JEFFERSON MATH PROJECT REGENTS BY CHAPTER

All 1384 NY Math A & B Regents Exam Questions from June 1999 to August 2006 Sorted by Prentice Hall Chapter GEOMETRY

(Answer Key)

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Dear Sir

I have to acknolege the reciept of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter books of Euclid, & some of Archimedes, which are useful, & I have no doubt you have been made acquainted with them. trigonometry, so far as this, is most valuable to every man, there is scarcely a day in which he will not resort to it for some of the purposes of common life. the science of calculation also is indispensible as far as the extraction of the square & cube roots; Algebra as far as the quadratic equation & the use of logarithms are often of value in ordinary cases: but all beyond these is but a luxury; a delicious luxury indeed; but not to be indulged in by one who is to have a profession to follow for his subsistence. in this light I view the conic sections, curves of the higher orders, perhaps even spherical trigonometry, Algebraical operations beyond the 2d dimension, and fluxions.

Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.

[2] A correct construction is drawn to find the midpoint of $\overline{BC}$, showing both sets of arcs and a line connecting A with the midpoint.
[1] A correct construction is drawn to find the midpoint of $\overline{BC}$, but the median is not drawn.
or [1] The construction is appropriate, but a compass and a straightedge are not used.
[0] No construction arcs are shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[1]   obviously incorrect procedure.

[2] A correct construction is drawn, showing the arcs intersecting above and below $\overline{AB}$, and line c is drawn.
[1] A correct construction is drawn, but line c is not labeled.
[0] A drawing that is not a construction is shown with arc marks sketched.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[2]   obviously incorrect procedure.

[2] A correct construction is drawn to find the midpoint of $\overline{BC}$, showing both sets of arcs and a line connecting A with the midpoint.
[1] A correct construction is drawn to find the midpoint of $\overline{BC}$, but the median is not drawn.
or [1] The construction is appropriate, but a compass and a straightedge are not used.
[0] No construction arcs are shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[3]   obviously incorrect procedure.

[2] A correct triangle with the longest side on $\overline{PQ}$ and a vertex at P is drawn, and three appropriate arcs are shown.
[1] A correct triangle is constructed on $\overline{PQ}$, but P is not a vertex.
or [1] A correct triangle is constructed with no sides on $\overline{PQ}$.
[0] A triangle that is not congruent to the correct solution or a triangle with less than three arcs is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[4]   obviously incorrect procedure.

[3] 80, and appropriate work is shown.
[2] x = 30 is shown, but the student fails to substitute to find $m\angle AEC$.
or [2] $x = 30$ is shown, but the student states that the answer is $100°$, by finding the supplement of $\angle AEC$.
or [2] The student makes one computational error in the solution of the correct equation $4x - 40 = x + 50$ but appropriately substitutes the incorrect value to solve for $m\angle AEC$.
[1] The student makes one computational error in the solution of the correct equation $4x - 40 = x + 50$ and fails to substitute to find $m\angle AEC$.
or [1] The student makes more than one computational error in the solution of the correct equation $4x - 40 = x + 50$, but appropriately substitutes the incorrect value to solve for $m\angle AEC$.
or [1] 80, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[5]   incorrect procedure.

[6]   D____

[7]   A____

[3] 120, and appropriate work is shown, such as $6t + 30 + 8t - 60 = 180$.
[2] The student finds correctly the unknown, t = 15, but does not find the measure of angle 4.
or [2] Appropriate work is shown, but one computational error is made.
[1] The student forms an incorrect equation, such as setting the two angles equal, and arrives at t = 45 and an angle of 300.
or [1] 120, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[8] incorrect procedure.

[9] C

[10] B

[2] 75, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] An incorrect equation of equal difficulty, such as x + 5x = 180, is solved appropriately, and an appropriate angle measure is found.
or [1] A correct equation is written and solved for x, but no further correct work is shown.
or [1] 75, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[11] incorrect procedure.

[4] 112.5, and appropriate work is shown, such as solving the equation $5x - 20 = x + 50$.
[3] Appropriate work is shown, but one computational error is made.
or [3] $m\angle BED = 67.5$ or $m\angle AEC = 67.5$, but no further correct work is shown.
[2] Appropriate work is shown, but two or more computational errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, but an appropriate measure for $\angle CEB$ is found.
or [2] A correct equation is written and solved for x, but no further correct work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational error are made.
or [1] 112.5, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[12] incorrect procedure.

[13] C

[14] A

[15] D

[4] $m\angle A = 20$, $m\angle B = 59$, and $m\angle C = 101$, and appropriate work is shown.
[3] Appropriate work is shown, but one computational error is made.
or [3] A correct equation is written and solved, and the correct measures for the angles are found, but they are not labeled or are labeled incorrectly.
[2] Appropriate work is shown, but two or more computational errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] A correct equation is written and solved for x, but the measures of the angles are not found.
or [2] An incorrect equation of equal difficulty is solved appropriately, and the three angles are found.
[1] Appropriate work is shown, but one conceptual error and one computational error are made.
or [1] A correct equation is written, but no further correct work is shown.
or [1] $m\angle A = 20$, $m\angle B = 59$, and $m\angle C = 101$., but no work is shown.
[0] $m\angle A = 20$ or $m\angle B = 59$ or $m\angle C = 101$, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[16] obviously incorrect procedure.

[17] A

[18] B

[19] D

[20] B

[21] C

[2] 29, and appropriate work is shown, such as 92 – 63 = 29.
[1] The correct application of the exterior angle theorem is shown, but one or more computational errors are made.
or [1] The correct application of supplementary angles and the sum of the angles of a triangle are shown, but one or more computational errors are made.
or [1] $m\angle BCA$ is calculated incorrectly, but the sum of the angles in a triangle is used appropriately.
or [1] 29, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[22] incorrect procedure.

[2] 120, and appropriate work is shown, such as $m\angle CDB = 180 - 130 = 150$ and $m\angle CBA = 70 + 50 = 120$ or correctly labeled angles in a diagram.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] $m\angle CBD = 60$ is found, but no further correct work is shown.
or [1] 120, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[23] incorrect procedure.

[24] D

[25] C

[26] A

[27] D

[28] A

[29] A

[30] A

[31] C

[32] C

[33] D

[34] C

[35] D

[4] 12 and an appropriate method is shown, such as $(AB)^2 = 9^2 + 8^2$.
[3] An incorrect length is found for AE, but then it is used to correctly complete the problem.
or [3] An appropriate method is shown, but one computational mistake is made.
or [3] An appropriate method is shown, but the answer is not given to the nearest foot, such as $\sqrt{145}$.
[2] AE = 8 and one computational mistake is made using the Pythagorean theorem.
or [2] An incorrect length is found for AE, but then it is used to complete the problem correctly, but the answer is not rounded.
[1] AE = 8 is found, but the Pythagorean theorem is not used.
or [1] 12 and no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[36] incorrect procedure.

[2] The student draws a parallelogram, which is not a rectangle, with four sides and four angles labeled, such as angles of 60, 120, 60, and 120 and sides of 4, 6, 4, and 6.
[1] A parallelogram or rhombus, not a square, is drawn, which does not have measures for all lengths or angles.
[0] Angles and/or lengths are not appropriate for a parallelogram.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[37] obviously incorrect procedure.

[38] A

[39] A

[2] 2, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown to find the number of students for any flavor other than coffee.
or [1] 2, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[40] incorrect procedure.

[2] 50, and appropriate work is shown, such as using a proportion.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] An incorrect fractional part is determined, but an appropriate number of students is found.
or [1] 50, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[41] incorrect procedure.

[2] 100 and an appropriate method is shown, such as $360 - 300 = 60$ degrees, which is $\frac{1}{6}$ of the circle so $\frac{1}{6}$ of 600 is 100.
[1] 100 and no explanation is given.
or [1] An incorrect degree measure is used to develop a fraction by which to multiply 600, obtaining an appropriate answer.
or [1] A correct degree measure is used to develop $\frac{1}{6}$.
or [1] 60 degrees is used, but an incorrect number of people is found.
[0] Only 60 degrees is found.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[42] obviously incorrect procedure.

[4]A correct circle graph is drawn and labeled, and appropriate work is shown, such as using proportions. [A correct graph will show 150° for brown, 120° for black, 60° for blond, and 30° for red.]

[3] Appropriate work is shown, but one computational error is made, but an appropriate graph is drawn.

or [3] Appropriate work is shown, but one graphing error is made.

or [3] Appropriate work is shown and a correct graph is drawn, but the sectors are not labeled or are labeled incorrectly.

[2] Appropriate work is shown, but two or more computational errors are made, but an appropriate graph is drawn.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Correct numbers of degrees or correct proportional values are found, but two or more graphing errors are made.

or [2] Correct numbers of degrees or correct proportional values are found, but no graph is drawn.

or [2] A correct circle graph is drawn and labeled, but no work is shown.

