THINKING SKILLS **9694/03**

Paper 3: Problem Solving and Critical Thinking (Advanced) **October/November 2009**

1 hour and 15 minutes

Additional Materials: Answer Booklet/Paper

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on the Answer Booklet/Paper in the space provided unless this has been done for you.

Write in dark blue or black pen.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Electronic Calculators should be used.

There are **20** questions on this paper. Answer **all** questions. Each question has two parts.

For each part of the question there are five possible answers **A**, **B**, **C**, **D** and **E**. Select the **one** answer you think is correct for that part.

Record your choice(s) in the separate Answer Booklet/Paper.

Start each question on a new line.

INFORMATION FOR CANDIDATES

Each question is worth 2 marks. Marks will not be deducted for wrong answers.

[Turn over

1 The Government should return a painting it has bought from a convicted criminal for $375, because he is a violent criminal. The Government has spent more than $1 million on art for its new building. The artist, whose painting depicts an eccentric person with his hoard of junk, is currently serving five life sentences. He also escaped from prison in 1995 using welding equipment he had been given for artwork. The Government cannot be seen to tolerate his activities.

(i) Which **one** of the following, if true, most strengthens the above argument?

A Prisoners should be able to develop skills that will aid their reintegration into society.

B Prisoners should be required to do work that helps the community.

C Prisoners should not be allowed to do creative work whilst serving their prison sentence.

D Prisoners should not have access to equipment which might aid their escape.

E Prisoners who have committed serious offences should not receive money from the Government.

(ii) Which **one** of the following, if true, would most weaken the above argument?

A A desire for revenge against people who have committed offences is counterproductive.

B Art critics say that the prisoner's paintings show great artistic talent.

C Buying a painting does not imply condoning the artist's behaviour.

D The Government bought the painting in ignorance of the identity of the artist.

E The $1 million spent on art could have been spent on improving conditions in prisons.

2 Fraudsters have a creative new way of flourishing on the web – the art of phishing i.e. creating fake, look-alike websites to lure people into parting with personal details. Is it possible to guard against online 'phishing'? Unfortunately the only real weapon we have against such scams is our own unreliable intelligence. Fraudsters have realised that we are often most dopey when staring at our computer screen. As with all forms of deception, phishing scams try to be convincing, so many people fall for these scams. Anyone who clicks on a link in an e-mail purporting to be from a bank deserves everything they get.

But even if we are the most tech-astute, some phishing scams can still fool us. Our fear of fraud will often lead us to believe messages telling us that 'fraudulent activity is suspected on your account', and then willingly volunteer personal details – which is when the fraud actually begins. It is not just banking details that phishing scams will try to extract; it could be MySpace passwords, e-mail log-ins, anything that might help with identity theft. And, given that many of our personal details are secured with a single, simple password, it pays to be vigilant.

[Dopey – stupefied]

(i) Identify the main conclusion of the argument.

(ii) Identify an assumption underlying the argument.

A   We have no weapons against Internet scams.

B   The most tech-astute web users are difficult to fool.

C   It is difficult to guard against online phishing.

D   It is important to be vigilant.

E   Anyone who falls for phishing scams is stupid.

3 Attacks on the reputations of big businesses _____. The private sector contributes massively to taxes, provides wealth-generating systems and keeps entire systems going. Despite this, too many opinion-formers have a naïve view that the public sector is somehow morally superior to the private sector just because they do not make profits. Yet companies have to justify themselves everyday in the market place and respect the free choice of consumers. If customers feel ripped off or lied to, they stop buying – and companies go bust. If private equity houses, the drugs companies, television stations and food manufacturers were so terrible, their customers would shun them – because in a free market there is always choice. But in the case of the public sector there is almost no choice. You cannot change your tax department or local government authority if you feel like it– not at least until the next election.

(i) Which **one** of the following phrases most logically completes the blank in the above argument?

A are driving them to more welcoming countries

B are fair but not constructive

C are neither fair nor constructive

D have made them step up campaigns to promote public relations

E ought not to be tolerated

(ii) What is the function in the structure of the above argument of the comparison between private and public sectors?

A To counter the claim that the public sector is somehow superior to the private sector.

