



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

THINKING SKILLS

9694/13

Paper 1 Problem Solving and Critical Thinking

October/November 2010

1 hour 30 minutes

Additional Materials: Multiple Choice Answer Sheet
 Soft clean eraser
 Soft pencil (type B or HB is recommended)



READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

There are **30** questions on this paper. Answer **all** the questions.

For each question there are five possible answers **A, B, C, D** and **E**. Choose the **one** you consider correct and record your choice in pencil on the separate answer sheet.

Read very carefully the instructions on the answer sheet. Ignore responses numbered 31 – 50 on the answer sheet.

INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

This document consists of **19** printed pages and **1** blank page.



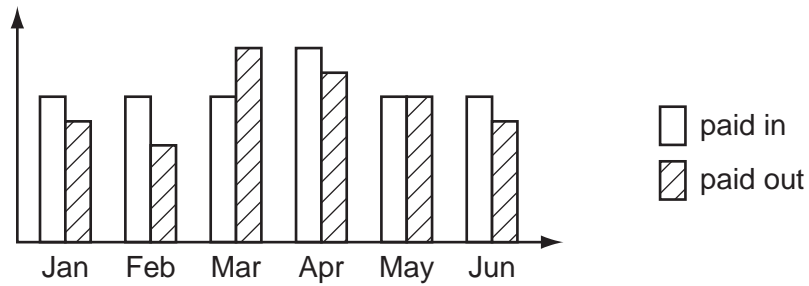
- 1 The Helford estuary rowing crew practise at a constant speed through the water. The course takes them out to a buoy 3 km towards the sea before returning to their start point. To minimise the danger of being swept away they normally train at slack water, when there is no tide flowing in the estuary.

On a normal day it takes the crew 30 minutes to complete the 6 km round trip. Today however, they missed their normal training time, and found a falling tide, causing a steady 3 km/h flow towards the sea.

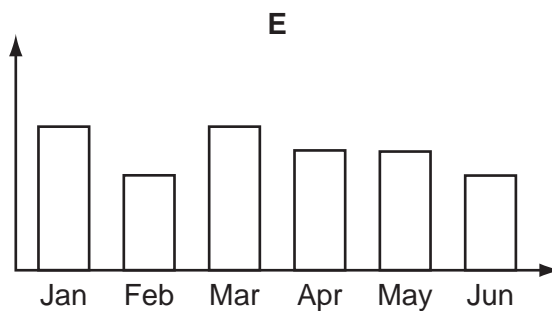
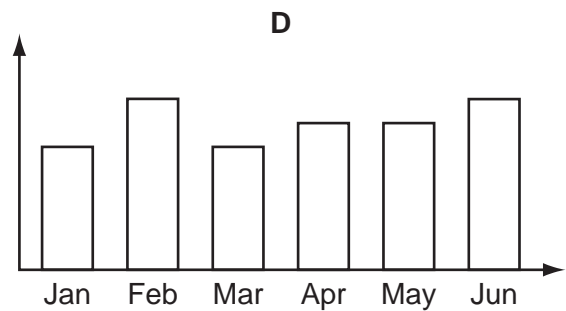
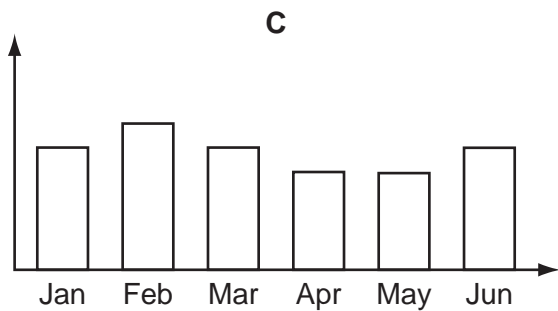
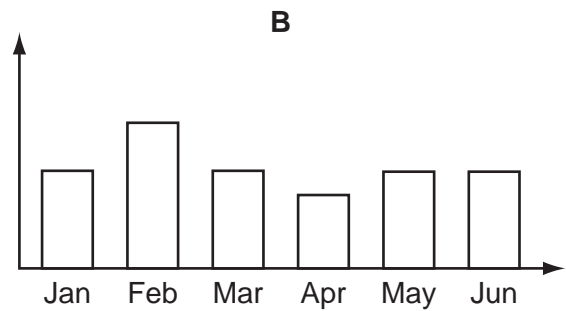
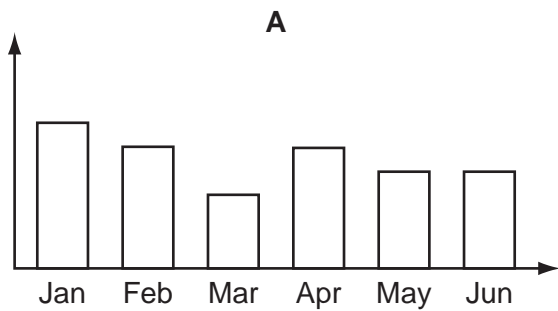
How long will it take to complete the course in today's practice? (Assume that no time is spent in turning around at the buoy.)

