



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

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THINKING SKILLS

9694/11

Paper 1 Problem Solving

October/November 2012

1 hour 30 minutes

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

* 4 6 4 7 4 6 3 4 1 9 *

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 **17** printed pages and **3** blank pages.



- 1 I have some free time on Monday and Wednesday evenings and so I want to enrol on a class for one of those two days. The options available at the local college are shown below. There is more than one class per week for each course and participants choose the day they want to attend when they enrol.

<i>Course</i>	<i>Dates and times available</i>	<i>Room</i>	<i>Level</i>	<i>Price (\$)</i>
Ballroom Dancing	Monday afternoon Tuesday evening Thursday evening	F34 F34 F34	Intermediate	100
Bridge	Monday evening Wednesday evening	F21 F21	Beginners	150
Creative Writing	Tuesday morning Friday evening	F19 F30	Intermediate	110
Website Design	Monday evening Thursday afternoon	E34 E34	Beginners	120

Anyone is allowed to do a beginners course, but intermediate courses may only be attended by those who have done the beginners course previously. I did the beginners Creative Writing course last year but I have never done any Ballroom Dancing.

What is the cheapest course that I could attend?

- A Ballroom Dancing
 - B Bridge
 - C Creative Writing
 - D Website Design
- 2 A child leaves home at 8 am and walks to school. When she arrives at school, 15 minutes is spent having breakfast and then she has 20 minutes to catch up with friends before lesson 1 begins. There are 6 lessons a day of 50 minutes duration and a break after every 2 lessons. Morning break after lesson 2 is 15 minutes, and lunch break after lesson 4 is 1 hour long. At the end of the day it takes 25 minutes to walk home, which is 5 minutes longer than walking to school.

What time does lesson 5 start?

- A 13:30
- B 13:35
- C 14:20
- D 15:10

- 3 Amelia is running around a circular 6 km loop. Her friend Boris is injured, so is not going to complete the full distance. At the same time that Amelia starts, Boris sets out in the opposite direction around the loop, walking at half her running speed. When they meet, Boris turns around and runs the beginning with Amelia, running at her pace.

How far did Boris **run**?

- A 1.5 km
 - B 2.0 km
 - C 3.0 km
 - D 4.0 km
- 4 At a recent televised snooker match between James Hoopoo and Ron Knight, a viewer phone-in was held to vote on which player was the better tactician. Ron scored only 24%.

If this figure has been given to the nearest 1%, what is the smallest number of votes that could have been cast?

- A 4
 - B 17
 - C 25
 - D 33
- 5 In each of the last five rugby matches between Harlacens and Sarequins, Harlacens have scored a different multiple of 7 points between 14 and 42 inclusive, whilst Sarequins have scored a different multiple of 5 points between 15 and 35 inclusive.

David worked out that the scorelines (Harlacens first) were 14 – 15, 21 – 25, 28 – 20, 35 – 30 and 42 – 35.

Which of the following additional pieces of information was sufficient by itself for him to work out the scorelines?

- A The largest total number of points scored in one match was 77.
- B The largest winning margin was 8 points.
- C The smallest total number of points scored in one match was 29.
- D The smallest winning margin was 1 point.

- 6 I am buying cards to give to my friends for Christmas. I am going to buy as many cards

I want to make sure that I have a mixture of designs with no more than 4 cards of any one design. In each pack of cards there is the same number of cards for each design. None of the designs occur in more than one type of pack, and all packs of a given type are identical.

The different packs that are available are summarised below.

<i>Number of designs</i>	<i>Number of cards in pack</i>	<i>Price</i>
2	8	\$0.40
2	16	\$0.80
4	20	\$1.40
4	40	\$1.60
5	20	\$1.00

