THINKING SKILLS												**9694/11**

Paper 1 Problem Solving												**May/June 2012**

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 four possible answers **A**, **B**, **C** and **D**. 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 – 40 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 **18** printed pages and **2** blank pages.

[Turn over

1 A café has the following menu:

Bacon	$1.50	Chips (per portion)	$0.40
Egg	$0.70	Baked beans	$0.50
Bacon and Egg	$2.00	Toast (per slice)	$0.25
Bacon, Sausage and Egg	$3.00	Bread and butter	$0.20
Bacon and Sausage	$2.50	Mushrooms	$0.60
Sausage	$1.20	Tea (per mug)	$1.00

Special offer!!!

FULL ENGLISH BREAKFAST
Bacon, eggs, sausage, baked beans, mushrooms and toast (2 slices) and mug of tea – **ONLY $5.00**

Three friends enter the café. Bert wants a full English breakfast, Gertie fancies bacon, egg, two slices of toast and a mug of tea and Fred orders bacon, sausage, mushrooms and baked beans. They work out the cheapest prices for each person's meal without moving food between plates.

How much would the three meals cost?

A $11.85

B $12.10

C $12.30

D $12.50

2 I need to use the bus service to get to work. There are two different routes that I could use to get to the central bus station and then I need to catch another bus from there to get to work.

To get to the central bus station I could catch a bus from the end of my street (which I can get to in 2 minutes). This bus service runs every 15 minutes starting at 06:00 and takes 34 minutes to get from my street to the central bus station. The alternative is to walk for 10 minutes to a different stop. The buses from there run every 30 minutes starting at 06:15 and take 23 minutes to get to the central bus station. I need to allow 2 minutes to change buses at the central bus station. The bus that I need to take from the central bus station to work takes 21 minutes and leaves every 15 minutes, starting from 07:05. I then need 5 minutes to walk to work from the bus stop and I have to be at work by 08:30.

What is the latest possible time that I could leave home?

A 06:58

B 07:05

C 07:13

D 07:15

3 Billy runs a corner shop. He is having a New Year sale and decides to reduce the price of cornflakes by dropping the profit he makes on each packet (i.e. his selling price minus his buying price) by 25%. He finds that, during the week of his sale, he has made 20% more profit overall on cornflakes than he usually does.

By what percentage did the number of packets of cornflakes sold increase during the sales week compared with a normal week?

A 20%

B 45%

C 60%

D 80%

4 My local film club conducted a survey to find out what types of film were preferred by its members. The films were grouped into five categories. The conclusion was that 75% of the members preferred either romantic or comedy films while 15% preferred science fiction. The remaining two categories had smaller numbers.

Which one of the following pie charts could **not** represent the results of the survey?

| A | B | C | D |
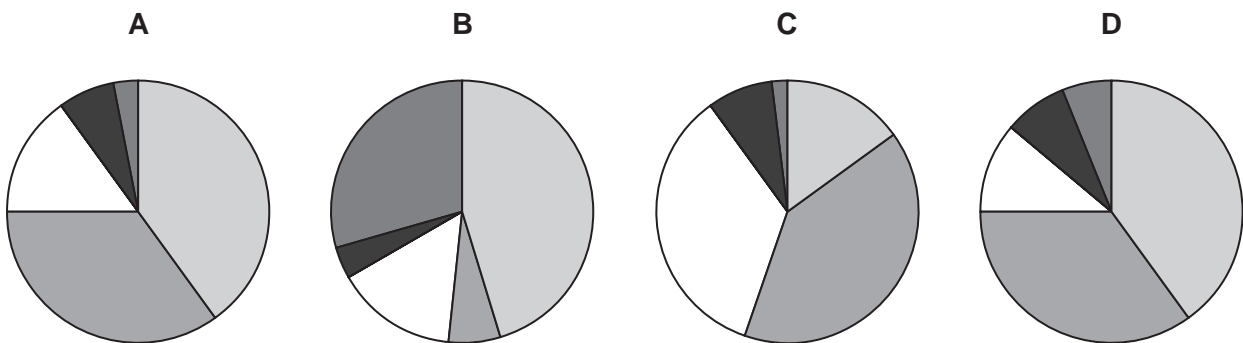
5 A large container may be filled with water from three independent sources. If just source A is used it takes 16 hours to fill the container. If used alone, source B fills the container at the rate of 25 litres per minute. Source C, if used alone, would fill the container at half the rate of source A.

