#### **INTERNATIONAL A LEVEL**

### **Decision Maths 1**

### Solution Bank



#### **Chapter Review 6**

1 a Activity D depends on activities A and C, whereas activity E depends only on activity A. This shows that a dummy is required.

Activity J depends on activities G and I, whereas activity H depends only on activity G. This shows that a second dummy is required.









**b** Dummy 1 is needed to show *dependency*. *E* and *F* depend on *C* and *B*, but *D* depends on *B* only.

Dummy 2 is needed so that each activity can be *uniquely* represented in terms of its event.

Solution Bank





**b** There are *two* critical paths: *ACGIM* and *ACHK* 

The critical activities are A, C, G, H, I, K

**c** Total float on *D* is 21 - 5 - 14 = 2Total float on *F* is 42 - 20 - 14 = 8

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d
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e Day 15: C Day 25: G, H, E, F

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4 a J depends on H alone, but L depends on H and I.





**c** Total float on D = 20 - 7 - 8 = 5Total float on E = 20 - 11 - 9 = 0Total float on F = 29 - 5 - 8 = 16





- e  $\frac{95}{38} = 2.5$  so 3 workers.
- f For example

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

С	E	H	J	M
B	G		K	
A	D	F	L	



#### Solution Bank



5 a



- **b** A critical path is a continuous path from the source node to the sink node such that a delay in any activity results in a corresponding delay in the whole project.
- **c** The critical paths are: *AEHK* and *AEL*.
- **d**  $\frac{\text{Sum of all of the activity times}}{\text{critical time of the project}} = \frac{110}{30}$

Lower bound for number of workers is 4.

**e** *D*, *H*, *I*, *J*, *L* 

g

**f** The answers to part **e** show that 5 workers are needed on day 20 in order to complete the project in the minimum time.

(	) 1	1	2	3	4	5	i (	6	7	8	91	.01	.11	21	31	41	51	61	71	81	92	02	212	22.2	232	24	25	26	27	28	29	<del>)</del> 30
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# Solution Bank



6 a



28 days

- **b**  $\frac{83}{28} = 2.96$  so the lower bound is 3.
- c

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
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d



### Solution Bank



7 a Minimum time required to complete the project is 17 days.



**b** *BEHK* and *BEHJL* 



d For example,

B	(6)	E(6)	H(2)	J(1) L(2)	
A(3)		D(8)			<i>K</i> (3)
C(5)	G(1)	F(4)	<i>I</i> (3)		

Solution Bank



#### Challenge

Minimum time required for the project is 39 days



For example,

A(6)	<i>E</i> (10)		I(7)			K(6)	<i>M</i> (10)
<i>B</i> (8)	F(12)	)					
C(5)	D(11)			<i>H</i> (4	.)	L(4)	
	(	7(15)				J(8)	