

BioMedical Admissions Test

4500/01

Wednesday

1 November 2006

Morning

One hour

SECTION 1 Aptitude and Skills

Instructions to Candidates

Please read this page carefully, but do not open the question paper until you are told that you may do so.

A separate answer sheet is provided for this section. Please check you have one. You also require a soft pencil and an eraser.

Please first write your name, date of birth, BioMedical Admissions Test candidate number and centre number in the spaces provided on the answer sheet. Please write very clearly.

Speed as well as accuracy is important in this section. **Work quickly, or you may not finish the paper.** There are no penalties for incorrect responses, only points for correct answers, so you should attempt all 35 questions. Unless otherwise stated, all questions are worth one mark.

Answer on the sheet provided. Many questions ask you to show your choice between options by shading a circle (or circles, if specified in the question). If questions ask you to write in words or numbers, be sure to write clearly in the spaces provided. If you make a mistake, erase thoroughly and try again.

Any rough work should be done on this question paper.

Calculators are NOT permitted.

Please wait to be told you may begin before turning this page.

This paper consists of 23 printed pages and 5 blank pages.



- 1 The ratio of seabirds to people on Gannet Island is 80:1. However, during the last twenty years the seabird population has fallen by 60 %, whilst the human population has increased by 25 %.

What approximately was the ratio of seabirds to people on Gannet Island twenty years ago?

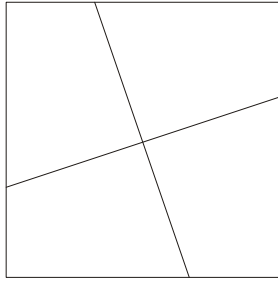
- A 150:1
- B 175:1
- C 250:1
- D 500:1

- 2 “Freedom of speech is generally considered to be a key element of a democracy. But when that freedom is used to incite hatred of minority groups, another key feature of democracy – tolerance – is lost. So while it is true to say that freedom of speech is very desirable, it has to have limits put upon it if democracy is to be sustained.”

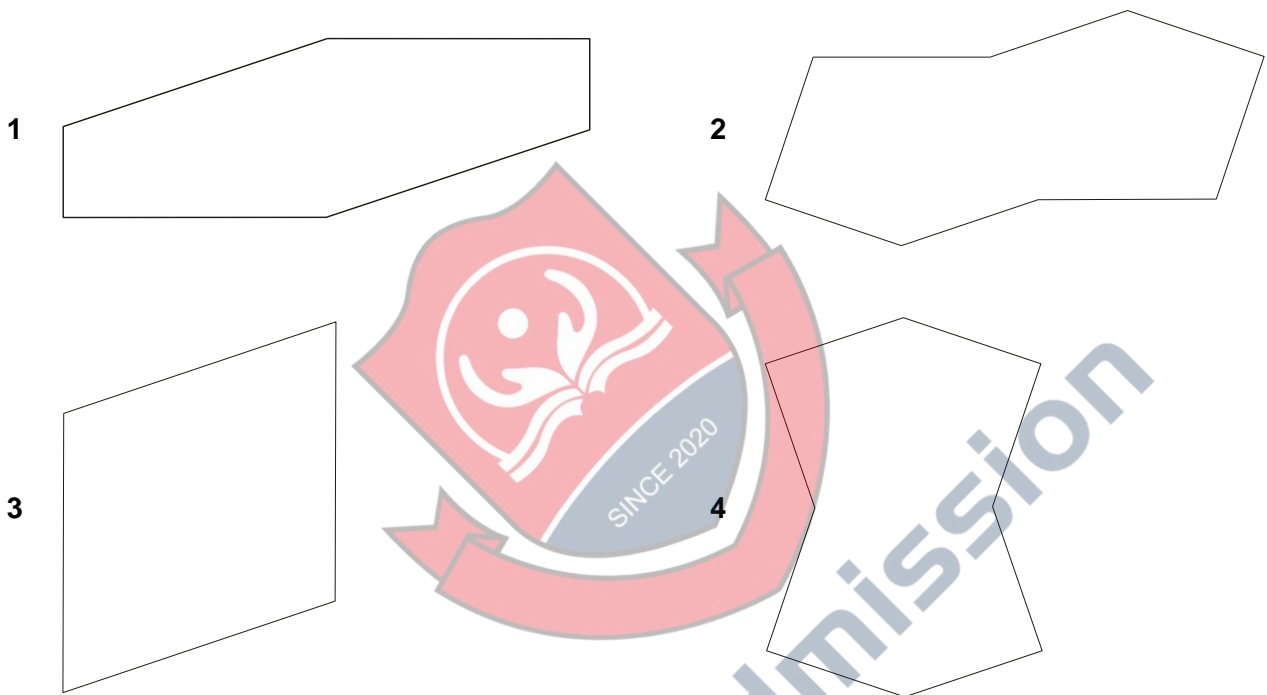
Which of the following best expresses the conclusion of the passage?

