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**THINKING SKILLS**

**9694/12**

Paper 1 Problem Solving

**October/November 2016**

**1 hour 45 minutes**

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

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**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.

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This document consists of **19** printed pages and **1** blank page.



- 1 48 competitors entered the men's 100 metres freestyle event at this year's Muscan Swimming Championships. They were divided randomly into 6 heats, with the fastest 16 qualifying for the semi-finals.

These are the results of the 6 heats.

<i>Heat 1</i>		<i>Heat 2</i>		<i>Heat 3</i>	
<i>Name</i>	<i>Time (s)</i>	<i>Name</i>	<i>Time (s)</i>	<i>Name</i>	<i>Time (s)</i>
Vic Richmond	52.67	Neil Trenton	52.29	Connor Hartford	52.60
Mitch Lansing	52.75	Wynn Cheyenne	52.37	Noel Halifax	52.63
Ted Austin	52.79	Corey Colima	52.55	Sonny Pierre	52.83
Orville Salem	53.06	Noah Bismarck	52.70	Miles Jackson	52.94
Archie Phoenix	53.15	Ilya Springfield	53.31	Yuri Merida	53.20
Vernon Xalapa	53.84	Gene Atlanta	53.69	Declan Dover	53.38
Michael St Paul	54.58	Milton Morelia	55.64	Morgan Helena	54.14
Neville Lincoln	55.90	Norris Raleigh	56.41	Wayne Olympia	55.36
<i>Heat 4</i>		<i>Heat 5</i>		<i>Heat 6</i>	
<i>Name</i>	<i>Time (s)</i>	<i>Name</i>	<i>Time (s)</i>	<i>Name</i>	<i>Time (s)</i>
Karl Topeka	52.19	Alan Edmonton	52.51	Wes Charleston	52.54
Colin Saltillo	52.38	Carlos Sacramento	52.77	Terry Nashville	52.82
Ioan Desmoines	52.61	Mark Augusta	52.99	Scott Regina	52.98
Alex Juneau	52.73	Nelson Concord	53.45	Alvin Montgomery	53.11
Rhodri Providence	52.88	Conan Denver	53.89	Kevin Frankfort	53.52
Matt Boston	52.90	Idris Boise	53.96	Duane Durango	53.77
Ned Albany	53.63	Sol Columbia	54.30	Arthur Littlerock	54.86
Hiram Pachuca	54.97	Peter Harrisburg	56.73	Will Madison	56.28

From which heat was there only one qualifier for the semi-finals?

- A Heat 1
- B Heat 3
- C Heat 5
- D Heat 6

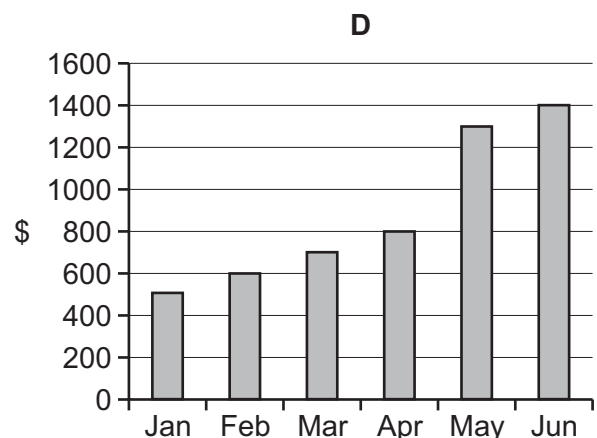
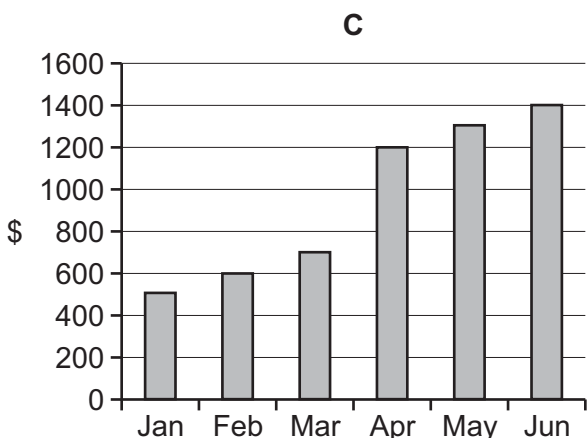
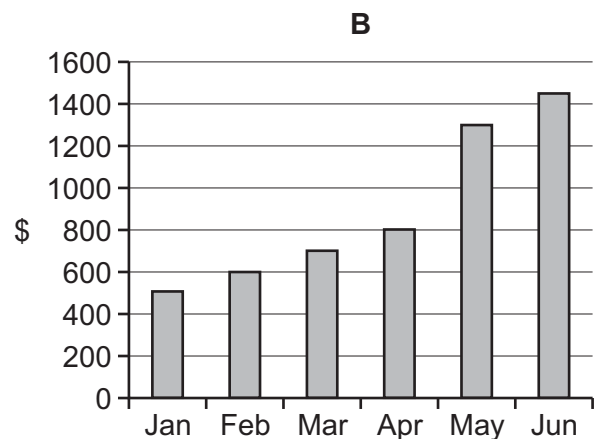
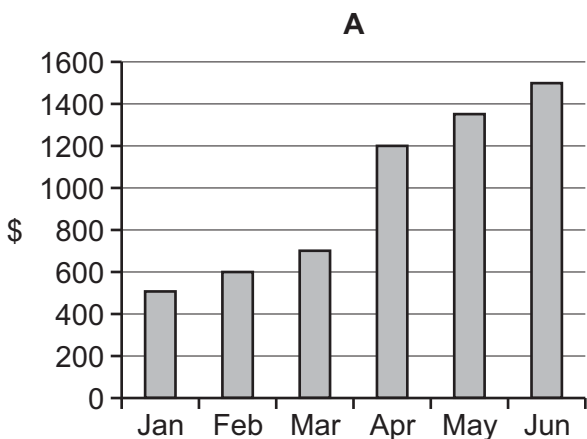
- 2 The ingredients on a jar of mincemeat are in order of content by weight and are as follows:

