

## ADDITIONAL PRACTICE ITEMS ANSWER KEY

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
1	MGSE9-12.G.SRT.3	1	A	The correct answer is choice (A) because when the third angle is found, corresponding angles are congruent. Choices (B), (C), and (D) are incorrect because they have angle measures that are different than the original triangle.
2	MGSE9-12.G.CO.13	2	N/A	See scoring rubric and exemplar responses on page 171.
3	MGSE9-12.G.SRT.5	3	N/A	See scoring rubric and exemplar responses beginning on page 172.
4	GSE-1: G.SRT.5	2	Part A: C Part B: D	See scoring rubric on page 174.
5	MGSE9-12.G.SRT.7	1	D	The correct answer is choice (D) because the angles are complements, the sine of an angle is equal to the cosine of the angle's complement. Choices (A), (B), and (C) are incorrect because they do not correspond to any trigonometric identities.
6	GSE-1: G.SRT.7	2	Part A: B/D Part B: B	See scoring rubric on page 175.
7	MGSE9-12.G.GPE.4	2	D	The correct answer is choice (A) because the point (0, 5) is only 5 units away from the center of the circle. Choices (B), (C), and (D) are incorrect because they are 10 units away from the center of the circle.
8	MGSE9-12.G.SRT.8	2	N/A	See scoring rubric and exemplar responses on page 176.
9	MGSE9-12.G.C.5	2	N/A	See scoring rubric and exemplar responses on page 177.
10	GSE-1: G.C.2	3	B/D/E	See scoring rubric on page 178.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
11	MGSE9-12.G.C.2	2	D	The correct answer is choice (D) because $m \widehat{CD}$ is $80^\circ$ , $m \angle DAC$ is $40^\circ$ . Since the angles in a triangle add to $180^\circ$ , $m \angle AOB$ is $50^\circ$ ; if $2x = 50$ , then $x = 25$ . Choice (A) is incorrect because it is the $m \angle OAB$ . Choice (B) is incorrect because the answer is true only if the triangle is isosceles. Choice (C) is incorrect because it is the $m \angle AOB$ , not the value of $x$ .
12	MGSE9-12.G.MD.1	2	N/A	See scoring rubric and exemplar responses on page 179.
13	MGSE9-12.G.CO.5	1	B	The correct answer is choice (B) Triangle $ABC$ is reflected across the line $x = 3$ . Then it is translated 6 units down. Choice (A) is incorrect because the triangle is translated more than 2 units down. Choices (C) and (D) are incorrect because rotating the triangle after the translation would not yield the correct orientation of the triangle $QRS$ .
14	MGSE9-12.G.CO.2	1	C	The correct answer is choice (C) dilation by a scale factor of 2. When a figure is dilated, its line segments are either increased or decreased by a scale factor to form a similar figure. Choices (A), (B), and (D) are incorrect because these are rigid transformations that move the figure on the plane without affecting side lengths.
15	MGSE9-12.G.CO.2	2	A	The correct answer is choice (A) $(6, -3)$ . Rotating the figure 270 degrees counterclockwise about the origin is the same as rotating it clockwise 90 degrees. Therefore, the figure would be in the 4th quadrant and point $R$ would be at $(6, -3)$ . Choices (B) and (C) are incorrect because they are in the 2nd quadrant. Choice (D) is incorrect because even though it is in the 4th quadrant, the coordinate points are wrong.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
16	MGSE9-12.G.GPE.7	2	B	<p>The correct answer is choice (B) 25.6 units. Apply the distance formula to find the length of one side, which is 6.4. Since this is a square, multiply 6.4 by 4 to obtain the perimeter. Choice (A) is incorrect because the number of unit squares on a line segment were counted to estimate the length and then multiplied by 4. Choice (C) is incorrect because the number of unit squares across the square were counted to estimate the length and then multiplied by 2. Choice (D) is incorrect because it is the approximate area of the square.</p>
17	MGSE9-12.G.GPE.6	2	C	<p>The correct answer is choice (C) (5, 9.2). The rise from <math>Q</math> to <math>R</math> is 5 and the run from <math>Q</math> to <math>R</math> is 7. Multiply each value by the ratio <math>\frac{3}{5}</math> and then add that amount to the original coordinates (starting point) to find the <math>x</math>- and <math>y</math>-values for point <math>P</math>. Choice (A) is incorrect because these are the <math>x</math>- and <math>y</math>-values that need to be added to point <math>Q</math>. Choice (B) is incorrect because this is the midpoint of the line segment <math>QR</math>. Choice (D) is incorrect because this is the difference of the <math>x</math>-coordinates and <math>y</math>-coordinates.</p>
18	MSG9-12.G.GPE.5	2	D	<p>The correct answer is choice (D). This response is correct because the negative reciprocal of the slope, along with the <math>x</math>- and <math>y</math>-values of the given point, is substituted into the point-slope formula to find the <math>y</math>-intercept. Choice (A) is incorrect because this line is parallel, not perpendicular to the given line. Choices (B) and (C) are incorrect because the negative reciprocal is not used to find the equation of the perpendicular line.</p>

