

VARC

Read the passage below and answer the questions that follow:

Among the ocean's menagerie of bizarre creatures, sea dragons stand out. Relatives of sea horses and pipefish, sea dragons have long, narrow snouts that they use like a straw to suck up meals of microscopic crustaceans. Instead of scales, the fish are covered in bony armour, and their backbones are kinked. Like their sea horse cousins, male sea dragons gestate a female's fertilized eggs in a pouch.

Bill Cresko at the University of Oregon studies sea dragon genetics to answer one fundamental question: He and his colleagues want to know "how the hell" these fish came to look the way they do. "We're just really fascinated by, 'How can you have an organism that looks like that? What has changed in the genome?'" he said.

A study tried to answer these questions. Researchers sequenced the genomes of leafy and weedy sea dragons and compared them with other fish. The strange appearance of sea dragons made the team think that there might have been something unusual happening with their fibroblast growth factor genes, "which are really important for development of things like teeth, which they don't have, or the shape of faces or appendage outgrowth, to name just a few," said Susie Bassham, a researcher in Dr. Cresko's lab and an author of the paper.

But when they zeroed in on the animals' genomes, the researchers were surprised to see that sea dragons were missing several of these key developmental genes altogether. "I didn't really believe it at first," said Clay Small, another author of the paper, also at the University of Oregon.

While the sea dragons were missing these growth genes, their genomes were packed with repetitive sections of code called transposons. This sort of repetitive code throughout the genome was once called "junk DNA," as scientists were not sure what it did. But transposons, or "jumping genes," are actually capable of cutting and pasting themselves from one spot within the genetic code to another, preventing other genes from shaping an organism's traits.

The researchers cannot say for sure if the jumping genes are responsible for the absence of the growth factor genes. There is evidence of repeating genetic code near the spots where genes are missing, which might point to transposon activity, Dr. Small said. But scientists will need more genomes from across the fish family tree to confirm a cause-and-effect relationship.

Axel Meyer, a sea dragon researcher at the University of Konstanz in Germany, says the study furthers understanding of extreme body plans. "This is a poster child of the exuberance of evolution. It's sort of like evolution gone crazy," said Dr Meyer, who was not involved with the study. "The fun of being an evolutionary biologist is, you get to study these crazy animals and try to make sense of them genetically."

Sea dragon DNA could give insights into how to conserve them, Dr Cresko says, which is critical because they are rare in the wild and hard to keep in captivity. A single fish can cost upward of \$10,000, and they have proven almost impossible to breed.

1. Researchers speculate that transposons may explain why certain growth factor genes are missing in sea dragons. For this explanation to be valid, which of the following must be true?

- A. Transposons in all fish species cause gene deletions.
- B. Transposons are more active in sea dragons than in other related species.
- C. Transposon activity can interfere with normal gene structure or placement.
- D. Transposons only affect genes related to body shape and facial structure.

2. According to the passage, transposons play which of the following roles that are fundamental for sea dragons?

- A. They prevent other genes from shaping the sea dragons' attributes.
- B. They help give the sea dragons their peculiar shape.
- C. They are capable of cutting and pasting each other from one gene to another.
- D. They repeat the genetic code near the spots where genes are missing.

3. Researchers who study sea dragons are fundamentally doing it for which of the following reasons?

- A. The sea dragon's unusual gene pool contains lots of transposons.
- B. The lack of any development genes in sea dragons is common among other creatures.
- C. They are rare in the wild and hard to keep or breed in captivity.
- D. The sea dragons have a peculiar shape, complete with a snout, bony armour, and kinked backs.

4. Which of the following statements can be inferred from the passage?

- A. Transposons cause sea dragons to have their peculiar shape.
- B. Fibroblast growth factor genes solely determine the presence of teeth and give shape to faces.
- C. Sea dragons subsist mainly on crustaceans like crabs, lobsters, shrimps, and barnacles.

D. The genomes of sea dragons could give insights into their conservation.

5. Five jumbled-up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

1. Finally, during the protests that began in the spring of 2020, I saw my students draw connections between domestic issues of racism and social inequality and the historical legacy—and present realities— of the American empire.

2. When I ask students to define what an empire is, they typically picture Rome or the British Empire, not the United States.

3. Much of my work as a historian and an educator focuses on conveying and exploring this fact.

4. Every year, however, I witness students struggling to internalise it.

5. Imperialism, expansion, and colonialism have been integral to every period of America's existence, including the present.

6. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Much of the research on how colour can affect human behaviour is contradictory, though. Some studies suggest it can influence everything from our mood and emotions to how fast our hearts beat, and even physical strength. Bright shades of red, for example, have been found to lead to higher states of arousal and can even stave off drowsiness. Experiments have also suggested that monotonous tasks like proofreading can be more effectively achieved in red offices while creative tasks, such as essay writing, are better done in blue rooms. But other work has shown that red and blue can also be distracting when trying to perform tasks.

A. Research on colour has shown contrasting results as colours can affect people in different ways.

B. Colour can affect our human behaviour in mutually opposed ways by making us effective in certain conditions and ineffective in others.

C. Red and blue have been shown to have contrasting effects on people under different conditions.

D. Research on colour has shown contrasting results as red and blue are highly effective in certain studies and ineffective in others.

7. The four sentences (labelled 1, 2, 3 and 4) given below, when properly sequenced, would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer.

1. This approach proved highly effective.

2. As trade became more internationalised and competitive, innovation and the generation of new ideas became more important.
3. To encourage more creativity among workers, German firms delegated decision-making power to lower levels of management.
4. Germany's business culture increasingly championed quality and empowered lower levels of management led firms to introduce more products that customers appreciated.

8. *There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit.*

Sentence: This was necessary for their own psychological survival.

Paragraph: Much like your favourite therapist does for you, these children developed a way of intuiting how to support their parents and others.

____(1)____. Not caring for their parents was not an option. ____ (2)____.

The consequences could range from the parents withholding love from the children to outright violence between the parents themselves, which the child would come to learn was her fault for not preventing say.

____(3)____. These children do not have the opportunity to understand that the problems they are trying to solve are not their own or why the problems continue despite their best efforts. ____ (4)____. They learn only that they need to pay more attention, intuit better.

- A. Option 1
- B. Option 2
- C. Option 3
- D. Option 4

9. *Five jumbled-up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.*

1. We, therefore, welcome this multidisciplinary collection of papers to push forward the field and showcase sociology as a unique outlet for novel scholarship in this area, including empirical, methodological and theoretical work.

2. There is a diverse community of policymakers, funders, scholars, and practitioners of different types, and all of them work in the field of evidence use.

3. This is because multiple theories, approaches, interventions, and initiatives can be tried and developed.

4. This diversity has also led to extremely valuable work being contained within silos, or research/practice developments being duplicated in different disciplinary areas.

5. This diversity is a strength for the academic field of 'evidence, policy, and practice studies.'

10. *There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit.*

Sentence: Merriam laid off more than a dozen staffers.

Paragraph: Pageviews were declining for Merriam-Webster.com, the company's free, ad-driven revenue engine: Tweaks to Google's algorithms had punished Merriam's search results. ____ (1) ____ . The company had always been lean and profitable, but the financial hit was real. ____ (2) ____ . Merriam's parent, Encyclopaedia Britannica, was facing challenges of its own—who needed an encyclopaedia in a Wikipedia world? ____ (3) ____ . Its longtime publisher, John Morse, was forced into early retirement. ____ (4) ____ . The revision of Merriam's unabridged masterpiece was abandoned.

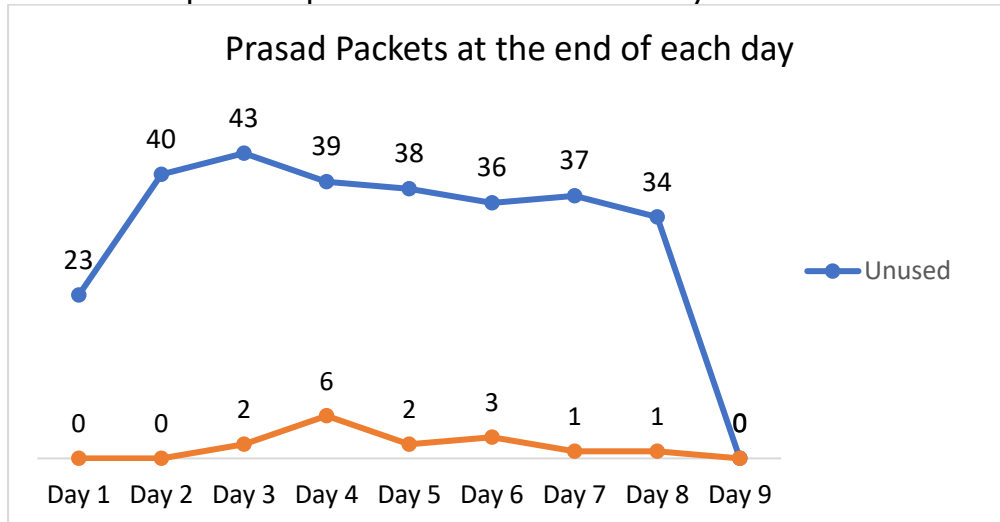
- A. Option 1
- B. Option 2
- C. Option 3
- D. Option 4