Sugar; Apples (26%); Vine fruit (26%); Candied mixed peel (4%); Vegetable suet; Treacle; Acetic Acid; Mixed spices (0.3%); Citric Acid; Antioxidant (Ascorbic Acid).

To the nearest 1%, what is the possible range of sugar content?

- A 26% to 43%
- B 26% to 44%
- C 31% to 43%
- D 31% to 44%
- 3 Tom needs to save some money to buy himself a new car. At the start of January there is \$400 in his savings account. He is able to add \$100 to the account at the end of each month. In April he knows that he will be paid a bonus and have an increase in his salary, so he expects to add \$500 to his account at the end of April and then \$150 each month after that.

Which of the following graphs represents the total money that he will have in his savings account at the end of each month?



- 4 A question-master asks each of four contestants up to 15 questions. The process is repeated again for a second round. The 'score' is the number of questions answered correctly. The scores after each round are announced in ascending **numerical** order.

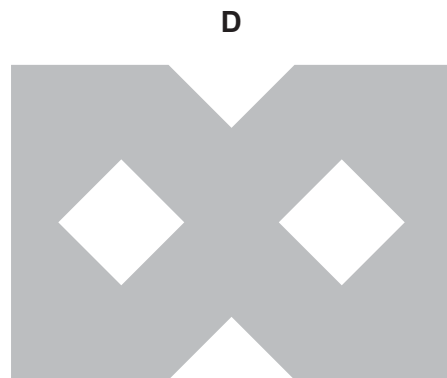
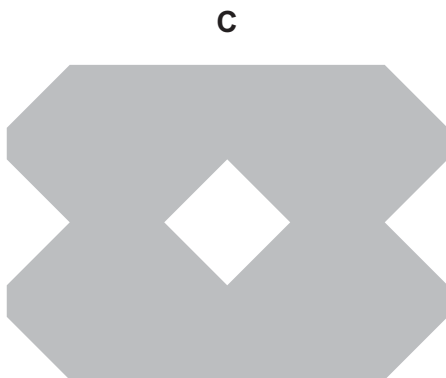
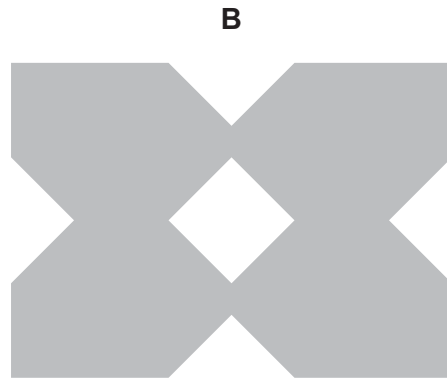
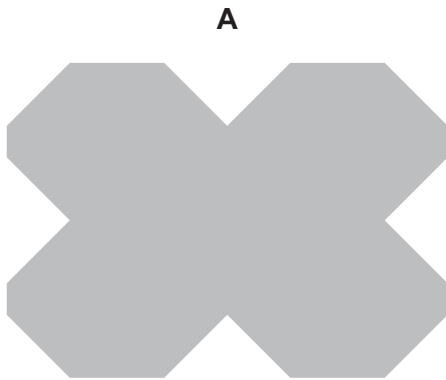
After the first round of a contest the scores were 8, 10, 11, and 14.

After the second round the total scores for the contestants were 13, 18, 20, and 24.

