

VARC

Read the passage below and answer the questions that follow:

Dust controls numerous atmospheric and surface processes on Mars. In the atmosphere, suspended dust can lead to substantial temperature variations, can perturb atmospheric dynamics, and can lead to local, regional, and even global dust storms. On the surface, seasonal and post-storm dust settling has been tied to the occurrence and modification of surface features such as slope streaks and recurring slope lineae. The role of dust in controlling the temperature of the atmosphere and surface makes it a central part of the weather and climate system. In addition, dust might affect Mars' past and current habitability through the exchange and distribution of nutrients and shielding of ultraviolet radiation. Dust has a direct effect on the exploration of Mars as well, by affecting remote sensing observations, surface hardware, crew operations, and the power efficiency of solar panels; in particular, large-scale dust storms and planet-encircling dust events can severely affect operations on Mars. The National Aeronautics and Space Administration's most recent Mars Exploration Program specifically calls out the need for a better understanding of the dynamics and interactions of Mars' dusty surface and atmosphere in the context of sustainable, future exploration.

Most likely, martian dust is the result of aeolian processes eroding exposed bedrock over geologic time frames. Past work established that wind stress exerted by (i) "vortical" processes, such as convective vortices and dust devils, and (ii) "nonvortical" processes, such as (straight-line) wind gusts, convection cell fronts, and meridional circulation, is responsible for the bulk injection of dust into the atmosphere. Dust particles are difficult to lift directly into the thin Martian atmosphere due to cohesive forces, especially if they do not form dust aggregates. However, the saltation of larger grains is easier to initiate on Mars at wind shear velocities beyond the "static threshold". In turn, saltating sand particles can directly and efficiently inject finer-sized particles into the atmosphere upon reimpact on the surface.

Early modeling efforts and wind tunnel experiments suggested that the static threshold of ~ 100 - to ~ 200 - μm -sized martian grains is located at wind shear velocities between ~ 1.5 and ~ 2 m/s, which can be converted to wind velocities between ~ 15 and ~ 22 m/s at an altitude of ~ 1.5 m above the surface, assuming an average aerodynamic surface roughness and a convectively stable atmosphere. However, the atmospheric data collected by missions on Mars seemed to suggest that winds do not—or only rarely—exceed this threshold, despite frequent observations of active aeolian surface processes from orbit, a discrepancy termed the "martian sand transport puzzle". More recent in situ measurements on Mars—most prominently by the InSight lander (Interior Exploration using Seismic

Investigations, Geodesy and Heat Transport) and Perseverance rover—showed that wind velocities can be substantially higher and that sand and dust transport can be initiated at lower wind shear velocities than anticipated earlier.

1. The "martian sand transport puzzle" mentioned in the passage represents a conflict between:

- A. observations of frequent dust storms from orbit and the lack of dust measured on the surface by landers.
- B. theoretical models predicting high wind velocity thresholds for sand movement and the lower wind speeds previously measured on Mars.
- C. the cohesive forces affecting fine dust particles and the shear forces required to initiate saltation of larger grains.
- D. wind tunnel experiments conducted on Earth and the aerodynamic principles governing the thin Martian atmosphere.

2. Why does the author mention "cohesive forces" in the second paragraph?

- A. To explain why the saltation of larger grains is easier to initiate than the lifting of fine dust.
- B. To argue that Martian dust is fundamentally different from sand found on Earth.
- C. To introduce the concept of dust aggregates as the primary form of Martian surface material.
- D. To illustrate the primary mechanism by which wind gusts inject dust into the atmosphere.

3. Which of the following scenarios is most analogous to the process of dust injection via saltation as described in the passage?

- A. A strong wind blowing fine powder off a completely flat and smooth surface.
- B. A swift river current washing away silt from the riverbed.
- C. A billiard player using the cue ball to scatter a tightly packed rack of other balls.
- D. A large wave crashing on a beach, pulling fine sand back into the ocean as it recedes.

4. Which of the following, if discovered to be true, would most seriously weaken the proposed resolution to the "martian sand transport puzzle"?

- A. It is determined that the aerodynamic surface roughness on Mars is significantly lower than the average value used in models
- B. Scientists find that dust devils are far more effective at lifting sand than previously believed, even at low wind speeds.
- C. New orbital imagery shows that active sand transport occurs even in regions where rovers have measured consistently calm conditions.

D. Further analysis reveals that the wind sensors on the InSight and Perseverance missions were miscalibrated, consistently over-reporting wind speeds.

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. Many of us still know something about these treatments: studies estimate that as much as 80 per cent of the world's population still use traditional plant- and animal-based medicines.

2. We treated insomnia with lettuce and halitosis with parsley – according to a 10th-century cookbook from Baghdad, which devotes an entire chapter to the humoral properties of different vegetables.

3. We treated pain with willow bark and terminated pregnancies with abortifacient herbs.

4. At one point or another, we all knew something about how to heal ourselves using the plants and animals that surround us, at least somewhat.

