Question			Answer	Marks	AO	Guidance
13	(a)		Arrivals at other gates may not be included Arrivals at other days/times may not be included	**B1** **B1** **[2]**	**1.1** **1.1**	(must give two distinct points and refer specifically to the sampling method i.e. entrance, time or 'first 50') Examples: • "It doesn't include the entire population" B0 • " Not everyone has an equal chance of being chosen" B0 • "the sample size is probably too small" B0 • "they are only sampling from one entrance" B1 • "they are only asking from a pool of people who arrive early" B1 • "students using a particular entrance are going to have similar results" B1 BOD • "Most students might not pick that entrance" B1 BOD • "More students might come in on a different morning" B1 BOD • "a particular year group might prefer coming through a specific gate" B1 BOD • "the first 50 students will be those who arrive earliest and may not be representative" B1

Question			Answer	Marks	AO	Guidance
13	(b)					**Allow 2 sf throughout**
			H_0: $p = 0.3$ where p = **proportion** of students (at college) who think lunches satisfactory	**B1**	**1.1**	Allow "where p is the population **proportion**" Allow "like" for "think lunches satisfactory"
			H_1: $p < 0.3$	**B1**	**2.5**	Subtract B1 for each error e.g.: • 2-tail B1B0 • undefined p or 'probability' B1B0 • use of X,x and not defined B0B0 • not in terms of parameter B1B0 • p = sample proportion implied B1B0 • Not include value 0.3 B0B0 • e.g. $H_0 = 0.3$ etc: B0B0
			B(50, 0.3) & $X = 9$ Allow $X = 8$ or 10	**M1**	**3.3**	Correct distribution and value of X, both may be stated or implied e.g. by 0.0183 ($X \leq 8$) or 0.0220 ($X = 9$) even if within incorrect statement e.g. P($X = 9$) = 0.040.
			P($X \leq 9$) = 0.04023…	**A1**	**3.4**	**BC** allow 2 sf (0.040)
			0.040… < 0.05	**A1FT**	**1.1**	Correct for their value of 0.0402, FT their hypotheses (e.g. >0.95) and condone 5% for 0.05.
			Reject H_0	**M1**	**1.1**	dep P($X \leq 9$ or 8 or 10) stated or calculated. Condone "Accept H_1" but not "Do not reject H_1" Correct conclusion from their comparison.
			Sufficient evidence that proportion who think lunches satisfactory is < 0.3	**A1**	**2.2b**	In context, not definite, e.g. not "Proportion who think lunches satisfactory is < 0.3" or "has decreased" Accept "sufficient evidence to support Dev's claim" but not just "Dev is correct" www (not dependent on B1B1 and can gain this mark if 0.04 to 1sf only)
				[7]		

Question			Answer	Marks	AO	Guidance
13	(c)		**Yes**. Whether one sample member says lunch is satisfactory is not independent of other members.	**B1** **[1]**	**3.5b**	Accept **Yes**, P(success) not constant Accept **No**, P(success) is nearly constant [because the school is large] Examples: • "each student may not be independent from one another" (not sample member and no mention of opinion) B0