8. A research team has genetically engineered a strain of fruit flies to eliminate errors during DNA replication. The team claims that this will eliminate genetic variation in the engineered flies. A second research team claims that eliminating errors during DNA replication will not entirely eliminate genetic variation in the engineered flies.

   (a) **Provide** ONE piece of evidence that would indicate new genetic variation has occurred in the engineered flies.

   (b) **Describe** ONE mechanism that could lead to genetic variation in the engineered strain of flies.

   (c) **Describe** how genetic variation in a population contributes to the process of evolution in the population.

STOP

END OF EXAM

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Question 8

A research team has genetically engineered a strain of fruit flies to eliminate errors during DNA replication. The team claims that this will eliminate genetic variation in the engineered flies. A second research team claims that eliminating errors during DNA replication will not entirely eliminate genetic variation in the engineered flies. (**3 points maximum**)

(a) **Provide** ONE piece of evidence that would indicate new genetic variation has occurred in the engineered flies. (**1 point**; LO 1.10)

Piece of evidence
- New phenotypes
- Different DNA sequence
- New genotypes
- Chromosomal differences
- Different mRNA sequence
- Protein with different amino acid sequence

(b) **Describe** ONE mechanism that could lead to genetic variation in the engineered strain of flies. (**1 point**; LO 3.28)

Describe mechanism
- Sexual reproduction produces offspring with new combinations of alleles/traits
- Meiosis produces new combinations of alleles/traits
- Crossing over produces new combinations of alleles/traits
- Independent assortment produces new combinations of alleles/traits
- Random fertilization produces new combinations of alleles/traits
- Immigration/gene flow introduces new alleles/gene sequences
- Viral infection inserts DNA into genome
- Nondisjunction causes anomaly in chromosome number
- Chromosomal rearrangements (e.g., large deletions, duplications, translocations, inversions, transposons, etc.) inactivate genes or result in multiple copies of genes
- Radiation or chemicals or mutagens induce mutations/changes in DNA

(c) **Describe** how genetic variation in a population contributes to the process of evolution in the population. (**1 point**; LO 1.25)

Description
- Genetic variation is the basis of phenotypic variation that can be acted upon by natural selection
- Without genetic variation, there is no phenotypic variation on which natural selection can act