[1] Appropriate work is shown and a graph is drawn, but two or more computational errors and two or more graphing errors are made.

or [1] At least two numbers of degrees or proportional values are found correctly, but no graph or an incorrect graph is drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[43]   incorrect procedure.
_____

[2] 600, and appropriate work is shown, such as $\dfrac{240}{360} \cdot 900 = 600.$

[1] Appropriate work is shown, but one computational error is made or the answer is expressed as a fraction.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] The central angle of 240° is found, but the number of students is not calculated.

or [1] An incorrect equation of equal difficulty is solved appropriately.

or [1] A correct equation is written, but no further correct work is shown.

or [1] 600, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[44]   incorrect procedure.
_____

[45]   C _____

[46]   A _____

[47]   B _____

[48]   C _____

[49]   D _____

[50]   B _____

[51]   B _____

[52]   C _____

[53]   D _____

[54]   D _____

[55]   A _____

[56]   A _____

[57]   C _____

[58]   A _____

[59]   B _____

[60]   D _____

[61] D

[62] A

[63] A

[64] D

[65] A

[4] $S'(0,6),\ U'(-3,5),\ N'(-3,0),$ and the correct graphs of both triangles are shown.
[3] The correct graphs of both triangles are shown, but the coordinates of $\Delta S'U'N'$ are not stated correctly.
or [3] ΔSUN is graphed and labeled correctly, and the coordinates of $\Delta S'U'N'$ are stated correctly but not graphed correctly.
or [3] The coordinates of $\Delta S'U'N'$ are graphed and stated correctly, but ΔSUN is not graphed or labeled.
or [3] ΔSUN is graphed incorrectly, but the graph and the coordinates of $\Delta S'U'N'$ are appropriate, based on that error.
[2] $\Delta S'U'N'$ is graphed correctly, but the coordinates of $\Delta S'U'N'$ are not stated, and ΔSUN is not graphed.
or [2] ΔSUN is graphed and labeled correctly, but $\Delta S'U'N'$ is reflected in the x-axis, and the coordinates
$S'(0,-6), U'(3,-5), N'(3,0)$ are stated.
or [2] ΔSUN is graphed incorrectly, but $\Delta S'U'N'$ is graphed appropriately, based on that error, but the coordinates of $\Delta S'U'N'$ are not stated.
[1] ΔSUN is graphed and labeled correctly, but no other work or completely incorrect work for $\Delta S'U'N'$ is shown.
or [1] $\Delta S'U'N'$ is graphed correctly, but the coordinates of $\Delta S'U'N'$ are not stated, and ΔSUN is not graphed or is graphed incorrectly.
or [1] $S'(0,6),\ U'(-3,5),\ N'(-3,0),$ but no work or graph is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[66]

[2] $A'\ (0,-2)$ and $B'\ (4,-6)$ are stated, and an appropriate graph is drawn.
[1] Only one endpoint, A' or B', is graphed and stated correctly.
or [1] Both endpoints are reflected in other than the x-axis, and the coordinates are graphed and stated correctly, such as:
y-axis $A'\ (0,2)$ and $B'\ (-4,6)$
y = x $A'\ (2,0)$ and $B'\ (6,4)$
Origin $A'\ (0,-2)$ and $B'\ (-4,-6)$
or [1] Both points A' and B' are stated correctly, but no graph is drawn.
or [1] An appropriate graph is drawn, but no coordinates or incorrect coordinates are labeled.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[67] incorrect procedure.

[3] The figure is drawn accurately and the new coordinates are labeled and stated as J'(7,-2), B'(2,-1), C'(3,-2), and D'(2,-4).
[2] One error is made in drawing the figure, such as misplotting one point, but the new coordinates are labeled and stated appropriately, based on that figure.
or [2] The figure is drawn and labeled accurately, but the new coordinates are not stated or are stated incorrectly.
or [2] The new coordinates are labeled and stated correctly, but the figure is not drawn.
[1] Two errors are made in drawing the reflected figure, but the new coordinates are labeled and stated appropriately, based on that figure.
or [1] Appropriate work is shown, but one conceptual error is made, such as reflecting the figure in the x-axis or the origin.
or [1] Correct points are plotted and labeled, but the figure is not drawn, and the coordinates are not stated.
or [1] The figure is drawn correctly, but the new coordinates are not labeled or stated.
[0] An appropriate reflection in the x-axis is drawn, and the coordinates are not labeled or stated.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[68] obviously incorrect procedure.

[3] *A'* (-2,0), *B'* (-1,7), and *C'* (-5,1) are graphed, labeled, and stated correctly.
[2] Appropriate work is shown, but one graphing or labeling error is made.
or [2] *A'* (-2,0), *B'* (-1,7), and *C'* (-5,1), but no graph is drawn.
[1] Appropriate work is shown, but two or more graphing or labeling errors are made.
or [1] Appropriate work is shown, but one conceptual error is made, such as reflecting over the *x*-axis.
or [1] The three points are plotted correctly, but the coordinates *A'*, *B'*, and *C'* are not stated.
[0] (-2,0), (-1,7), and (-5,1), but no further correct work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[69] obviously incorrect procedure.

[70]   A_____

[2] Δ HOC and opposite, and an appropriate explanation is written.
[1] The image of Δ EOA is identified incorrectly, but the type of isometry is appropriate, and an appropriate explanation is written.
or [1] The difference between a direct and opposite isometry is explained correctly, but no further correct work is shown.
or [1] Δ HOC, but no explanation or an incorrect explanation is written.
[0] Opposite, but no further correct work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[71] obviously incorrect procedure.

[72]   C_____

[73]   D_____

[4] 12.6, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but the quadratic formula is incorrect.
[2] An appropriate equation is shown and put in standard form, but the quadratic formula is not used correctly.
or [2] An appropriate equation is shown and put in standard form, but no further work is shown.
or [2] Appropriate work is shown, but more than one computational error or one computational and one rounding error are made.
[1] An appropriate equation is shown, but all other work is missing or is incorrect.
or [1] 12.6, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[74]   incorrect procedure.

[75]   C

[76]   A

[77]   C

[78]   D

[79]   A

[80]   D

[81]   D

[82]   C

[83]   A

[84]   D

[85]   B

[86]   D

[87]   B

[88]   B

[89]   B

[90]   C

[91]   B

a [2] The equation $2y = 2x^2 - 4$ is graphed correctly over the required interval and labeled.
[1] An appropriate graph is shown, but less than the required interval is drawn.
or [1] An appropriate graph is shown, but one coordinate is calculated incorrectly.
b [2] A correct composition of transformations of the graph drawn in part a is sketched and labeled.
[1] Only one of the transformations is correct.
or [1] The composition of transformations is correct, but done in reverse order.
a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[92]   obviously incorrect procedure.

[4] Both equations are graphed correctly and the description of the transformation $a \rightarrow b$ is correct, such as $T_{(4,3)} \circ r_{x-axis}$ or $r_{y=3} \circ T_{(4,3)}$ or $T_{(4,3)} \circ R_{180°}$ or an equivalent explanation, such as a shift right of 4 followed by a reflection over the x-axis followed by a shift up of 3.
[3] Both equations are graphed correctly, but only one transformation is shown or described correctly.
[2] Both equations are graphed correctly, but no further correct work is shown.
[1] Only one equation is graphed correctly, and no composition formula or explanation is shown.
or [1] The correct composition formula or explanation is shown, but no graphs or incorrect graphs are drawn.
or [1] Both equations are graphed incorrectly, but an appropriate composition formula or explanation is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[93]   incorrect procedure.

[4] $\overline{AB}$ and $\overline{A''B''}$ are graphed and labeled correctly, $A''(0,-5)$ and $B''(-2,0)$, and a correct transformation is identified, such as $R_{180°}$, $R_{-180°}$, or $r_{(0,0)}$.

[3] One error is made in graphing $\overline{AB}$, but $\overline{A''B''}$ is graphed and labeled appropriately, and an appropriate transformation is identified.

[2] $\overline{AB}$ is graphed and labeled correctly but one mistake is made in finding $\overline{A''B''}$, but an appropriate transformation is identified.

or [2] Both $\overline{AB}$ and $\overline{A''B''}$ are graphed and labeled correctly, but the transformation is missing or is incorrect.

[1] $\overline{AB}$ is graphed and labeled correctly, but one mistake is made in finding $\overline{A''B''}$, and the transformation is missing or is incorrect.

or [1] One error is made in graphing $\overline{AB}$, but $\overline{A''B''}$ is graphed and labeled appropriately, but the transformation is missing or is incorrect.

or [1] $R_{180°}$, $R_{-180°}$, or $r_{(0,0)}$, but no graph is drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[94] _____

[2] (-5,-7), and appropriate work is shown, such as stating the coordinates of each transformation or graphing each transformation.

