

THINKING SKILLS

9694/11

Paper 1 Problem Solving

October/November 2018

1 hour 45 minutes

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

* 4 5 8 1 3 5 3 0 0 2 *

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 The table below shows the dates of the reigns of the monarchs of Portugal from 1640 to the abolition of the monarchy in 1910. (Where the dates overlap, this indicates a King and Queen ruling together.)

<i>Monarch</i>	<i>Start date</i>	<i>End date</i>
João IV	15 December 1640	06 November 1656
Afonso VI	06 November 1656	12 September 1683
Pedro II	12 September 1683	09 December 1706
João V	09 December 1706	31 July 1750
José	31 July 1750	24 February 1777
Maria I	24 February 1777	20 March 1816
Pedro III	24 February 1777	25 May 1786
João VI	20 March 1816	10 March 1826
Pedro IV	10 March 1826	05 May 1826
Maria II	05 May 1826	30 June 1828
Miguel	30 June 1828	26 May 1834
Maria II (again)	26 May 1834	15 November 1853
Fernando II	16 September 1837	15 November 1853
Pedro V	15 November 1853	11 November 1861
Luís	11 November 1861	19 October 1889
Carlos	19 October 1889	01 February 1908
Manuel II	01 February 1908	05 October 1910

Which monarch ruled for the longest?

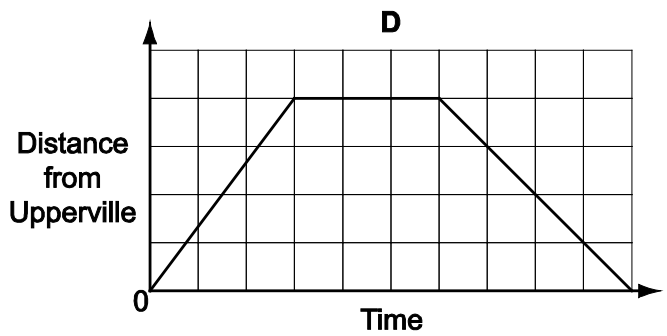
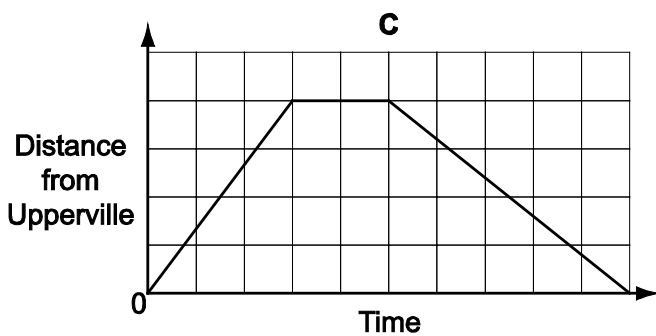
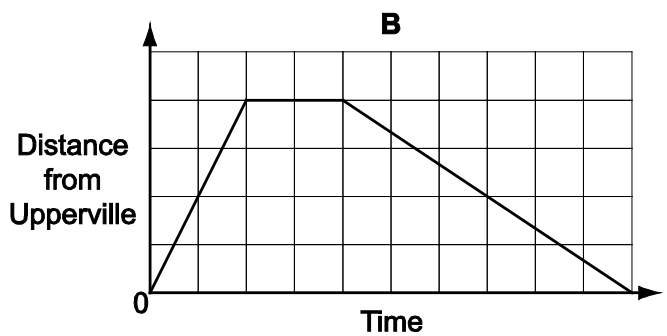
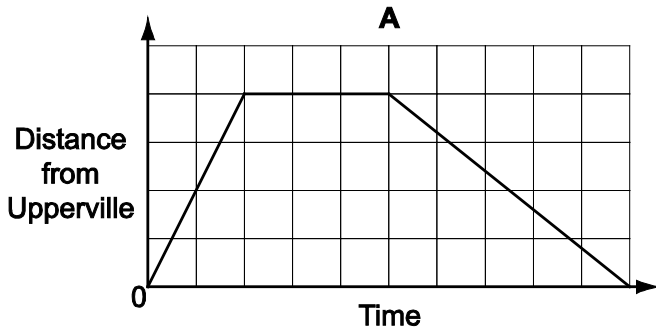
- A** Afonso VI
- B** João V
- C** Luís
- D** Maria I

- 2 An hourly tram service connects the town of Upperville with the popular beach of Lowsands.

