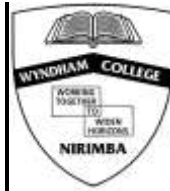


Student Name: _____

Marks: _____ / 65



HSC COMMON TEST General Mathematics

Assessment Date: Week 8, Term 2 2010
Assessment Value: 20%

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Section 1

Multiple choice (15 marks)

Attempt questions 1 – 15

Please remove multiple choice

answer sheet provided

Clearly write your name and teacher's name

-
1. The total repayments for a \$3400 loan on a flat rate interest of 8.5% p.a. over a 3-year period are:
(A) \$867 (B) \$942.78 (C) \$4267 (D) 4342.78
 2. A \$115 000 loan is repaid over a 25-year term at the rate of \$1211.21 per month. The total amount of interest that is paid on this loan is:
(A) \$30 280.25 (B) \$145 280.25 (C) \$248 363.00 (D) \$363 363.00
 3. A sphere has a volume of 360 cm³.
What is its radius (correct to one decimal place)?
(A) 1.7 cm (B) 4.4 cm (C) 8.1 cm (D) 9.3 cm
 4. The table is used to calculate monthly loan repayments.

Monthly loan repayments (in dollars) per \$1000 borrowed

Interest rate % pa	5 years	10 years	15 years	20 years
5%	18.87	10.61	7.91	6.60
6%	19.33	11.10	8.44	7.16
7%	19.80	11.61	8.99	7.75
8%	20.28	12.13	9.56	8.36
9%	20.76	12.67	10.14	9.00

Samantha has borrowed \$70 000 at 8% per annum for 15 years.
What is her monthly loan repayment?

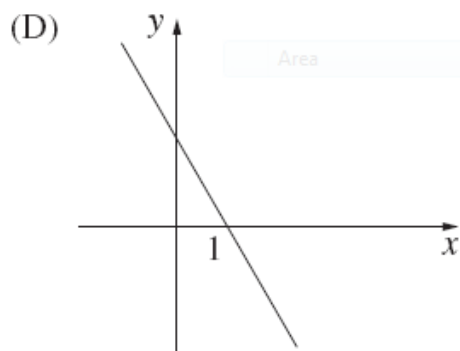
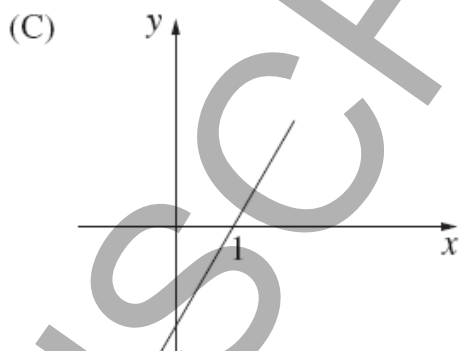
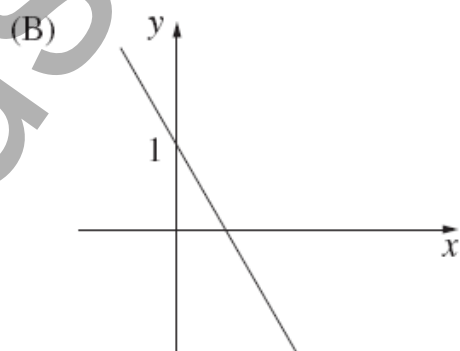
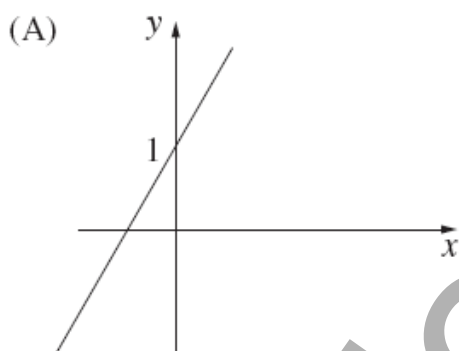
- (A) \$143.40 (B) \$669.20 (C) \$8 330.40 (D) \$10 038.00

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5. The sheets of paper Jenny uses in her photocopier are 21 cm by 30 cm. The paper is 80 grams, which means that one square metre of this paper has a mass of 80 grams. Jenny has a pile of this paper weighing 25.2 kg.