[1] Appropriate work is shown, but one computational or graphing error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as performing the translation before the reflection.

or [1] Only one of the transformations is performed correctly.

or [1] (-5,-7), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[95] incorrect procedure. _____

[96] C _____

[97] D _____

[98] B _____

[99] D _____

[100] D _____

[101] A _____

[102] C _____

[103] D _____

[104] B _____

[2] Both correct lines of symmetry are drawn: one horizontal, one vertical.

[1] Only one correct line is drawn.

or [1] Two correct and one or two incorrect lines, such as the diagonals, are drawn.

[0] More than two incorrect lines are drawn.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[105] obviously incorrect procedure. _____

[2] The four correct lines of symmetry are drawn.

[1] At least two correct lines of symmetry are drawn, and no inappropriate lines are drawn.

or [1] All four correct lines of symmetry are drawn, but one or more inappropriate lines are also drawn.

[0] At least one of the correct lines of symmetry is missing, and one or more inappropriate lines are drawn.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[106] obviously incorrect procedure. _____

[107] A _____

[3] ΔABC and $\Delta A'B'C'$, A'(–2,4), B'(0,12), C'(10,8), are graphed correctly.
[2] ΔABC is graphed correctly, but only two image points are graphed correctly.
or [2] ΔABC is graphed incorrectly, but $\Delta A'B'C'$, is graphed appropriately, based on an incorrect ΔABC.
[1] Only ΔABC is graphed correctly.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[108] incorrect procedure.

[3] Yes, A'' is (1,–3) and B'' is (2,–1) and appropriate work is shown, algebraically or graphically.
[2] Correct coordinates for A'' and B'' are found, but no conclusion is shown.
or [2] Either A'' or B'' is correct, and an appropriate conclusion is shown.
or [2] One transformation is correct and one is incorrect, such as the reflection in y, but an appropriate conclusion is shown.
[1] Neither transformation is correct, but an appropriate conclusion is shown.
or [1] One transformation is correct.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[109] incorrect procedure.

[110] B

[111] C

[2] A graph is sketched that maps (–3,5) to (–6,10), (0,1) to (0,2), and (1,3) to (2,6).
[1] One graphing or computational error is made, but an appropriate graph is sketched.
[0] A graph is sketched that represents a dilation of only x or y.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[112] obviously incorrect procedure.

[113] B

[114] D

[115] D

[116] A

[3] 2, 6, 10, 14, and 18 and an appropriate method is shown.
[2] One mistake is made with selection, such as including 0.
[1] One of the appropriate sets is found: either 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 or not 4, 8, 12, 16, 20.
or [1] The correct numbers are found, and no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[117] incorrect procedure.

[118] C

[119] D

[120] B

[121] C

[122] D

[123] D

[124] D

[125] A

[126] A

[127] B

[128] B

[129] B

[130] D

[131] D

[132] A

[133] A

[134] A

[135] D

[136] B

[137] C

[138] A

[139] A

[140] B

[141] D

[2] An isosceles triangle that is not acute is drawn, and its three angles are labeled, such as 20, 20, 140 or 45, 45, 90.
[1] An isosceles triangle is drawn that shows an angle that is not acute, but the base angles are not labeled.
or [1] The three angles are stated correctly, but no triangle is drawn.
[0] The triangle that is drawn and labeled is not isosceles or is acute.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[142] obviously incorrect procedure.

[3] 135 and appropriate work is shown.
[2] The two correct angles of 65° and 70° are found, but their sum is not identified as the answer to the question.
or [2] 65° or 70° and an appropriate sum is found.
[1] Either the 65° or the 70° is correctly identified.
or [1] Two incorrect angle measures are found, but they are added correctly.
or [1] 135 and no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[143] incorrect procedure.

[3] The student draws an obtuse triangle and all sides and all angles are correctly calculated, such as by using 120°, 30°, and 30° and sides 4, 4, and 10.
[2] The student has the angles correctly indicated and the two congruent sides marked, but the length of the longest side is incorrect or is missing.
or [2] All sides are correctly marked, but the angles do not add to 180°, but an obtuse angle and two congruent angles are shown.
[1] Only the angles are correctly shown.
or [1] Only the sides are correctly shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[144] incorrect procedure.

[2] 32, and appropriate work is shown, such as a diagram or "let" statements and an appropriate equation, such as $5x + 20 = 180$.
or [2] 32, and an appropriate trial-and-error method with at least two trials and appropriate checks are shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] An incorrect equation set equal to 180° is shown, but it is solved appropriately, such as $4x + 20 = 180$; or an incorrect equation set equal to 360° is shown, such as $5x + 20 = 360$.
or [1] 32, and an appropriate trial-and-error method with less than two trials and appropriate checks are shown.
or [1] 32, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[145] incorrect procedure.

[2] 30, and appropriate work is shown or an appropriate explanation is given.
[1] Angles of the equilateral triangle are shown to be 60°, but x is not determined or is determined incorrectly.
or [1] 30, but no work is shown or no explanation is given.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[146] incorrect procedure.

[147] B

[148] C

[149] D

[150] B

[4] The proof in column or paragraph form explains clearly, by using contradiction or indirect proof, that altitude $\overline{BD}$ does not bisect side $\overline{AC}$.
[3] An appropriate conclusion is shown, without specifying that congruent triangles are actually formed only if a triangle is isosceles.
[2] An appropriate diagram is drawn and some evidence that congruence may be an issue is shown, but no further reasoning is given or no conclusion is drawn.
[1] Circular reasoning is used or the statement is said to be true, but no proof by contradiction or indirect proof is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[151] incorrect procedure.

[2] A correct indirect proof is written with appropriate statements and reasons.
[1] The assumption that $\overline{AT}$ is perpendicular to $\overline{CD}$ is written, but no further correct work is shown.
or [1] A method other than an indirect proof is used to show that $\overline{AT}$ is not perpendicular to $\overline{CD}$.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[152] incorrect procedure.

[153] C

[154] C

[155] C

[156] B

[157] D

[158] B

[159] C

[2] The statements $7 + 8 = 15$ and "15 is not greater than 16" are written or the explanation is given that the sum of any two sides of a triangle must be greater than the third side.
[1] An explanation is written that includes a reference to the triangle inequality, but the explanation is not complete or an incorrect conclusion is stated.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[160] incorrect procedure.

[161] B

[162] C

[163] B

[164] D

[165] B

[166] D

[167]   A

[168]   A

[169]   B

[170]   A

[171]   D

[4] A correct diagram is drawn, two X points are marked, a numerical 2 is given for the places to dig, and appropriate work is shown.
[3] The diagram is correct including two X points, but an incorrect answer or no answer is found.
[2] One correct locus situation and one incorrect locus situation are drawn, but the answer is appropriate according to the diagram.
or [2] Each locus situation is correctly drawn, but no X points are marked, and no numerical answer is found.
[1] Only one locus situation is correctly drawn and an incorrect conclusion or no conclusion is shown.
or [1] 2 but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[172]

[2] 2 and an appropriate sketch of two circles intersecting in two points is shown.
[1] 2 and no sketch is shown.
or [1] An appropriate sketch is shown, without indicating 2 as the possibilities.
or [1] An appropriate number is found, based on an inappropriate sketch.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[173]

a [2] A correct sketch is drawn that shows two possible locations, such as parallel lines and a perpendicular bisector. Students can draw their own sketch or use the diagram given.
[1] A correct sketch is drawn, but with no indication of where the treasure is buried.
or [1] A partial sketch is drawn, showing either the distances from the fence or the distance from the trees.
b [1] 5 feet
or [1] An appropriate answer is found for an incorrect part a.
a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[174]   obviously incorrect procedure.

[4] Two Xs are indicated at the intersections of the angle bisector and the parallel lines in the correct sketch of the loci.
[3] All loci are drawn correctly, but no Xs are drawn to indicate the locations, or only one X is drawn.
or [3] The angle bisector is drawn correctly, but only one line is drawn parallel to the walkway, but an X is indicated appropriately.
[2] Only one correct locus is drawn, but Xs indicate the two appropriate locations of the intersection of the loci.
[1] Xs are drawn in the correct locations, but no loci are shown.
or [1] Only one correct locus is drawn, and no Xs are indicated.
or [1] Both loci are drawn incorrectly, but Xs are drawn on the appropriate points of intersection.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[175]   incorrect procedure.

a [3] Two parallel lines, one 3 units above and one 3 units below $\overleftrightarrow{AB}$, and a circle with its center at P with a radius of 5 units are described correctly in words or drawn.
[2] Only one parallel line 3 units above or 3 units below $\overleftrightarrow{AB}$ and a correct circle are described in words or drawn.
or [2] Appropriate parallel lines are shown, but the circle is incomplete.
[1] Both parallel lines and the circle have incomplete descriptions or drawings.
[0] Only one incomplete locus is described or drawn.
b [1] 4, and appropriate work is shown.
or [1] An appropriate answer for an incorrect part a is found.
a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct
response that was obtained by an obviously

[176] incorrect procedure.

