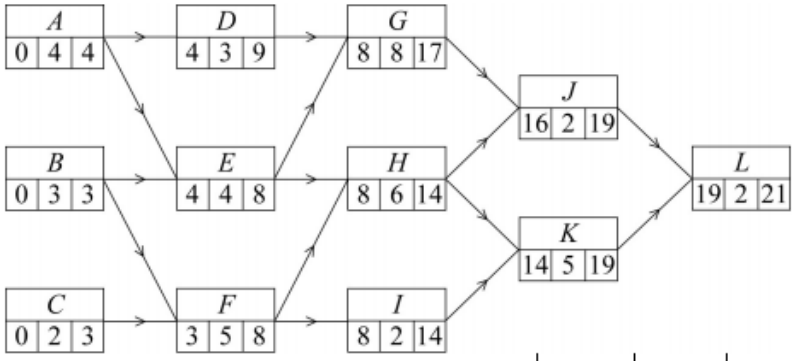
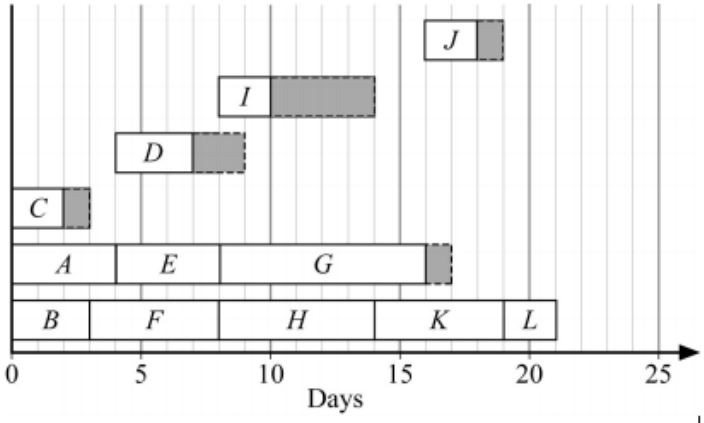
JUNE 2010

1(a)



	Earliest start times	M1		one slip follow through
		A1		all correct
	Latest finish times	M1		one slip follow through
		A1	4	all correct
(b)	Critical paths are *AEHKL* and *BFHKL*	M1		one correct
		A1		both correct and no extras
	Minimum completion time = 21 days	B1	3	

(c)

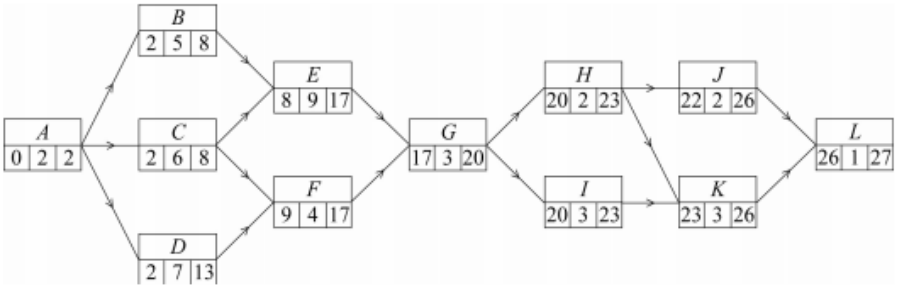


$A(0 \rightarrow 4)$
$B(0 \rightarrow 3)$
$C(0 \rightarrow 2 \rightarrow 3)$
$D(4 \rightarrow 7 \rightarrow 9)$
$E(4 \rightarrow 8)$
$F(3 \rightarrow 8)$
$G(8 \rightarrow 16 \rightarrow 17$
$H(8 \rightarrow 14)$
$I(8 \rightarrow 10 \rightarrow 14$
$J(16 \rightarrow 18 \rightarrow 19$
$K(14 \rightarrow 19)$
$L(19 \rightarrow 21)$