DILR

This Navratri, Goddess Durga decided to give a magical prasad to her top 50 devotees on each of the nine days that would fulfil their wishes. They were supposed to consume the packet within three days, else the prasad would vanish. For example, if a devotee received a packet of prasad on the 4th day, he/she need to consume it by the 6th day or else it will vanish by the end of the 6th day.

The graph below shows the number of unused packets of prasad and the number of prasad packets that vanished by the end of each of the 9 days.



It is known that:

- The number of people consuming the prasad on the last day of vanish is a single digit number for every day.
- The number of people consuming the prasad of previous day on day 2 was 15. The number of such persons (consuming prasad of previous day), increased by a constant number each day.
- It was mandatory for everyone to consume the prasad on the last day. As a result, there were no unused or vanished packets of prasad on the 9th day.

11. How many people who received the prasad on day 2 consumed it on the same day?

- A. 22
- B. 20
- C. 18
- D. 15

12. How many people who received prasad on day 8 consumed it on day 9?

- A. 27
- B. 29
- C. 28
- D. 26

13. What was the maximum number of people consuming prasad on the last day of any occasion?

14. What percentage of the people who received the prasad on day 6 consumed it on the same day?

- A. 40%
- B. 33.33%
- C. 50%
- D. 25%

Jalaj loves playing Minesweeper on his tablet. The game has a 10 x 10 matrix. The columns are labelled A to J from left to right, and the rows are labelled 1 to 10 from top to bottom. A cell is denoted by the combination of columns and rows. For example, G4 denotes the Gth column and the 4th row.

There's a mine located at exactly at one of the cells. If a person clicks in a cell which is in the same row, same column or on any of the diagonals in the 4 possible directions, the mine blasts and the game is over. The objective of the game is to click on all the safe cells.

The first three clicks are safe, and based on these clicks, the computer picks a cell as a mine.