[2] The points *D* and *M* are plotted, the graph of the line $x = 3$ is drawn, and its equation is stated.
[1] One graphing error is made, but an appropriate equation is stated for the locus of points.
or [1] A correct graph is drawn, but the equation is not stated or is stated incorrectly.
or [1] $x = 3$, but no graph is drawn.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[177] incorrect procedure.

[178] A

[179] B

[180] C

[181] A

[182] D

[183] B

[184] D

[185] C

[186] A

[2] $6x - 2$ or an equivalent expression, and appropriate work is shown, such as $2(2x + 3) + 2(x - 4) = 6x - 2$.
[1] The length is represented correctly as $2x + 3$ and the width as $x - 4$, but the representation of the perimeter is determined incorrectly.
or [1] The length, the width, and the perimeter are represented appropriately, but by a variable other than x.
or [1] One or both dimensions are represented incorrectly, but the perimeter is represented appropriately.
[0] One or both dimensions are represented incorrectly, and the perimeter is not determined.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[187] obviously incorrect procedure.

[4] 16 and appropriate work is shown, such as $W(W + 2) = 15$.
[3] Appropriate work is shown, but one computational error is made.
or [3] L = 5, W = 3, and the perimeter = 16, but no work is shown.
[2] Appropriate work is shown, but more than one computational error is made.
or [2] L = 5, W = 3, and appropriate work is shown, but the perimeter is not found.
or [2] The length and width are incorrect, but the perimeter is computed appropriately.
[1] Length and width are appropriately defined in terms of a single variable.
or [1] 16 but no work is shown.
[0] L = 5 and W = 3 but no work is shown, and the perimeter is not found.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[188] obviously incorrect procedure.

[4] Width = 20 and length = 25 and an appropriate algebraic equation is shown, such as $x^2 + 5x - 500 = 0$.

[3] A correct quadratic equation is shown, but one error is made.

or [3] A correct quadratic equation is shown, but solved for only one dimension.

[2] An appropriate solution is shown, but the student fails to reject the negative root and finds two sets of dimensions.

or [2] The quadratic equation $(5x)(x) = 500$ is solved appropriately for both dimensions, $x = 10$ and $5x = 50$.

[1] The student writes only the correct quadratic equation or only the equation $x(x + 5) = 500$ or fails to solve the equation correctly.

or [1] The student writes a linear equation from $x(x + 5) = 500$, such as $2x + 5x = 500$, but solves that equation appropriately.

or [1] A correct equation is shown for the perimeter and solved appropriately.

or [1] $(5x)(x) = 500$ is solved correctly for only one dimension.

or [1] 20 and 25 but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[189]   incorrect procedure.

[4] $x(x + 10) = 144$ or an equivalent equation and 8 = width and 18 = length, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] A correct equation is used and a correct solution is found, but only one dimension is identified.

[2] An appropriate solution is found to an incorrect equation of equal difficulty.

or [2] A correct equation set equal to zero is shown, with no further work or incorrect work.

[1] A conceptual error is made, such as writing the equation $2x + 2(x + 10) = 144$, but the dimensions are found appropriately.

or [1] $x(x + 10) = 144$ and 8 = width and 18 = length, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[190]   incorrect procedure.

[4] w(w + 3) = 40, width = 5, and length = 8, and appropriate work is shown.
[3] w(w + 3) = 40 and appropriate work is shown, but one computational error is made in finding the length and width.
or [3] w(w + 3) = 40 and appropriate work is shown, but only the width is found.
[2] w(w + 3) = 40 and appropriate work is shown, but the length and width are not identified.
or [2] w(w + 3) = 40 and appropriate work is shown, but more than one computational error is made in finding the length and width.
or [2] An incorrect equation of equal difficulty is solved appropriately for the length and width.
[1] w(w + 3) = 40, but no further correct work is shown.
or [1] Appropriate work is shown, but one conceptual error is made, such as solving the equation 2w + 2w + 6 = 40.
or [1] w(w + 3) = 40, width = 5, and length = 8, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[191]   incorrect procedure. _____

[3] Perimeter = 4x + 4 or 4(x + 1) and area = $x^2 + 2x - 24$, and appropriate work is shown.
[2] 4x + 4 and $x^2 + 2x - 24$, and appropriate work is shown, but the answers are not labeled or are labeled incorrectly.
or [2] Appropriate work is shown, but one computational error is made.
or [2] Area = $x^2 + 2x - 24$, and appropriate work is shown, but the perimeter is not found or is found incorrectly.
or [2] The area and perimeter are represented correctly, but only one of them is expressed in simplest form.
[1] Appropriate work is shown, but two or more computational errors are made.
or [1] Perimeter = 4x + 4, and appropriate work is shown, but the area is not found or is found incorrectly.
or [1] The area and perimeter are represented correctly, but neither is expressed in simplest form.
or [1] Perimeter = 4x + 4 or 4(x + 1) and area = $x^2 + 2x - 24$, but no work is shown.
[0] Perimeter = 4x + 4 or area = $x^2 + 2x - 24$, but no work is shown.
or [0] 4x + 4 and $x^2 + 2x - 24$, but no work is shown and the answers are not labeled or are labeled incorrectly.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[192]   obviously incorrect procedure. _____

[4] 283.5 or 284 and appropriate work or an explanation is shown, such as 4x + 12 = 96, $\dfrac{21 \times 27}{2}$, or trial and error.

[3] Appropriate work is shown, but one computational error is made.

[2] Appropriate work is shown, but more than one computational error is made.

or [2] 283.5 or 284 and only a check is shown.

[1] Appropriate work is shown, but no answer is found.

or [1] 283.5 or 284 but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[193]

[2] Kerry is incorrect and an explanation is given that the original area is 24 ft^2 and the area of the rose plot is 6 ft^2, which is not half of 24 ft^2.

or [2] Kerry is incorrect and an explanation is given that since the original area is 24 ft^2, the area of the rose plot should be 12 ft^2, so the new dimensions should multiply to 12, such as 3×4, 4×3, 2×6, 2×6.

or [2] Kerry is incorrect and a diagram is used to show the original area is 24 ft^2 and the area of the rose plot is 6 ft^2.

[1] Kerry is incorrect but the work or diagram shows one error.

or [1] Appropriate work is shown, but the incorrect conclusion is found.

[0] Kerry is incorrect or correct but no explanation is given.

or [0] Kerry is correct and $\dfrac{1}{2}(4) = 2$ or $\dfrac{1}{2}(6) = 3$ is shown.

or [0] Kerry is correct and the student uses the perimeter.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[194]

[2] 256, and appropriate work is shown, such as finding the side of the square and calculating the area.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] Appropriate work is shown, but only the area of the circle is found.
or [1] An incorrect value for the side of the square is determined, but an appropriate area is found.
or [1] A correct value for the side of the square is determined, but the area is not found or is found incorrectly.
or [1] The area for the square inscribed in the circle is found, resulting in an answer of 128.
or [1] 256, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[195] _____

[4] $148.54, and appropriate work is shown.
[3] The correct pre-tax amount of $137.54 is found, but no tax or an incorrect tax is shown.
or [3] Appropriate work is shown, but one computational error is made.
[2] The correct area of 46 ft^2 is found, but no cost is shown.
or [2] Appropriate work is shown, but more than one computational error is made.
or [2] An incorrect area is determined, such as by adding or multiplying all sides, but then a final cost including tax is determined appropriately.
[1] An incorrect area is shown, and one computational error is made.
or [1] $148.54, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[196] _____

a [2] 15 and an appropriate method is shown, such as finding GB = JC = 2x and FC = ED = HJ = 3.
[1] 15 and no work is shown.
or [1] At least one of the values is correct, as shown above, and the area is calculated based on the incorrect value.
b [1] Any form equivalent to $(2x + 5)(x + 3)$ is shown, such as $5x + 2x^2 + 6x + 15$.
or [1] Any correct total area based on the students incorrect answer in part a is found.
a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[197] obviously incorrect procedure.
_____

[3] 10 and 30, and appropriate work is shown, such as 2x + 2(2x + 10) = 80 or trial and error with at least three trials and appropriate checks.
[2] Appropriate work is shown, but one computational error is made.
or [2] Appropriate work is shown, but only one of the dimensions is found.
or [2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.
[1] Appropriate work is shown, but two or more computational errors are made.
or [1] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.
or [1] An incorrect equation of equal difficulty is solved appropriately.
or [1] Appropriate solutions are found based on the incorrect use of the perimeter formula, such as 3x + 10 = 80.
or [1] 10 and 30, but no work or only one trial with an appropriate check is shmvn.
[0] 10 or 30, but no work or only one trial with an appropriate check is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[198] obviously incorrect procedure.
_____

[3] 162, and appropriate work is shown.
[2] The Pythagorean theorem is used correctly to find the hypotenuse, but the result is not multiplied by 6.
or [2] Appropriate work is shown, but one computational or rounding error is made.
[1] Appropriate work is shown, but more than one computational or rounding error is made.
or [1] 162, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[199] incorrect procedure.