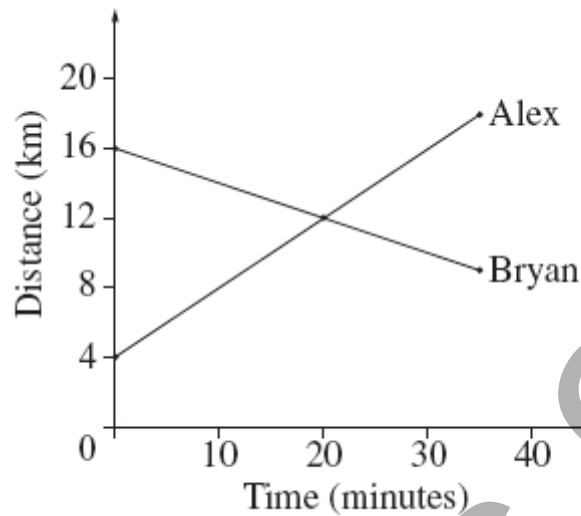
How many sheets of paper are in the pile ?

- (A) 500 (B) 2000 (C) 2500 (D) 5000
6. At the end of 2000, Zara purchased a new computer for \$4999. Use the declining balance method to determine the value of the computer at the end of 2002, assuming a depreciation rate of 40% per annum. (Answer to the nearest dollar.)
- (A) \$800 (B) \$1000 (C) \$1800 (D) \$2000
7. Which one of the following could be the graph of $y=3x+1$?



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8. At the same time, Alex and Bryan start riding towards each other along a road. The graph shows their distances (in kilometres) from town after t minutes. How many kilometres has Alex travelled when they meet?



- (A) 4 (B) 8 (C) 12 (D) 20

9. Sarah has two packets of jelly beans. Each packet contains one black and five yellow jellybeans. Sarah takes one jelly bean from each packet without looking.

What is the probability that both of the jelly beans are black ?

10. This set of data is arranged in order from smallest to largest.
5, 6, 11, x , 13, 18, 25

The range is six less than twice the value of x .
Which one of the following is true?

- (A) The median is 12 and the interquartile range is 7
(B) The median is 12 and the interquartile range is 12
(C) The median is 13 and the interquartile range is 7.
(D) The median is 13 and the interquartile range is 12.
- 11 Jamie wants to know how many songs were downloaded legally from the internet in the last 12 months by people aged 18–25 years. He has decided to conduct a statistical inquiry. After he collects the data, which of the following shows the best order for the steps he should take with the data to complete his inquiry?
- (A) Display, organise, conclude, analyse
(B) Organise, display, conclude, analyse
(C) Display, organise, analyse, conclude

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(D) Organise, display, analyse, conclude

12. The mean of a set of 5 scores is 62. What is the new mean of the set of scores after a score of 14 is added?

(A) 38 (B) 54 (C) 62 (D) 76

13. The diameter of the hydrogen atom is approximately 0.000 000 000 025 4 metres. This distance expressed in scientific notation is

(A) 25.4×10^{-11}
(B) 2.54×10^{11}
(C) 2.54×10^{10}
(D) 2.54×10^{-11}

14. Two people are to be selected from a group of six people to form a team. How many different teams can be formed ?

(A) 15 (B) 18 (C) 30 (D) 36

15. Kay randomly selected a marble from a bag of marbles, recorded its colour and returned it to the bag. She repeated this process a number of times.

<i>Colour</i>	<i>Tally</i>	<i>Frequency</i>
Red	 	7
Blue		3
Yellow		2
Green		4
Purple	 	8

Based on these results, what is the best estimate of the probability that Kay will choose a green marble on her next selection.