At ten past each hour the tram sets off from Upperville, covering the 8 km route at a constant speed of 40 km/h.

At half past the hour it begins its return journey, which, because it is uphill all the way, it covers at a constant speed of 24 km/h.

Which one of these graphs shows the tram's progress from Upperville to Lowsands and back?



- 3 Mobile phones use the following keys for forming words when sending text messages.

2	3	4	5	6	7	8	9
ABC	DEF	GHI	JKL	MNO	PQRS	TUV	WXYZ

To form the word RED, for instance, requires 7 to be pressed three times, 3 to be pressed twice, then 3 to be pressed once more.

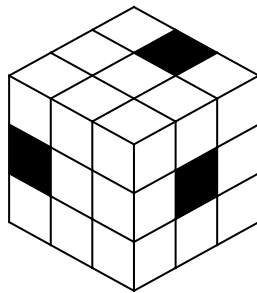
Which key is pressed most times altogether when the word ACTIVATION is formed?

- A** 2
B 4
C 6
D 8

- 4 At 10:00 this morning I set off from home for an appointment at 14:00, 240 kilometres away. After 1 hour 40 minutes I had completed exactly half of the journey. Since then I have only travelled 15 kilometres in 50 minutes due to heavy traffic.

What is the minimum speed I must average for the rest of the journey in order to arrive at my destination no later than 14:00?

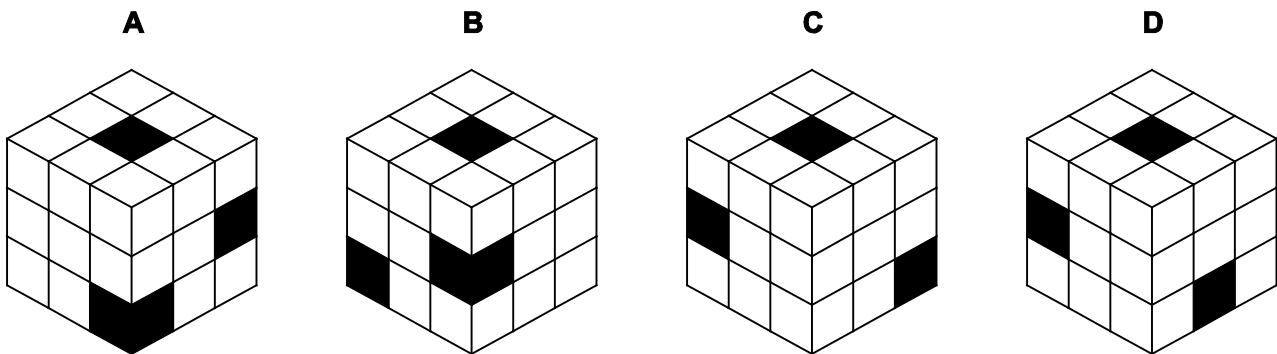
- A 66 km/h
 B 70 km/h
 C 75 km/h
 D 80 km/h
- 5 This is today's appearance, from one particular direction, of an exhibit entitled *Separated*, currently on display at the Luksi art gallery.



It consists of 4 small black cubes, separated from each other by 23 white cubes of the same size. The whole structure forms a larger cube. The fourth black cube is at the corner that is not visible in the appearance shown above.

Every morning, before the gallery opens, the exhibit is rotated through 90° . Yesterday the right-hand face of the appearance shown above was the top face.

Which one of the following could **not** have been the appearance of the exhibit yesterday from any direction?



