
THINKING SKILLS

9694/12

Paper 1 Problem Solving

May/June 2015

1 hour 45 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 **18** printed pages and **2** blank pages.

- 1 Mr and Mrs Dax are going to the *Startrakkers* sci-fi convention this weekend with their two children and Mr Dax's father. The Dax children are 7 and 13, and Mr Dax's father is in his sixties. The parents will attend both days with the elder child but Mr Dax's father and the younger child will spend one day visiting relatives. Ticket prices are listed below.

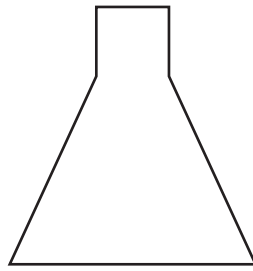
	One-day ticket	Two-day ticket
Adult	\$12	\$20
Child	\$9	\$15
Concession*	\$7	\$14

*Under 12, Starman pass or over 55

How much will the convention cost the Dax family if they buy the cheapest tickets?

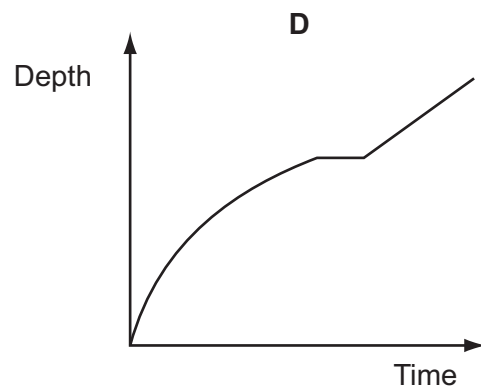
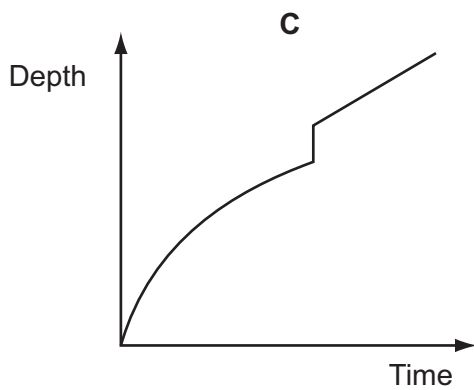
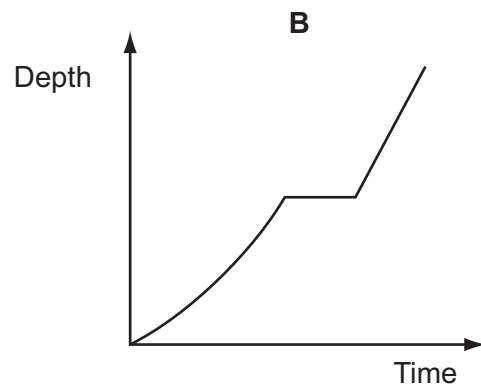
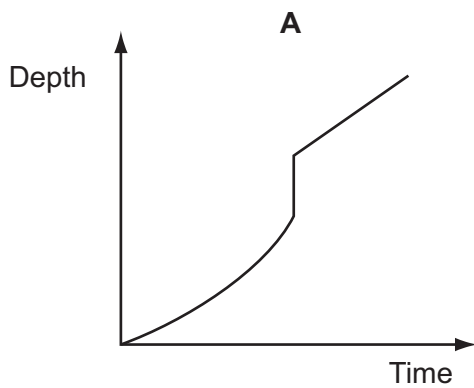
- A \$63
- B \$69
- C \$71
- D \$74

- 2 The drawing shows the cross-section of a container used in the storing of liquids. A liquid is poured into the container at a constant rate, until the liquid is at the base of the neck of the container. After a short pause, more liquid is poured in, at the same constant rate, until the container is full.



An observer draws a graph to show how the depth of the liquid changes with time, as the container is being filled.

Which one of the following graphs is consistent with the given information?



- 3 At the Bolandia zoo, baby hippanas need to be given tablets, according to their masses, as shown in the table on the left. Extra tablets are needed if the hippana has an elevated temperature, as detailed in the table on the right.