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End of Section 1

Section II

50 marks

Attempt questions 16 – 19

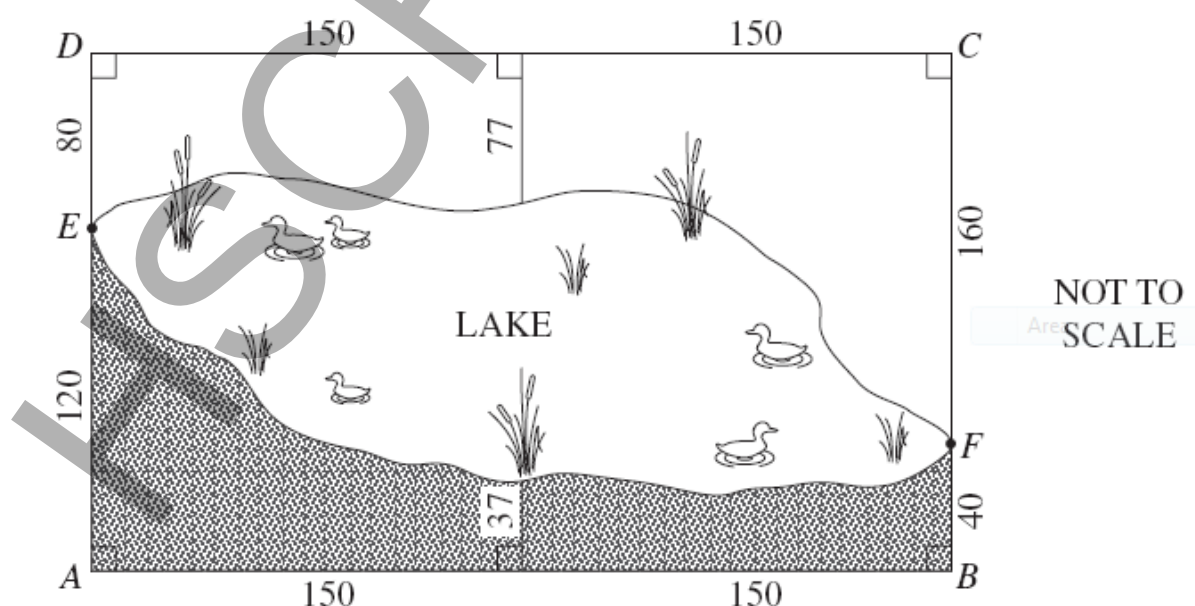
Start each question on a new sheet of paper

Clearly label each sheet with the question number, and your teacher's name
(Even if you don't attempt the question)

QUESTION 16 (12 marks)

- a. i) A basketballer has a probability of 0.4 of landing a three point shot. The basketballer has two shots at the basket. Calculate the probability that the basketballer lands both shots. 2
- ii) In a cricket team of eleven players, a captain and vice-captain are to be chosen. In how many ways can this be done? 1
- iii) A printing machine worth \$150 000 is bought in December 2005. In December each year, beginning in 2006, the value of the printing machine is depreciated by 10% using the declining balance method of depreciation. 2
In which year will the depreciated value first fall below \$120 000?
- iv) Solve $4(x - 5) = 9x - 10$ 2

b. In order to find the area of a lake. Bob took some measurements (in metres) and drew the following diagram



- (i) Use Simpson's Rule to find the shaded area ABFE

2

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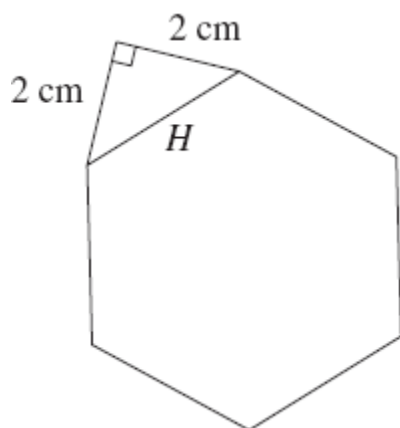
(iii) Calculate the area of the lake.

3

QUESTION 17 (15 marks)

a. This shape is made up of a right-angled triangle and a regular hexagon

3



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The area of a regular hexagon can be estimated using the formula $A = 2.598H^2$ where H is the side-length.

Calculate the total area of the shape using this formula

b.

A batch of sniffer dogs is trained by customs to smell drugs in suitcases. Before they are used at airports they must pass a test. The results of that test are shown in the two-way table below

	Test results		Total
	Detected	Not detected	
No. of bags with drugs	24	1	25
No. of bags without drugs	11	164	175
Total	35	165	

(i) How many bags did the sniffer dogs examine?

1

(ii) In how many bags did the dogs detect drugs?

1

(iii) In what percentage of bags without drugs did the dogs incorrectly detect drugs?

1

(iv) Based on the above results, what is the probability that the dogs will not detect a bag carrying drugs?

1

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- c Ashan has an annuity that has a future value of \$500 000 on his retirement in 23 years. The annuity is invested at 8% p.a., with interest compounded annually. Calculate the present value of Ashan's annuity.

2

- d Ted has borrowed \$70 000 at an interest rate of 6.24% per annum compounded monthly. The repayments have been set at \$680 per month.

The loan balance sheet shows the interest charged and the balance owing for the first month.

<i>Month</i>	<i>Principal (at start of month)</i>	<i>Monthly interest</i>	<i>Monthly repayment</i>	<i>Balance (at end of month)</i>
1	\$70 000	$\$70\,000 \times 0.0052$ = \$364	\$680	\$69 684
2	\$69 684	<i>A</i>	\$680	<i>B</i>

- (i) Explain why 0.0052 is used to calculate the monthly interest.