- A 30 mins
- B 32 mins
- C 35 mins
- D 36 mins
- E 40 mins

- 2 The bar chart shows the amount of money that was paid into and taken out of my bank account in the first six months of the year.



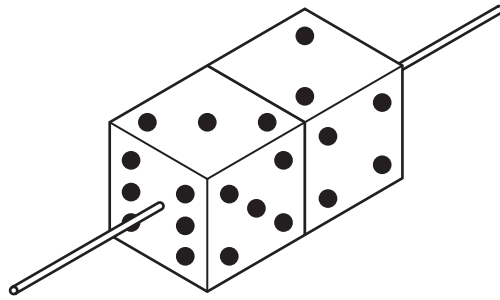
Which one of the bar charts **could** show the amount of money in my bank account at the end of each month from the start of this year?



- 3** The unit of currency of Nondecima is the awk. There is a whole number of beks in an awk, and a whole number of cets in a bek. A visitor has forgotten both how many beks there are in an awk, and how many cets there are in a bek. At the first shop he buys 2 cakes costing 3 awks 12 beks and 4 cets each and he has to pay exactly 7 awks for these.

Which one of the following explains this?

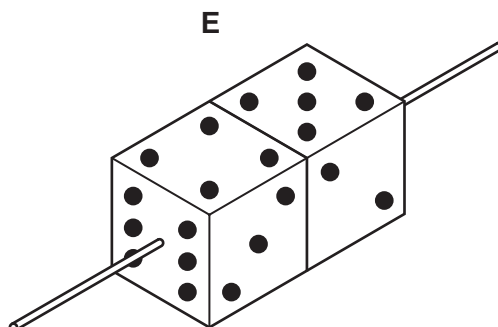
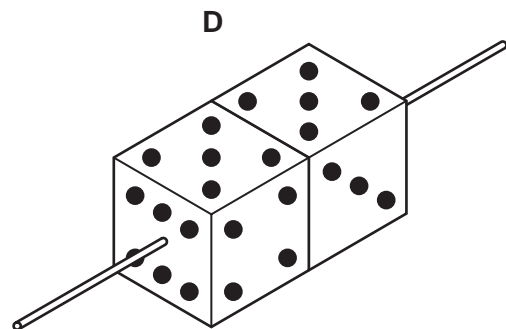
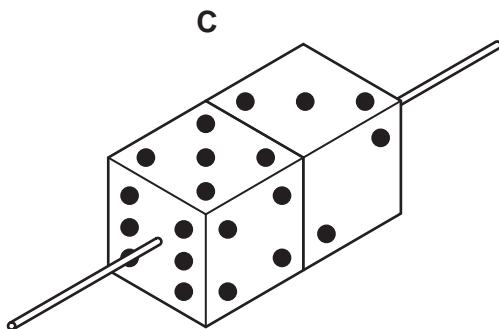
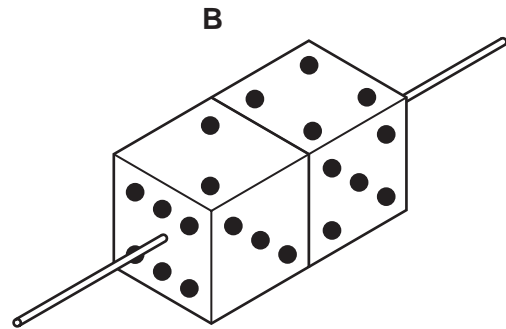
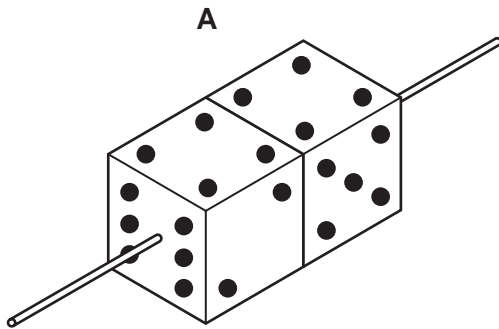
- A** There are 24 beks in an awk, and 8 cets in a bek.
- B** There are 25 beks in an awk, and 6 cets in a bek.
- C** There are 25 beks in an awk, and 8 cets in a bek.
- D** There are 26 beks in an awk, and 6 cets in a bek.
- E** There are 26 beks in an awk, and 8 cets in a bek.