- 6 George sells pads of paper at a price of \$2 each, but if more than 50 pads are ordered then the price for the extra pads is reduced to just \$1 each. He is considering changing the prices so that pads cost \$2.50 each, and if more than 50 are bought the price for the extra pads is reduced to \$1.50 each. My monthly order for pads of paper usually costs me \$300.

How much will the order cost me when George increases his prices?

- A \$400
 B \$425
 C \$500
 D \$550
- 7 Concentrated fruit juice has to be diluted using 2 parts concentrate to $1\frac{1}{2}$ parts water before it can be consumed. Chris has, by mistake, added water so that she has 6 litres of juice which is half concentrate and half water.

What must she add to make the proportions of the juice correct?

- A 1 litre of water
 B $\frac{1}{2}$ litre of water
 C $\frac{1}{2}$ litre of concentrate
 D 1 litre of concentrate
- 8 A group of friends intend to rent a villa in Real Beach for four weeks in the summer. They would like a villa with a sea view and off-road parking. They would also like to be less than 2 km from the nearest shop, and for the rental charge to include cleaning at least three times each week. They have narrowed their search down to four villas. Details of the facilities at these villas are shown in the following table.

<i>Villa</i>	<i>Sea View</i>	<i>Off-road parking</i>	<i>Cleaning</i>	<i>Distance to nearest shop</i>	<i>Rental charge</i>
Argyle	Yes	No	Every 2 days	1 km	\$500 per week
Balms	No	Yes	Every 3 days	2.5 km	\$70 per day
City	Yes	Yes	Daily	3 km	\$450 basic charge plus \$400 per week
Denia	Yes	No	None	1.5 km	\$2150 for 4 weeks

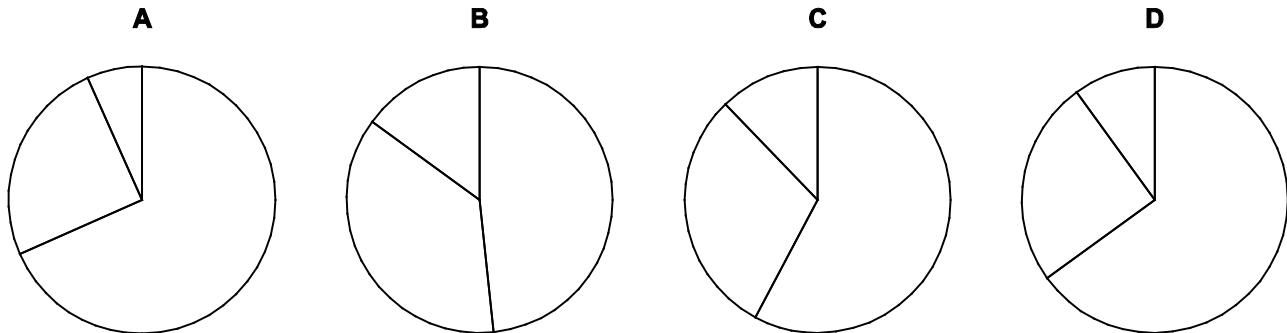
Since no villa has everything they would like, the friends agree that it must satisfy at least two of their criteria. If more than one villa is then suitable, they will opt for the one with the cheapest rental charge.

Which villa will the friends choose?

- A Argyle
 B Balms
 C City
 D Denia

- 9 There are 240 households in the village of Ferr End. A survey has revealed that 40 of the households have no dogs, 116 have one dog, 60 have two dogs and 24 have three dogs. No household has more than three dogs.

Which one of the following pie charts could illustrate the data for the households that do have at least one dog?



- 10 A free bus service operates throughout the day around Brelney City Centre. The bus starts from the Railway Station, then stops successively at the Castle, the Shopping Centre, the Park and the Stadium, before returning to the Railway Station. The journey time for each section of the circuit is 5 minutes.

The first departure of the day from the Railway Station is at 09:15. Each time the bus arrives back at the Railway Station it waits for 10 minutes before setting off again.