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
19	MGSE9-12.G.GPE.1	2	C	The correct answer is choice (C) because when the equation is changed to standard form using completing the square, the $h$ - and $k$ -values are 3 and $-1$ and $r^2 = 4$ , so $r = 2$ . Choices (A) and (B) are incorrect because the radius comes from taking the square root of the constant in standard form. Choice (D) is incorrect because the signs of the center are opposite.
20	MGSE9-12.G.CO.11	2	C	The correct answer is choice (C) because if diagonals bisect one another, then the quadrilateral is a parallelogram. Choices (A), (B), and (D) are incorrect because there is not enough information to prove the quadrilateral is a parallelogram.
21	MGSE9-12.G.MG.2	3	N/A	See scoring rubric and exemplar responses on page 180.
22	MGSE9-12.S.CP.5	1	N/A	See scoring rubric and exemplar responses on 181.
23	MGSE9-12.S.CP.7	1	B	The correct answer is choice (B) because an even number or a number less than 3 includes the outcomes of 1, 2, 4, and 6 and there are 6 outcomes in the sample space; $\frac{4}{6}$ simplifies to $\frac{2}{3}$ . Choice (A) is incorrect because there is an overlap of 2 in the outcomes of an even number and a number less than 3, and the overlap must be subtracted: $P(A \text{ or } B) = P(A) + P(B) - P(A \cap B)$ . Choice (C) is incorrect because it is the probability of an even number only. Choice (D) is incorrect because it is the probability of a number less than 3 only.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
24	MGSE9-12.S.CP.3	2	B	<p>The correct answer is choice (B) because with the conditional probability, we assume that an odd number was rolled, which reduces our sample space to 1, 3, and 5. Out of those possibilities, the probability of rolling a 5 is <math>\frac{1}{3}</math>, 1 successful outcome out of 3 total outcomes. Choice (A) is incorrect because it is the probability of rolling 5 without knowing an odd number was rolled. Choice (C) is incorrect because it is the probability of rolling an odd number. Choice (D) is incorrect because it is the complement of the correct answer.</p>

## ADDITIONAL PRACTICE ITEMS SCORING RUBRICS AND EXEMPLAR RESPONSES

### Item 2

#### Scoring Rubric

Points	Description
2	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Student demonstrates complete understanding of constructing an equilateral triangle. Award 2 points for a student response that contains both of the following elements: <ul style="list-style-type: none"> <li>• States that in step 2, line segment <math>BC</math> is drawn before the necessary arcs are drawn.</li> <li>• States that point <math>C</math> is formed from the intersection of the two arcs drawn from the endpoints <math>A</math> and <math>B</math>.</li> </ul> </li> </ul>
1	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Student shows partial understanding of constructing an equilateral triangle. Award 1 point for a student response that contains only one of the following elements: <ul style="list-style-type: none"> <li>• States that in step 2, line segment <math>BC</math> is drawn before the necessary arcs are drawn.</li> <li>• States that point <math>C</math> is formed from the intersection of the two arcs drawn from the endpoints <math>A</math> and <math>B</math>.</li> </ul> </li> </ul>
0	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Student demonstrates limited to no understanding of constructing an equilateral triangle.</li> </ul>

#### Exemplar Response

Points Awarded	Sample Response
2	In step 2, line segment $BC$ cannot be drawn until after both arcs are drawn from endpoints $A$ and $B$ . Point $C$ is the intersection of the arcs drawn from endpoints $A$ and $B$ . The segments $BC$ and $AC$ are drawn after that intersection is found.
1	The error is in step 2 because line segment $BC$ was drawn too early.
0	<i>Student does not produce a correct response or a correct process.</i>

