



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

THINKING SKILLS

9694/11

Paper 1 Problem Solving

October/November 2013

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.

DO NOT WRITE IN ANY BARCODES.

INFORMATION FOR CANDIDATES

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

This document consists of **16** printed pages.



- 1 Luke needs various lengths of pipe to complete some home improvement work. Specifically he needs one pipe each of lengths 1 m, 3 m, 5 m, 7 m, and 9 m. He can buy pipe in lengths of 2 m, 4 m, 6 m, 8 m, 10 m, and 20 m and cut them to the sizes he needs. Pipe costs \$1 per metre whatever the length of pipe bought.

What is the least that Luke must spend on the pipes to get the lengths he requires?

- A \$25
 B \$26
 C \$28
 D \$30
- 2 In an attempt to boost my collection, I wrote to 53 celebrities asking for signed photographs, and I enclosed a stamped addressed envelope with each request. The stamps cost 66 cents each. I was pleased to receive replies from 31 of them.

Which one of the pieces of information given above is **not** needed to work out how much this exercise cost me in postage?

- A A stamped addressed envelope was enclosed with each request.
 B I wrote to 53 celebrities.
 C The stamps cost 66 cents each.
 D 31 celebrities replied.
- 3 I want to attend one football match this month. Since I want to see a good match, I have decided to see a team who finished within four places of my team last year. My team finished 8th last year. I also want to watch an away game, but would like to travel the shortest distance possible to reach the game. I have summarised the information about this month's matches for my team in the table shown below.

Week	Wednesday game				Saturday game			
	Location	Distance to travel (km)	Ticket price (\$)	Opponent's position last year	Location	Distance to travel (km)	Ticket price (\$)	Opponent's position last year
1	Home	2	40	17	Away	21	50	1
2	Away	52	38	5	Away	32	42	11
3	Home	2	35	9	Home	2	45	14
4	Away	14	47	2	Home	2	40	7

Which match will I go to see?

- A Week 1 Saturday
 B Week 2 Wednesday
 C Week 2 Saturday
 D Week 3 Wednesday

- 4 Germination rates of sweet pea seeds vary by colour. Whenever seeds for particular colours are planted, one can be sure that a certain percentage will germinate. These percentages are given below.

White	60%
Blue	80%
Red	90%
Salmon	70%
Pink	50%

Fifty plants of each colour are required for a display.

