Question			Answer	Marks	AO	Guidance
10	(a)		H_0: $\rho = 0$ H_1: $\rho \neq 0$ where ρ is the **correlation coefficient** for the population **or** where ρ is the **correlation coefficient** between amount spent (h) and no. of customers (c)	**B1** **B1**	**1.1** **2.5**	Subtract B1 for each error: • Undefined ρ: B1B0 • 1-tail: B1B0 • Allow other letters (but not r, c or h: B1B0) • Hypotheses in words (no parameter): B1B0 ○ H_0: There is no correlation ○ H_1: There is correlation ○ Do not allow "negative" or "positive" correlation for H_1: B0B0 Accept "pmcc" for correlation coefficient
			$0.798 > 0.7079$ oe	**B1FT**	**1.1**	FT their setup/hypotheses • e.g. for H_1: $\rho < 0$, compare 0.798 with 0.6581 Must use $n = 12$ and specify a corresponding value from the table • 0.6581 or 0.7079 only (NB not 0.6**85**1 from $n = 11$) Must compare this with 0.798 with the same sign • Condone $-0.798 < -0.7079$ or $\lvert-0.798\rvert$ • Do not accept $-0.798 < 0.6581$ NB this is the only mark that can be scored with no hypotheses
			Reject H_0	**M1**	**1.1**	This step must be seen, consistent with their hypotheses and their comparison. Condone Accept H_1
			Sufficient evidence for a (linear) **correlation** between amount spent (h) and no. of customers (c) oe	**A1** **[5]**	**2.2b**	Conclusion must be in context, not definite and consistent with their hypotheses and comparison. • Disregard any mention of "negative" or "positive" • "Relationship" A0 • "Prove(d)" A0 • Condone "there is evidence of a linear correlation between h and c" • Condone "significant" for "sufficient" Must conclude that there is evidence **for** a correlation.

Question			Answer	Marks	AO	Guidance
10	(b)		Points (fairly) close to a (straight) **line** with negative gradient oe	**B1** **B1** **[2]**	**1.2** **1.2**	For a statement about the relative strength of the linear correlation: • Accept "points form a **line**" or • Accept "points lie (relatively) close to the **line**" • Not "points are close together" or "close to each other" For a statement about the appearance of the negative correlation: • Accept "line from 2nd to 4th quadrant" • Accept "two clusters in top left and bottom right" • Accept "line will be downwards sloping" • Not "negatively correlated" (must be a feature of the scatter diagram) This mark only may be implied by a sketch (showing a scatter diagram with negative correlation, with or without a line of best fit).
10	(c)		Correlation does not imply causation A suggested 3rd factor affecting both *c* & *h* e.g. time of year, temperature, weather	**B1** **B1** **[2]**	**2.3** **2.4**	oe, may be implied (but do not allow "independent") Any sensible comment about the statement but must be in context: • Accept "Some people may not visit if the store is too cold" • Accept "the shop being too warm may mean customers don't want to go inside" • Not "There may be a third factor affecting both *c* and *h*" (a possible factor must be specified) • Accept "more people in the store may mean there is less need for heating" (so the implication might be the other way around) or equivalent statements about causation

Question			Answer	Marks	AO	Guidance
10	(d)		If no (linear) correlation in the population, then for (a sample of) 10 (pairs) $P(r > 0.7155) = 0.01$ or $P(\|r\| > 0.7155) = 0.02$	**B1** **B1** **[2]**	**1.2** **2.5**	For the setup, condone "n=10" but must reference 'no correlation' Allow $\geq$ Accept an equivalent statement in words, but it must be about a probability: • e.g. "The **probability** that the pmcc is greater than 0.7155 is 1%" • e.g. "There is a 1% **chance** that there is actually no correlation when r is greater than 0.7155."