This is Mary Cetine's latest work of art, entitled "One-to-one." It consists of two identical dice rotating at the same speed, but in opposite directions, about a horizontal axis. The two single-spot faces are together.

(The dice are conventional; i.e. the **total** number of spots on opposite faces is always seven.)

Which one of the following shows the appearance of "One-to-one", viewed from the same position, later?



- 5 Anna had been given \$25 to buy snacks for the office party. She bought crisps at \$1.40 for a pack and nuts at \$3.30 for a pack. She spent as much as possible without exceeding the \$25.

How much money was left over?

- A \$0.00
 - B \$0.10
 - C \$0.20
 - D \$0.60
 - E \$1.00
- 6 Children should be taught to type as soon as they start schooling. Information Technology is so basic to education that 'keying' starts now at pre-school education. But traditional thinking equates writing with learning. Teaching good handwriting is seen as the bed-rock of education, while typing is seen as an inferior or optional skill. So, few people realise that children need to be taught to type even as they start writing. You only have to watch children hunting and pecking over keyboards to see the need. These days children need typing more than writing.

What is the function of "*typing is viewed as an inferior or optional skill*" in the **structure** of the above argument?

- A Explanation
 - B Main conclusion
 - C Assumption
 - D Intermediate conclusion
 - E Counter-argument
- 7 It is more important for punishments to make offenders less likely to commit further crimes than for criminals to have to suffer very tough punishments. Imprisonment is ineffective in preventing re-offending. A new scheme in New Zealand should be more widely adopted. There, instead of being sent to prison, first offenders whose crime has harmed others are required to meet their victims and to agree a way in which they can compensate for their crimes. The result is that criminals are many times less likely to commit crimes again, probably because it helps them to develop a sense of social responsibility. The public may initially think this system is too lenient, but once the results become obvious, public support will follow.

Which one of the following, if true, **strengthens** the above argument?

- A Adopting the New Zealand scheme will be expensive in the early stages.
- B Criminals who have taken part in the New Zealand scheme say it is just as tough as going to prison.
- C Some crimes, for example, failure to pay taxes, do not have an obvious victim.
- D The public want the authorities to give criminals more severe punishments.
- E Victims in the New Zealand scheme say the system helps them to cope with distress caused by the crime.

8 Incidence of theft of visitors' food by seagulls in St Ives, Cornwall, U.K:

	<i>Winter 2005</i>	<i>Summer 2005</i>	<i>Winter 2006</i>	<i>Summer 2006</i>
<i>No. of incidents per day</i>	95	405	25	175
<i>No. of visitors per day</i>	2027	3506	2010	3052
<i>No. of seagulls in resort</i>	10,000	10,025	8025	11,000

Which one of the following is the **best explanation** for the decline in theft of food by seagulls between Summer 2005 and Summer 2006?

- A Action had been taken by the local council to reduce the number of seagulls.
 - B Fewer visitors visited St Ives in the summer of 2006.
 - C The summer of 2006 was cold and wet.
 - D There were more blackbirds in 2006.
 - E Visitors are more likely to eat out of doors in the summer.
- 9 With only skeletons to work from, we rely on artists' impressions of how dinosaurs looked 'in the flesh'. Lawrence Witmer recently caused a stir when he said that artists have generally put the nostrils of dinosaurs too high on the head. He spent months studying the relative positions of noses and nostrils in modern animals. He wanted to see if there is a correlation – whether the bone of the nose reveals the location of the fleshy nostril. He found that there is such a correlation.

Witmer then examined fossils and concluded that in modern reconstructions of dinosaur heads the nostrils had always been misplaced. They should be shown low on the nose, near the mouth. Nostrils in that position would heighten the animal's ability to nuzzle potential food and decide whether it was edible.

According to the passage, Witmer **bases his hypothesis** on which one of the following pieces of evidence?

- A The correlation between the bones of the nose and the position of the nostrils in modern animals.
- B The correlation between the positions of the noses in modern animals and in dinosaurs.
- C The fact that modern animals use their nostrils to decide whether or not potential food is edible.
- D The similarity between the skeletons of modern animals and those of dinosaurs.
- E The tendency of artists to base their impressions of dinosaurs on the appearance of modern animals.

