Question			Answer	Marks	AO	Guidance
15	(a)		$50 \times$ their $\frac{6}{32}$ Or 50×0.1875	M1	3.4	condone $50 \times \frac{5}{32} = 7.8125$ Must be a genuine attempt at using binomial distribution. Coeff of 5 must be seen or implied or cumulative binomial found. NOTE: $p(4H) = 5 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^4 = \frac{5}{32}$ (0.15625) and $p(5H) = \left(\frac{1}{2}\right)^5 = \frac{1}{32}$ (0.03125) $p(X \geq 4) = 0.1875$
			$\frac{75}{8}$ **oe or** 9 games	A1	1.1	If they round to 10 then withhold this mark
				[2]		

Question			Answer	Marks	AO	Guidance
15	(b)		**Combined/larger** sample because unbiased samples become **more representative** of theoretical distributions as **sample size increases**	**B1**	**3.5b**	Needs to refer to the idea that experimental data only mimics theoretical distributions if the samples are large and representative. Accept 'increasing the sample size/combining the samples gives a more accurate estimate of the value of p' Accept for this context 'the larger the sample, the more accurate the data' B1
				[1]		
15	(c)		$40p = 28$ so $p = 0.7$	**B1**	**1.1**	
				[1]		
15	(d)		$50 \times (5 \times 0.7^4 \times 0.3 + 0.7^5)$ Or $50 \times p(X \geq 4)$ using $X \sim B(5, 0.7)$ Gives 50×0.52822 26.4.. or 26	**M1** **A1**	**3.3** **3.4**	Makes a valid attempt at calculating using $X \sim B(5, 0.7)$ Must be a genuine attempt at using binomial distribution. Coeff of 5 must be seen or implied or cumulative binomial found. condone $50 \times 5 \times 0.7^4 \times 0.3$
				[2]		
15	(e)		Ali's model better fit since 25 much closer to 26 than to 9 **cao**	**B1 FT**	**3.5a**	Correct statement FT their values from (a) and (d) Must compare 25 with the expected number of wins for both Ali and Sam for the reasoning. The comparison can be indirect e.g. Ali's better as number of expected wins closer to the true value.
				[1]		