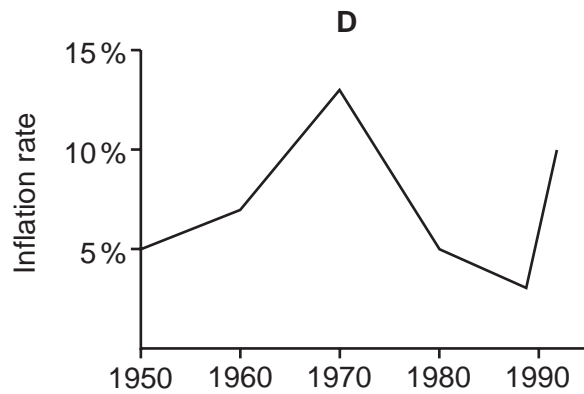
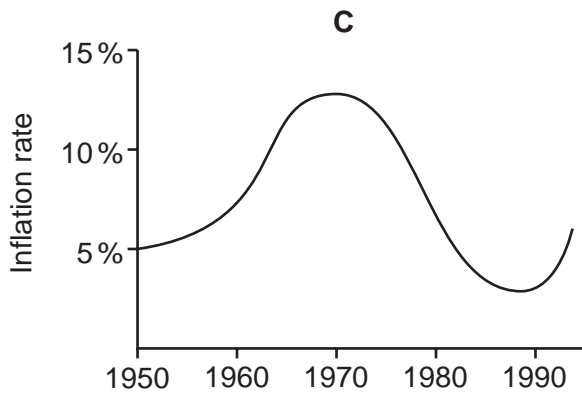
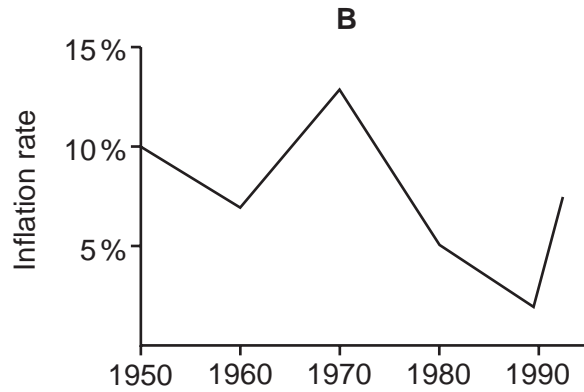
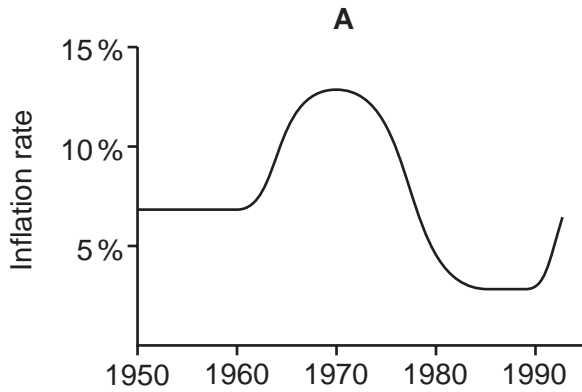
<i>Number of designs</i>	<i>Number of cards in pack</i>	<i>Price</i>
2	10	\$0.50
4	12	\$0.80
4	32	\$2.00
5	10	\$1.30
8	40	\$2.40

What is the average price per card of the cards that I will buy?

- A 4¢
- B 5¢
- C 7¢
- D 8¢

- 7 In Westland, during the 1950s, prices rose steadily at about 7% per annum. During the 1960s, higher wage demands caused prices to increase more and more rapidly throughout the decade. The Government decided to make control of inflation its prime objective and gradually the rate at which prices rose, year on year, began to fall. This continued throughout the 1970s until by the end of the decade prices were only rising at about 5% per annum. The first half of the 1980s saw price rises slow further, and by 1985 inflation had dropped to 3%. This was maintained until 1989 when a series of major bank failures caused high inflation over the following 3 years, as the currency fell sharply in value.

Which of the following graphs best represents the Westland inflation rate?



- 8 Jake's television set has broken and he wishes to replace it. Whenever he makes a purchase like this, Jake looks carefully at all the alternatives. He considers each possible set and decides on the one that is the very most he would pay for it, if no other set were available. From this maximum he subtracts the price he would have to pay for the set. He chooses to buy the item that gives him the biggest difference between the maximum he would pay and the price he has to pay.

His list of alternatives, together with the maximum he would pay for each, and the prices in the three stores he can visit, is given in the table below.

	<i>Maximum prepared to pay</i>	<i>Price in store A</i>	<i>Price in store B</i>	<i>Price in store C</i>
<i>Ace View</i>	\$500	\$200	\$300	\$250
<i>Bigscreen.1</i>	\$700	\$500	\$400	\$450
<i>Contrasto</i>	\$900	\$550	\$600	\$599
<i>Defhigh 3D</i>	\$1000	\$1500	\$700	\$675

Which television set should Jake buy?

