg inside doesn't crack from the fall.
- **Reflection:** How is the force of impact getting distributed onto the egg? Can this system be made compact and put in cars, or into clothes as a safety measure?
- **Challenge Extension:** Try to keep increasing the height of the fall as far as possible, without breaking laws or trespassing. Note down the maximum height you could reach.



Did You Know?

Glass is neither a liquid nor a solid. It exists in a state called supercooled liquid. When a liquid does not turn solid, even after crossing the freezing point, it forms a supercooled liquid. In this state, the particles move about, albeit slower than in liquids... but particles in a solid do not move at all. This is why panes of glass in old windows are thicker at the bottoms compared to the tops.



Brain Teaser:

DEF, DEF2, DE2F2, _____, D2E2F3

What comes next in the series?

Previous edition answer:
Only conclusion II is correct



Science Video: Cockroaches and Their Eggs!

Cockroaches, also known as roaches, are common household pests closely related to termites. While cockroaches have been indicators of uncleanness throughout human history, most cockroach species are not "dirty pests" but live in various habitats. Only 30 cockroach species out of the 4,600 known species roam near human habitats. Cockroaches can tolerate various climatic conditions, ranging from the Arctic cold to the tropical heat. Tropical cockroach species are larger than species in other regions.

The basic body structure of the species remains constant, consisting of a head, a thorax, and an abdomen. The external surface of the cockroach consists of a substance known as calcium carbonate. The head is small and flat, having large compound eyes, two ocelli (also called simple eyes), and long, flexible antennae. Additionally, mouthparts consisting of mandibles or jaws for chewing, salivary glands, and touch and taste receptors are present. The thorax is divided into three segments, and the abdomen is divided into ten segments. Two pairs of wings, attached to the second and third segments of the thorax, allow the cockroach to fly. Three pairs of legs are attached to the thorax. Spiracles, present on the abdomen, are used for respiration. The final segment of the abdomen has the organs for reproduction (different in male and female cockroaches) and an anus.

Female cockroaches lay egg cases, known as oothecae, through the organs of reproduction. These egg cases hatch, giving rise to new individuals, which go through the life cycle: egg, nymph, and adult stages. Watch this video of how cockroach eggs hatch, giving rise to many new cockroach individuals!

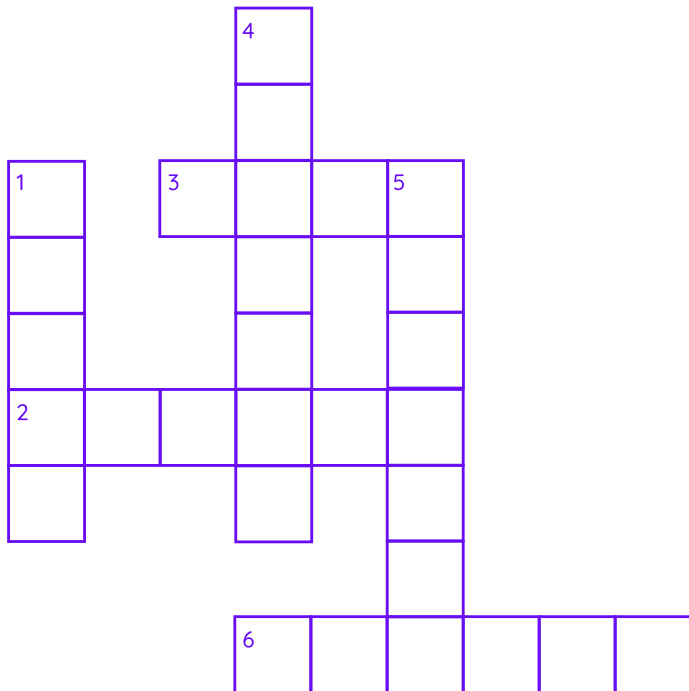
Scan QR code to see the video



4	5	3	1	2
1	3	4	2	5
5	2	1	4	3
3	4	2	5	1
2	1	5	3	4

Previous edition
Futoshiki answer

Crossword



CLUES:

Across:

- Plants respond to stimuli. When the response is not affected by the direction of the stimuli, what is it called?
- When a fatty acid combines with sodium or potassium, this substance is formed. This forms foam with water.
- A type of igneous rock formed due to the rapid cooling of magnesium and iron-containing lava.

