Question Number	Scheme	Marks
5 (a)	B(n, 0.045)	B1
		(1)
(b)	Applicants are independent (no identical twins) or the proportion/probability identified as colour blind does not change over time	B1
		(1)
(c)	B(120, 0.045) $\Rightarrow$ Po(5.4)	B1
	$\mathrm{P}(X=5)=\dfrac{\mathrm{e}^{-5.4}\times 5.4^5}{5!}$	M1
	= 0.1728… awrt 0.173	A1
		(3)
(d)	Binomial with large n	B1
	and very small p	B1
		(2)
(e)	$\mathrm{H}_0: p=0.75 \quad \mathrm{H}_1: p\neq 0.75$	B1
	B(96, 0.75) $\Rightarrow$ N(72,18)	B1
	$Z=\dfrac{67.5-72}{\sqrt{18}}$ or $\dfrac{x\pm 0.5-72}{\sqrt{18}}$	M1
	= –1.06066… or $\dfrac{x+0.5-72}{\sqrt{18}}<-1.96$ or $\dfrac{x-0.5-72}{\sqrt{18}}>1.96$	A1
	P(z < –1.06) = 0.1444... / 0.1446 or CR < 63.2 awrt 0.144 or 0.145	A1
	There is insufficient evidence to reject H_0	dM1
	Insufficient evidence against Jaymini's claim	A1
		(7)
ALT	Let p be the probability of an applicant fail to become a pilot.	
	$\mathrm{H}_0: p=0.25 \quad \mathrm{H}_1: p\neq 0.25$	B1
	B(96, 0.25) $\Rightarrow$ N(24,18)	B1
	$Z=\dfrac{28.5-24}{\sqrt{18}}$ or $\dfrac{x\pm 0.5-24}{\sqrt{18}}$	M1
	= 1.06066… or $\dfrac{x+0.5-24}{\sqrt{18}}<-1.96$ or $\dfrac{x-0.5-24}{\sqrt{18}}>1.96$	A1
	P(z > 1.06) = 0.1444... / 0.1446 or CR > 32.8 awrt 0.144 or 0.145	A1
	There is insufficient evidence to reject H_0	dM1
	Insufficient evidence against Jaymini's claim	A1
		(7)

	Notes	**Total 14**
5 (a)	**B1**	For binomial with correct parameters n and 0.045
(b)	**B1**	For one of the given reasons. Must have context Allow equivalent statements Do not allow number for proportion/probability
(c)	**B1**	Using or writing Po(5.4)
	M1	For $\dfrac{\mathrm{e}^{-\lambda}\lambda^5}{5!}$ with any value for λ
	A1	awrt 0.173
		NB A correct answer with no incorrect working scores 3/3
(d)	**B1**	n is large (Allow number of trials for n)

	B1	p is small (Allow probability for p)
(e)	**B1**	Both hypotheses correct in terms of p or π Must be attached to H_0 and H_1
	B1	For writing or using N(72, 18) (May be implied by a correct standardisation expression)
	M1	Standardising using 67.5 or 67 or 66.5 or $x \pm 0.5$ with their mean and standard deviation (Allow ±)
	A1	awrt -1.06 (may be implied by awrt 0.144 or 0.145) or a correct standardisation with ±1.96 (ignore incorrect inequality symbol and allow =)
	A1	Using a probability route: awrt 0.144 or 0.145 or critical value of $z = \pm 1.96$ Using a critical region route: CR < 63.2
	dM1	Dependent on M1 A1. A correct statement – no context needed but do not allow contradicting non contextual comments. (Ignore any comparisons)
	A1	Correct conclusion in context. Must include the word claim. If they give an answer that refers to the claim then they must include the words applicants (oe), and pilots. No hypotheses then A0
		NB Award M1 A1 for a correct contextual statement on its own
ALT	**B1**	Both hypotheses correct in terms of p or π Must be attached to H_0 and H_1
	B1	For writing or using N(24, 18) (May be implied by a correct standardisation expression)
	M1	Standardising using 28.5 or 29 or 29.5 or $x \pm 0.5$ with their mean and standard deviation (Allow ±)
	A1	awrt 1.06 (may be applied by awrt 0.144 or 0.145) or a correct standardisation with ±1.96 (ignore incorrect inequality symbol and allow =)
	A1	Using a probability route: awrt 0.144 or 0.145 or critical value of $z = \pm 1.96$ Using a critical region route: CR < 32.8
	dM1	Dependent on M1 A1. A correct statement – no context needed but do not allow contradicting non contextual comments. (Ignore any comparisons)
	A1	Correct conclusion in context. Must include the word claim. If they give an answer that refers to the claim then they must include the words applicants (oe), and pilots. No hypotheses then A0
		NB Award M1 A1 for a correct contextual statement on its own