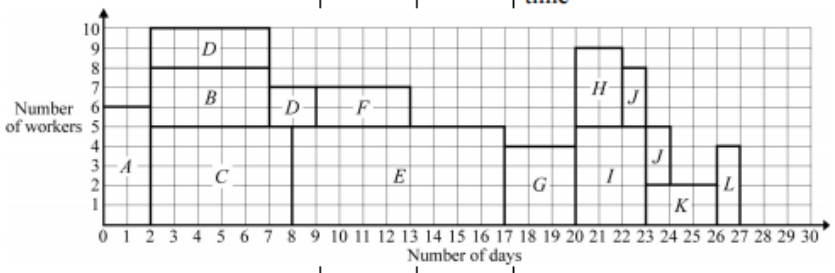
		B1		*A*, *B*, *E*, *F*, *H*, *K*, *L* correct
		M1		*C*, *D*, *G*, *I*, *J* (4 with correct start and duration)
		A1	3	All 5 correct with correct slack indicated
(d)(i)	*K* now starts day 17	B1		or "delayed" b 3 days if 14 in network
	L now starts day 22	B1	2	or "delayed" b 3 days if 19 in network
(ii)	Overall delay 3 days	B1	1	

JAN 2011

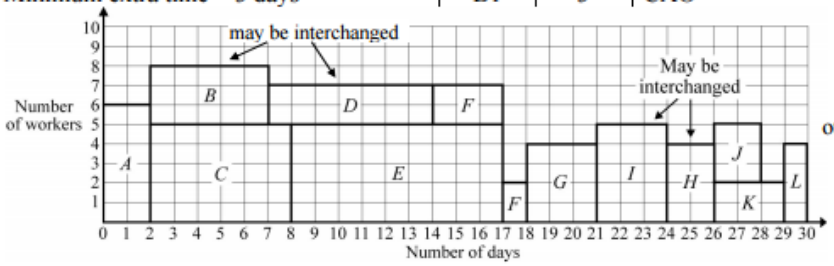
1



(a)	Forward pass	M1		up to one slip ft
	Correct	A1		
	Backward pass	M1		up to one slip ft
	Correct	A1	4	
(b)(i)	Critical path *A C E G I K L*	B1		
(ii)	Float for $D = 13 - 2 - 7$	M1		'their 13' – 'their 2' – 7
	$= 4$ days	A1	3	
(c)	*A C E G I K L* correct durations and heights	M1		one slip in duration or height
		A1		correct
	D and *B* and *F* correct (no "holes")	B1		
	H and *J* correct (no "holes")	B1	4	withhold final mark earned if not clear which activities are taking place at any time



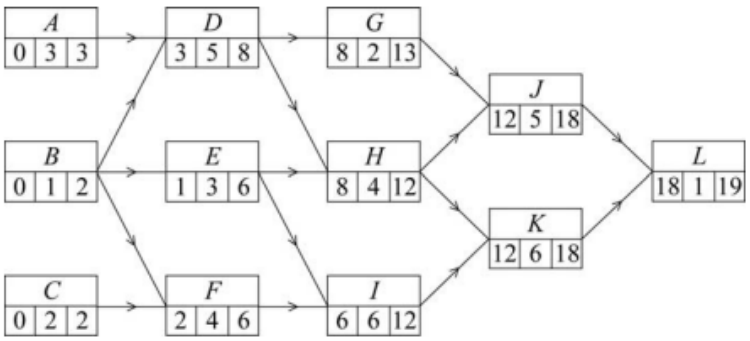
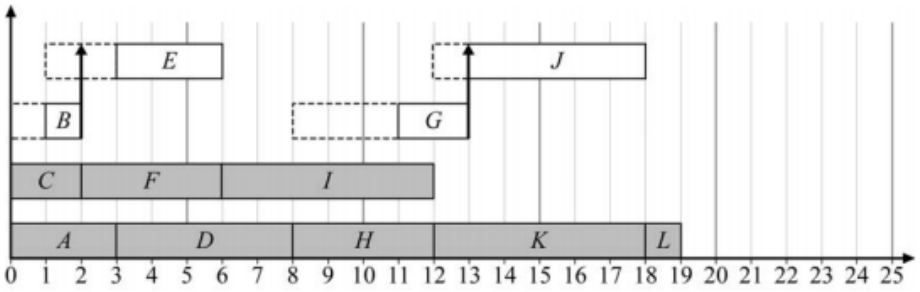
(d)	Correctly dealing with *D*, *B* and *F*	B1		ft 1 slip
	Correctly dealing with *H* and *J*	B1		ft 1 slip
	Minimum extra time = 3 days	B1	3	CAO



