

Section 2

2012 Cath. Trial

HSCFocus.com

Section II

75 marks

Attempt Questions 26–30

Allow about 1 hour and 55 minutes for this section

Answer each question in the appropriate writing booklet. Extra writing booklets are available.

All necessary working should be shown in every question.

Question 26 (15 marks) Use a SEPARATE writing booklet.

(a)

Home Loan Table				
	Amount Borrowed =	\$80 000		
	Annual Interest Rate =	8%		
	Monthly Repayment (R)	\$1000		
N	Principal (P)	Interest (I)	P + I	P + I - R
1	\$80 000	\$533.33	\$80 533.33	\$79 533.33
2	\$79 533.33	\$530.22	\$80 063.55	\$79 063.55
3	\$79 063.55	\$527.09	\$79 590.64	\$78 590.64
4	\$78 590.64	X	\$79 114.58	\$78 114.58

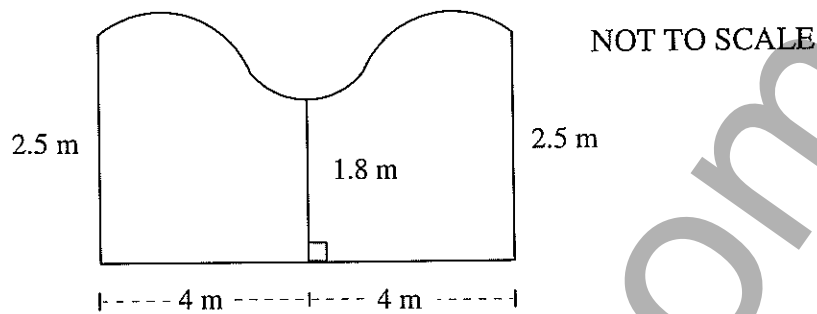
- (i) Find the value of X in the home loan table above. 1
- (ii) What percentage of the loan has been repaid at the end of 4 months? Give your answer correct to 1 decimal place. 2

(b) Simplify $\frac{w^8}{3w^2} \times w^6$. 1

Question 26 continues on Page 13

Question 26 (continued)

- (c) A banner is made from a material which has been cut in the shape below.



- (i) Use Simpson's rule to find the area of this banner correct to 2 decimal places. 2
- (ii) Convert your answer from part (i) to cm^2 . 1
- (d) Mr Yu is looking to invest \$50 000 in a term deposit account. The bank has given him the following options: 2

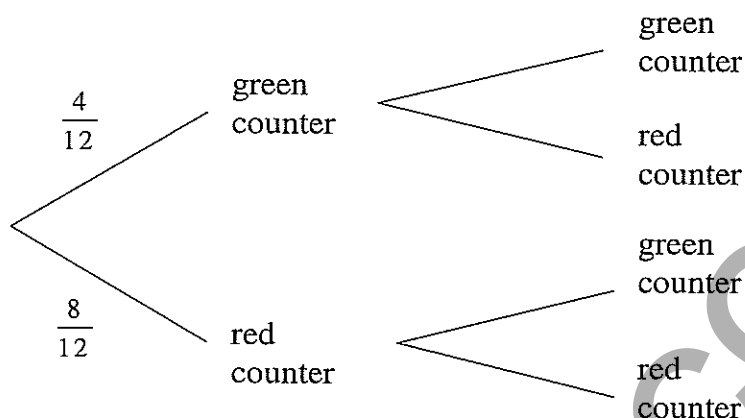
Option A: 8% p.a. simple interest
Option B: 5.8% p.a. compounded yearly

Which option will give him the best return after 10 years?
Justify your answer using appropriate calculations.

