



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

**THINKING SKILLS**

**9694/13**

Paper 1 Problem Solving

**May/June 2013**

**1 hour 30 minutes**

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

\* 9 9 6 6 0 9 0 \*  
6 6 0 9 0 9 5 5 6

**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 **19** printed pages and **1** blank page.



- 1 My local hat shop advertised “Buy one, get one half price”, but also now advertises that there is “A further 20% off”.

What will be the overall reduction from the full price if I buy two hats?

- A 40%
- B 45%
- C 47%
- D 60%
- 2 Jane is a student taking her examinations. Her first examination is on Wednesday 16 May and she has one examination each day for 16 days. There are no examinations on Tuesdays, Saturdays or Sundays.

May						
M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

June						
M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

What is the day and date of her final examination?

- A Thursday 31 May
- B Tuesday 5 June
- C Wednesday 6 June
- D Monday 11 June

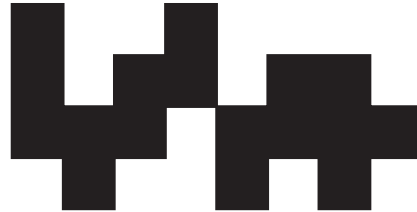
- 3 The other day I saw an alien spacecraft, which had some strange markings on the underside, hovering overhead. My three friends and I each made a drawing of these markings as the craft rotated slowly above us.

Three of us drew them correctly. Which of the following drawings is wrong?

A



B



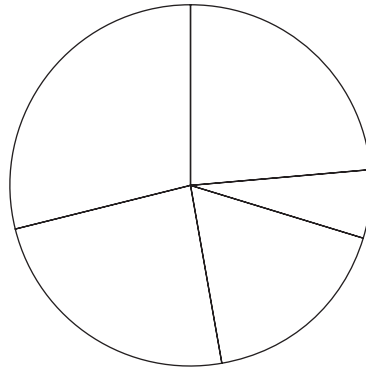
C



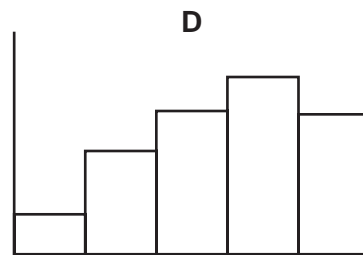
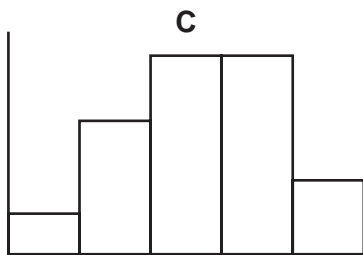
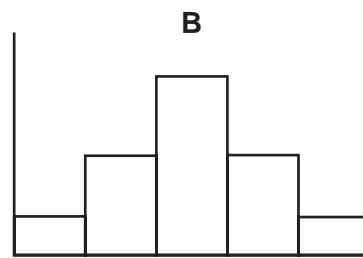
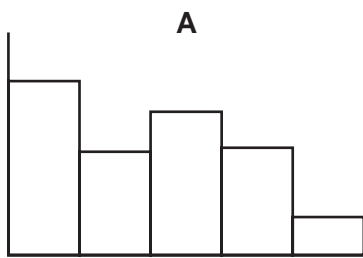
D



4 Kate was asked to draw a bar chart for her homework, but she drew the pie chart shown below.



Assuming that her pie chart correctly represents the data, which of the following should Kate have drawn?



- 5 The following table reports the results of a survey into sport participation in Scotland.

<i>Participation in Sport in last 4 weeks by Gender and Age (percentage)</i>									
	Male	Female	16–24	25–34	35–44	45–59	60–74	75+	All
<b>2007</b>									
Any sport (excluding walking)	60	44	70	67	61	44	43	22	51
Any sport (including walking)	79	70	89	86	79	72	69	48	74
Walking (at least 30 min for recreational purposes)	64	60	73	69	64	62	57	41	62
<b>2008</b>									
Any sport (excluding walking)	54	43	77	63	55	45	37	16	48
Any sport (including walking)	76	70	91	86	80	72	67	38	73
Walking (at least 30 min for recreational purposes)	62	60	69	70	67	62	59	42	61
Number surveyed 2007	1436	1952	280	440	617	832	780	439	3388
Number surveyed 2008	1486	1901	253	417	608	818	845	446	3387

Which age group has shown the largest percentage reduction between the two years in participation in any sport (including walking)?