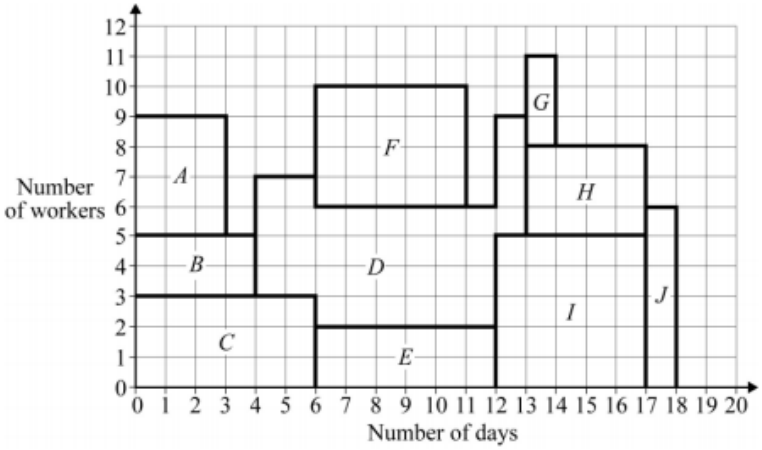
other possibilities

	Total		**14**

JUNE 2011

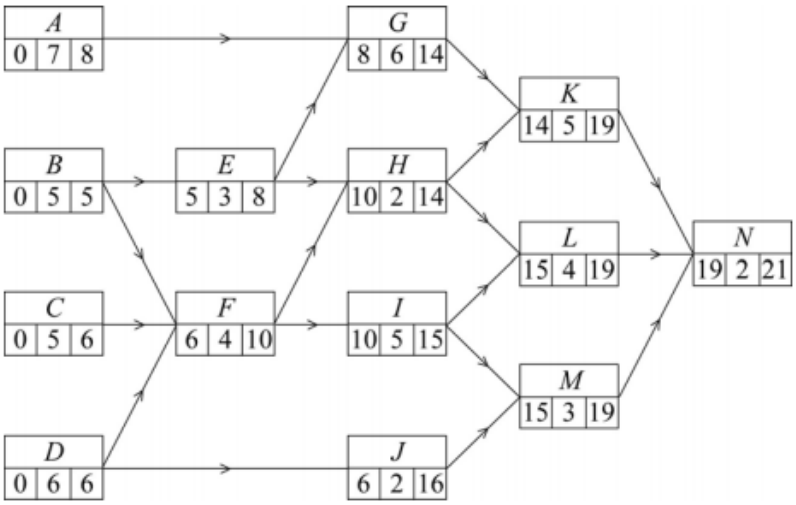
Q	Solution	Marks	Total	Comments
1(a)				
	Earliest start times	M1 A1		condone one slip + ft all correct
	Latest finish times	M1 A1	4	condone one slip + ft all correct
(b)	Critical paths *A D H K L* *C F I K L* Minimum time = 19	B1 B1 B1	3	one path correct second path correct and no others 19 days
(c)	Greatest float time at *G* (13 − 8 − 2) = 3 (days)	M1 A1cso	2	ft their activity with greatest float for M1 values at *G* must be correct
(d)	*A, D, H, K, L* and *C, F, I* *B, E, G, J* *B(1-2); E(3-6); G(11-13); J(13-18)*	M1 A1 M1 A1cso	4	one of 'their' critical paths "correct" all 8 of these activities correct 3 of these with correct duration and latest start time (may omit slack) all 4 correct with correct slack shown
				
	Total		**13**	

JAN 2012

1(a)	$x = 4$ $y = 12$ $z = 13$	B1 B1 B1	3	
(b)	*B D H J* and *C E I J*	M1 A1	2	first correct path 2nd correct and no others
(c)	*G* Float = 3	B1 B1	2	
(d)	One of their CPs correct height *B, D, H, J* and *C, E, I* correct	M1 A1		and correct durations and correct durations
				
	A starting at 0 and ending at 3 *F* starting at 6 and ending at 11 *G* starting at 13 and ending at 14	M1 A1 A1	5	one correct with correct height two correct with correct height all correct with correct height withhold first A1 earned if it is not clear which activities take place at any given time withhold another A1 if "holes" appear in histogram
(e)	New earliest *J* 22 days	B1		assuming activities continuous
	Minimum extra time 5 days	B1	2	assuming activities continuous
	Total		**14**	

