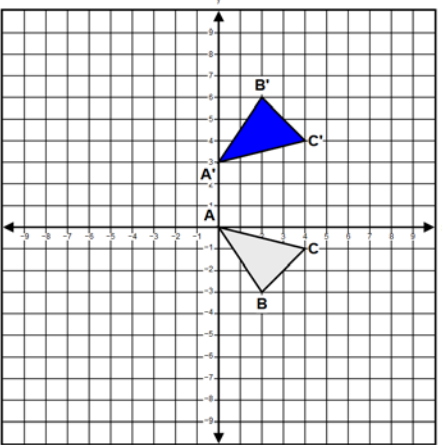


Grade 10 Mathematics Computer-Based Practice Test Answer Key

In April 2018, grade 10 students participated in a field test of the next-generation MCAS Mathematics assessment, which included new question types that align to the standards (<http://www.doe.mass.edu/mcas/tdd/math.html?section=nextgen>) in the [2017 Massachusetts Mathematics Curriculum Framework](#). This practice test is made up of questions from the field test. The purpose of the practice test is to increase students' familiarity with the new question types and to show examples of how the new content based on the grades 9 and 10 standards will be assessed on the operational test. The practice test has a much larger percentage of technology-enhanced questions than the operational test will have, and has a large percentage of content that was not previously assessed on the legacy MCAS. The practice test should not be used to evaluate how students will do on the next-generation operational test. The test design for the grade 10 operational test can be found [here](#).

The following pages include the answer key for all machine-scored items, followed by rubrics for the hand-scored items. The rubrics also show sample student responses; other valid methods for solving a problem can earn full credit unless a specific method is required by the item. In items where the scores are awarded for full and partial credit, students can still earn points for reasoning or modeling even if they make a computation error.

Session 1

| Item Number | Item Type | Answer Key | Number of Points | Standard |
|-------------|-----------|---|------------------|------------|
| 1 | SR | B | 1 | G.GPE.B.5 |
| 2 | SR | C | 1 | G.CO.D.12 |
| 3 | SA | 900 | 1 | G.CO.C.11 |
| 4 | CR | <i>See Rubric on pages 5 and 6.</i> | 4 | A.REI.D.12 |
| 5 | SA | $T = \frac{PV}{nR}$ | 1 | A.CED.A.4 |
| 6 | SA |  | 1 | G.CO.A.5 |
| 7 | SR | Part A: | 2 | N.RN.B.3 |

| Expression | Rational | Irrational |
|--------------------------------------|----------------------------------|----------------------------------|
| $3\sqrt{9} \cdot \sqrt{2}$ | <input type="radio"/> | <input checked="" type="radio"/> |
| $\frac{\sqrt{9}}{\pi}$ | <input type="radio"/> | <input checked="" type="radio"/> |
| $\frac{\pi\sqrt{24}}{\sqrt{6\pi^2}}$ | <input checked="" type="radio"/> | <input type="radio"/> |
| $-\sqrt{3} + 2$ | <input type="radio"/> | <input checked="" type="radio"/> |

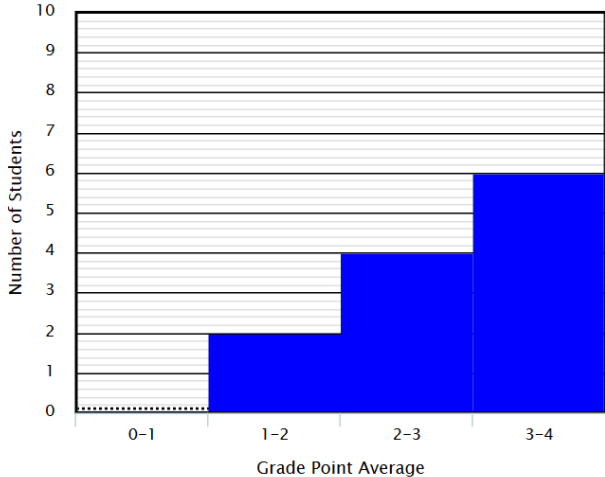
Part B:

The expression is because is/are .

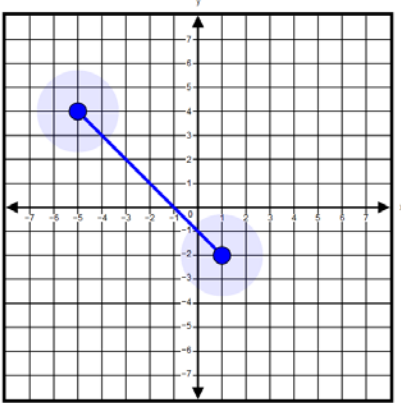
| | | | | |
|---|----|--|---|-----------|
| 8 | SA | <p style="text-align: center;">Two-Day Hike</p> | 1 | A.CED.A.2 |
|---|----|--|---|-----------|