- A Freedom of speech and tolerance cannot co-exist.
- B Inciting hatred of minority groups should be illegal.
- C Freedom of speech and tolerance are key features of democracy.
- D Tolerance of minority groups is more important than freedom of speech.
- E Freedom of speech in a democracy cannot be unrestrained.

- 3 A square conference table is made up of four smaller tables as shown below:



Which two of the following table shapes could be made up using these four smaller tables?



- A 1 and 2 only
- B 1 and 3 only
- C 1 and 4 only
- D 2 and 3 only
- E 2 and 4 only
- F 3 and 4 only

- 4 “The media have an important role to play in a democracy, since a democracy requires that voters are well informed about the political issues. However, whenever a government minister makes a serious mistake, journalists seize on it as the only topic worth reporting in the political sphere. They focus on it to the exclusion of all other important political issues. Moreover, the particular story itself has its own dramatic requirements, which means that every detail that supports claims of a minister’s incompetence is included, whereas details that would support an alternative view are omitted. A good story is not the same thing as the truth. So it is clear that political journalists are not doing their job properly.”

Which of the following is an unstated assumption upon which the above argument is based?

- A Political journalists are deliberately distorting the truth.
- B Voters believe everything they read in the newspapers.
- C It is the job of political journalists to inform voters about the political issues.
- D Democracy does not require that voters know about ministers’ mistakes.
- E Political journalists are aiming to destroy the careers of politicians.

- 5 A railway tunnel is 615 metres long. There is a strict speed limit of 45 kilometres per hour inside the tunnel and within 500 metres of either end.

The front of a train, whose length is 80 metres, has just entered the tunnel. The front of another train, of length 120 metres and travelling towards the tunnel in the opposite direction on a parallel track, is 40 metres away from the other end.

If both trains travel at the speed limit, how many seconds will it be before both trains have completely emerged from the tunnel? (Give your answer to the nearest second.)

- 6 “Despite a growing problem of eating disorders among young women, the print media still contribute to the problem by featuring photographs of models far thinner than most ‘ordinary’ people. On the one hand they publish articles about the dangers of anorexia and bulimia, but on the other hand they use images of excessively thin models to promote the latest fashions.”

Which one of the following could be drawn as a conclusion of the passage above?

- A Young women are more influenced by photographs in the media than by articles about eating disorders.
- B The print media are unaware of the effects of the photographs they publish.
- C The print media are inconsistent in their approach to this issue.
- D The public are only interested in fashion models who are extremely thin.
- E The dangers of anorexia and bulimia are insufficiently understood.

Questions 7 to 10 refer to the following information:

The table below shows one measure of pupils' achievements in all GCSE subjects in England broken down by ethnicity, gender and whether they have English as a first language. The measure shown is the percentage of pupils achieving 5 or more GCSE passes at grades A* to C. The columns labelled 'KS 2-4 VA Measure' give a measurement of the pupils' improvement between Key Stage 2 (typically aged 11) and Key Stage 4 (typically aged 16). This is commonly known as 'Value Added'.

Table 43: Achievements at GCSE at Equivalents for pupils at the end of Key Stage 4, in maintained schools, in 2005, by ethnicity and English as a first Language

