10 Science GENETICS Term I — Practice Test

1. c.
2. a
3. b
4. b
5. c (same value as A and T are complementary bases)
6. b
7. b (in a typical heterozygous cross 25% change of homozygous recessive)

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9. male has recessive phenotype ∴ homozygous recessive (rr)
female is heterozygous (Rr)

	r	r
R	Rr	Rr
r	rr	rr

genotype = 50% Rr, 50% rr
phenotype = 50% red coat (Rr), 55% silver-black coat (rr)

10. Sex-linked (XX + XY). The question assumes colour blindness is recessive (mum is a carrier for colour blindness)
male — has recessive phenotype $X_b Y$
mum — is a carrier (heterozygous) $X_B X_b$

	X_b	Y
X_B	$X_B X_b$	$X_B Y$
X_b	$X_b X_b$	$X_b Y$

boys: 50% $X_B Y$, 50% $X_b Y$
"normal", colourblind

girls - 50% $X_B X_b$, 50% $X_b X_b$
"normal", colour blind

(a) 50% — see above
(b) 50% - see above

8. a. asexual
b. sexual
c. gene
d. 46
e. 23
f. recessive
h. dominant
i. heterozygous
j. homozygous.

11. a) Recessive. In the pedigree, 2 "normal" parents have had an affected child. This is only possible if the trait is caused by a recessive allele. This occurs twice for parents 1 & 2, and once for parents 10 & 11.

ALTERNATIVELY – Recessive. In the pedigree, the trait skipped a generation and went from grandparents (3 & 4) to grandchildren (12 & 13) without being in parents (10, 11). This is only possible if recessive

b) 1. Aa 4. aa 10 Aa 11. Aa.

12. a) Three

b) II2 - normal tooth enamel, II4 - normal, II8 - normal enamel

c) (brother-sister) siblings

d) Assumption made that this trait is caused by a dominant allele (see answer to e)

I2 - Ff, II2 - ff, II4 - ff, II6 - Ff, II8 - ff,
III2 - Ff, III4 - ff, III6 - ff, III8 - ff, III10 - Ff

e) Actually could be either, no proof it is recessive and both assumptions work for this pedigree. Because it did NOT skip a generation I have assumed it is a dominant allele, but this is NOT proof.

f) Assuming it is dominantly inherited, I1 would be homozygous recessive.

Assuming it is recessively inherited, I1 would be heterozygous

13. Darwin's theory of evolution would explain future change by

- Penguins will continue to have more chicks than can survive
- The chicks will continue to be different colours including white & grey
- The environmental change would mean that non-white chicks would be better adapted and more likely to survive to adulthood and have offspring
- This trait (non-white) would be inherited by the next generation
- The next generation of penguins (after the climate change) would mainly be non-white (grey)