

Daily Question

Day 2 Statistics – Mark Scheme

Question 1

8(a)	Let X be the random variable the number of customers asking for water.			
(i)	$X \sim B(10,0.6)$	$Y \sim B(10,0.4)$		B1
	$P(X = 6) = (0.6)^6 (0.4)^4 \frac{10!}{6!4!}$	$P(Y = 4) = (0.4)^4 (0.6)^6 \frac{10!}{6!4!}$		M1
	= 0.2508...	= 0.2508	awrt 0.251	A1
(ii)	$X \sim B(10,0.6)$	$Y \sim B(10,0.4)$		
	$P(X < 9) = 1 - (P(X = 10) + P(X = 9))$ $= 1 - (0.6)^{10} - (0.6)^9 (0.4)^1 \frac{10!}{9!1!}$	$P(X < 9) = 1 - P(Y \leq 1)$ $= 1 - 0.0464$		M1
	= 0.9536...	= 0.9536...	awrt 0.954	A1
(b)	$X \sim B(50,0.6)$ $Y \sim B(50,0.4)$ $P(X < n) \geq 0.9$ $P(Y > 50 - n) \geq 0.9$ $P(Y \leq 50 - n) \leq 0.1$ $50 - n \leq 15$ $n \geq 35$ $n = 35$	or $P(X < 34) = 0.8439$ $P(X < 35) = 0.9045$	awrt 0.844 awrt 0.904/0.905	M1
				A1
				(3) Total 8

[for part b you can answer a different way]

Question 2

2. (a)	Let X be the random variable the number of faulty bolts		
	$P(X \leq 2) - P(X \leq 1) = 0.0355 - 0.0076$	or $(0.3)^2 (0.7)^{18} \frac{20!}{18!2!}$	
	= 0.0279	= 0.0278	
			M1
			A1
			(2)
(b)	$1 - P(X \leq 3) = 1 - 0.1071$ = 0.8929		M1
			A1
			(2)
	or $1 - (0.3)^3 (0.7)^{17} \frac{20!}{17!3!} - (0.3)^2 (0.7)^{18} \frac{20!}{18!2!} - (0.3)(0.7)^{19} \frac{20!}{19!1!} - (0.7)^{20}$		
(c)	$\frac{10!}{4!6!} (0.8929)^6 (0.1071)^4 = 0.0140.$		M1A1√A1
			(3)

[check mark scheme for correct final answers do not worry about the alternative methods they have used]