KEY

Biology 30 – Monohybrid / Dihybrid Crosses Quiz A

/27

Answer the following questions and show all of your work.

In shorthorn cattle, coat color may be red, white, or roan. Crosses between a red bull and a white cow produce only roan offspring.

1. If a roan shorthorn is crosses with a white-coated shorthorn, what is the probability that the offspring will be a roan shorthorn? (4 marks) **Answer:** 0.50 or 50%

$C^RC^W \times C^WC^W$

	C^R	C^W
C^W	C^RC^W	C^WC^W
C^W	C^RC^W	C^WC^W

50% roan

50% white

Use the following information to answer the next question

Dominance Hierarchy and Symbols for Eye Colour in *Drosophila* (Fruit Fly)

Phenotype	Genotypes	Dominant to
Wild type	E^1E^1 and E^1E^2 and E^1E^3 and E^1E^4	Apricot and honey and white
Apricot	E^2E^2 and E^2E^3 and E^2E^4	Honey and white
Honey	E^3E^3 and E^3E^4	White
White	E^4E^4	

2. Which row correctly identifies the probability of certain offspring being produced from a cross of a wild-type fly carrying the allele for white and a wild type fly carrying the allele for apricot? (4 marks)

	Probability of Producing Offspring with a Certain Eye Color			
Row	**Wild type**	**Apricot**	**Honey**	**White**
A	1.00	0.00	0.00	0.00
(B)	0.75	0.25	0.00	0.00
C	0.50	0.50	0.00	0.00
D	0.25	0.25	0.25	0.25

$E^1E^4 \times E^1E^2$

	E^1	E^4
E^1	E^1E^1	E^1E^4
E^2	E^1E^2	E^2E^4

3 wild : 1 apricot

0.75 wild, 0.25 apricot

I^AI^A or I^Ai ii

3. A man of unknown genotype with blood type A and a woman with blood type O are going to have a child. Depending on the man's genotype, the minimum probability that the child will have blood type O is zero. What is the maximum probability that the child will have blood type O? (4 marks)
Answer: 0.50 or 50% ↳ need i ∴ make man I^Ai for max probability

$I^Ai \times ii$

	I^A	i
i	I^Ai	ii
i	I^Ai	ii

$\frac{2}{4}$ or 0.50 or 50% maximum probability

In garden peas, the allele for tall plant height (T) is dominant over the allele for short plant height (t) and the allele for round seed shape (R) is dominant over the allele for wrinkled seed shape (r). The genes for these traits assort independently.

TTrr Ttrr TTRR TTRr TtRR TtRR

4. Consider the cross:
Plant I (tall-wrinkled seeds) X Plant II (tall-round seeds)
Which row correctly identifies the gametes that might be produced by these plants?

Tr, tr or TR

Row	Gametes Produced by Plant I	Gametes Produced by Plant II
A	Tr or tr only ✓	TR, Tr, tR, or tr ✓
B	TR, Tr, tR, or tr	TR, Tr, tR, or tr
C	Tr or tr only ✓	TR or tr only
D	TR, Tr, tR, or tr	TR or tr only

Place the gametes you have chosen in a dihybrid punnett square and identify the phenotypes (fraction) of the offspring. (6 marks)

	TR	Tr	tR	tr
Tr	TTRr	TTrr	TtRr	Ttrr
tr	TtRr	Ttrr	ttRr	ttrr

$\frac{3}{8}$ tall, round

$\frac{1}{8}$ short, wrinkled

$\frac{3}{8}$ tall, wrinkled

$\frac{1}{8}$ short, round

F - free
f - attached

Part B – Multiple Choice

In humans, the gene for free earlobes, F, is dominant to the gene for attached earlobes, f. A man with attached earlobes, whose father had free earlobes and whose mother had attached earlobes, marries a woman with free earlobes. The women's mother had attached earlobes and her father had free earlobes.

ff — F? — ff — Ff or FF

1. What is the man's genotype?
   a. FF
   b. Ff
   (c) ff
   d. unable to determine
   e. attached

2. What is the woman's genotype?
   a. FF
   (b) Ff
   c. ff
   d. unable to determine
   e. free

3. What is the genotype of the woman's father?
   a. FF
   b. Ff
   c. ff
   (d) unable to determine
   e. free

4. If the man and the woman have four children, how many would be expected to have attached earlobes? ff
   Ff x ff

	F	f
f	Ff	ff
f	Ff	ff

   a. 0
   b. 1
   (c) 2
   d. 4
   e. 3

5. How many of the children would be expected to have free earlobes?
   a. 0
   b. 1
   (c) 2
   d. 4
   e. 3

6. How many of the children would be expected to have the genotype FF?
   (a) 0
   b. 1
   c. 2
   d. 4
   e. 3

7. In pea plants, yellow seeds (Y) are dominant over green seeds (y). If one parent and all the offspring are homozygous dominant, the second parent:
   (a) has yellow seeds
   b. could be homozygous recessive.
   c. has genotype Yy. Yy
   d. has a phenotype different from the offspring's.

YY x — → YY

8. In rabbits spotted coat *(S) is* dominant over solid coat (s). If a test cross results in all offspring having spotted coats, what were the parents' genotypes?
   a. SS and SS not a testcross
   (b) SS and ss
   c. Ss and ss
   d. ss and ss

	S	S
S	Ss	Ss
S	Ss	Ss

9. In a case of incomplete dominance where one parent is homozygous recessive and the other parent is homozygous dominant, all of the following are true EXCEPT:
   (a) All the F1 generation have a phenotype different from both parents.
   b. The F2 generation have a phenotypic ratio of 1:2:1.
   (c) The genotype of the F1 generation is heterozygous.
   d. The F1 phenotype is recessive to the two parental phenotypes.

both work.

Snapdragons; create new phenotype

	C^R	C^R
C^W	C^RC^W	C^RC^W
C^W	C^RC^W	C^RC^W