

Dos and Don'ts for the General Science & Ability Paper

(M) (T) (M) (T) (F) (S) (S)

DATE: _____

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STAR

GENERAL SCIENCE & ABILITY

Part II

SECTION: I

Q2

(a) Differentiate between a star and a planet. Briefly describe the life cycle of a star from a nebula to a black hole.

ANSWER:

DIFFERENCE BETWEEN STAR AND PLANET:

STAR

PLANET

DEFINITION

3. A star is a huge glowing ball of hot gases that produces its own light and heat through nuclear fusion. A planet is a large round body that does not produce its own light but reflects the light of a star. Make your answers look scientific, not just theoretical. Use flowcharts and diagrams wherever they add clarity. Neatness matters – keep your handwriting clean, avoid cutting or overwriting.

5. Mind your spelling and grammar – while GSA doesn't deduct marks for these, your expression leaves an impression. Stars are very large. Planets are much smaller than stars.

6. In the ability portion, explain analytical ability questions in words. For a 5 mark part, show all steps and provide clear explanations. A star orbits the center of a galaxy. A planet revolves around a star.

Good luck for CSS 2026 – you're going to ace it, in sha Allah! ★

NEIGHBOURHOOD CLEARING

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A Star does not need to clear any neighbourhood.

A planet must have cleared its neighbourhood around its orbit.

NUCLEAR FUSION

A star performs Nuclear fusion to reflect light and heat.

A planet does not perform any Nuclear fusion and cannot produce its own light and heat.

EXAMPLES

- Sun
- Proxima Centauri

- Mars
- Earth

(B)

LIFE CYCLE OF A STAR FROM NEBULA TO A BLACKHOLE :

(i) Nebula :

A star begins as a nebula, a large cloud of gases and dust combine in space to form nebula.

The Gravity pulls these gases and dust together starting the formation of a star.

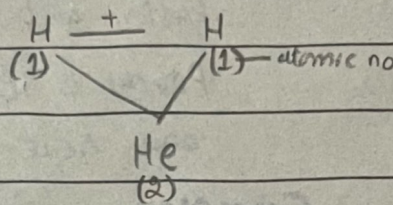
The nebula condenses into a protostar, which gradually heats up.

(3)

(ii) Main Sequence Stage

A Star spends 90% of its life in main Sequence Stage.

In this stage Hydrogen elements are present in abundance, so two Hydrogen atoms fuse through Fusion reaction and form Helium.



Million of Hydrogen atoms fuse together to form million of Helium atoms, which produces light and energy also.

This is the longest and more stable stage of a star's life.

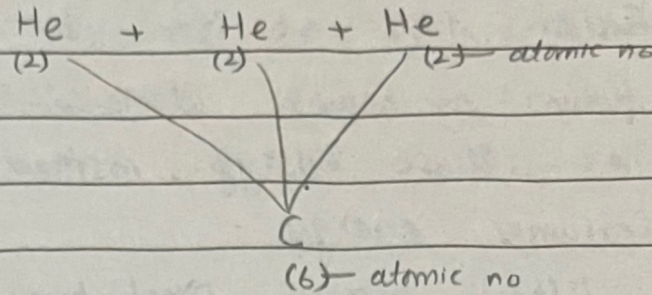
(iii) Triple Alpha Stage / Red Giant Stage / Helium fusion stage:

After main Sequence Stage, the star then enters into triple alpha stage.

The Hydrogen is used in main - Sequence Stage now Helium is present in this stage.

Now three Helium atoms fuse together to form Carbon atom.

More heat is released in this stage than the previous one.



The star expands into a Red giant. It will become closer to the planets and will evaporate the water from the planets which would make life difficult on planets. i.e. when star (Sun) goes into its triple alpha stage the life on earth would become impossible.

(iv) The carbon burning stage

In carbon burning stage the carbon nuclei fuses at very high temperature to form Neon.

(v) Neon burning stage:

The neon nuclei fuses to form oxygen. ~~oxygen will form neon.~~

(vi) The oxygen burning phase:

The oxygen nuclei fuse to form Silicon.

(vii) Silicon burning stage:

Silicon fuses into iron, forming an iron core.

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Fusion stops at iron because the fusion of heavier elements does not release energy, instead, it consumes energy.

Without energy production, the star can no longer support itself against gravity, the core collapses leading to Supernova (for massive stars, the medium or small stars from Blue dwarf $\rightarrow$ white dwarf and finally Black dwarf).

(viii) Black hole:

A black hole formed after a Supernova of a very massive star. The core collapses under gravity and its density becomes extremely high. Gravity becomes so strong that not even light can ^{not} escape.

The Black holes grow by absorbing matter or by merging with other black holes.

Conclusion:

Nebula $\rightarrow$ Protostar $\rightarrow$ Main Sequence stage $\rightarrow$ Triple alpha stage $\rightarrow$ The Carbon burning stage $\rightarrow$ Neon burning stage $\rightarrow$ Oxygen burning stage $\rightarrow$ Silicon burning stage $\rightarrow$ Black hole.

Q21
(C) Define Global warming. Explain the mechanism of Greenhouse effect and List (3) major greenhouse gases. (6)

ANSWER:

GLOBAL WARMING:

Global warming is the gradual increase in the earth's average temperature due to accumulation of greenhouse gases in the atmosphere, which trap heat.

Mechanism of Green house effect:

The green house effect is a natural process where certain gases in the atmosphere trap heat, acting like a glass roof of greenhouse.

i- Solar radiation enters the atmosphere:

The earth atmosphere allows most incoming Solar radiation (visible light) from the sun to pass through and reach the surface.

ii- Absorption and Re-radiation:

The earth surface (land and oceans) absorbs this energy and warms up. It then radiates this energy

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back towards space as infrared (heat) radiation.

iii- Heat trapping by Greenhouse Gases:

As this infrared radiation moves up through the atmosphere, some of it is absorbed by greenhouse gas molecules such as Carbon-dioxide, methane and water vapour.

iv- Warming the Planet:

These gases re-emit the absorbed heat in all directions, including back down towards the earth's surface and lower atmosphere.