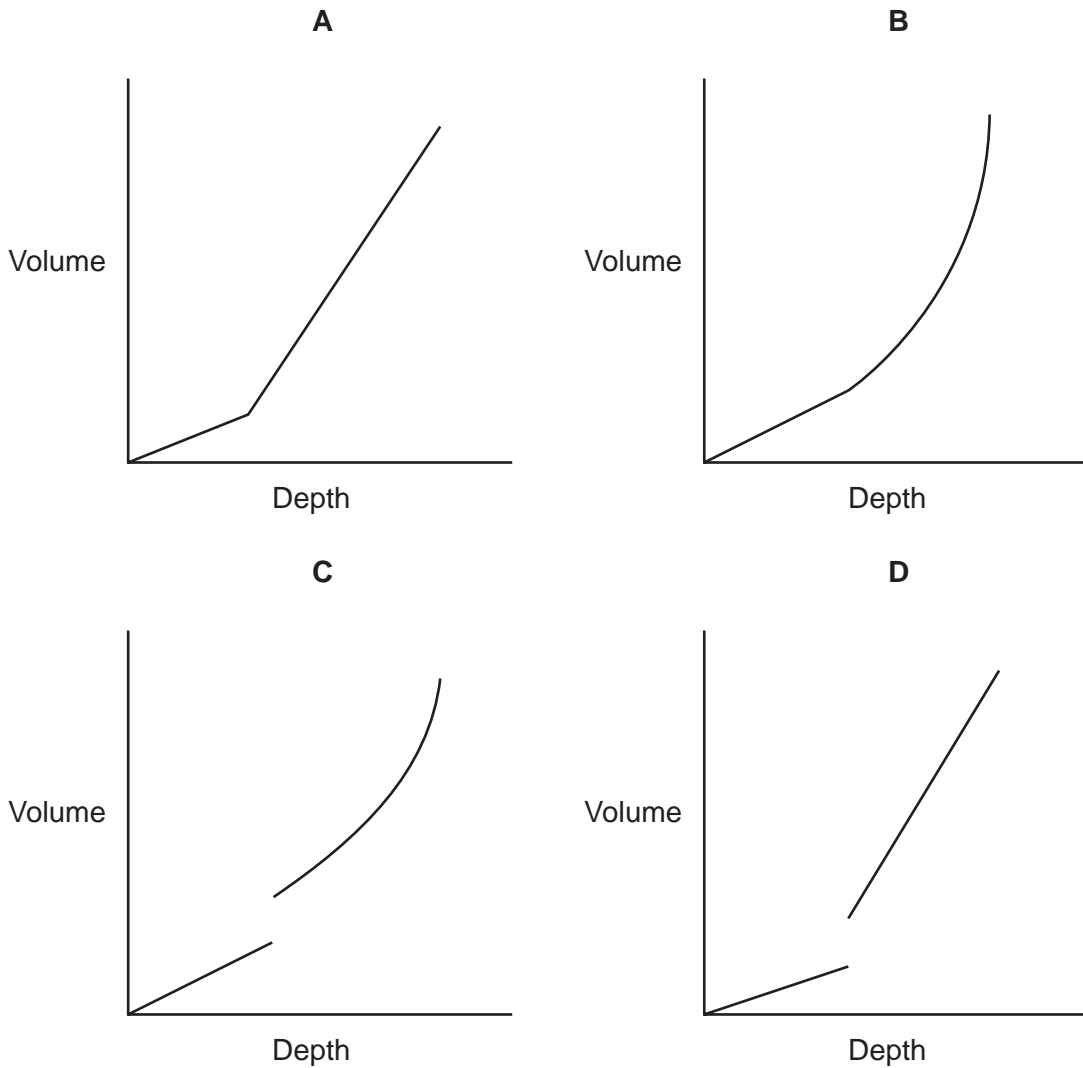
How many seeds in total need to be planted?

- A 350
- B 375
- C 500
- D 700

- 5 The new coffee cups we have are designed to be a better fit in the cup-holders in the car. They are circular, and look like this from the side:



How does the volume of coffee vary with the depth when the cups are upright?



- 6 Visitors to the Joanna Louisiana theme park have two types of ticket available to them, as follows.

1-day ticket – This is valid on the day of issue only.

3-day ticket – This is valid on the day of issue and the next two days only.

This is a record of the tickets issued last week.

	<i>1-day</i>	<i>3-day</i>
<i>Monday</i>	417	459
<i>Tuesday</i>	432	516
<i>Wednesday</i>	440	483
<i>Thursday</i>	308	477
<i>Friday</i>	319	628
<i>Saturday</i>	373	561
<i>Sunday</i>	526	425

How many tickets altogether were valid for use on Thursday last week?

- A 1476
 B 1657
 C 1784
 D 1974
- 7 Ferry boats left Vilerpool on January 1st last year for Dalgous, Flabest and Budlin. Thereafter boats were scheduled to leave for Dalgous every fifth day, Flabest every seventh day, and Budlin every tenth day.

How many more times during the year did boats for all three places leave Vilerpool on the same day?

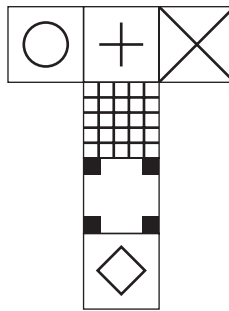
- A 1
 B 5
 C 7
 D 10

- 10 Alice and Julie hired a tandem cycle for their holiday. On the way to where they were staying, Alice cycled at the front for 25 km and Julie took over for the rest.

