



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Subsidiary Level

GENERAL PAPER

8001/21

Paper 2

October/November 2011

INSERT

1 hour 30 minutes

READ THESE INSTRUCTIONS FIRST

You are required to answer **one** question.

This Insert contains three passages, one for each of Questions 1 to 3. You need to study the passage for the question you have chosen before starting your answer. The time needed to do this is allowed for within the time set for the examination.

This document consists of **6** printed pages and **2** blank pages.



Passage 1 Study this dialogue between two colleagues to answer Question 1 parts (a – d).

Denno:	You were a long time. Got the sack?	
Ebba:	Not at all. The Boss was just running her latest bright idea past me.	
Denno:	Oh, yes? Fancy dress on the checkouts? Free newspaper if you spend a fortune on groceries?	
Ebba:	That was yesterday. No, we're going to clean cars and make money that way.	5
Denno:	You are joking!	
Ebba:	Well, not us, but all the local unemployed.	
Denno:	All?	
Ebba:	All right, not all, but 'specifically designated units of unskilled labour', as one of her Senior Management Team might put it.	10
Denno:	You mean 'Swallowed-a-Dictionary' Fowa? Anyway, have you forgotten Green Auto Services just across the road?	
Ebba:	Have you ever tried using their automatic car wash?	
Denno:	I've tried but it always seems to be out of service for some reason.	
Ebba:	Precisely, and so all our cars remain dirty because there's nowhere else in town.	15
Denno:	Unless they're cleaned in our car park where everyone fights for space on market day?	
Ebba:	Exactly. Now, you tell me, how long does the average customer take to go through our supermarket?	20
Denno:	About 45 minutes, I reckon, unless they're in a hurry. There are so many people you're bound to meet in the aisles, and who would want to miss the gossip?	
Ebba:	And how long would you take to clean your car at home?	
Denno:	In the region of 20 minutes, but you can't always depend on the water supply – it's always being switched off.	25
Ebba:	But we have a bore hole here as well as the mains water.	
Denno:	All right, we've got the water, but how many washboys is she thinking of hiring?	
Ebba:	You know her, she won't say. No, she won't be pressed over detail.	
Denno:	Isn't that just typical! Too many, and they'll be standing around doing nothing and being bored stiff when business is slack. Too few, and there'll be a lot of very impatient drivers during peak periods. Then, your washboys will be really unpopular.	30
Ebba:	Well, a good few folk walk into town, either before or after they've shopped with us, so there'll be some flexibility, won't there?	
Denno:	And what would the washboys do during the rainy season?	35
Ebba:	Be laid off, I suppose. But they could always get their job back later in the year, if they're still out of work.	
Denno:	And, come to think of it, who'd bother to have their car cleaned in the hot season when there's so much dust about?	
Ebba:	Some would, I'm sure.	40
Denno:	Do you fancy charging the earth for a car wash in the recession and with people cutting back on expenditure wherever they can? Those poor washboys will have to get used to taking no for an answer!	
Ebba:	Some people will always take pride in their cars.	
Denno:	Incidentally, have you noticed that black has come back as the most popular colour?	45
Ebba:	Just like cars in the 1950s.	
Denno:	Which is as old as some of our patrons' vehicles seem to be. They'd fall to bits if washed.	
Ebba:	Oh, come off it! Anyone who is our customer has a roadworthy car which deserves the greatest care and attention.	50
Denno:	And you're saying the washboys would keep an eye on all those cars so that they're not vandalised or broken into?	

- Ebba: That's a good point! The Boss is always worried that Healthy Foods' car park is considered safer than ours. Yes, that would give our clients extra confidence, even during the rainy season. 55
- Denno: And these washboys have all been unemployed? With no money coming in and, maybe, a family to support?
- Ebba: You know that.
- Denno: And have never been tempted to steal? 60
- Ebba: The Boss would never employ anyone who had been convicted of theft.
- Denno: So, every car thief is brought to justice?
- Ebba: She'd want references.
- Denno: For people who'd never had a job?
- Ebba: Look, where would we be if we didn't offer the customers of Inter-Islands Stores just that little bit extra? 65
- Denno: Queuing up to clean cars, I imagine. Talk about slave labour on a minimum wage!

Passage 2 Study the material below to answer Question 2 parts (a – d).

From midday onwards on a particular Wednesday, a survey was recently conducted in the centre of Ryanol, a city with a population of 225,000. On this occasion, the people who were interviewed at the bottom of Exchange Street were asked this question initially: 'Why are you here today?'

Their replies fell into the following categories:

A	On some kind of business	28
B	On the way to meet someone for lunch	32
C	Visiting the Exchange Street Shopping Complex	60
D	Sightseeing	13
E	For other reasons	17
Total:		150

They were then asked: 'Will you be in this part of the city at this time tomorrow?'