- 10 Brazil nuts are an important source of selenium, a mineral that research suggests is a major contributor to the prevention of certain types of cancer. If people do not include brazil nuts in their diet they are failing to take all the steps they could to protect their health. It is irresponsible, therefore, not to eat brazil nuts.

Which one of the following identifies the **main flaw** in the above argument?

- A Brazil nuts may contain many calories and may be fattening.
- B Eating brazil nuts may not be sufficient to prevent cancer.
- C Eating brazil nuts may not be the only source of selenium.
- D The connection between selenium in the diet and lower rates of cancer may just be coincidental.
- E The research mentioned is not documented sufficiently.
- 11 The rates offered by four mobile telecommunications providers are shown below:

<i>Network Provider</i>	GlobalCom	Mauve	TeleStyle	TalkMore
<i>UK Calls (per minute)</i>	\$0.20	\$0.15	\$0.25	\$0.20
<i>Text (per message)</i>	\$0.12	\$0.12	\$0.10	\$0.10
<i>Internet (per day)</i>	\$0.35	\$1.00	\$0.40	\$0.40
<i>International Calls (per minute)</i>	\$0.50	\$0.80	\$0.50	\$0.60
<i>Voice Mail (per minute)</i>	\$0.20	\$0.25	\$0.25	\$0.20

Alice selected the network provider which provided the lowest available rate for text and international calls.

In the month of May, in addition to sending \$2.40 of text messages, Alice made a total of 400 minutes of calls, 100 minutes of which were international. She made no use of any other services.

How much should Alice be billed for May in total?

- A \$112.40
- B \$122.40
- C \$127.40
- D \$152.40
- E \$177.40

- 12 A rechargeable battery in a laptop computer is regularly used over a 24 hour period with the following units consumed. However, the battery only has a charge of 4 units at the beginning of today. The battery will be continually charging at a rate of $\frac{1}{2}$ unit per hour. You can assume that the consumption of units is uniform within each 8 hour period.

<i>Time period</i>	<i>Total units used during the period</i>
00:00 – 08:00	4
08:00 – 16:00	8
16:00 – 24:00	4

When does the battery completely run out of charge?

- A 04:00
 B 08:00
 C 12:00
 D 16:00
 E 24:00
- 13 The hose on a foot pump is only long enough to reach the tyre valve on each of a motorbike's wheels when the valve is precisely at its lowest point.

Prior to starting work, the motorbike is positioned such that both valves are at their lowest point. The circumferences of the front and rear wheels are 2.1 m and 2.4 m respectively.

Rolling the bike forwards, how many times must the front wheel revolve before both valves are simultaneously at their lowest point again?

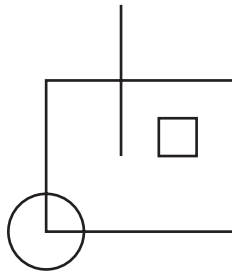
- A 3
 B 6
 C 7
 D 8
 E 12

- 14 A passenger who normally travels from Cambridge to Leicester on the 17:00 train finds that engineering work means he has to catch a bus instead. He needs to catch a connection from Leicester and normally has 20 minutes to spare, although 10 minutes are sufficient to allow him to catch the connection. His 60 mile journey to Leicester normally takes 110 minutes. The bus journey is 25% further and the average speed of the bus is 30 miles per hour. Buses leave every 15 minutes after 15:55.

