

Please check the examination details below before entering your candidate information

Candidate surname

Other names

**Pearson Edexcel
Level 3 GCE**

Centre Number

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Candidate Number

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Wednesday 17 June 2020

Afternoon (Time: 1 hour 30 minutes)

Paper Reference **9FM0/3D**

Further Mathematics

Advanced

Paper 3D: Decision Mathematics 1

Answer book

Do not return the question paper with the answer book.

Total Marks

Turn over ►

P62678A

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1/1/1/1/1/1/1/



Pearson

1.

	A	B	C	D	E	F	G
A	–	24	–	22	35	–	–
B	24	–	25	27	–	–	–
C	–	25	–	33	31	36	26
D	22	27	33	–	–	42	–
E	35	–	31	–	–	37	29
F	–	–	36	42	37	–	40
G	–	–	26	–	29	40	–

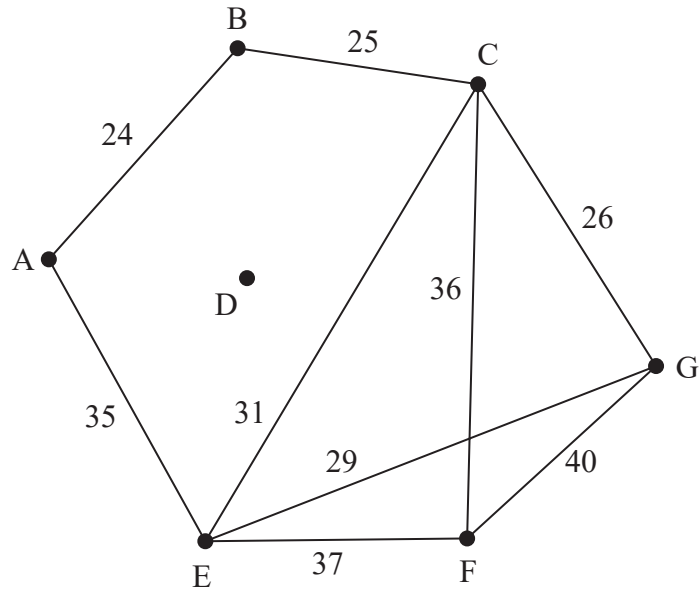


Diagram 1



DO NOT WRITE IN THIS AREA

Question 1 continued

Lined area for writing answers.

(Total for Question 1 is 6 marks)



2. (a)

(b)