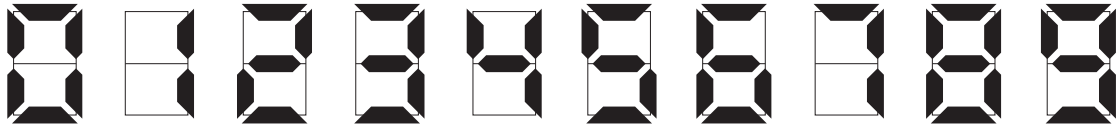
What was the largest possible score achieved in the second round of this contest?

- A 10  
 B 11  
 C 14  
 D 16
- 5 A rectangular piece of paper is folded in half and then folded in half the other way to produce a rectangle with sides half the lengths of those of the unfolded paper. Three corners of this folded paper are then cut off and the paper unfolded.

Which one of the following could **not** be a representation of the paper when unfolded again?



- 6 A display showing the 24-hour time (0000 to 2359) uses some or all of seven lights for each digit as follows:



What is the greatest number of lights on at any time?

- A 25  
 B 26  
 C 27  
 D 28
- 7 My family – 2 adults and 2 children – are planning to go to an amusement park. Tickets are priced as follows:

Adult	\$45.00
Child	\$35.00
Family Ticket 2 adults 2 children	\$150.00

However, there are various offers available:

- 10% off the cost of each ticket if you book in advance
- \$7.00 off individual tickets with a Dollarland Stores loyalty card
- with vouchers from a newspaper, one child can be admitted for \$7.50 when two adults take two children and buy individual tickets
- \$120.00 plus a \$16.50 booking fee for a family ticket if you book online.

Only one offer can be used at a time.

What is the lowest price we can pay to go to the amusement park?

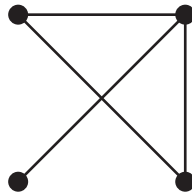
- A \$132.00  
 B \$132.50  
 C \$135.00  
 D \$136.50

- 8 In her first five weekly shopping trips on Saturdays, Angela spends \$14, \$7, \$14, \$7, \$7 respectively to ensure that she has enough stock of her new daily vitamin pill to last for the week, without spending more than she needs to.

Which one of the following would explain this variation?

- A The pills are sold in packets of 4  
 B The pills are sold in packets of 5  
 C The pills are sold in packets of 6  
 D The pills are sold in packets of 7
- 9 Four members of an online community construct a diagram to show whether they have ever met in real life. Each person is represented by a dot and two dots are joined together with a line if those two people have ever met in real life.

The diagram looks like this:



Each member of the group then makes a table, showing with a tick when two people have ever met in real life. Shaded cells show people linked to themselves.

Which person's table is wrong?

A	B	C	D																																																																
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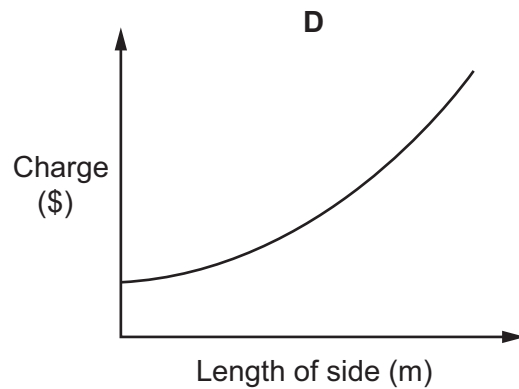
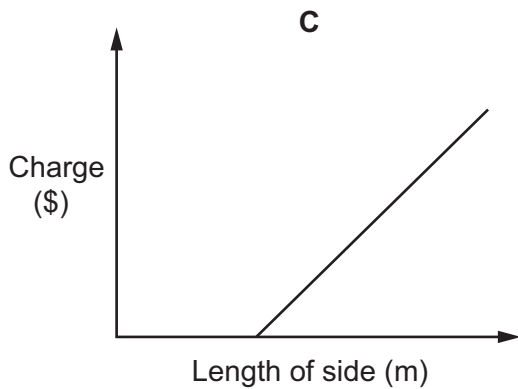
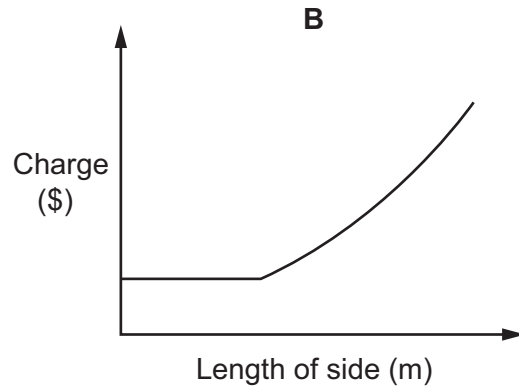
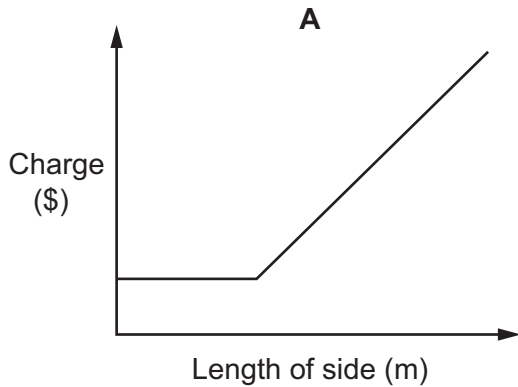
10 People employ Mo to cut and trim their lawns.