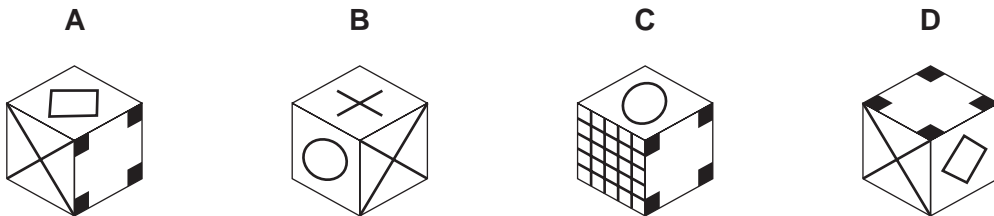
On the way back, Julie cycled at the front first for 30 km, then Alice took over for the remainder.

Who cycled at the front for most, and by how much?

- A Alice, by 5 km
 B Alice, by 10 km
 C Julie, by 5 km
 D Julie, by 10 km
- 11 The net shown below is folded up to make a cube.



Which of the following cubes could be made from this net?



- 12 Carl and Ryan are students who regularly pass coded notes to each other during lessons. The colour of the ink is the key to which of their four codes is being used in any particular note, as summarised below.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Black	V	G	I	Q	W	R	A	N	C	P	X	F	H	S	D	T	J	Y	M	O	B	Z	L	U	E	K
Blue	H	G	B	M	K	L	E	C	V	X	F	U	T	I	D	S	W	O	Q	Y	N	A	R	Z	J	P
Green	R	X	J	M	L	I	N	B	D	T	Y	Q	A	F	V	Z	H	W	K	C	P	G	O	S	E	U
Red	D	K	Y	F	B	T	M	L	P	X	S	G	O	W	Z	A	J	V	E	Q	N	I	R	H	C	U

GOOD LUCK, for example, would be written as ADDQ FBIX in black ink, EDDM UNBF in blue ink, NVVM QPJY in green ink and MZZF GNYS in red ink.

Their teacher has intercepted a note from Ryan to Carl that reads

TVBF ODQQ ALLC PK RC CBL KCRCDFV.

In what colour ink did Ryan write this note?

- A Black
 - B Blue
 - C Green
 - D Red
- 13 The competitors for the Bolandian half-marathon need numbers. The numbers will consist of pieces of thin card, each with a single digit, so the number 327 will appear as shown below.



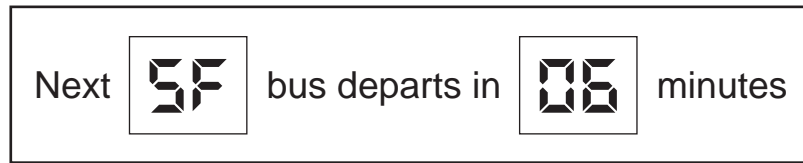
There are 425 competitors.

How many 3s will be needed?

- A 43
- B 83
- C 163
- D 183

- 14** The 5F bus, on which I travel home from work, departs from the bus station in town every 20 minutes. At its boarding point there is a digital display that shows the time to the next departure.

As I arrived at the boarding point yesterday the display showed



Now I have just arrived to see it change from



to



I am told that a fault occurred last night which has caused the "5F" to be superimposed on the number of minutes.

How long is it now to the departure of the next 5F bus?

- A** 11 minutes
 - B** 14 minutes
 - C** 16 minutes
 - D** 17 minutes
- 15** A three-dimensional shape is made by taking a cube and cutting off each of its corners. The cuts extend to less than halfway along each edge.

How many edges does the new shape have?

- A** 12
- B** 20
- C** 32
- D** 36

- 16 My friend Callum is coming to visit me this afternoon. His journey involves travelling on two buses and he told me that he would be arriving at 6 pm. He just phoned me to tell me that he is on the first bus, but it was delayed in traffic and will arrive at the bus station (where he needs to catch the second bus) 20 minutes late. I know that the second bus service runs every 15 minutes.