[3] 18, and appropriate work is shown.
[2] Appropriate work is shown, but one computational error is made.
or [2] Appropriate work is shown, and the value of x is found, but no further correct work is shown.
[1] Appropriate work is shown, but two or more computational errors are made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] A correct expression is written for the perimeter of each figure, but no further correct work is shown.
or [1] 18, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[200] incorrect procedure.

[4] 2,050, and appropriate work is shown, such as finding the length of one side of the field, finding the perimeter, and calculating $(2.50 \cdot 800) + 50$.
[3] Appropriate work is shown, but one computational error is made.
or [3] Appropriate work is shown, but the installation fee is not added to the cost of the fencing.
[2] Appropriate work is shown, but two or more computational errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
[1] Appropriate work is shown, but one conceptual error and one computational error are made.
or [1] 2,050, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[201] incorrect procedure.

[4] 12.6, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but the quadratic formula is incorrect.
[2] An appropriate equation is shown and put in standard form, but the quadratic formula is not used correctly.
or [2] An appropriate equation is shown and put in standard form, but no further work is shown.
or [2] Appropriate work is shown, but more than one computational error or one computational and one rounding error are made.
[1] An appropriate equation is shown, but all other work is missing or is incorrect.
or [1] 12.6, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[202] incorrect procedure.

[203] D

[4] $c(x) = 0.06x^2$ or an equivalent equation;

width $= \sqrt{11.5}$ inches or an equivalent, length $= 3\sqrt{11.5}$ inches or an equivalent, and height $= \dfrac{3}{2}\sqrt{11.5}$ inches or an equivalent, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] One or more dimensions are represented incorrectly, but all further work is appropriate.

or [3] The correct function is found and solved for x, but no further work is shown.

[2] The dimensions are represented correctly, but the equation is incorrect, but all further work is appropriate.

or [2] The dimensions are represented correctly, and the correct function is written, but further work is incomplete or is incorrect.

[1] The dimensions are represented correctly, but the function is written and solved incorrectly.

or [1] $\sqrt{11.5}, 3\sqrt{11.5},$ and $\dfrac{3}{2}\sqrt{11.5},$ but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[204] incorrect procedure.

[205] D

[206] B

[207] B

[208] B

[4] All lines are graphed and labeled correctly and area = 10, and appropriate work is shown.

[3] The lines are graphed and labeled correctly, but the area of the triangle is missing or is incorrect.

or [3] One of the lines is graphed incorrectly, but the area for the given triangle is found appropriately.

[2] One of the lines is graphed incorrectly, and the area of the triangle is missing or is incorrect.

[1] Only one line is graphed and labeled correctly, and no further correct work is shown.

or [1] All three lines are graphed incorrectly, but the area for the given triangle is found appropriately.

or [1] Area = 10, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[209] incorrect procedure.

[4] 270 and an appropriate method is shown, such as using the Pythagorean theorem or trigonometry to find base AC = 36.

[3] An appropriate method is shown, but one computational mistake is made.

[2] An inappropriate formula for the area of the triangle is used, but work is carried to a solution.

or [2] The Pythagorean theorem is used correctly, but only the area of triangle ADB is found, as 150.

or [2] The Pythagorean theorem is used incorrectly arriving at incorrect AB, but work is carried to its appropriate solution for triangle ADC.

[1] Only the area of triangle DBC is found, as 120.

or [1] The Pythagorean theorem is used incorrectly, and the area is not found.

or [1] 270 and no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[210] incorrect procedure.

[4] 260, and appropriate work is shown, such as applying the appropriate area formula,

or $A = \dfrac{1}{2}bh$ or $A = \dfrac{1}{2}h(b_1 + b_2)$, to find the

length of $\overline{AE}$ and using the Pythagorean theorem or stating the Pythagorean triple to determine AB.

[3] 300, because $\overline{BE}$ is added to the perimeter.

or [3] Appropriate work is shown, but one computational error is made.

[2] Appropriate work is shown, but more than one computational error is made.

or [2] Only AB and AE are determined correctly.

[1] Only AB or AE is determined correctly.

or [1] 260, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[211]   incorrect procedure.

[3] 7, 11, 16, and yes, and appropriate work is shown, and an appropriate explanation of the Triangle Inequality theorem is given.

[2] 7, 11, 16, and yes, and appropriate work is shown, but no explanation or an incorrect explanation of the Triangle Inequality theorem is given.

or [2] One computational error is made, but appropriate substitution is shown, and an appropriate explanation is given.

or [2] The correct equation is written but not solved, but the Triangle Inequality theorem is stated correctly.

[1] Appropriate work is shown, and x = 4 is determined, but no further work is shown.

or [1] The Triangle Inequality theorem is stated correctly but not evaluated for the sides, or the correct equation is written, but no further work is shown.

or [1] 7, 11, 16, and yes, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[212]   incorrect procedure.

[4] Quadrilaterals ABCD and A'B'C'D' are drawn and labeled correctly and 24 is found as the area, and appropriate work is shown.

[3] One graphing error is made in the transformation, but an appropriate area of A'B'C'D' is found.

or [3] Correct quadrilaterals are drawn and labeled, but one computational error is made in determining the area.

or [3] Quadrilaterals ABCD and A'B'C'D' are drawn correctly and 24 is found as the area, but the vertices are not labeled.

[2] Correct quadrilaterals are drawn and labeled, but no further correct work is shown.

or [2] One conceptual error is made, such as reflecting in the x-axis, but the correct area is found.

[1] 24, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[213]   incorrect procedure.

[214]   C

[215]   A

[216]   B

[217]   C

[4] The side equals 2.3 and the area equals 25.5, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] Appropriate work is shown, but one incorrect formula is used, such as using an incorrect trigonometric function, but appropriate answers are found.
or [2] Appropriate work is shown to find the correct side, but no further correct work is shown.
[1] The radius equals 3 and the central angle equals 45°, but no further correct work is shown.
or [1] The side equals 2.3 and the area equals 25.5, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[218] incorrect procedure.

[219] D

[220] C

[3] 32, and appropriate work is shown, such as finding the circumference to be 10π and dividing 1,000 by 10π.
[2] Appropriate work is shown, but one computational or rounding error is made or the answer is expressed in terms of π.
[1] An incorrect circumference formula is used, but an appropriate number of revolutions is found.
or [1] The circumference of the wheel is found to be 10π or an equivalent decimal, but no further correct work is shown.
or [1] 32, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[221] incorrect procedure.

[3] 1.3 and appropriate work is shown, such as calculating the circumference of the wheel and the length of the trail in feet, and converting them to miles, such as
$$\frac{2 \cdot \pi \cdot 1100.5}{5280}.$$
[2] The student correctly calculates the circumference and length in feet but does not convert them to miles.
or [2] Correct calculations are shown, but the answer is rounded incorrectly or is not rounded.
or [2] Appropriate work is shown, but one error is made.
[1] The correct circumference is calculated.
or [1] Appropriate work is shown, but more than one error is made.
or [1] 1.3 but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[222] incorrect procedure.

[223] C

[224] B

[2] 621.1, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] A correct formula is written, but incorrect substitutions are made.
or [1] An incorrect proportion is written, but an appropriate solution is found.
or [1] The correct circumference is found, but no further correct work is shown.
or [1] 621.1, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[225] incorrect procedure.

[4] 94, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] Appropriate work is shown, and the correct radian value is found for è, but it is not converted to degrees.
or [2] Both formulas are set up correctly, but no further correct work is shown.
or [2] An incorrect radian value is found for è, but it is converted correctly to degrees.
[1] Only one formula is set up correctly, and no further correct work is shown.
or [1] 94, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[226]   incorrect procedure.

[2] 9.42, and appropriate work is shown, such as changing the angle to radians and finding s.
[1] The formula $s = \theta r$ is stated, but 54° is not converted to radian measure.
or [1] Appropriate work is shown, but one computational or rounding error is made.
or [1] 9.42, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[227]   incorrect procedure.

[2] 6.9. and appropriate work is shown, such

as $2.4 \cdot 165 \cdot \dfrac{\pi}{180}$.

[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] Appropriate work is shown, but the calculations are performed in radians.
or [1] Correct substitution is made into the equation for the length of the arc, but no further correct work is shown.
or [1] 6.9, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[228]   incorrect procedure.

[4] 145, and appropriate work is shown, such as $(\frac{1}{2}\pi 13^2)-(\frac{1}{2}\cdot 10\cdot 24)$.

[3] Appropriate work is shown, but one computational or rounding error is made or the answer is expressed in terms of π.

or [3] Appropriate work is shown, but the area of the entire circle is used to calculate the area of the shaded region.

or [3] The areas of the semicircle and triangle are found correctly, but they are not subtracted to find the shaded area.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] An incorrect formula is used to find the area of the triangle or the semicircle, but an appropriate shaded area is found.

or [2] Only the area of the semicircle or the area of the triangle is found correctly, and no further correct work is shown.