Which one of the following pieces of information would **not** be sufficient to enable the time taken to fill the container using all three sources to be calculated?

A The time taken to fill the container using source B alone.

B The capacity of the container.

C The time taken to fill the container using sources A and C together.

D The rate at which source C alone would fill the container.

6 The graph below shows the cumulative distribution of ages in the Bolandian population.

Percentage below age given (y-axis: 0 to 100)

Age (years) (x-axis: 0 to 80)
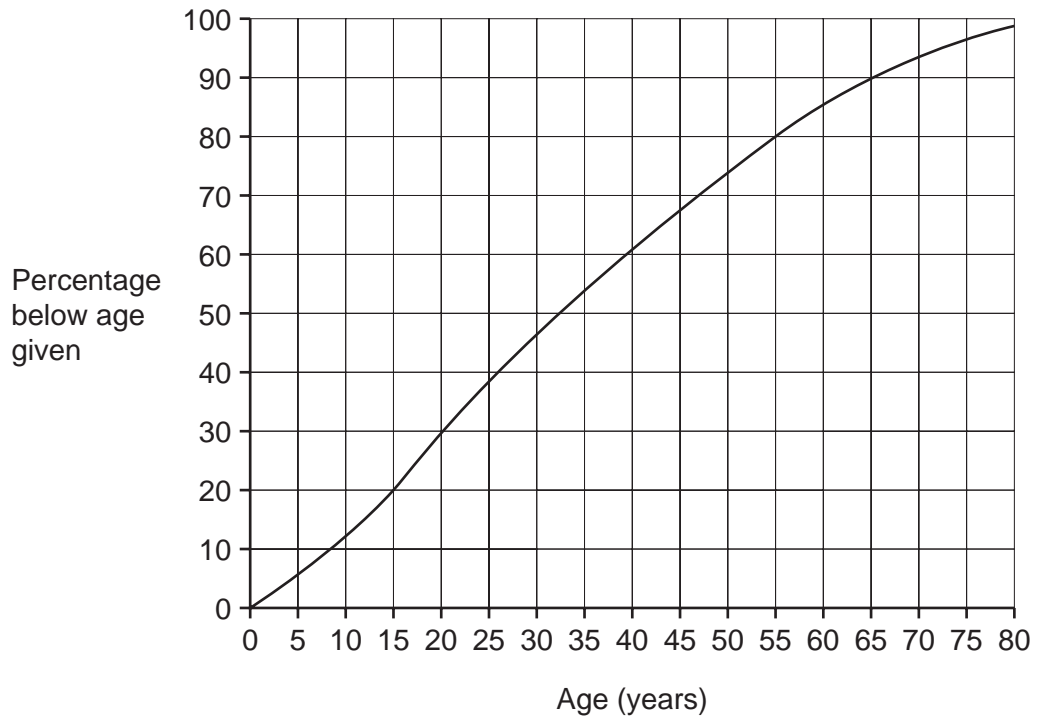
Ashley realises that exactly 20% of the population are older than him. How old is he?

A 15 years

B 30 years

C 55 years

D 98 years

7 All vehicles with a large number of seats or capable of carrying heavy loads are required to have a device installed which records how fast they travel. A paper disc rotates very slowly, and the speed is marked, with zero in the centre and the maximum speed at the edge.

Last Monday I drove on a motorway; there were no hold-ups apart from an area where there was a speed restriction for some roadworks.

Which of the following recordings would show this?