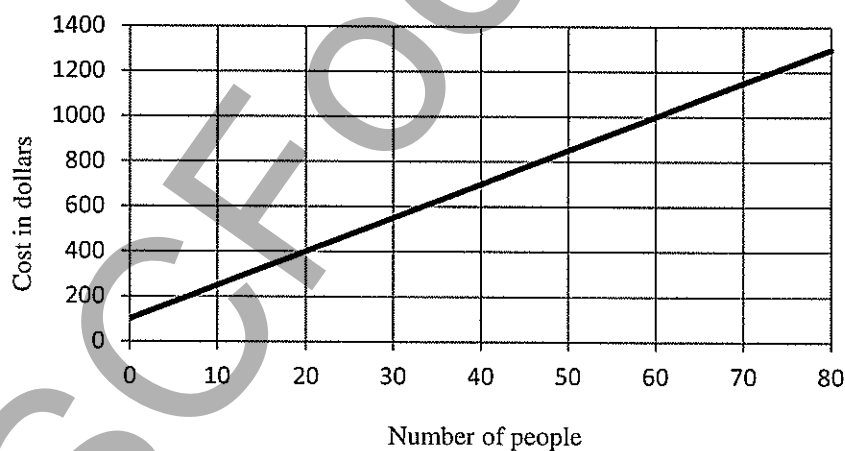
Question 26 continues on Page 14

Question 26 (continued)

- (e) A bag contains four green counters and eight red counters. Two counters are selected at random.



- (i) Copy and complete the tree diagram above, showing the probability on each branch. 1
- (ii) Calculate the probability that one counter of each colour is selected. 2
- (f) Abbey is holding her 18th birthday party at a local restaurant. The graph below models the cost of Abbey's party at this restaurant.

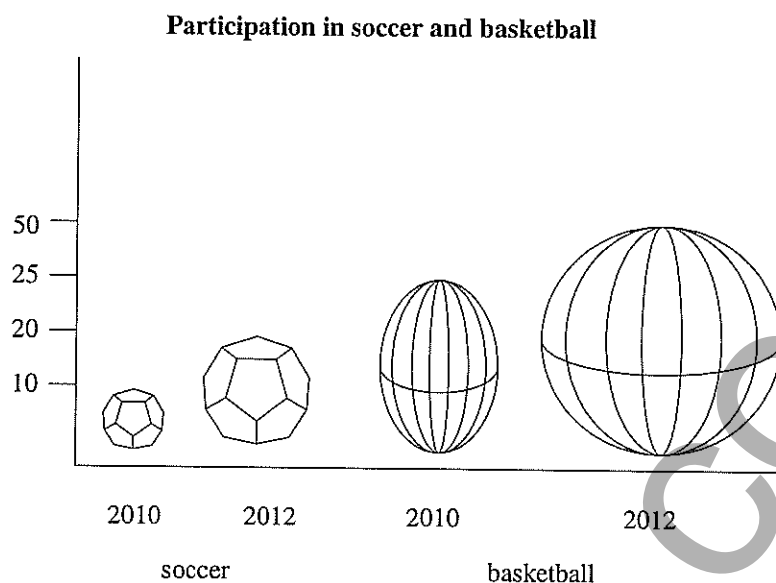


- (i) What is the initial cost to hire the restaurant? 1
- (ii) The gradient of the line is 15. What does this gradient represent? 1
- (iii) If the restaurant increases the cost per person, what effect will this have on the line? 1

End of Question 26

Question 27 (15 marks) Use a SEPARATE writing booklet.

(a)



The graph shows the growth in student participation in soccer and basketball between 2010 and 2012.

2

List TWO reasons why this graph is misleading.

- (b) Oliver collected data on the ages of people at the Big Day Out Concert and displayed it in the frequency distribution table shown.

Age	Frequency
15-24	61 000
25-34	32 000
35-44	5000
45-54	2000
Total	100 000

- (i) What is the modal class of this data? 1
- (ii) Calculate the approximate mean age of people who attended the Big Day Out Concert. 2
- (iii) Using the data above, explain why it is not possible to know the exact mean age of people who attended the Big Day Out Concert. 1

