11	**(a)**		$H_0 : \mu = 161.6$ $H_1 : \mu > 161.6$	**B1**	**1.1**	both hypotheses; allow other parameters (but not X or $\bar{X}$) if defined as mean	
			μ is the **population** mean height of adult females (in 2020)	**B1**	**2.5**		
			1-tailed test because it is suspected that the mean height has increased **oe**	**B1**	**2.4**		
				[3]			
11	**(b)**		use of $\bar{X} \sim N\left(161.6, \frac{1.96}{200}\right)$ soi	**M1**	**3.3**	may see $1.645 = \frac{\bar{X}-161.6}{\sqrt{\frac{1.96}{200}}}$	$\bar{X} = 161.76...$ implies **M1** only
			awrt $\bar{X} > 161.8$ BC	**A1**	**1.1**	allow if inequality not strict NB 161.76283…	allow eg sample mean > 161.8
				[2]			

Question			Answer	Marks	AOs	Guidance	
11	(c)		the 1st statement is correct because $\bar{X} > 161.8$ **or** $\bar{X} > 161.8$ so the sample mean is in the critical region	M1	2.3	FT their 161.8 (must be greater than 161.6) or allow if *their* $P(\bar{X} > 161.9)[= 0.00122] < 0.05$ or *their* $z > 1.645$ is considered	critical region must be an upper tail; their probability must be less than 0.5
			the 2nd statement is incorrect because the sample mean is in the critical region **oe** or because the result is significant **oe** **or** '…so/hence the null hypothesis is rejected.' following from the first statement	A1	2.4	FT their calculated critical region or their calculated probability,	
			the 3rd statement is incorrect; because it is only possible to infer, not prove, using a hypothesis test **oe**	B1	2.2b	ignore comments about rejecting the null hypothesis **oe**	
				[3]			