A

B

C

D
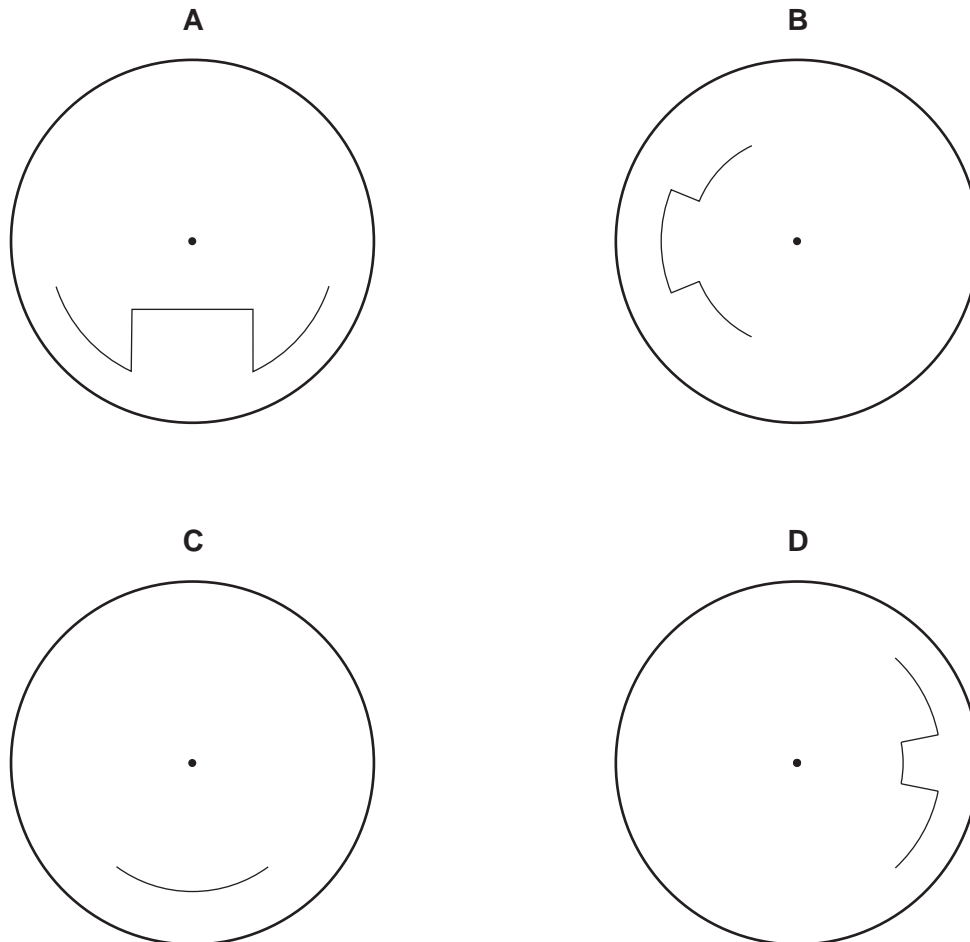
8 I am the manager of a mobile phone shop which is open 7 days a week. Our best-selling brand is the Ring-It phone. I never sell more than 10 Ring-Its and never fewer than 6 on any particular day. In addition, my assistant always sells at least 5 Ring-Its, but never as many as 10 per day.

I order the Ring-It phones from a depot every Sunday evening, and they arrive the following morning. They come in boxes of 10 or 12, but I can never be sure which I will get. I can only order a specific number of boxes, not individual phones. At closing time this Sunday I have only 8 Ring-It phones in stock.

How many boxes do I need to order to ensure that I do not run out of stock during the next week?

A 11

B 12

C 13

D 14

9 The table below shows the average journey time by car, on the fastest roads, between four Italian towns.

	Arezzo	Firenze	Pisa	Siena
Arezzo	–			
Firenze	1 hr 00 min	–		
Pisa	2 hr 00 min	1 hr 05 min	–	
Siena	1 hr 15 min	1 hr 10 min	1 hr 55 min	–

Sylvia, starting from Pisa, wishes to visit Arezzo, Firenze, and Siena and return to Pisa on the same day. She wants to spend as little time in her car as possible, and chooses a route that minimises her expected time in car travel.

How long does she expect to spend travelling in her car?

A 5 hr 00 min

B 5 hr 15 min

C 5 hr 30 min

D 6 hr 05 min

10 Jessica works in an office and can work the hours that she wants. She catches a bus home which runs every 10 minutes. There is a school a five-minute walk away which is open from Monday to Friday. She wants to avoid the crush from students catching the same bus, and so she decides to watch which buses they catch from her office window. She notices that the students do not catch the bus at the same time every day.

She cannot always catch sight of the students but she records what she sees on a chart.

Day	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Monday	15:40		15:20	15:40	15:00	15:20
Tuesday	15:20	15:40		15:20		15:00
Wednesday	15:00					
Thursday	15:40	15:00	15:20	15:40	15:20	15:20
Friday	15:20	15:40	15:00	15:20	15:40	15:20

She thinks she knows what policy the school follows about letting students leave at the end of the school day. Which hypothesis fits the information?

A The school follows a 3-week timetable.

B The school works on a 3-day timetable, closing 20 minutes earlier than the previous day.

C The school follows a 5-day timetable, closing 20 minutes earlier than the previous day except on Thursday when it reverts to a later closing.

D The school follows a 6-day timetable.