1

- (ii) Find the missing amounts at *A* and *B*.

2

- e. Simplify

$$\frac{x^3}{3x^2} \times x^5$$

2

- f. Solve

$$\sqrt{x-2} = 5$$

2

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QUESTION 18 (13 marks)

(a) Barry constructed a back-to-back stem-and-leaf plot to compare the ages of his students.

Ages of students attending Barry's Ballroom Dancing Studio

<i>Females</i>		<i>Males</i>
9	1	1 2 3
7	2	0 2 2 2 4 5
5	3	0 0 1 7
5 2	4	6 7
3 2 0	5	2
4 4 2 1	6	4 4

(i)_Write a brief statement that compares the distribution of the ages of males and females from this set of data. 1

(ii)_What is the mode of this set of data? 1

(iii)_Liam decided to use a grouped frequency distribution table to calculate the mean age of the students at Barry's Ballroom Dancing Studio. 2

For the age group 30–39 years, what is the value of the product of the_class centre and the frequency

(iv)Liam correctly calculated the mean from the grouped frequency_distribution table to be 39.5.

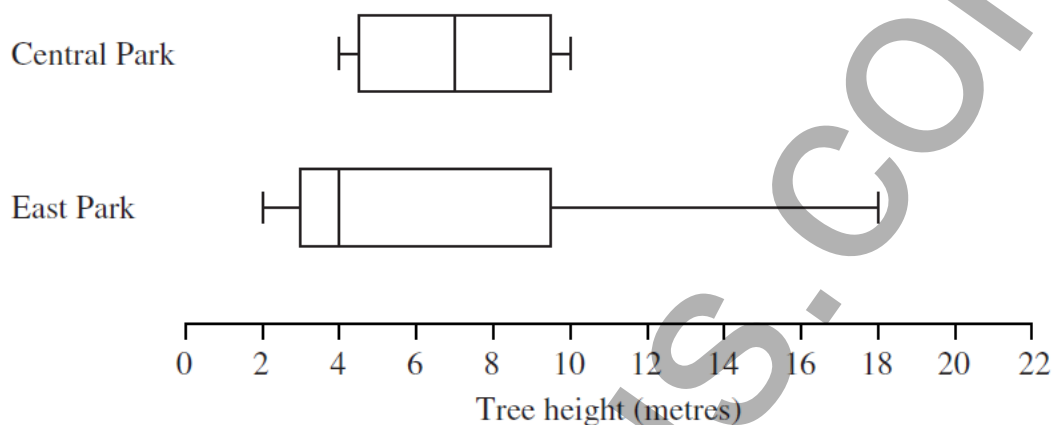
Caitlyn correctly used the original data in the back-to-back stem-and-leaf plot and calculated the mean to be 38.2 What is the reason for the difference in the two answers? 1

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- (b) Andy and her biology class went to two large city parks and measured the heights of the trees in metres.

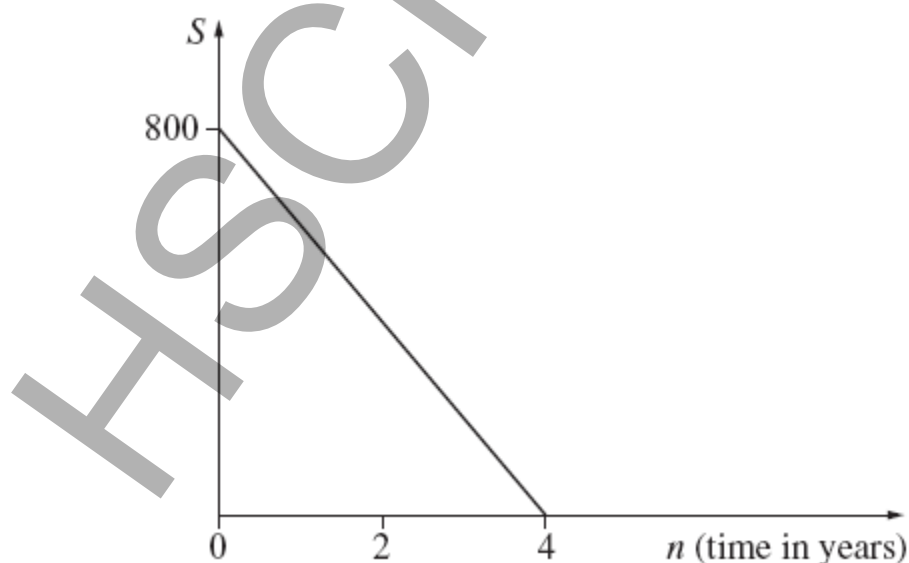
In Central Park there were 25 trees. In East Park there were 27 trees.