		English as a first language			Other than English as a first language			Total [†]		
		Eligible pupils	% with 5 A* to C	KS 2-4 VA Measure	Eligible pupils	% with 5 A* to C	KS 2-4 VA Measure	Eligible pupils	% with 5 A* to C	KS 2-4 VA Measure
Ethnicity										
Boys	White	242,958	50.3	975.0	3,342	48.0	1008.7	246,777	50.3	975.3
	Mixed	5,211	48.9	972.3	629	50.9	996.1	5,862	49.0	974.1
	Asian	2,534	63.7	1006.8	15,605	51.8	1009.9	18,152	53.4	1009.4
	Black	6,568	37.9	975.0	3,319	37.3	1004.2	9,929	37.7	982.3
	Chinese	266	84.2	1020.3	922	74.9	1027.8	1,192	77.1	1025.7
	Any other	822	56.0	984.0	1,763	46.3	1013.0	2,600	49.3	1001.4
	All pupils[†]	268,064	50.0	975.1	26,091	49.8	1009.3	296,077	49.9	977.5
Girls	White	236,567	60.2	994.4	3,143	57.3	1030.0	240,110	60.2	994.7
	Mixed	5,621	60.1	988.9	581	59.4	1017.1	6,223	59.9	990.8
	Asian	2,326	75.4	1026.5	14,744	62.6	1034.4	17,090	64.3	1033.3
	Black	6,705	53.6	1005.4	3,734	47.5	1032.0	10,462	51.4	1012.4
	Chinese	256	84.4	1036.9	863	85.4	1044.4	1,124	85.1	1042.4
	Any other	754	62.3	994.4	1,573	57.6	1042.0	2,328	59.1	1023.3
	All pupils[†]	261,178	60.1	994.5	25,241	60.0	1033.3	288,182	60.0	997.3
Total	White	479,525	55.2	984.6	6,485	52.5	1019.3	486,887	55.1	984.9
	Mixed	10,832	54.7	980.9	1,210	55.0	1005.8	12,085	54.6	982.7
	Asian	4,860	69.3	1016.3	30,349	57.1	1021.9	35,242	58.7	1021.1
	Black	13,273	45.9	990.2	7,053	42.7	1018.7	20,391	44.7	997.5
	Chinese	522	84.3	1028.5	1,785	80.0	1036.0	2,316	81.0	1034.0
	Any other	1,576	59.0	989.0	3,336	51.6	1027.1	4,928	54.0	1012.0
	All pupils[†]	529,242	55.0	984.7	51,332	54.8	1021.2	584,259	54.9	987.3
[†] This includes unclassified pupils										

- 7 To the nearest 1%, by how many percentage points do Asian students out perform white students at GCSE?
- A 3%
 - B 4%
 - C 5%
 - D 13%
 - E 14%
- 8 Which ethnic group, not having English as a first language, achieves the greatest improvement between Key Stages 2 and 4?
- A White
 - B Mixed
 - C Asian
 - D Black
 - E Chinese
- 9 Which one of the following statements is best supported by the data shown?
- A Boys show a bigger improvement between Key Stages 2 and 4 than girls.
 - B A higher proportion of Chinese pupils have English as a second language than any other group.
 - C The difference in performance between boys and girls is smaller for white pupils than for any other ethnic group.
 - D Pupils from only one ethnic group with English as a second language perform better at GCSE than their equivalents with English as their first language

- 10 The KS 2-4 VA Measure shows that, for all ethnic groups, girls improve more between the ages of 11 and 16 than boys. Which one of the following could **not** be a possible explanation for this?
- A Girls are innately more intelligent than boys.
 - B Boys mature later than girls.
 - C Boys become more interested than girls in non-academic pursuits between these ages.
 - D The bigger improvement for Asian girls biases the averages.
-

- 11 "A recent study compared the mental abilities of cannabis smokers with those of people who had never smoked cannabis. There were three groups of subjects: group 1, those who had smoked cannabis for 15 years; group 2, those who had smoked cannabis for 7 years; group 3, those who had never smoked cannabis. Because it is known that smoking cannabis has an immediate effect on brain activity, none of the subjects had smoked for 24 hours before the test. All subjects were asked to memorise and recall a list of 15 words. On average, those in group 1 recalled 7 words, those in group 2 recalled 9 words, and those in group 3 recalled 12 words."

Which of the following could help to explain the results of the study?

- 1 Long-term smoking of cannabis impairs one's ability to learn and remember.
 - 2 Cannabis can affect brain activity for more than 24 hours after smoking it.
 - 3 Before they started using cannabis, subjects in groups 1 and 2 had lower IQs than those in group 3.
- A 1 only
 - B 2 only
 - C 1 and 2 only
 - D 1 and 3 only
 - E 1, 2 and 3

- 12** A supermarket always makes 40% gross margin on its cereals. So if it sells a box for \$1, it has paid the supplier 60 c. When items are sold at a special offer price, the suppliers are expected to reduce their prices so that the supermarket still makes the same percentage gross margin.

A particular cereal normally sells for \$1.50 a box. This week there is a special offer which gives the customer 3 boxes for the price of 2.

By how much has the supplier of this cereal had to reduce the price of each special offer box?

- A** 30 c
- B** 40 c
- C** 45 c
- D** 60 c
- E** 90 c

- 13** The table below shows UK standard postal rates from April 2006.