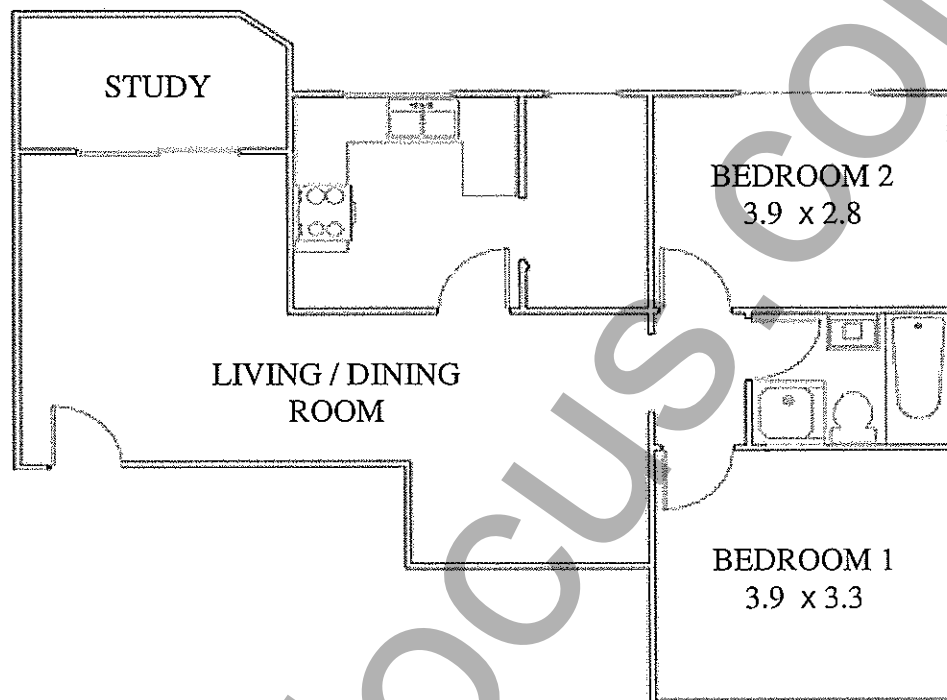
Question 27 continues on Page 16

Question 27 (continued)

- (c) Chris works in a hardware shop. Last week he earned \$526.40 by working 30 hours at normal time, 6 hours at time-and-a-half and 4 hours at double time. 2

Calculate Chris' hourly rate of pay.

(d)



The floor plan above shows the dimensions of two bedrooms in metres.
The owners of the house want to carpet the two bedrooms and have chosen a carpet which costs \$85 per square metre.

- (i) What is the cost of the carpet for the two bedrooms? 2
- (ii) What scale is being used in this plan? 1
- (iii) Determine the real length of the STUDY. 1

Question 27 continues on Page 17

Question 27 (continued)

- (e) A Health Survey calculated the Body Mass Index (BMI) for 200 adult men and women.

The results are displayed in the two-way table shown below.

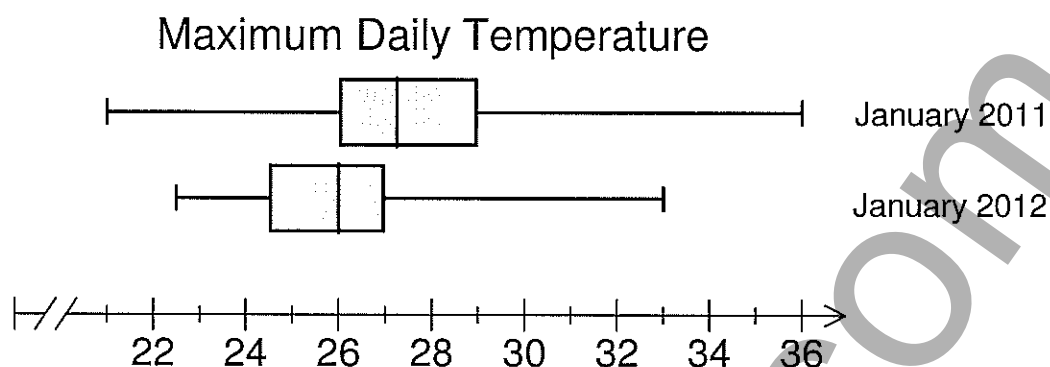
	Men	Women	TOTALS
Normal	33	40	73
Overweight	42	36	77
Obese	25	24	49
TOTALS	100	100	200

- (i) How many men were classified as overweight? 1
- (ii) The women's results are to be displayed in a sector graph. 1
Calculate the size of the angle that would represent women with a normal BMI.
- (iii) If a person is selected at random from the obese group, find the probability that 1
the person selected is male.

End of Question 27

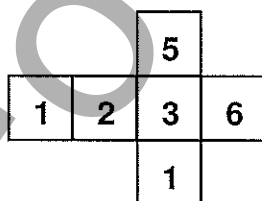
Question 28 (15 marks) Use a SEPARATE writing booklet.

- (a) The box-and-whisker plots below show the maximum daily temperature for Sydney in January 2011 and January 2012.



- (i) Find the range of the temperatures in January 2012. 1
- (ii) How many days in January 2011 had a temperature of 26° or less? 1
- (iii) With reference to the box-and-whisker plots, comment on the statement 2
- “January 2011 was hotter than January 2012”.