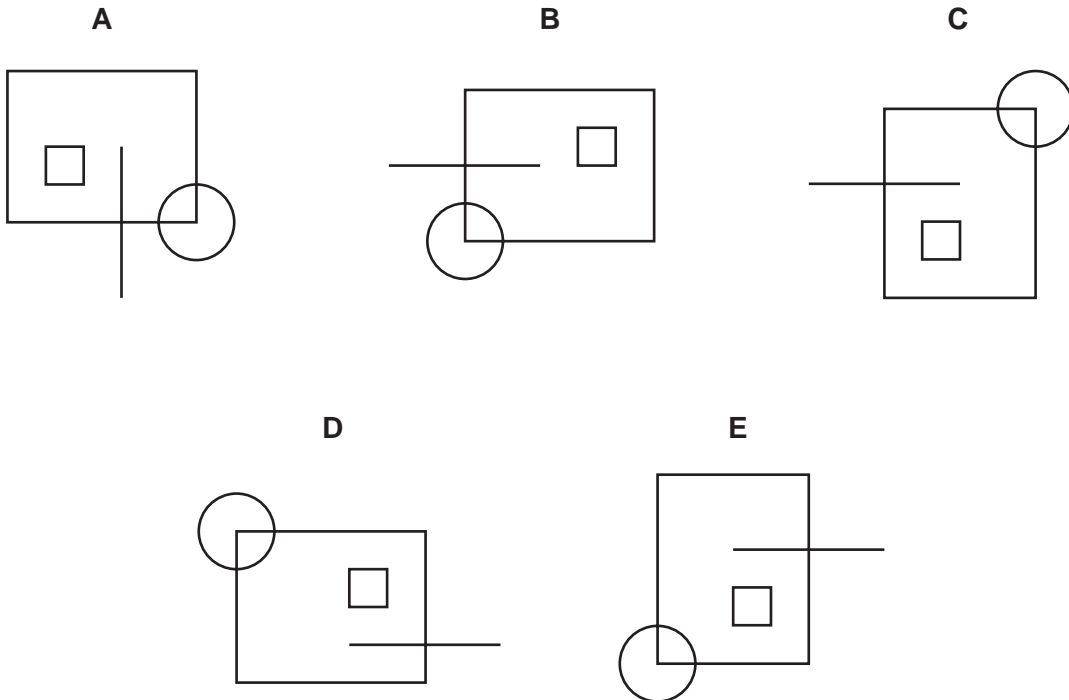
Which bus should he catch to ensure that he arrives at Leicester no more than 20 minutes and no less than 10 minutes before his connecting train?

- A 15:55
- B 16:10
- C 16:25
- D 16:40
- E 16:55

- 15 The image below is placed in front of a mirror, giving a resultant reflection.



Which one of the following images **could** be the reflected image?



- 16 For many people, the radio is usually a means of listening to music in the background when driving or doing household chores. However, people should seriously consider it as a means of listening to things like plays. Watching a film or a play on television leaves little to the imagination whereas the radio play enables one to create one's own imaginary world. Moreover, the quality of scriptwriting has to be better in a radio play as the author cannot use visual elements to prop up poor writing. So, the radio is a better medium for drama than film or television. One certainly gets fewer mindless car chases in a radio play.

Which one of the following expresses the **main conclusion** of the above argument?

- A Not many people use the radio to listen to things like plays.
 - B People should give serious consideration to using the radio to listen to things like plays.
 - C Radio allows people to use their imagination more.
 - D Scriptwriters for television and film can use visual props to compensate for poor writing.
 - E The radio is a better way of experiencing drama than film or television.
- 17 Recent riots and demonstrations against World Trade Organisation meetings have forced the issue of globalisation onto TV screens around the world. But this contentious topic raised its head in 1940s France over an imported foreign soft drink. The increasing popularity of the beverage provoked fury in some quarters, prompting parliamentary debates and front page editorials which warned not only of the alleged menace of the soft drink to French national health and to its wine industry, but to France's very way of life. As the Cold War began, many in France viewed this symbol of globalisation as representing everything they did not want, and they said so loudly.

Which one of the following is a **conclusion** which can be drawn from the above passage?

- A Anti-globalisation protest is not something new.
- B France was the first nation to stand up to globalisation.
- C Globalisation has altered France's way of life.
- D Imported soft drinks were a threat to the French wine industry in the 1940s.
- E There are health risks associated with soft drinks.

- 18 Going for a 'gap year' before university has become a popular idea with many young people in the developed world. However, there are some academic subjects, especially mathematics, which require continuity of study when young. Evidence of the work of great mathematicians suggests that mathematical ability typically peaks at the age of 24. Losing a year at university in the vital years between 18 and 24 therefore means a young mathematician will have seriously interrupted their intellectual development. This in turn means that they will not be able to develop to their full mathematical potential. Any young person who wants to excel at mathematics would be therefore well advised to avoid a gap year.

Which one of the following is an **assumption** underlying the above argument?

- A Mathematical development can only occur in a formal academic environment.
 - B Mathematicians should never take a long break from study.
 - C Students who go on gap years cannot complete a mathematics degree before the age of 24.
 - D Students wishing to study mathematics at university should never take a gap year.
 - E There are no detrimental effects of gap years on subjects which do not require continuity.
- 19 A study of the diet and lifestyle of 2339 men and women aged between 70 and 90 across Europe has shown that there are four important factors that give a recipe for health and living longer. A diet high in fruit, vegetables and nuts, but low in meat, is one of them. Drinking alcohol only moderately and avoiding smoking are two more. The fourth is taking exercise each day. In the study, those who did not adhere to these four factors lived less long. The evidence on diet and lifestyle is clear enough for this age-group. If they want to live long and healthily, younger age-groups should ensure that they have a good diet and lifestyle.

