

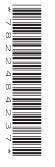
# Thursday 21 October 2021 – Afternoon

## A Level Further Mathematics A

### Y544/01 Discrete Mathematics

### Printed Answer Booklet

### Time allowed: 1 hour 30 minutes



#### You must have: • Question Paper Y544/01 (inside this document)

- the Formulae Booklet for A Level Further
- Mathematics A
- · a scientific or graphical calculator



Please write clea	arly in	black	ink. I	Do no	ot writ	e in the barcodes.		
Centre number						Candidate number		
First name(s)								
Last name								

#### INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided in the **Printed Answer** Booklet. If you need extra space use the lined pages at the end of the Printed Answer Booklet. The guestion numbers must be clearly shown.
- Answer all the questions.
- · Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.
- · Give non-exact numerical answers correct to 3 significant figures unless a different degree of accuracy is specified in the question.
- The acceleration due to gravity is denoted by  $gms^{-2}$ . When a numerical value is needed use g = 9.8 unless a different value is specified in the question.

### **INFORMATION**

- The total mark for this paper is 75.
- The marks for each question are shown in brackets [].
- This document has 16 pages.

### ADVICE

· Read each question carefully before you start your answer.

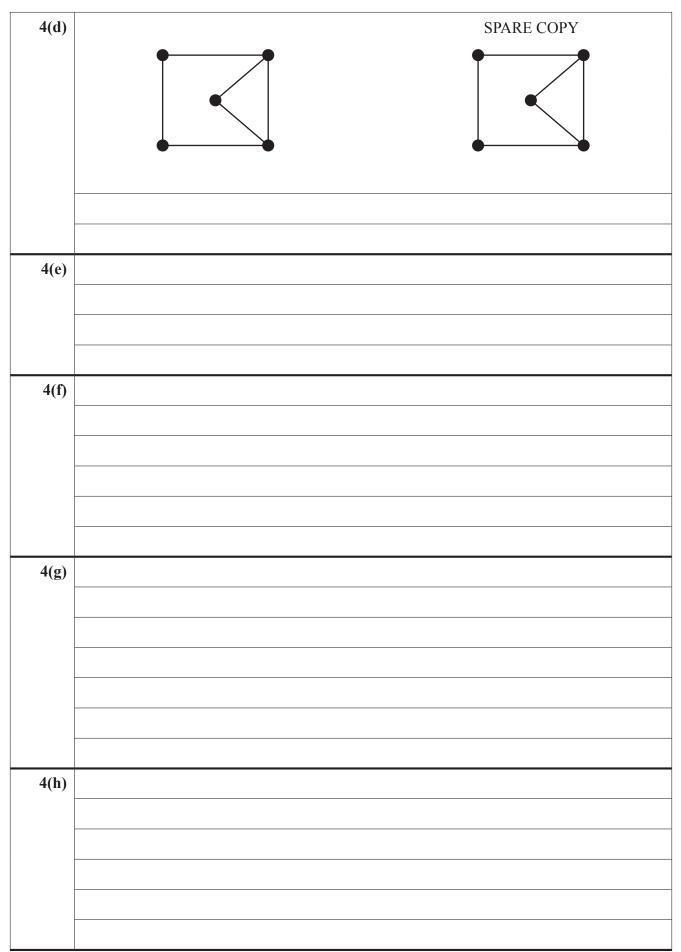
1(a)	Bag 1:
	Bag 2:
	Bag 3:
	Bag 4:
	Bag 5:
1(b)	
1(c)	

2(a)(i)							
2(a)(ii)							
2(b)							
	1.						
							_
	2.						
							_
							_
							_
2(c)							_
2(0)		J	K	L	М	Ν	
	Indegree						
	Outdegree						
2(d)(i)							
2(d)(ii)							
	1						

3(a)	
- ()	
3(b)	

<b>3(c)</b>	
3(d)	

