READING PASSAGE 1

Questions 1 – 13 are based on Reading Passage 1.

THE LIFE CYCLE OF A STAR

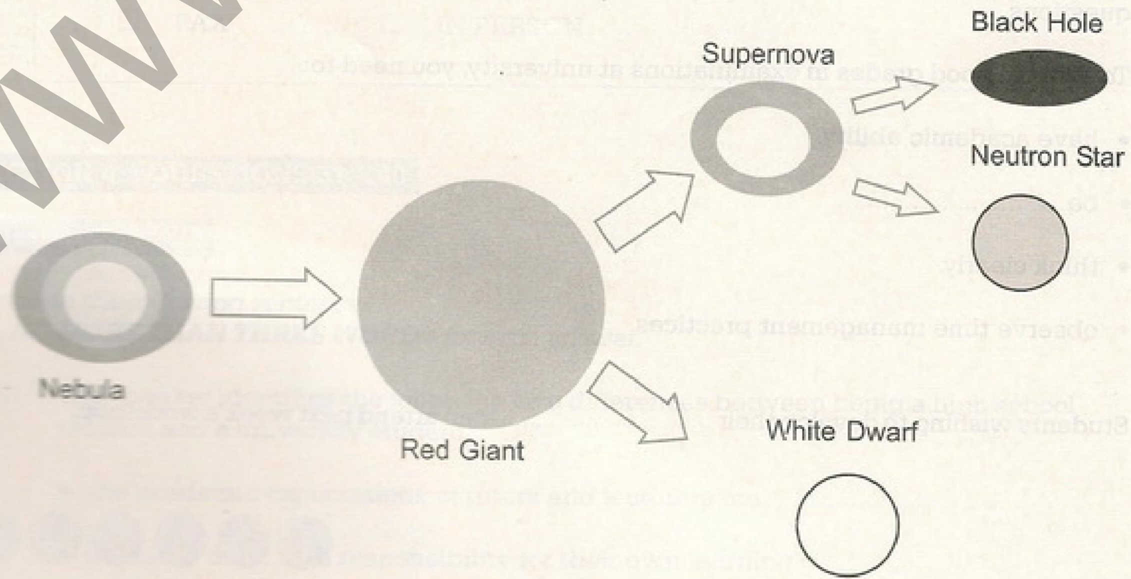
It has been conservatively estimated that there are some 10,000 billion, billion stars in the universe. It is difficult to know the exact age of a star (astronomers have identified stars as young as 25,000 years old and others are thought to be over 10 billion years old), but what astronomers do know is that there are many different kinds. How each star is formed, and its mass, influences its type and longevity.

A star is born in a nebula, which is a giant cloud of gas and dust. The larger the amount of matter that is in the nebula, the greater the mass of the star that is created. Inside these nebulae are dense areas of gas, which, due to their density, have a stronger gravitational pull than the rest of the nebula. Gradually, gravity drags the gas in the nebula together and it begins to spin and become increasingly hotter. Once the temperature reaches 15,000,000°C, nuclear fusion occurs in the centre of the cloud, and it begins to glow brightly. It stabilizes at this temperature, contracts slightly and becomes what is known as a main sequence star (an example of this is our own Sun). It can remain in this stage for millions or billions of years.

As it glows, hydrogen in the centre (through the nuclear fusion) becomes helium. Eventually the hydrogen supply in the core diminishes and the core of the star becomes unstable, contracting more. However, the outer parts of the star (which are still mainly hydrogen) expand and cool, and in doing so, the star starts to glow red. It is at this stage that the star becomes a red giant. It is anticipated that it will take the Sun another 5 billion years to reach this stage. By then it will have grown large enough to engulf the three closest planets (Mercury, Venus and Earth) and glow 2,000 times brighter than it currently does.

Exactly how a star will react in the red giant phase depends on its mass. Throughout the red giant phase, the hydrogen in the outer parts carries on burning, and the centre gets hotter and hotter. On reaching 200,000,000°C, the helium atoms fuse forming carbon atoms. The remainder of the hydrogen explodes and forms a ring around the core called a planetary nebula.

With medium-sized stars, once the final helium atoms have fused into carbon atoms, the star starts to die. The gravitational pull leads to the last of the star's matter collapsing inwards and compacting to become extremely dense. A star like this is called a white dwarf. It will shine white-hot until the remaining energy (thermal energy trapped in its interior) has been exhausted after which it will no longer emit light. This can take in excess of several billion years. It is then termed a black dwarf (a cold, dark star, perhaps replete with diamonds) and remains in that stage forever.