JUNE 2012

1(a)

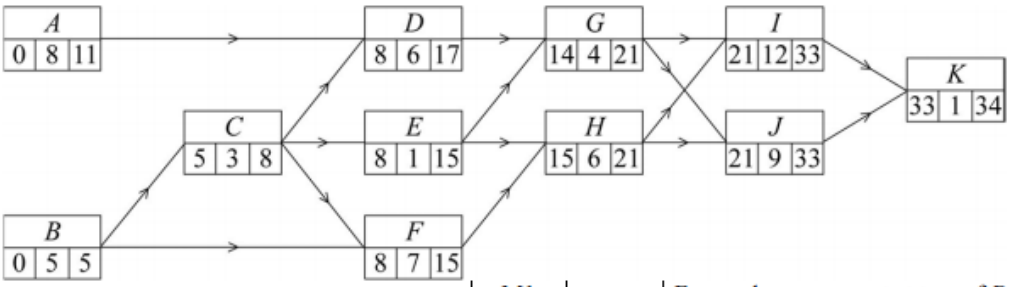


	Forward pass	M1		condone one slip (follow through)
		A1		all correct
	Backward pass	M1		condone one slip (follow through)
		A1	4	all correct
(b)	Critical paths $B\ E\ G\ K\ N$	M1		first path correct
	$D\ F\ I\ L\ N$	A1		second path and no others
	Minimum completion time is 21 days	B1	3	
(c)	Cascade diagram			may be in blocks or bars (see examples)
	One of 'their' CPs correct	M1		ft their CP
	$B, D, E, F, G, I, K, L, N$	A1		these activities correct
	A, C, H, J, M	M1		3 of these with correct start and duration
		A1		3 correct with correct slack indicated
		A1	5	all 5 correct with correct slack
(d)	(Max value of x is) 10	M1		considering $J_{\text{latest}} - J_{\text{earliest}}$
	$\Rightarrow x \leqslant 10$	A1 cao	2	(condone $x < 11$ for SC2)
				NMS $x \leqslant 10$ award M1 A1
	Total		**14**	

	Slack
A 0 – 7	7 – 8
C 0 – 5	5 – 6
H 10 – 12	12 – 14
J 6 – 8	8 – 16
M 15 – 18	18 – 19

JAN 2013

1(a)



		M1		Forward pass, correct at two of *D, E, F*
		A1		All correct
		M1		Backward pass, correct at *G* **AND** *H* ft
		A1	4	All correct

(b)

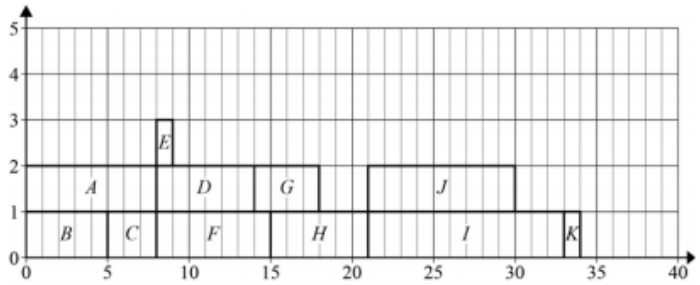
Activity	Predecessor
A	–
B	–
C	*B*
D	*A, C*
E	*C*
F	*B, C*
G	*D, E*
H	*E, F*
I	*G, H*
J	*G, H*
K	*I, J*

		B1		6+ correct
		B1	2	All correct

(c) (Critical) *B C F H I K* — B1 — 1

(d) (Float *E)* 6 (hrs) — B1 — 1

(e)



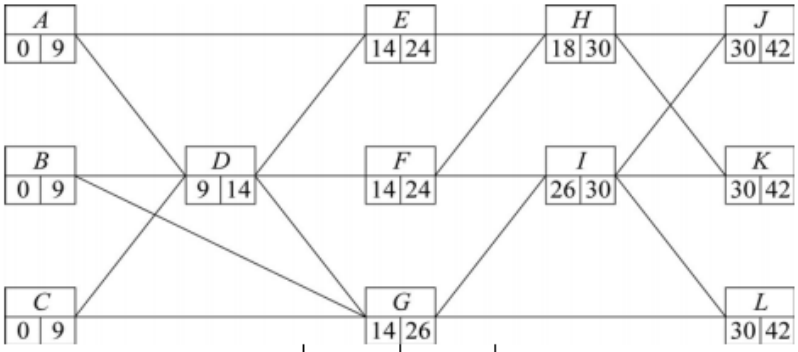
	M1		Their critical activities and 3 others shown
	A1		Critical activities and 3 others correct
	A1	3	All correct, condone floats seen