11 Mark woke up in the middle of a 'focus group' session where notelets had been handed out and people had been encouraged to write issues on them. Some colleagues had already placed the gummed rectangular (but not square) notelets on a board. From where he was sitting he could only see the shape of where the notelets had been placed (shown on the diagram below), but he could tell that some were overlapping and perhaps even placed completely over others.
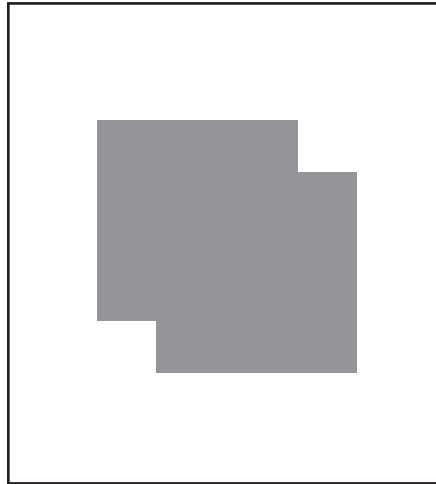
What is the smallest number of identical notelets that could have been placed on the board?

A 2

B 3

C 4

D 6

12 A group of 5 men are able to load a pile of 90 logs onto a truck in 15 minutes.

How long, to the nearest minute, would it take 3 men to load 120 logs, if they load them at the same rate?

A 12 minutes

B 19 minutes

C 33 minutes

D 40 minutes

13 Dave goes to the gym four days each week. He does a slightly different routine on each of his four visits. He never uses more than four pieces of equipment. His schedule for each visit (in minutes spent on each piece of equipment) is given in the table below, together with the hourly rate at which he burns off calories (kcal/hr).

	Exercise bike (400 kcal/hr)	Cross-trainer (600 kcal/hr)	Treadmill (750 kcal/hr)	Rowing machine (600 kcal/hr)
Monday	15 min	15 min	15 min	15 min
Wednesday	30 min	25 min	15 min	Not used
Friday	Not used	20 min	15 min	20 min
Saturday	60 min	Not used	15 min	Not used

On which visit does Dave burn off most calories?

A Monday

B Wednesday

C Friday

D Saturday

14 In an examination involving students from three schools, the following results were achieved:

	A	B	C	D	E	U
School 1	20	45	80	40	25	27
School 2	30	80	110	70	20	30
School 3	15	80	200	90	18	20
TOTAL	65	205	390	200	63	77

Which one of the following bar charts represents these results?