When the larger red giants (massive stars) collapse, which happens in an instant, so much planetary nebula is created that this gas and dust can be used as building material for planets in developing solar systems. In addition, with massive stars, as the temperature increases, the carbon atoms get pulled together to form increasingly heavier elements like oxygen, nitrogen and finally iron. Once this happens, fusion ceases and the iron atoms begin absorbing energy. At some point in the future, this energy is released in a huge explosion called a supernova. A supernova can have a core temperature of up to 1,000,000,000°C and the explosion can light up the sky for weeks, outshining an entire galaxy. Astronomers believe that Earth is made up of elements formed from the inside of stars, in particular red giants that exploded as supernovas. These massive stars have an average life span of one million years.

After becoming a supernova, the remaining core of a massive star that is 1.5 to 4 times as massive as the Sun becomes a neutron star. It starts to spin and often emits radio waves. If these waves occur in pulses, the neutron star is referred to as a pulsar. When a massive star has eight or more times the mass of the Sun, it will remain massive after the supernova. It has no nuclear fusion supporting the core and becomes engulfed by its own gravity. This results in a black hole, which sucks in any matter or energy that passes close to it. The gravitational field of a black hole is powerful enough to prevent the escape of light and is so dense that it cannot be measured. The phrase 'black hole' originated from the physicist John Archibald Wheeler; before this, black holes were known as 'frozen stars'. Wheeler came up with this name two years before the proof of the existence of the first black hole, X-ray binary star Cygnus X-1, in 1971. Astronomers think that there may be a black hole at the centre of each galaxy.

The life cycle of a star is really that – the materials from an exploded star mix with the hydrogen of the universe. This mixture in turn will be the starting point of the next star. The Sun is a case in point, containing the debris from numerous other stars that exploded long before the Sun was born.

Questions 1 – 6

*Different stages and types of stars are mentioned in Reading Passage 1. Choose **ONE** of the types or stages (**A – H**) from the box below which best matches the descriptions (**Questions 1 – 6**). Write your answers in boxes 1 – 6 on your Answer Sheet.*

NOTE: you may use any answer more than once.

A	nebula	E	black dwarf
B	main sequence star	F	supernova
C	red giant	G	neutron star
D	white dwarf	H	black hole

		Answer
Example:	hottest, brightest point of a star	F
1	the Sun	....
2	birthplace of a star	....
3	a dying star	....
4	sometimes has pulsating waves	....
5	its size is immeasurable	....
6	its supply of energy has run out	....

*Complete the sentences using **NO MORE THAN THREE WORDS** for each answer. Write your answers in boxes 7 – 13 on your Answer Sheet.*

7 Hydrogen will turn to helium after .... occurs.

8 The colour of the red giant is formed as the .... becomes smaller and the outer areas cool.

9 At 200,000,000°C the star's helium atoms fuse into carbon atoms, and then the star ....

10 Unlike small and medium-sized stars, large stars .... quickly.

11 A black hole's .... stops light from being emitted.

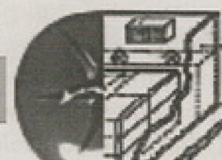
12 Astronomers knew about .... before they were able to confirm their existence.

13 Planets and stars are likely to consist of .... from exploded celestial bodies.

READING PASSAGE 2

***Questions 14 – 27** are based on Reading Passage 2.*

TOMATO RIPENING



Tomatoes give off minute quantities of ethylene gas which is active in starting the natural ripening process. If left to nature, however, the tomatoes ripen in a random way. The trickled ethylene gas process of tomato ripening consists of exposing the tomatoes to a low concentration of ethylene gas under controlled temperature conditions in a special tomato-ripening room. This treatment initiates and controls the speed of the natural ripening and colouring process in the tomatoes.

Controlled ripening and colouring enables the grower to market tomatoes of more uniform colour and quality than is possible with green or field-ripened produce. Timing of harvesting and marketing may, within limits, also be regulated by the use of controlled ripening and colouring in order to achieve maximum returns and make the best use of labour and equipment.

Ripening Conditions

All fruit must be mature green at harvest for controlled ripening to be successfully carried out. Relative humidity does not appear to be of great importance in the tomato-ripening process. Little moisture loss from the tomatoes occurs during the ripening process due to the relatively impermeable nature of the tomato skin. Ripening time will depend on the ripening temperature range; however, ripening temperatures above 24°C will result in poor colour development with yellow or orange fruit rather than red. The heating and cooling capacity should be such that the tomatoes can be brought to the recommended ripening temperature within 24 hours.