(f) 34 (hrs) — B1 — 1

(g) 62 (hrs) — B1 — 1

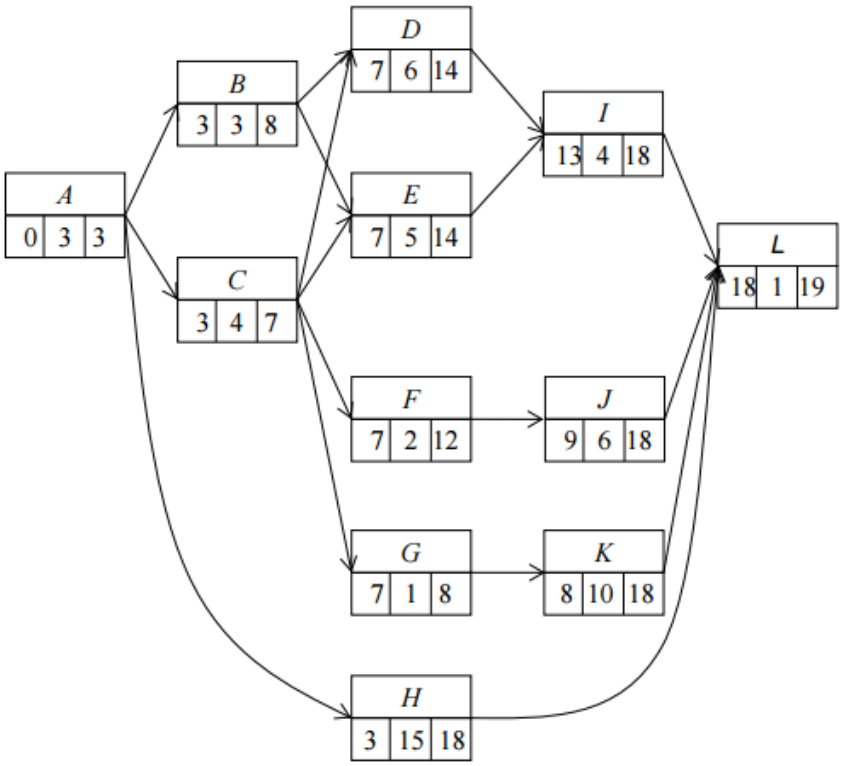
Total — **13**

JUNE 2013

1(a)				
		M1		Forward pass, correct at *D, E, F, G*
		A1		All correct
		M1		Backward pass, correct at *H, I, G* ft
		A1	4	All correct
(b)	*C D G I J* only	B1	1	
(c)	6	B1ft	1	Their (latest – earliest – 4)
(d)	*H* delayed by 4	E1		
	K delayed by 5	B1		
	New time 51	B1	3	51 scores 3/3
	Total		**9**	

JUNE 2014

1(a)



(a)		**M1** **A2**	**3**	Network diagram -1 each independent error (ignore extra 'end' box)
(b)		**M1** **A1**	**2**	Forward pass, correct at *D, E, F*
(c)		**M1** **A1**	**2**	Backward pass, correct at 3 of *D, E, F, G* ft
(d)	*A,C,G,K,L* *(A),H,(L)*	**B1** **B1**	**2**	− 1 for each extra
	Total		**9**	

8(a)	$x = 4$ $y = 17$ $z = 17$	 **B1** **B1**	 **2**	 Any 2 correct All 3 correct
(b)	*B D G I K*	**B1**	**1**	
c(i)	Reduce *G* to 5 (as critical) oe	**E1**		Decrease *G* by 3
	Reduce *F* to 4 or 5 Reduce *F* to5	**E1** **E1**		Decrease *F* by 2 or 3 Decrease *F* by 2 Condone new values shown on diagram
	Don't reduce *E* (as path through E still not critical)	**E1**		
(ii)	25 (weeks)	**B1**		
(iii)	Cost (3 x 6 + 2 x 7) PI by 32 = £32 000	**M1** **A1**	 7	
	Total		**10**	