STUDENT RESPONSE HANDOUT

Investigating mutations

Name _____ Class _____ Date _____

A small DNA change has appeared. Follow its effects from the gene to the protein. Use the reusable class set for all information. Write and draw only on this handout.

1 Find the changes

Compare Cases A, B, and C with the original DNA. For each, name the mutation type and describe exactly what was replaced, added, or removed.

Case A

Case B

Case C

2 Follow the instructions

Use the lookup table to write the amino acid charge sequence (+, -, or 0) for each case. Include every amino acid in order.

Case A

Case B

Case C

3 Make a prediction

In the original chain, amino acids 1 and 6 have opposite charges. Which case removes that particular attraction by changing a charge? Which case removes it by losing an amino acid? Explain using the sequences you wrote.

Continue on page 2 to draw what could happen to the chains.

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Draw possible protein shapes

4 Draw a possible 2D shape for each case. Use numbered circles labeled +, -, or 0. Keep the sequence in order and use solid lines between neighbors. Use dashed lines for possible attractions between non-neighboring opposite charges. More than one shape may be reasonable.

Case A

Case B

Case C

5 What is evidence and what is a prediction

Choose one drawing. State one change that the DNA and lookup table show directly. Then state one prediction you made about the protein. Explain why the drawing does not prove whether it still works.

6 Different changes have different effects

Classify Examples 1, 2, and 3 on class set page 2 as neutral, harmful, or beneficial in the stated environment. For each, give a detail that supports your choice.

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Explain a body effect

7 Build a model of Marfan syndrome

How could a change too small to see affect an eye or a blood vessel? Choose the eye lens or the aorta. Draw a labeled 2D model that connects the following parts. Use arrows and short labels to explain what each change causes.

A chromosome containing the FBN1 gene → a mutation in that gene → a change in fibrillin or its availability → altered supporting fibers → an effect on your chosen body part

You may use simple sketches and labeled shapes. You do not need to draw an exact fibrillin structure. Your model should show the mechanism described in the reading.

Explain your model. Use at least two specific details from the Marfan evidence. Explain how a change in the supporting structures can affect what the body part does.

8 Think about the model

A student says, “Any mutation makes a protein useless.” Use the worked example to respond. Then identify one way the charge drawings help explain proteins and one feature of real proteins they leave out.