<i>Mass</i>	<i>Number of tablets</i>
20 – 35 grams	2
35 – 50 grams	2
50 – 65 grams	3
65 – 80 grams	4
80 – 95 grams	4
95 – 110 grams	5

<i>Temperature</i>	<i>Number of extra tablets</i>
30 – 31 degrees	0
31 – 32 degrees	0
32 – 33 degrees	1
33 – 34 degrees	1
34 – 35 degrees	2
35 – 36 degrees	3

Two baby hippanas, with masses of 55 grams and 82 grams, need to be given tablets. Their temperatures are 33.3 degrees and 31.4 degrees respectively.

How many tablets will be needed in total?

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

- 4 Aaron and Eve are booking a photographer for their wedding. The following table shows the packages on offer from four local firms.

FIRM	PHOTOGRAPHS TAKEN				FORMAT			COST
	Before the ceremony	Ceremony	Reception	Disco	CD	Video	Album	
Digiphoto	✓	✓	✓	✓	✓	×	✓	\$3000
Galloshoot	×	✓	✓	×	✓	✓	✓	\$1800
Memories	×	✓	✓	✓	✓	×	✓	\$2250
Snapshots	✓	✓	✓	✓	✓	✓	×	\$2400

As a record of their special day, Aaron and Eve want an album showing pictures of the wedding ceremony, the reception and the disco and they also want to keep their budget as small as possible.

Which photographic firm should Aaron and Eve choose?

- A Digiphoto
 B Galloshoot
 C Memories
 D Snapshots
- 5 Among the films showing at Kevin's nearest multiplex cinema there are two that Kevin would like to see. The start times and running times are in the table below.

Title	Start times			
Tim Burton's Corpse Bride (76 minutes)	11:45	13:30	15:15	17:00
	18:45	21:00		
Wallace and Gromit in the Curse of the Were-Rabbit (85 minutes)	12:30	13:30	14:15	15:00
	16:00	16:45	17:30	18:30
	19:15	20:00	21:45	

Kevin's plan is to see these films tomorrow. He does not mind what order he sees them in but wants to arrive at the cinema as late in the day as possible. Buses from his house arrive at the cinema at 10 minutes and 40 minutes past each hour. The last bus for the day returning from the cinema to Kevin's house leaves at 23:00.

What is the arrival time at the cinema of the latest bus that Kevin can take to fulfil his plan?

- A 18:10
 B 18:40
 C 19:10
 D 19:40

- 6 The table below shows the examination results of groups of pupils from the same year from two schools in their end-of-school exams and their university degree. Results are expressed as percentages of each group achieving the top grades. Mansera College has significantly smaller class sizes than Hamid Higher.

<i>School</i>	Mansera College	Hamid Higher
<i>End-of School exams</i>	65	40
<i>University degree results</i>	10	12

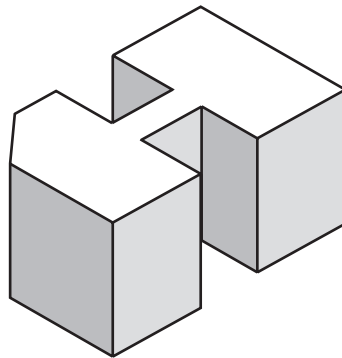
Two newspapers made different comments on this report:

1: Mansera College is better than Hamid Higher at teaching to achieve good results in the end-of-school exams.

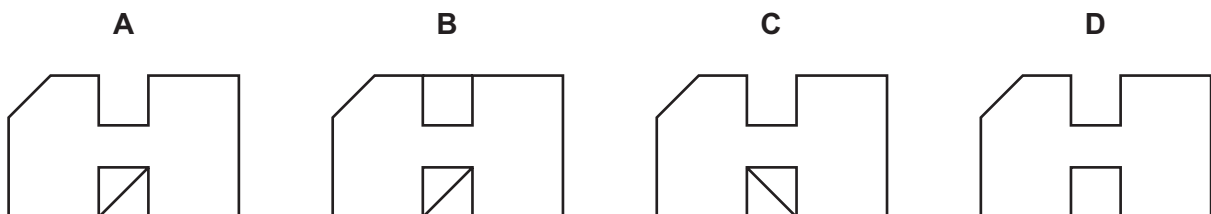
2: Hamid Higher prepares pupils better than Mansera College for university education.