- A 16–24
- B 35–44
- C 45–59
- D 75+

- 6 A company offers one of their salespeople the choice of two pay deals.

Deal 1: 46 hours per week including 9 hours overtime – paid at \$5 per hour, with overtime paid at \$10 per hour.

Deal 2: Basic weekly pay of \$50 plus commission of 1/50 of the weekly sales, but not on the first \$5000 of sales.

If the person makes sales of \$15 000 in a week, what is the best weekly pay that can be earned?

- A \$250
- B \$275
- C \$320
- D \$350

- 7 The time on my clock has just changed to 19:57, showing four different odd digits.

How long will it be until the next time the display shows four different odd digits?

- A 5 hours 38 minutes
- B 15 hours 14 minutes
- C 18 hours 00 minutes
- D 19 hours 40 minutes

- 8 An internet company allows tracks and albums to be downloaded at certain fixed costs according to how old the music is.

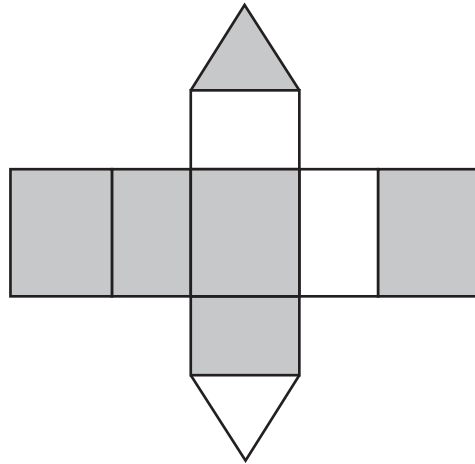
	<i>This year</i>	<i>1–5 years</i>	<i>6–10 years</i>	<i>Over 10 years</i>
<i>Track</i>	\$2	\$1	75¢	50¢
<i>Album</i>	\$12	\$5	\$4	\$3

The year is 2011 and a man wishes to buy 6 tracks from the current most popular album, 4 tracks released in the year 2000 and an album released 4 years ago.

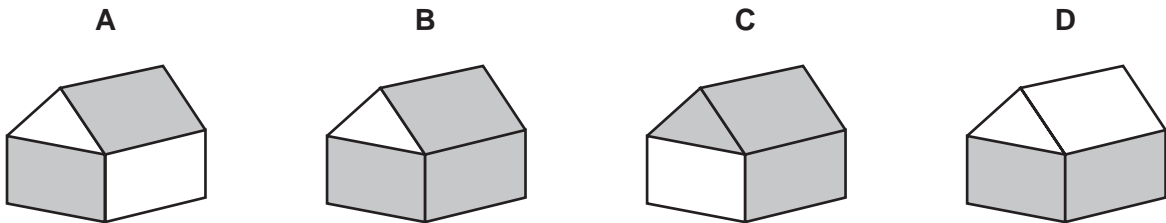
How much will all these cost him?

- A \$15
- B \$17
- C \$19
- D \$20

- 9 The piece of cardboard shown below folds to form a house for use with a model railway. The other side of the cardboard is black, which forms the inside of the house.



Which of the illustrations below correctly shows the assembled house?



- 10 In the Erewhon football league there are 24 teams and each team plays every other team twice: once during the first half of the season and once during the second half. In the first half of the season teams are awarded 2 points for a win and 1 point for a draw. In the second half of the season a win earns 3 points while a draw still gives 1 point.

The performances up to the end of the first half of last season by the four teams with the lowest number of points at that stage are given in the table below.

