

Module 6.3 Practice FRQ

polymerase during transcription.

(b) **Identify** the dependent variable in the experiments. **Identify** a control group missing from the second experiment. **Justify** the need for this control group in the second experiment.

(c) **Describe** the effect of amanitin on the maximum elongation rate for the wild-type and modified RNA polymerases. **Determine** the ratio of the average maximum elongation rate for the modified RNA polymerase compared to the wild strain RNA polymerase in Figure 1.

(d) **State the null hypothesis** for the experiment in Figure 1. **Provide reasoning to justify** the claim that the change in the amino acid sequence in the modified RNA polymerase affected the shape of the active site on the enzyme.

Part A

Select a point value to view scoring criteria, solutions, and/or examples and to score the response.



0	1	2
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The response includes both of the following criteria.

- ☐ A description that an RNA nucleotide has the following three structural components: a five-carbon sugar (ribose), a phosphate group, and a nitrogen base (adenine, cytosine, guanine, or uracil)
- ☐ An acceptable explanation of the role of RNA polymerase.
Acceptable explanations include the following.
 - RNA polymerase synthesizes a new RNA molecule based on a DNA template by matching the current DNA base with the proper RNA complement.
 - RNA polymerase joins/bonds the newly paired RNA nucleotide and the growing RNA strand with a covalent bond.

Part B

Select a point value to view scoring criteria, solutions, and/or examples and to score the response.



0	1	2	3
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The response includes all of the following criteria.

- ☐ The dependent variable is identified as the maximum elongation rate of the mRNA.
- ☐ An acceptable control group missing from the second experiment is identified. Acceptable control groups include the following.
 - Wild strain from the first experiment without amanitin

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- ☐ - Experimental strain from the first experiment without amanitin
- ☐ The justification that the missing control is needed because the effect of amanitin on the maximum elongation rate cannot be determined without comparison to the maximum elongation rate under the same conditions without amanitin

Part C

Select a point value to view scoring criteria, solutions, and/or examples and to score the response.



0	1	2
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The response includes all of the following criteria.

- ☐ A description that amanitin decreases the maximum elongation rate for the wild strain and does not affect the rate in the experimental strain
- ☐ The ratio of the average maximum elongation rate for the modified RNA polymerase compared to the wild strain RNA polymerase is determined to be 1 : 6 / 1/6 / 1 to 6.

Part D

Select a point value to view scoring criteria, solutions, and/or examples and to score the response.



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The response includes all of the following criteria.

- ☐ An acceptable null hypothesis is provided. Acceptable null hypotheses include the following.
- The modified RNA polymerase would not affect the maximum elongation rate.
 - Any difference between the two elongation rates is due to chance.
- ☐ A description that a change to the active site would explain the decrease in the elongation rate is provided as reasoning to justify the claim.