Max weight	First class	Second class
60 g	32 p	23 p
100 g	49 p	37 p
150 g	68 p	50 p
200 g	84 p	62 p
250 g	99 p	75 p
300 g	£1.14	88 p
350 g	£1.29	£1.00
400 g	£1.49	£1.21
450 g	£1.70	£1.39
500 g	£1.90	£1.55
600 g	£2.30	£1.78
700 g	£2.69	£2.01
750 g	£2.89	£2.12
800 g	£3.10	n/a
900 g	£3.49	n/a
1 kg	£3.89	n/a

Available stamp denominations (below £1) are as follows:

1 p	2 p	5 p	9 p	10 p	20 p	23 p
32 p	37 p	42 p	44 p	49 p	50 p	72 p

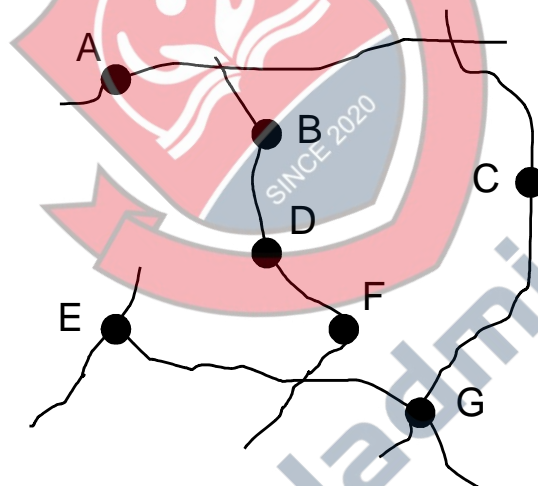
What is the lowest standard postal rate which cannot be made up using only one or two stamps?

- 14 "According to scientists who have studied fingerprinting, no one knows whether it is reliable because its accuracy has never been measured, even though it has been used for over a hundred years. But we should not doubt its reliability because fingerprint examiners are the experts in using the technique, and they all agree that it is a completely reliable method of identifying criminals."

Which one of the following identifies a weakness in the above argument?

- A Sometimes experts in any technique fail to apply their method correctly.
- B Scientists do not know enough about fingerprinting to judge whether it is accurate
- C The opinion of experts does not guarantee the reliability of their method.
- D The fact that a technique has been used over a long period does not prove its reliability.

- 15 The map below shows an area of Scotland and the relative positions of seven villages and towns. Unfortunately, on the map I have, none of them are named.



I am looking for Windyhill. I ask a local for help, but he can only give me the following information:

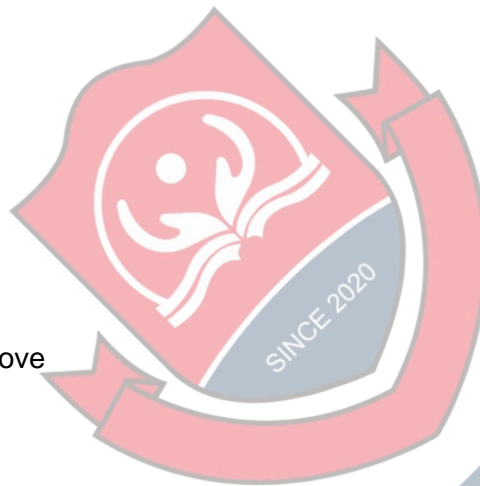
Clashandarran is south and east of Aultvaich.
 Wellbank is due east of Ruilick.
 Beauly is south and west of Windyhill.
 Aultviach is due north of Ruilick.
 Rheindown is due south of Clashandarran.

Which town is Windyhill?

- 16** “Most scientists now agree that global warming is a major world threat, and that human activity in generating greenhouse gasses is at least a contributory factor, if not the whole explanation. Although many countries in the developed world have set targets to reduce greenhouse gas emissions, it is considered unrealistic to expect such restraint by the less developed countries as they attempt to improve their economies and thus reduce poverty. So we are left with a stark choice: is it a priority to act to reduce the long term problems of global warming, or to alleviate current levels of poverty in developing countries?”

Which one or more of the following is an assumption of the above argument?

- 1** Less developed countries have not set targets to reduce greenhouse gas emissions.
 - 2** Developed countries regard alleviating poverty as a higher priority than reducing global warming.
 - 3** Levels of prosperity in the developing countries are not improving.
 - 4** Developing countries can only improve their economies by activities which generate greenhouse gasses.
- A** 1 only
B 4 only
C 1 and 3 only
D 2 and 4 only
E 2, 3 and 4 only
F None of the above



4Uadmission

- 17** Mrs Watts took her grandson and nine of his school friends to a local theme park as a birthday treat. She had saved £125 to spend on rides, the prices of which are shown below.

MAIN RIDES	Apocalypse	£9.00
	Armageddon	£7.50
OTHERS	Dodgems	£5.00
	Helter Skelter	£4.50
	Carousel	£3.50

All the children want to go on one of the main rides. Mrs Watts decided that the children could have two rides each. If they chose Apocalypse then they had to go on the Carousel for their other ride. If they chose Armageddon then they could choose between the Dodgems and Helter Skelter for their second ride. Two chose to go on Apocalypse.