	<i>Won</i>	<i>Drawn</i>	<i>Lost</i>
<i>Academicals</i>	4	11	8
<i>Ballplayers</i>	5	8	10
<i>Cornerkickers</i>	6	5	12
<i>Deadballspecs</i>	7	2	14

Surprisingly, the results in the second half of the season for all four of these teams were exactly the same as in the first half.

Which of these teams had the fewest points at the end of the whole season?

- A Academicals
- B Ballplayers
- C Cornerkickers
- D Deadballspecs

- 11 Woddinese is a language. Here are some sentences in Woddinese, together with their correct English translations.

Eh minkbad um plinko muk oflik.  
*I picked up my grapes and bananas.*

Yaz minkdab um oflik muk plinko.  
*He will pick up my bananas and grapes.*

Yaz minkbad yam oflik.  
*He picked up his bananas.*

Here is a sentence in Woddinese:

Yaz minkdab yam plinko muk oflik.

Which English sentence conveys its correct meaning?

- A *I picked up his grapes and bananas.*
  - B *He picked up my grapes and bananas.*
  - C *I will pick up my bananas and grapes.*
  - D *He will pick up his grapes and bananas.*
- 12 A water company is laying a new water pipeline between two towns, Salia and Potania, which are 10 kilometres apart. The company decides to start laying the pipes from both ends so that the two teams will meet up somewhere in between.

Team A is made up of five workers and two diggers, laying pipes at the rate of 500 metres a day, and will start from Salia.

Team B is made up of three workers and one digger, laying pipes at the rate of 200 metres a day, and will start from Potania.

What distance from Salia and on which day will both teams meet?

- A 7.14 km, 14th day
- B 7.14 km, 15th day
- C 7.34 km, 14th day
- D 7.34 km, 15th day



- 13** Harry visits his mother every Sunday. He catches a train from Newtown Station to Oldtown Station which is a 10-minute bus ride from his mother's house. There are two trains an hour. One is a stopping train taking 35 minutes and the other is a direct train taking 20 minutes. Both buses and trains run every half hour. He finds that whichever train he catches, his journey time from catching the train to arriving at his mother's (including any wait for the bus) is always 55 minutes.

Assuming the trains and buses run on time, which of the following would account for the above?

- A** Both trains and buses leave on the hour and half past the hour.
  - B** Buses leave Oldtown 15 minutes after trains leave Newtown.
  - C** The direct train arrives at Oldtown 20 minutes before a bus leaves and the stopping train arrives 5 minutes before a bus leaves.
  - D** Trains leave Newtown 20 minutes before buses leave Oldtown.
- 14** Mary works in a top secret research laboratory. In order to gain access to the building, she must use a secret four-digit code. All codes from 0000 to 9999 are possible. As a security feature, Mary is required to get exactly one digit wrong each time, and not to enter the same four-digit number as she did last time.

The security guard can see the numbers that she enters into the keypad.

What is the maximum number of different four-digit numbers Mary can enter without the security guard being able to be certain of the secret code?

- A** 2
  - B** 8
  - C** 32
  - D** 4096
- 15** I have forgotten the combination number for my sports equipment padlock, but I remember that I need four digits from 0 – 9 in a certain order, from left to right. To stop anyone else accessing my equipment, I didn't write down the number, but I did write down five helpful clues. This is what I wrote:

The total of the four digits is 17.  
The third digit is a square number.  
The first digit is 3 less than the third digit.  
The second digit is even.  
One of the digits is 0.

