

**MARK SCHEME for the May/June 2011 question paper  
for the guidance of teachers**

**5014 ENVIRONMENTAL MANAGEMENT**

**5014/22**

Paper 2, maximum raw mark 60

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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- 1 (a) (i) world recession/lack of demand/product substitution/Ni surplus/eq; [1]
- (ii) to keep the price high/help price recover/eq; to maintain profit/reduce costs;  
(allow metal ore to last longer/eq) [2]
- (b) (i) 15 (tonnes); reject Kg or other units [1]
- (ii) large amount of overburden/soil needs to be moved/stored/noise pollution/visual pollution/dust released/habitat destruction/eq; reject pollution unqualified [1]
- (c) wear masks/eq; protective clothing/gloves/washing facilities/eq; (allow ref to controlled working hours/exposure time) [2]
- (d) (i) very few female miners/eq; [1]
- (ii) to give diseases time to develop/eq; [1]
- (iii) measure health/other causes of death in miners/non miners/eq;  
record different numbers of deaths from lung cancer in miners/non miners; [1]
- (iv) longer time; more participants; compare smoking miners with non smoking miners/smokers with non smokers; include women; record for younger age group(s);  
record time in mining industry; [2]
- (e) (i) **B**, longest contact/closest to mine and/ or mine waste; [1]
- (ii) heavy metals (normally) bio accumulate/bio magnify/accumulate;  
heavy metal passes up food chain(s)/eq;  
some small fish may die; so less food for large fish; so large fish starved/poisoned/do not reproduce; [2]
- (iii) bar graph plotted; label axes (number of mayflies/A B C D E);; plots;  
(allow population for number) [4]
- (iv) mayflies increase further away from the mine/converse statement/eq; mayflies poisoned by nickel; [2]
- (f) saves energy; less pollution/damage to the environment; mining reserves last longer;  
reduces cost of mining/cheaper than mining; [2]
- (g) (i) high level of pollution at the start/after one year;  
pollution reduced at ten years/reduces over time;  
still some pollution after ten years/eq; [2]
- (ii) *advantage* fast; fast/easy/cheap/ no skill needed/ no special equipment needed;  
*disadvantage* not a specific response to Ni/ no concentration measured/do not know how much Ni is present/ref to validity; [2]
- (iii) more than 10 yrs/11+yrs; [1]

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- (h) (i) plant Euphorbia in soil; extract water and grow mung beans/use same method; measure root growth of mung beans; [2]
- (ii) could become a dominant/invasive plant/outcompetes native plants/reduces biodiversity; could alter food chains/webs/eq; genes may pass to local plants/ hybridise with local euphorbs; could introduce a new pest/disease; [2]
- (iii) *for*: very valuable export; not highly dangerous to humans; or environment; provides jobs/income to people/country;
- against*: destroys farmland; toxic to humans/livestock/eq; and environment; does not employ many people; (max 2 if both for and against arguments given) [3]
- 2 (a) (i) October, February; [1]
- (ii) Nov–April; [1]
- (iii) 112 (days); [1]
- (b) (i) 1. lower no. of plants; less cell division/growth;  
2. fewer leaves; so less photosynthesis/growth;  
3. fewer flowers; so fewer seeds/ less reproduction; (max 4)
- (ii) (lower number/absence of) flowers; [1]
- (iii) do weevils infect other plants/crops/alter food chains/can weevils survive/eq; [1]
- (c) (i) three valid points related to source eg:  
medium/high milk yield; medium/high growth rate; low stress at high temperatures; ref to disease resistance; [3]
- (ii) table drawn; suitable headings(milk yield/days); for 7 days; [3]
- (d) (i) no (income from) milk; cost of buying new animals;  
chickens not enough of a substitute food source/eq;  
not much to sell; only cassava to eat; so have to buy in food; [2]
- (ii) better because using WH to keep/feed cattle; so milk all year;  
WH a source of food for chickens; can sell chickens/eggs; [2]
- (iii) more crops/food sources grown; so always something to eat; or to sell/more income;  
beans are N fixers; beans are a high protein food; tomatoes are a source of vitamins;  
storing dry WH helps keep cattle/milk production; [2]

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- (e) good ideas such as:
1. cattle by channel, qualified;
  2. WH dried on field edges;
  3. chickens can be moved to any field to eat crop wastes;
  4. cattle can be fed crop wastes;
  5. a rotation idea;
  6. further detail of rotation; e.g. leave a field fallow
  7. beans fix N;
  8. and 9. AVP;; such as ref to irrigation/water supply, chickens close to farmhouse for security, tomatoes need water, so in fields 1/2/3, keep chickens away from beans and tomatoes
- [4]