Bart will be the driver for the first 4 circuits tomorrow.

At what time will Bart arrive back at the Railway Station for the final time tomorrow?

- A** 11:25
B 11:35
C 11:45
D 11:55
- 11 A postal service has charges for parcels to a particular destination. It charges \$1.30 for the first 250g and \$0.20 for each additional whole or part 100g.

What could be the weight in grams of a parcel for which the charge is \$3.10?

- A** 259g
B 900g
C 1145g
D 1550g

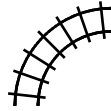
- 12 A locksmith is developing an unconventional combination lock. He has decided to vary the number of digits on each dial. The design for the lock currently has the following three dials:

0–5	0–9	0–3
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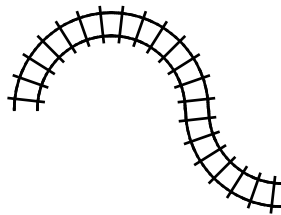
The first dial (0–5) has 6 positions, the second (0–9) has 10 positions and the third (0–3) has 4 positions.

Which of the following will result in a larger number of possible combinations than the others?

- A Adding another 0–9 dial at the end of the current design
 - B Adding a 0–4 dial at the start and a 0–4 dial at the end of the current design
 - C Adding three consecutive 0–2 dials after the 0–9 dial in the current design
 - D Adding a 0–5 dial at the start and a 0–3 dial at the end of the current design
- 13 Fred is constructing a model railway by fitting together identical curved pieces of track. Each piece of track makes a 90° turn, as shown below.



He begins his design by connecting 3 pieces, as shown below.



What is the smallest number of pieces that need to be added to this design to make a complete circuit?

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

- 14 Some Latin poetry uses the *hexameter* for each line: the pattern of syllables must conform to specific rules. A hexameter has six *feet*, and each *foot* must be one of *dactyl*, *spondee* and *trochee*.

<i>Foot</i>	<i>Syllable pattern</i>
Dactyl	Long Short Short
Spondee	Long Long
Trochee	Long Short

For a standard hexameter, the first four feet must be dactyls or spondees but not all the same, the fifth must be a dactyl, and the last either a spondee or a trochee.

How many different possible standard hexameter lines are there?

- A 10
 B 28
 C 30
 D 62
- 15 On the second day of every month James pays \$400 into a bank account. The money in this account is used to pay the following bills during the year:

\$300 for rent every month (1st day of each month)
 \$45 for his phone bill every 3 months (1st February, 1st May, 1st August, 1st November)
 \$60 for electricity every 3 months (1st March, 1st June, 1st September, 1st December)
 \$900 for council tax (1st January)

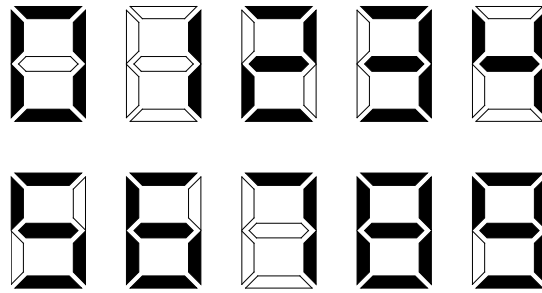
The bank adds 5% to the amount in the account on 31st December each year.

The payments into the account mean that James will have the same amount of money in his account on any day as he did in the previous year.

How much money was in James' account on 30th December last year?

- A \$1200
 B \$2100
 C \$2400
 D \$2800

- 16 A clock showing the 24-hour time (00:00 to 23:59) uses a seven-light display for each digit as follows.

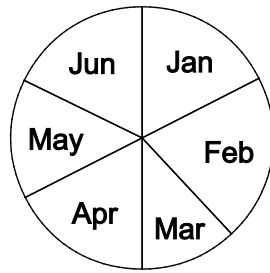


Extra power is required to turn any light on. For example, changing from 0 to 1 does not require any light to be turned on, but changing from 1 to 2 requires four lights to be turned on.