- A Ace View
 B Bigscreen.1
 C Contrasto
 D Defhigh 3D
- 9 When I glanced at my car mileage it showed 24 942, a palindromic number (one which reads the same forwards as backwards). A few days later, I noticed that it showed 26 062, another palindromic number.

How many other palindromic numbers had I missed between the two?

- A 1
 B 9
 C 10
 D 100

- 10 In Bolandia, customers pay monthly for the use of electricity.

The electricity company can either have a constant **unit rate** for all levels of consumption, or it can charge one rate up to a certain level of consumption, and a lower rate above that level.

The company can choose whether or not to have a monthly **fixed charge** in addition to the unit rate.

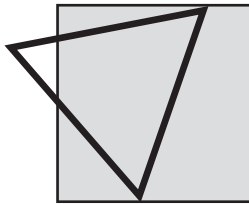
Electricity tariffs have not changed for some time. David paid \$132.50 in January, when he used 1200 units; in March his bill for 800 units was \$92.50, and in July he paid \$50.00 and used 400 units.

Which one of the following tariff structures could explain these bills?

Fixed charge? *Lower unit rate?*

- | | | |
|----------|-----|------------------|
| A | No | After 500 units |
| B | No | After 1000 units |
| C | Yes | No |
| D | Yes | After 300 units |

- 11 A chef is going to use a triangular cutter to cut shapes from square pieces of pastry. The cutter and the pastry have the same side length. One possible shape is shown below.



What is the maximum number of sides that a cut piece of pastry inside the triangle can have?

- A** 4
- B** 5
- C** 6
- D** 7

- 12 In a school, precisely one ninth of the students study at least one musical instrument. Of these, exactly two thirds play a stringed instrument as their main instrument. Of those stringed-instrument players, one quarter play the viola. You may assume that any student who plays a musical instrument has one and only one instrument.

What is the smallest size that the school could be?

- A 36
 - B 54
 - C 108
 - D 216
- 13 The members of Purlone knitting club decided recently to knit scarves to sell for charity. Their goal was to create a chain one kilometre in length along Purlone promenade by knotting scarves together.

All 50 members of the club pledged to knit 10 scarves, each 2 metres long. This has now been successfully achieved, except that one member got confused and has only produced 2 scarves, but both are 10 metres long.

It has become clear, however, that **laying** the scarves end to end will be the only way to achieve one kilometre, because each knot in a chain of scarves would reduce the overall length by 40 centimetres.

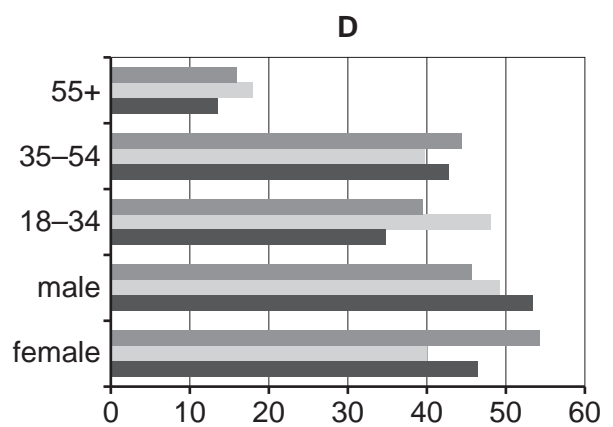
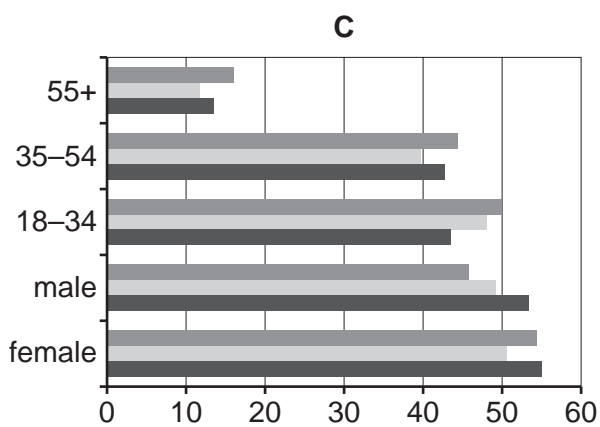
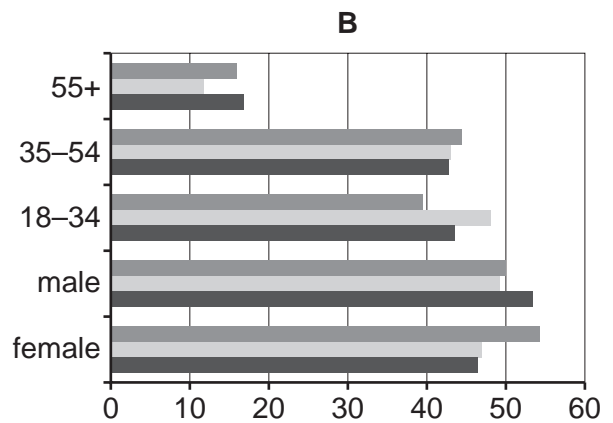
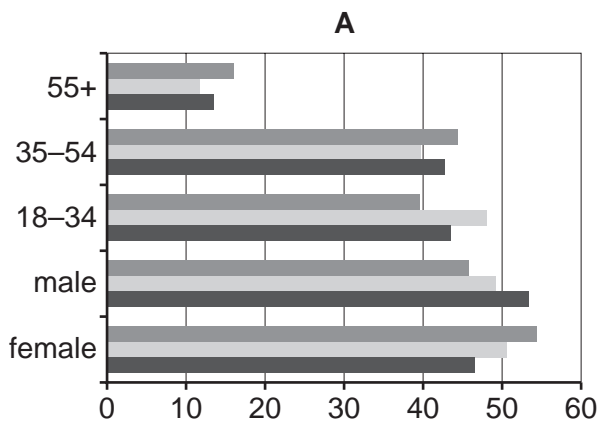
If Purlone knitting club were to make a knotted chain with their scarves, how far short of one kilometre would it be (to the nearest whole metre)?