B To counter the conclusion that the private sector gives more free choice than the public sector.

C To show that the public sector is less accountable to the people than the private sector.

D To support the reasoning that the private sector contributes more to the nation than the public sector does.

E To support the reasoning that the private sector have to justify themselves continually to the public.

4 Psychologist Sam Gosling of the University of Texas, Austin, and colleagues recorded the Facebook profiles of 133 students, which included photos, personal details and messages from friends. They then showed these profiles to strangers and compared their impressions with a personality score taken from tests. They found that strangers' ratings of someone's extroversion, agreeableness, conscientiousness and openness (on the basis of the Facebook profile) were a good match with the personality score. By contrast, when the team then asked what impression people thought their own profiles created, they found it did not match how strangers perceived them.

A student read the information and concluded, 'People are better at judging the impressions made by strangers than the impressions they make on others.'

(i) Which **one** of the following statements, if true, would strengthen the student's conclusion?

(ii) Which **one** of the following statements, if true, would weaken the student's conclusion?

A Personality tests provide sufficient information to make a judgement about what someone is really like.

B People tend to make judgements about you within the first few milliseconds of getting to know you.

C People tend to try to present themselves on social networking sites as they would like to be seen.

D The strangers' ratings used simple, measurable personality categories, whereas profile owners made complex, subjective judgements about themselves.

E The team found similar results when they studied face-to-face interactions in the real world.

5 In developing technology which allows users to play but not copy discs, music companies are making the same mistake they have been making since the 1970s. Then they tried to deal with professional criminals, such as music pirates, by issuing badges with the words: 'Home taping is killing music - and it's illegal.' Badge messages do not shame real pirates into mending their ways. Home users who copy their own discs to listen to in their cars are not pirates, and do not like being branded as such. Digital rights management software, which controls copying, also _____. It has the same effect: innocent customers are frustrated while professional criminals carry on as usual. Music companies need to come up with a completely new approach to dealing with music piracy.

(i) Which **one** of the following phrases, inserted in the blank space, most logically completes the passage?

A aims to keep the music industry alive

B classes professional criminals and home users as the same

C prevents pirate and other criminal activity

D recognises the difference between professional criminals and home users

E represents a huge advance on 1970s technology

(ii) Which **one** of the following is an assumption underlying the passage?

A Home users have a vested interest in keeping music alive.

B Home users should legally be able to copy their discs for personal use.

C Organised criminals have a vested interest in keeping music alive.

D Organised criminals are doing the music industry less damage than the music industry believes.

E Organised criminals have access to better technology than music companies.

6 The table below shows the records of an amateur meteorologist for the town of Valeste in 2007.

| Month	Temperature			Sunshine & Rainfall		
	Average Daily Maximum	Maximum	Minimum	Average Sun per Day	Total Rainfall	Rain Days
January	10.4°C	13.8°C	- 0.5°C	2.3 hr	74.2mm	21
February	10.2°C	12.8°C	0.3°C	2.8 hr	111.1mm	16
March	11.7°C	15.2°C	- 0.3°C	5.5 hr	47.2mm	9
April	17.1°C	24.0°C	3.8°C	9.1 hr	1.6mm	1
May	16.5°C	22.6°C	6.1°C	6.3 hr	90.3mm	15
June	19.5°C	22.3°C	10.5°C	6.6 hr	58.2mm	12
July	19.7°C	23.4°C	11.0°C	8.2 hr	114.2mm	18
August	20.8°C	25.2°C	11.6°C	7.5 hr	27.6mm	7
September	19.7°C	25.1°C	7.0°C	6.0 hr	51.8mm	13
October	15.8°C	20.1°C	3.0°C	3.5 hr	35.9mm	6
November	12.2°C	16.5°C	- 0.6°C	3.2hr	43.4mm	13
December	9.7°C	14.1°C	- 1.0°C	2.4hr	88.6mm	11
Year	**15.3°C**	**25.2°C**	**- 1.0°C**	**5.3hr**	**744.1mm**	**142**

(i) Which three month period had the highest total rainfall?

A January, February, March

B May, June, July

C June, July, August

D July, August, September

E October, November, December

(ii) Which was the driest (in terms of total rainfall) of the months during which the temperature dropped below 0°C?