Their replies were as follows:

A	Yes: 17	No: 11
B	Yes: 24	No: 8
C	Yes: 15	No: 45
D	Yes: 2	No: 11
E	Yes: 12	No: 5

Supplementary information:

- 1 According to the experts, the city centre has little architectural merit.
- 2 A couple of music stores in the Exchange Street Shopping Complex have cafes attached to them catering specifically for teenagers.
- 3 Casual labour is sometimes recruited at dawn in the park adjoining Exchange Street.
- 4 The Central Court of Justice is situated a hundred metres up Exchange Street.
- 5 It is quite common for colleagues from different work places to compare notes over a sandwich.
- 6 The bus stop for the world-famous Ryanol Renegades' football ground is just opposite where the survey has taken place.
- 7 Early closing day for some of the department stores is Thursday.
- 8 Tourists are warned against pickpockets in the city centre.
- 9 There are plenty of cheap cafes in the city centre but most of the expensive restaurants are in the suburbs.
- 10 Special offers are available in some shops and stores on a Wednesday.
- 11 Several banks have their main branch on or close to Exchange Street.
- 12 Exchange Street was immortalised in the lyrics of 'Ryanol Beat', a celebrated pop group of the 1960s.
- 13 The Wednesday of the survey was the last day of the school holidays.
- 14 There is a high rate of unemployment in the former industrial areas of the city.
- 15 The Passport Office is to be found not far away.
- 16 On that particular Wednesday, there was a Stamp Dealers' Fair at the top end of Exchange Street.
- 17 Ryanol is still at the heart of the diamond trade in that part of the world despite having lost much business in other spheres.
- 18 Few firms in the city centre have canteens where their employees can eat.
- 19 Parking charges are to be increased significantly on the following Friday.
- 20 The country's First Minister originally practised law in a building nearby.

Passage 3 Study the following passage to answer Question 3 parts (a – d).

A Spacecraft to save Earth

Heroic missions to stop life on Earth from being wiped out by an asteroid have become a favourite theme for Hollywood disaster films. Now, a team of British engineers have designed a real-life spacecraft to save the world from destruction. Their invention, called a ‘gravity tractor’, would be deployed when an orbiting rock is detected on a collision course with Earth. The spacecraft would intercept the asteroid and position itself to fly alongside it, just 50 metres from its surface. From this position, the 10-tonne craft is able to exert a small gravitational force on the rock, pulling the asteroid towards it. By gradually modifying its course, over several years, the gravity tractor is able to slowly shift the asteroid’s trajectory enough to ensure it misses the Earth.

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Details of the planned craft come just weeks after an asteroid or comet was found to have ploughed into Jupiter, which is a giant gas planet, leaving behind a vast impact scar – estimated to be about the same size as the Earth – in its atmosphere. Scientists believe it is only a matter of time before an asteroid comes close enough to the Earth to be a threat. Nasa, the US space agency, is so concerned that it has established an expensive monitoring programme to track every object in the sky that might come close to the planet. It estimates there are more than 100,000 asteroids orbiting near the Earth that are large enough to destroy a city. So far the agency has only been able to identify and track 6,363 of them.

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Just one football pitch-sized asteroid would be capable of obliterating a large city and could cause widespread destruction by also throwing flaming material into the atmosphere and triggering tidal waves. In 1908, a meteor of this size exploded above Lake Tunguska in Siberia, destroying almost 2000 square kilometres of forest. Such collisions hit the Earth every 100 years. To avoid such a disaster, engineers at space company EADS Astrium, which designs and builds spacecraft for Nasa and the European Space Agency, have designed the gravity tractor.

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The team, who are based in Southern England, believe the craft could divert asteroids that are up to 400 metres across – big enough to release 100,000 times more energy than the nuclear bomb dropped by the United States on Hiroshima in 1945.

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“Anything bigger than 30 metres across is a real threat to the Earth,” said Dr Ralph Cordey, science and exploration business development manager at Astrium.

“Unfortunately it is a matter of when rather than if one of them hits us.”

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The gravity tractor exploits the principles of very basic physics – every object with a mass has its own gravity that affects objects around it. It can move fairly large objects 300 metres to 400 metres across.

“These asteroids are hurtling around our solar system at 10 kilometres per second, so when you scale that up, you just need a tiny nudge to send it off course.”

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The 30-metre long gravity tractor would need to be launched around 20 years before an asteroid is due to hit the earth, giving it enough time to intercept the asteroid as it orbits the sun and change its trajectory. The spacecraft would use four highly efficient low energy thrusters – known as ion thrusters which are often used on deep space probes – to gradually shift its position as it flies above the rock, causing the gravitational pull it has on the asteroid to ‘tug’ it off the collision course. With an asteroid around 300 metres across, the gravity tractor changes the angle it is travelling in by a tiny fraction over a period of 15 years, creating enough of a change in the orbit for the asteroid to miss the Earth.

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The team have designed the gravity tractor and planned the details of the mission. The craft could be built in a relatively short time, using existing technologies, if an asteroid was detected on a collision course. It is likely it would require an international agreement to send a mission into space.

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Christian Trenkel, who worked on the mission plans, said: "We have designed the mission using the technology that we currently have available, so it could be put into practice at any time."

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