Activity	Immediately preceding activities
A	
B	
C	
D	

Activity	Immediately preceding activities
E	
F	
G	
H	

Activity	Immediately preceding activities
I	
J	
K	
L	

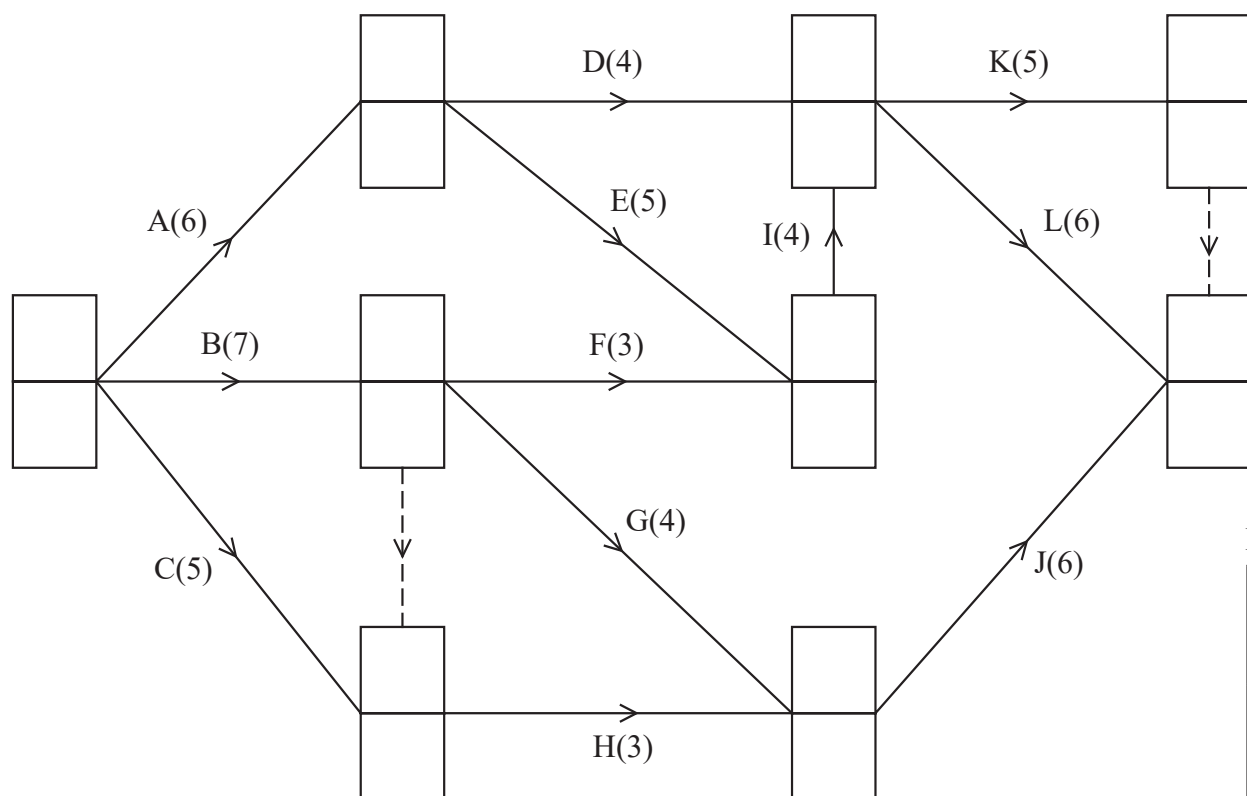


Diagram 1

Key:

Early event time
Late event time

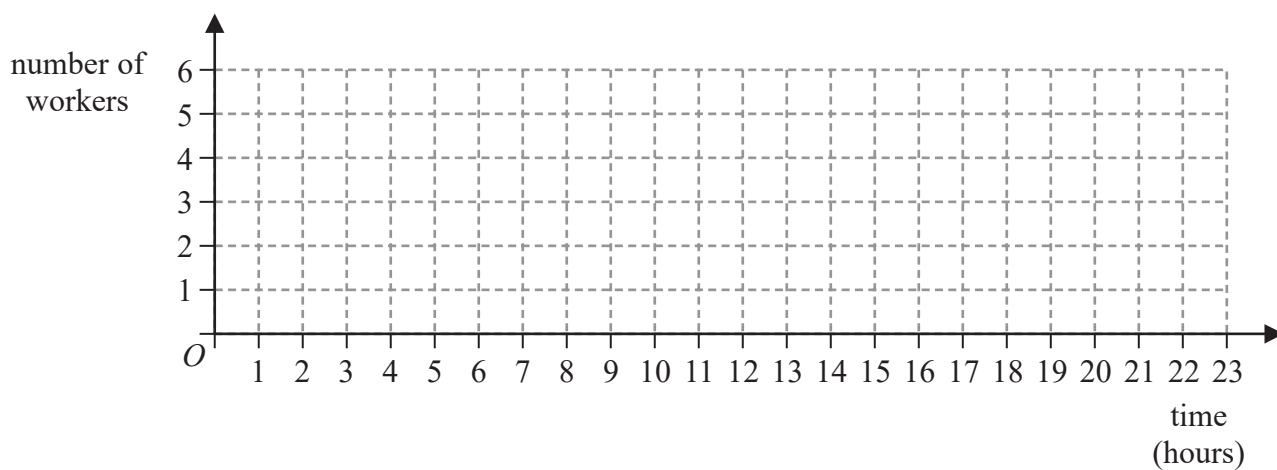


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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 2 continued



Grid 1

(Total for Question 2 is 15 marks)



3. (a)

Initial time matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

Initial route matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

(b)

Time matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

Route matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

Time matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

Route matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

If you make an error there are spare copies of these matrices on Page 9.



DO NOT WRITE IN THIS AREA

Question 3 continued

Lined area for writing the answer to Question 3.



Question 3 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Question 3 continued

Only use these matrices if you have made an error in your working.

(a)

Spare copy of initial time matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

Spare copy of initial route matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

(b)

Spare copy of time matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

Spare copy of route matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

Spare copy of time matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

Spare copy of route matrix

	A	B	C	D	E
A					
B					
C					
D					
E					

(Total for Question 3 is 9 marks)



4.

