

Website: contoureducation.com.au | Phone: 1800 888 300 Email: hello@contoureducation.com.au

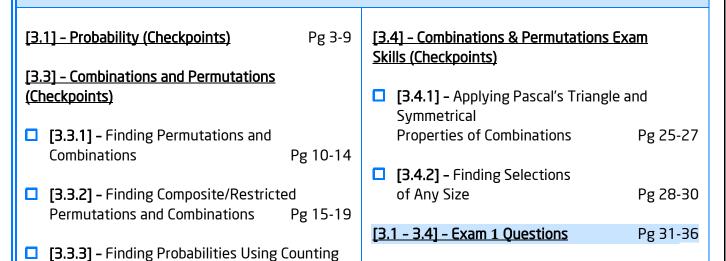
VCE Mathematical Methods ½
AOS 3 Revision [3.0]
Contour Check

[3.1 - 3.4] - Exam 2 Questions



Methods

## **Contour Check**



Pg 20-24

Pg 37-56



# Section A: [3.1] - Probability (Checkpoints) (37 Marks)

Question 1 (11 marks)		
A bag contains 4 red, 3 green and 5 blue balls.		
A student randomly selects two balls, one after another, without replacement.		
<b>a.</b> Find the probability that both balls are blue. (2 marks) [3.1.1]		
<b>b.</b> Find the probability that one ball is red and the other is green. (3 marks) [3.1.1]		
7 ma the probability that one but is red and the other is green. (5 marks) [5:1:1]		
<del></del>		
c. Find the probability that the first ball is green and the second is not green. (2 marks) [3.1.1]		



l <b>.</b>	Given that the second ball drawn is red, what is the probability that the first was also red? (4 marks) [3.1.1	.]
		-
		-
		-
		-
		-
		-
		-
)	pace for Personal Notes	
יכ	pace for Personal Notes	
)	pace for Personal Notes	
ָּרָ	pace for Personal Notes	
)	pace for Personal Notes	
)	pace for Personal Notes	
)	pace for Personal Notes	
),	pace for Personal Notes	
0	pace for Personal Notes	
	pace for Personal Notes	
	pace for Personal Notes	
	pace for Personal Notes	
סי	nace for Personal Notes	
P	pace for Personal Notes	



Question 2 (9 marks)
In a class of 50 students:
ightharpoonup 28 take English ( $E$ ).
→ 31 take Maths ( <i>M</i> ).
➤ 14 take both English and Maths.
A student is selected at random.
a. Complete a Venn diagram for this situation. (3 marks) [3.1.2]
<ul><li>b. What is the probability that a randomly selected student studies at least one of the two subjects? (2 marks)</li><li>[3.1.2]</li></ul>
c. Given that a student studies English, find the probability that they also study Maths. (2 marks) [3.1.2]
co en on and a source state of successive and another state of the source state of the successive stat



Two students are selected at random without replacement. Find the probability that both study Maths. (2 marks) [3.1.2]
nce for Personal Notes
-



Qι	nestion 3 (6 marks)
Le	$t \Pr(A) = 0.4, \Pr(B) = 0.5 \text{ and } \Pr(A \cap B) = 0.2.$
a.	Are events A and B independent? Justify. (2 marks) [3.1.3]
b.	Are events A and B mutually exclusive? Justify. (2 marks) [3.1.3]
c.	Find $Pr(A \cup B)$ . (2 marks) [3.1.3]
Sp	pace for Personal Notes



Question 4 (11 marks)
A machine produces widgets in three shifts:
Morning: 40% of total output, 2% defective.
Afternoon: 35% of total output, 4% defective.
Night: 25% of total output, 5% defective.
A widget is chosen at random.
<b>a.</b> Draw a tree diagram showing all outcomes and probabilities. (3 marks) [3.1.4]
·
<b>b.</b> Calculate the probability that a widget is defective. (2 marks) [3.1.4]
c. Given that a widget is defective, find the probability it came from the afternoon shift. (2 marks) [3.1.4]