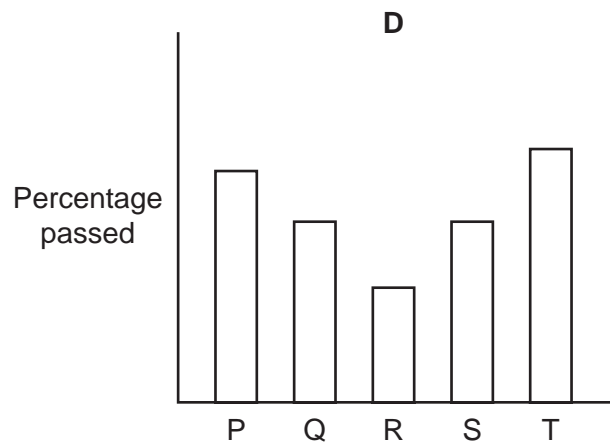
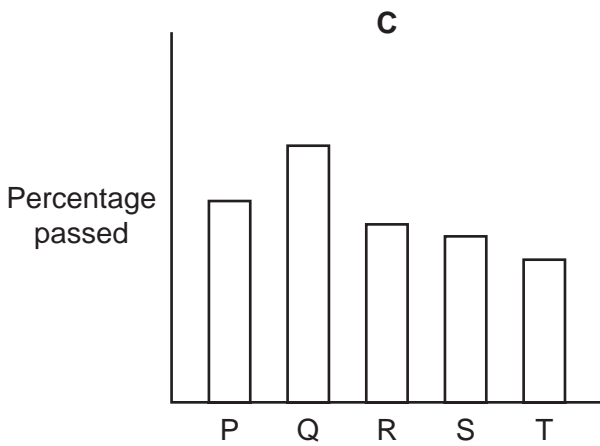
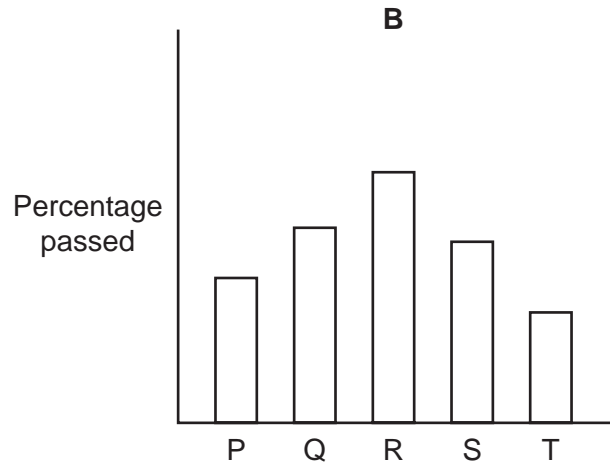
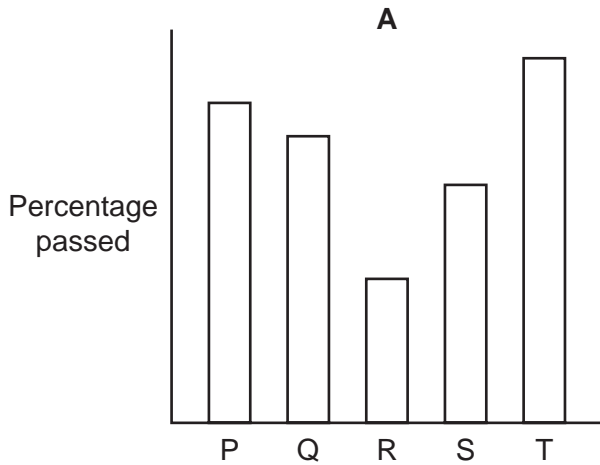
Which number is the correct product of the non-zero digits on my padlock combination?

