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NASA gladly loses a spacecraft

Level 2 | Intermediate

1 Key words

Match the words and their definitions.

1. audacious
2. collision
3. equivalent
4. eruption
5. monitor (verb)
6. data
7. astronomer
8. crater
9. solar system
10. orbit

a. the sun and the nine planets
b. the moment when a volcano explodes
c. someone who studies the stars
d. bold, daring
e. the same as
f. the path a planet or a comet follows as it goes around the sun
g. to observe something for a long time
h. crash
i. facts and figures, information
j. the large round hole caused by an explosion

2 Find the information

Look in the text and find this information as quickly as possible.

1. How much did this space mission cost?
2. How fast was the spacecraft travelling when it hit the comet?
3. How much did the comet slow down after the collision?
4. How far was the mothership from the collision?
5. How many telescopes on Earth were focused on the comet?
6. How long has Tempel 1 been parked beyond the orbit of the furthest planets?

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NASA gladly loses a spacecraft
By Tim Radford

Last week a little American spacecraft crashed into a comet 133m km from Earth, taking a photograph every minute before it was totally destroyed in an explosion that was equivalent to exploding five tonnes of TNT.

The mission cost $335m and involved accurate timing, a speed of 37,000km/h at the point of impact and an amazing series of photographs that ended with a final close-up picture just three seconds before the destruction of the spacecraft. "Right now we are minus one spacecraft," said a delighted NASA engineer, while a colleague at the Jet Propulsion Laboratory in Pasadena said: "There is a comet in the sky wondering what happened." Deep Impact was like an American Independence Day fireworks display. It took many years to plan and ended in a flash.

The spacecraft which crashed into the comet was made of copper and was the size of a washing machine. It was dropped from a mothership into the path of the comet and the mothership then photographed the cloud of ice, dust and organic chemicals that rose from the surface of the comet.

This traffic accident in space completely destroyed the spacecraft but hardly affected the comet: experts believe that the impact would have slowed the comet down by no more than 1/10,000th of a millimetre a second. The aim of the mission was to investigate for the first time the interior of a comet, one of the ghostly visitors that have fascinated human imagination throughout history.

The mothership was 480km from the explosion and observed the impact, and the eruption that followed, with instruments for 800 seconds. Seven satellites, including the Hubble space telescope, monitored the moment of drama, and over the next day and night about 50 telescopes on Earth were focused on the tiny, faraway flare.

The first people to produce pictures in Britain, even ahead of NASA, were pupils from King's school, Canterbury, using data from the 2m Faulkes telescope in Hawaii, an instrument intended for the use of schools. But long before giant telescopes could begin to analyse the details of the collision in the optical ultraviolet, infra-red and x-ray wavelengths, astronomers and planetary scientists from the US and around the world were enjoying a moment of triumph. For the first time, they had clear and close-up studies of a comet. They could count the impact craters on its surface, they could estimate the density of the comet, and they could estimate the firmness of its surface from the size of the flare after the collision. And the clouds of material coming out of the collision crater, might enable them to see the pure raw material of the whole solar system.

Comets like Halley's Comet which visit the Earth frequently fly close to the sun and have been weathered and altered by solar radiation. But comets such as Tempel 1 have spent most of the past 4.6bn years parked far beyond the orbit of the furthest planets. Because of their relative isolation, these icy time capsules could hold the secrets of the planets, the Earth's oceans and even of the original organic chemistry from which life developed. "If you are thinking of comets as possible sources of organic material, then you want the organic elements carbon, hydrogen, oxygen, nitrogen. And we now know enough about comets to know that some of these elements are in the form of organic molecules," said John Zarnecki of the Open University.

For Andrew Coates of the Mullard space science laboratory of University College London, it was one of the most audacious experiments in history. "You have the comet getting bigger and bigger in the field of view, the level of detail on the comet getting better and better," he said. "We know that comets produce jets. What we have now is the first artificial jet from a comet," he added. "The fact that there are craters tells us the surface must be solid in some way. We see a relatively dark surface, probably some organic molecules and silicates, and it is the composition of that mixture which is going to be really exciting."

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3 Comprehension check

Are these statements True or False according to the text?

1. Scientists were very disappointed when the spacecraft hit the comet?
2. The aim of the mission was to find evidence of life on comets.
3. Scientists hope the mission will help to solve some of the secrets of the planets.
4. The first pictures of the comet were produced by NASA.
5. This is the first time scientists have had clear, close-up pictures of a comet.
6. Tempel 1 doesn't orbit near the sun like Halley's Comet.

4 Vocabulary 1 - Collocations

Fill the gaps using prepositions. Check your answers in the text.

1. focus _____
2. intended _____
3. source _____
4. equivalent _____
5. crash _____
6. ahead _____

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5 Vocabulary 2 - Word-building

Complete the table.

	Verb	Noun
1.	collide	
2.	explode	
3.	destroy	
4.	analyse	
5.	erupt	
6.	investigate	
7.	develop	
8.	compose	

6 Grammar focus - Comparatives with *get*

Look at this example from the text: *The comet is getting bigger and bigger*.
Make similar sentences from the prompts.

1. Space research/expensive
2. Scientists/excited
3. The temperature of the Earth/hot
4. The weather/unpredictable
5. Information about comets/detailed
6. Space missions/audacious

7 Discussion

Should money be spent on space research or should the money be spent on projects on Earth?

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KEY

1 Key words

1. d; 2. h; 3. e; 4. b; 5. g; 6. I; 7. c; 8. j; 9. a; 10. f

2 Find the information

1. $335m
2. 37,000km/h
3. 1/10,000th of a millimetre a second
4. 480km
5. About 50
6. 4.6bn years

3 Comprehension check

1. F; 2. F; 3. T; 4. F; 5. T; 6. T

4 Vocabulary 1 – Collocations

1. on
2. for
3. of
4. to
5. into
6. of

5 Vocabulary 2 – Word-building

1. collision
2. explosion
3. destruction
4. analysis
5. eruption
6. investigation
7. development
8. composition

6 Grammar Focus – Comparatives with *get*

1. Space research is getting more and more expensive.
2. Scientists are getting more and more excited.
3. The temperature of the Earth is getting hotter and hotter.
4. The weather is getting more and more unpredictable.
5. Information about comets is getting more and more detailed.
6. Space missions are getting more and more audacious.