Which of the comments made above is a plausible explanation of the data in the table?

- A Both comment 1 and comment 2
 B Neither comment 1 nor comment 2
 C Only comment 1
 D Only comment 2
- 7 A view of a carved block is shown below.

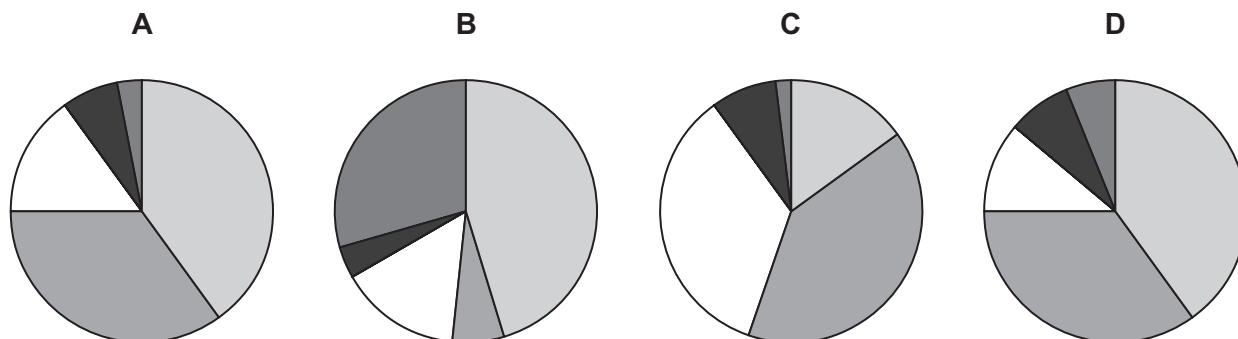


Which of the following plan views is **not** a possible representation of the carved block as seen from above?



- 8 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?



- 9 An oil tank can be filled using one or more of five sources. Source 1 fills at 10 litres per second, source 2 at 20 litres per second, source 3 at 30 litres per second, source 4 at 40 litres per second, and source 5 at 50 litres per second. Currently the tank is being filled at 90 litres per second.

Which one of the following pieces of information would be sufficient to identify, with certainty, which sources were being used?

- A** One of the sources being used is source 2
B One of the sources being used is source 3
C One of the sources being used is source 4
D One of the sources being used is source 5
- 10 In a rather wet spring a farmer harvests his barley at 20% water content by weight. He has to dry it partially to deliver to the maltings at 12% water content.

How much barley must he harvest to deliver 1 tonne (1000 kg) to the maltings?

- A** 1080 kg
B 1100 kg
C 1400 kg
D 1667 kg

- 11 I tiled the floor of a room in my house last week. At the DIY store the tiles I chose were \$2.50 each or \$24.00 for a pack of 12. I bought 5 packs. When I had completed the job I had 6 tiles left over.

How much more than necessary did I spend on the tiles?

- A \$3
 B \$9
 C \$12
 D \$15
- 12 A group of friends plans to make a round trip using a boat service along a river, so that they can see the city from the waterfront. The sightseeing journey will start from Chelsea Harbour and take the boat service to both ends, finishing back at Chelsea Harbour. The friends are ready to take their first boat at 07:50. They want as little time as possible waiting for a boat, so they will always get the next available boat.

Eastbound					
Putney	07:25	08:00	08:40	09:25	10:10
Wandsworth	07:35	08:10	08:50	09:35	10:20
Chelsea Harbour	07:45	08:20	09:00	09:45	10:30
Cadogan	07:50	08:25	09:05	09:50	10:35
Embankment	08:10	08:45	09:25	10:10	10:55
Blackfriars	08:20	08:55	09:35	10:20	11:05
Westbound					
Blackfriars	07:20	08:25	09:10	09:50	
Embankment	07:30	08:35	09:20	10:00	
Cadogan	07:50	08:55	09:40	10:20	
Chelsea Harbour	07:55	09:00	09:45	10:25	
Wandsworth	08:05	09:10	09:55	10:35	
Putney	08:15	09:20	10:05	10:45	

At what time will they return to Chelsea Harbour?