- A** 17
- B** 108
- C** 160
- D** 216

16 The table shows the numbers of people taking driving tests and the number failing.

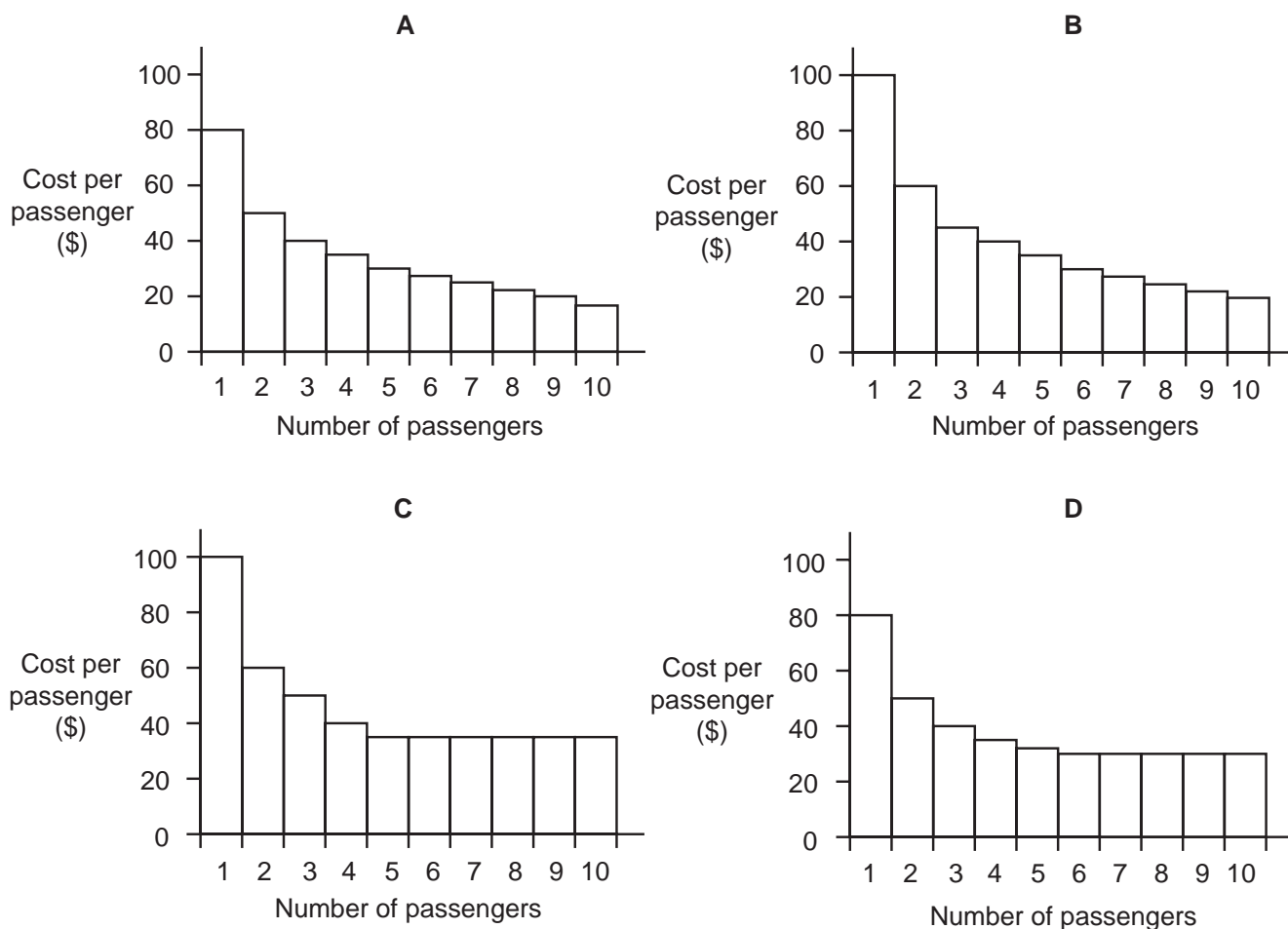
Area	P	Q	R	S	T
Number Entered	1200	1100	650	900	1250
Number Failed	720	495	195	450	875

Which of the following charts represents the percentage of passes in each area?



- 17 The travel company Flyaway has a 10-seater minibus which can be hired by groups for transfer to Gatrow Airport for up to \$180. For smaller groups, the charge is \$80 for the first passenger plus \$20 for each subsequent passenger, to a maximum of \$180.

Which of the following graphs correctly illustrates how the cost per passenger of hiring the Flyaway minibus varies with group size?



- 18 The hexameter is a line, used in heroic Roman poetry, consisting of six 'feet'. Each foot is either a *spondee* or a *dactyl* (but not both). The last foot is always a *spondee* and the one before must be a *dactyl*.

A poet does not wish to use three identical consecutive feet within a line.

How many patterns could he use for a single line?