Spa	ace for Personal Notes	
Бра	ace for Personal Notes	
Бра	ace for Personal Notes	
ipa	ace for Personal Notes	
- Spa	ace for Personal Notes	
рē	ace for Personal Notes	
ρē	ace for Personal Notes	
ρē	ace for Personal Notes	
ρē	ace for Personal Notes	
iρā	ace for Personal Notes	
ipa	ace for Personal Notes	
ipa	ace for Personal Notes	
Spa	ace for Personal Notes	
S p a	ace for Personal Notes	
ipa	ace for Personal Notes	



## Section B: [3.3] - Combinations and Permutations (Checkpoints)



## <u>Sub-Section [3.3.1]</u>: Finding Permutations and Combinations

Qu	testion 5
Fin	nd the following:
a.	<sup>5</sup> <i>P</i> <sub>2</sub> . [ <b>3.3.1</b> ]
b.	<sup>0</sup> <i>P</i> <sub>0</sub> . [3.3.1]



C	<sup>7</sup> C <sub>4</sub> . [3.3.1]
· ·	04. [ <i>3.</i> 3.1]
_	
d.	<sup>5</sup> C <sub>4</sub> . [3.3.1]
П	
∥ <sub>5</sub>	pace for Personal Notes
∥ <sup>3p</sup>	ace for Personal Notes
II	

11



Question 6		
Disaster has struck at Contour Glen Waverley. The paper is running out, and more is coming in tomorrow. 6 sets of booklets have to be printed, but there is only enough paper for 3 sets to be printed.		
a. How many different sets of 3 can be chosen? [3.3.1]		
Now that 3 sets of booklets have been chosen, they need to be queued in the printer.  b. How many different ways can the chosen booklets be queued? [3.3.1]		



No	t to worry! Nayuta has saved the day by driving 10 reams of paper over from Contour Box Hill. Now all of the
	oklets can be printed.
_	How many different ways can all of the healdate be ground 9 [2 2 1]
c.	How many different ways can all of the booklets be queued? [3.3.1]



Question 7		
At	lunchtime, $n$ students rush to be first in line at the canteen, where $n \in \mathbb{Z}^+$ .	
a.	How many ways can the students queue? Give your answer in terms of $n$ . [3.3.1]	
b.	Within the $n$ students, 2 of them are just in the queue to hang out with their friends, while the others are	
	actually there to buy food. If there are 10 different ways that there can be a group of 2 students who aren't buying food, how many total students are in the queue? [3.3.1]	
Sp	ace for Personal Notes	





# <u>Sub-Section [3.3.2]</u>: Finding Composite/Restricted Permutations and Combinations

Question 8		
The 1	The letters in the word 'METHODS' are jumbled and rearranged.	
How	many ways can the letters be rearranged if:	
<b>a.</b> T	There are no restrictions? [3.3.2]	
_		
_		
_		
_		
_		
_		
<b>b.</b> A	A vowel must be first? [3.3.2]	
_		
_		
-	·	
_		
_		
_		



c.	The vowels must be together? [3.3.2]
п	

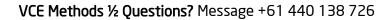
Space for Personal Notes



Qu	estion 9
	amily of 3 children must share 6 different flavoured doughnuts. In order to prevent fighting, their mother sures that they all receive an equal amount of doughnuts and take turns choosing.
a.	How many different ways can the doughnuts be divided? [3.3.2]
b.	If the eldest picks both of their doughnuts first, how many different selections can the middle child make if they make both of their selections next? [3.3.2]



	The youngest child has a temper tantrum at this proposal, and so everyone agrees to let him pick his doughnt first. Given that he takes a strawberry-flavoured one, how many different groups of 2 can the youngest child make? [3.3.2]
p	ace for Personal Notes





Question 10 [3.3.2]
A small errand requires a singular group of 3 to be made from within a small class of 6 students (Abbey, Ben, Charlie, Derek, Erica and Frank). The teacher has had enough of the students always working with the same people, and so they decide to make the groups. The teacher is quite well informed and knows that:
Abbey and Ben recently broke up, so they cannot be in the group together.
Frank and Ben are tight, so Frank will not take part in the group if Abbey is in the group.
Abbey and Erica will not be part of the group if they are not together.
How many ways can the group be formed?
Space for Personal Notes