- A 190 metres
- B 191 metres
- C 196 metres
- D 197 metres

- 14 The usage of 3 leading Internet search engines (Star, Pluto and Saturn) by different people was researched, and the data produced is shown below.

	Female (%)	Male (%)	18 – 34 (%)	35 – 54 (%)	55+ (%)
Star	46.58	53.42	43.57	42.85	13.57
Pluto	50.76	49.24	48.23	39.83	11.94
Saturn	54.26	45.74	39.53	44.49	15.99

Which one of the following charts correctly represents the data shown above?



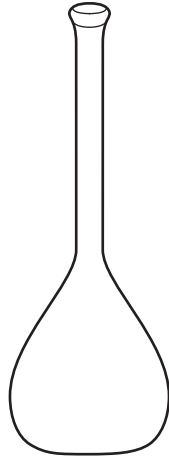
- 15 A club's football field has a playing area of 105 m x 70 m. Outside the playing area there is a surround, 5 metres wide, which is not used for play.

The club uses the playing area for junior games which are played on pitches of 34 m x 24 m but with 2 metres gap between them for safety.

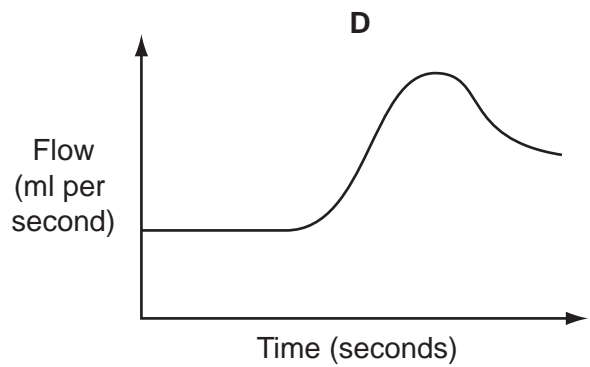
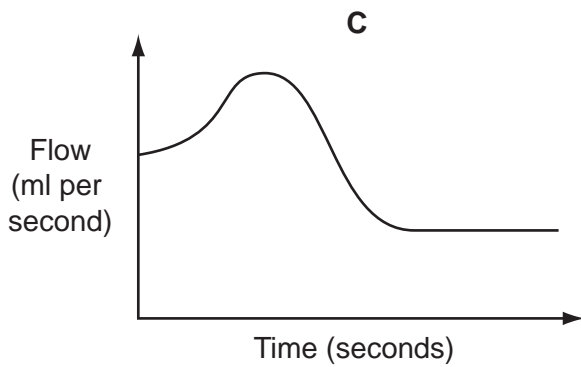
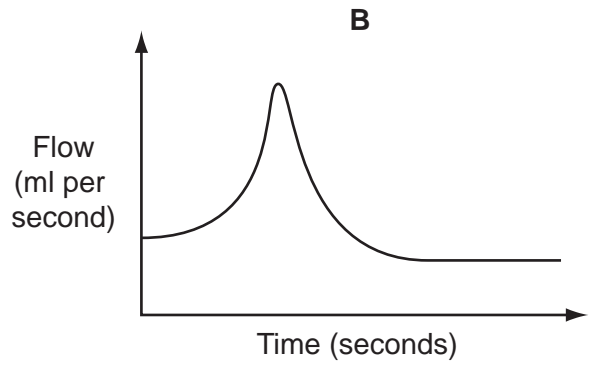
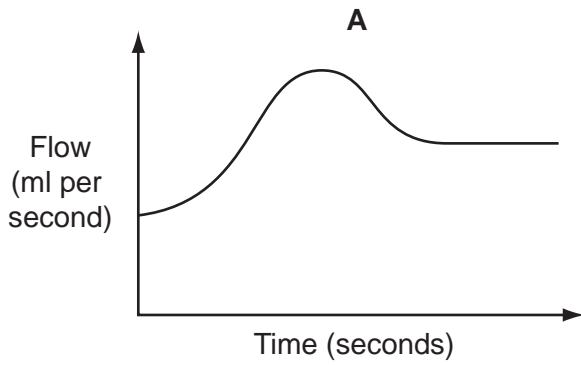
How many junior pitches can be fitted into the playing area?

- A 4
- B 6
- C 8
- D 9

- 16 Having established the relationship between the height and the volume of liquid in a flask, a laboratory worker uses this information to calculate how he should regulate the flow of liquid into the flask so that the height of liquid rises at a constant rate.



Which one of the following graphs best represents the planned flow of liquid?



- 17 George's consultancy firm has a large number of employees who use their own cars for travelling to customers. The company pays 10¢ per kilometre travelled towards the cost of the journey, plus an additional 25¢ for each visit made. Because many employees have complained that this is not enough to cover the cost, George has decided to change the policy.