A January

B March

C April

D November

E December

 [Turn over

7
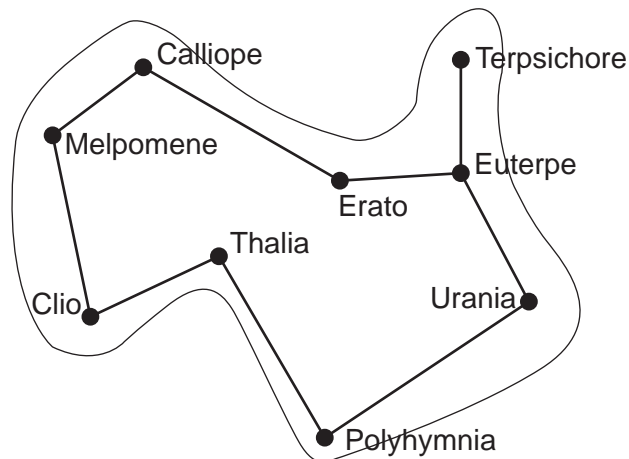
This map shows the island of Mnemosyne. Due to the mountainous nature of the island, the only roads connecting its nine towns are as shown.

The shortest distance (in kilometres) by road between the towns is as follows:

Calliope								
45	Clio							
35	80	Erato						
53	98	18	Euterpe					
17	28	52	70	Melpomene				
99	54	79	61	82	Polyhymnia			
69	114	34	16	86	77	Terpsichore		
66	21	101	94	49	33	110	Thalia	
76	92	41	23	93	38	39	71	Urania

Muse Travel operates a taxi service throughout the island, and also a helicopter service, on demand, between Melpomene, Polyhymnia and Terpsichore.

The taxis cost 50 cents per kilometre, and can be expected to travel at an average of 60 kilometres per hour.

The helicopters cost $40 for a one-way flight between any two of the helipads. All flights are of 15 minutes duration.

For customers wishing to hire Muse Travel to take them from Erato to Thalia, which route should they choose if they want:

(i) the shortest total journey time?

(ii) the cheapest journey?

A via Calliope, Melpomene and Clio.

B via Calliope, Melpomene and Polyhymnia.

C via Euterpe, Terpsichore, Melpomene and Clio.

D via Euterpe, Terpsichore and Polyhymnia.

E via Euterpe, Urania and Polyhymnia.

8 This is my patio, which is covered with 48 square tiles.
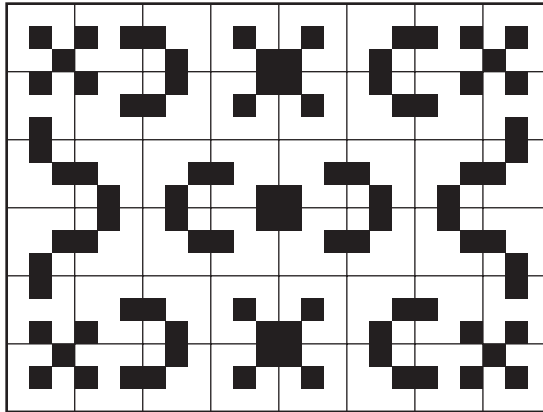
(i) How many **different** designs are there on the individual tiles that cover my patio?

A 4

B 5

C 6

D 7

E 8

(ii) Each of the square tiles that cover my patio contains two black non-adjacent squares in what is effectively a 3 x 3 grid. How many other such designs on individual tiles (that are not in my patio) are possible?

A 2

B 3

C 4

D 5

E 6

9 My block of flats is served by three lifts. All start at the ground floor (Marked '0' on the buttons). Lift A visits floors 0, 3, 6, 9 etc., lift B serves floors 0, 2, 5, 8 etc. and lift C serves floors 0, 1, 4, 7, etc.. The lifts arrive completely randomly but, on average, it takes 5 minutes from a lift leaving a given floor until it has returned and is ready to leave again. On average it takes the lift 15 seconds between successive floors (e.g. floor 0 to floor 3 takes 45 seconds). Each lift is at the ground floor for 30 seconds. I live on floor 10 and it takes me 30 seconds to walk up or down one floor.

