Question	Scheme	Marks	AOs
4(a)	It is not possible to have a sampling frame	B1	2.3
		(1)	
(b)	Quota sampling **and** (catch 85 common carp, 45 mirror carp and 30 leather carp) **or** (ignore any fish caught of a type where the quota is full)	M1	1.1a
	Quota sampling **and** catch 85 common carp, 45 mirror carp and 30 leather carp **and** ignore any fish caught of a type where the quota is full	A1	1.1b
		(2)	
(c)	$\sigma = \sqrt{\frac{3053}{160} - \left(\frac{692}{160}\right)^2}$	M1	1.1b
	$= 0.6129\ldots$ awrt 0.613	A1	1.1b
		(2)	
(d)(i)	This would have no effect as the piece of data would remain in the same class	B1	2.2a
(ii)	This would increase the standard deviation as change in mean is small and $6.4 - 4.6 \approx 3\sigma$ therefore estimate of standard deviation will increase	B1	2.2a
		(2)	

(7 marks)

Notes		
(a)	**B1:**	For the idea there cannot be a sampling frame/list
(b)	**M1:**	Quota sampling **and** either for the correct numbers of each type **or** for the idea that if quota full ignore the fish.
	A1:	Quota sampling **and** both the correct numbers of each type **and** for the idea that if quota full ignore the fish or sample until all quotas are full
(c)	**M1:**	A correct expression for σ
	A1:	Awrt 0.613 allow s = awrt 0.615
(d)	**B1:**	Correct deduction with suitable explanation Allow range for class. Do not allow there is no differences
	B1:	Correct deduction with suitable explanation. so would increase the standard deviation and a suitable reason. Allow the value is bigger than any others in the table **oe**