- A** 6  
**B** 8  
**C** 11  
**D** 13

- 19 Richard employs one assistant for 40 hours per week to help him to run his business. Up to the end of last week, he paid \$6 per hour, but \$8 per hour for any overtime. He pays the assistant at the end of every week. Richard has now increased the pay rate per hour but will no longer pay a higher rate for overtime. This week the assistant did no hours of overtime and, even though his pay rate had increased, he earned exactly the same amount as in the previous week.

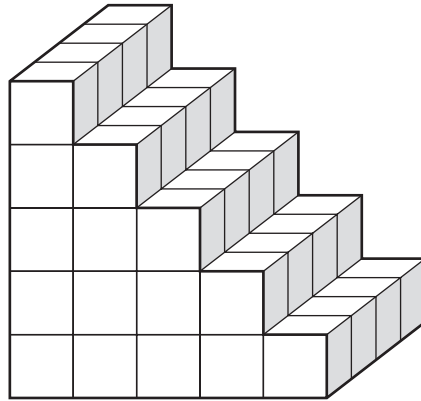
Which of the following could explain the fact that the assistant's pay has not changed?

- A The assistant worked 10 hours of overtime in the week before the pay rise and the pay rise was to \$6.25 per hour.
  - B The assistant worked 3 hours of overtime in the week before the pay rise and the pay rise was to \$6.50 per hour.
  - C The assistant worked 5 hours of overtime in the week before the pay rise and the pay rise was to \$7 per hour.
  - D The assistant worked 8 hours of overtime in the week before the pay rise and the pay rise was to \$7.50 per hour.
- 20 Roger has decided to share some money between his three children, Amy, Brian and Carl. He has decided to share the money according to their ages (a whole number of dollars per year). The children's grandfather Fred is also going to share some money between the three children, but he has decided to give all three children the same amount of money. When both Roger and Fred have shared out the money, Brian will have received twice as much as Carl and three times as much as Amy. Amy will receive \$30 from Roger and \$30 from Fred.

Which of the following pieces of information would **not** be sufficient to determine Carl's age?

- A Brian's age.
- B The amount of money per year of age that Roger gives to the children.
- C The sum of all three children's ages.
- D The total amount of money that Roger has to give to the children.

21 A staircase is made from 60 cubes fitted tightly together in the arrangement shown below.

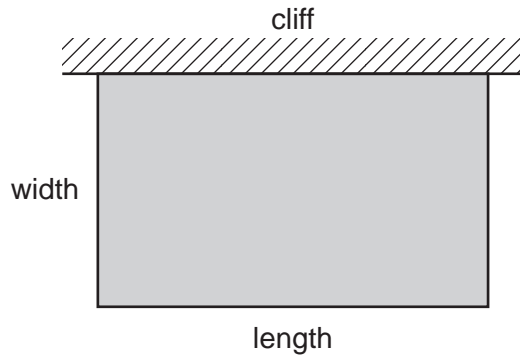


The staircase is fully immersed in quick-drying paint. All the exposed faces become covered in paint, but the inner ones remain unpainted.

