

High School Mathematics Test 2013

Year
10

Two and Three Stage Events

Calculator Allowed

Skills and Knowledge Assessed:

- Describe the results of two- and three-step chance experiments, both with and without replacements, assign probabilities to outcomes and determine probabilities of events. Investigate the concept of independence (ACMSP246)
- Use the language of 'ifthen', 'given', 'of', 'knowing that' to investigate conditional statements and identify common mistakes in interpreting such language (ACMSP247)

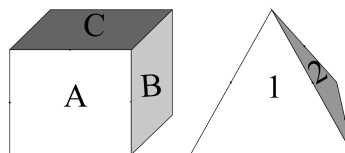
Name _____

Longer Answer Assessment

Write all working and answers in the spaces provided on this test paper.

Marks

1. In a board game, two dice are rolled together. One die is six sided with the letters A, B, C, D, E and F on the faces and the other die is four sided with the numbers 1, 2, 3 and 4 on the faces.



- a) Complete the grid below to give the possible outcomes.

2

	1	2	3	4
A				
B		B2		
C				
D				
E				
F				

- b) What is the probability of rolling B2?

1

.....

- c) What is the probability of rolling an A or a C with an even number?

1

.....

- d) What is the probability of rolling a combination which does not have an A or a 2?

1

.....

.....

Marks

2. A sample of males and females are asked if they prefer to talk or text on their phones. The results are shown in the table.

	Male	Female	Total
Talk	24	18	
Text	26	32	
Total			

- a) Complete the totals in the table. **2**

- b) If one person is chosen at random from the sample. What is the probability that they prefer to text? **1**

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- c) What is the probability that a person chosen at random is a female who prefers to talk? **1**

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- d) A person who prefers to text is chosen at random. What is the probability that they are male? **1**

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.....

- e) A male is chosen at random. What is the probability that he prefers to talk? **1**

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Marks

3. A two digit number is to be created using the digits 2, 3, 4 and 5 allowing repetition.

For example the numbers could be 45, 22, 34 etc.

- a) Draw a tree diagram to show all the possible numbers that can be created.

2

- b) What is the probability that the number created is an even number.

1

.....
.....

- c) What is the probability that the number created is not a multiple of 3?

1

.....
.....

- d) What is the probability that the number created is greater than 30 and an even number?

1

.....
.....

- e) Given that the number is less than 50, what is the probability that it is a multiple of 3?

1

.....
.....

Marks

4. Freddie has 5 songs on his phone, which we will abbreviate as M, N, O, P and Q. He randomly chooses two different songs to play on his way home.

- a) Draw a tree diagram to show the possible choices of the two songs and the order in which they are played. **2**

- b) What is the probability that the songs are M and O in either order? **1**

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.....

- c) What is the probability that the two songs are either P and Q or M and N? **1**

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.....

- d) What is the probability that P is not included? **1**

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.....

- e) Given that one of the songs is Q, what is the probability that the other is M? **1**

.....

.....

Marks

5. A young couple are planning on having three children. If they are successful, a tree diagram can be used to show the possible outcomes for the three child family.

a) Draw the tree diagram.

2

b) What is the probability that two eldest children are boys?

1

.....

.....

c) What is the probability that the two youngest children are the same gender?

1

.....

.....

d) What is the probability that the first and last children are the same gender with the middle child different?

1

.....

.....

e) Given that the first child is a different gender to the second, what is the probability that there are two boys?

1

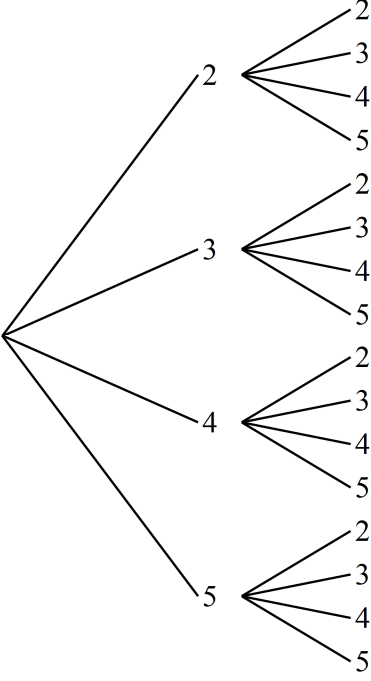
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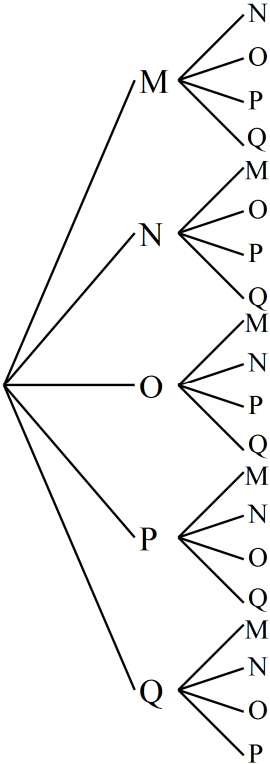
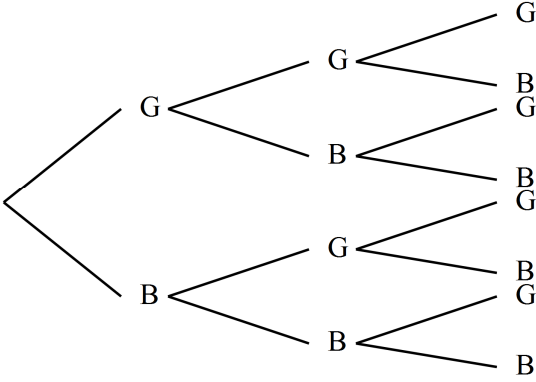
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High School Mathematics Test 2013 Two and Three Stage Events