Which one of the following, if true, would most **strengthen** the above argument?

- A 935 of the 2339 people in the study had died by the end of it.
- B Many people below the age of 70 have had access to good health care throughout their lives.
- C Many younger people are aware of the health value of a good diet and lifestyle.
- D People in their 80s who are healthy are in the minority.
- E The longer-living people in the study had adopted a healthy diet and lifestyle when they were younger.

20 In an argument there must be a conclusion, and one or more reasons to support the conclusion.

From the above definition, which one of the following is most obviously an **argument**?

- A A zoo in Thailand has dropped plans to serve giraffe and tiger for dinner in its restaurant. There were many complaints from conservationists.
- B Ants use chemical signals to tell other ants which paths lead to food, and which do not. Research into these signals should be funded, as it might lead to products to keep ants away from human food stores.
- C Fossil dung collected in Pisdura, near Nagpur in India, contains evidence that dinosaurs ate grass. Scientists had thought that grass was not around at the same time as dinosaurs.
- D Lions are under threat because of increasing populations of people in their natural habitats. Conservation efforts are being planned to avoid the extinction of lions.
- E Studies have long suggested that music helps children learn mathematics. New research indicates that musical training helps children acquire a second language.

21 In the drivers' championship, points are awarded for each race as given in the table below.

<i>Place</i>	<i>Points</i>
1 st	6
2 nd	4
3 rd	2
4 th	1

With 5 races remaining the top 3 drivers are Lewis, Michael and Jenson.

<i>Driver</i>	<i>Championship points</i>
Lewis	27
Michael	25
Jenson	24

Assume that Jenson continues to finish in the top three for every race. What is the smallest number of the remaining races that Jenson needs to win to **guarantee** winning the championship?

- A 1
- B 2
- C 3
- D 4
- E 5

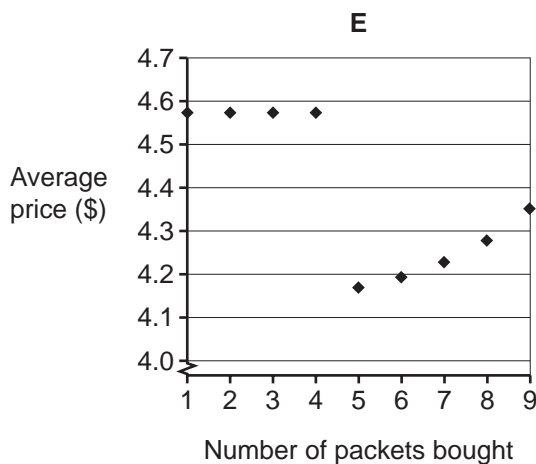
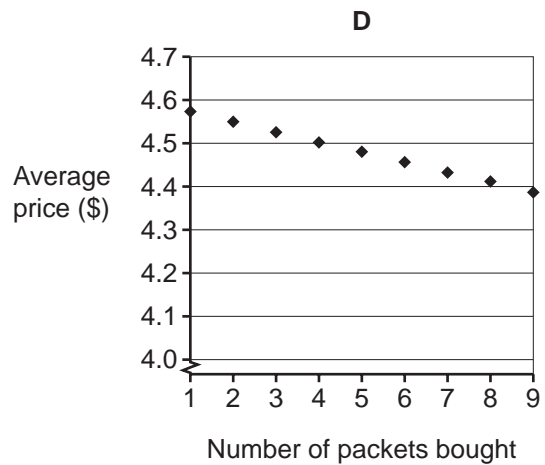
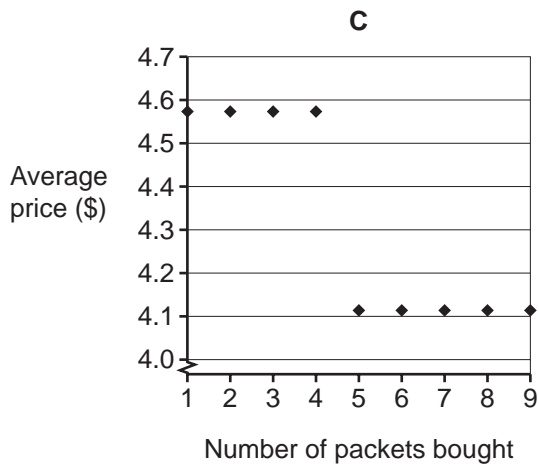
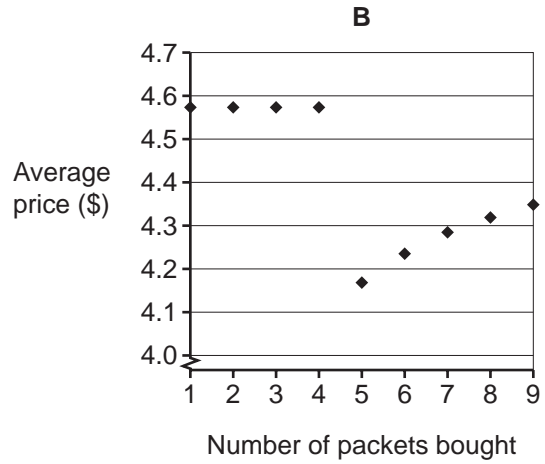
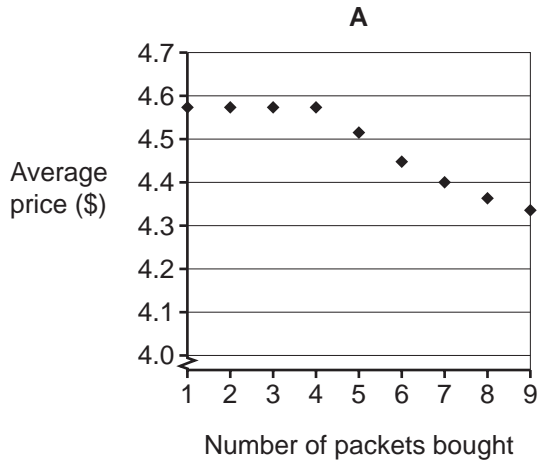
- 22 *Tops* and *tips* are the only two ways of scoring points in the sport of T-Ball. In a thrilling T-Ball match this afternoon the Eagles beat the Panthers 48 – 47. The Panthers had taken the lead in the third minute, scoring what proved to be the only *top* of the day. They then led right up to the last play of the game, which resulted in a victory-snatching *tip* for the Eagles.