What is the maximum number of lights turned on when the time changes from one minute to the next?

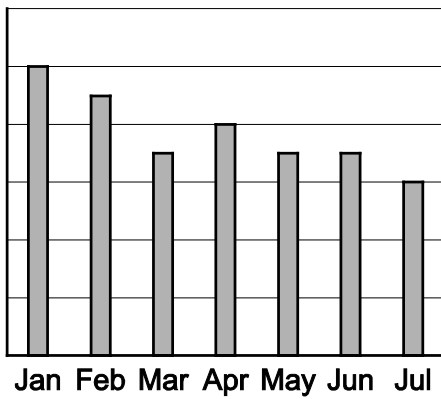
- A 7
- B 8
- C 9
- D 10

- 17 Bill earns a fixed amount of money each month, but spends different amounts of money each month. The pie chart below shows how much he spent in each of the last six months.

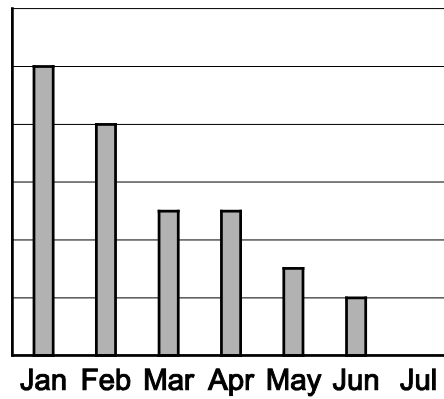


Which of the following charts could **not** show the total amount of money that Bill had at the start of each month?

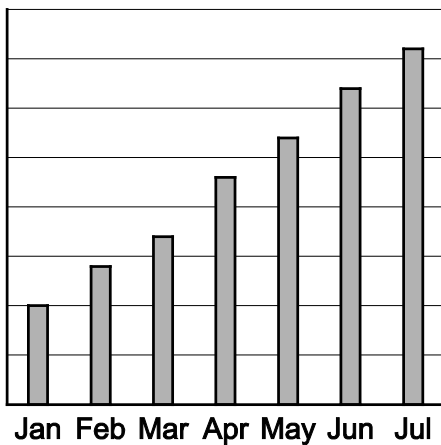
A



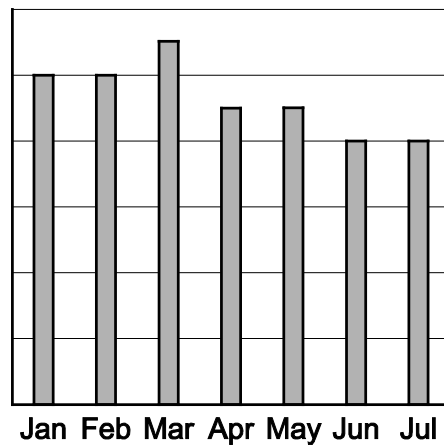
B



C



D



- 18 Richard works for 8 hours every day, five days every week. He earns \$10 per hour, but also gains a bonus which is calculated based on the quality of his work. At the end of each day Richard's supervisor scores his performance on a scale from 1 to 4. When the five scores for the week have been allocated, the second-lowest score is added to the second-highest score and the total is multiplied by \$100 to give the value of the bonus.

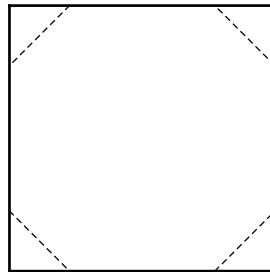
Last week Richard's scores were 4, 1, 3, 2 and 4; so his bonus was \$600.

Richard knows that he was given scores of 3, 2 and 3 on Monday to Wednesday this week.

What score for his work on Thursday would allow Richard to know what the value of his bonus for the week will be?