His charges are:

- 20 cents per square metre of area that he cuts
- 20 cents per metre of lawn edge that he trims

However, he has a minimum total charge of \$12 per lawn.

Which of the following graphs shows how Mo's charge for cutting and trimming the whole of a **square** lawn varies with the length of its sides?



- 11 The table below shows the price (in dollars) per person of travelling on a ferry boat from Revod to Olamst or the reverse journey from Olamst to Revod. The price depends upon the accommodation chosen and the time of year the journey is made.

<i>Accommodation type</i>	<i>October to April</i>	<i>May and September</i>	<i>June, July and August</i>
2-berth outside cabin	105	119	140
2-berth inside cabin	95	108	125
3-berth outside cabin	98	116	129
3-berth inside cabin	86	104	117
2-berth inside cabin (no shower or w.c.)	76	86	103
No cabin – reclining seats	45	55	65
Simple passage	35	45	56

A family of five plan to go by ferry from Revod to Olamst in May returning in June. The parents wish to travel both ways in a 2-berth outside cabin, and are willing to pay for the children to enjoy a 3-berth inside cabin on both journeys. The three children think all members of the family should take the cheapest (even if most uncomfortable) fare available, and use the savings made as compared to the parents' plan for special holiday treats.

How much would the family save in total on the ferry crossing if the children's plan was adopted compared to the parents' plan?

- A \$379
- B \$650
- C \$676
- D \$1181



12 Below is a table containing information about unemployment figures in seven countries.

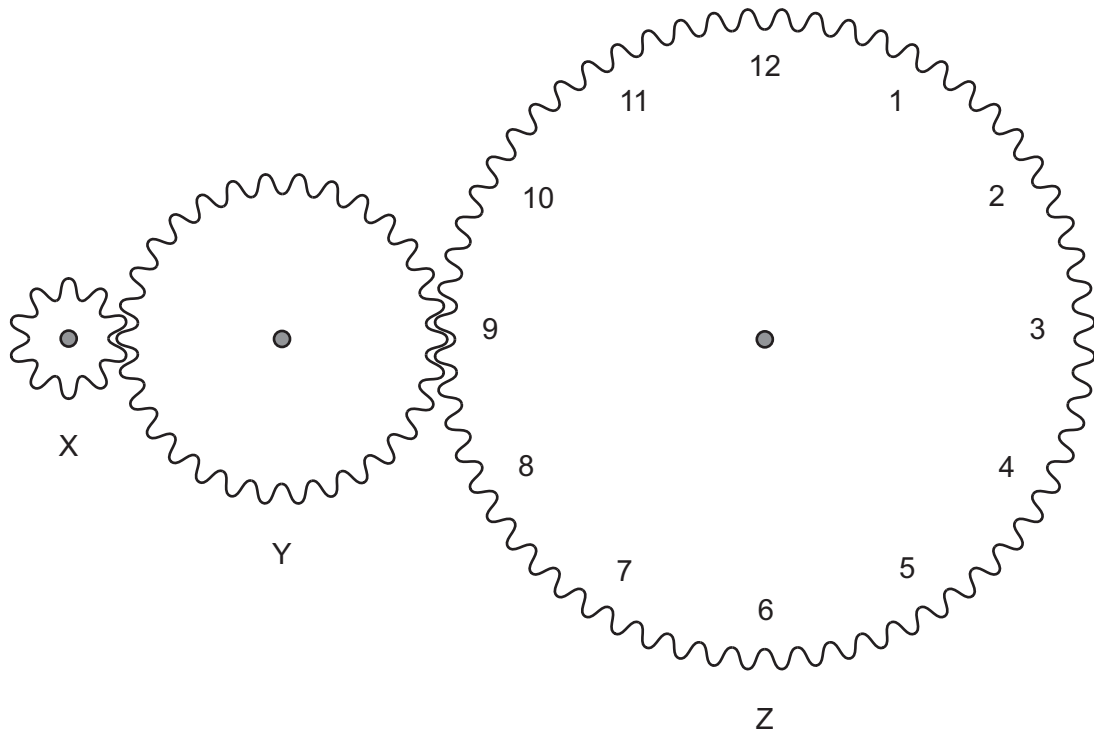
**Total 25 – 54 unemployment (%)**

	2000	2001	2002	2003	2004	2005
Australia	5.30	5.00	5.10	4.80	4.00	3.90
Canada	5.70	6.20	6.50	6.40	5.90	5.70
Czech Republic	7.70	7.50	6.50	7.00	6.00	7.40
Estonia	12.90	11.80	10.00	9.40	8.90	7.50
Finland	8.00	7.40	7.30	7.30	7.20	6.80
France	8.80	8.10	8.30	8.90	10.00	9.10
Germany	7.30	7.50	8.20	9.50	9.00	10.40

Which two countries experienced the same change in unemployment between 2001 and 2004?