Assuming that there are no other delays to bus services, which one of the following additional pieces of information would be sufficient for me to work out the time I should expect Callum to arrive?

- A The total amount of time that Callum expected to be travelling on buses today.
 - B The total amount of time that Callum expected to be waiting at the bus station.
 - C The time that Callum expected to be arriving at the bus station.
 - D The time that Callum expected to be leaving the bus station.
- 17 On 1 January the manager of a large organisation learned that the company was about to be taken over. He sent emails to five colleagues to inform them of the news.

On 2 January these five colleagues each sent out five emails informing other colleagues.

On 3 January those colleagues who heard the news on 2 January each sent out four emails informing other colleagues.

On 4 January those colleagues who heard the news on 3 January each sent out fifteen emails informing other colleagues.

On the first three days that the rumour of this take-over was being spread, recipients of the information only received one email each. On 4 January, however, two thirds of recipients received emails from two different colleagues informing them of the news. The remainder just received one email.

How many colleagues received **two** emails on 4 January?

- A 600
- B 900
- C 1000
- D 1200

- 18** Fred has three different routes by which he can walk to work in the morning. It takes Fred 3 minutes to get to work if he takes the quickest route and either 7 or 9 minutes to get to work if he uses one of the other routes. If Fred is leaving home less than 10 minutes before the time that he starts work, then he will always take the 3-minute route, and he will only take the 9-minute route if he is leaving home more than 15 minutes before the time that he starts work. Last week the numbers of minutes early that Fred arrived at work were 7, 2, 4, 12 and 9.

What is the largest number of minutes that Fred could have spent walking to work last week?

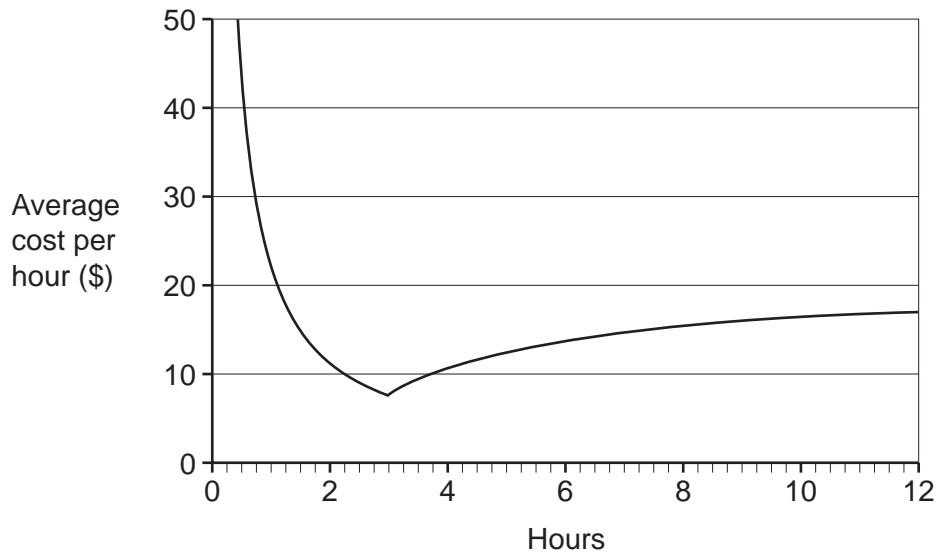
- A** 19
 - B** 21
 - C** 37
 - D** 45
- 19** When I visited Sonos, I discovered that the Sonic currency consists of four different coins, known as buzzes, drones, hums and whirrs.

I had no idea, at first, of the relative value of each coin. However, shortly after my arrival I was asked if I could exchange a buzz and a drone for two whirrs, and a short time later a similar request involved the exchange of a hum and a drone for three whirrs.