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

15. What is the maximum possible number of safe cells in a game?

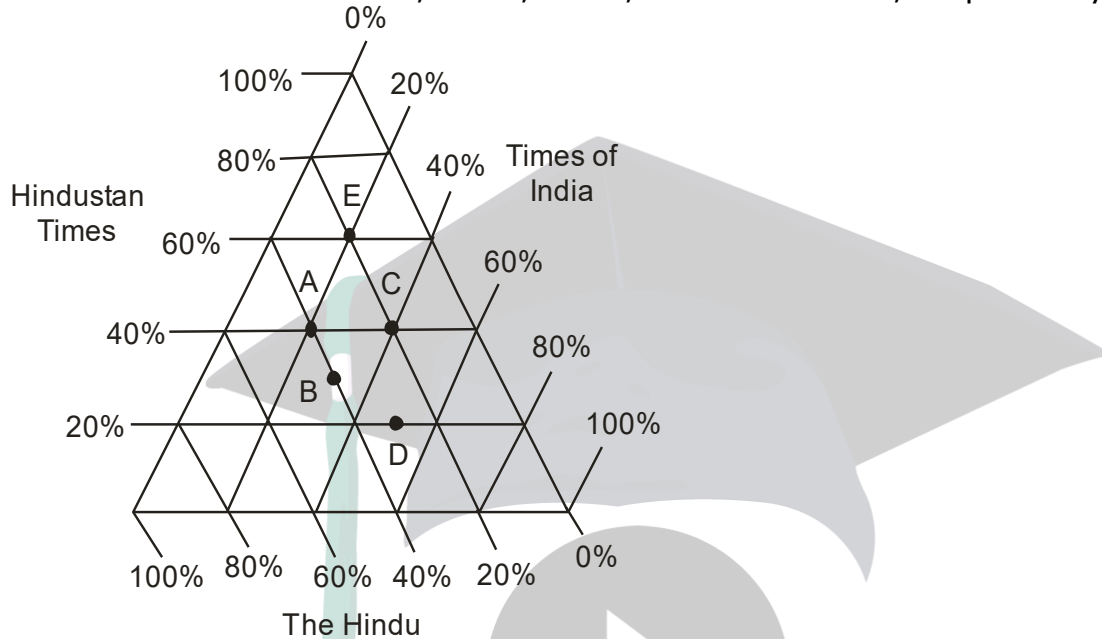
- A. 60
- B. 64
- C. 68
- D. 72

16. If the first three clicks are C2, G4 and J5, which of the following cells cannot be the location of a mine?

- A. E1
- B. D3
- C. H9
- D. F7

17. If the mine is at D8, how many of the given cells are unsafe?
C10, A4, B6, E5, F10, G3, H5

The graph gives the distribution of the circulation of three newspapers - The Times of India, The Hindu and The Hindustan Times in five localities - A, B, C, D and E of a city. The total circulation of these three newspapers in these localities is 5600, 7800, 7000, 6400 and 5000, respectively.



18. In how many localities does The Hindustan Times have a circulation of more than 1500?

19. What is the total circulation of The Hindu in the given five localities?

- A. 9450
- B. 9870
- C. 9220
- D. 9680

20. If in the next year the circulation of The Times of India in locality D increases by 20% and the circulation of The Hindu and The Hindustan Times in the same locality increases by 30% and 40% respectively, then what will be the total circulation of these three papers in locality D?

- A. 7214
- B. 6848
- C. 8128
- D. 7620

QA

21. The average run scored by a batsman in 7 innings is 55. The average runs scored by the batsman in the first 3 innings is 41; the runs scored in the fourth innings are 21 more than the runs scored in the fifth innings. The average runs scored in the sixth and seventh innings is 32.5 runs more than the average runs scored in the first three innings. Find the runs scored by the batsman in the fourth innings.

22. If

$$\log_2 x^2 + \log_3 \frac{1}{y^3} = 4$$

$$\log_2 x + \log_3 y^4 = 13$$

Find the value of $\log_4 x - \log_y 9$.

- A. $3/2$
- B. $5/2$
- C. $1/2$
- D. $1/4$

23. Find the number of natural numbers less than 6000 whose sum of digits is 8.

24. $f(n)$ is defined as a function such that, $n^2 f(n) = f(1) + f(2) + f(3) + \dots + f(n)$. If $f(1) = 2025$, find $f(2025)$.

- A. $1/2025$
- B. $1/2026$
- C. $1/1012$
- D. $1/1013$

25. The length and the width of a rectangular field are '60' units and 'a' units, respectively. Two goats are tied at the poles that are diagonally opposite to each other. The goats are tied with ropes of length equal to the width of the rectangle. Find the value of 'a' ('a' is an integer) if the minimum area that is not grazed by both the goats is 175 square units. Assume that the goats only graze the area inside the rectangle, and there is no common area that is grazed by both the goats.

- A. 21
- B. 35
- C. 25
- D. 28

26. In a zoo, there are some tigers, some deer, and some panthers. The number of deer is 3 times the total number of tigers and panthers. Which of the following could be the total number of these animals in the zoo?

- A. 42
- B. 66
- C. 84
- D. 51

27. Dinesh formed a quadrilateral PQRS and drew a circle inside it such that the circle touches all four sides of the quadrilateral. If the lengths of PQ, QR, and PS are 164 mm, 226 mm, and 180 mm, respectively, find the length (in mm) of the remaining side.

28. Amit has invested an amount A in the ABC bank for three years, in which he will get simple interest for the first 2 years and then compounded interest. Instead, if he had invested the same amount at the same rate of interest, but the ratio and order of the time period of SI to that of CI are reversed, then the difference in the interest earned at the end of three years is Rs. 3300. Find the amount A when the rate of interest is 20%.

- A. 68750
- B. 67500
- C. 65000
- D. 62500

29. $|x - 1| + |x - 3| + |x - 7| = 10$

The number of integral solutions for the above equation is

30. Two boats, X and Y, start travelling from point M simultaneously. The ratio of their speeds is 5:3 respectively, and the speed of the stream is 5 km/h. Boat X goes a certain distance and returns to the original point in 6.25 hours, and boat Y goes the same distance and returns to the original point in 11.25 hours. Find the distance between point M and boat Y when boat X returns to the original point M.

- A. 62.5 km
- B. 50 km
- C. 45 km
- D. Either 50 km or 62.5 km