- A Australia and Germany
- B Czech Republic and Germany
- C France and Germany
- D Australia and the Czech Republic

13



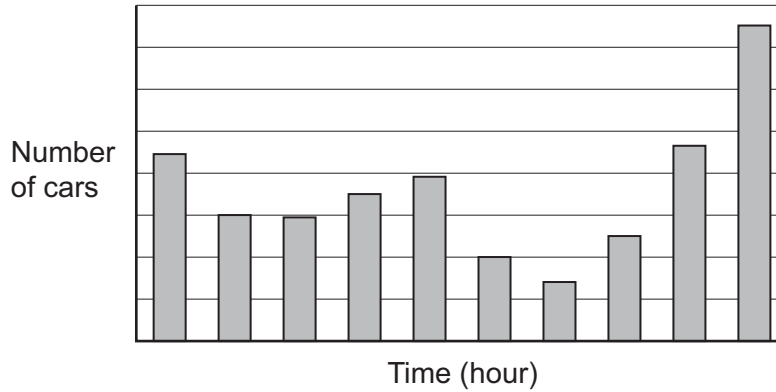
The diagram shows three wheels meshed together so that when wheel X is turned, wheel Y turns, and this turns wheel Z. There is no slipping or sliding when the wheels are turned. The diameters of wheels X, Y and Z are 10 cm, 30 cm and 60 cm respectively. Starting from the position in the diagram, wheel X is turned four times round in a clockwise direction.

After these four revolutions, what will the number be at the top of wheel Z?

- A 2
- B 4
- C 8
- D 10

- 14** The Green Road car park has a capacity of 150 cars. It is open from 8 am to 6 pm and cars are not allowed to stay overnight. It is mainly used by commuters and shoppers. About half the capacity is used by commuters, who mainly stay for the whole day. Shoppers generally come after 9 am and leave before 5 pm, but only stay for the morning or afternoon.

Given the above information, which of the statements **A – D** is the most likely description of the graph shown below?



- A** The number of cars arriving in the car park during each hour
- B** The number of cars leaving the car park during each hour
- C** The number of cars in the car park at the end of each hour
- D** The number of spaces in the car park at the end of each hour

- 15** 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 a 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

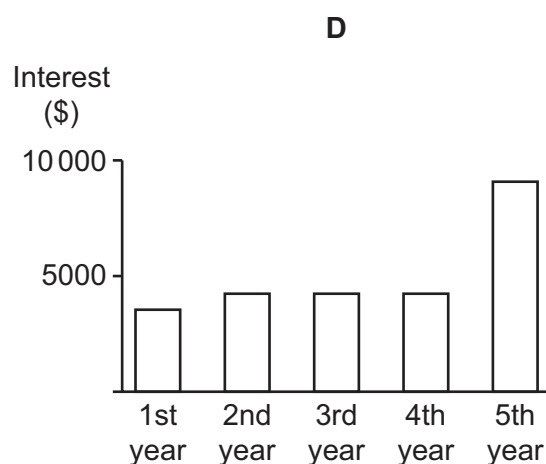
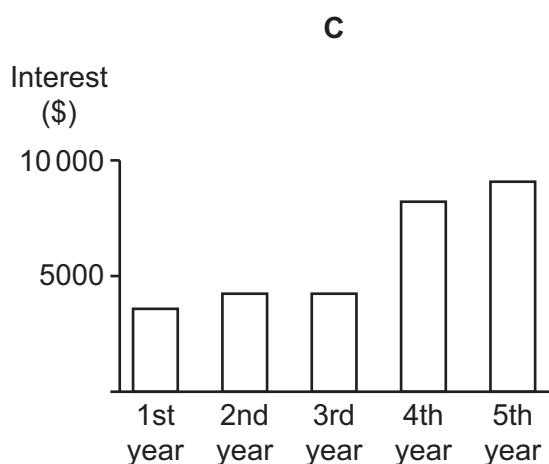
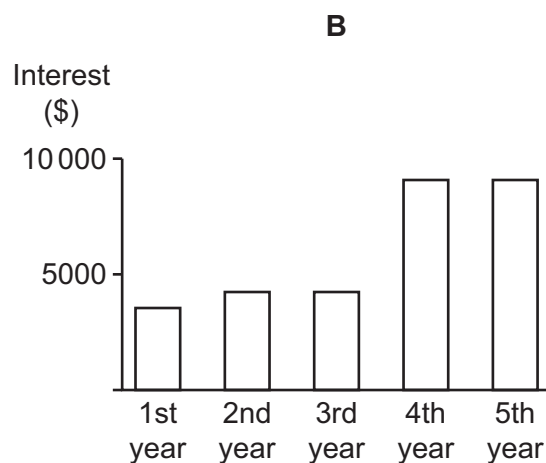
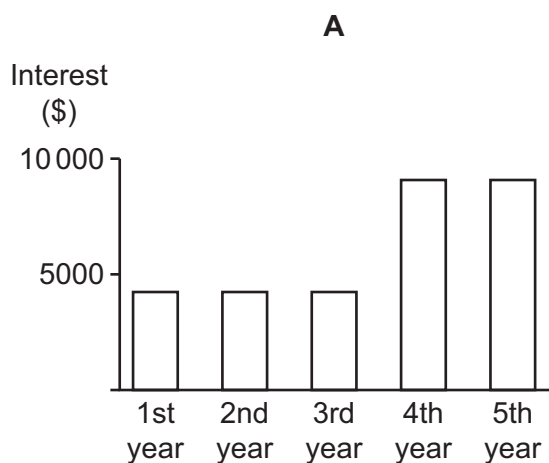
16 Yesterday I opened a savings account and paid in the \$87 500 that I recently inherited.