- (b) The figure below shows the net of a biased die.



- (i) Find the probability of rolling an even number. 1
- (ii) In a game this die is rolled once. The financial expectation of the game is \$1.50. 2
A player wins \$2.00 for rolling an even number. Calculate the amount won when an odd number is rolled.
- (iii) David rolls this die twice and adds the two numbers shown. What is the 1
probability that the total of the two numbers rolled is 8?

Question 28 continues on Page 19

Question 28 (continued)

- (c) Melinda works in a clothing shop and earns \$1226 per week. How much does Melinda earn per month? 1
- (d) On Monday 10th April, there were 1000 bacteria in a culture. The number of bacteria increased at a rate of 15% per day. The number of bacteria, B , present in the culture n days after Monday can be represented by the formula $B = 1000(1.15)^n$.
- (i) How many bacteria were present on Thursday 13th April? 1
- (ii) On what date did the number of bacteria triple? 2
- (e) Yvette calculated the correlation coefficient of a data set to be -0.2 . Explain what this means about the strength of the relationship between the two variables. 1
- (f) The table below shows the monthly repayments on a loan of \$1000 at various interest rates over various periods.

Monthly Repayment Table (per \$1000 borrowed)

Interest Rate % p.a.	Time of Loan (years)			
	10	15	20	25
6.5%	11.35	8.71	7.46	6.75
7.5%	11.87	9.27	8.06	7.39
8.5%	12.40	9.85	8.68	8.05
9.5%	12.94	10.44	9.32	8.74

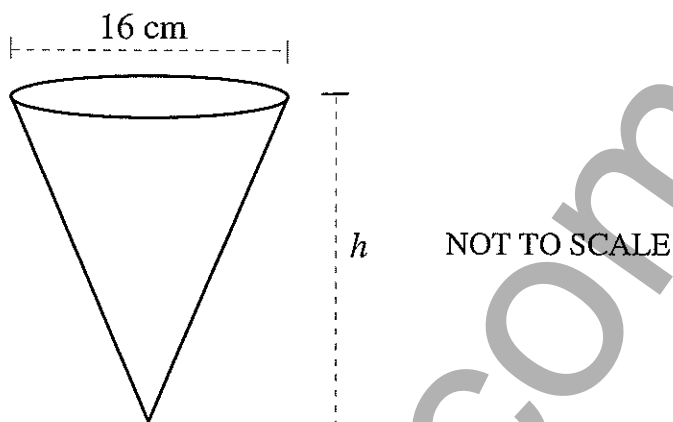
- (i) Giselle wishes to buy a house for \$475 000. The bank offers her a loan over 15 years at 8.5% p.a. Using the table above, calculate her monthly repayments. 1
- (ii) Giselle's brother, Mauro also borrowed money from the same bank at 8.5% p.a. over 25 years. If his monthly repayments were \$6182.40, how much money did he borrow? 1

End of Question 28

Question 29 (15 marks) Use a SEPARATE writing booklet.

- (a) The volume of the cone below is 670.2 cm^3 .