## <u>Sub-Section [3.3.3]</u>: Finding Probabilities using Counting Methods

Qu	Question 11	
3 o	3 of the letters in the word 'CHANCE' are randomly selected. Find the probability that:	
a.	All 3 letters are consonants. [3.3.3]	
b.	Both vowels are selected. [3.3.3]	
	<del></del>	



c.	Only 1 vowel is selected. [3.3.3]	
Spa	ace for Personal Notes	



Qu	Question 12	
	When being assigned lockers, you and your 2 best friends really hope that you get adjacent lockers. There are 5 lockers to be assigned amongst 5 people. What is the probability that:	
a.	You get an end locker? [3.3.3]	
b.	You and your 2 best friends get adjacent lockers? [3.3.3]	
c.	You and your 2 best friends all have separated lockers? [3.3.3]	
	<del></del>	



<b>Ouestion</b>	13
Oucsuon	IJ

Subu and Sam have bought another bucket of KFC, once again containing their favourite combo of 5 nuggets, 3 original recipes, and 2 tenders. This time, they are inspecting each piece of chicken to see if they can recreate the recipe for themselves so they can stop spending so much money on KFC. To do this, they line each of the 10 pieces of chicken up on a bench. Find the probability that:

a.	No nuggets are next to each other. [3.3.3]
b.	The 2 tenders are first in the line and the 3 original recipes are together. [3.3.3]



c.	The tenders are not next to each other. [3.3.3]
Spa	ace for Personal Notes



## Section C: [3.4] - Combinations & Permutations Exam Skills (Checkpoints)

# <u>Sub-Section [3.4.1]</u>: Applying Pascal's Triangle and Symmetrical Properties of Combinations

Qu	estion 14
۱.	Using Pascal's Triangle, determine the value of ${}^n\mathcal{C}_n$ for $n\in\mathbb{Z}^+$ . [3.4.1]
•	Find ${}^6C_3 + {}^6C_4$ using Pascal's Triangle. Express your answer in the form ${}^nC_r$ , where $n, r \in \mathbb{Z}^+$ . [3.4.1]
•	Find ${}^6C_2$ without directly calculating using the symmetrical property of combinations. You may leave your answer in the form ${}^nC_r$ , where $n,r \in \mathbb{Z}^+$ . [3.4.1]
δp	ace for Personal Notes



Question 15		
Consider the expression ${}^{n}C_{2}=28$ where $n\in\mathbb{Z}^{+}\backslash\{1\}$ .		
<b>a.</b> Using the symmetrical property of combinations, state the value of ${}^{n}C_{n-2}$ . [3.4.1]		
<b>b.</b> Find <i>n</i> . [ <b>3.4.1</b> ]		
c. Hence, find the value of $^{n+1}C_2$ . [3.4.1]		



Qu	estion 16
	ntour is trying to find 2 Maths tutors to be assistant heads of maths because James has finally reached his limit. ere are $n$ sign-ups, where $n$ is an integer larger than 2.
a.	Find the smallest value of $n$ for which ${}^{n}C_{2} = {}^{n}C_{n-2}$ . [3.4.1]
b.	Given that Subu is guaranteed the role because of his crazy teaching hours, how many possible ways can the 2 assistant heads be selected? Give your answer in terms of $n$ . [3.4.1]
c.	Let $n=10$ . It is known that ${}^{10}C_r={}^{10}C_{r^2-7r+18}$ . Find all possible values of $r$ , given that $r\in\mathbb{Z}^+\cup\{0\}$ .[3.4.1]





## <u>Sub-Section [3.4.2]</u>: Finding Selections of Any Size

Quest	tion 17 [3.4.2]
James can at	is organising another maths meeting. There are 6 possible attendees. Given that any number of attendees tend or skip the meeting, how many possible attendee lists are possible?
_	
_	
Spac	e for Personal Notes



Question 18		
Your group of friends is planning your VCE results day hangout so everyone has something to look forward to. Everyone is discussing what movies to watch from a list of $n$ movies. Any number of movies can be watched, including none if no one is feeling it.		
a. Express the number of movie combinations in terms of n. [3.4.2]		
<b>b.</b> How many movies are there to choose from if there are 128 possible movie combinations? [3.4.2]		
c. In the event that at least one movie must be watched, how many possible selections are there now? [3.4.2]		
Space for Personal Notes		