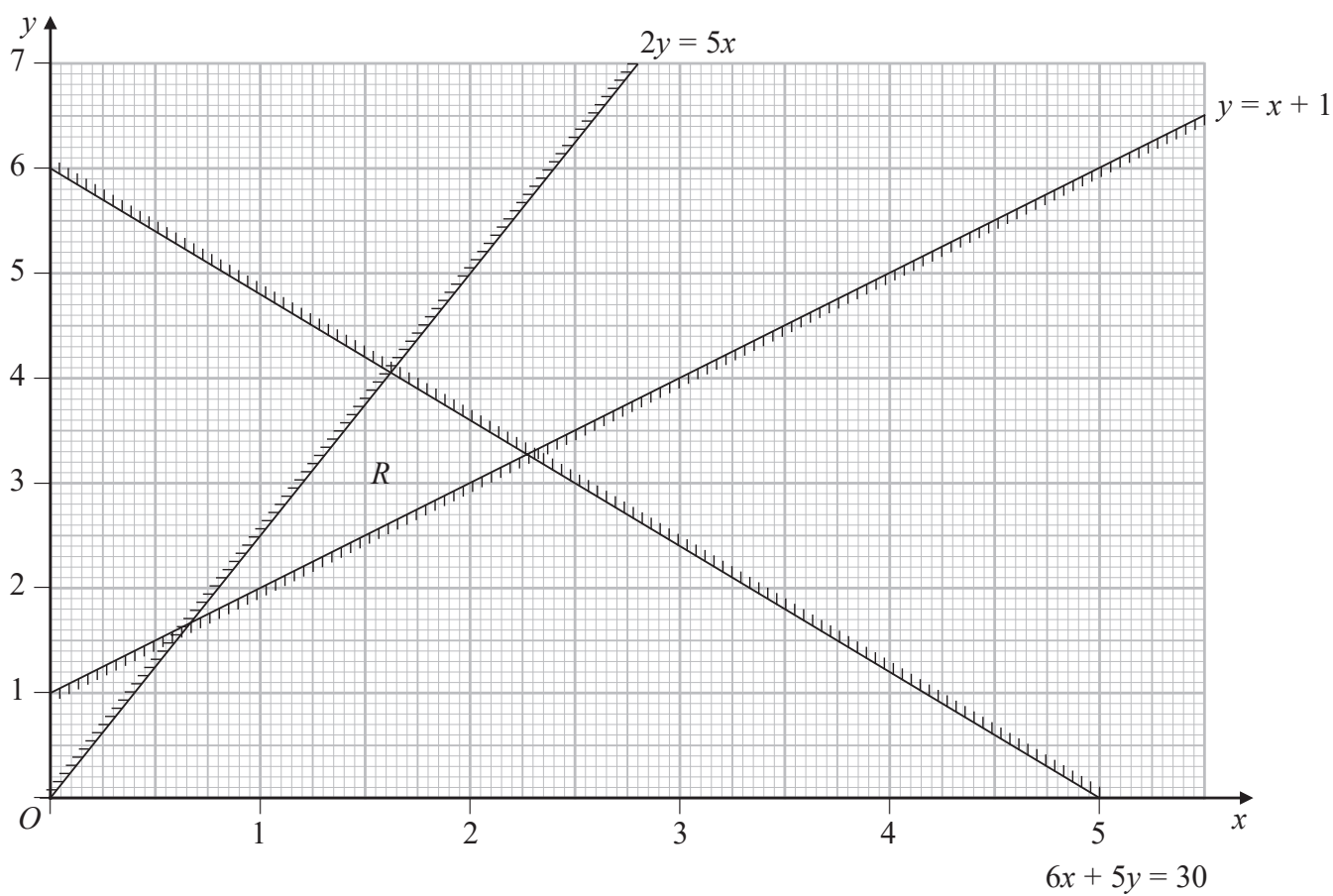


Figure 3



DO NOT WRITE IN THIS AREA

Question 4 continued

Lined area for writing the answer to Question 4.



P 6 2 6 7 8 A 0 1 1 2 0

Question 4 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

Question 4 continued

Lined area for writing answers.

(Total for Question 4 is 10 marks)



