Question Number	Scheme	Marks
3.		
(a)	<table><tr><td></td><td>200m</td><td>400m</td><td>d</td><td>d^2</td></tr><tr><td>A</td><td>3</td><td>1</td><td>2</td><td>4</td></tr><tr><td>B</td><td>2</td><td>2</td><td>0</td><td>0</td></tr><tr><td>C</td><td>1</td><td>4</td><td>–3</td><td>9</td></tr><tr><td>D</td><td>4</td><td>5</td><td>–1</td><td>1</td></tr><tr><td>E</td><td>7</td><td>7</td><td>0</td><td>0</td></tr><tr><td>F</td><td>6</td><td>6</td><td>0</td><td>0</td></tr><tr><td>G</td><td>5</td><td>3</td><td>2</td><td>4</td></tr></table>	M1 A1
	$\sum d^2 = 18$	A1
	$r_s = 1 - \frac{6\times 18}{7\times 48} = \frac{19}{28} =$ awrt **<u>0.679</u>**	dM1 A1
		(5)
(b)	$H_0 : \rho = 0$ $H_1 : \rho > 0$	B1
	Critical value 0.7143	B1
	$(0.679 < 0.7143)$ so insufficient evidence to reject H_0	M1
	There is insufficient evidence to suggest a **positive** correlation between the finishing order in the 200 metre race and the finishing order in the 400 metre race.	A1ft
		(4)
(c)	There are tied lengths so use average ranks	B1
	Then use $r_s = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}}$	dB1
		(2)
		Total 11
	Notes	
(a)	M1 for an attempt to rank athletes lists (at least 3 correct for each) A1 for correct rankings for both (may be reversed). Can be implied by correct $\sum d^2$ A1 $\sum d^2 = 18$ dM1 (dep upon previous M1) for use of the correct formula, follow through their $\sum d^2$ A1 awrt 0.679	
(b)	B1 both hypotheses correct ρ or ρ_s B1 for correct c.v. (sign should match H_1 or r_s) M1 ft their r_s and their c.v. A1 ft a correct contextualised comment including positive correlation and races/finishing orders (oe) **with all previous marks in (b) scored**	
(c)	B1 for use of average ranks or use of 1.5 or 6.5(for C and D)/4.5 or 3.5 (for B and G) dB1 (dep on 1st B1) for use of pmcc (with the average ranks)	