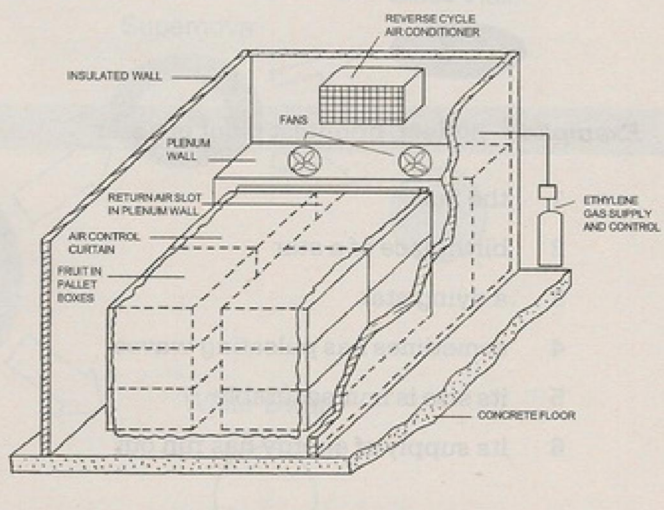


Figure 1: Tomato-Ripening Room

General Arrangement

A typical arrangement for a tomato-ripening room is shown in Figure 1 with the essential components of the system identified.

Room Size and Construction

For efficiency and convenience in operation, on-farm tomato–ripening rooms are usually sized to accommodate the normal daily tomato pick during the peak harvest time. The room capacity is generally in the range of two to ten tonnes of tomatoes; however, larger rooms may sometimes be installed. Since the average ripening time is three or four days, the provision of multiple rooms on the one farm is generally desirable.

Air Circulation and Ventilation System

Fan-forced air circulation is required for adequate and uniform temperature control and ethylene gas distribution in the ripening room. An air circulation rate of two room air volumes per minute is recommended for good results. This is equivalent to around 480 cubic metres of air per hour per tonne of tomatoes. At the recommended heating or cooling capacity of 0.6 to 1.2kw per tonne of tomatoes, this gives an air temperature differential of 3.5 to 7° C across the heating or cooling system. These high air circulation rates are necessary to limit variations in temperature in different parts of the room to acceptable levels and to achieve an adequate rate of heating or cooling of the tomatoes.

The ventilation system circulates the room air continuously, introducing a small proportion of fresh air and exhausting a similar amount of air at the same time. This prevents a build up of ethylene gas in the room and also removes carbon dioxide produced by the fruit during respiration. If this carbon dioxide were allowed to build up to too high a level in the room atmosphere, it would interfere with the ripening process.

Temperature Control System

The temperature of tomatoes in the ripening room has a great influence on the ripening process. In fact, the product heat load usually represents around 80% of the total heat load. The remainder is due to heat transmission through the external walls of the room and the fresh air exchange rate. In some cases, both heating and cooling are required to maintain the room temperature within the required range. The time required for ripening can be reduced to some extent by increasing the temperature. Reverse cycle air-conditioners are successfully used for both heating and cooling in tomato-ripening rooms where humidity control does not appear to be of great importance.

Supply and Control Systems

With the trickled ethylene gas system, a low concentration of ethylene gas is maintained in the ripening room atmosphere by a continuous small, controlled flow of gas of about 10 parts per million (ppm). Ethylene gas is supplied as bottled gas under high pressure and it is released into the ripening room through a pressure regulator and metering system.

The outlet gas pressure is adjusted by means of the gas pressure regulator and the gas flow rate is then adjusted by the fine needle valve. A normally closed solenoid valve in the ethylene gas supply line ensures that gas is not discharged into the room unless the fans and ventilation system in the ripening room are operating. The solenoid valve is electrically interlocked with the operation of the ventilation system fans and is also controlled by an air flow switch. A gas control thermostat is used to measure when gas should be supplied to the room. The temperature-sensing element of this thermostat is pushed into a tomato so that it senses the pulp temperature of the tomatoes in different parts of the room.

Provided that the ethylene gas supply and control systems are correctly arranged, the ethylene gas concentration in the room will not exceed the low level which is sufficient for ripening but is far below the explosion hazard level. Under these conditions, tomato-ripening rooms installed on farms and used only for ripening fruit produced by the owner have been approved by certain Electricity Commissions as not constituting a hazardous location.

(Adapted from an article written by Brian Hesse for the 'Electrofarming Notebook' for The South East Queensland Electricity Board, October 1989.)