Based on my encounters, which is the only one of the following that can be confirmed?

- A** A buzz is worth more than a drone.
- B** A drone is worth more than a hum.
- C** A hum is worth more than a whirr.
- D** A whirr is worth more than a buzz.

- 20 Fred Coley rents out fishing boats to tourists. The average cost per hour rented is shown in the graph below.



Which one of the following charging schemes does he use?

- A** \$7.50 plus \$2.50 per quarter hour.
B \$7.50 for the first hour plus \$2.50 per quarter hour after that.
C \$22.50 for the first 3 hours plus \$5.00 per quarter hour after that.
D \$5.00 plus \$2.50 for each quarter hour up to 3 hours, plus \$5.00 for each quarter hour after that.
- 21 Bongani is a driver for the Zulu Taxis business. He drives passengers on the route from township *A* to city *B*, starting the first trip at 05:00 in the morning. The first journey from *A* to *B* takes 1 hour. The remaining journeys take only 30 minutes each way because there is less traffic. There are never any passengers to carry from *B* to *A* before 12:00. At the end of his working day he has to return the taxi to township *A*.

The taxi can legally carry 8 passengers plus the driver. Bongani does not break the law. He is paid 25 Rand per journey by each passenger. Bongani gets to keep all fares paid by his passengers, but he must pay 1000 Rand to Zulu Taxis per day for use of the taxi and fuel.

What is the earliest time Bongani could finish work and have at least 400 Rand in his pocket after paying Zulu Taxis?

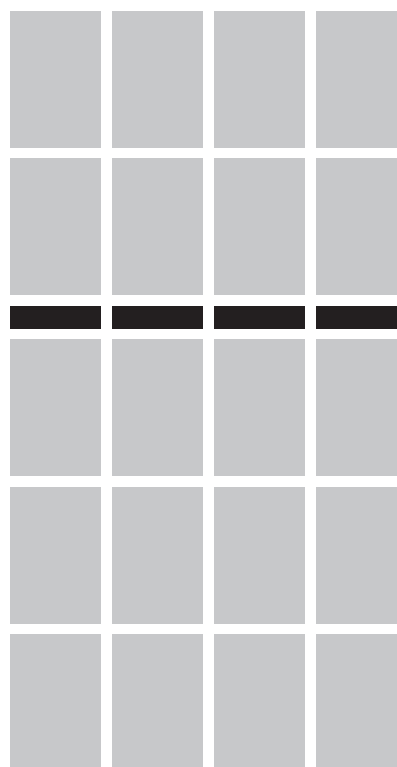
- A** 10:30
B 12:00
C 12:30
D 15:30

- 22 Varinda is tiling a wall with grey tiles and a decorative strip of thin black tiles, part of which is shown alongside.

The grey tiles are 30 x 20 cm. The black strip is 5 cm wide and its lower edge is at a height of 1.4 m. The gaps between all the tiles are 0.5 cm; these are filled with a white compound. There are similar gaps at the edges of the wall, ceiling and floor.

He can cut tiles to size where necessary and reuse the cut pieces if they fit with the pattern.

The wall is 2.25 m high x 1.85 m wide.



How many grey tiles will he need?

- A 56
 B 63
 C 72
 D 80
- 23 The SaveMost mini market is open for 7 days a week and employs three part time assistants who each work for 3 days a week. None of them works for three consecutive days but at least one of them is there each day.

Arif cannot work on Tuesdays, Thursdays or Sundays.

Bjorn cannot work on Saturdays.

Carla cannot work on Thursdays or Sundays.

They all work on Wednesdays.

Which of the following is possible?