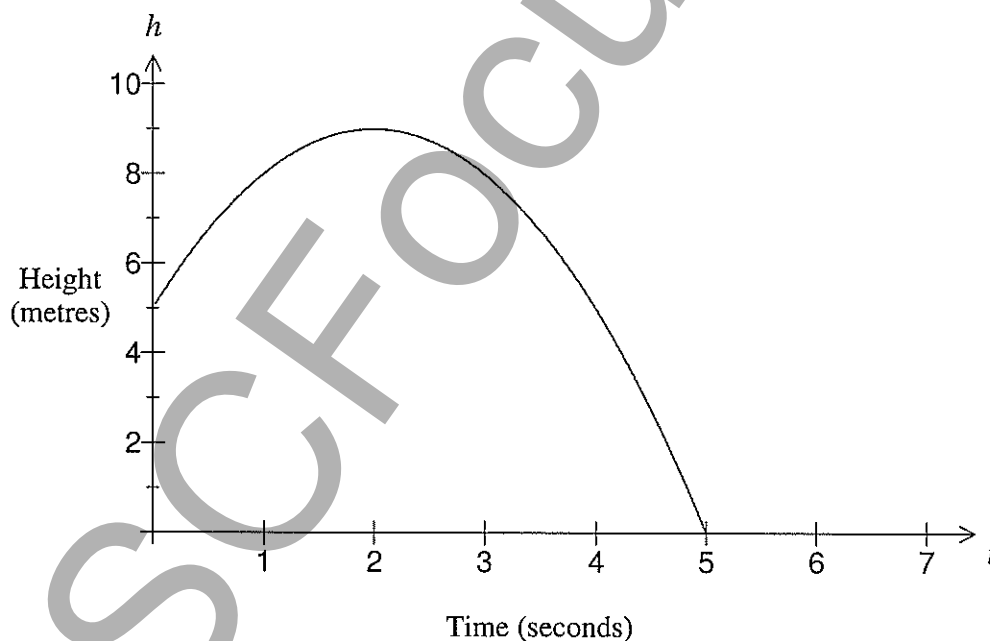
2



Find the height, h , correct to the nearest centimetre.

- (b) A ball is thrown vertically into the air from a window 5 metres above the ground. The graph below shows the height of the ball after t seconds.

1



A roof overhangs the building at a height of 5 metres above the same window. Will the ball hit the roof? Justify your answer with reference to the graph.

Question 29 continues on Page 21

Question 29 (continued)

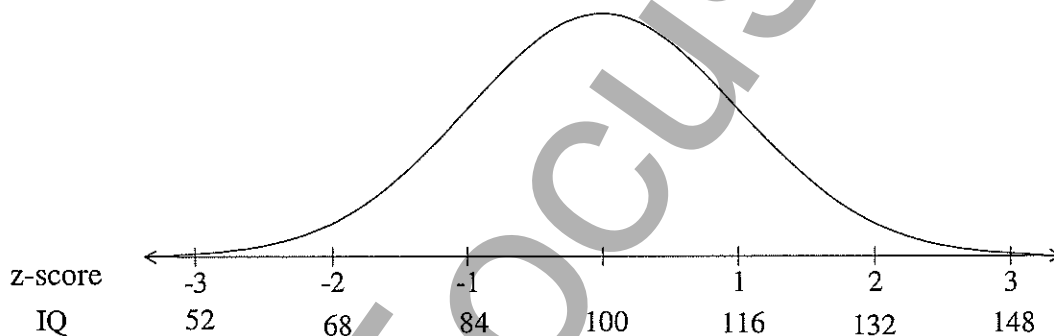
- (c) Sam and Ben own rival companies. They each bought a computer server for \$16 480. Sam uses the straight line depreciation method to calculate his tax deductions. Ben uses the declining balance method of depreciation to calculate his tax deductions at a rate of 20% p.a.

- (i) Complete the following table for Ben by finding the value of A. Give your answer correct to the nearest dollar. 1

Year	1	2	3	4
Salvage Value	\$13 184	\$10 547	A	\$6750

- (ii) Sam's company server depreciates by \$3296 per year. In your answer booklet, sketch a graph to show the value of Sam's server over time until its value reaches zero. Use the horizontal axis to represent the time and the vertical axis to represent the value of the server. 2

(d)



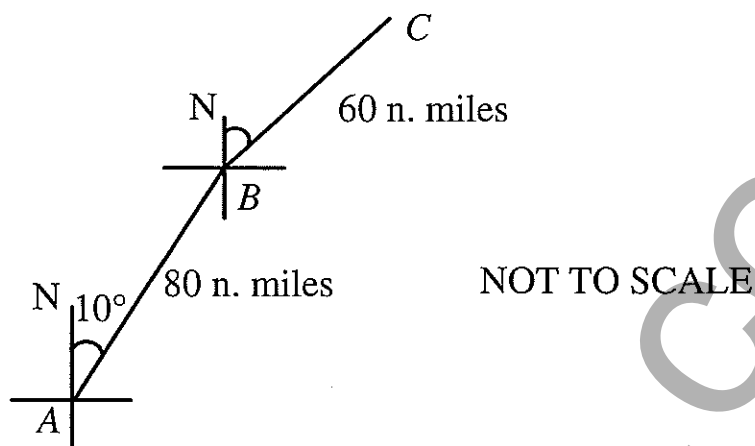
Intelligent Quotient (IQ) data is normally distributed.