[1] Both the areas of the semicircle and the triangle are found incorrectly, but they are subtracted to find an appropriate shaded area.

or [1] Only the length of $\overline{AC}$ is found correctly.

or [1] 145, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[229]   incorrect procedure.

[230]   C

[231]   A

[3] 2,827.4, and appropriate work is shown, such as $50^2\pi - 40^2\pi$.

[2] The areas of both circles are found correctly, but the two areas are not subtracted.

or [2] Appropriate work is shown, but one computational error is made.

[1] The correct area is found for only one of the circles.

or [1] The circumference formula is used, but the appropriate difference is shown, such as $100\pi - 80\pi = 20\pi$.

or [1] 2,827.4, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[232]   incorrect procedure.

[3] 78.5 square feet or 25π or an equivalent answer, and appropriate work is shown.

[2] Appropriate work is shown, but one computational error is made.

or [2] Appropriate work is shown, but the measure of one side of the square is used as the radius of the circle.

or [2] Appropriate work is shown, but the perimeter is used to find a side of the square.

[1] The correct length of the side of the square is shown, but further work is missing or is incorrect.

or [1] The equation for the circumference of the circle instead of the equation for the area of the circle is solved appropriately.

or [1] Appropriate work is shown, but more than one error is made.

or [1] 78.5 square feet or 25π, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[233]   incorrect procedure.

[234]   A

[4] $2,950.33 and a correct method is shown, such as area 1204π square feet multiplied by $0.78.

or [4] Various correct values of π are used that lead to slightly different totals such as $2,948.84 (if 3.14 is used).

[3] The shaded area is found, such as 1204π (or similar values based on π approximation).

or [3] The correct shaded area is found, but one computational mistake is made in the price, or the final cost is not rounded correctly.

[2] The two separate areas are found but not correctly used.

or [2] An inappropriate formula for areas is shown, but work is carried to an appropriate value.

or [2] Only one appropriate area is found and an appropriate cost is computed.

or [2] The area found is incorrect but calculated to an appropriate cost.

[1] Only one appropriate area is found, either 2500π or 1296π.

or [1] An inappropriate area is found, and one computational mistake is made in calculating the cost.

or [1] $2,948.84 through $2,950.33 and no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[235] incorrect procedure.

a [2] 125.6 or 125.7 (correct for the value of π used) and appropriate work is shown.

[1] The area is left as 40π or the answer is not rounded correctly.

or [1] An appropriate method is shown, but one computational mistake is made.

or [1] The correct areas of both circles are found, but the two areas are not subtracted.

or [1] The circumference formula is used correctly for both circles and the circumferences are subtracted for an answer of 25.1.

or [1] 125.6 or 125.7 and no work is shown.

b [2] 49 and an appropriate explanation is given.

or [2] An appropriate percent for an incorrect part a is found and supported by area formulas.

[1] The answer is left as $\dfrac{40\pi}{81\pi}$.

or [1] An appropriate fraction for an incorrect part a is found but not given as a percent.

or [1] An appropriate percent for an incorrect part a is found and is supported by circumference formulas.

or [1] 49 and no work is shown.

[0] $\dfrac{4}{9}$ or 44% and no work is shown.

or [0] 4 is found by subtracting the radii.

or a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[236] obviously incorrect procedure.

[4] 9, and appropriate work is shown.
[3] Appropriate work is shown, but one
computational or rounding error is made.
or [3] Appropriate work is shown, and the
areas of the rectangle and one circle are found
correctly, but the area of the circle is not
doubled, but an appropriate number of bags is
found.
[2] Appropriate work is shown, but two or
more computational or rounding errors are
made.
or [2] Appropriate work is shown, but one
conceptual error is made, such as using an
incorrect formula for the area of a circle, but
an appropriate number of bags is found.
or [2] The areas of the rectangle and the circle
are found correctly, but no further correct
work is shown.
[1] Appropriate work is shown, but one
conceptual error and one computational or
rounding error are made.
or [1] 9, but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[237] incorrect procedure.

[238] D

[239] B

[240] C

[241] D

[242] C

[243] A

[4] 11, and appropriate work is shown, such
as solving the quadratic equation $3x(x + 5) =$
150 or trial and error with at least three trials
and appropriate checks.
[3] Appropriate work is shown, but one
computational error is made.
or
[3] Appropriate work is shown to determine
that 5 is the shorter side of the box, but the
shorter side of the original sheet is not found
or is found incorrectly.
or
[3] An incorrect quadratic equation of equal
difficulty is solved appropriately, and an
appropriate shorter side of the original sheet
is found.
[2] Appropriate work is shown, but more than
one computational error is made.
or
[2] Appropriate work is shown, but one
conceptual error is made.
or
[2] An incorrect quadratic equation of equal
difficulty is solved appropriately, but the
shorter side of the original sheet is not found.
or
[2] A correct quadratic equation is set equal to
zero, but no further correct work is shown.
or
[2] The trial-and-error method is used to find
a correct solution, but only two trials and
appropriate checks are shown.
[1] Appropriate work is shown, but one
conceptual error and one computational error
are made.
or
[1] One conceptual error is made in finding
the shorter side of the box, and the
corresponding shorter side of the original
sheet is not found or is found incorrectly.
or
[1] A correct quadratic equation is written,
but it is not set equal to zero, and no further
correct work is shown.
or
[1] 11, but no work or only one trial with an
appropriate check is shown.
[244] [0] A zero response is completely incorrect,

irrelevant, or incoherent or is a correct
response that was obtained by an obviously
incorrect procedure.

[245] B

[246] C

a [1] Either (x – 2)(x + 1)(2x) = V or the same
expression without "= V" is shown.
or
[1] $2x^3 - 2x^2 - 4x$ or an equivalent
expression is shown.
b [1] 864
or
[1] The student substitutes appropriately into
an incorrect part a equation.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[247] incorrect procedure.

[3] 3, 12, and 30 and an appropriate
arithmetic method or equation is shown, such
as $40x^3 = 1080$.
[2] An appropriate equation or method is
shown, but not all three dimensions are found.
or
[2] An appropriate method is shown, and
although one computational mistake is made,
the student does find three dimensions based
on this mistake, such as dividing 1080 by 40
incorrectly.
[1] The student shows that multiplication is
required to find volume but sets up an
incorrect method and does not find three
dimensions.
or
[1] 3, 12, and 30 and no work is shown.
[0] The sum is used instead of the product,
or
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[248] incorrect procedure.

[2] 20, and appropriate work is shown, such
as $3,360 \div (14 \times 12)$.
[1] Appropriate work is shown, but one
computational error is made.
or
[1] 20, but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[249] incorrect procedure.

[3] 27 and an appropriate method or
explanation is shown, such as
$(\frac{1}{6})(\frac{1}{3})(\frac{2}{3}) = \frac{1}{27}$ of a cubic foot, thus 27
bricks needed or, in inches, $\frac{1728}{64} = 27$. A
labeled drawing is an acceptable explanation.
[2] An appropriate method for finding volume
is shown, but one computational mistake is
made.
[1] Correct conversion into feet is shown.
or
[1] The volume of 64 cubic inches is found.
or
[1] 27 and no explanation is given.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[250] incorrect procedure.

[3] 64, and appropriate work is shown, such as calculating $\dfrac{(36 \times 144)}{(9 \times 9)}$ or drawing a labeled diagram.
[2] Appropriate work is shown, but one computational error is made.
[1] Appropriate work is shown, but more than one computational error is made.
or
[1] Appropriate work is shown, but one conceptual error is made.
or
[1] 64, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[251]   incorrect procedure.

[3] 5-inch box and appropriate work is shown, including showing a diameter between 4 and 5.
[2] The correct diameter is shown, but the wrong box size is chosen.
or
[2] The correct radius is shown, but the 3-inch box is chosen.
[1] The correct diameter or radius is shown, but no box is chosen.
or
[1] An appropriate radius between 2 and 3 is shown, using the incorrect formula $A = \pi r^2$, and the 3-inch box is chosen.
or
[1] An appropriate diameter, using $A = \pi r^2$, is shown, but the appropriate box is chosen.
or
[1] An appropriate radius, using $A = \pi r^2$, is shown, but no box is chosen.
or
[1] The 5-inch box is chosen, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[252]   incorrect procedure.

[4] 21 by 23, and appropriate work is shown, such as solving the equation $765 = 3(x - 4)(x - 6)$.
[3] Appropriate work is shown, but one computational error is made.
or
[3] Appropriate work is shown, but only one dimension is found.
[2] Appropriate work is shown, but two or more computational errors are made.
or
[2] Appropriate work is shown, but one conceptual error is made.
or
[2] An incorrect equation of equal difficulty is solved appropriately, and appropriate dimensions are found.
or
[2] A correct quadratic equation is written in standard form, but no further correct work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational error are made.
or
[1] An incorrect equation of equal difficulty is written, and one computational error is made, but appropriate dimensions are found.
or
[1] An incorrect equation of equal difficulty is solved appropriately, but one computational error is made when finding the length.
or
[1] 21 by 23, but no work is shown.
[0] 21 or 23, but no work is shown.
or
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[253]   incorrect procedure.