(i) If I arrive at the lift doors on my floor, how long on average will it take me to get to the ground floor?

A   2 min 30 sec

B   3 min 10 sec

C   5 min 00 sec

D   5 min 30 sec

E   7 min 30 sec

(ii) I have just arrived at the ground floor. As I arrive, lifts A and C are just leaving. By how much will I be better or worse off on average by taking lift B rather than waiting for lift C?

A   B will be 5 min 15 sec faster than C

B   B will be 2 min 30 sec faster than C

C   B will be 2 min 00 sec faster than C

D   B will be 1 min 45 sec faster than C

E   C will be 30 sec faster than B

10 Larousse Language College will have 201 students in the Sixth Form next year. Mr Roche, who does the timetabling, knows that between 70% and 75% of the students intend to study French and between 40% and 50% of the students intend to study German. All students study either French or German or both.

(i) What is the smallest number that intend to study both French and German?

A 0

B 21

C 40

D 60

E 81

(ii) What is the largest number that intend to study both French and German?

A 49

B 100

C 150

D 201

E 250

11 We tend to worry about running out of oil, but the earth's supplies of minerals such as gold, silver, uranium, zinc, lead, indium and platinum are also running low.

Mineral	Uses	US demand per capita 2006	How many years left if the world consumes Earth's resources at today's rate	How many years left if the world consumes Earth's resources at half the US consumption rate
Aluminium	Transport, electrical goods	20.3 kg	1027	510
Gold	Jewellery, dental	0.6g	45	36
Lead	Pipes, batteries	5.3kg	42	8
Indium	LCD screens	0.42g	13	4
Platinum	Jewellery, catalytic converters, fuel cells in cars	0.58g	360	42
Silver	Jewellery, catalytic converters in cars	20g	29	9
Tantalum	Cellphones, camera lenses	2g	116	20
Uranium	Weapons, power stations	76g	59	19

(i)   Which **one** of the statements below follows from the information in the table?

The gap between US consumption and average actual world consumption is:

A   Smallest for aluminium and greatest for lead.

B   Smallest for gold and greatest for platinum.

C   Smallest for gold and greatest for tantalum.

D   Smallest for lead and greatest for aluminium.

E   Smallest for platinum and greatest for gold.

(ii) Which **one** of the following is **not** a variable which might affect the predictions in the table above?

A Development of new technologies.

B Discovery of new reserves of minerals.

C Migration.

D Plans to mine the moon.

E Population growth.

12 It may seem risky to allow children to climb trees, race around or engage in water sports. They may hurt themselves. They may drown. However, Western society is so risk adverse that we avoid many beneficial activities. Children develop and learn about their limits when they are playing. They learn what is safe and what is not. Children who play outside develop independence and responsibility. Children who are protected from all risk are not only more vulnerable to life's risks, they are also often unhealthy as a result of lack of exercise. Thus the benefits of engaging in risky activities could outweigh their potential risks. What we need to do is to make objective and realistic assessments of the risks and benefits of adventurous outdoor play.

(i) 'The benefits of engaging in risky activities could outweigh their potential risks.'

(ii) 'Children who are protected from all risk are not only more vulnerable to life's risks, they are also often unhealthy.'

Which **one** of the following describes the function in the above argument of each of the statements **(i)** and **(ii)**?

A Counter argument.

B Explanation.

C Intermediate conclusion.

D Main conclusion.

E Reason.

13 Sir,

Californian state laws must be changed to allow the sale of human organs. The law recognises our right to give away an organ such as a kidney. So the law should also recognise our right to sell one. The law recognises our right to pay for life-saving medical treatment. So it should also recognise our right to pay for a life-saving organ for transplant. Those able to pay for organs would benefit at no one's expense but their own. Those unable to pay would still rely on charity, as they have done. And those able to pay would no longer be on hospital waiting lists, which would increase the chances of those remaining of getting the organ they need. Many of the thousands waiting for organs would be spared much suffering and escape an early death.

Ali Rubenfeld
California, USA

**(i)** Which **one** of the following best expresses a flaw in the reasoning?

A Having an organ transplant might be a necessary condition for avoiding an early death, but it is not sufficient.

B If the law allowed the sale of human organs, donors might put their own lives in danger.