When she had paid all their rides, she found that she had exactly enough left to buy each of them a 25 p packet of bubble gum.

How many went on the Dodgems?

- A** 2
- B** 3
- C** 4
- D** 5
- E** 8



- 18** "Farmers are often criticised for their heavy use of pesticides, which has had a harmful effect not only on many species of wildlife, but, it is alleged, on people who live near farms where pesticides have been sprayed. And yet the fault does not lie with farmers. People choose supermarkets according to price. Supermarkets compete for our business and so bring prices down to gain our business. Farmers are therefore forced to sell their produce at increasingly lower costs, and therefore need to maximise their yield or make a loss at the prices supermarkets demand. Therefore people do not have the right to complain about farmers' use of pesticides."

Which of the following is a flaw in the above argument?

- A** The argument has confused objections to the manner of use of pesticides with the use in general.
- B** The argument contradicts itself by saying that pesticides damage the environment but also that they help maximise yield.
- C** It assumes that the use of pesticides is the only way to avoid making a loss.
- D** Farmers sometimes sell their produce direct to the public at farmers' markets.
- E** There is no proof that people who live near farms have been affected by pesticides.

- 19 Ayesha swims 6 mornings a week, taking Saturday off. She knows that, for each scheduled session she misses, it will take three sessions before her fitness returns to its previous level.

Up to the beginning of April 2006, she had a long uninterrupted run of training and was as fit as she could expect to be. She then had a week's holiday from 8th April to 15th April inclusive and did not swim while she was on holiday. Two weeks after coming back, she had a sore shoulder and missed four further sessions. The calendar for the relevant period is shown below.

April							May						
Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
					1	2	1	2	3	4	5	6	7
3	4	5	6	7	8	9	8	9	10	11	12	13	14
10	11	12	13	14	15	16	15	16	17	18	19	20	21
17	18	19	20	21	22	23	22	23	24	25	26	27	28
24	25	26	27	28	29	30	29	30	31				

If she misses no further sessions, after the session on which date can she expect to be fully fit again?

- A Wednesday 10th May
- B Monday 15th May
- C Thursday 18th May
- D Friday 19th May
- E Wednesday 24th May

PLEASE TURN OVER

Questions 20 to 22 refer to the following information:

The graphs below relate to the number of General Practitioners (GPs) in practices in England from 1994 to 2004.