The account that I have chosen is aimed at savers with at least \$50 000 to invest. It pays no interest for two months when the account is first opened, but from the third month interest is credited to the account as follows:

<i>Balance before interest is added</i>	<i>Monthly interest</i>
less than \$50 000	0
from \$50 000 to \$99 999	\$350
\$100 000 or more	\$750

My intention is to leave the money in this account without making any withdrawals for at least the next five years.

Which one of these bar charts shows the total interest I can expect to receive during each of the next five years?



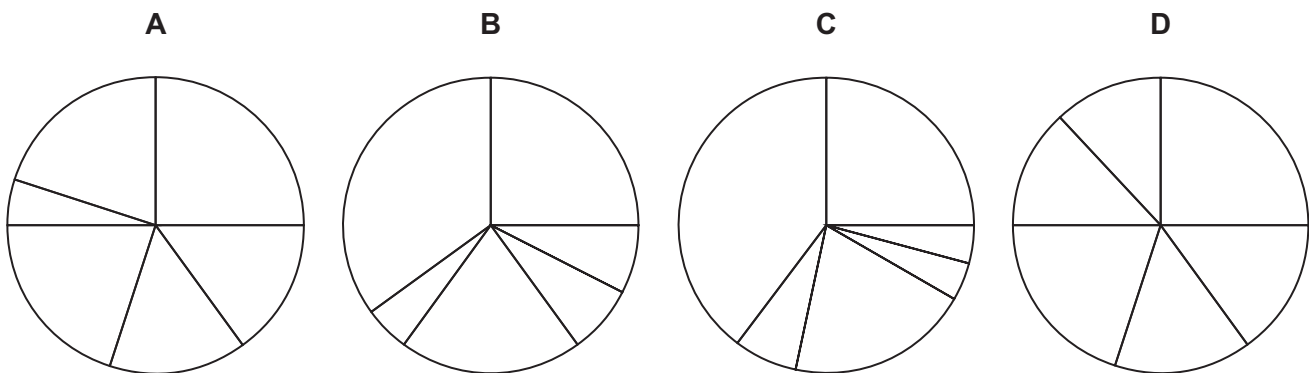
- 17 I went shopping for presents and bought two each of three different books, and one of a fourth book. The four books were all different prices. All four prices were whole numbers of dollars. The total bill was \$25. None of the books was as low as \$1.

Which of the following could have been the price of the book I bought only one of?

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

- 18 Last year, Billy decided to save up to buy a computer. In January he saved 25% of the total cost of the computer. In each of February and March he saved 15% of the total cost. In April he saved 20% of the total cost. In May, he only managed to save 25% of what he had saved in April, but in June he was able to save the remaining amount that he needed to buy his computer.

Which one of the following pie charts could represent Billy's monthly savings?



- 19 John and Tanya are playing a game. Tanya has thought of a three-digit number and given John two clues to help him to work out the number. The clues that she has given him are:
- The digits add up to 12.
  - The first digit is twice as much as the last digit.

Which one of the following extra pieces of information would be sufficient to allow John to deduce the number?