A

B

Key

School 1
School 2
School 3

C

D

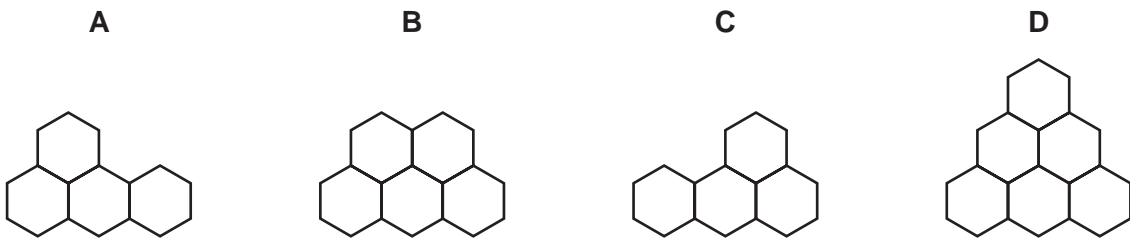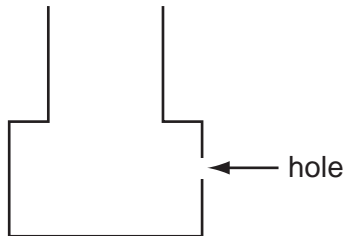**[Turn over**
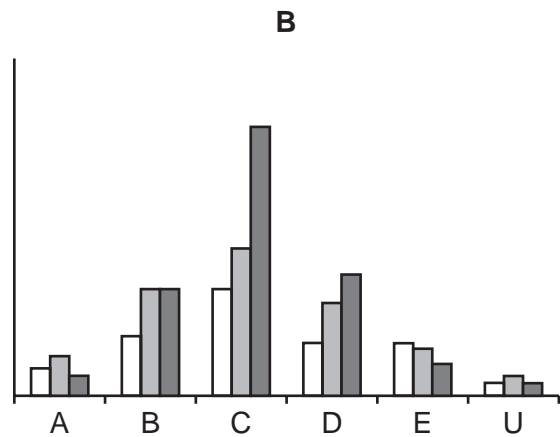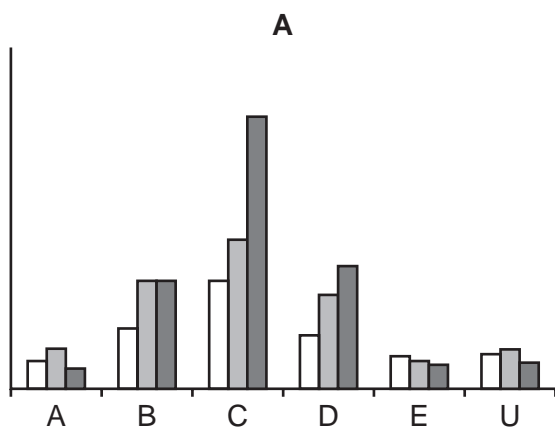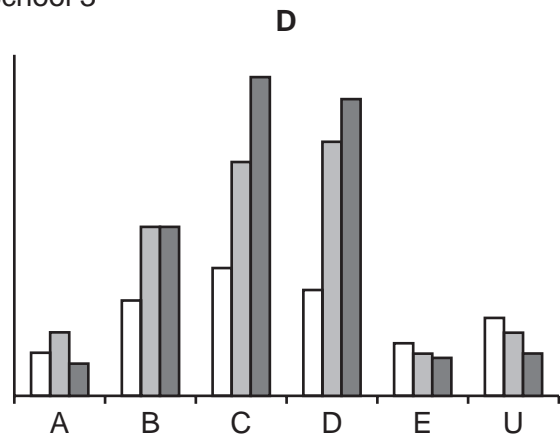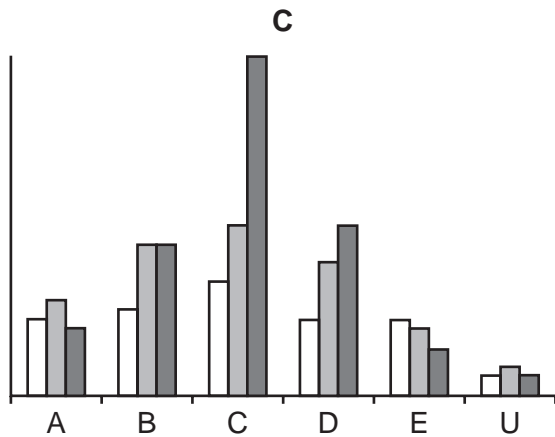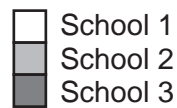
15 The honeycomb structure below is constructed by joining a number of hexagonal blocks together.
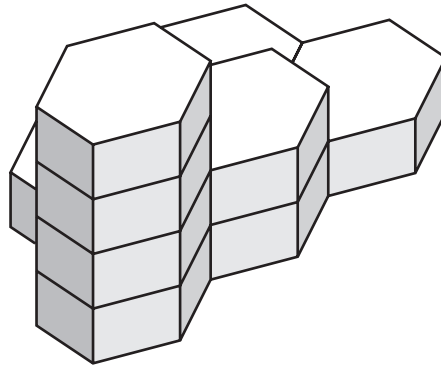
Which of the plan views below is a true representation of the 3-dimensional honeycomb structure, as seen from above?

A	B	C	D

16 The diagram shows the shape of a container that is made from two cylindrical sections.

← hole

There is a hole in the bottom cylinder of the container. Water is poured into the container at a constant rate. Once the level of water has reached the hole, water starts to leak out at a constant rate that is half the rate at which water is being poured in.

Which graph best represents the rise in the level of water in the container?

A	B	C	D
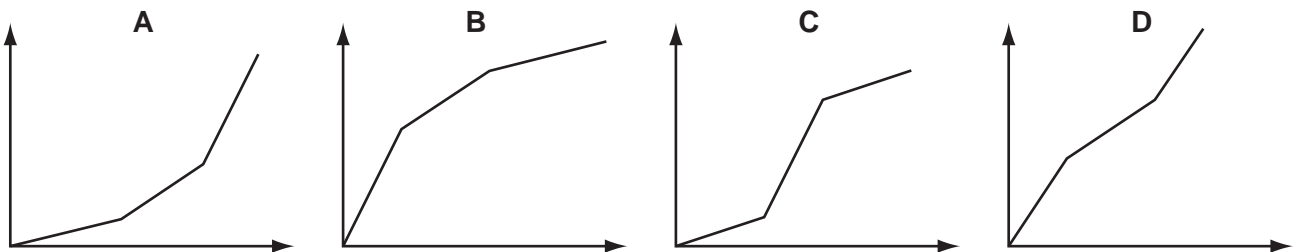
17 Yesterday I opened a savings account and paid in the $87 500 that I have recently inherited.