C My right to buy a life-saving organ implies your duty to sell me one.

D The fact we have one right does not necessarily mean we should have another right.

E The opinions of a person from California cannot be generalised to a person in, for example, Penang.

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

A A rich person would be able to buy an organ from a suitable donor.

B Allowing the sale of human organs would create sufficient supply for everyone.

C It is as morally acceptable to sell an organ for profit as it is to donate one.

D People would still be prepared to give organs away for the poor.

**E** There is no chance of exploitation resulting from a system of selling organs.

14 (i) Which **one** of the following is an argument?

(ii) Which **one** of the following is an explanation?

A Many parents feel they should monitor their children's use of Internet chatrooms because they have heard that some older men lie about their age in order to make contact with teenagers through such chatrooms.

B Many teenagers portray a fantasy life in their contributions to chatrooms. If parents read their conversations and took them literally, they would be scared out of their wits.

C Parents have a responsibility to protect their children by monitoring their use of Internet chatrooms and checking that they are neither accessing inappropriate sites nor being targeted by people wanting to exploit them.

D Some parents have been able to save their children from serious harm by reviewing their e-mails and participation in chatrooms and intervening when necessary.

E Very few parents would contemplate opening their children's letters: they should regard reading their e-mails as equally unacceptable.

15 Boring playgrounds could be leading to bullying in schools, a charity has warned, after a survey suggested that many parents think their children's schools lack green space. According to one in five parents polled, schools lack proper spaces for sports, and, as a result, one in six children are bored at break times. Over half of the parents in the survey agreed that teachers' fears for children's safety are hampering play. It is known that children often engage in bullying because they are bored. So, clearly, facilities for stimulating play are needed. Thus schools should provide more green space.

(i) Which **one** of the following statements is an unstated assumption in this argument?

A All of the children who say they are bored at breaks engage in bullying.

B Children cannot gain anything from being bored.

C Green spaces would provide stimulating play areas.

D Teachers should not be concerned about children's safety.

E You need green spaces for sport.

(ii) Which **one** of the following statements expresses a flaw in the above argument?

A The argument makes an unfair personal attack on teachers for being overly restrictive and causing problems.

B The argument only refers to one in six children which is too few to be concerned about.

C The argument restricts the options to either encouraging stimulating play or dealing with playground bullying.

D The argument uses insufficient and possibly unreliable evidence from a single survey to support a general conclusion.

E The argument wrongly excludes other methods of dealing with bullies.

16 The graph below shows speed against time for a cyclist making a journey.
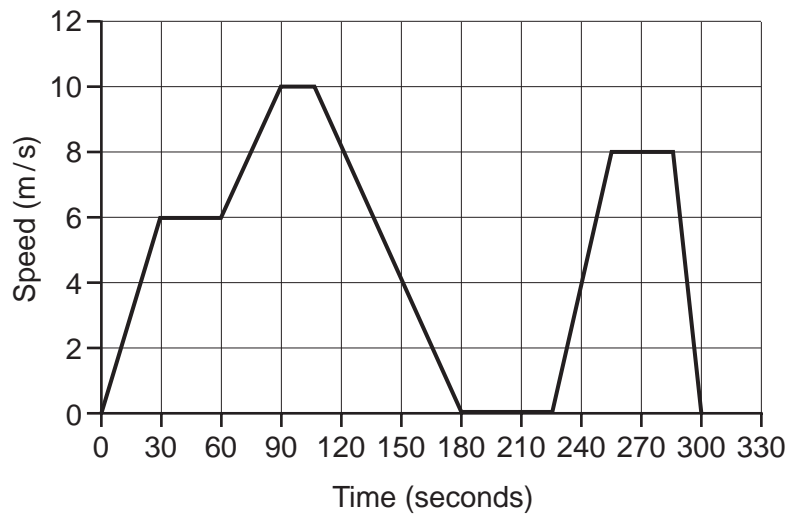
(i) Which **one** of the following graphs correctly shows distance travelled against time for the same journey?