Questions 14 – 16

Complete the table in the box below.
*Use **NO MORE THAN THREE WORDS OR A NUMBER** for each answer. Write your answers in boxes 14 – 16 on your Answer Sheet.*

Requirements for successful use of the Ethylene Gas System for Tomato Ripening:
14 Tomatoes should be picked when they are ....
15 Room temperature must be .... °C.
16 Optimal ripening temperature for fruit must be achieved ....

Questions 17 – 20

Complete the flow chart below using information from the text.
*Use **NO MORE THAN THREE WORDS** for each answer. Write your answers in boxes 17 – 20 on your Answer Sheet.*

Tomatoes are harvested
⇓
Placed in ripening room to regulate ripening & (17) .... ⇐ Room air circulation limits temperature (18) ....
⇐ Air conditioning controls temperature & humidity
⇓
Ideal temperature is reached ⇐ Ventilation system controls the amount of (19) .... & (20) ....
⇐ Ethylene gas supplied in pressurised form
⇓
Tomatoes are ripened & removed
⇓
Tomatoes are marketed

Questions 21 – 27

Below is a list of assumptions.
Using the information given in the passage, choose:

TRUE	*if it is a reasonable assumption*
FALSE	*if it is NOT a reasonable assumption*
NOT GIVEN	*if it is not possible to make the assumption from the information in the text.*

Write your answers in boxes 21 – 27 on your Answer Sheet.

		Answer
Example:	Ethylene gas systems improve the grower's chance of selling the tomatoes.	**TRUE**
21	Carbon dioxide is not beneficial to the ripening process.	....
22	The outside air temperature determines the amount of extra heating needed in the ripening room.	....
23	Increased temperature can speed up the maturing process.	....

24 For successful tomato ripening, humidity levels need to be carefully monitored. ....

25 The solenoid valve has to be checked at regular intervals. ....

26 A build up of ethylene gas may result in an explosion. ....

27 Setting up ethylene gas ripening rooms is not always safe. ....

READING PASSAGE 3

Questions 28 – 40 are based on Reading Passage 3.

ECO-TOURISM

If you still believe the once-commonly held misconception that tourism is only an indulgence for the wealthy, you are out of step with the times! The tourism market is accessible to, and indeed marketed toward, many different sections of the community. Adventurers, fitness freaks, nature-lovers and business people all contribute to a rapidly expanding sector of the global economy.

Section A

This billion-dollar industry, whilst affected slightly by the unforeseen events of 11 September 2001, has experienced significant growth since the late 1980s. The subsequent economic benefits for governments are well-documented as tourism boosts foreign investment and foreign exchange. Large-scale resorts and civil infrastructure were often the only response to successful marketing and increased tourist demand. It is not surprising then that the direct impact on the environment and regional or indigenous populations became a contentious issue. Governments and big business became the target of environmentalists and activists who argued that mass tourism was not (and is not) sustainable. As hordes of tourists descended on often overcrowded beaches and overused parklands, this became apparent. Eco-tourism was born.

Section B

The broad concept of eco-tourism as a nature-based, culturally sensitive form of tourism was taken up enthusiastically because there appeared to be few losers. Governments were given a convenient escape route as eco-tourism appeased the environmentalists and local communities, but still provided income. Environmentalists saw eco-tourism as an alternative to mass tourism and its resource-exploiting ways. Local communities envisaged receiving at least a percentage of the tourist dollars, creating job opportunities and giving them control over the impact on their own communities. It seemed that the benefits of mass tourism were going to be expanded in the new world of eco-tourism to include cultural, social and environmental elements.

Section C

As evidence of the benefits of eco-tourism unfolded, the practice has spread. So much so that the United Nations nominated 2002 as the International Year of Eco-tourism. Perhaps inevitably, the meaning of eco-tourism became less clear as it enveloped the globe. It could be argued that the form of eco-tourism adopted in some cases was found wanting in certain aspects and the need for agreement on a tighter definition resulted.

The eco-tourist is one who does not wish to contribute to the negative impact of large-scale tourism. He / she generally travels in small groups to low-key developments and attempts to "tread lightly" on the earth. These smaller-scale developments are environmentally responsible with a view to sustainability in all of the resources used. Their landscaping often relies on the use of native flora and they incorporate recycling methods and energy-efficient practices.

Within the eco-tourist's holiday experience will be an element of education about the local environment. The emphasis is on conservation and the part that humans play in keeping ecosystems functioning. If the area is of cultural or social importance, this too is highlighted.

The eco-tourist doesn't condone the exploitation of the indigenous or local community. Far from it, they insist that the host culture is acknowledged and respected. The repatriation of funds to external sources is frowned upon. Wherever possible, the benefits of an eco-tourist's holiday should be shared with the regional community – the hosts.