Item 3

Scoring Rubric

Points	Description
4	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Response demonstrates a complete understanding of geometric proofs. Give 4 points for a complete proof with justifications for each step.</li> </ul> <p><b>Scoring Note:</b> There are multiple valid ways of solving. Accept any valid method.</p>
3	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Response demonstrates a nearly complete understanding of geometric proofs. Give 3 points for any of the following response types:               <ul style="list-style-type: none"> <li>• Incomplete proof with one step missing.</li> <li>• Incomplete proof with 1 error in a statement or justification.</li> </ul> </li> </ul> <p><b>Scoring Note:</b> There are multiple valid ways of solving. Accept any valid method.</p>
2	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Response demonstrates a partial understanding of geometric proofs. Give 2 points for any of the following response types:               <ul style="list-style-type: none"> <li>• Incomplete proof with 2 steps missing.</li> <li>• Incomplete proof with 2 errors in a statement or justification.</li> <li>• Incomplete proof with 1 step missing and 1 error in a statement or justification.</li> </ul> </li> </ul> <p><b>Scoring Note:</b> There are multiple valid ways of solving. Accept any valid method.</p>
1	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Response demonstrates a minimal understanding of geometric proofs. Give 1 point for 3 errors:               <ul style="list-style-type: none"> <li>• Steps missing.</li> <li>• Error/s in a statement or justification.</li> </ul> </li> </ul> <p><b>Scoring Note:</b> There are multiple valid ways of solving. Accept any valid method.</p>
0	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Response demonstrates limited to no understanding of geometric proofs.</li> </ul>

## Item 3

## Exemplar Response

Points Awarded	Sample Response		
4	<b>Step</b>	<b>Statement</b>	<b>Reason</b>
	1	$\triangle ABC$ is a right triangle	Given
	2	Altitude $BD$	Given
	3	$\angle BDC$ is a right angle	Definition of Altitude
	4	$\angle ABC \cong \angle BDC$	All right angles are congruent.
	5	$\angle BCD \cong \angle BCA$	Reflexive Property of Congruence
6	$\triangle ABC \sim \triangle BDC$	Angle-Angle (AA) Similarity	
3	<b>Step</b>	<b>Statement</b>	<b>Reason</b>
	1	$\triangle ABC$ is a right triangle	Given
	2	Altitude $BD$	Given
	3	$\angle BDC$ is a right angle	Definition of Altitude
	4	$\angle ABC \cong \angle BDC$	All right angles are congruent.
	5	$\angle BCD \cong \angle BCA$	Complimentary Angles are Congruent
6	$\triangle ABC \sim \triangle BDC$	Angle-Angle (AA) Similarity	
2	<b>Step</b>	<b>Statement</b>	<b>Reason</b>
	1	$\triangle ABC$ is a right triangle	Given
	2	Altitude $BD$	Given
	3	$\angle BDC$ is a right angle	Definition of Altitude
	4	$\angle ABC \cong \angle BDC$	All right angles are congruent.
	5	$\angle BCD \cong \angle BCA$	Complimentary Angles are Congruent
6	$\triangle ABC \sim \triangle ADB$	Angle-Angle (AA) Similarity	
1	<b>Step</b>	<b>Statement</b>	<b>Reason</b>
	1	$\triangle ABC$ is a right triangle	Given
	2	Altitude $BD$	Given
	3	$\angle ABC \cong \angle BDC$	All right angles are congruent.
4	$\triangle ABC \sim \triangle BDC$	Angle-Angle (AA) Similarity	
0	<i>Student does not produce a correct response or a correct process.</i>		



**Item 4**

**Scoring Rubric**

Points	Description
2	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• A score of 2 indicates complete understanding of how to use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.</li> <li>• The student determines that the correct answer for Part A is Choice (C). AND</li> <li>• The student determines that the correct answer for Part B is Choice (D).</li> </ul>
1	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• A score of 1 indicates a partial understanding of how to use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.</li> <li>• The student determines that the correct answer for Part A is Choice (C). OR</li> <li>• The student determines that the correct answer for Part B is Choice (D).</li> </ul>
0	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• A score of 0 indicates limited to no understanding of how to use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.</li> </ul>

**Item 6**

**Scoring Rubric**

Points	Description
2	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• A score of 2 indicates a complete understanding of how to explain and use the relationship between the sine and cosine of complementary angles.</li> <li>• The student determines that the correct answers for Part A are Choice (B) and Choice (D). AND</li> <li>• The student determines that the correct answer for Part B is Choice (B).</li> </ul>
1	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• A score of 1 indicates a partial understanding of how to explain and use the relationship between the sine and cosine of complementary angles.</li> <li>• The student determines that the correct answers for Part A are Choice (B) and Choice (D). OR</li> <li>• The student determines that the correct answer for Part B is Choice (B).</li> </ul>
0	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• A score of 0 indicates limited to no understanding of how to explain and use the relationship between the sine and cosine of complementary angles.</li> </ul>