5. Lately, we often relegate this kind of intelligence to laboratories.

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

There was a moment during Scotland's match against South Africa, as tempers frayed and testosterone flowed, that harked back to rugby union's bygone era. Damian de Allende pinned an elbow to Ben White's head. Darcy Graham and Cheslin Kolbe grabbed each other's necks. The big men came steaming in. And while what the Daily Record called a "furious World Cup rammy" soon fizzled out, it reflected a basic tenet of collision sports: win the physical battle, win the match. Some players, however, believe this goes even further. And that when a fight breaks out on the pitch, winning it can change the momentum of a match. Perhaps even a series.

A. A tense World Cup rugby clash between Scotland and South Africa saw tempers flare, highlighting the enduring belief that physical dominance in contact sports secures victory.

B. Individual scuffles in rugby symbolize outdated aggression that rarely affects match outcomes, despite occasional nostalgia for the sport's past.

C. Moments of on-field fighting in rugby are believed not only to influence immediate physical battles but also to shift match or series momentum.

D. The brief fight in a World Cup rugby match reflected a decline in sportsmanship, with physical contests seen as detrimental to team performance.

7. 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: The juxtaposition between his supposed arrested development and his numerical facility made his mathematical feats even more impressive.

Paragraph: On 25 November 1915, the American newspaper The Review published the extraordinary case of an 11-year-old boy with prodigious mathematical abilities. ____ (1) _____. Perched on a hill close to a set of railroad tracks, he could memorise all the numbers of the train carriages that sped by at 30 mph, add them up, and provide the correct total sum. ____ (2) _____. What was remarkable about the case was not just his ability to calculate large numbers, but the fact that he could barely eat unassisted or recognise the faces of people he met. ____ (3) _____. 'How can you account for it?' asked the article's author. ____ (4) _____. The answer took the form of a medical label: the boy was what 19th-century medicine termed an 'idiot savant'.

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

8. 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. While a new Alzheimer's drug, Leqembi, has recently been approved by the FDA, it is available only for a small portion of people living with dementia.
2. People living with dementia also require significantly more hours of care than older adults without dementia.
3. Direct medical spending for dementia is relatively small because there aren't many treatments available.
4. While many elderly adults eventually need help with activities of daily living, such as eating and bathing, people living with dementia often need constant or near-constant supervision.

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. For the first couple of centuries after the invention of the printing press, reading remained largely an elite pursuit.
2. It was an age of monumental works of thought and knowledge.
3. People alive at the time understood that something momentous was going on.
4. But by the beginning of the 1700s, the expansion of education and an explosion of cheap books began to diffuse reading rapidly down through the middle classes and even into the lower ranks of society.

5. Suddenly, it seemed that everyone was reading everywhere: men, women, children, the rich, the poor.

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: Recovering alcoholics notwithstanding, I enjoyed the collective sense of what was meant by a night out.

Paragraph: I miss the ubiquity of a rambunctious drinking culture, whether I participated in it or not, at whatever level. ____ (1) ____ . These are not the rantings of someone in her forties assuming that there's no party because she wasn't invited. This is a wave of moderation. ____ (2) ____ . The new language of sobriety is particularly ill-suited to writers. ____ (3) ____ . Mocktails are etymologically and financially silly. ____ (4) ____ . And there's nothing so tedious as a conversation about abstinence.

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



DILR

In an Avenger fan club which has 3000 kids, a survey was conducted for their liking of Captain America, Thor or Iron Man. The ratio of boys to girls in the club is 5:3. On the day of the survey, 75 boys and 75 girls were absent. The results obtained from the remaining kids were:

- Each kid liked at least one superhero.
- 50% of the boys liked Captain America, while 50% of the girls liked Thor.
- 3% of the boys liked all three superheroes, while this percentage was 4% among girls.
- The number of boys liking only Thor was 50% more than the number of boys liking only Iron Man.
- The number of girls liking only Captain America was the same as the number of girls liking only Iron Man.
- The percentage of boys liking only Captain America and Thor was 7%, only Thor and Iron Man was 5%, and only Iron Man and Captain America was 9%. The respective percentages in girls were 8%, 6% and 6%.

11. *What is the ratio of boys liking Iron Man to those liking Thor?*

- A. 2:3
- B. 5:6
- C. 7:10
- D. 21:25

12. *What is the number of girls who like Iron Man?*

13. *What is the difference between the number of only Captain America fans and only Thor fans?*

14. *What percentage of the users surveyed like all three superheroes?*

- A. 3.37%
- B. 3.20%
- C. 3.50%
- D. 3.44%

15. *How many of the surveyed kids like Captain America?*

- A. 1245
- B. 1270
- C. 1310
- D. 1320

Six friends, Parag, Harsh, Roopa, Azam, Siddhi, and Edwin, are natives of different cities from among Patiala, Hisar, Rourkela, Agra, Siliguri and Erode. Each of them works in a different city from among Rome, Auckland, Istanbul, Seoul, Edinburgh and Delhi, with a different annual CTC (in Rs. lakhs) out of 20, 25, 30, 35, 40 and 45. It is also known that:

For each person, the initials of name, native place and city in which they work are different.

