1	(use case studies as examples in exam)
Climate change is imposing ever increasing selection on wild populations	• Serious climate changes in the future are predicted across Australia • Evolution will underpin species' responses to environmental changes • Evolution can occur quickly enough to be relevant

Evolution will be a major factor that underpins species response to climate change	• Evolutionary forces act on genetic diversity resulting in evolution of populations and species
	• Evolution can be defined as a change in allele frequency
	  ○ Adaptive evolution – responding to selective pressures
	  ○ Neutral evolution – genetic drift
	• Four evolutionary forces act on genetic variation
	  ○ Mutation
	  ▪ Source of all genetic variation
	  ▪ Can be neutral, beneficial or deleterious
	  ▪ Very slow
	  ○ Random genetic drift (neutral)
	  ▪ Results in isolated populations diverging and drifting apart
	  ○ Migration (neutral)
	  ▪ Counteracts divergence due to drift or selection (if stronger than selection)
	  ○ Selection (adaptive)
	  ▪ Divergent natural selection results in populations diverging
	  ▪ Uniform natural selection counteracts population divergence

Quantitative traits are; traits that show a continuous phenotypic distribution, controlled by many genes, influenced by both genetic and environmental factors	• Any trait that shows a normal distribution
	• Focus on continuously distributed phenotypes (traits) as opposed to discrete traits
	• Genetic basis of these phenotypes (traits) statistically characterised by measuring the same trait in related individuals
	• Quantitative genetics is important because it
	  ○ Allows us to understand the genetic basis of adaptive evolution
	  ○ Underpins our ability to predict evolutionary responses to selection

Evolution by natural selection requires…	• Evolution be natural selection requires
	  ○ Phenotypic variation – individuals within a population must vary
	  ○ Variation must have a genetic basis – differences between individuals passed from parents to offspring
	  ○ Variation must result in differences in reproductive success (i.e. fitness)
	  ○ Survival and reproduction of individuals must not be random – linked to the variation among individuals

Can partition total phenotypic variation in quantitative traits into genetic and environmental components VP = (VA+VD+VI)+VE	• $V_P = V_G + V_E$ $V_P = (V_A + V_D + V_I) + V_E$