Which one of the following could **not** be T-Ball's scoring system?

- A A *top* scores 5 points, a *tip* scores 2 points.
- B A *top* scores 5 points, a *tip* scores 3 points.
- C A *top* scores 7 points, a *tip* scores 2 points.
- D A *top* scores 7 points, a *tip* scores 3 points.
- E A *top* scores 7 points, a *tip* scores 4 points.

23 A supermarket offers a \$2 reduction on any bill over \$20. I only want to buy coffee; each packet costs \$4.57.

Which one of the following graphs shows how the average price of a packet of coffee varies with the number of packets bought?



- 24** The following table shows the exchange rates for five world currencies against the UK pound. An investor will change some pounds into one of these currencies in May and exchange the full amount back into pounds in October.

<i>Currency</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>
US dollar	2.1	2	1.8	1.7	1.5	1.6
SINGAPORE dollar	1.4	1.2	1.3	1.25	1.4	1.35
BRUNEI dollar	2.4	2.5	2.6	2.6	2.7	2.8
AUSTRALIAN dollar	2	2.1	2	1.95	1.9	1.7
ARGENTINE peso	6.3	6.2	5.9	4.5	5	5.2

For example, 1 UK pound buys 2 AUSTRALIAN dollars in May.

Which currency will make the investor the most money in UK pounds over the six months?

- A** ARGENTINE peso
 - B** AUSTRALIAN dollar
 - C** BRUNEI dollar
 - D** SINGAPORE dollar
 - E** US dollar
- 25** I am buying stationery for use in the office. I have 23 staff in the office and need to get 2 pens and 1 notebook for each of them. The pens are sold in packets of either 10 or 12 and the notebooks are sold in packets of 8 or 10. I decided to buy just the larger packets of each and save any extra ones. I told my assistant how many packets of pens and notebooks to buy, but when he returned I found that he had bought the smaller packets in each case. I am going to buy sufficient extra pens and notebooks that I need for my staff singly. A single pen will cost 12¢ and a single notebook will cost 35¢.

How much do I need to pay for the extra pens and notebooks?

- A** 36¢
- B** 72¢
- C** \$2.81
- D** \$3.06
- E** \$3.17

- 26 For years environmentalists have been telling us that because human activity damages the planet, there is a danger that human life will be wiped out. They have made many predictions which they say will provide us with evidence that the planet cannot recover from our destructive activities, and thus that it will be unable to sustain human existence. Everyone agrees that this would be a disaster. But the things which environmentalists have predicted have not happened, so we can conclude that our activities do not pose a threat to human existence.

