

(b) Any feasible method e.g.

Trace the leaf outline onto a piece of clear acetate held against the leaf (1). Place the acetate over graph paper and add up the squares (1). [Allow: use of graph paper directly (1), then count squares (1).]

or Photograph all leaves using a scale adjacent to show size (1). Cut out the leaf shape, place on graph paper and add up the squares covered (1). [Allow casting image of leaf onto blue print paper and proceed as above.]

or Trace the leaf outline onto a piece of clear acetate (1). Cut out the leaf outline, weigh the piece of acetate and calculate area from knowing the mass per unit area of acetate (1).

Do not allow use of nail varnish peels. 2

(c) (A high rate of) photosynthesis. 1
Allow also refs to "more (light) energy", "increased leaf surface area contributes most" and also longer stolons, therefore, increases number of plants.

(d) (i) (Up to 650 lux), all three measures of growth are boosted, each showing an increase (or equivalent statement). Allow also refs to decreasing growth rate as light decreases. 1

(ii) All gain 2 marks even if not answered. 2
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Question 3

(a) Manx: M^oM¹ Tailed: M¹M¹ Dead embryo: M^oM^o 2
2 correct: 1 mark; 1 correct: zero. For any genotype, if more than one answer given, this loses the mark.

(b) 25%/0.25/ 1/4 1
Can also indicate in a ratio which component refers to tailed cats. If genotypes in (a) incorrect, no further penalty here.

(c) 20 1

(d) Tyrosinase activity inhibited by the core body/intra-uterine temperature of the cat (or stimulated by low temperatures) (1). After birth, the extremities experience a slightly lower temperature which allows tyrosinase to operate, so producing pigment (1).

(Alternative explanation acceptable: tyrosinase production inhibited by core temperatures.) 2

Also: If state categorically that enzyme is denatured at normal body temperature, but other information is correct - 1 mark penalty. Allow as possible answer for 1 mark: "Tyrosinase inhibits pigment production; lower turnover in cooler extremities."

Either of the two schemes below: but can use ANY pictorial representation, or even largely descriptive in words. Do NOT penalise minor slip in otherwise correct scheme.

Parental phenotypes:	Black female	x	Ginger male	Ginger female	x	Black male	
Parental genotype:	Xc^bXc^b		Xc^gY	Xc^gXc^g		Xc^bY	1

(Mark for parental genotype can be given if gametes correct, but no parental genotype given.)

Gametes	Xc^b	Xc^g	Y	Xc^g	Xc^b	Y	1
Offspring genotypes		Xc^g	Y		Xc^b	Y	
	Xc^b	Xc^bXc^g	Xc^bY	Xc^g	Xc^gXc^b	Xc^gY	
	Xc^b	Xc^bXc^g	Xc^bY	Xc^g	Xc^gXc^b	Xc^gY	1

This line not essential.

Offspring phenotypes: 2 tortoiseshell females: 2 tortoiseshell females: 1
 2 black males 2 ginger males

(This mark is for describing/translating offspring genotype. ANY effective method of conveying meaning is OK.)

If parental genotypes incorrect - try to award marks for what is correct in principle. Often mark for gametes and offspring genotypes can still be gained.

If believe there is no colour allele on X chromosome and reverse X and Y chromosomes - only 1 mark penalty.

If in cross 2, black male given as $Xc^b Yc^g$ - 2 errors made, (Y has allele; translation of genotype incorrect): Allow 2 marks for subsequent correct working.

If answer is very confused, but candidate has shown how gamete and offspring genotypes are related - 1 mark.

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Question 4

(a) Any two answers, eg,

Light reaching algae/plants beneath decreases (1) so reducing (photosynthetic) release of oxygen or leads to decreased photosynthesis (1).

Plants/algae lower down die without light (1). Their decomposition (by bacteria) uses up oxygen (1) as a result of respiration (1). (2 marks MAX)
 (Can also refer to animals dying and subsequent decomposition/respiration.)

Blanket weed provides food and encourages increased numbers of herbivores (1). The increased levels of their respiration causes a decline in oxygen (1).

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