He can only afford to increase the total cost for an average week (40 visits covering a total of 300 kilometres) by 10%. The new policy will still offer a rate per kilometre, plus an amount per visit (both of which will be a whole number of cents), and George wants the rate per kilometre to be as high as possible.

What will be the amount paid for a visit involving travel of 20 kilometres?

- A \$2.80
 - B \$2.85
 - C \$3.00
 - D \$3.05
- 18 Petra receives three job offers. She will only work 35 hours a week (excluding breaks) and for no more than 9 hours a day (including breaks). She will only work five days each week, but she wants to earn the highest salary possible.

Her current post at Ripemoff Limited fits her time conditions perfectly and she earns \$10 per hour with a fixed bonus of \$25 per week.

She is offered a post at Hardwork Products. She would have to work four half days (08:00 to 14:00) and one full day (08:00 to 17:30 with a lunch break of 1 hour), and would be paid \$70 for each of her four half days and \$140 for her full day.

Another post is at Slavedrivers Incorporated. She would have to work 09:00 to 16:00 for three days and 09:00 to 18:00 for the other two, with half an hour lunch break every day. She would be paid \$11 per hour.

The third post is at Poundflesh Partners. She would have to work 08:30 to 16:30 (with two breaks of half an hour each) five days each week, and would be paid \$9 per hour and a fixed bonus of \$14 per day.

None of the companies pays its employees for their breaks.

Which option should Petra choose?

- A Stay at Ripemoff Limited
- B Move to Hardwork Products
- C Move to Slavedrivers Incorporated
- D Move to Poundflesh Partners

- 19 The number of new dwellings completed each quarter by a builder for 3 years is shown in the table below.