MM12 [3.0] - AOS 3 Revision - Contour Check



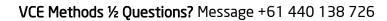
<b>Ouestion</b>	19
Outsuun	1

Qι	Question 19				
	m is choosing snacks to bring to his secret snack stash at Contour. He has $n$ different snacks to choose from, and can pick any number of snacks, including none if he is feeling less cheeky that day.				
a.	One morning, Sam wakes up a little too smart and realises he has 2048 different snack combinations, but can't count how many snacks he has to choose from. How many different snacks does Sam have to choose from?  [3.4.2]				
b.	Wanting to make sure he brings at least one snack to Contour, how many different snack combinations does Sam have now? [3.4.2]				
c.	Sam goes shopping before he goes to Contour and buys 2 more snacks, which makes him more likely to have something that Emily enjoys. He also wants to bring at least 3 snacks so that he definitely has something to give to Emily and something to eat for himself. How many different snack combinations are possible now?  [3.4.2]				



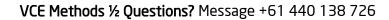
# Section D: [3.1 - 3.4] - Exam 1 Questions (Checkpoints) (21 Marks)

Question 20 (2 marks)		
Sam no longer wants KFC after having a falling out with Subu because Sam ate all of the chicken nuggets. Now he goes to McDonald's but doesn't feel like any of the menu items so he decides to build his own burger. On top of the patty, the burger contains:		
→ 3 ingredients were chosen from lettuce, tomato, onion, pickles and cheese.		
2 sauces chosen from ketchup, mustard, aioli, and BBQ sauce.		
a. How many different burgers can Sam build if he can have multiple of the same ingredient or sauce if the order of the ingredients in the burger does matter (e.g. lettuce on top of cheese and cheese on top of lettuce are as different burgers)? (1 mark)		
<b>b.</b> How many different burgers can Sam build if all the ingredients and sauces must be different? (1 mark)		
Space for Personal Notes		



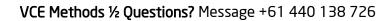


Question 21 (3 marks)			
A s	tudent randomly selects 2 books from a shelf of 8 books in a library.		
a.	How many ways can the student select the 2 books? (1 mark)		
b.	If 3 of the books on the shelf are textbooks, what is the probability that both selected books are textbooks? (2 marks)		
Space for Personal Notes			



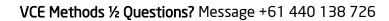


Question 22 (4 marks)  James wants to take a photo with the top 5 most senior members of the maths team. Everybody will stand in a line			
	am and Subu still have beef after their falling out over KFC so they refuse to stand next to each other. How different possible lines exist?		
-			
_			
_			
_			
_			
_			
_			
_			
_			
_			
-			
Бра	ce for Personal Notes		



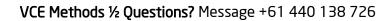


Question 23 (5 marks)				
	A lucky draw consists of 6 different prizes and a contestant randomly selects 2 prizes. 2 of the prizes are identical gift cards.			
a.	How many ways can the contestant select 2 prizes? (1 mark)			
b.	What is the probability that the contestant wins both gift cards? (2 marks)			
c.	If the contestant wins at least one gift card, how many prize selections are possible? (2 marks)			
Sp	ace for Personal Notes			
Sp	ace for Personal Notes			





Question 24 (4 marks)		
	ishi is choosing paint colours for a palette for a painting project. She has $n$ different colours and can choose number of them, including none.	
a.	If there are 64 possible palettes, find $n$ . (1 mark)	
	Khushi realises that at least one colour of paint is needed to be able to paint. How many possible palettes can Khushi make now? (1 mark)	
	Khushi is gifted 2 new colours of paint by her friend, and so Khushi decides that she will use at least 3 colours on her palette. How many palettes can Khushi make now? (2 marks)	3
Spa	ace for Personal Notes	





Question 25 (3 marks)	
A row of chairs contains 6 chairs. 3 students must be seated in this row. However:	
The students must all sit together in a single cluster.	
The other 2 chains must stay among	
The other 3 chairs must stay empty.	
Find the number of different ways the students can be seated in a row.	
Space for Personal Notes	



# Section E: [3.1 - 3.4] - Exam 2 Questions (Checkpoints) (87 Marks)

#### Question 26 (1 mark)

A 14-person club needs to form a 5-person leadership team out of the 14 members. Which of the following expressions is equivalent to the number of ways that this can happen?