**Item 8**

**Scoring Rubric**

Points	Description
2	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Student demonstrates complete understanding of finding the sine of an angle in a triangle. Award 2 points for a student response that contains both of the following elements: <ul style="list-style-type: none"> <li>• Finds the length of the third side.</li> <li>• Explains how to find the sine of the angle.</li> </ul> </li> </ul>
1	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Student shows partial understanding of finding the sine of an angle in a triangle. Award 1 point for a student response that contains only one of the following elements: <ul style="list-style-type: none"> <li>• Finds the length of the third side.</li> <li>• Explains how to find the sine of the angle.</li> </ul> </li> </ul>
0	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Student demonstrates limited to no understanding of finding the sine of an angle in a triangle.</li> </ul>

**Exemplar Response**

Points Awarded	Sample Response
2	Use the Pythagorean theorem to find that the length of the third side of the triangle is 4 inches. The sine of an angle is the ratio of the length of the opposite leg compared to the length of the hypotenuse. So, the sine of theta is equal to the ratio of 4 to 5.
1	Use the Pythagorean theorem to find that the length of the third side of the triangle is 4 inches. The sine of an angle is the ratio of the length of the opposite leg compared to the length of the adjacent leg. So, the sine of theta is equal to the ratio of 4 to 3.
0	<i>Student does not produce a correct response or a correct process.</i>

## Item 9

## Scoring Rubric

Points	Description
2	The response achieves the following: <ul style="list-style-type: none"> <li>• Student demonstrates complete understanding of the equation for the area of the sector. Award 2 points for a student response that contains both of the following elements:                             <ul style="list-style-type: none"> <li>• Explains the meaning of <math>\frac{\pi}{360}</math>.</li> <li>• Explains the meaning of <math>\pi r^2</math>.</li> </ul> </li> </ul>
1	The response achieves the following: <ul style="list-style-type: none"> <li>• Student shows partial understanding of the equation for the area of the sector. Award 1 point for a student response that contains only one of the following elements:                             <ul style="list-style-type: none"> <li>• Explains the meaning of <math>\frac{\pi}{360}</math>.</li> <li>• Explains the meaning of <math>\pi r^2</math>.</li> </ul> </li> </ul>
0	The response achieves the following: <ul style="list-style-type: none"> <li>• Student demonstrates limited to no understanding of the equation for the area of the sector.</li> </ul>

## Exemplar Response

Points Awarded	Sample Response
2	The first part of the formula shows the degree measure of the central angle of the sector divided by the degree measure of the entire circle. So, it represents the fraction of the circle that consists of the sector. The second part of the formula shows pi times the radius squared, which is the area of the entire circle. So, the product of these two parts represents the fraction of the area of the circle that is included in the sector.
1	The fraction in the formula shows the degree measure of the central angle of the sector divided by the degree measure of the entire circle. So, it represents the fraction of the circle that consists of the sector.
0	<i>Student does not produce a correct response or a correct process.</i>

**Item 10**

**Scoring Rubric**

Points	Description
2	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>A score of 2 indicates complete understanding of how to identify and describe relationships among inscribed angles, radii, chords, tangents, and secants. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.</li> <li>The student selects Choice (B), Choice (D), and Choice (E).</li> </ul>
1	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>A score of 1 indicates a partial understanding of how to identify and describe relationships among inscribed angles, radii, chords, tangents, and secants. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.</li> <li>The student selects Choice (B) and Choice (D), with or without an additional incorrect answer. OR</li> <li>The student selects Choice (D) and Choice (E), with or without an additional incorrect answer. OR</li> <li>The student selects Choice (B) and Choice (E), with or without an additional incorrect answer.</li> </ul>
0	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>A score of 0 indicates limited to no understanding of how to identify and describe relationships among inscribed angles, radii, chords, tangents, and secants. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.</li> <li>The student selects Choice (B), with or without any additional incorrect answers. OR</li> <li>The student selects Choice (D), with or without any additional incorrect answers. OR</li> <li>The student selects Choice (E), with or without any additional incorrect answers. OR</li> <li>The student does not select any correct answers.</li> </ul>