- A 09:40
 B 09:45
 C 10:25
 D 10:30

- 13** During the holiday period, the RiverRock bookshop has a special offer. All books are priced at \$15, \$20 or \$22. When you have chosen your books, if the total price is a two-digit number and not a multiple of 10, then you can multiply the digits of the price before you pay (i.e. a price of \$65 would become \$30, but you would not be able to change a price of \$80).

I am only going to visit the shop once. What is the largest saving that I can make with this offer?

- A** \$73
B \$74
C \$82
D \$92
- 14** I have gone to a drop-in surgery to see a doctor. I take a number from a dispenser and wait for my turn to be shown on the display board.

The rota of the doctors is shown on a printed notice:

	18:00 – 20:00	20:00 – 22:00	22:00 – 00:00	00:00 – 02:00
Dr Bilius	✓	✓	✓	
Dr Curemall	✓	✓		✓
Dr Killemov	✓		✓	✓
Dr Ziswoanert		✓	✓	✓

The doctors take it in turns alphabetically to see patients and they spend 10 minutes with each one.

I arrive at 23:03 and am given the number 87. The number on the display board says 64.

Which doctor will I see?

- A** Dr Bilius
B Dr Curemall
C Dr Killemov
D Dr Ziswoanert

- 15** Goodman's is a courier company. One of their clients is on an offshore island, connected to the mainland by a toll bridge which charges vehicles \$15.00 to cross to the island and return. There is an option to buy a 12-week pass costing \$720 which permits unlimited crossings during that period.

The number of deliveries to the island varies between 0 and 7 each week. Each delivery requires a separate journey and takes a whole day. The Goodman's manager is not informed until 9 am each day whether a delivery is required or not. He takes an optimistic view and buys the 12-week pass.

The following table shows how many deliveries per week were made in the first seven weeks of the period.

<i>Week</i>	1	2	3	4	5	6	7	8	9	10	11	12
<i>Deliveries</i>	3	7	4	5	3	4	1					

What is the lowest average number of deliveries per week that are needed over the next 5 weeks to avoid losing money on the purchase of the pass?

- A** 4.0
B 4.2
C 4.8
D 5.4
- 16** The postcode for 1 Hills Road, Cambridge is **CB1 2EU**. The second part of the UK postcode is always a digit followed by two letters. Any digit **0 – 9** is allowed, but certain letters, such as **O**, are never used.

The probability of guessing the second part purely at random is one of the following. Which one must it be?

- A** 1 in 4000 ($10 \times 20 \times 20$)
B 1 in 5400 ($9 \times 25 \times 24$)
C 1 in 5625 ($9 \times 25 \times 25$)
D 1 in 6500 ($10 \times 26 \times 25$)

17 Four retailers, Jim, Kevin, Lance and Michael, sell pencils.

Jim charges \$0.18 each. Kevin charges \$0.24 each for the first 100 pencils, then \$0.17 for any further pencils. Lance charges \$0.19 each, with a discount of 5% on the total cost if more than 500 pencils are purchased at the same time. Michael sells pencils in boxes of 200, charging \$45 per box if 1 to 4 boxes are purchased and \$35.80 per box if 5 or more boxes are purchased at the same time.

Eric wishes to buy 1000 pencils from one of the four retailers.

Which retailer should he choose in order to minimise the cost?