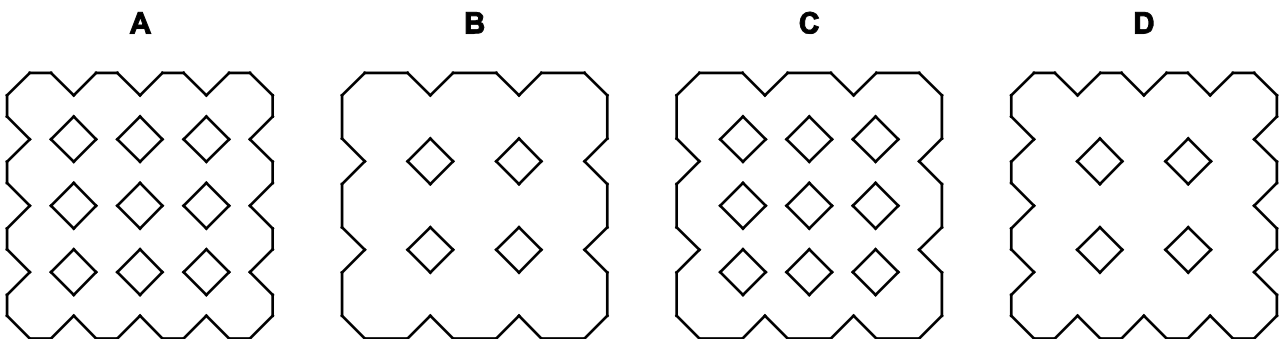
- A 1
- B 2
- C 3
- D 4

- 19 A square piece of paper is folded over equally four times and then the corners are cut off.



The paper is then unfolded to reveal a pattern.

Which of the following is the resulting pattern?



- 20 Shopping for clothes yesterday, I bought two shirts, one priced at \$14, the other at \$16. I also bought a jumper, a pack of socks, a pair of trousers and a tie priced at \$26, \$5, \$30 and \$7 respectively.

I paid with a \$100 note and unexpectedly received \$23 change. I had failed to notice that one of the shirts and one of the other items had been reduced to half price.

Which one of the other items had been reduced to half price?

- A The jumper
 - B The pack of socks
 - C The pair of trousers
 - D The tie
- 21 Mr Prod has a replicator. He uses it to triple everything he finds. Mrs Quot has a disintegrator. She uses it to destroy half of everything she finds. Ms Subtra is a thief who always steals six apples.

One day a farmer left his apple cart unattended in his field. He returned to find he was missing 4 apples. He knows Mr Prod, Mrs Quot and Ms Subtra were the only three people to pass his cart but he does not know the order in which they passed.

Which one of the following numbers of apples did the farmer **definitely not** begin the day with?

- A 4
 - B 10
 - C 20
 - D 28
- 22 I was in Chromia for a very short time and did not really understand the currency, which seemed to have rather strange coloured coins; so when buying something I just offered a handful of coins.

Some of the prices in the shops were just marked as colours. In the coffee shop I bought a coffee which was marked as blue. The assistant took 2 green coins and gave me one red as change. Later I bought a newspaper, which was marked as green. The assistant took 3 red coins and gave me one blue in change.

Which of the following could be the value of the Chromian green and red coins?

- A Green 3, red 4
- B Green 4, red 3
- C Green 5, red 2
- D Green 5, red 3

- 23 A large corporation interviews people to fill positions in their business. Each man who applies is twice as likely as each woman to be offered a job. Three times as many women apply as men.

What proportion of those offered a job are expected to be men?