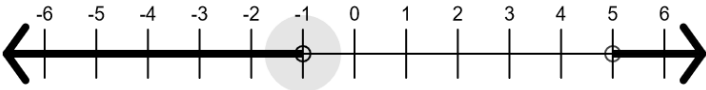
| | | | | |
|---|----|---|---|----------|
| 9 | SR | <div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="border: 1px solid blue; padding: 5px; margin: 5px;">$t^{\frac{1}{3}}$</div> <div style="border: 1px solid blue; padding: 5px; margin: 5px;">$t^{\frac{2}{3}}$</div> <div style="border: 1px solid blue; padding: 5px; margin: 5px;">$t^{\frac{3}{2}}$</div> <div style="border: 1px solid blue; padding: 5px; margin: 5px;">$\frac{t^{\frac{1}{3}}}{t^{\frac{2}{3}}}$</div> <div style="border: 1px solid blue; padding: 5px; margin: 5px;">$\frac{t^{\frac{2}{3}}}{t^{\frac{1}{3}}}$</div> <div style="border: 1px solid blue; padding: 5px; margin: 5px;">$\frac{t^{\frac{4}{3}}}{t}$</div> </div> | 1 | N.RN.A.1 |
|---|----|---|---|----------|

| | | | | |
|----|----|------------------------------|---|----------|
| 10 | SA | 160 | 1 | G.C.A.2 |
| 11 | CR | <i>See Rubric on page 7.</i> | 4 | F.BF.B.3 |

| | | | | |
|----|----|---|---|----------|
| 12 | SA | <p style="text-align: center;">Grade Point Averages of Students</p>  | 1 | S.ID.A.1 |
| 13 | SR | B | 1 | N.Q.A.2 |

Session 2

| Item Number | Item Type | Answer Key | Number of Points | Standard |
|-------------|-----------|---|------------------|-----------|
| 1 | SR | A | 1 | F.IF.B.5 |
| 2 | SR | A, B, D | 1 | G.CO.B.6 |
| 3 | SR | B | 1 | N.Q.A.3 |
| 4 | CR | <i>See Rubric on page 8.</i> | 4 | S.ID.A.3 |
| 5 | SA | 7.5 | 1 | G.SRT.B.5 |
| 6 | SR | D | 1 | F.IF.A.1 |
| 7 | SR | Part A: 4 Part B: $(x - \boxed{3})^2 + (y - \boxed{-5})^2 = \boxed{16}$ | 2 | G.GPE.A.1 |
| 8 | SR | C | 1 | F.LE.B.5 |
| 9 | SA |  | 1 | G.SRT.A.1 |

| | | | | |
|----|----|--|---|-----------|
| 10 | SR | <p>Events X and Y are <input type="text" value="independent"/> events because the equation <input type="text" value="(0.4)(0.6) = 0.24 is true"/>.</p> | 1 | S.CP.A.2 |
| 11 | CR | <i>See Rubric on page 9.</i> | 4 | G.SRT.C.7 |
| 12 | SA |  | 1 | A.REI.B.3 |
| 13 | SR | A | 1 | G.GMD.A.1 |

Scoring Rubric for Grade 10 Practice Test

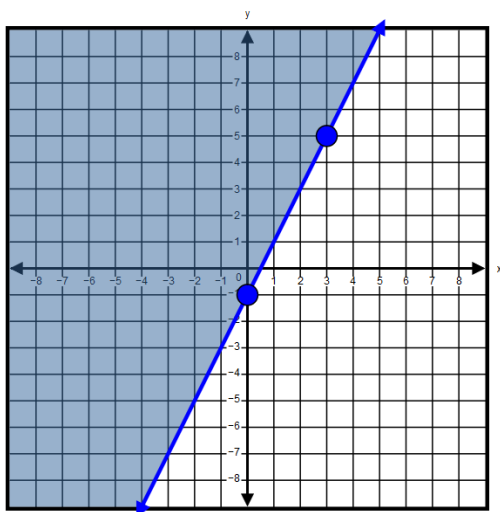
Session 1, Item #4

Scoring Guide:

| Score | Description |
|-------|--|
| 4 | The student response demonstrates an exemplary understanding of the Algebra concepts involved in representing and solving inequalities graphically. The student correctly graphs an inequality and a system of inequalities, and identifies ordered pairs that satisfy both. |
| 3 | The student response demonstrates a good understanding of the Algebra concepts involved in representing and solving inequalities graphically. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points. |
| 2 | The student response demonstrates a fair understanding of the Algebra concepts involved in representing and solving inequalities graphically. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points. |
| 1 | The student response demonstrates a minimal understanding of the Algebra concepts involved in representing and solving inequalities graphically. |
| 0 | The student response contains insufficient evidence of an understanding of the Algebra concepts involved in representing and solving inequalities graphically to merit any points. |

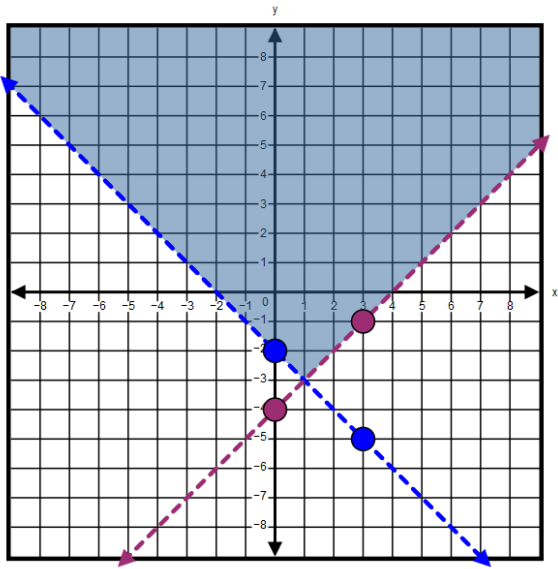
Sample Response:

A:



B: $(-5,0)$; This point is located in the shaded region of my graph.