- A Jim
- B Kevin
- C Lance
- D Michael

18

HOCKNEY WATERPARK	
Adults	Children
\$15	\$9

Three adults and eight children have arrived at Hockney Waterpark. They have the following two special offer vouchers cut out of the local newspaper:

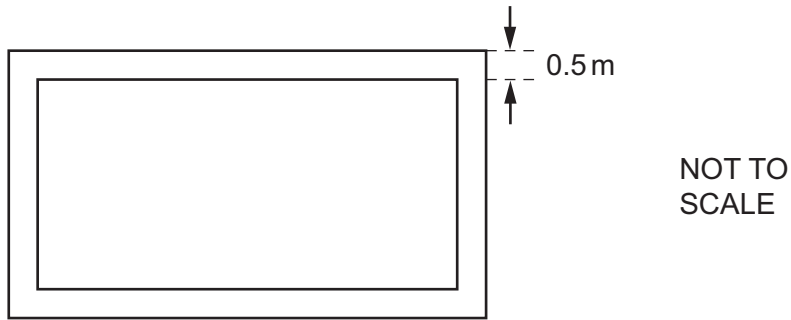
HOCKNEY WATERPARK
\$5 OFF ALL TICKETS (MAXIMUM 12)

HOCKNEY WATERPARK
2 CHILDREN ENTER FREE WHEN 1 ADULT PAYS FULL PRICE (VALID FOR UP TO 4 ADULTS)

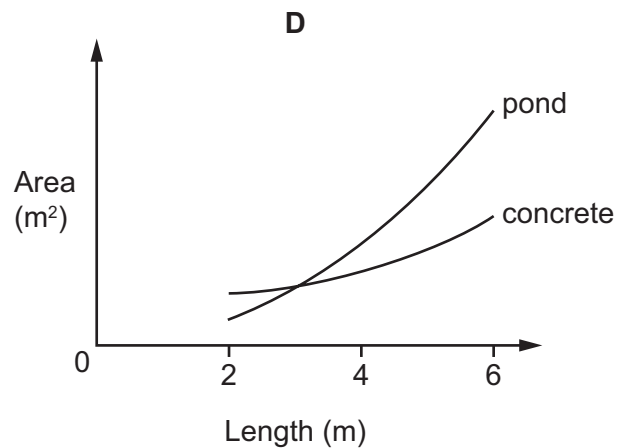
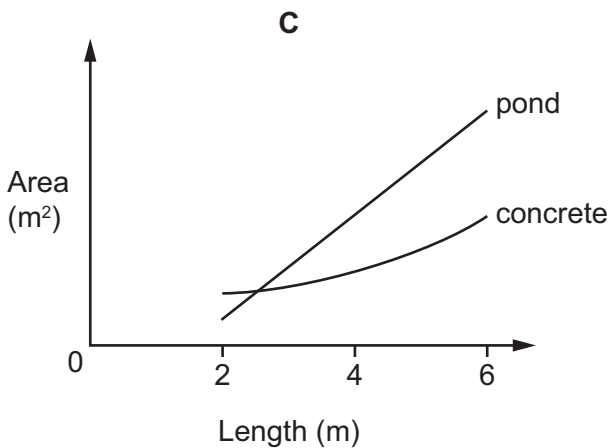
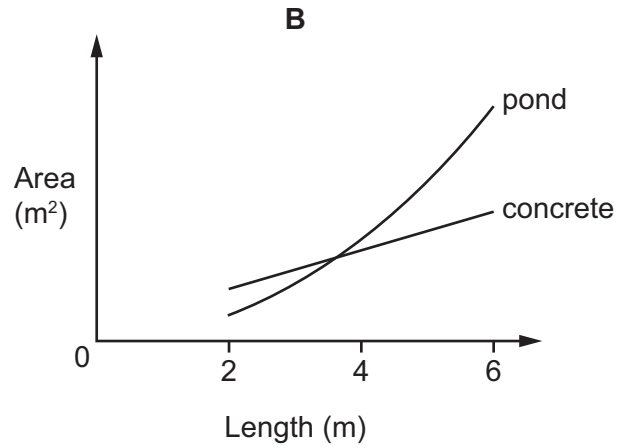
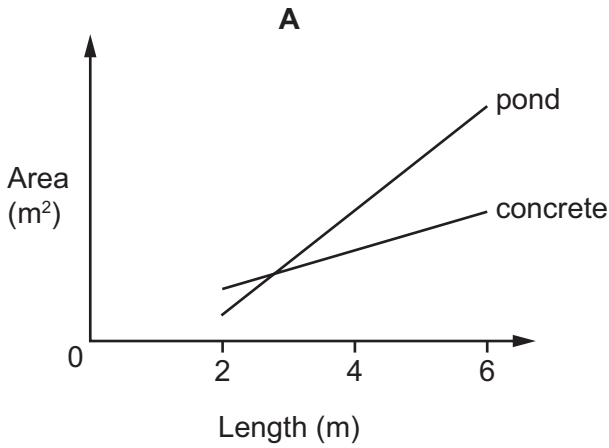
What is the maximum amount that this group can save on normal prices using either or both of these vouchers?