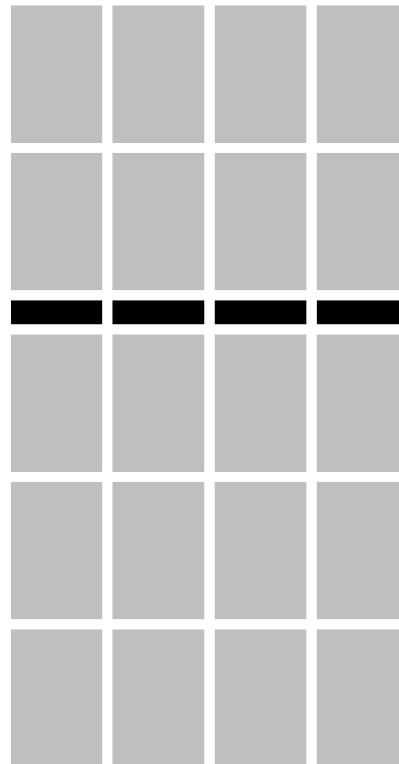
- A $1/3$
- B $2/5$
- C $1/2$
- D $2/3$

- 24 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

- 25** 100 people voted in a secret ballot for sporting hero of the year. The result was that Alan got 55 votes, Bella 35 votes and Cain 10 votes. After the result had been announced the voters were all asked individually how they voted. 80 said they voted for Alan, 10 for Bella and 10 for Cain.

What is the lowest number of voters that could be telling the truth?

- A** 35
 - B** 50
 - C** 65
 - D** 75
- 26** Sami is organising a conference and has to provide lunch for the delegates. He expects at least 108 and at most 120 people will attend. For lunch, each delegate will be offered a packet of sandwiches, with a choice of salmon, turkey, or cheese. From experience he knows that at least a quarter of people will choose each type, but no more than a half will choose salmon, no more than a third will choose turkey, and no more than a third will choose cheese.

The packets of sandwiches cost Sami \$6 each for salmon, \$5 each for turkey, and \$4 each for cheese. Sami has arranged with the supplier that he can get half the cost back for any packet that is not used. Sami buys exactly the number of packets that will ensure that every delegate can get the type they want.

What is the least amount of money that Sami could get back when he returns the unused packets to the supplier?

- A** \$36.00
 - B** \$40.00
 - C** \$40.50
 - D** \$45.00
- 27** A local store sells a variety of products related to a television show. The items for sale are books, T-shirts and models of characters who feature in the show.

Books cost \$8 each, T-shirts cost \$12 each and the models are \$10 each. Whenever three or more items are bought the cheapest one is reduced to half price. Today, 8 books, 8 T-shirts and 4 models were sold and discounts were applied to 5 of the items.

What is the difference between the greatest and least possible total amount paid for these items?

- A** \$5
- B** \$6
- C** \$8
- D** \$10

- 28 Every day from Monday to Saturday last week Roger ate one packet of sandwiches and drank one carton of fruit juice for his lunch. Roger went to the store to buy sandwiches and/or cartons of fruit juice each evening.

The cartons of fruit juice are only sold in packs of 3. The amounts that he spent each night last week are as shown in the table.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
\$5	\$2	\$3	\$3	\$2	\$2

Roger did not have any sandwiches or cartons of fruit juice left before he went shopping on Sunday and did not have any sandwiches or cartons of fruit juice left after his lunch on Saturday.

On one day Roger was able to take advantage of a “Buy one, get one half price” offer on sandwiches when at the store.

On which day did the store have the offer in place?

- A Monday
 - B Tuesday
 - C Wednesday
 - D Thursday
- 29 Four teams are taking part in a quiz. Each question is asked to all four teams. If only one team answers correctly, that team scores 10 points. If two teams answer correctly they both score 4 points, if three teams answer correctly they score 2 points each and if all four answer correctly they all score 1 point.

After the first 10 questions the scores are as follows:

Hoos	31 points
Watts	23 points
Wennis	15 points
Wares	13 points

The Wares are disappointed to be in last place at present, particularly as they have answered five questions correctly – more than two of the other teams.

What is the greatest number of questions that the Hoos may have answered correctly so far?

- A 6
- B 7
- C 8
- D 9

- 30** To unlock my mobile phone, I have to enter a 4-digit PIN code. The four digits are all different and multiply together to give 360. When the code is written as words, the digits are in alphabetical order.

Which one of the following additional pieces of information would, by itself, enable you to deduce with certainty that my PIN code is 5492?

- A** The first digit is 5
- B** The second digit is 4
- C** The third digit is 9
- D** The fourth digit is 2

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