## Item 12

## Scoring Rubric

Points	Description
2	The response achieves the following: <ul style="list-style-type: none"> <li>• Student demonstrates complete understanding of the formulas for the volume of pyramids and rectangular prisms. Award 2 points for a student response that contains both of the following elements:                             <ul style="list-style-type: none"> <li>• Explains that the volume of a pyramid is equal to <math>\frac{1}{3}</math> of the area of its base times its height and the volume of a rectangular prism is equal to the area of its base times its height.</li> <li>• Explains that the volume of the pyramid in the problem is <math>\frac{1}{3}</math> the volume of the rectangular prism (or the volume of the rectangular prism is triple the volume of the pyramid) because the pyramid and the prism have the same height and bases with the same area.</li> </ul> </li> </ul>
1	The response achieves the following: <ul style="list-style-type: none"> <li>• Student shows partial understanding of the formulas for the volume of pyramids and rectangular prisms. Award 1 point for a student response that contains only one of the following elements:                             <ul style="list-style-type: none"> <li>• Explains that the formula for the volume of a pyramid is equal to <math>\frac{1}{3}</math> of the area of its base times its height and the volume of a rectangular prism is equal to the area of its base times its height.</li> <li>• Explains that the volume of the pyramid in the problem is <math>\frac{1}{3}</math> the volume of the rectangular prism (or the volume of the rectangular prism is triple the volume of the pyramid) because the pyramid and the prism have the same height and bases with the same area.</li> </ul> </li> </ul>
0	The response achieves the following: <ul style="list-style-type: none"> <li>• Student demonstrates limited to no understanding of the formulas for the volume of pyramids and rectangular prisms.</li> </ul>

## Exemplar Response

Points Awarded	Sample Response
2	The volume of a rectangular prism is equal to the area of its base times its height, and the volume of a pyramid is equal to one-third of the area of its base times its height. Since the pyramid and the rectangular prism have congruent bases, their bases have the same area. Since the heights are congruent, they also have the same height. So, the volume of the pyramid is one-third of the volume of the rectangular prism.
1	The volume of a rectangular prism is equal to the area of its base times its height, and the volume of a pyramid is equal to one-third times the area of its base times its height.
0	<i>Student does not produce a correct response or a correct process.</i>

**Item 21**

**Scoring Rubric**

Points	Description
2	The response achieves the following: <ul style="list-style-type: none"> <li>• Student demonstrates a complete understanding of using the concepts of area and volume in a modeling situation. Award 2 points for a student response that contains both of the following elements:                             <ul style="list-style-type: none"> <li>• 13</li> <li>• 3</li> </ul> </li> </ul>
1	The response achieves the following: <ul style="list-style-type: none"> <li>• Student shows partial understanding of using the concepts of area and volume in a modeling situation. Award 1 point for a student response that contains only one of the following elements:                             <ul style="list-style-type: none"> <li>• 13</li> <li>• 3</li> </ul> </li> </ul>
0	The response achieves the following: <ul style="list-style-type: none"> <li>• Student demonstrates little to no understanding of using the concepts of area and volume in a modeling situation.</li> </ul>

**Exemplar Response**

Points Awarded	Sample Response
2	<ul style="list-style-type: none"> <li>• 13</li> <li>• 3</li> </ul>
1	<ul style="list-style-type: none"> <li>• 13</li> </ul>
0	<i>Student does not produce a correct response or a correct process.</i>

**Item 22**

**Scoring Rubric**

Points	Description
2	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Student demonstrates complete understanding of independent events. Award 2 points for a student response that contains both of the following elements:               <ul style="list-style-type: none"> <li>• Explains that the probability of picking an ace on the first draw affects the probability of picking a 7 on the second draw.</li> <li>• Explains that without replacement, the sample space changes.</li> </ul> </li> </ul>
1	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Student shows partial understanding of independent events. Award 1 point for a student response that contains only one of the following elements:               <ul style="list-style-type: none"> <li>• Explains that the probability of picking an ace on the first draw affects the probability of picking a 7 on the second draw.</li> <li>• Explains that without replacement, the sample space changes.</li> </ul> </li> </ul>
0	<p>The response achieves the following:</p> <ul style="list-style-type: none"> <li>• Student demonstrates limited to no understanding of independent events.</li> </ul>

**Exemplar Response**

Points Awarded	Sample Response
2	<p>When the first card is drawn from the deck, there are 52 cards to choose from. Because the first card is not replaced, there are only 51 cards to choose from when the second card is drawn. So, the result of picking an ace on the first draw affects the sample space and, therefore, the probability of picking a 7 on the second draw. So, the events are not independent.</p>
1	<p>The probability of choosing a card and not replacing it affects the probability of the second card drawn.</p>
0	<p><i>Student does not produce a correct response or a correct process.</i></p>