The data sets were displayed in two box-and-whisker plots.



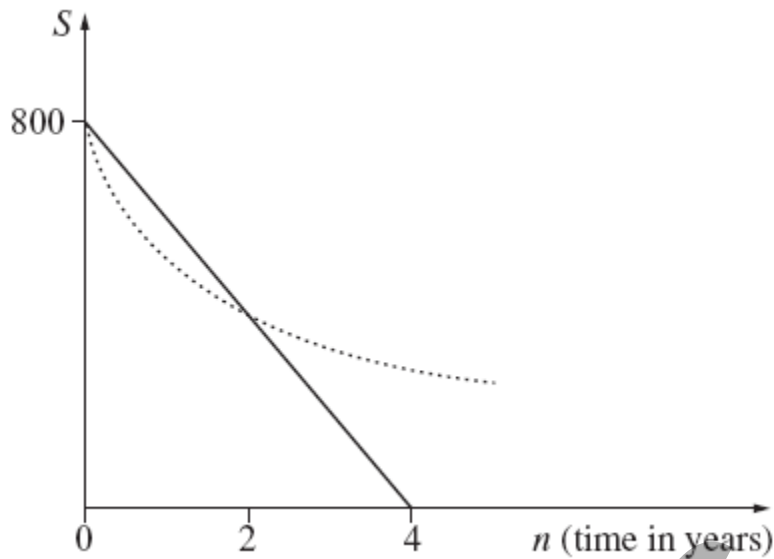
- (i) In which park is the tallest tree, and how high is it? 1
- (ii) What is the median height of trees in Central Park? 1

- (c) While Sandra is on holidays she buy a digital camera for \$800. Using the Straight-line method of depreciation, the salvage value, S , of the camera will be zero in four years time, as shown on the graph below 4



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Using the declining balance method of depreciation, at a rate of $R\%$ per annum, the Salvage value is represented by the dotted curve on the graph below.



Both methods give the same salvage value after two years. Find the value of R .

- (d) Peta borrows \$28 000 from a credit union at 6% per annum compounding monthly. She will repay the money over nine years.
Peta uses the formula:

$$28\,000 = M \left\{ \frac{(1+r)^n - 1}{r(1+r)^n} \right\}$$

to calculate her monthly repayment, M .

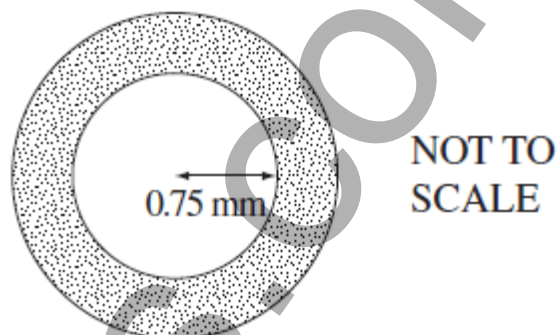
- | | |
|--|---|
| (i) Rewrite the formula, showing the correct substitutions for r and n . | 1 |
| (ii) Calculate Peta's monthly repayment. | 2 |

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QUESTION 19 (10 MARKS)

a (i) Rearrange the formula for the area of an annulus, $A = \pi (R^2 - r^2)$, to make R the subject. 2

(ii) A small metal washer is to be made in the shape of an annulus with inner radius 0.75 mm.