The account that I have chosen is aimed at savers with at least $50 000 to invest. It pays no interest for two months when the account is first opened, but from the third month interest is credited to the account as follows.

Balance before interest is added	Monthly interest
less than $50 000	0
from $50 000 to $99 999	$350
$100 000 or more	$750

My intention is to leave the money in this account without making any withdrawals for at least the next five years.

Which one of these bar charts shows the total interest I can expect to receive during each of the next five years?

A

B

C

D
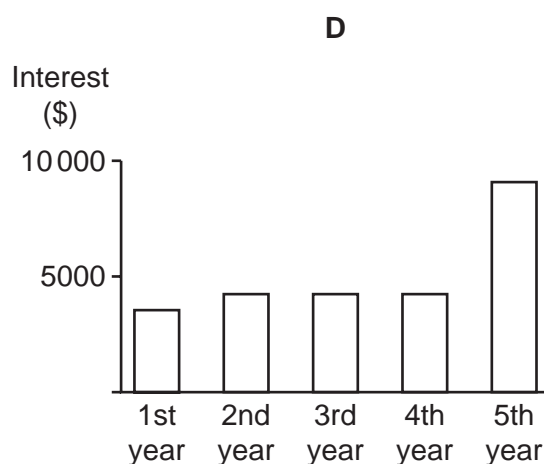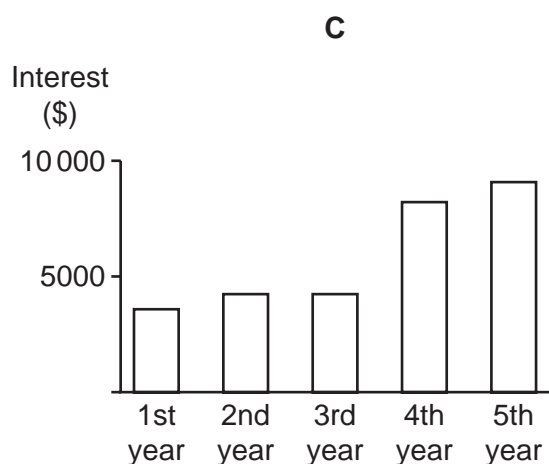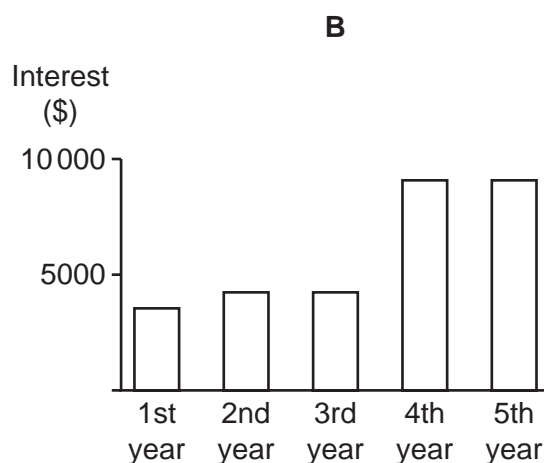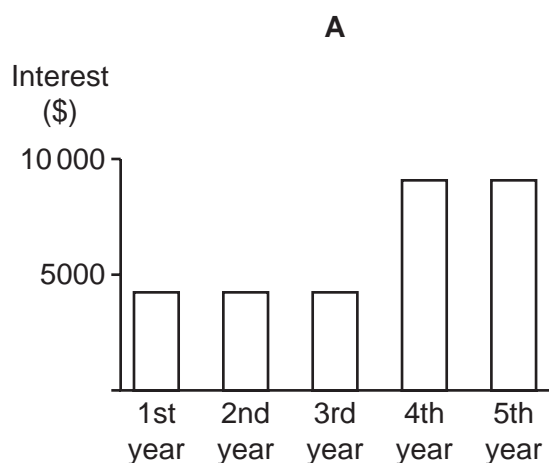
18 A detective investigating a murder is trying to pin down the time when the victim was killed in his own home.