- Azam works in Seoul.
- Neither of the persons who work in Auckland and Istanbul have the highest or the lowest CTC. The sum of the CTC of these two persons is equal to the sum of the CTC of the persons who are natives of Hisar and Patiala.
- The CTC of Edwin, who works in Rome, is less than the CTC of the person from Agra.
- The person with the lowest CTC is from Siliguri and works in Delhi.
- The CTC of the person working in Istanbul is Rs. 35 lakhs.
- The CTC of each of Siddhi, Parag, Azam and the person who is from Agra is less than the CTC of Roopa.

16. What is the sum of the CTC of the persons who are natives of Erode and Rourkela?

- A. Rs. 65 Lakhs
- B. Rs. 70 Lakhs
- C. Rs. 75 Lakhs
- D. Cannot be determined

17. Who works in Istanbul?

- A. Roopa
- B. Siddhi
- C. Parag
- D. Harsh

18. What is the CTC of the person who works in Seoul?

- A. Rs. 35 Lakhs
- B. Rs. 30 Lakhs
- C. Rs. 25 Lakhs
- D. Rs. 20 Lakhs

19. What is the CTC (in Rs. Lakhs) of Siddhi?

20. Which of the following additional information will enable us to uniquely determine the hometown, working city and CTC of each of them?

- A. The CTC of the person working in Rome is less than that of the person who is from Rourkela.
- B. The person who is from Rourkela earns more than the person who is from Patiala.
- C. The person who is from Erode earns less than the person who is from Rourkela.
- D. The person who is from Hisar earns more than the person who is from Erode.

QA

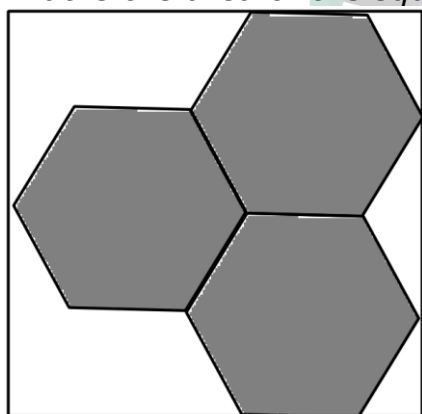
21. Find the sum of all the possible values of p such that $p^{48} - p^{33}$ has the unit's digit as 2, where $20 \leq p \leq 30$.

22. How many values of x satisfy the system of equations $|2-y| = 3$ and $2(|x|-3) = y+1$?

23. Sarika takes 27 seconds to ride an escalator when walking at her normal speed in the same direction. When she doubles her speed in the same direction, it takes her 18 seconds. If Sarika stands still on the escalator, how long will it take her to complete the ride?

- A. 36 seconds
- B. 48 seconds
- C. 45 seconds
- D. 54 seconds

24. In the given figure, the area of each regular hexagon is 12 sq cm. What is the area of the square?



- A. 56 sq cm
- B. 54 sq cm
- C. 48 sq cm
- D. 45 sq cm

25. A person had borrowed some money at the rate of 10% interest. At the end of the first year, he paid Rs 10000, and the rest of the amount was paid in the second year. The rate of interest in the second year was 8%. The ratio of the interest which he paid in the first year to that in the second was 3:2. Find out the amount that was borrowed.

- A. Rs 45000
- B. Rs 40000
- C. Rs 37500
- D. Rs 52500

26. For natural numbers a , b , and c , let $f(x) = ax - 3$ and $g(x) = x^b + c$, where $x \in R$. If $(fog)^{-1}(x) = (\frac{x-7}{2})^{1/3}$ then $(gof)(b)$ is equal to

27. The probability of success in an event is 40%. What is the probability of at least 1 success in 4 such events? (Rounded off to the nearest integer)

- A. 80%
- B. 82%
- C. 85%
- D. 87%

28. Ramya had kept three jugs, A, B and C, in her kitchen that contained 400 ml each of carrot, papaya and orange juice respectively. Her son poured 100 ml of juice from jug A to B, mixed the contents and poured 100 ml of the mixture into jug C. He then poured 100 ml of the mixture from jug C to jug A. What is the ratio of the final quantity of orange juice in jug A to that of papaya juice in jug C?

- A. 6:5
- B. 5:4
- C. 4:3
- D. 3:2

29. If $2^x = 4^y = 8^z$ and $xyz = 288$, evaluate $\frac{1}{2}x + \frac{1}{4}y + \frac{1}{8}z$

- A. $\frac{11}{96}$
- B. $\frac{17}{144}$
- C. $\frac{7}{72}$
- D. $\frac{5}{36}$

30. If points A (4, 3) and B (x, 5) are on the circle with centre O (2, 3), find the value of x.

MBA KARO