Down:

- A solution with a high concentration of common salt.
- The pores on the surface of a plant leaf that open during the day and close during the night and are involved in plant respiration are called:
- The strength of poison released by a scorpion can be more or less determined by the size of a pair of organs they possess. The larger these organs, the less poisonous the scorpion. Name the organ.



Science in Depth

Editing Our DNA to Cure Disease



What types of diseases are scientists working to cure?

Scientists and doctors have been very successful at curing some of the world's most serious medical conditions. We use vaccines and antibiotics to stop infections in their tracks. We use surgeries to transplant organs and perform life-saving procedures. And we use chemotherapy to fight back against cancer.

However, a class of conditions known as genetic diseases have proven much harder to treat. This includes diseases like sickle cell anemia, cystic fibrosis, and muscular dystrophy. There are more than 7,000 different genetic diseases and they affect 1 in every 10 people in the US. Most of these diseases cannot be cured and many are deadly.

What are genetic diseases and where do they come from?

Genetic diseases particularly difficult to cure, because they are encoded in our DNA. Our DNA is the blueprint that tells our body how to develop and function.

Even if the symptoms of a genetic disease could be treated, a patient's genes would push their body back into sickness over and over again. The only way to cure a genetic disease completely is to change that person's DNA.

Can scientists edit a person's DNA?

Editing DNA has long been possible, but not practical. In many cases, DNA editing is unable to target just the gene responsible for causing a disease. In cases where scientists could cut out a single disease-causing gene, there is no way to replace it with a healthy version of the same gene.

These problems have been solved by a new technology called CRISPR. CRISPR enables scientists to cut out and replace a gene with extremely high accuracy. It can target any gene that scientists want, so they can change the individual DNA sequences responsible for causing a genetic disease. CRISPR is such a major advance in DNA editing that the scientists who discovered it won the Nobel Prize in Chemistry in 2020.

[Scan QR code to know more](#)

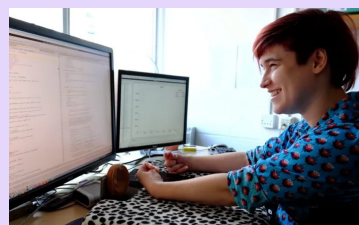


STEM Career:

Watch Particle Physicist Claire Malone at Work

I am a particle physicist. I analyze data from the Large Hadron Collider at CERN to search for as-yet undiscovered particles.

As a scientist I think it is very important to explain to the public what I am looking at in my research. That is why I make my work accessible to everyone who is interested.



Hunting for new particles involves analyzing lots of data from a detector at CERN. To do this I have to write computer code to instruct the computer which calculations to perform to tell us something useful about the data.

I was especially excited about being asked to give a talk for TEDxLondonWomen, because I feel it is particularly important to show young women that they can also pursue a career in the sciences. I have always wanted to understand why the world around me was the way it was. At school, I just wanted to finish the other lessons and get into the science lab. It was the only way I found to quench my curiosity.



Modern particle physics experiments are often the size of a large cave and are very complicated to build and use. There are whole teams of scientists working on monitoring a small part of the detector. Even more are needed to analyze the data. That is why it is very important that people communicate their ideas clearly when they are working in big teams, like when I give talks to colleagues.

The satisfaction I felt when performing experiments in the lab and understanding something new about the universe shaped my studies. I earned a master's in science at Imperial College London and a PhD in Particle Physics at the University of Cambridge.



During my research I have been very fortunate to meet some amazing people. I even had the chance to meet Professor Stephen Hawking, whose work I greatly admire.

Particle physicists have a pretty good understanding of all

the particles that we have discovered so far. However, there is strong evidence that there are more particles throughout the universe that we still know nothing about. For example, when we look at how fast far away galaxies are spinning, we see that they are spinning too fast to just be made of the stars that we can see. There must be additional "stuff" in them. It is my job to find out which particles this "stuff" is made of.



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