Section D

All of these elements promote minimal impact on human resources as well as on physical, cultural and environmental ones. They support conservation through education and experience. Despite the best of intentions, as popularity of eco-tourism spreads there is concern that the eco-tourist will have a more adverse effect on the environment.

Critics argue that unethical tour operators wanting to take advantage of the trendy eco-tourism market print brochures that espouse the ethics of eco-tourism and show familiar emblems of green frogs and crocodiles to promote themselves but do little else. If such operators are not held accountable, the industry will not survive. Open and honest eco-tourism marketing as well as world-recognised accreditation must be endorsed and implemented.

The sheer volume of tourists wanting to visit unique, unspoiled environments is also a cause for concern. Evidence of the need to restrict the number of visitors to sensitive areas exists in many eco-tourist attractions already. Hikers and bush walkers in Mount Kenya National Park have caused damage by straying from set trails and leaving food scraps behind. The number of Orca whales visiting Canada has declined in recent migratory seasons, as the restrictions placed on whale-watching boats and organisers are thought to be inadequate.

Section E

Eco-tourism does not guarantee sustainable tourism and it should not be viewed as a complete cure for the problems that have beset tourism. Until all stakeholders agree to a definition of eco-tourism, insist that eco-tourism operators abide by a strict code of ethics and carefully monitor the impact of eco-tourism (and all tourism), fragile ecosystems will continue to be besieged by tourists. There must be an educational program to promote ecologically-sustainable tourism across the board, so that the underlying principle in ALL forms of tourism is the management of resources.

Eco-tourism can bring wealth to areas where there is nothing else but natural attractions. The reasons for visiting The Galapagos Islands in Ecuador can only be explained by an interest in nature itself. The subsequent tourist dollars, if re-injected into the community, can mean the survival of such habitats. Licenses and entry fees to some sites have, in many cases, replaced government funding as their source of income.

Countries as diverse as Australia, New Zealand, Costa Rica and Kenya are developing strategies to identify and cope with the constraints that inevitably come with a long-term vision of sustainable tourism. Eco-tourism has played an important role in developing an awareness for sustainable tourism practices but governments, tourist agencies and operators must be willing to join forces with eco-tourists to ensure that natural attractions are protected from their own popularity.

Questions 28 – 31

*Look at the list of headings (I – VI) below. Choose the most suitable heading for **Sections B to E**.*
Write your answers in boxes 28 – 31 on your Answer Sheet.

LIST OF HEADINGS

I	Eco-tourism Explained
II	The Appeal of Eco-tourism
III	Tourism Gives Birth to Eco-tourism
IV	The Future of Eco-tourism
V	Questioning Sustainability
VI	The Eco-tourist's Itinerary

		Answer
Example:	Section A	III
28	Section B	....
29	Section C	....
30	Section D	....
31	Section E	....

Questions 32 – 36

Complete the sentences below with words taken from Reading Passage 3.
Use ***NO MORE THAN THREE WORDS*** *for each answer. Write your answers in boxes 32 – 36 on your Answer Sheet.*

32 Polluted, high density tourist destinations are proof that .... cannot be allowed to continue.

33 Eco-tourism spread because .... were obvious to environmental and government representatives as well as cultural and social groups.

34 Eco-tourists choose to stay in .... that do relatively less harm to the environment.

35 .... can damage the eco-tourism industry and governments need to supervise them carefully.

36 The success of the Galapagos Islands shows that .... can be a magnet for tourists.

Questions 37 – 40

Choose the correct letter from ***A – D*** *and write it in boxes 37 – 40 on your Answer Sheet.*

37 The main aim of the writer is to

- **A** point out the economic benefits of tourism.
- **B** outline the impact of tourism on the environment.
- **C** introduce the concept of eco-tourism.
- **D** explain the origins of eco-tourism.

38 The tourism industry cannot survive unless it

- **A** promotes ecologically-sustainable activities.
- **B** ensures that eco-tourism operators are genuine.
- **C** considers the long-term effects of tourism on physical resources.
- **D** All of the above.

39 The eco-tourist

- **A** is often a victim of false advertising by unethical tour operators.
- **B** accepts the restrictions that are placed on natural habitats.
- **C** can unintentionally contribute to the negative effects of tourism.
- **D** never goes to larger-scale tourist resorts.

40 The eco-tourism market

- **A** is more likely to impact on natural habitats.
- **B** is likely to restrict marketing of unethical tour operators.
- **C** is more likely to repatriate profits from local communities.
- **D** is likely to be more sustainable than mass tourism.