The pathologist examined the body at 16:50 and found that the body temperature was 2.0°C below normal; bodies lose between 1°C and 1.5°C every hour. He also looked at the state of rigor mortis and decided from the degree of stiffening that death occurred between 1.5 and 2.5 hours ago. The victim had caught a train to his home at 13:45, a journey which took 45 minutes, and lived 25 minutes walk from the station. Mr Jones found the body in the victim's hallway at 15:35.

Which one of the following is a possible time that the man died, according to the evidence?

A 14:50

B 15:10

C 15:30

D 15:50

19 The draw has been made for this year's Middle-earth Cup, as follows:

First Round

Match 1	Harrowdale	v	Rushey
Match 2	Nardol	v	Haysend
Match 3	Upbourn	v	Bucklebury
Match 4	Staddle	v	Esgaroth
Match 5	Bree	v	Hobbiton
Match 6	Tighfield	v	Bywater
Match 7	Crickhollow	v	Underharrow
Match 8	Rivendell	v	Little Delving

Second Round

Match 9	Overhill	v	Winner of Match 5
Match 10	Winner of Match 3	v	Isengard
Match 11	Stock	v	Winner of Match 1
Match 12	Winner of Match 6	v	Edoras
Match 13	Winner of Match 2	v	Frogmorton
Match 14	Tuckborough	v	Winner of Match 7
Match 15	Michel Delving	v	Winner of Match 4
Match 16	Winner of Match 8	v	Budgeford

Third Round

Match 17	Winner of Match 15	v	Winner of Match 12
Match 18	Winner of Match 11	v	Winner of Match 9
Match 19	Winner of Match 16	v	Winner of Match 13
Match 20	Winner of Match 10	v	Winner of Match 14

Semi-Finals

Match 21	Winner of Match 18	v	Winner of Match 20
Match 22	Winner of Match 19	v	Winner of Match 17

Final

Match 23	Winner of Match 22	v	Winner of Match 21

All matches (including the Final) are to be played at the home ground of the first-named team.

Which team faces the prospect of having to play five matches, all away from home, in order to win this year's Middle-earth Cup?

A Esgaroth

B Hobbiton

C Rushey

D Underharrow

20 Ashley's journey to work each morning includes a 12-minute bus ride from Flinchester to Warnham station and 23 minutes aboard the train from Warnham to Pontford.

Buses from Flinchester to Warnham start from Vauton at 10, 25, 40 and 55 minutes past each hour, stopping at Flinchester 18 minutes later.

Trains for Pontford depart from Warnham every 20 minutes from 06:35 onwards.

Ashley leaves home every morning at 07:50, taking 3 minutes to reach the bus stop in Flinchester.

At what time does Ashley arrive at Pontford Station?

A 08:28

B 08:33

C 08:38

D 08:58

21 Simon and his two friends buy tickets from a low cost airline to fly to Rome. The return flight costs $10 less than the outgoing flight and the airport tax for each flight is $20 on top of the airfare. One of Simon's friends will not return and only has an outgoing ticket. The overall cost of the flights was $320.

What is the price of the outgoing flight?

A $38

B $44

C $48

D $68

22 A question-master asks each of four contestants up to 15 questions. The process is repeated again for a second round. The 'score' is the number of questions answered correctly. The scores after each round are announced in ascending **numerical** order. After the first round of a contest the scores were 8, 10, 11, and 14.

After the second round the total scores for the contestants were 13, 18, 20, and 24.

What was the largest possible score achieved in the second round of this contest?

A 10

B 11

C 14

D 16

23 The cost of a mortgage (loan) for buying a house used to be very simple: a fixed cost for paperwork, a cost of a survey depending on the house value, and then a specified interest rate for an agreed number of years. There is now a bewildering range of mortgages. The variety is supposedly to cater for different markets, but makes it hard to compare the offerings of different providers.

One type provided by many companies is a discounted rate, where there is a fixed 'arrangement' fee, and then an interest rate which remains lower than the company's regular rate for a given time, but with an early-repayment charge if the loan is repaid before the end of the discount period. At the end of the discount period the rate switches to the regular rate, and there is then no repayment charge.

The Best Bolandian Bank's one-year regular (simple) rate is 3.0%, but it offers discounted rates:

Arrangement Fee	Discounted (simple) rate	Early-repayment charge
$1000	2.6%	1.00%
$2000	2.5%	1.50%

If not repaying early, what is the minimum loan for which the total cost to have the discounted rate with the higher fee is less than either the other discount or the regular rate?