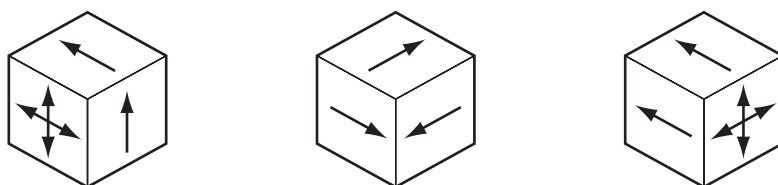
- A Arif works Wednesday, Friday, Saturday.
 B Bjorn works Monday, Wednesday, Thursday.
 C Carla works Monday, Wednesday, Friday.
 D Carla works Tuesday, Wednesday, Saturday.

- 24 A man is given two ways of investing \$100. The first option will increase the investment by \$20 every year (after one year \$120, after two years \$140, after three years \$160 etc.). The second option will increase the investment by \$30 the first year, and then by \$29, and so on, by \$1 less each year (after one year \$130, after two years \$159, after three years \$187 etc.).

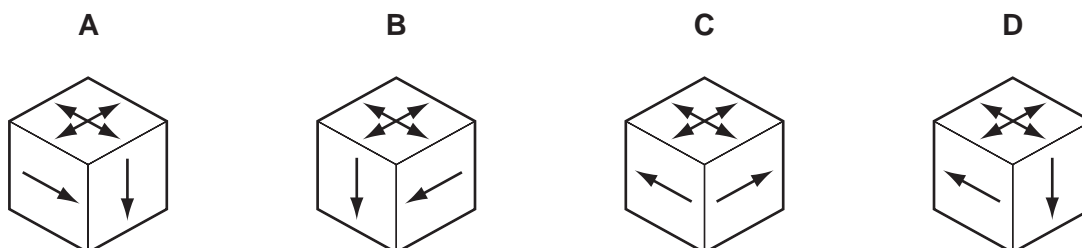
For how long would the man have to invest his money in order for the first option to be more profitable than the second?

- A 15 years
 B 20 years
 C 22 years
 D 25 years
- 25 “Way To Go” is a game that combines answering trivia questions and throwing two dice in order to move a piece around a board. One of the dice is an ordinary die. The other one is a direction die, indicating which way to go. Five of the faces are marked with a single arrow on each of them, whilst the sixth face has a four-way arrow, giving the player a choice of direction.

These are three views of the direction die.



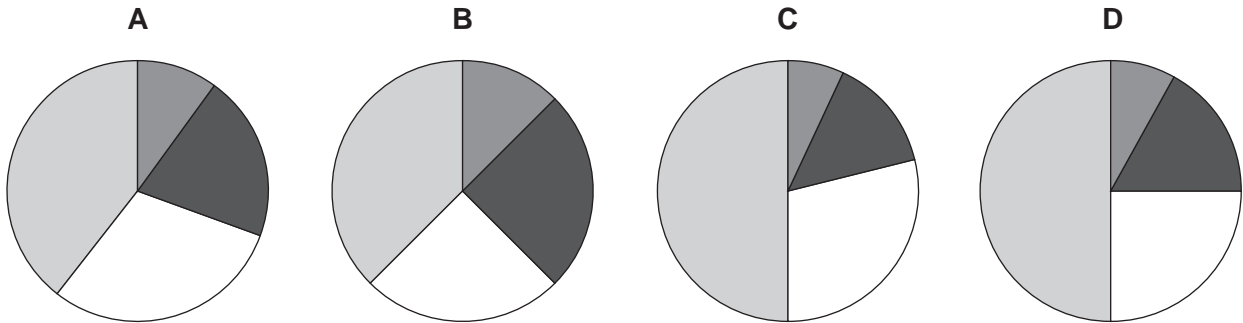
Which one of the following is another view of the direction die?