Figure 1. Number of GPs

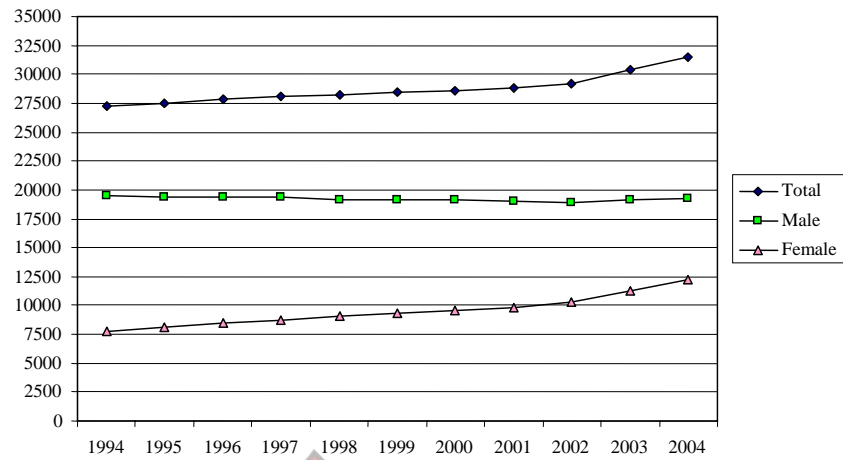


Figure 2. Percentage of GPs practising part time

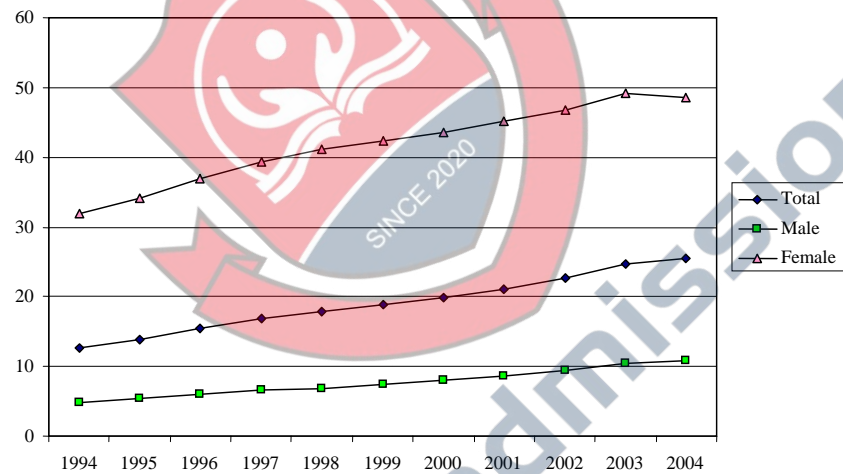
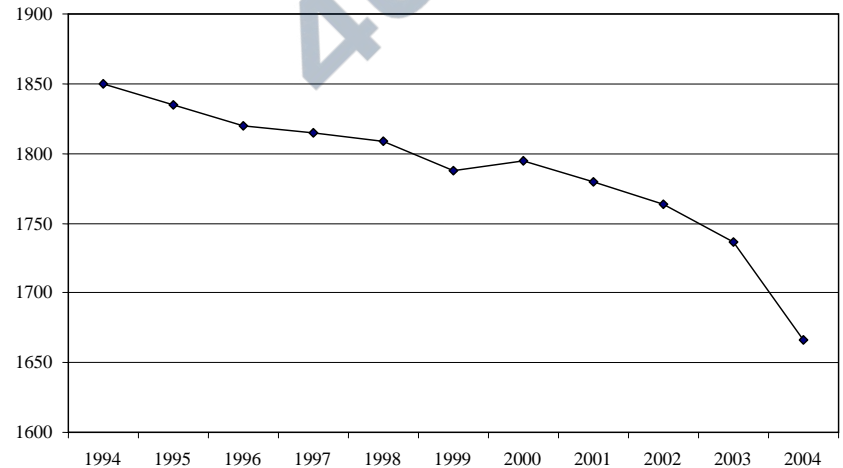


Figure 3. Patients per practitioner



- 20 What, approximately, in 2004 was the percentage of General Practitioners who were female?
- A 12%
 - B 36%
 - C 50%
 - D 57%
 - E 65%
- 21 Approximately how many female GPs were practising part time in 2004?
- A 1300
 - B 3000
 - C 6000
 - D 8000
 - E 16000
- 22 Whilst the number of GPs has risen between 1994 and 2004, the percentage practising part time has also risen. Assuming those practising part time work 50% of normal hours, what, approximately, has been the effect on the total number of GP hours?
- A a fall of 35%
 - B a fall of 1%
 - C a rise of 1%
 - D a rise of 10%
 - E a rise of 19%
-

- 23 Six friends went to their local agricultural show. They all decided to enter the 'Guess the Weight of the Bull' competition. The guesses of the six friends are shown below in hundredweight (cwt).

	cwt
Wally	40
Herbert	37
Jack	26
Mary	19
Simon	9
Suzie	4

The average of their guesses was closer than any of their individual guesses. Suzie's guess is nearer than Wally's.

What, to the nearest cwt, is the weight of the bull?

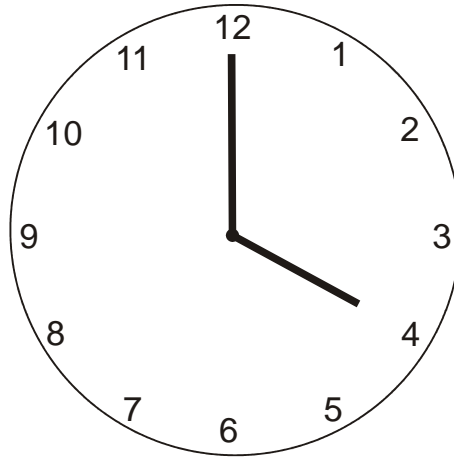
- A 20
- B 21
- C 22
- D 23
- E 24

- 24 "The World Health Organisation has recorded 184 human cases of the H5N1 strain of bird flu, all of them caused by contact with infected birds. That 103 of these have resulted in death indicates how dangerous this virus is, and no vaccine has yet been developed. For there to be a worldwide epidemic of H5N1 amongst humans, it would have to be possible for the virus to be passed easily from one person to another. Unlike normal influenza, H5N1 can only bind to receptors deep in the lungs. As a result, it cannot multiply in the upper respiratory system and thereby be transmitted by sneezing and coughing. So it cannot be transmitted easily between people. Influenza viruses can mutate, and thus possibly change the way in which they infect victims."

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

- A Unless a vaccine is developed, many more people will catch the H5N1 strain of bird flu.
- B If H5N1 mutates, there is likely to be a worldwide epidemic amongst humans of this strain of bird flu.
- C Unless H5N1 mutates, a worldwide epidemic amongst humans of this strain of bird flu is unlikely.
- D If a person has no contact with birds they are unlikely ever to catch the H5N1 strain of bird flu.