A

B

C

D

E
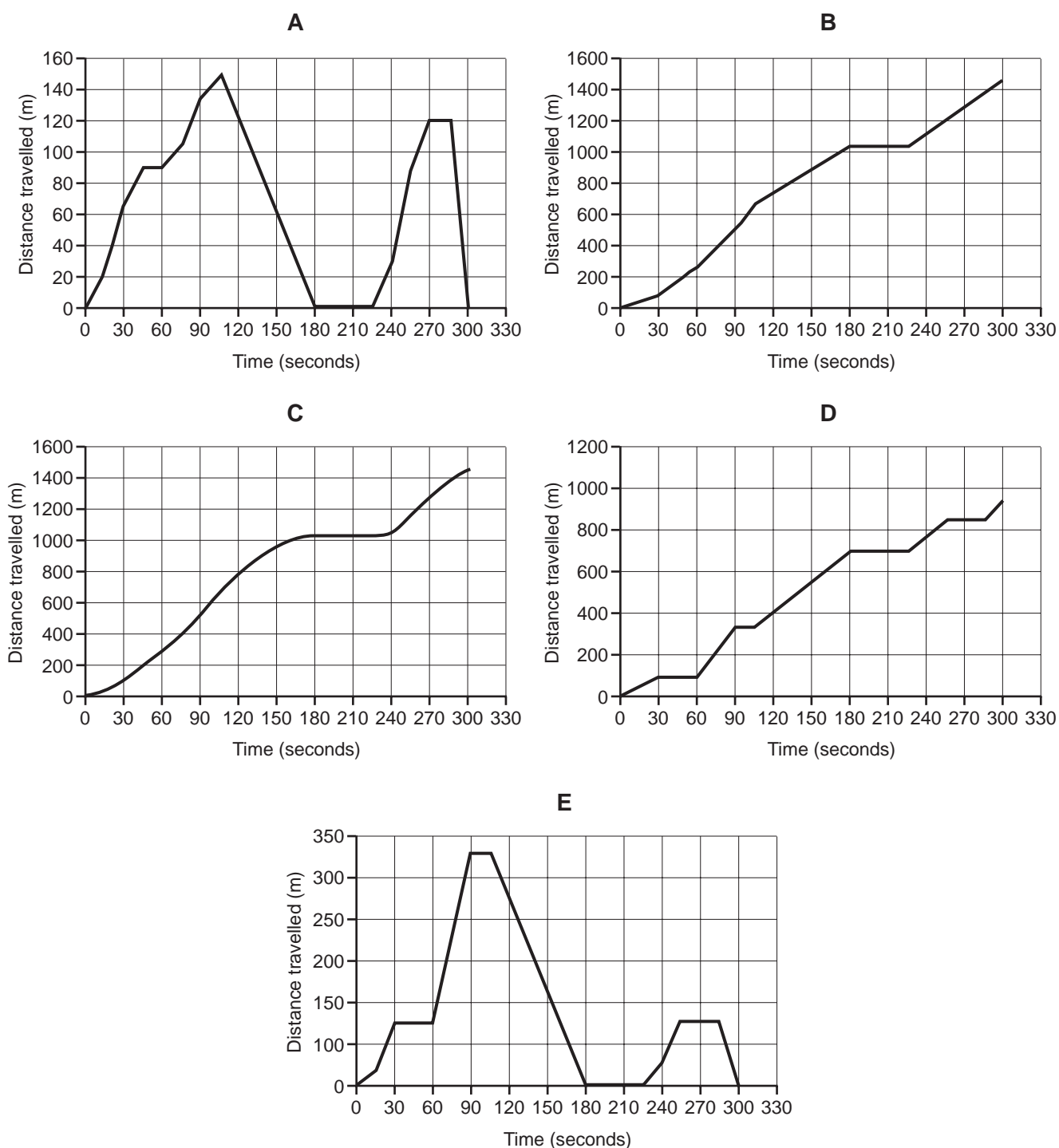
(ii) Which **one** of the following can be inferred from the speed-time graph?

A The cyclist's journey included both uphill and downhill sections.

B The cyclist stopped four times during her journey.

C The cyclist's journey contained four sections on horizontal ground.

D The cyclist's greatest acceleration was just after a stop.

E The cyclist did not retrace her tracks at all.