5. 23 17 19 x 24 8 18 10 21

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

Question 5 continued

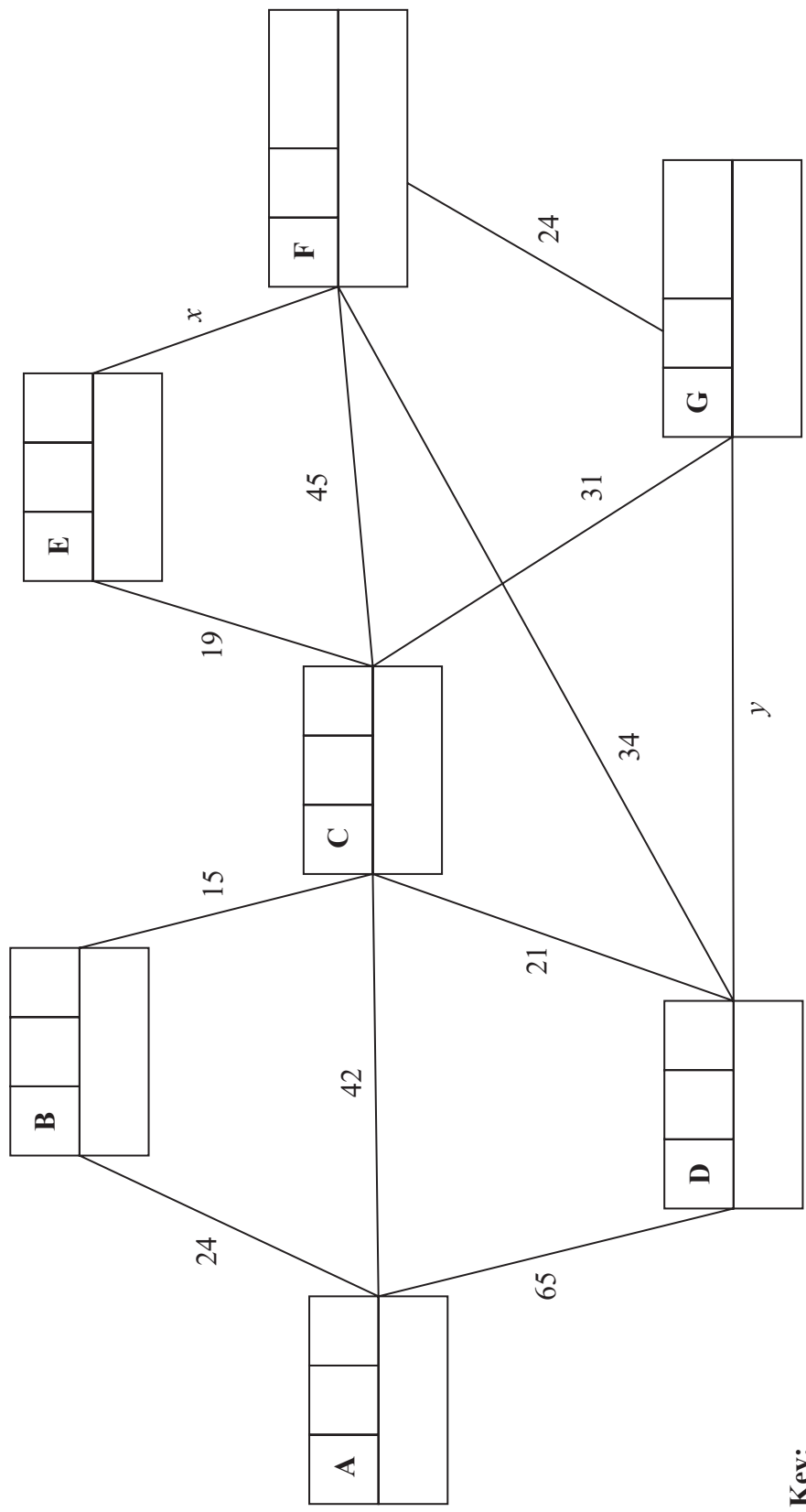
Lined area for writing the answer to Question 5.

(Total for Question 5 is 7 marks)





6. (a)



Key:

Vertex	Order of labelling	Final value
Working values		

DO NOT WRITE IN THIS AREA

Question 6 continued

Lined area for writing answers.

(Total for Question 6 is 11 marks)



7.

Basic variable	x	y	z	s_1	s_2	s_3	a_1	a_2	Value
s_1	1	2	3	1	0	0	0	0	45
a_1	3	2	0	0	-1	0	1	0	9
a_2	-1	0	4	0	0	-1	0	1	4
P	-2	-1	-3	0	0	0	0	0	0
A									

Table 1



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 7 continued

b.v.	x	y	z	s_1	s_2	s_3	Value
s_1	0	$\frac{5}{6}$	0	1	$\frac{7}{12}$	$\frac{3}{4}$	$\frac{147}{4}$
x	1	$\frac{2}{3}$	0	0	$-\frac{1}{3}$	0	3
z	0	$\frac{1}{6}$	1	0	$-\frac{1}{12}$	$-\frac{1}{4}$	$\frac{7}{4}$
P	0	$\frac{5}{6}$	0	0	$-\frac{11}{12}$	$-\frac{3}{4}$	$\frac{45}{4}$

b.v.	x	y	z	s_1	s_2	s_3	Value	Row Ops
P								

Spare copy

b.v.	x	y	z	s_1	s_2	s_3	Value	Row Ops
P								



Question 7 continued

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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 7 is 17 marks)

TOTAL FOR PAPER IS 75 MARKS

