1 **(a)** *bars must be within potato square*

bars plotted accurately at 2.6 and 5.6 ;
shading correct according to key ; [2]

(b) **(i)** (sugar) beet ; [1]

(ii) wheat ; [1]

(c) *award three different main points as given below*
or award two marks for the main points and max one for any detail of one point

use of named appropriate machinery ; e.g. tractor / combine harvester
detail e.g. more efficient, sowing / harvesting / watering ;
(artificial) fertilisers ;
detail e.g. prevent mineral deficiencies / provide more nutrients ;
pesticides / insecticides / fungicides / AW ;
detail e.g. control, pests / diseases, feed / destroy / damage, crops ;
A reduce losses to, pests / diseases
herbicides ;
detail e.g. control / kill, weeds / competitors ;
use of, hormones / named hormone(s) ;
detail e.g. reduce vegetative growth / promote fruiting / AW ;
irrigation ; **R** 'put on (more) water'
detail e.g. prevent water becoming limiting factor / not relying on rain / AW ;
glasshouses / greenhouses ;
detail e.g. control, light intensity / carbon dioxide concentration / temperature

monoculture ;
detail e.g. easier to harvest ;

genetic engineering / gene transfer / GM ; *ignore* genetic technology
artificial selection / selective breeding ;
detail e.g. improve, growth / aspect of yield / quality / disease resistance / pest resistance ; [max 3]

(d) *idea that* water content of plants varies ; [1]

(e) *idea that* energy is lost, along a food chain / between maize and cows ; [1]

energy loss by animals to max 2
food not eaten ;
food not, digested / absorbed ; **A** egested
(chemical energy) excreted ;
heat loss ;
movement ;
respiration ; [max 2]

1 **(f)** **(** $6O_2$ **;** **R** $6O^2$ / 6O2 [1]

(ii) large surface area / broad / wide **;** **R** flat
chloroplasts / chlorophyll **;**
leaf mosaic / leaves arranged to avoid shading **;**
leaves, grow at right angles to light / move to follow the sun **;**
cuticle / epidermis, thin / transparent **;**
leaf is thin **;**
palisade cells tightly packed **;**
movement of chloroplasts towards light source **;**
AVP **;** [max 2]

(iii) root hair(s) **;**
down water potential gradient / from high to low water potential / soil has higher water potential / root has lower water potential **;**
osmosis / across partially permeable membrane **;**
A semi-permeable / selectively permeable **R** 'and active uptake'
[3]

(iv) (carbon dioxide) diffuses (from air) / ref to down diffusion gradient **;**
through stoma(ta) **;**

air spaces, between (mesophyll) cells / in leaf **;**
dissolves in water, on / in, cell wall **;**
(diffuses) through, cell wall / membrane **;**

carbon dioxide from, respiration / mitochondria **;** [max 2]

[Total: 19]

2 **(a)** ref. to presence of feathers; Ⓡ wings
ref. to presence of beak; ◯ **[2]**

(b)(i) each organism is given two names/ref. to genus and species/trivial;
suitable example (*Oxyura jamaicensis* or *Oxyura leucocephala*); **[2]**

(ii) cross-mating results in a fertile + duck/variety/offspring/sub-species/ new species;
they both belong to the + same genus/genus Oxyura;
they are attracted to each other AW; **max. [2]**

(c)(i) they also exist in America; Ⓡ they exist in Spain
Ⓡ refs to other parts of the world unqual. **[1]**

(ii)

- ref. to hunting/more predators;
- ref. to destruction of habitat;
- ref. to pollution;
- ref. to disease;
- ref. to loss of food/more competition for food or other named factor;
- ref. to change in climate/sudden change in environment;
- ref. to very small population; **max. [1]**

(d)

- food chains only show one source of food for each level in a food chain AW;
- ref. to two different organisms at secondary consumer level AW;
- ref. to no information about link between seeds and insect larvae AW;
- Ruddy duck feeds + as herbivore and carnivore/at two different levels/ as an omnivore AW/has two different sources of food;
- Ruddy ducks have two different predators AW;
- A is a straight line/a food web is a network AW; **max. [2]**

Total 10