- A The number is even
- B The number is odd
- C The difference between the largest and smallest digit is 3
- D The difference between the largest and smallest digit is 8

- 20** Four teams – the Blues, the Greens, the Reds and the Yellows – took part in a football tournament in which several exciting goals were scored.

The number of goals scored altogether by the Blues and the Reds was equal to twice the number scored by the Greens, whilst the total scored altogether by the Reds and the Yellows was equal to three times the number scored by the Greens.

Which is the only one of the following statements that is definitely true?

- A** The Blues scored more goals than the Greens
  - B** The Greens scored more goals than the Reds
  - C** The Reds scored more goals than the Yellows
  - D** The Yellows scored more goals than the Blues
- 21** The local science museum needs to raise a certain amount of money every week to pay its running costs. The entrance fee is \$10 for adults and \$8 for children. Last week 140 adults and 100 children visited the museum and the money raised from their entrance fees was just enough to cover the running costs.

This week however the running costs will be \$100 more than last week. Tina assumes that the same number of people will visit this week, and so has decided to increase the entrance fee to \$12 for adults and \$9 for children. She is also going to introduce a family ticket, which will admit 2 adults and 2 children. She predicts that 40 of these family tickets will be sold.

What is the cheapest price for the family ticket that will raise the required amount of money?

- A** \$33
  - B** \$35
  - C** \$37
  - D** \$41
- 22** Eight students take a Physics test and their marks are 40, 35, 56, 29, 74, 61, 50 and 39. Two other students, Ron and Sam, also take the test and join the eight students to form a group of ten.

Which one of the following sets of information would be sufficient to find Sam's mark?

- A** The mean increases by 2 marks and the median increases by 3 marks when the marks for Ron and Sam are included
- B** The mean mark of all ten students and knowledge that Ron's mark is 2 more than Sam's mark
- C** The mean mark of all ten students and the mean mark of Ron and Sam
- D** The median mark of all ten students and the median mark of Ron and Sam

- 23** I have a collection of 160 gold coins which I want to share between my four grandchildren. At present they are 9, 5, 4 and 2 years old, so I could share out the coins in the ratio of their ages without having to round off any figures. However, I have decided to wait until the next time their ages are such that I can share them out in the ratio of their ages without having to round off any figures.

How many more coins will my youngest grandchild eventually receive than if I had decided to share them out now?

- A** 3
- B** 5
- C** 9
- D** 12

- 24** Each day I eat lunch at my own house, my aunt's house or my sister's house. During the last 11 days I ate lunch at least once at each person's house. I ate lunch twice as many times at my aunt's house as at my own house.

Which piece of information, by itself, would enable you to work out how many days I ate lunch at my sister's house?

- A** I ate lunch at my sister's house more times than at my own house
- B** I ate lunch at my sister's house an odd number of times
- C** I ate lunch at my aunt's house an even number of times
- D** I ate lunch at my sister's house more times than at my aunt's house

- 25** Widgeo Inc. make *gruffles* and *mankets*. Gruffles only come in black, while mankets come in either black or white. Last week, 84% of the mankets they made were white and 37% of all the items they made were black.

What percentage of the items they made last week were gruffles?

- A** 21%
- B** 25%
- C** 31%
- D** 53%



- 26** Fatima and Sam like to go cycling. They both ride at a constant speed but Fatima's speed is quicker than Sam's. Last week they set off from Applebig at the same time but Fatima got to their destination Beechwood 45 minutes before Sam. This week, their route was 20 km shorter but Fatima arrived at their destination with Sam still having 8 km to ride. Sam always cycles at a constant speed of 16 km/h.

What is the constant speed at which Fatima always cycles?