[3] 47, and appropriate work is shown.
[2] Appropriate work is shown, but one computational or rounding error is made.
or
[2] The correct numerical value of the volume of the cup (20π or its equivalent) and the volume of the tank (3,000) are shown, but the solution is not completed.
[1] The correct volume of only the cup or only the tub is shown.
or
[1] 47, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[254]   incorrect procedure.

[3] 12, and appropriate work is shown, such as calculating volume = 5,760 in^3 and dividing by 500 in^3.
[2] Appropriate work is shown, but one computational or rounding error is made.
or
[2] The volume is found incorrectly by multiplying 24 ? 16 ? 18, but it is divided by 500 and rounded appropriately, resulting in an answer of 14.
[1] Appropriate work is shown, but two or more computational or rounding errors are made.
or
[1] Appropriate work is shown, but one conceptual error is made.
or
[1] The volume of 5,760 is found correctly, but no further correct work is shown.
or
[1] 12, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[255]   incorrect procedure.

[256]   D

[257]   A

[4] $\dfrac{8}{36}$ or $\dfrac{2}{9}$ or 2:9, and all three lines are graphed correctly and the triangle's area is shown to be 8 and the square's area is shown to be 36.
[3] The three lines are graphed correctly, but one area is incorrect, but the probability is appropriate, based on this error.
or [3] The graphs and areas are correct, but the probability is incorrect, based on one computational error.
or [3] The three lines are graphed correctly and both areas are calculated correctly, but the probability is not found.
or [3] One equation is graphed incorrectly, but the area is appropriate, based on the graph, and the probability is appropriate, based on the areas.
[2] The three lines are graphed correctly, but the area of the smaller triangle is used, but the probability is appropriate, such as $\dfrac{2}{36}$.
or [2] Two or three lines are graphed incorrectly, but the areas and the probability are appropriate.
or [2] The lines are graphed correctly, but the areas are incorrect, but the probability is appropriate, based on the errors.
[1] All graphs and the areas are incorrect, but the probability is appropriate.
or [1] $\dfrac{8}{36}$ or $\dfrac{2}{9}$ or 2:9, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[258]   incorrect procedure.

[2] $\frac{800}{900}$ or an equivalent answer, and appropriate work is shown, such as finding the areas of the two squares, subtracting the area of the smaller square from the area of the larger square, and setting up a correct ratio.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as calculating the perimeters of the squares instead of the areas.
or [1] Appropriate work is shown, but $\frac{100}{900}$ or an equivalent answer (the complement of the correct answer) is found.
or [1] The areas of the squares are calculated incorrectly, but an appropriate probability is found.
or [1] $\frac{800}{900}$ or an equivalent answer, but no work is shown.
[0] The areas of the squares are calculated correctly, but no probability is stated.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[259]   obviously incorrect procedure.

[260]   D

[261]   D

[262]   B

[263]   C

[6] A complete and correct proof is written.
[5] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement or reason is missing or is incorrect, or the concluding statement is missing.
[4] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements or reasons are missing or are incorrect.
[3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
[2] Some correct relevant statements about the proof are made, but three or four statements or reasons are missing or are incorrect.
[1] Only one correct statement and reason are written.
[0] The "given" and/or the "prove" statements are rewritten in the style of a formal proof, but no further correct relevant statements are written.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[264]   obviously incorrect procedure.

[4] The reasons for all four steps are correct, such as:
Step 3: Perpendicular line segments form right angles.
Step 6: If two parallel lines are cut by a transversal, the alternate interior angles are congruent.
Step 8: $AAS \cong AAS$.
Step 9: Corresponding parts of congruent triangles are congruent.
[3] The reasons for only three steps are correct.
[2] The reasons for only two steps are correct.
[1] The reason for only one step is correct.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[265]   incorrect procedure.

[266] C

[267] D

[268] C

[269] B

[270] C

[3] 102, and appropriate work is shown, such as using the equation $2x + 10 + 3x = 180$ or an equivalent equation.
[2] The equation $2x + 10 + 3x = 180$ is solved correctly for x, but m–B is not determined or is determined incorrectly.
[1] Appropriate work is shown, but one computational error is made or x is not determined.
or [1] The equation $2x + 10 + 3x = 360$ is solved correctly, and an answer of 210 is found.
or [1] 102, but no work is shown.
[0] The equation $2x + 10 = 3x$ where $x = 10$ is given.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[271] obviously incorrect procedure.

[6] Either a correct Euclidean proof is written, with a concluding statement that the diagonals bisect each other, or a correct analytic proof using coordinate geometry is written, with a concluding statement that the diagonals bisect each other.
[5] One reason is omitted or incorrect.
or [5] Appropriate work is shown, but one computational error is made.
[4] The appropriate triangles are proven to be congruent, but the corresponding parts and a final statement that indicates why the diagonals are bisected are omitted.
or [4] Appropriate work is shown, but two computational errors are made.
or [4] A correct analytic proof using coordinate geometry is written, but no concluding statement is made.
[3] An appropriate conclusion is drawn, including a statement that indicates why the diagonals are bisected; but only a partial proof is written, with two steps missing, and errors in the statements or reasons are made.
or [3] An analytic proof using coordinate geometry with more than two errors is written, but an appropriate concluding statement is made.
or [3] The diagram in an analytic proof is labeled incorrectly or numerically, but the rest of the proof is correct.
[2] Statements for the Euclidean proof are written, but no valid reasons are given.
or [2] A congruence proof is written with some valid statements and reasons, but a concluding statement that the diagonals bisect each other is not made.
[1] A correctly labeled diagram for a Euclidean proof is shown, but no proof is written.
or [1] An analytic proof using coordinate geometry with more than two errors is written, but no concluding statement is made.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[272] incorrect procedure.

[6] A complete and correct proof is written.
[5] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement and/or reason is missing or is incorrect.
[4] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements and/or reasons are missing or are incorrect.
[3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
[2] Some correct relevant statements about the proof are made, but three or four statements and/or reasons are missing or are incorrect.
[1] Only one correct statement and reason are written.
[0] The "given" and/or the "prove" statements are rewritten in the style of a formal proof, but no further correct relevant statements are written.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[273]   obviously incorrect procedure.

[6] A complete and correct proof that includes a concluding statement is written, such as showing that $\overline{AB}$ is parallel to $\overline{CD}$ and that $\overline{BC}$ is not parallel to $\overline{AD}$ by finding their slopes and using the distance formula to show that the two nonparallel sides are equal.
[5] Appropriate work is shown, but one computational error is made.
[4] Appropriate work is shown, but two or more computational errors are made.
or [4] Appropriate work is shown, but one conceptual error is made, such as using an incorrect formula.
or [4] The slopes of all four sides are found correctly and the lengths of $\overline{AD}$ and $\overline{BC}$ are found correctly, and appropriate work is shown, but no conclusion is stated.
or [4] A proof is written that correctly shows *ABCD* is a trapezoid, but it is not proved to be isosceles.
[3] The slopes of only one pair of sides are found correctly, but the lengths of $\overline{AD}$ and $\overline{BC}$ are found correctly, and appropriate work is shown, and an appropriate conclusion is stated.
or [3] A correct numerical illustration is given in lieu of a proof of the general case.
[2] The slopes of only one pair of sides are found correctly, but the lengths of $\overline{AD}$ and $\overline{BC}$ are found correctly, and appropriate work is shown, but no conclusion is stated.
[1] Either the slopes or the lengths of $\overline{AD}$ and $\overline{BC}$ are found correctly, but no conclusion is stated.
or [1] The correct definition of an isosceles trapezoid is written, but no further correct work is shown.
[0] The slopes of $\overline{AB}$ and $\overline{DC}$ are found correctly, but no further correct work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[274]   incorrect procedure.

[275]   B

[276]   D

    [2] 75, and appropriate work is shown, such as $3x + 15 = 4x - 5$.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as showing $\overline{AC}$ and $\overline{BD}$ as congruent opposite sides.
or [1] A correct equation is written, but no further correct work is shown.
or [1] A correct equation is written and solved for x, but the length of $\overline{AC}$ is not found.
or [1] An incorrect equation of equal difficulty, such as $3x + 15 + 4x - 5 = 180$, is solved appropriately, and an appropriate length of $\overline{AC}$ is found.
or [1] 75, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[277]   incorrect procedure.