C:



D: $(0,2)$; This point is located in the shaded regions of both graphs.

Scoring Rubric for Grade 10 Practice Test

Session 1, Item #11

Scoring Guide:

| Score | Description |
|-------|---|
| 4 | The student response demonstrates an exemplary understanding of the Functions concepts involved in building new functions from existing functions. The student correctly compares transformations of a function, and then graphs the function over a different transformation. |
| 3 | The student response demonstrates a good understanding of the Functions concepts involved in building new functions from existing functions. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points. |
| 2 | The student response demonstrates a fair understanding of the Functions concepts involved in building new functions from existing functions. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points. |
| 1 | The student response demonstrates a minimal understanding of the Functions concepts involved in building new functions from existing functions. |
| 0 | The student response contains insufficient evidence of an understanding of the Functions concepts involved in building new functions from existing functions to merit any points. |

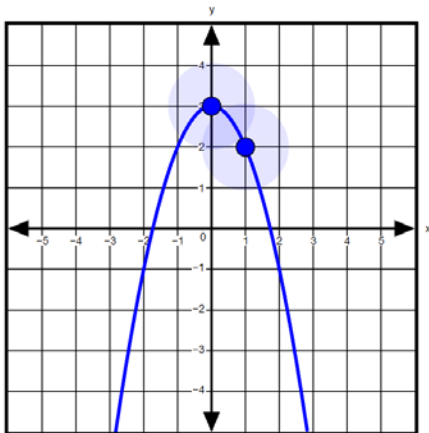
Sample Response:

A. 2

B. -7 ; Since $f(4) = 2$, then $2+k = -5$ and $k = -7$.

C. $f(x)+3$ shifts $f(x)$ up 3 units, where $f(x+3)$ shifts $f(x)$ left 3 units.

D.



Scoring Rubric for Grade 10 Practice Test:

Session 2, Item #4:

Scoring Guide:

| Score | Description |
|-------|--|
| 4 | The student response demonstrates an exemplary understanding of the Statistics and Probability concepts involved in summarizing, representing, and interpreting data on a single count or measurement variable. The student correctly analyzes a set of data and determines how an outlier and its removal affects the center and spread of the data.. |
| 3 | The student response demonstrates a good understanding of the Statistics and Probability concepts involved in summarizing, representing, and interpreting data on a single count or measurement variable. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points. |
| 2 | The student response demonstrates a fair understanding of the Statistics and Probability concepts involved in summarizing, representing, and interpreting data on a single count or measurement variable. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points. |
| 1 | The student response demonstrates a minimal understanding of the Statistics and Probability concepts involved in summarizing, representing, and interpreting data on a single count or measurement variable. |
| 0 | The student response contains insufficient evidence of an understanding of the Statistics and Probability concepts involved in summarizing, representing, and interpreting data on a single count or measurement variable to merit any points. |

Sample Response:

- A. first quartile score = 2; median score = 2.5; third quartile score = 5
- B. 3; $5 - 2 = 3$
- C. Because of this outlier, this data is skewed to the right.
- D. 0.8; $3.4 - 2.6 = 0.8$

Scoring Rubric for Grade 10 Practice Test

Session 2, Item #11:

Scoring Guide:

| Score | Description |
|-------|--|
| 4 | The student response demonstrates an exemplary understanding of the Geometry concepts involved in defining trigonometric ratios and solving problems involving right triangles. The student correctly describes the relationship between sine and cosine of complementary angles in a triangle. |
| 3 | The student response demonstrates a good understanding of the Geometry concepts involved in defining trigonometric ratios and solving problems involving right triangles. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points. |
| 2 | The student response demonstrates a fair understanding of the Geometry concepts involved in defining trigonometric ratios and solving problems involving right triangles. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points. |
| 1 | The student response demonstrates a minimal understanding of the Geometry concepts involved in defining trigonometric ratios and solving problems involving right triangles. |
| 0 | The student response contains insufficient evidence of an understanding of the Geometry concepts involved in defining trigonometric ratios and solving problems involving right triangles to merit any points. |

Sample Response:

A. $B; \frac{FG}{EG}$

B. They are equal; $\sin(x) = \frac{FG}{EG}$ and $\cos(\angle G) = \frac{FG}{EG}$ therefore they are equal.

C. 60° ; We have shown that $\sin(x) = \cos(90 - x)$. In this case, $x = 30^\circ$, so $90^\circ - 30^\circ = 60^\circ$.

D. $(90^\circ - x)$