

Homework 14B – Solutions

1)

(a)		M1 A3,2,1,0	Network diagram -1 for each independent error				
(b)		M1	Early time at D or E correct from their C				
(c)		A1	CAO				
		M1	Any late time at H, K, L, J, F or G correct, from their M				
		A2,1,0	-1 for each independent error				
(d)	Critical A, B, C, E, G, M	B1					
(e)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>D</td> <td>L</td> </tr> <tr> <td>5</td> <td>6</td> </tr> </table>	D	L	5	6	B1 B1	5,6 unlabelled 2/2 6, 5 unlabelled 1/2 5 unlabelled B1 6 unlabelled B0
D	L						
5	6						
	TOTAL	12					

12

2)

	Solution	Mark	Total	Comment
(a)	Cost is $\frac{42}{1.17}$ $= \pounds 35.8974$ $= \pounds 35.90$	M1 A1 A1	3	M1 only if $\frac{1}{1.17}$ and then multiply result by 42 with an incorrect answer SC2 $\pounds 36$, $\pounds 35.89$ 35.9 is SC2 [not in correct money] If T&I or build up, only gain marks if obtain a quoted answer

(b)	Ratio of 3:4:5 = 12 parts Amount paid is $\pounds 66 \times \frac{5}{12}$ $= \pounds 27.50$	B1 M1 A1	3	Condone $\pounds 27.5$ SC1 for 16.5 or 22 or SC2 16.5, 22 and 27.5 unless state which is paying the most
(c)	Total payment is $\pounds 546 \times 3 = \pounds 1638$ $\pounds 1638 = 84\%$ of total cost for four people Total cost for four = $\pounds 1638 \times \frac{100}{84}$ $= \pounds 1950$ Extra cost is $\pounds 1950 - \pounds 1638$ $= \pounds 312$	B1 B1 M1 A1 A1	5	If used correctly
Total			11	

11

3)

Q	Solution	Marks	Total	Comments
(a)	0.35	B1	1	CAO or equivalent fraction or %
(b)	$P(< 3) = 0.45$ $'0.35' \times '0.45' (= 0.1575)$ $\times 2 = 0.315$	B1 M1 A1	3	Their 0.35 and 0.45 CAO or equivalent fraction or %
(c)	Mean = $1 \times 0.19 + 2 \times 0.26 + 3 \times 0.20 + 4 \times 0.13 + 5 \times 0.07 + 6 \times 0.15$ $= 0.19 + 0.52 + 0.60 + 0.52 + 0.35 + 0.90$ $= 3.08$ $10 \times 3.08 = 30.8$ (pence) or $\pounds 0.308$	M1 A1 B1	1	This working, or the next line, must be seen (at least 3 products) CAO. AG. CAO Must show \pounds sign if 0.308

5

4)

(a)	by using $(0.5)^{10} = 0.000976... = 0.001$ to 3 dp	B1 B1	2	$(0.5)^{10}$ or 0.000976... seen Not simply stating $P(X=10) = 0.001$
(b)(i)	Mean prize = $(50 \times 0.044 + 200 \times '0.01' + 800 \times 0.001)$ $= 5p$ (4.93p from exact values)	M1 A1		Or equivalent in \pounds . Their '0.01' but must use (0 and) 50/0.5, 200/2 & 800/8 AWFW 4.9 to 5.0. Allow without working for B2
(ii)	Doubling the prizes would make the expected prize 10p ('= charge for the game' or 'doubled') Or the standard deviation 67p (or doubled) Because cost = expected prize this would be a fair game, Or ... no point in Rodney running the game.	B1 E1		AWFW 9.8 to 10 Either AFWF 66 to 68 Do not award E1 if $E(2X) \neq 9.8$ to 10 OE – concept of fairness Either OE – concept of zero profit
			2	

6

TOTAL: (59)