- A \$53
- B \$55
- C \$58
- D \$64

19 I want to create a rectangular pond in my garden. I have not yet decided on the exact dimensions, but its length will be twice its width and will be between 2 metres and 6 metres inclusive. There will also be a strip of concrete of width 0.5 metres around the edges of the pond, as illustrated below.



Which of the following graphs best represents how the surface area of the pond and the area of the concrete vary with the length of the pond?



- 20 Harry has a large 24-hour digital clock at work. These are the shapes of the numbers as they appear on the display:



He can see the time both directly and through a mirror. He notices that some of the times look the same when viewed directly and through the mirror, e.g. 01:10.

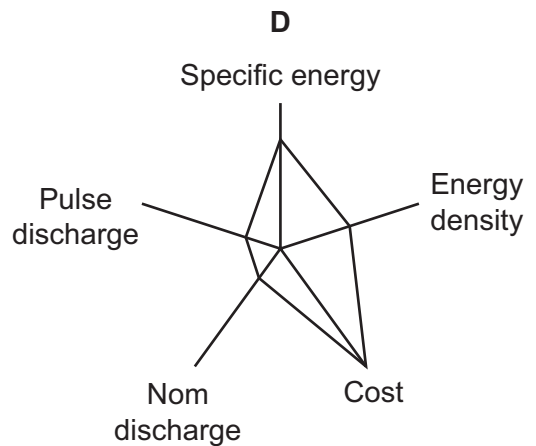
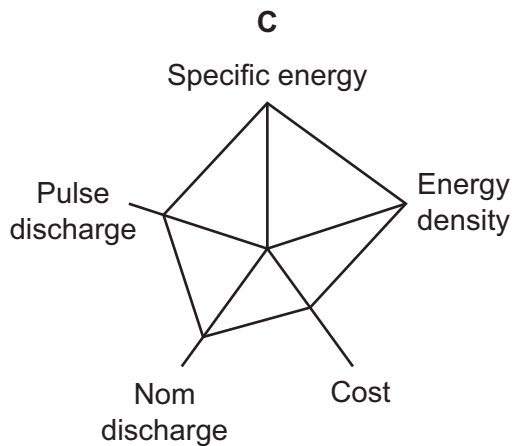
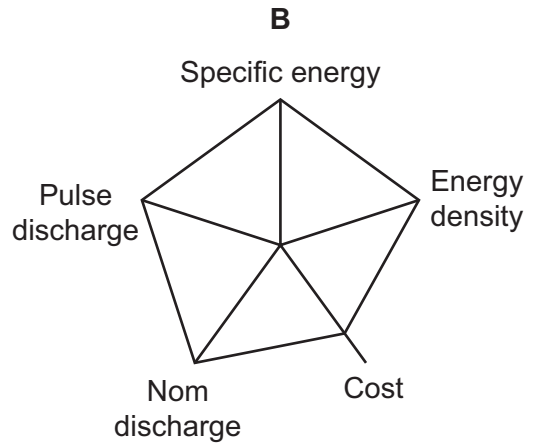
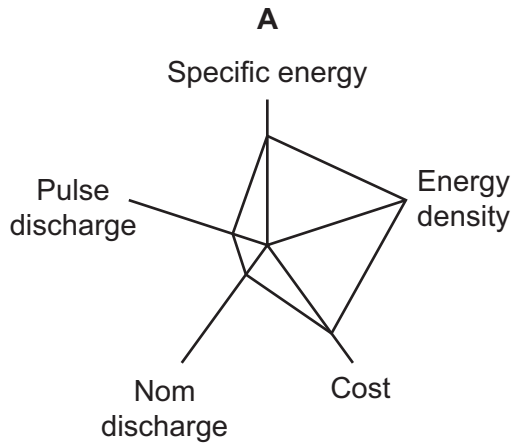
How many times does this happen between 09:00 and 17:00?

