**MCAS High School Biology and Introductory Physics**

**Test Information**

This document describes the question types and test design for the MCAS High School Biology and Introductory Physics tests. It also provides information about the reporting categories for the tests. The tests are aligned to the [2016 Massachusetts Science and Technology/Engineering Curriculum Framework](http://www.doe.mass.edu/frameworks/scitech/2016-04.pdf). Each test has two sessions.

**Question Types**

The following table contains information about the question types on the tests. Questions may be either selected-response or constructed-response.

|  | **Question Type** | **Total Points** |
| --- | --- | --- |
| **Selected-Response Questions1** | Multiple Choice*Students select one correct answer from among several answer options.* | 1 or 2 |
| Multiple Select*Students select more than one correct answer from among several answer options.* | 1 or 2 |
| Technology Enhanced*Students taking the computer-based tests answer questions using technology, such as drag-and-drop, hot spot, and drop-down menus.*  | 1 or 2 |
|  | Constructed Response2*Students write a response to a multi-part question.* | 3 or 4 |

1 These question types are machine-scored. Two-point questions typically consist of multiple parts. Students may earn partial credit on two-point questions.
2 The written portions of the constructed-response questions are human-scored.

**Test Design**

Each test includes both common and matrix questions. Common questions count toward a student's score, while matrix questions are either field-test or equating questions and do not count toward a student's score.

Common Questions

Students complete a variety of question types as described above. Information about the number of common questions by points for each test is in the tables below.

**Common Questions on the High School Biology Test3**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **­** | **1-pt. Selected-Response Questions** | **2-pt. Selected-Response Questions** | **3-pt. Constructed-Response Questions** | **4-pt. Constructed-Response Questions** | **Total** |
| **Number of Questions** | 32 | 5 | 2 | 3 | 42 |
| **Points** | 42 | 6 | 12 | 60 |

3 The Biology test design includes two common modules, each consisting of a group of questions associated with a scenario or phenomenon. Each module is worth a total of 8 points and includes three 1-point selected-response questions, one 2-point selected-response question, and one 3-point constructed-response question.

**Common Questions on the High School Introductory Physics Test4**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **­** | **1-pt. Selected-Response Questions** | **2-pt. Selected-Response Questions** | **3-pt. Constructed-Response Questions** | **4-pt. Constructed-Response Questions** | **Total** |
| **Number of Questions** | 34 | 4 | 2 | 3 | 43 |
| **Points** | 42 | 6 | 12 | 60 |

4 The Introductory Physics test design includes two common modules, each consisting of a group of questions associated with a scenario or phenomenon. As of spring 2024, each module is worth a total of 6 points and includes three 1-point selected-response questions and one 3-point constructed-response question.

Matrix Questions

In addition to common questions, students complete matrix (field-test and equating) questions that vary by test form. These matrix questions do not count toward a student’s score. The total number of matrix questions in both test sessions are in the table below.

**Matrix Questions on the High School Biology and Introductory Physics Tests**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **­** | **1-pt. Selected-Response Questions** | **2-pt. Selected-Response Questions** | **Constructed-Response Questions (3 pt. or 4 pt.)** | **Total** |
| **Biology** | 11 | 3 | 2 | 16 |
| **Introductory Physics** | 13 | 2 | 2 | 17 |

**Reporting Categories**

All questions are coded to one content standard from the [2016 Massachusetts Science and Technology/Engineering Curriculum Framework](http://www.doe.mass.edu/frameworks/scitech/2016-04.pdf). The percentage of points for each content reporting category is shown in the tables below.

**Biology Content Reporting Category Percentages (+/−5%)**

|  |  |
| --- | --- |
| **Reporting Category** | **Percentage** |
| Molecules to Organisms | 35% |
| Heredity | 25% |
| Evolution | 20% |
| Ecology | 20% |

**Introductory Physics Content Reporting Category Percentages (+/−5%)**

|  |  |
| --- | --- |
| **Reporting Category** | **Percentage** |
| Motion, Forces, & Interactions | 50% |
| Energy | 30% |
| Waves | 20% |

In addition to the content reporting categories, at least 50% of the questions are coded to an MCAS Practice Category. These questions are dually coded, meaning that they are coded to both a content category and a practice category. The table lists the science and engineering practices associated with each MCAS Practice Category.

**Science and Engineering Practices Assessed on MCAS**

| **MCAS Practice Category** | **Science and Engineering Practices** |
| --- | --- |
| A. Investigations and Questioning | Asking Questions and Defining ProblemsPlanning and Carrying Out Investigations |
| B. Mathematics and Data | Analyzing and Interpreting DataUsing Mathematics and Computational Thinking |
| C. Evidence, Reasoning, and Modeling | Developing and Using ModelsConstructing Explanations and Designing SolutionsEngaging in Argument from EvidenceObtaining, Evaluating, and Communicating Information |

***Notes about the practices:*** Each content standard includes a reference to one science and engineering practice. For example, standard HS-PS3-2 states:

*Develop and use a model to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles and objects or energy stored in fields.*

Although only a single practice is referenced within each standard, different practices may be assessed with the associated content. In the example above, questions assessing standard HS-PS3-2 may assess practices in addition to the developing and using models practice, such as constructing explanations or analyzing and interpreting data.

Each released question that assesses a practice will be coded to one of the three practice categories listed in the table. However, when reporting results by reporting category, a general “Science and Engineering Practices” reporting category will be used. Results are not reported on each MCAS Practice Category due to the limited number of questions.