- **A.**  $^{14}C_4 + ^{14}C_5$
- **B.**  $^{14}C_5$
- C.  $^{14}C_9$
- **D.** Both B and C.

#### Question 27 (1 mark)

A student is packing their bag after school and their locker has 8 things in it. The student can bring any number of these things home, including none. How many different packed bags are possible?

- **A.** 64
- **B.** 128
- **C.** 256
- **D.** 512

#### Question 28 (1 mark)

A group of 6 friends is deciding how they will sit on a theme park ride. Within the group, there is a couple who insist on sitting together. How many seating arrangements are possible?

- **A.** 120
- **B.** 240
- **C.** 480
- **D.** 720



Question 29 (1 mark)

A school randomly selects 3 parents from a committee of 10 to help organise an event.

What is the probability that a specific parent, Jennifer, is chosen?

- A.  $\frac{3}{10}$
- **B.**  $\frac{1}{3}$
- C.  $\frac{1}{4}$
- **D.**  $\frac{1}{10}$

Question 30 (1 mark)

A lock screen pin consists of 4 digits chosen from 0-9, where the first digit must be even and not 0, and digits cannot repeat. How many different pins are possible?

- **A.** 10000
- **B.** 5040
- **C.** 2520
- **D.** 2016

Question 31 (1 mark)

The letters of the word SOCIETY are placed at random in a row. The probability of getting a vowel is:

- **A.**  $\frac{2}{7}$
- **B.**  $\frac{3}{7}$
- C.  $\frac{4}{7}$
- **D.**  $\frac{5}{7}$



Question 32 (1 mark)

A girl calculates that the probability of her winning the first prize in a lottery is  $\frac{8}{100}$ . If 6,000 tickets are sold, how many tickets has she bought?

- **A.** 400
- **B.** 750
- **C.** 480
- **D.** 240

Question 33 (1 mark)

Three identical dice are rolled. What is the probability that the same number will appear on each of them?

- **A.**  $\frac{1}{6}$
- **B.**  $\frac{1}{36}$
- C.  $\frac{1}{18}$
- **D.**  $\frac{3}{28}$

Question 34 (1 mark)

A bag contains 5 brown and 4 white socks. George pulls out two socks. What is the probability that both socks are of the same colour?

- **A.**  $\frac{9}{20}$
- **B.**  $\frac{2}{9}$
- C.  $\frac{3}{20}$
- **D.**  $\frac{4}{9}$



Question 35 (1 mark)

20 cards are numbered from 1 to 20. If one card is drawn at random, what is the probability that the number on the card is a prime number?

- **A.**  $\frac{1}{5}$
- **B.**  $\frac{2}{5}$
- C.  $\frac{3}{5}$
- **D.** 5

Question 36 (1 mark)

The probability that it will rain tomorrow is 0.85. What is the probability that it will not rain tomorrow?

- **A.** 0.25
- **B.** 0.145
- C.  $\frac{3}{20}$
- **D.** None of the above

Question 37 (1 mark)

What is the probability that a number selected from the numbers (1, 2, 3, ...., 15) is a multiple of 4?

- A.  $\frac{1}{5}$
- **B.**  $\frac{4}{5}$
- C.  $\frac{2}{15}$
- **D.**  $\frac{1}{3}$



#### Question 38 (1 mark)

Cards bearing numbers 3 to 20 are placed in a bag and mixed thoroughly. A card is taken out from the bag at random. The probability that the number on the card taken out is an even number is:

- **A.**  $\frac{1}{20}$
- **B.**  $\frac{1}{4}$
- C.  $\frac{1}{3}$
- **D.**  $\frac{1}{2}$

#### Question 39 (1 mark)

Let A and B be two events such that the probability that exactly one of them occurs is  $\frac{2}{5}$  and the probability that A or B occurs is  $\frac{1}{2}$ , then the probability of both of them occurring together is:

- **A.** 0.02
- **B.** 0.20
- **C.** 0.01
- **D.** 0.10

#### Question 40 (1 mark)

How many different rearrangements are there of the letters in the word TATARS if the two A's are never adjacent?

