RADLEY

Academic Scholarship 2019

Biology

Time allowed – 30 minutes

Total marks available = 33

BIOLOGY: The K-T Extinction Event [33 marks]

It was the worst day in the history of our planet, a day that ended more than 150 million years of evolution and set life on a new course. *Tyrannosaurus rex* was there to witness it. When a pack of them woke up that morning 66 million years ago, the final day of the **Cretaceous period**, all seemed normal. Forests of **conifers** and ginkgos stretched to the horizon, interspersed with the bright flowers of palms and magnolias. The distant churn of a river was drowned out by the low bellow of a herd of ***Triceratops*** several thousand strong. Various small critters darted through the sky, some flapping their feathered wings and others **gliding** on currents of hot air rising from the humidity of the young day, their chirps and tweets a beautiful dawn chorus. They flew over armoured ankylosaurs and dome-headed pachycephalosaurs hiding in the trees, legions of duckbills just beginning their breakfast of flowers and leaves, raptors chasing mouse-sized mammals and lizards through the brush.

Then things started to get weird. A gigantic, shining orb appeared above them in the south-eastern sky. The *T. rex* wouldn't have known what to make of it; it was far beyond their brainpower to be able to understand **meteorites**. Then, the orb went with a flash. No noise, just a split second flair of yellow light. Then another flash, but this one a blinding firework display that burnt their **retinas**. Still no sounds to go with the visual fury. In fact, no noise at all: the birds and flying raptors had all stopped chirping. A few seconds of calm, then ground beneath their feet started to rumble then to shake and then to flow. Like waves. Pulses of **energy** shot through the rocks, turning the ground into a giant trampoline. Even the largest, heaviest, 40 foot long Rexes in the pack were launched into the air, bounced helplessly to death. Moments earlier they had been the undisputed kings of North America; now they were little more than seven ton pinballs, their limp bodies careering through the air. When the shaking finally stopped, they lay like casualties on a battlefield.

Then the rains came. But what fell from the sky was not water. It was beads of glass and chunks of rock, each one scalding hot. These pea-sized morsels pelted the surviving dinosaurs, gunning them down. Meanwhile, as the bullets of **glassy rock** fell down from above, they transferred heat to the air. The **atmosphere** grew hotter, until the surface of the Earth became an oven. Forests spontaneously ignited and wildfires swept the land. The surviving animals were roasted. It was no more than 15 minutes since the *T. rex* pack was startled by the first jolt of bright light, but now they were all gone, as were most of the dinosaurs they had lived with. The once lush woodlands and river valleys were aflame. Still, animals had survived – some of the **mammals** and lizards were underground, some of the crocodiles and turtles were underwater, and some of the birds had been able to fly to safe refuges. Now it was their turn to take over the Earth in the millennia ahead.

Adapted from "The Rise and Fall of the Dinosaurs" by Steve Brusatte.

Using the information in the passage and your own knowledge, answer these questions:

1. What is meant in the passage by the words indicated in bold as follows:

i.	Cretaceous period	vi.	Retinas	
ii.	Conifers	vii.	Energy	
iii.	*Triceratops*	viii.	Glassy rock	
iv.	Gliding	ix.	Atmosphere	
v.	Meteorites	x.	Mammals	[10]

2. Describe three ways in which *Tyrannosaurus rex* was adapted to living at the top of the North American food chain. [3]

3. Name two predators and two herbivores mentioned in the passage. [4]

4. Describe two differences between reptiles and birds. [2]

5. Would you expect ankylosaurs (paragraph one) to be predators or prey? Explain why. (Hint: think of animals with similarities that are alive today) [2]

6. Write down a food chain that involves 4 organisms named in the passage. [2]

7. Explain three things that did irreparable damage to the dinosaur ecosystems of North America within 15 minutes of the meteorite strike 66 million years ago. [3]

8. Some organisms survived the K-T extinction event. Explain:

i. Which ones survived?

ii. Why they survived? [2]

9. Climate change is one of the biggest challenges facing the Earth and its ecosystems today. Explain in as much detail as you can what problems our wildlife are facing because of climate change and how we can help avoid the problem. [5]

[Total 33 marks]

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