

# Identifying Reasoning

## Teacher key

### 1. Choose the best reasoning to complete the argument below.

**Observation** Two light tan mice had a baby mouse pup with dark brown fur.

**Question** How did light parents produce a pup with dark fur?

**Claim** In at least one of the parents' gametes (reproductive cells), mutation of the MC1R gene generated a new allele that caused the mouse pup to have dark fur.

- Evidence**
- Genetic testing showed that the two light-colored mice are definitely the parents of the dark-colored pup.
  - DNA sequencing revealed that the mouse pup has an allele of the MC1R gene that causes more black pigment to be made in the fur.
  - Neither parent has a copy of this dark MC1R allele.

Which of the following statements provides the **best reasoning** to justify why the evidence supports the claim?

- a. Mutation is a natural process that generates genetic variation.
- b. DNA is passed from parents to offspring so that each offspring gets half of their genetic information from their father and half from their mother.
- c. The dark MC1R allele is dominant to the light MC1R allele.
- d.** Since offspring inherit DNA from their parents, if neither parent carried the dark MC1R allele, mutation in a parent's sex cell must have generated the allele.
- e. Mutation happens when errors are made in copying the DNA, sometimes as a result of environmental causes.

**2. Complete the argument: Draw a line to match the evidence to the relevant reasoning.**

**Claim:** A disease in rats is caused by having an allele of the C gene called C<sup>2</sup>.

EVIDENCE	(connect the dots)	REASONING
No healthy rats have the C <sup>2</sup> allele.		If a single copy of the C <sup>2</sup> allele causes the disease, then diseased rats will always have at least one copy of the C <sup>2</sup> allele.
Every rat with the disease has at least one copy of the C <sup>2</sup> allele.		If a single copy of the C <sup>2</sup> allele causes the disease, then putting the C <sup>2</sup> allele into rats with normal C alleles will give them the disease.
When a C <sup>2</sup> allele is put into rat embryos whose parents had only normal alleles of the C gene, the embryos have the disease when they grow up.		If a single copy of the C <sup>2</sup> allele causes the disease, then healthy rats will never have the C <sup>2</sup> allele.

**3. a. Use the information below to fill in the table.**

**Observation** Some dogs have curly hair, and others have straight hair.

**Question** Does the K gene influence hair texture in dogs?

**Claim** Having at least one K<sup>C</sup> allele causes curly hair in dogs.

(Check the appropriate box)

EVIDENCE	Supports claim	Does not support claim	
		Not related to claim	Opposes claim
All dogs have two alleles of the K gene.		✓	
All dogs with a K <sup>C</sup> allele have curly hair.	✓		
No dogs with straight hair have a K <sup>C</sup> allele.	✓		
Some dogs have wavy hair.		✓	

**b.** For one piece of evidence that supports the claim, **provide the reasoning** that connects the evidence to the claim.

*You may want to prompt your students to model their answers on the evidence in the table.*

(All dogs with a K<sup>C</sup> allele have curly hair)

If having a K<sup>C</sup> allele causes curly hair, then all dogs that have a K<sup>C</sup> allele should have curly hair.

(No dogs with straight hair have a K<sup>C</sup> allele)

If having a K<sup>C</sup> allele causes curly hair, then no dogs that have a K<sup>C</sup> allele should have straight hair.