ANSWERS

1. a)		2																																			
<table><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>A</td><td>A1</td><td>A2</td><td>A3</td><td>A4</td></tr><tr><td>B</td><td>B1</td><td>B2</td><td>B3</td><td>B4</td></tr><tr><td>C</td><td>C1</td><td>C2</td><td>C3</td><td>C4</td></tr><tr><td>D</td><td>D1</td><td>D2</td><td>D3</td><td>D4</td></tr><tr><td>E</td><td>E1</td><td>E2</td><td>E3</td><td>E4</td></tr><tr><td>F</td><td>F1</td><td>F2</td><td>F3</td><td>F4</td></tr></table>			1	2	3	4	A	A1	A2	A3	A4	B	B1	B2	B3	B4	C	C1	C2	C3	C4	D	D1	D2	D3	D4	E	E1	E2	E3	E4	F	F1	F2	F3	F4	
	1	2	3	4																																	
A	A1	A2	A3	A4																																	
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C	C1	C2	C3	C4																																	
D	D1	D2	D3	D4																																	
E	E1	E2	E3	E4																																	
F	F1	F2	F3	F4																																	
b) $P(B2) = \frac{1}{24}$		1																																			
c) $P(A \text{ or } C \text{ with even}) = \frac{4}{24} = \frac{1}{6}$		1																																			
d) $P(\text{no A or 2}) = \frac{15}{24} = \frac{5}{8}$		1																																			
2. a)		2																																			
<table><tr><td></td><td>Male</td><td>Female</td><td>Total</td></tr><tr><td>Talk</td><td>24</td><td>18</td><td>42</td></tr><tr><td>Text</td><td>26</td><td>32</td><td>58</td></tr><tr><td>Total</td><td>50</td><td>50</td><td>100</td></tr></table>			Male	Female	Total	Talk	24	18	42	Text	26	32	58	Total	50	50	100																				
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Talk	24	18	42																																		
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Total	50	50	100																																		
b) $P(\text{Text}) = \frac{58}{100} = \frac{29}{50}$		1																																			
c) $P(\text{Female and Talk}) = \frac{18}{100} = \frac{9}{50}$		1																																			
d) $P(\text{Male given Text}) = \frac{26}{58} = \frac{13}{29}$		1																																			
e) $P(\text{Talk given male}) = \frac{24}{50} = \frac{12}{25}$		1																																			

3. a)		2
	b) $P(\text{Even}) = \frac{8}{16} = \frac{1}{2}$	1
	c) $P(\text{Not multiple of 3}) = 1 - P(\text{Multiple of 3})$ $= 1 - \frac{5}{16} = \frac{11}{16}$	1
	d) $P(\text{Greater than 30 and even}) = \frac{6}{16} = \frac{3}{8}$	1
	e) $P(\text{Multiple of 3 given less than 50}) = \frac{4}{12} = \frac{1}{3}$	1

4. a)		2
	b) $P(\text{M and O}) = \frac{2}{20} = \frac{1}{10}$	1
	c) $P(\text{P and Q or M and N}) = \frac{4}{20} = \frac{1}{5}$	1
	d) $P(\text{P not included}) = \frac{12}{20} = \frac{3}{5}$	1
	e) $P(\text{M given Q}) = \frac{2}{8} = \frac{1}{4}$	1
5. a)		2
	b) $P(\text{BB any}) = \frac{2}{8} = \frac{1}{4}$	1

	c) $P(\text{any BB or anyGG}) = \frac{4}{8} = \frac{1}{2}$	1
	d) $P(\text{BGB or GBG}) = \frac{2}{8} = \frac{1}{4}$	1
	e) $P(2 \text{ B given first 2 different}) = \frac{2}{4} = \frac{1}{2}$	1