- **A.** 24
- **B.** 120
- **C.** 144
- **D.** 180





In how many ways can 5 boys and 5 girls be seated at a round table so that no two girls may be together?

- **A.** 4!
- **B.** 5!
- C. 4! + 5!
- **D.**  $4! \times 5!$

#### Question 42 (1 mark)

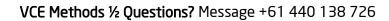
If  $^{n+1}C_3 = 2^nC_2$ , then the value of n is:

- **A.** 3
- **B.** 4
- **C.** 5
- **D.** 6

#### Question 43 (1 mark)

How many 3-letter words with or without meaning, can be formed out of the letters of the word, LOGARITHMS, if repetition of letters is not allowed?

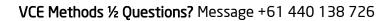
- **A.** 720
- **B.** 420
- C. None of these.
- **D.** 5040





Question 44 (1 mark)

From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?
<b>A.</b> 645
<b>B.</b> 564
C. 735
<b>D.</b> 756
Space for Personal Notes





t	iased coin has a probability $p$ of landing on heads. The coin is tossed twice.
	Find an expression for the probability of getting exactly one head. (2 marks) [3.1.1]
	Given that the probability of getting exactly one head is $0.42$ , find the value(s) of $p$ . (3 marks) [3.1.1]
	Show that the total probability across all outcomes equals 1. (2 marks) [3.1.1]
)	ace for Personal Notes

44



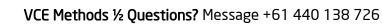
Questio	on 46 (16 marks)
At a un	iversity, 150 students were surveyed about their enrolment in two subjects:
<b>&gt;</b> 92	students were enrolled in Data Science $(D)$ .
<b>&gt;</b> 78	students were enrolled in Discrete Maths ( <i>M</i> ).
<b>&gt;</b> 49	students were enrolled in both subjects.
> The	e rest were enrolled in neither.
Let:	
<b>▶</b> D =	= Enrolled in Data Science
<b>→</b> M :	= Enrolled in Discrete Maths
A stude	ent is selected at random.
a. Det	termine the number of students who:
i.	Study only data science. (1 mark) [3.1.2]
ii.	Study only discrete maths. (1 mark) [3.1.2]
iii.	Study neither subject. (1 mark) [3.1.2]



b.	Represent this in a Venn diagram. (2 marks) [3.1.2]



i.	Studies both subjects. (1 mark) [3.1.2]
ii.	Studies only one subject. (1 mark) [3.1.2]
iii.	Studies neither subject. (1 mark) [3.1.2]
iv.	Studies Data Science given they study Discrete Maths. (2 marks) [3.1.2]





Twe	o students are selected at random without replacement. Find the probability correct to four decimal places t:
i.	Both study at least one subject. (2 marks) [3.1.2]
ii.	Exactly one of them studies only Discrete Maths. (2 marks) [3.1.2]
	ven that a student studies at least one subject, what is the probability that they study exactly one subject? ve your answer correct to three decimal places. (2 marks) [3.1.2]
ace	for Personal Notes
	ii.  Giv Giv



**Question 47** (14 marks)

Let Pr(A) = 0.4, Pr(B) = x,  $Pr(A \cap B) = 0.25$ 

**a.** Find the value of x, if any, such that A and B are independent events. If not, justify why. (2 marks) [3.1.3]

**b.** Find  $Pr(A \cup B)$ , using your result from **part a.** (2 marks) [3.1.3]

Find the value of x, if any, such that A and B are mutually exclusive. If not, justify why. (2 marks) [3.1.3]

A new event C is defined such that P(C) = 0.3, and A and C are not independent.

It is known that  $P(A \cap C) = 0.08$ .

**d.** Show that *A* and *C* are not independent events. (1 mark) [3.1.3]

\_\_\_\_\_\_



## VCE Methods ½ Questions? Message +61 440 138 726

e.	Find the probability that neither $A$ nor $C$ occurs. (2 marks) [3.1.3]
f.	Suppose that $Pr(A \cup B) = 0.57$ and we do not know $Pr(A \cap B)$ . It is known that $A$ and $B$ are independent. Find the value of $x$ correct to three decimal places. (2 marks) [3.1.3]
-	Civer A and D are exerts such that $Dr(A) + Dr(D) > 1$ . Character A and D connect be martially evaluating
g.	Given A and B are events such that $Pr(A) + Pr(B) > 1$ . Show that A and B cannot be mutually exclusive (3 marks) [3.1.3]
Sp	ace for Personal Notes



Question 48 (11 marks)

A security screening system has two levels:

- All passengers first go through Scanner A. If a passenger sets off Scanner A, they go to Scanner B for a second check.
- If a passenger does not trigger Scanner A, they are allowed through without further checks.