A $200 000

B $250 000

C $400 000

D $1 000 000

24 An exhibit at the Emirst Art Gallery consists of 21 free-standing bricks, two of which have been painted black all over. They have been stacked into a vertical triangle, with six on the bottom row, then each successive row containing one brick fewer, tapering to one at the top. The whole exhibit is on a base that rotates continually, so that both sides are seen from the viewing position.

The Gallery has closed for the night, and the cleaner has accidentally knocked some of the bricks out of position. This is how the exhibit appears at present.

She knows that the overall shape resembles a triangle, but she can't remember where the other black brick was situated. However, she is certain that the two black bricks were **not** touching each other.

In an attempt to reconstruct the exhibit, how many distinguishably different appearances that **might** be correct has the cleaner got to choose from?

A 4

B 6

C 7

D 8

25 The four provinces that make up the Republic of Fungary (Boletus, Fuligo, Lepista and Morchella) all have their own currency at present. Next year, however, all four currencies will be replaced by a single Fungarian currency, to be known as the myco.

The relationship between the currencies has been fixed as follows.

$$1 \text{ myco} = \begin{array}{l} 1.5 \text{ Boletan ceps} \\ 3.2 \text{ Fuligan tans} \\ 0.6 \text{ Lepistan blewits} \\ 2.5 \text{ Morchellan morels} \end{array}$$

Meanwhile, in the run-up to the changeover, businesses in each of the provinces are dealing in all four currencies, at the appropriate exchange rates.

In Lepista today I paid for a DVD with a 100 morel note, and received 32 tans in change.

What was the price of the DVD in blewits?

A 18 blewits

B 30 blewits

C 45 blewits

D 50 blewits

26 Richard is buying new carpet for his office. The carpet comes in tiles which are 50 cm by 50 cm. The office is 820 cm long and 520 cm wide. Since there is no pattern on the tiles, any piece of a given size can be used and orientation is not important.

Richard wants to make sure that the whole tiles or pieces always meet in fours at their corners and that the smallest total number of pieces is used. How many tiles does Richard need to buy?

A 173

B 174

C 186

D 187

27 The price of posting a letter depends on the size of the letter and the class of post required. The different options are shown in the table.

Size	Price (1st class)	Price (2nd class)
Small	7¢	4¢
Large	22¢	17¢

At the moment there is one stamp for each amount of money needed, but it has been decided to introduce a new system where only two values of stamp are available. People wanting to post letters will then need to buy stamps to give the required total. It will be possible to make all four of the above prices exactly with a combination of the new stamps.

The values of the two stamps have been chosen so that their values add up to the largest total possible and their difference is as small as possible.

All parcels will cost six of the more expensive stamps and four of the cheaper ones.

How much will it cost to send a parcel?

A 34¢

B 36¢

C 38¢

D 40¢

28 Last month there was a sponsored aerobics marathon at Hope Springs Leisure Centre. Each participant raised between $200 and $1000 for charity. The amount raised by Faith, written in the form $XXX.XX, has three consecutive digits in descending order, followed by the sum of the three digits.

Which one of the following statements can be made with certainty about the digits that make up the amount that Faith raised?

A　All five digits are different.

B　The five digits alternate between odd and even digits.

C　The first digit is the highest of the five.

D　The sum of all five digits is a multiple of three.

29 A canal bridge is only wide enough for one boat. It takes 20 minutes for a boat to cross and boats have to leave at 5-minute intervals. There is a rule allowing the bridge to be used each way for one hour at a time (including crossing time), unless there is no boat waiting at the other end.

When our boat arrived at the bridge, just after 09:00, there was a queue of 12 boats in front of us and 10 boats at the other end, the first of which had just started to cross. No other boats arrived before we had crossed.

When did our boat arrive at the other side of the bridge?

A　10:55

B　11:50

C　11:55

D　12:30

30 Ann, Beth, Chet, and Den took a test, but the teacher, in an attempt to get them to do some more thinking, did not give them their individual scores in the test but the following pieces of information.

The combined score of Ann and Beth was 127.
The combined score of Beth and Chet was 145.
The combined score of Chet and Den was 134.

Which one of the following additional pieces of information would be sufficient to enable the students to deduce their individual marks?

A　The combined score of Ann and Den was 116.

B　Beth scored 11 more than Den.

C　The total score of all four students was 261.

D　The combined score of Ann and Chet was 108.

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