<i>Year</i>	2008				2009				2010			
<i>Quarter</i>	1	2	3	4	1	2	3	4	1	2	3	4
<i>Bungalows</i>	7	12	14	9	6	10	13	4	5	8	12	3
<i>Terraced houses</i>	6	9	11	7	9	12	17	7	10	16	19	9
<i>Semi-detached houses</i>	15	29	32	20	18	27	34	17	20	33	37	26
<i>Detached houses</i>	8	14	16	13	9	16	19	12	24	27	27	21

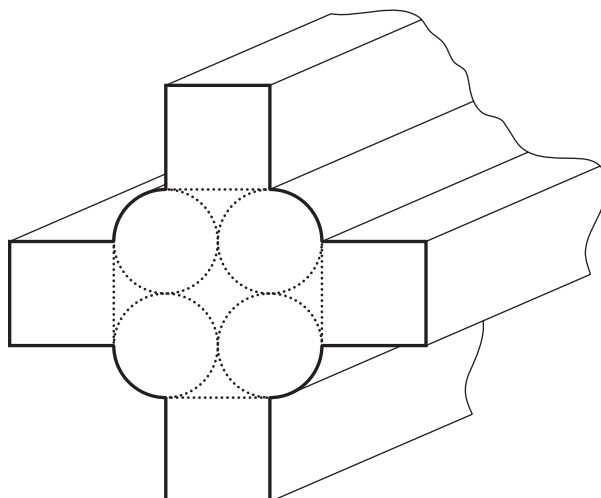
How many more semi-detached houses were built in the second half of 2010 than were built in the first half of 2008?

- A 11
 B 19
 C 26
 D 41
- 20 Ben hires a motor van to help his friend move house. He knows that the round trip is 350 km and the van hire company tells him that the van does 100 km per \$10.00 worth of diesel fuel (the diesel costs 70 cents per litre). He asks them to put \$36.00 worth of diesel into the van. However, the pump is faulty and actually puts in extra fuel at a rate of 51 litres for every 50 litres shown on the pump. On the return journey he encounters a fallen tree across the road and has to make a detour. There are no filling stations on the remainder of his journey, but he decides to get as near to his destination as he can.

What is the maximum distance the detour could have added to his journey if he still manages to make it back?

- A 2.8 km
 B 7.2 km
 C 10.0 km
 D 17.2 km

- 21 The hollow tube below is to be painted on the outside surface along its length. The perimeter of each circle is 471 mm and the perimeter of each square is 600 mm. The length of the tubular section to be painted is 5 metres.



What approximately is the outside surface area of the tube (**not** including the ends)?

- A 2.27 m²
 B 11.4 m²
 C 12.0 m²
 D 21.4 m²
- 22 Polly and Dolly have the same parents. Polly's son Wally is married to Dolly's daughter Molly. They have one daughter, Holly. Holly is constructing a family tree.

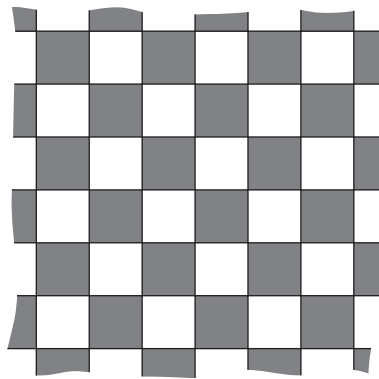
What is the largest possible number of great-great-grandparents that Holly will discover?

- A 6
 B 12
 C 14
 D 16
- 23 I am in my car on a highway travelling at 120 km/h and have just come up behind a truck travelling at 100 km/h. I need to get off at the next junction, for which there is a sign saying it is 2 km away. I am 25 m behind the truck which is 25 m long. I will need a gap of 50 m between me and the truck if I am to pull in safely in order to leave the highway.

How far will I be from the junction when I am 50 m in front of the truck?

- A 0.6 km
 B 1.4 km
 C 1.5 km
 D 1.9 km

24 I recently laid a carpet with the following pattern.



Due to the awkward shape of the room, I had to cut four pieces out to make it fit.

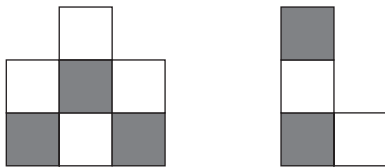
I was able to stitch the four pieces together to make a rectangular mat with exactly the same pattern as the whole carpet.

These were two of the pieces.

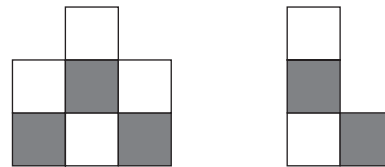


Which one of the following pairs could have been the other two pieces?

