

Mark Scheme 4771
June 2006

(i)

Least weight route: A F B G E D
Weight = 10

(ii) 11
From working value. Can't be bettered since new least weight must be bigger than 10.

M1 sca Dijkstra
A1 labels
A1 order of labelling
A1 working values

B1
B1

B1
B1

2.

(i) e.g.

a tree

(ii) 13

(iii) 14

(iv) e.g.

M1
A1

B1

B1

M1
A1
A1

3.

<p>(i) $M = 1$ $f(M) = -1$ $L = 1$</p> <p>$M = 1.5$ $f(M) = 0.25$ $R = 1.5$</p>	<p>B1 B1 B1</p> <p>B1 B1 B1</p>
<p>(ii) Solves equations (Allow "Finds root 2".)</p>	<p>B1</p>
<p>(iii) A termination condition</p>	<p>B1</p>

4.

(i) & (ii)

Critical activities: A, C, E

(iii) people

	B				D
1	A	A	C	E	E
	0.5 hours				

(iv) 2 hours (resource smoothing on A/B, but extra time needed for D/E).

(v)

P	–
Q	–
R	–
S	Q, R
T	Q, R
U	R
V	S, T, U
W	U

M1 sca activity-on-arc
 A1 A, B, C
 A1 D
 A1 E
 B1 forward pass
 (1.25 at end of B/dummy)
 B1 backward pass
 (1.25 at start of dummy/D)
 B1

M1
 A1

M1
 A1

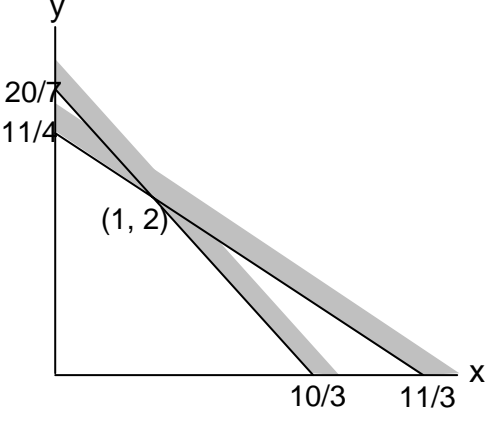
B1
 B1
 B1
 B1
 B1

4771

Mark Scheme

June 2006

5.

<p>(i) Let x be the number of hours spent at badminton Let y be the number of hours spent at squash</p> $3x + 4y \leq 11$ $1.5x + 1.75y \leq 5$	<p>B1 B1 B1</p>
<p>(ii)</p> 	<p>B1 axes labelled and scaled B1 line B1 line B1 shading B1 intercepts B1 (1, 2)</p>
<p>(iii) $x + 2y$</p>	<p>B1</p>
<p>(iv) $22/4 > 5 > 10/3$, so 5.5 at $(0, 11/4)$</p>	<p>M1 A1</p>
<p>(v) Squash courts sold in whole hours 1 hour badminton and 2 hours squash per week</p>	<p>B1 B1</p>
<p>(vi) 3 hours of badminton and no squash</p>	<p>B1 B1</p>

6.

(i) year 1: 00 – 09 failure, otherwise no failure year 2: 00 – 04 year 3: 00 – 01 year 4: 00 – 19 year 5: 00 – 19 year 6: 00 – 29	M1 A1 A1																																																																		
(ii)(A)																																																																			
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 8%;">Run 1</th> <th style="width: 8%;">Run 2</th> <th style="width: 8%;">Run 3</th> <th style="width: 8%;">Run 4</th> <th style="width: 8%;">Run 5</th> <th style="width: 8%;">Run 6</th> <th style="width: 8%;">Run 7</th> <th style="width: 8%;">Run 8</th> <th style="width: 8%;">Run 9</th> <th style="width: 8%;">Run 10</th> </tr> </thead> <tbody> <tr> <td>year 1</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>x</td> <td>√</td> <td>√</td> <td>x</td> <td>√</td> <td>√</td> </tr> <tr> <td>year 2</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td>√</td> <td>√</td> <td></td> <td>√</td> <td>√</td> </tr> <tr> <td>year 3</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td>√</td> <td>√</td> <td></td> <td>√</td> <td>√</td> </tr> <tr> <td>year 4</td> <td>√</td> <td>√</td> <td>√</td> <td>x</td> <td></td> <td>√</td> <td>√</td> <td></td> <td>x</td> <td>√</td> </tr> </tbody> </table>		Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	year 1	√	√	√	√	x	√	√	x	√	√	year 2	√	√	√	√		√	√		√	√	year 3	√	√	√	√		√	√		√	√	year 4	√	√	√	x		√	√		x	√	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 10%;"></td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> </tr> </table> M1 ticks and crosses A1 run 1 A1 runs 2–4 A1 runs 5–7 B1 runs 8–10 B1		√	√	√	√	√	√	√	√	√	√
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10																																																									
year 1	√	√	√	√	x	√	√	x	√	√																																																									
year 2	√	√	√	√		√	√		√	√																																																									
year 3	√	√	√	√		√	√		√	√																																																									
year 4	√	√	√	x		√	√		x	√																																																									
	√	√	√	√	√	√	√	√	√	√																																																									
(B) 0.6																																																																			
(iii)																																																																			
(A) if no failure then continue after year 3 – but using rules for yrs 1 to 3	B1 B1																																																																		
(B)																																																																			
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 8%;">Run 1</th> <th style="width: 8%;">Run 2</th> <th style="width: 8%;">Run 3</th> <th style="width: 8%;">Run 4</th> <th style="width: 8%;">Run 5</th> <th style="width: 8%;">Run 6</th> <th style="width: 8%;">Run 7</th> <th style="width: 8%;">Run 8</th> <th style="width: 8%;">Run 9</th> <th style="width: 8%;">Run 10</th> </tr> </thead> <tbody> <tr> <td>year 1</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>x</td> <td>√</td> <td>√</td> <td>x</td> <td>√</td> <td>√</td> </tr> <tr> <td>year 2</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td>√</td> <td>√</td> <td></td> <td>√</td> <td>√</td> </tr> <tr> <td>year 3</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td>√</td> <td>√</td> <td></td> <td>√</td> <td>√</td> </tr> <tr> <td>year 4</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td>√</td> <td>√</td> <td></td> <td>x</td> <td>√</td> </tr> </tbody> </table>		Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	year 1	√	√	√	√	x	√	√	x	√	√	year 2	√	√	√	√		√	√		√	√	year 3	√	√	√	√		√	√		√	√	year 4	√	√	√	√		√	√		x	√	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 10%;"></td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> <td style="text-align: center; width: 8%;">√</td> </tr> </table> M1 A1 runs 1–5 A1 runs 6–10		√	√	√	√	√	√	√	√	√	√
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10																																																									
year 1	√	√	√	√	x	√	√	x	√	√																																																									
year 2	√	√	√	√		√	√		√	√																																																									
year 3	√	√	√	√		√	√		√	√																																																									
year 4	√	√	√	√		√	√		x	√																																																									
	√	√	√	√	√	√	√	√	√	√																																																									
(C) 0.3	B1																																																																		
(iv) more repetitions	B1																																																																		