This process traps heat and keeps the average temperature of the earth livable.

Human activities:

Human activities increase the concentration of these gases, leading to more heat being trapped and an overall rise in global temperature occurs, known as global warming.

THREE MAJOR GREENHOUSE GASES:

(8)

i. Carbon-dioxide (CO_2)

Carbon dioxide is the major cause of global warming as it is the largest contributor to the greenhouse effect. It mostly emits from burning of fossil fuels for cars, factories, electricity and from deforestation.

ii- Methane (CH_4)

Methane is very powerful at trapping heat. It comes from cows, landfills (trash dumps), and drilling for natural resources.

iii. Nitrous oxide (N_2O):

Nitrous oxide is released from agricultural activities (like using fertilizers), industrial activities, as well as the burning of fossil fuels and biomass.

(9)

SECTION II

Q 8.

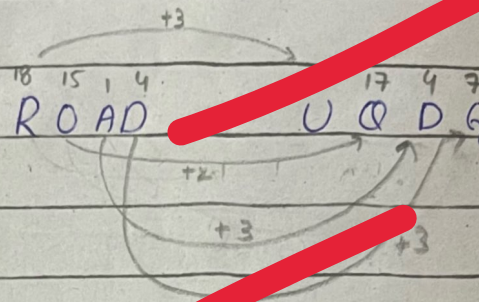
(a)

Given:

ROAD code = UQDG

Find:

LAKE code = ?

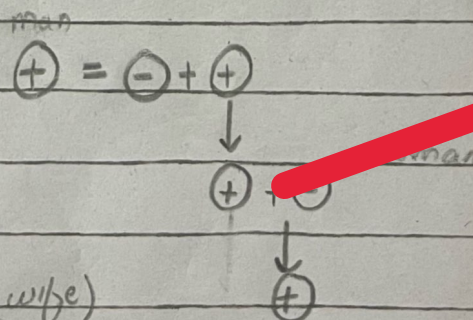
Sol:Result:

LAKE = OCNH

pattern is = +3, +2, +3, +3

(b)

A man tell a women, "The Son of my Sister's husband is the father of your son". How is the woman related to the man?



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(10)

The woman is _____ wife of the man _____.

(c)

i. 4, 12, 6, 18, 9, 27, 135
 $4 \times 3 = 12$ $\frac{12}{2} = 6$ $6 \times 3 = 18$ $\frac{18}{2} = 9$ $9 \times 3 = 27$ $\frac{27}{2} = 13.5$

The pattern is Multiply (3) and then divide by 2.
 $\times 3, \div 2, \times 3, \div 2, \times 3, \div 2$

ii. 1, 2, 6, 24, 120, 720
 $1 \times 2 = 2$ $2 \times 3 = 6$ $6 \times 4 = 24$ $24 \times 5 = 120$ $120 \times 6 = 720$

The pattern is multiplying with 2, then 3, then 4, then 5, then 6.
 $\times 2, \times 3, \times 4, \times 5, \times 6$

(d)

Given:

P, Q, R, S, T
 $R < P < Q$
 $Q < S < T$

Shortest = 150 cm

Tallest = 180 cm

Find:

Third tallest = ?

Maximum possible range of their height?

Sol:

$R < P$
 $P < Q$
 $Q < S$
 $S < T$

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⑪

Tall $\rightarrow$ Short

$$T > S > Q > P > R$$

$$T = \text{Tallest} = 180 \text{ cm}$$

$$R = \text{Shortest} = 150 \text{ cm}$$

$$Q = \text{Third tallest}$$

$$\text{Range} = 180 - 150 = 30$$

Result:

Q = Third tallest

Range of their heights = 30

Q6 =

(a)

Given:

A fill a tank in 10 hours

B fill a tank in 15 hours

C empty the full tank in 30 hours

Find:

If all three pipes opened simultaneously
how much time will take to
full the tank = ?

Sol:

$$A = \frac{1}{10}$$

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$$B = \frac{1}{15}$$

$$C = -\frac{1}{30}$$

$$A+B-C = \frac{1}{10} + \frac{1}{15} - \frac{1}{30}$$

$$= \frac{3+2-1}{30}$$

$$= \frac{4}{30} = \frac{2}{15}$$

$$\text{To Full 1 tank} = \frac{1}{\frac{2}{15}}$$

$$= 1 \div \frac{2}{15}$$

$$= 1 \times \frac{15}{2}$$

$$= 7.5 \text{ hr}$$

Result:

To full a tank while all the three pipes A, B, C are open it would take 7 hours and 30 mins.

(b)

Given:

Ratio of Salaries

$$X:Y:Z = 4:5:7$$

(13)

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$$y = 5 + 10\% \text{ of } 5$$

$$2 = 7 - 25\% \text{ of } 7$$

New total Salary = 169500 Rs

Find:

Find original Salary of x

Sol:

$$y = 5 + \frac{10}{100} \times 5$$

$$y = 5 + \frac{1}{2} \quad \text{or}$$

$$y = 5 + 0.5 = 5.5$$

$$2 = 7 - \frac{25}{100} \times 7$$

$$2 = 7 - 1.75$$

$$2 = 6.25$$

$$X + y + 2 = 4 + 5.5 + 6.25$$

$$= 15.75$$

$$X = \frac{4}{15.75} \times 169500$$

$$X = 43047.619$$

Result:

$$X = 43047.619$$