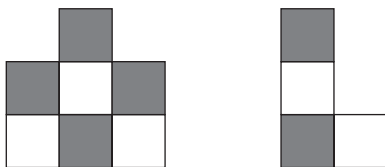
A



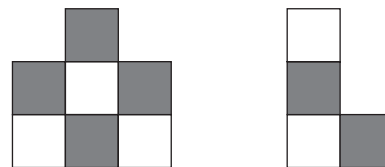
B



C



D



- 25 A teacher's contract requires her to spend 800 hours in contact with students during the school year. The school year lasts 40 weeks and each lesson lasts 1 hour.

This is her timetable for the new academic year.

Day	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6
Monday	3B	2J	1H	-	2H	1A
Tuesday	-	3B	-	4G	3T	5L
Wednesday	1A	-	6L	2P	-	2T
Thursday	2J	-	5L	2T	4G	-
Friday	1H	-	2P	3T	-	6L

Within the 40 weeks of the school year, students get a week's study leave in January and three weeks in June. However, the teacher is expected to do 9 hours of invigilation during each week of study leave, which also counts as contact hours.

The teacher checks whether the school is giving her too much contact time.

How many hours over or under her contracted time is she due to work?

- A 4 hours over
 - B 8 hours over
 - C 8 hours under
 - D 17 hours under
- 26 Andrew works from 8.30 am to 5.00 pm each day, operating a machine that makes splindons. He is allowed a total of $1\frac{1}{2}$ hours in breaks during the day.

First thing each morning, and after every break, the machine requires 6 minutes to warm up before any splindons can be made.

Andrew normally takes one $1\frac{1}{2}$ hour break at lunchtime, and produces splindons at an average rate of 3 per minute.

Yesterday he tried a different routine. He had a 20 minute break mid-morning, a 50 minute lunch break and a 20 minute break mid-afternoon. The result was that he was able to keep up an average production rate of $3\frac{1}{2}$ splindons per minute throughout the day.

How many more splindons did Andrew produce yesterday than he usually does?

- A 126
- B 162
- C 210
- D 246

- 27 The winner of each edition of *What's The Score?* has the opportunity to scoop the jackpot in the *Winning Score* game. To be successful, all 5 questions must be answered correctly. All 5 questions all have different numerical answers that add up to 20 altogether.

James is today's winner, and his *Winning Score* questions have been revealed, as follows.

How many legs does a lacewing have?

How many days of the week begin with the same letter of the alphabet in both French and German?

How many Oscars did Marilyn Monroe win?

How many points are awarded for a field goal in American football?

How many stars are there on the flag of Tuvalu?

James knows that a lacewing is an insect, and therefore has 6 legs, that Marilyn Monroe did not win any Oscars, and that 3 points are awarded for a field goal in American football. However, he has no idea at all of either of the other 2 answers, so he will have to guess.

Assuming that James doesn't make a silly mistake, such as giving 5 answers that don't add up to 20, what chance does he have of winning the jackpot?

- A 1 chance in 3
 - B 1 chance in 4
 - C 1 chance in 5
 - D 1 chance in 6
- 28 The retirement age in Bolandia will be raised from 66 to 67 over two years: every six months the minimum age will jump up by 3 months. Anyone over the retirement age on the date they apply will immediately get a free retired-person's bus pass.

How much **younger** could one person with a free retired-person's bus pass be than someone not able to get one?

- A It's not possible to be younger.
- B Just under 3 months.
- C Just under 6 months.
- D Just under 1 year.

- 29 Service S6 buses leave Orton every hour on the hour and Casford every hour on the hour. The buses travel to the other town 150 km away. The journey takes 3 hours and the buses then wait for an hour at each terminus before returning.

While Dennis is driving the bus to Casford, how frequently, on average, does he pass a bus going the other way?

- A Every 15 minutes
 - B Every 30 minutes
 - C Every 45 minutes
 - D Every 60 minutes
- 30 In Cameronia you pay no income tax on the first \$20 000 of your annual income. You have to pay 20% in tax of any income above \$20 000 and up to \$100 000, and you have to pay 40% in tax of any income above \$100 000. Edwina is a taxpayer in Cameronia.

Which of the following statements would **not** be sufficient by itself to enable the calculation of Edwina's income before she pays tax?

- A Edwina pays 20% of her total income in tax.
- B Edwina pays \$24 000 less than 40% of her total income in tax.
- C Edwina pays \$24 000 in tax.
- D Edwina's income after tax is \$96 000.