25



The minute hand of this clock is 8.4 cm long and the length of the hour hand is 6.3 cm.

For this clock, what is the value of the ratio:

area swept out by minute hand : area swept out by hour hand

during any particular period of time?

- A 16:1
- B 64:3
- C 64:1
- D 80:1
- E 320:3



4Uadmission

- 26** “There is no point in building new nuclear power stations, which would increase the amount of dangerous nuclear waste. The major reason for doing so would be to reduce reliance on fossil fuels as a means to generating electricity, and thereby to reduce carbon emissions. New developments in green technologies such as wind power have resulted in a huge rise in the amount these technologies add to the worldwide electricity supply. Energy experts predict that by 2010 they will be contributing much more to that supply than will nuclear power. Although there will still be a need in 2010 for large scale fossil fuel generators, the future trend is clear. No new nuclear plants could be completed before 2020, and by then they will not be needed.”

Which of the following give(s) a reason why the conclusion of the above argument might be unsafe?

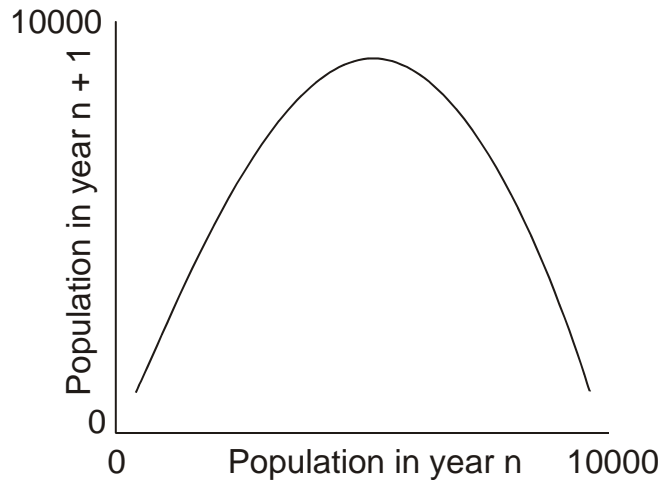
- 1** In 2020 the worldwide demand for electricity may have increased.
- 2** The rate of increase in the amount of electricity contributed by green technologies may slow down.
- 3** By 2020, safe ways of storing nuclear waste may have been developed.

- A** 1 only
- B** 2 only
- C** 3 only
- D** 1 and 2 only
- E** 2 and 3 only

- 27** Bill and Asha are on a walking holiday. Today they will walk up a local mountain. This involves some walking on the flat, then a climb to the top. They will reverse their route on the way down. They looked at the map and found that the total distance they plan to walk is 20 km. They walk at 4 km/h on the flat, 3 km/h uphill and 6 km/h downhill.

What will their total walking time be (in hours)?

- 28** The population of snaffers on a plain has been studied over a large number of years. The graph below shows the relationship between their numbers in successive years. An individual point on this graph would show, for example, the population in 2005 (along the horizontal axis) against the population in 2006 (along the vertical axis).



Which one of the following would best explain the shape of this curve?

- A** The births in each year just match the deaths due to old age and predation.
- B** When there is enough food to go round the snaffers can breed freely, when the population is large, there is high mortality due to starvation.
- C** Each pair of snaffers produces, on average, just over two cubs a year. The life expectancy of a snaffer is 5 years.
- D** The population of snaffers peaked around the middle of the years of the survey.
- E** The population oscillates between a very low value and a very high value in successive years.

- 29** Acrylamide is a chemical produced in many foods – for example, potatoes, pastries, bread, toast – during normal cooking processes. Animal studies have shown that when ingested, acrylamide is broken down to produce glycidamide, which can damage DNA and cause cancer. In humans, less glycidamide is produced than in animals when acrylamide is broken down. The only way to avoid production of acrylamide in food during cooking is to cook the food at temperatures lower than 120 °C. However, roasting or frying potatoes at lower temperatures makes them absorb more fat, and eating more fat is bad for one's health. Also, the lower the temperature during cooking, the more likely it is that bacteria will survive, thus increasing the risk of food poisoning.