- A 2
- B 3
- C 4
- D 7

21 Four batteries were reviewed in a technology magazine and compared using a spider chart. The table below shows the ratings given to each battery, using five categories.

Battery	Specific Energy	Energy Density	Cost	Nom Discharge	Pulse Discharge
Prismatic	4	4	2	3	3
Turnigy nano-tech	4	4	3	4	4
GBS	3	2	4	1	1
Headway	3	4	3	1	1

Which of the following could be a spider chart for the GBS battery?



- 22 Abe, a middle-distance runner, and Ben, a marathon runner, have agreed to compete in a race over a distance of 30 km.

Ben plans to run the whole race at his normal marathon-level pace of 3 mins per km, and completes the course in 90 minutes. Abe's plan is to start the race at his 3000 m pace of 2 mins 40 secs per km, and build up a good lead.

Naturally, after the first 3 km (3000 m), Abe begins to tire. He runs the next 6 km at 3 mins per km (the same pace as Ben), and the next 6 km after that at 3 mins 20 secs per km. Then for the whole of the second half of the race he slows to 3 mins 30 secs per km.

Ben wins. At what point in the race does he overtake Abe?

- A At 10 km
 - B At 12 km
 - C At 15 km
 - D At 20 km
- 23 Tanja drives to work every morning. Her journey starts with a section of 5 km where the speed limit is 50 km/h. She then joins a motorway where the speed limit is 90 km/h. She can leave the motorway at one of two exits and the last part of her journey is on roads where the speed limit is 60 km/h. If she stays on the motorway until the later exit then the part of her journey after she leaves the motorway is 10 minutes shorter than if she leaves at the earlier exit.

If Tanya drives at the speed limit for the whole journey, then either route will take a total of 1 hour.

What is the difference between the total lengths of Tanja's two routes?

- A 5 km
- B 10 km
- C 15 km
- D 25 km

- 24 At the local tennis club, there are monthly mini-leagues made up of players of roughly equal abilities, and, if they have the time and can organise the match, each player plays everyone else in the league once. The winner of each league gets a small prize. Matches in the league are determined over the best of three sets, so a match is won by either two sets to zero, or two sets to one. The table below shows the points awarded to players in division 5 for the May league.

	<i>v. Anita</i>	<i>v. Diane</i>	<i>v. Jeyna</i>	<i>v. Lizzie</i>	<i>Total points</i>
<i>Anita</i>	 	5	5	0	10
<i>Diane</i>	3	 	3	5	11
<i>Jeyna</i>	2	5	 	5	12
<i>Lizzie</i>	0	2	3	 	5

Which of the following sets of rules for awarding points could explain the points in this table?

- A** Three points for a win, and one point for each set won
- B** Two points for a win, one point for each set won, and one point for playing the match
- C** One point for a win, one point for each set won, and two points for playing the match
- D** Two points for each set won and one point for playing the match
- 25 A supermarket sells 4 types of bread. At the beginning of a month their prices were:

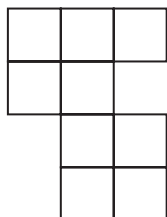
Golden Grain	\$1.30
Harvest Loaf	\$1.60
Seeded Batch	\$1.50
Wholemeal Sliced	\$1.40

By the end of the month all had changed price by more than 10 cents. Seeded Batch had come down in price more than Golden Grain and Harvest Loaf. Wholemeal Sliced had gone up in price.

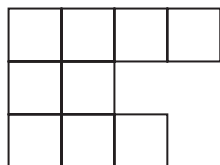
Which one of the following is **not** a possible list of the breads, in ascending order of price, at the end of the month?