- (i) John has an IQ of 120. Calculate his IQ z-score. 1
- (ii) What IQ corresponds to a z-score of -1.2 ? 1
- (iii) Arabella has an IQ of 132. Which percentile of the population does this place her in? 1

Question 29 continues on Page 22

Question 29 (continued)

- (e) An aeroplane left an airport, A , and travelled on a bearing of 010° . It stayed on this bearing for 80 nautical miles before altering course at B , to travel north east for a further 60 nautical miles before landing at C .



- (i) At its destination, C , calculate how far due east the plane is from its origin, A . Give your answer to the nearest nautical mile. 2
- (ii) Show that the obtuse angle ABC is 145° . 1
- (iii) Using the cosine rule, or otherwise, determine the shortest distance the aeroplane would have to travel to return to its starting point. 2
- (iv) Would the passengers on this aeroplane need to change the time on their watches after landing at C ? Explain your answer. 1

End of Question 29

Question 30 (15 marks) Use a SEPARATE writing booklet.

- (a) The resistance, R ohms, of a steel wire varies inversely with the square of its diameter, d millimetres.

The resistance is 8.75 ohms when the diameter is 0.4 millimetres.

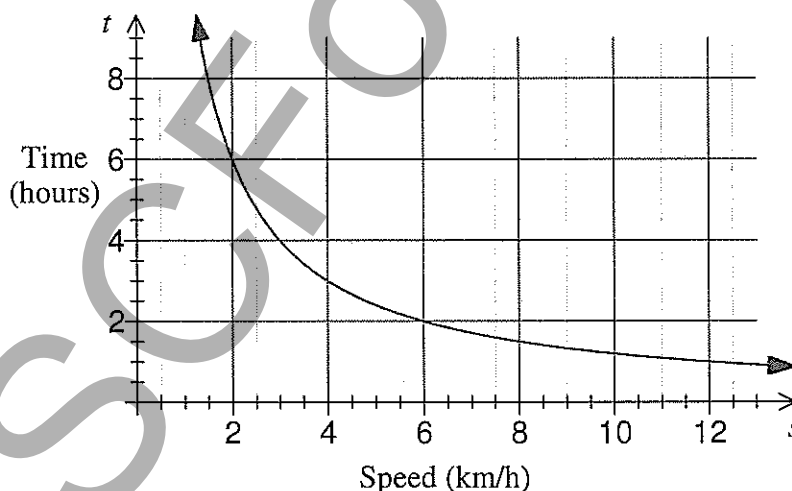
- (i) Find the value of the constant of variation, k . 2
- (ii) Find the resistance when the diameter of the wire is 0.75 millimetres. Give your answer correct to 2 decimal places. 1

- (b) Find the surface area of a closed hemisphere with a diameter of 28 metres. Give your answer correct to 2 decimal places. 2

- (c) Sissy is saving for an overseas holiday in 3 years time. She has opened a savings account which pays interest of 0.2% per fortnight, compounded fortnightly. Sissy wants to save \$12 000. Her parents decide to help her out when she first opens the bank account and they deposit \$3200 in her account. 3

Calculate how much she will have to invest fortnightly to achieve her goal of \$12 000.

- (d) The graph models the time taken, t , to walk 12 km at different speeds, s .



- (i) Using the graph, find the approximate time taken to walk 12 km at a speed of 8 km/h. 1
- (ii) Explain why it would be inappropriate to use this model for values of t less than $\frac{1}{2}$. 1

Question 30 continues on Page 24

Question 30 (continued)

- (e) Trudy owns a credit card with a daily interest rate of 0.05%. During June, she purchased items on her credit card. At the end of June, Trudy forgot to pay the bill. She was charged a late fee of \$40 and was charged interest only for the 12 days she was late in paying the bill. 2

Trudy had to pay a total of \$1080, which includes the original purchases, interest and late payment fee.

Find the cost of her purchases during the month of June.

Give your answer correct to the nearest dollar.

- (f) An unbiased die, with faces numbered 1, 2, 3, 4, 5, 6 is rolled three times. 3

Gabrielle guesses that either a 1, 2 or 3 will be rolled on the first roll of the die.

Salva guesses that a 1 will be rolled on the first roll, a 2 will be rolled on the second roll and a 3 will be rolled on the third roll.

For each correct guess they will receive a prize.

Explain why Gabrielle has a greater chance of winning at least one prize. Justify your response using probability calculations.

End of paper

EXAMINERS

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Tennille Cummings
Patricia Davis
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