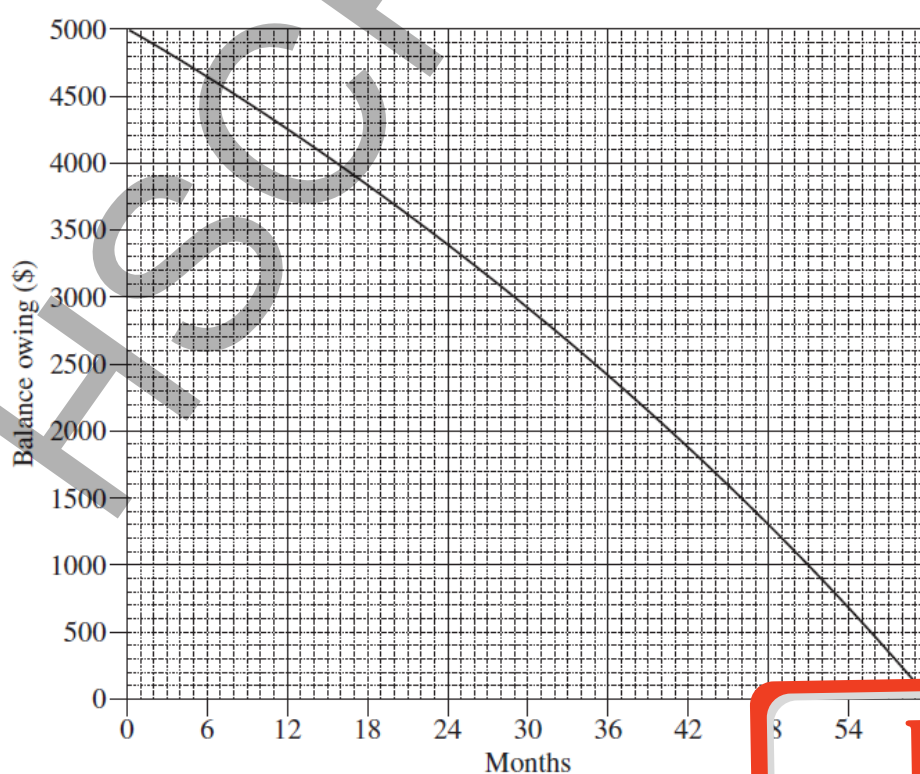
The area of the face of the washer (shaded on the diagram) is to be 6.79 mm². Calculate the outer radius correct to two decimal places. 2

b. Minh decides instead to borrow the required \$5000 from his local bank.

The loan is a reducing balance loan over 5 years, with monthly repayments. The graph shows the balance owing on the loan over time.

(i) Use the graph to determine the balance owing after 2 years. 1

(ii) Use the graph to determine when the loan is half-paid. 1

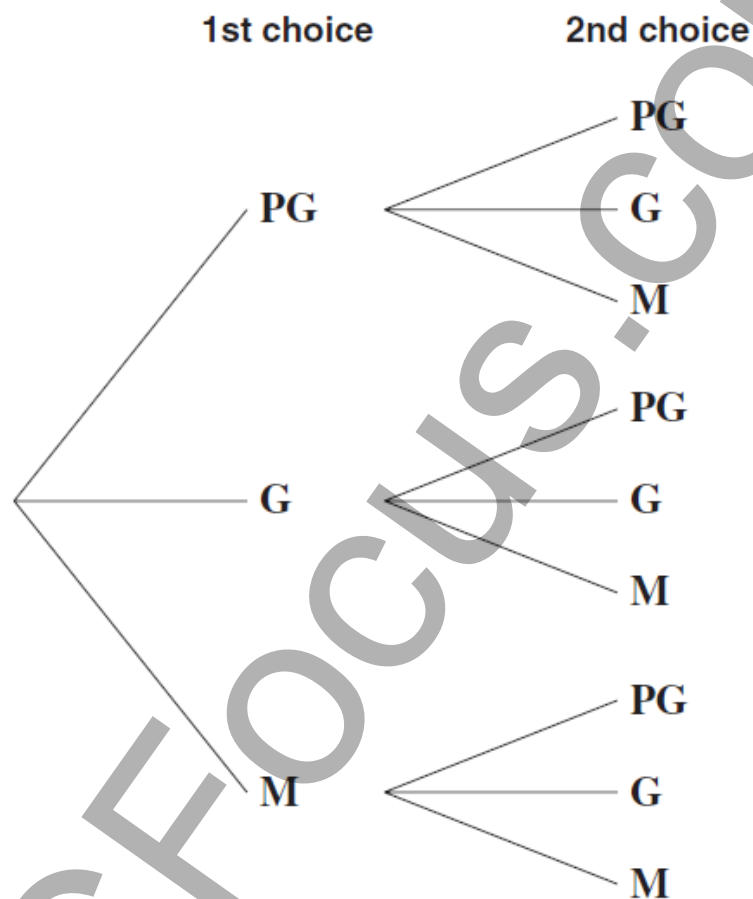


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c. In a stack of 10 DVDs, there are 5 rated **PG**, 3 rated **G** and 2 rated **M**

(i) A DVD is selected at random. What is the probability that it is rated **M**? 1

(ii) Grant chooses two DVDs at random from the stack. Copy or trace the tree diagram into your writing booklet. Complete your tree diagram by writing the correct probability on each branch. 1



(iii) Calculate the probability that Grant chooses two DVDs with the same rating.

2

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END OF SECTION 2

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