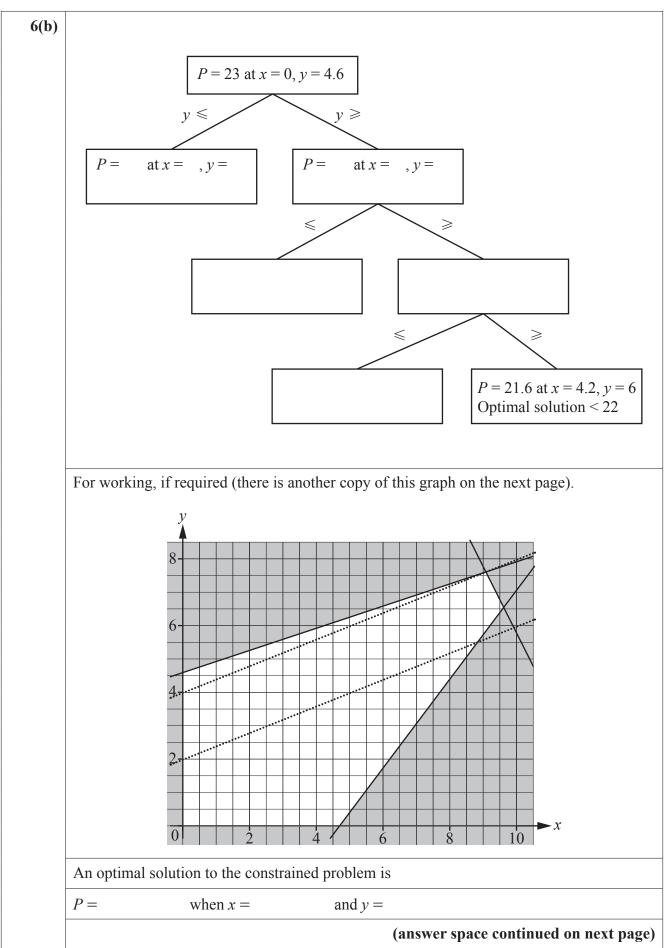
4(a)	Graph	is not isomorphic to K <sub>2,3</sub>
	because	
	Graph	is not isomorphic to K <sub>2,3</sub>
	because	
4(b)		
4(c)		