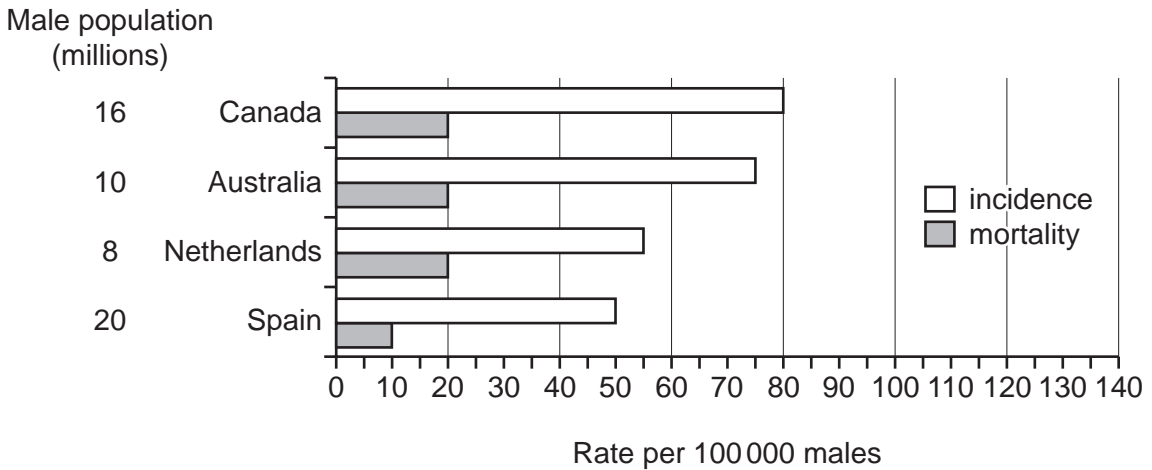
26 At the end of each year the manager of the local newspaper divides the money available for bonuses between the employees in a ratio according to the number of complete years that they have worked there. So, an employee who has worked for between two and three years gets twice as much as an employee who has worked between one and two years, and employees who have not yet worked for a full year get no bonus.

There are four employees at the moment. Ann has worked for 1 year 1 month, George has worked for 2 years 3 months and Harriet has worked for 3 years 10 months.

In the absence of any information about the length of employment of the fourth employee, which of the following pie charts could **not** represent the bonuses paid to the four employees?



27 Death rates of people suffering from cancer have been falling world-wide. Prostate cancer affects men and there have been increased rates of detection, which has helped the successful recovery from this disease. Data showing the comparative incidence of, and mortality from, this type of cancer for four different countries are given below.



Which country has the highest number of survivors from this type of cancer?

- A Australia
- B Canada
- C Netherlands
- D Spain

- 28 Sydney is nominally 10 hours ahead of London, but for most of the year it is either 9 or 11 hours, depending on whether it is summer time (when the clocks are one hour ahead) in the northern or in the southern hemisphere.

In both places the times change early on a Sunday morning. Clocks go forward by 02:00 becoming 03:00 and back by 03:00 being reset to 02:00.

On a weekend when both places changed time, and London 'lost' an hour, what was the time in Sydney when it was 16:30 on Saturday in London?

- A 01:30
- B 02:30
- C 03:30
- D 05:30

- 29 Recently a law was passed in Bolandia meaning that it is no longer necessary for a customer to be given change for a purchase if he or she cannot provide the exact money. Bolandian coins are available with values of 1 ¢, 5 ¢, 25 ¢, 50 ¢ and \$1. Accordingly, Frank adjusted his prices to make sure that paying the exact amount would always require at least six coins. On Monday his first customer bought one item, priced below \$2, but had only 50 ¢ and \$1 coins with him.

What is the maximum possible extra profit that Frank could have gained on this item as a result of the policy of not giving change?

- A 41 ¢
- B 42 ¢
- C 46 ¢
- D 49 ¢

- 30 I left Pickton in my car at 8.30 am, just as a bus from Orford was pulling into the bus station. The buses leave Orford for Pickton at 30-minute intervals. 10 minutes later, another Orford–Pickton bus passed me.

Assuming that both the buses and I travel at constant speeds, which one of the following additional pieces of information do I need in order to know when I will arrive at Orford?

- A The distance from Pickton to Orford.
- B The bus's average speed.
- C My average speed.
- D The bus journey time for Orford to Pickton.

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