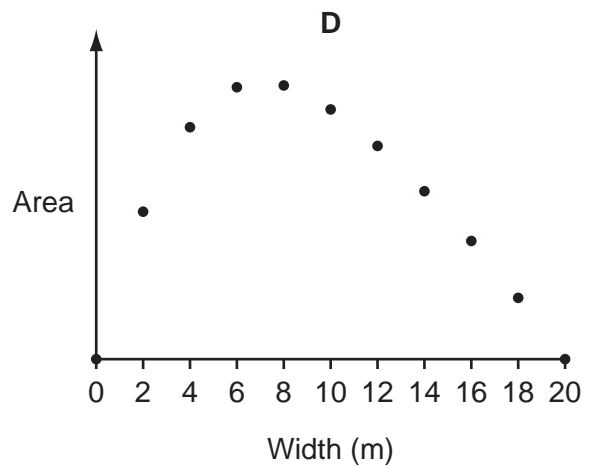
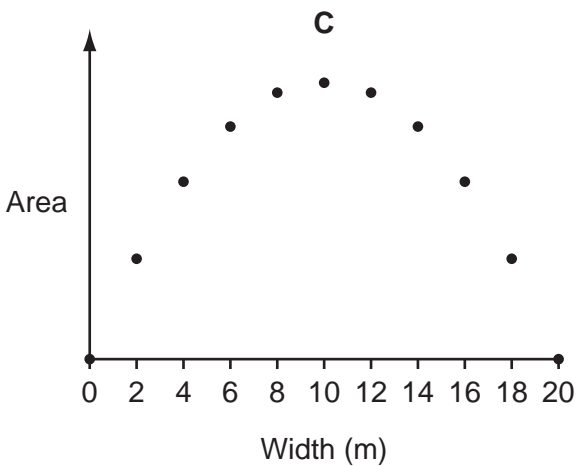
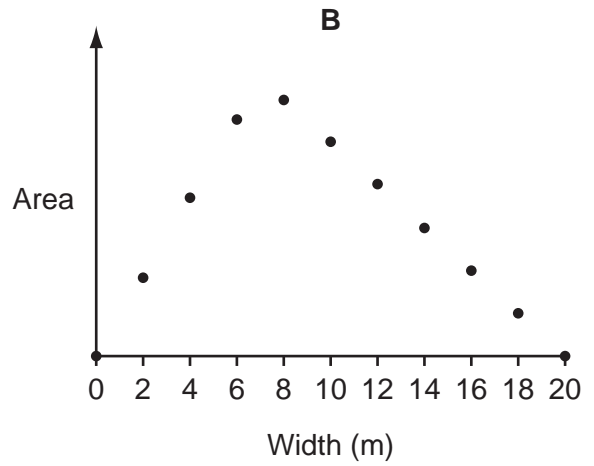
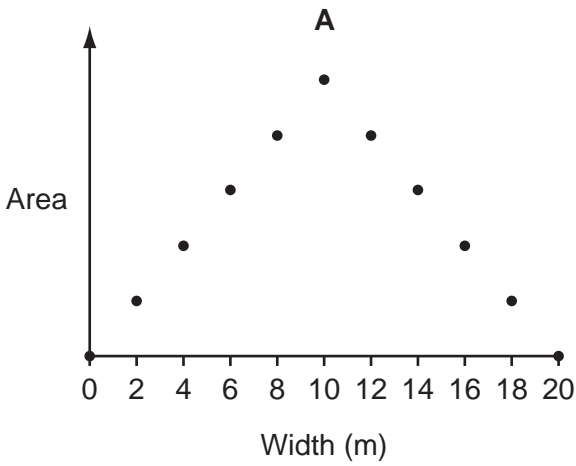
How many cubes remain **completely** unpainted?

- A 6
- B 12
- C 16
- D 30

22 A farmer has a field, one straight edge of which is against a vertical upward cliff. He wants to fence off a rectangular area for some cattle. He has twenty 2 m fencing panels.



Which of the following graphs, if suitably labelled, correctly shows the relationship of the width of the fenced off portion of the field to the area?



- 23 When I picked up a bottle of washing up liquid at the supermarket yesterday, I noticed that the label on the shelf had been changed from 45 cents per 100 ml to 60 cents per 100 ml since my last purchase. On closer inspection, I realised that not only had the price increased, but also the volume of the bottle had been reduced.

Which one of the following **could** explain the increase of the cost of the washing up liquid per 100 ml from 45 cents to 60 cents?

- A A price increase of 5% and a volume reduction of 25%.
  - B A price increase of 10% and a volume reduction of 20%.
  - C A price increase of 20% and a volume reduction of 10%.
  - D A price increase of 25% and a volume reduction of 5%.
- 24 Statistics for the Bolandian steam tram system are shown below (figures are for the year 2010):

Total track length: 180 km  
Number of stops: 48  
Individual passenger journeys: 420 000  
Total tram km: 1.2 million  
Total water consumption: 20 000 cubic metres  
Average time between stops: 8 minutes

Which of the following additional pieces of information would make it possible to calculate the average length of an individual journey?