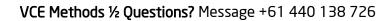
It is known that:

- ▶ 12% of passengers trigger Scanner A.
- Of those who go to Scanner *B*, 70% are cleared, and 30% are flagged.
- ➤ Of those who pass Scanner A (i.e., 88%), only 2% are actually threats.
- Of those flagged by Scanner B, 40% are real threats.

A passenger is selected at random.

**a.** Draw a clearly labelled tree diagram showing all outcomes. (3 marks) [3.1.4]

**b.** Calculate the probability that a passenger is flagged. (1 mark) [3.1.4]





c.	Given a passenger is flagged, calculate the probability they are actually a threat. (2 marks) [3.1.4]
d.	Calculate the probability that a randomly selected passenger is a real threat. (2 marks) [3.1.4]
<b>.</b>	The airport introduces a new AI system to reduce false positives at Scanner <i>B</i> . Now:
	6 15% of non-threats are incorrectly flagged (false positives).
	6 40% of actual threats are still correctly flagged (true positives, unchanged).
	Assume all other rates stay the same.
	Find the percentage of flagged passengers that are actually threats. (3 marks) [3.1.4]





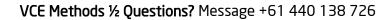
Qι	testion 49 (9 marks)
	eph is preparing a set of practice SAC questions for Methods from a set of pre-existing questions. There are 12 existing questions, and Joseph has to choose 4 of them.
a.	How many ways can these 4 questions be selected? (1 mark)
b.	Once selected, the 4 questions must be ordered. How many ways can this be done? (1 mark)
c.	What is the probability of a specific question, Question 7, being included in the final selection? (2 marks)
d.	If Question 7 is selected, what is the probability that it is chosen to go first in the final order? (2 marks)



<b>2.</b>	
	Of the 12 questions, 3 of them are on probability. Joseph wants at least one probability question to be on the
	final question set. How many selections are now possible? (3 marks)
	<del></del>
pa	ace for Personal Notes



Qu	testion 50 (11 marks)
As	school is forming a relay team.
a.	There are 10 candidates available. How many ways can a 4-person team be formed? (1 mark)
b.	Once the team is selected, a running order must be decided. How many running orders are possible? (1 mark)
c.	Instead of choosing 4 candidates, the school chooses to eliminate 6 candidates. Show that the number of ways to do this is equal to your answer from <b>part a.</b> (2 marks)
d.	The school decides that a reserve should be picked for the team, bringing the total number of team members
	up to 5. How many possible relay teams can be formed now? (1 mark)





•	Show that the new amount of possible teams with a reserve is equal to the sum of your answer from <b>part a.</b> and <b>part c.</b> , and state the principle that this property is derived from. (3 marks)
	At least one of the candidates chosen for the team must be an experienced runner. If 4 of the candidates are experienced runners, what is the probability that a randomly chosen team meets the requirements? (3 marks)

56



Website: contoureducation.com.au | Phone: 1800 888 300 | Email: hello@contoureducation.com.au

# VCE Mathematical Methods ½

# Free 1-on-1 Support

### Be Sure to Make the Most of These (Free) Services!

- Experienced Contour tutors (45 + raw scores, 99 + ATARs).
- For fully enrolled Contour students with up-to-date fees.
- After school weekdays and all-day weekends.

1-on-1 Video Consults	<u>Text-Based Support</u>
<ul> <li>Book via bit.ly/contour-methods-consult-2025 (or the QR code below).</li> <li>One active booking at a time (must attend before booking the next).</li> </ul>	<ul> <li>Message +61 440 138 726 with questions.</li> <li>Save the contact as "Contour Methods".</li> </ul>

Booking Link for Consults
bit.ly/contour-methods-consult-2025



Number for Text-Based Support +61 440 138 726