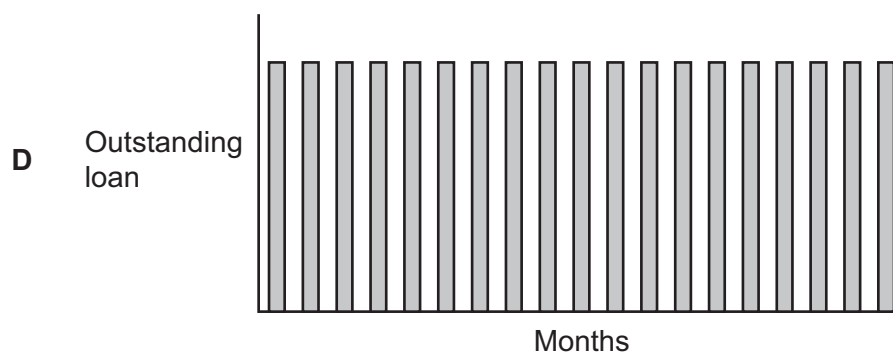
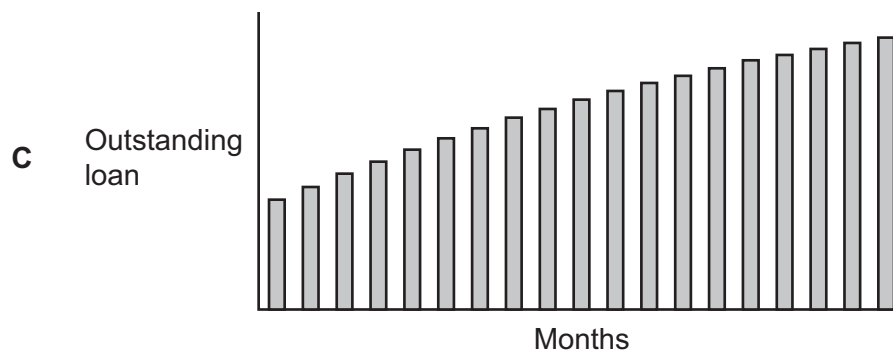
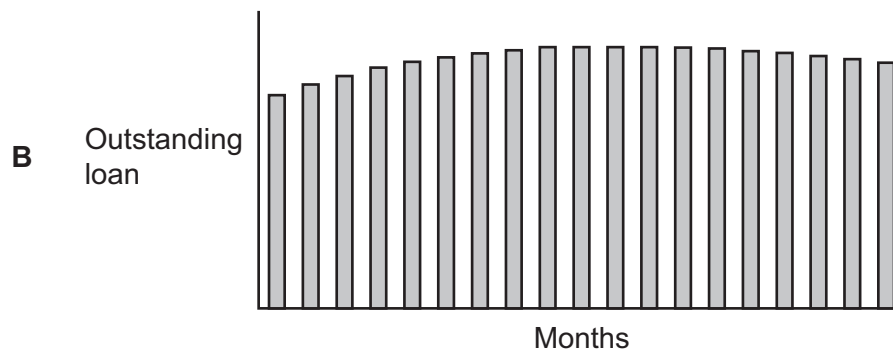
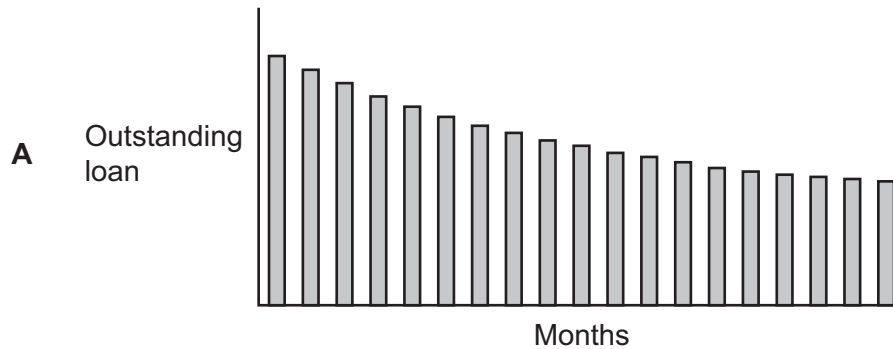
- A** 20 km/h
  - B** 24 km/h
  - C** 28 km/h
  - D** 32 km/h
- 27** At the end of each round of a racing competition points are awarded to each of the participants. The winner receives 5 points, the person in second place scores 3 points and all other participants score 1 point. Hilary and Jennifer have both competed in all of the rounds so far. Hilary has now scored a total of 30 points and Jennifer has a total of 38 points.

What is the smallest number of rounds that could have taken place?

- A** 8 rounds
- B** 9 rounds
- C** 10 rounds
- D** 12 rounds

- 28 Orla has a loan from her bank, with slightly unusual conditions. Every month, she pays back a fixed percentage of the outstanding amount. Every month the bank loans her an extra fixed amount. No interest is payable until the end of the loan period.

Which of the following graphs could **not** show her balance from month to month?



- 29** The manager of a train company calculates the price of a ticket by charging a fixed amount plus an extra amount per kilometre of travel. Last year, when prices needed to go up, the fixed amount was kept the same, but the cost per kilometre was increased by 2¢. This resulted in the price for a 30 kilometre journey going up by 2.5%. This year the manager has chosen to increase the fixed amount by 10% instead. The price for a 50 kilometre journey is now \$2.50 more than it was before the first change.

What is the cost of a ticket for a 50 kilometre journey after this latest increase?

- A** \$30.00
  - B** \$31.00
  - C** \$31.50
  - D** \$32.50
- 30** Tickets for a recent concert were \$10 each for adults and \$5 each for children. A family ticket for 2 adults and 2 children was available for \$25.

Tickets for all 640 seats in the theatre were sold, and the total income from ticket sales was \$4780.

What is the maximum number of family tickets that could have been sold?

- A** 52
- B** 82
- C** 108
- D** 160

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