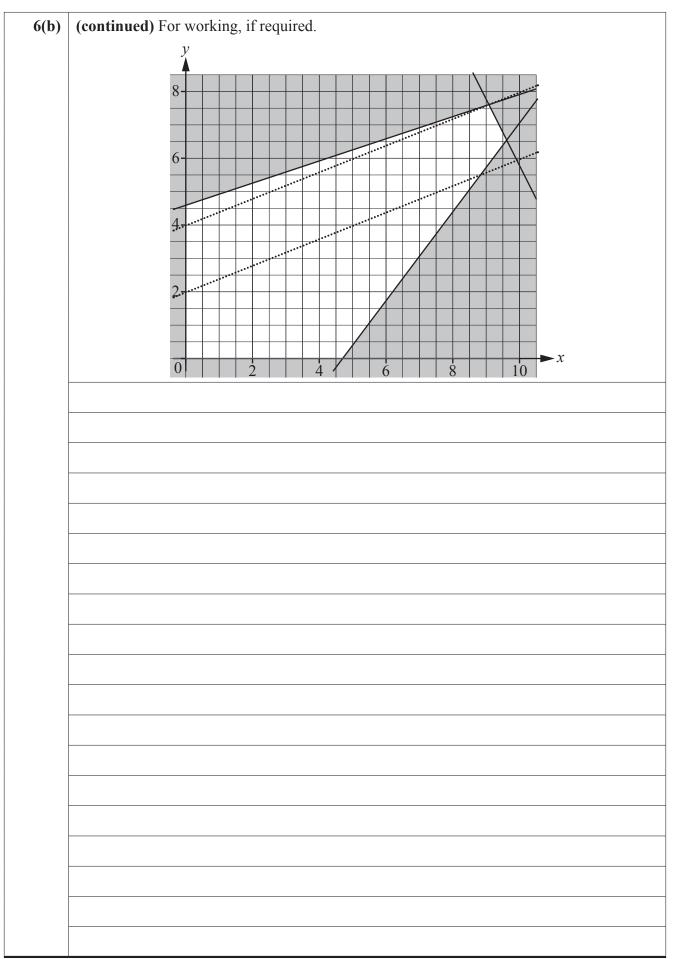


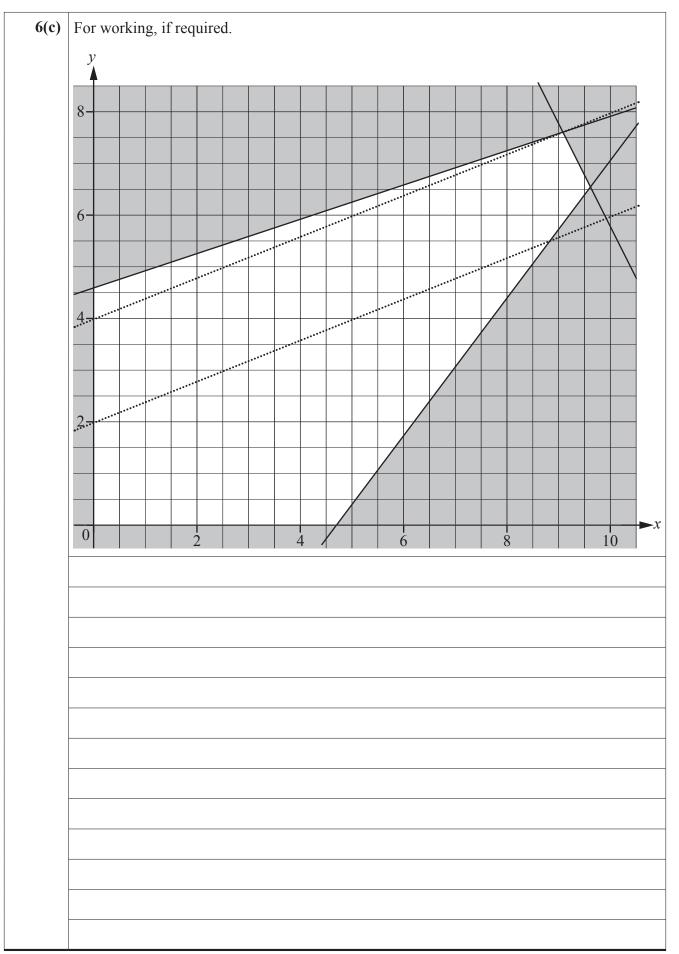
	Γ						]
5(a)				Beth			
			Х	Y	Ζ		
		Р	x	3	2		
	Alex	Q	4	0	-2		
		R	-3	-1	-3		
				I			
(i)	Stable when						
(ii)	Unstable when						
5(b)							
			Х	Y	Ζ		
5(c)							
					(answer si	pace continued o	n next page)
					· - ~		1 .9./

5(c)	(continued)
	For working, if required.
5(d)	
-	
-	
-	
-	
-	
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-	
-	

							DIIG	
	P	x	У	S	t	и	RHS	
	1	2	-5	0	0	0	0	
	0	2	1	1	0	0	25.8	
	0	-1	3	0	1	0	13.8	
	0	4	-3	0	0	1	18.8	
			1	I	I	I		
Maximise F	? <u>=</u>							
Maximise F	2 =							
Maximise F	) =							
	°=							
Maximise <i>F</i> Subject to	) =							
	<i>D</i> =							
	D =							
	D =							
	D =							
	P =							
	<sup>2</sup> =							
	) <u>_</u>							
	<sup>2</sup> =							
	> =    > =							
	> =    -    <							







7(a)(i)	BUBBLE SORT								
	Original list:	2.9	0.9	1.5	3.5	4.2	5.3	4.7	2.3
	After 1st pass:								
	After 2nd pass:								
7(a)(ii)	SHUTTLE SOR	Т							
	Original list:	2.9	0.9	1.5	3.5	4.2	5.3	4.7	2.3
	After 1st pass:								
	After 2nd pass:								
7(b)									

				15					
7(c)(i)	Sorted list:	0.9	1.5	2.3	2.9	3.5	4.2	4.7	5.3
7(c)(ii)							SPARE	СОРУ	
	Total weight o	f minimur	m spanni	ng tree:					
7(c)(iii)									

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).



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