- A** Golden Grain, Seeded Batch, Harvest Loaf, Wholemeal Sliced
- B** Seeded Batch, Harvest Loaf, Golden Grain, Wholemeal Sliced
- C** Seeded Batch, Golden Grain, Harvest Loaf, Wholemeal Sliced
- D** Golden Grain, Harvest Loaf, Seeded Batch, Wholemeal Sliced

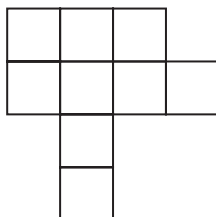
- 26** A large square of card was cut into exactly four pieces. These are shown below, along with one other piece cut from a different piece of card. Some of the pieces of card may have been turned over.



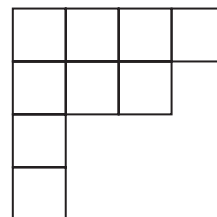
Shape A



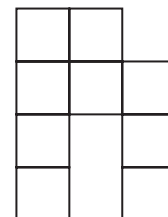
Shape B



Shape C



Shape D



Shape E

Which one of the five shapes was not cut out of the large square?

- A** Shape A
 - B** Shape B
 - C** Shape C
 - D** Shape D
- 27** A passenger train and a goods train are travelling in the same direction on parallel tracks. They depart from the same place and have the same destination. The goods train departs at 12:05 and the passenger train departs at 12:15. Both trains travel at uniform speed throughout their journeys. The passenger train catches up with the goods train after 10 minutes.

Which of the following further pieces of information, on its own, would be sufficient to determine the speed of the passenger train?

- A** The time that the passenger train takes to complete the journey
 - B** The time that the goods train takes to complete the journey
 - C** The speed of the goods train
 - D** The total distance of the journey
- 28** A chef is preparing a meal for 120 people to celebrate the local football team winning the league. For dessert he is making apple pies, blueberry pies, cherry pies and damson pies. Everybody will have one pie, but the chef doesn't want to make so many pies as to guarantee that everybody gets their first choice pie. He decides that he will make enough pies to ensure that there are no more than twenty people who can't get their first or second choice.

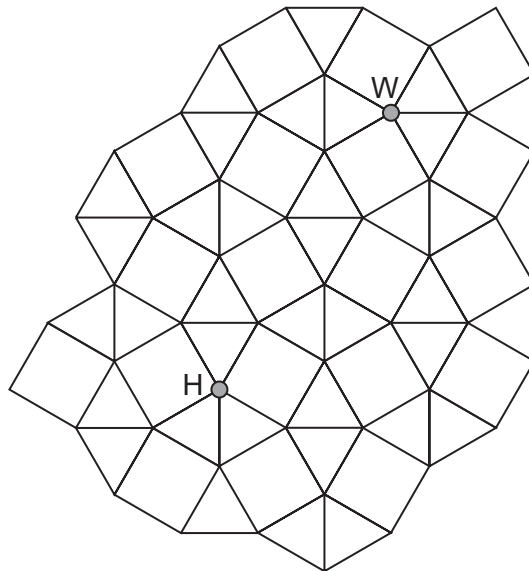
What is the total number of pies he should make?

- A** 140
- B** 160
- C** 200
- D** 220

- 29 Two strangers started to talk to each other whilst travelling on a train. During the conversation, the older one announced, "My date of birth, 24/06/1938, is the only date of the twentieth century that is made up of three multiples of 6 and has no repeated digits". "What a coincidence," replied the younger one, "my date of birth is one of only two dates of the twentieth century that are made up of three multiples of 7 and have no repeated digits, but it is the only one whose eight digits add up to a multiple of 7 as well."

What was the age difference between the two strangers?

- A 5 years
 B 7 years
 C 8 years
 D 15 years
- 30 Harry lives in Tessalia by the junction marked 'H' and works by the junction marked 'W'. All road sections in Tessalia are 100m long. Harry likes to vary his walk to work, but always walks the shortest possible distance.



How many different routes can he take?

- A 2
 B 4
 C 5
 D 8

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