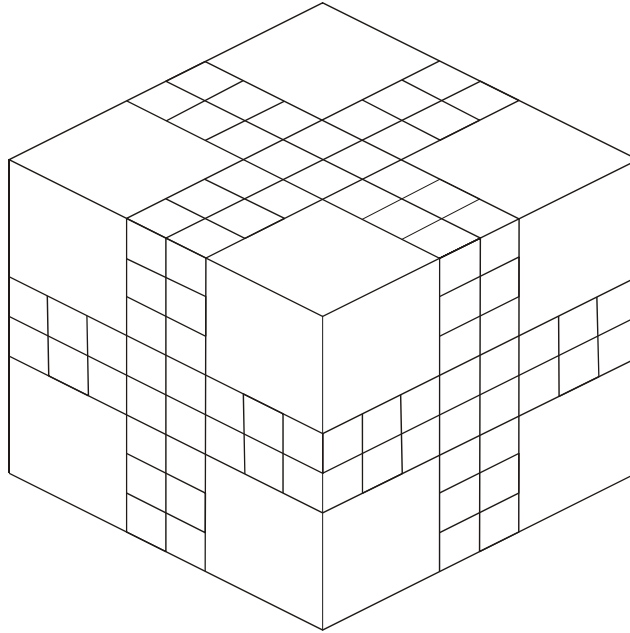
Which of the following can be concluded from the information in the passage above?

- 1** Ingesting acrylamide may be less dangerous for humans than for animals.
- 2** To avoid health problems, it is best to cook food at temperatures higher than 120 °C.
- 3** Eating roast or fried potatoes inevitably involves some health risks.

- A** 1 only
B 1 and 2 only
C 2 and 3 only
D 1 and 3 only
E 1, 2 and 3



4Uadmission



This is a wooden puzzle. It consists of three different sizes of wooden cubes (with sides 1 cm, 2 cm and 3 cm respectively) packed together to make one solid cube.

All six faces of the puzzle are identical in appearance, and all of the cubes that lie completely below the surface of the puzzle are 2 cm cubes.

How many 2 cm cubes are there in this wooden puzzle?

- A 19
- B 21
- C 23
- D 25
- E 27

Questions 31 to 35 refer to the following information:



Internet companies are discovering, as billions of people have before them, that while growing up brings problems, maturity brings more.

For e-Bay, Google, Yahoo! and Microsoft, the internet's commercial potential is proving bigger than even most early dreamers imagined. To keep expanding at sensational rates, however, players are encroaching on each other's territory. Competition, which was once sharks against minnows, is becoming a battle of the giants. Corporate manoeuvring is reaching soap opera intensity.

Google, now the dominant online search engine, is making the pace. It snatched a long-term link with AOL Time Warner from under the nose of Microsoft. In the first quarter of 2006 it boosted revenue by 80% to more than \$2 billion (£1.2 billion). That represents a lot of advertising, the common revenue all are chasing.

Yahoo! and Microsoft fret at losing market share. E-Bay, the auction and trading site, fears that Google is pushing its own new consumer trading facility and also threatening e-Bay's PayPal online payments system with a rival system.

The three, who recently looked down on Google, wonder if they can forge alliances to combat it. Microsoft does not want anyone repeating on the internet what it achieved in computer systems. The jockeying offers rich entertainment and opportunities for consumers, so long as the players do not gang up against them.

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31 Which of the following can reliably be inferred from the passage, especially from the last paragraph?

- A Google is achieving on the internet what Microsoft achieved in computer systems.
- B The former giants of IT no longer look down on Google.
- C The only way for Microsoft to stop Google is to merge with its former rivals.
- D Consumers will lose out if the big IT companies merge.

- 32** Which (one or more) of the following can safely be concluded from the data in paragraph three?

At the end of 2005 Google's revenue

- A** could have been less than £650 million.
- B** must have been at least £660 million.
- C** was less than £670 million.
- D** could not have been more than £680 million.

- 33** A cartoon on its own can have many interpretations. From the information in the text, which one of the following can most reasonably be inferred?

- A** That Google will triumph in the end.
- B** That Google is a 'knight in shining armour' compared with Microsoft, e-Bay, or Yahoo!
- C** That the danger facing Google is the prospect of an alliance.
- D** That Google cannot win.
- E** That Microsoft is afraid of Google.

- 34** Which of the following provide reasons for the conclusion in paragraph 3 that 'Google ... is making the pace'?

- 1** Google struck a corporate link which might otherwise have benefited Microsoft.
- 2** Google's accelerating revenue indicates that it is winning a large share of the advertising market.
- 3** The internet's potential is growing faster than even the optimists would have predicted.

- A** 1 only
- B** 2 only
- C** 1 and 2 only
- D** 2 and 3 only
- E** 1, 2 and 3

- 35 Which of the following is most strongly implied by the author?
- A Competition is generally good for consumers.
 - B Big companies have to merge once they start to encroach on each other.
 - C Mature companies cannot compete with emerging ones.
 - D None of the three giant companies will merge with Google.
 - E Google is the only company that poses a serious threat to Microsoft.

END OF SECTION 1



4Uadmission







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