5) **core math**

(a)	(The number of) train journeys that took more than 100 minutes	B1	oe
(b)	32 (+) 25	M1	32 and 25 selected
	57	A1	
(c)	$\frac{15}{47}$ or 0.31(...) or 0.32 or 31.9(...) % or 32%	B2	B1 Numerator 15 B1 Denominator 47

(5)

6)

	A	B	C	D	E
1	Item	Cost in April 2010 (£)	Cost in May 2011 (£)	Increase in cost (£)	Percentage increase in cost
2	Fuel	1400	1721	321	22.9
3	Insurance	623	815	192	30.8
4	MOT	54	55	1	1.9
5	Servicing	301	317	16	5.3
6	Tax	173	182	9	5.2
7	Total	2551	3090	539	21.1

(a)	Column D correct	B1	Condone one error
	Any in column E	M1 A1	Do NOT accept 2, 5 or 5 for these marks
	All column E correct	A1	Marks for column E; SC1 + B1 for percentages of 2011 which are 18.7, 23.6, 1.8, 5.0, 4.9, 17.4 SC1 for 19, 24, 2, 5, 5, 17 SC3 for 23, 31, 2, 5, 5, 21 SC2 for 22, 30, 1, 5, 5, 21
(b)	All correct to one decimal place	B1	5 cao
	$\frac{D4}{B4} \times 100$	B1	1 $\frac{C4 - B4}{B4} \times 100$
Total			6

(6)

7)

(a)	It is less than 100	B1	Any indication
(b)	1.1×500	M1	oe
	550	A1	

(3)

8)

(a)	$\pounds 1000 \times 1.025 = \pounds 1025$	B1																	
(b)	$r = \left(1 + \frac{i}{12}\right)^n - 1$	M1																	
	$0.025 = \left(1 + \frac{i}{12}\right)^{12} - 1$																		
	$1.025 = \left(1 + \frac{i}{12}\right)^{12}$	M1 A1																	
	$1 + \frac{i}{12} = \sqrt[12]{1.025} = 1.00206$ $i = 0.0247$ 2.47%	A1																	
(c)	<table border="1"> <thead> <tr> <th>n</th> <th>An</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>£ 1000.00</td> </tr> <tr> <td>1</td> <td>£ 1001.65</td> </tr> <tr> <td>2</td> <td>£ 1003.30</td> </tr> <tr> <td>3</td> <td>£ 1004.96</td> </tr> <tr> <td>4</td> <td>£ 1006.62</td> </tr> <tr> <td>5</td> <td>£ 1008.28</td> </tr> <tr> <td>6</td> <td>£ 1009.94</td> </tr> </tbody> </table>	n	An	0	£ 1000.00	1	£ 1001.65	2	£ 1003.30	3	£ 1004.96	4	£ 1006.62	5	£ 1008.28	6	£ 1009.94	M1 for evidence of 1.00165	alternative: M1 for 1.00165^6
	n	An																	
	0	£ 1000.00																	
	1	£ 1001.65																	
	2	£ 1003.30																	
	3	£ 1004.96																	
	4	£ 1006.62																	
5	£ 1008.28																		
6	£ 1009.94																		
TOTAL		7																	

(7)

9)

(a)	$\frac{175}{1+0.106} + \frac{175}{(1+0.106)^2} = 301.(29)$	M1A1	either calculation
	$\frac{175}{1+0.11} + \frac{175}{(1+0.11)^2} = 299.(69)$	A1	other calculation
(b)	$\frac{175}{1+0.108} + \frac{175}{(1+0.108)^2} = 300.489$		M1 A1 use of any value between
	$\frac{175}{1+0.109} + \frac{175}{(1+0.109)^2} = 300.090$		10.6% and 10.95% confirming value greater than £300
	$\frac{175}{1+0.1095} + \frac{175}{(1+0.1095)^2} = 299.891$		
	Therefore interest rate = 10.9%	A1	
TOTAL		6	

(4)