Which one of the following states the **flaw** in the above argument?

- A The fact that a prediction has not yet been fulfilled is not evidence that it will not ever occur.
 - B The fact that environmentalists are wrong is evidence that we should ignore all their predictions.
 - C The fact that human activity is damaging is not evidence that a disaster will soon occur.
 - D The fact that it would be a disaster if human life were wiped out is not evidence that this will not happen.
 - E The fact that the planet cannot recover from our destructive activities is not evidence that human life will be wiped out.
- 27 We need to have constant awareness that advancements in science can harm the environment, even if they are for human benefit. We can see this from the refrigerator dilemma – once upon a time a refrigerator could kill a person. Early models used toxic and explosive gases to keep food cold. But then, in 1927, the chemist Thomas Midgley invented chlorofluorocarbons – or CFCs – to replace these gases. Touted as an innovation, CFCs revolutionised refrigeration, and eventually this seemingly harmless family of chemicals found its way into all kinds of products. As it turned out, consumers should have been suspicious. Midgley’s previous claim to fame was the creation of leaded gasoline. By 1974, millions of refrigerators containing CFCs had been sold around the world. Then two scientists, Rowland and Molina, began to look more closely at their impact. They were soon to theorise that as CFCs rose into the atmosphere, their molecules would be broken down by the Sun, releasing chlorine into the ozone layer to eat it away. We now know that the Earth’s ozone layer is necessary for protecting us from the Sun’s damaging rays.

On reading this, somebody remarked: “Midgley was a rogue scientist”. Give a **plausible** response that would **counter** this assumption.

- A Advancements in science are made through trial and error and Midgley’s are no exception.
- B Midgley was a scientist who worked for corporate businesses and made discoveries in their interest.
- C Rowland and Molina specialise in atmospheric chemistry.
- D The writer is not attacking Midgley but simply making an objective observation about the passage of science.
- E There were many more reported cases of skin cancer from exposure to the Sun.

- 28 The pineal gland in the human brain produces a hormone called melatonin, which induces people to fall asleep. Some air travellers take supplements of melatonin to avoid sleeplessness when they cross time zones, but it is not known if these supplements cause side effects. For most people, melatonin is produced at dusk or during darkness, which is why we sleep mainly at night. This is also why it is difficult for night shift workers in factories to stay awake. Experiments have shown that if people are exposed to artificial light of certain wavelengths and intensities, their production of melatonin is suppressed.

Which one of the following can be drawn as a **conclusion** from the above passage?

- A Factories where people work at night should use lighting of the highest intensity.
 - B Lighting conditions could be used to help night workers to stay awake.
 - C Night workers could be made to stay awake by being given stimulating tasks to perform.
 - D People who suffer from insomnia should take supplements of melatonin.
 - E The pineal gland of night workers produces melatonin during the daytime.
- 29 Programmes which describe themselves as 'reality television', such as '*Big Brother*' and '*I'm a Celebrity Get Me out of Here*', grossly misuse the term 'reality'. For, whether or not you enjoy the genre, there is no escaping the fact that it is a contradiction in terms. Television requires the presence of cameras, and, as anyone who has been behind or in front of one knows, cameras inevitably influence the behaviour of those captured in the frame, unless they happen to be unaware that they are being filmed. The inmates of the *Big Brother* house and the celebrity camp in the jungle not only know they are being filmed, they revel in it. They may provide entertainment, but they are certainly not being spontaneous.

Which one of the following is the **main conclusion** of the above argument?

- A 'Reality television' is a misuse-of the word 'reality'.
- B So-called reality television is a contradiction in terms.
- C The participants in reality television are well aware that they are being filmed.
- D The participants in so-called reality television do not act spontaneously.
- E The presence of cameras inevitably influences people's behaviour.

- 30 Some businesses may claim that they are acting ethically, for example when they curb activities which cause environmental damage, or when they cease to exploit animals in the testing of their products. But this can never be described as 'acting ethically', because it is done only for economic reasons. Such policies may make consumers more likely to purchase the company's product, since to be accused of acting unethically is bad publicity. If a policy reduced profits and damaged the interests of shareholders, no business would pursue it.

Which one of the following is an **assumption** underlying the above argument?

- A Acting ethically requires that there is more than just a profit motive.
- B Businesses which do not act ethically will damage the interests of their shareholders.
- C Consumers are motivated principally by economic factors.
- D If businesses avoid causing environmental damage, their profits will fall.
- E It is possible for businesses to act ethically.

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.