- A The water consumption per passenger kilometre.
  - B The number of different people using the network in the year.
  - C The number of trams in service.
  - D The average speed of a tram.
- 25 The holiday resort of Goldensand has a beach that is 1000 metres long and runs from north to south. Holidaymakers are always spread out evenly along the full length of the beach. The sun is so hot that when a sunbather buys an ice cream they always buy from the ice cream seller situated nearest to them.

Joe, an ice cream seller, is deciding where to put his stall. There are currently two other sellers on the beach. *Nicest Ices* is situated 300 metres from the northernmost end of the beach, and *Classy Cones* is 200 metres from the southernmost end. Joe wants to position his stall so that he sells as many ice creams as possible.

Where should he place his stall?

- A At the very northernmost point of the beach.
- B Just to the north of *Nicest Ices*.
- C Either just to the south of *Nicest Ices* or just to the north of *Classy Cones*.
- D 450 metres from the south end of the beach.

26 In the drivers' championship, points are awarded for each race as given in the table below.

<i>Place</i>	<i>Points</i>
1 <sup>st</sup>	6
2 <sup>nd</sup>	4
3 <sup>rd</sup>	2
4 <sup>th</sup>	1

With 5 races remaining the top 3 drivers are Lewis, Michael and Jenson.

<i>Driver</i>	<i>Championship points</i>
Lewis	27
Michael	25
Jenson	24

Assume that Jenson continues to finish in the top three for every race. What is the smallest number of the remaining races that Jenson needs to win to **guarantee** winning the championship?

- A 2
- B 3
- C 4
- D 5

27 Due to the opening of a new road which avoids the town centre, my average journey time to work has been cut from 40 minutes to 30 minutes. This is because, although my journey is 4 kilometres longer than it used to be, my average speed has increased by 20 kilometres per hour.

How far do I currently travel to work?

- A 21 kilometres
- B 24 kilometres
- C 25 kilometres
- D 28 kilometres



28 8 swimmers will compete tomorrow for the Gardace Cup.

They will all take part in 4 heats, each one involving a different swimming stroke:

Heat 1: butterfly  
Heat 2: backstroke  
Heat 3: breaststroke  
Heat 4: freestyle

In each heat, points will be awarded as follows:

<i>Position</i>	<i>Points</i>
1st	20
2nd	15
3rd	12
4th	9
5th	6
6th	4
7th	3
8th	2

Anyone who scores a total of 40 points or more qualifies for the final, a medley race involving all four strokes.

What is the maximum number of competitors that can qualify for the final?

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

- 29 Oliver is a frequent visitor to More!, his favourite restaurant. Since its introduction, Oliver has ordered from the special offer 'More! For Less' menu every time.

## More! For Less

### 3 Courses

# ONLY \$12

<p>Starter Choose from</p> 	<p>Melon Balls Salmon Mousse Egg Mayonnaise</p>
<p>Main Course Choose from</p> 	<p>Chicken &amp; Mushroom Pie Lasagne Tuna Bake Cheese &amp; Onion Pie</p>
<p>Dessert Choose from</p> 	<p>Apple Pie Chocolate Mousse Ice Cream</p>

He has now ordered from this menu 11 times without ever repeating his combination of choices for the three courses.

Note that 'mousse' and 'pie' appear more than once on this menu. In the same meal he doesn't want to choose pie twice or mousse twice.

How many more times can Oliver order from the 'More! For Less' menu before he must have a combination he has already eaten?

- A 15
- B 18
- C 21
- D 26

- 30** On a television game show, four contestants compete in four rounds. Each round is worth a number of points between 1 and 10, and each contestant scores either 0 or the full amount available in each round. No two rounds are worth the same amount. The winner gets a prize of \$100 for each point that could have been scored. At the end of the competition, the contestants have scores of 27, 25, 24 and 14.

What was the total prize money for this game?

- A** \$2700
- B** \$3000
- C** \$3300
- D** \$3600

**BLANK PAGE**

---

*Copyright Acknowledgements:*

Question 5      © <http://www.scotland.gov.uk/Resource/Doc/296448/0092117.pdf>; Crown Copyright 2009.

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.