17

Date	Number of Hits	5-Day Average
1st	349	386.2
2nd	307	357.4
3rd	328	345.4
4th	381	354.2
5th	504	373.8
6th	482	400.4
7th	255	390.0
8th	360	396.4
9th	■■	396.4
10th	394	374.4
11th	363	350.6
12th	470	393.6
13th	516	424.8
14th	302	409.0
15th	373	404.8
16th	446	421.4
17th	387	404.8

This is the summary of hits on the Wotsthis website up to the 17th of the month. Each day the number of hits is recorded and the rolling 5-day average is calculated. For example, there were 470 hits on the 12th and the average for the 5-days from the 8th to the 12th was 393.6 hits per day.

(i) In the (extremely unlikely) event of there being no hits at all on the 18th, what would the 5-day average drop to?

A 275.8

B 301.6

C 323.8

D 327.4

E 328.0

(ii) The number of hits on the 9th has been obscured on the printout of the spreadsheet.

How many hits were there on the 9th?

A 302

B 360

C 381

D 416

E 504

18 A selective school is evaluating a new entrance test for admitting applicants. In the first two years the test results were not being used for admissions, but the proportion of those scoring over 60% average in the examinations at the end of the first year were recorded. The results are shown below:

Percentage of pupils		Entrance test	
		Pass	Fail
First year examination score	60% or over	56%	18%
	Under 60%	14%	12%

(i) In the following year, the school decides it will guarantee places to those who pass the entrance test. If there are 200 applicants for 180 places and the pass/fail rates stay as above, how many of those who fail the entrance test will gain admission?

A None

B 24

C 32

D 40

E 68

(ii) In the case of the pupils admitted to the school as described in part **(i)**, what would be the expected results of the first year examination (percentage scoring 60% or over)? Answers are given to the nearest 1%.

A 56%

B 70%

C 74%

D 76%

E 82%

19

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16:35:47
29/08
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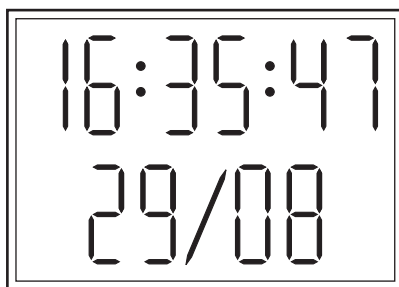
My digital clock shows the time and the date. This is its appearance at 4.35pm and 47 seconds on August 29th; one of the few times each year that all ten digits are displayed simultaneously.

(i) On which day each year does my clock **first** display all ten digits simultaneously?

A March 24th

B March 25th

C March 26th

D March 27th

E March 28th

(ii) On any day of the year, what is the earliest hour my clock can display all ten digits simultaneously?

A 01

B 02

C 12

D 13

E 16

20 2% of the population of Narubia have the disease maki-topi. Symptoms of the disease start to show between the ages of 15 and 25 and it is usually fatal. The United Health Organisation has decided to use a simple screening test (90% of those who will develop the disease show up as positive on this test) on all 13 year-olds. Those found positive for maki-topi are then treated with an expensive but effective drug which will prevent them developing the disease. However, it is found that the treatment is much more expensive than expected due to many more than the expected number of people being treated.

(i) Which **one** of the following best explains this?

A A significant number of false negatives* in the screening test mean that fewer of those with the disease than expected are identified.

B Because the vast majority do not have the disease, a very small proportion of false positives** in the screening test will result in many people being treated who do not need it.

C The screening test is less effective in identifying those who have the disease than in identifying those who do not have the disease.

D The screening test fails in 1% of cases but 2% of Narubians develop maki-topi.

E The percentage of false positives** in the screening test is twice the percentage of false negatives*.

(ii) If we wanted to know what percentage of people do not have the disease and pass the screening test (i.e. their test results are correct), which **one** of the following additional pieces of information would **not** enable us to calculate this?

A The percentage of all those taking the test who are found negative.

B The percentage of all those taking the test who are found positive.

C The percentage of those who do not have the disease who test negative.

D The percentage of those who do not have the disease who test positive.

E The percentage of those who have the disease who test negative.

* A false result in a screening test, leading to the classification of a person, who is actually positive, as negative.
** A false result in a screening test, leading to the classification of a person, who is actually negative, as positive.

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