[4] 114" (9 feet 6 inches) and 37" (3 feet 1 inch) and appropriate work is shown, such as $\sin 72° = \dfrac{x}{10}$ and $\cos 72° = \dfrac{y}{10}$ or use of the Pythagorean theorem.
[3] An incorrect diagram is drawn, but appropriate work and an appropriate solution for that diagram are shown.
or [3] Appropriate work is shown, but the answers are rounded to the nearest foot and then converted to inches, arriving at 120" and 36".
or [3] The setup is correct, but the answers are not converted to the nearest inch.
[2] One correct dimension is shown, such as 114" (9 feet 6 inches) or 37" (3 feet 1 inch).
or [2] Only one error involving interchanging sine and cosine is made.
or [2] An incorrect diagram is drawn, and the solution is appropriate for the diagram but is not rounded to the nearest inch.
[1] The student switches sine and cosine and does not round to the nearest inch.
or [1] The student uses the correct trigonometric function to compute one side correctly but does not convert it to the nearest inch.
or [1] 114" (9 feet 6 inches) and 37" (3 feet 1 inch) but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[278]   incorrect procedure.

[6] The correct slopes of $AB = \frac{1}{2}$ and

$CD = \frac{1}{2}$ are found, $\overline{AB} \parallel \overline{CD}$ is stated, and an

explanation of why they are parallel is given.

The correct slopes of $AD = -\frac{5}{2}$ and

$BC = -\frac{1}{2}$ are found, $\overline{AD}$ is not parallel to

$\overline{BC}$ is stated, and an explanation of why they
are not parallel is given. An explanation that
ABCD is a trapezoid is given.

[5] The correct slopes of $\overline{AB}, \overline{CD}, \overline{AD}$, and

$\overline{BC}$ are found, and $\overline{AB} \parallel \overline{CD}$ and

$\overline{AD}$ not $\parallel \overline{BC}$ are stated, but an explanation

that *ABCD* is a trapezoid is not given.
or [5] One computational error is made in
finding the slopes, but all further work is
appropriate, based on the calculated slopes.

[4] The correct slope of $\overline{AB}$ and $\overline{CD}$ are

found, and $\overline{AB} \parallel \overline{CD}$ is stated, but incorrect

slopes of $\overline{AD}$ and $\overline{BC}$ are found, but an
explanation of why they are not parallel is
given, but an explanation that *ABCD* is a
trapezoid is not given.
or [4] More than one computational error is
made in finding the slopes, but $\overline{AB}$ and $\overline{CD}$

are found to have equal slopes and $\overline{AD}$ and

$\overline{BC}$ to have different slopes, but an
explanation that *ABCD* is a trapezoid is given.

[3] Incorrect slopes of $\overline{AB}, \overline{CD}, \overline{AD}$, and $\overline{BC}$

are found, such as by using an incorrect

formula, $\overline{AB}$ and $\overline{CD}$ are found to have equal

slopes and $\overline{AD}$ and $\overline{BC}$ to have different

slopes, but an explanation that *ABCD* is a
trapezoid is given.

[2] Only the correct slopes of $\overline{AB}, \overline{CD}, \overline{AD}$,

and $\overline{BC}$ are found, and appropriate work is
shown.

[1] Only two correct slopes are found, and

[279] appropriate work is shown.

or [1] $AB = \frac{1}{2}$, $CD = \frac{1}{2}$, $AD = -\frac{5}{2}$, and

$BC = -\frac{1}{2}$, but no work is shown.

[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
incorrect procedure.

[6] $\overline{KA} \parallel \overline{ET}, \overline{AT}$ not $\parallel \overline{KE}$, and $\overline{KE} \neq \overline{AT}$, and

appropriate work is shown.
[5] Appropriate work is shown, but one
computational error leads to incorrect
conclusions that are appropriate, based on that
error.
[4] Appropriate work is shown to find

$\overline{KA} \parallel \overline{ET}$ or $\overline{AT}$ not $\parallel \overline{KE}$ and $\overline{KE} \neq \overline{AT}$, but

no further correct work is shown.
[3] Appropriate work is shown to find

$\overline{KE} \neq \overline{AT}$, and at least three of the four slopes

are found correctly, but no statement
regarding parallelism is made.
or [3] Appropriate work is shown to find the
four slopes, and correct statements of
parallelism are made, but no further correct
work is shown.
[2] Appropriate work is shown to find
unequal sides, but no further correct work is
shown.
or [2] Appropriate work is shown to find the
four slopes, but no conclusion is drawn.
or [2] The four slopes are correct, but no work
is shown, but appropriate opposite sides are
stated to be parallel and nonparallel.
or [2] The slope and distance formulas are
used, but more than one computational error
is made, but one accurate conclusion is
drawn.
[1] Only two correct slopes or distances are
found.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[280] incorrect procedure.

[4] Appropriate work is shown, and an appropriate concluding statement is made to prove quadrilateral *ABCD* is a rhombus.
[3] The proof is completed appropriately, but one computational error is made, but an appropriate concluding statement is made.
or [3] Appropriate work is shown to prove quadrilateral *ABCD* is a rhombus, but the concluding statement is missing, incomplete, or incorrect.
[2] The proof is completed appropriately, but more than one computational error is made, but an appropriate concluding statement is made.
or [2] Appropriate work is shown, but one of the formulas used is incorrect.
or [2] Appropriate work is shown to prove quadrilateral *ABCD* is a parallelogram, and an appropriate concluding statement is made, but the sides are not proved to be equal.
or [2] Quadrilateral *ABCD* is proved to be a rhombus by assuming quadrilateral *ABCD* is a parallelogram.
[1] Appropriate work is shown to prove quadrilateral *ABCD* is a parallelogram, and the concluding statement is missing, incomplete, or incorrect.
or [1] The definition of a rhombus is stated, but no proof is given.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[281]

[6] $\overline{JK} \parallel \overline{ML}, \overline{MJ}$ not $\parallel \overline{KL}$, $\overline{MJ} \neq \overline{KL}$, and appropriate work is shown or a complete and correct proof is written, and a concluding statement is written.
[5] Appropriate work is shown and a correct concluding statement is written, but one computational error is made in determining the slopes or the lengths of the legs.
or [5] Appropriate work is shown, but the concluding statement is missing or is incomplete.
[4] Appropriate work is shown and a correct concluding statement is written, but two or more computational errors are made.
or [4] The quadrilateral is proved to be a trapezoid, but the two nonparallel sides are not proved to be unequal.
or [4] A proof is written that shows that $\overline{JK} \parallel \overline{ML}$ and $\overline{MJ} \neq \overline{KL}$, but the difference between a quadrilateral and a trapezoid is not addressed.
[3] Appropriate work is shown, but one conceptual error is made.
[2] The quadrilateral is proved to be a trapezoid, but one conceptual error is made, and the two nonparallel sides are not proved to be unequal.
or [2] The lengths of all four sides are found correctly, but no further correct work is shown.
or [2] The two nonparallel sides are proved to be unequal, but no further correct work is shown.
[1] The proof shows that the first set of sides is parallel, but no further correct work is shown.
or [1] JKLM is graphed correctly and the definition of an isosceles trapezoid is written, but no proof is written.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[282]

[6] A complete and correct proof is shown.
[5] Appropriate work is shown, but one computational error is made.
or [5] Appropriate work is shown, but the final conclusion is not justified or is justified incorrectly.
[4] Appropriate work is shown, but two or more computational errors are made.
or [4] Appropriate work is shown to prove TEAM is a parallelogram and not a square, but no work is shown to prove it is a rhombus.
or [4] Appropriate work is shown to prove TEAM is a rhombus, and partial work is shown to prove TEAM is not a square, but the conclusion is not adequately justified.
[3] Appropriate work is shown to prove TEAM is a rhombus, but no further correct work is shown.
or [3] Appropriate work is shown to prove TEAM is not a square, but an incorrect method is used to prove TEAM is a rhombus.
or [3] An accurate explanation of the process required to complete the proof is stated, and needed formulas are given, but no further correct work is shown.
[2] Appropriate work is shown to prove TEAM is a parallelogram, but no further correct work is shown.
[1] A complete explanation of the method of the proof is written, but no further correct work is shown.
or [1] A statement that TEAM is not a square and a correct reason are written, but no further correct work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[283]

[6] Appropriate work is shown, such as using slopes to prove *ABCD* is a parallelogram but not a rectangle, and an appropriate concluding statement is made.
[5] Appropriate work is shown, but one computational or graphing error is made.
[4] Appropriate work is shown, but two or more computational or graphing errors are made.
or [4] Appropriate work is shown, but one conceptual error is made, such as using an incorrect formula.
or [4] A proof is written that correctly shows either *ABCD* is a parallelogram or it is not a rectangle, but not both.
[3] Appropriate work is shown, but two or more computational or graphing errors are made, and the concluding statement is incomplete.
[2] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
or [2] All four slopes are found correctly or the lengths of all four sides are found correctly, and appropriate work is shown, but no further correct work is shown.
[1] The slopes of all four sides are identified or the lengths of all four lines are identified, but no work is shown and no proof is written.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[284]

[285]   A

[286]   B

[2] 24 feet and appropriate work is shown,
such as $\frac{10}{15} = \frac{16}{x}$ or $= \frac{10}{16} = \frac{15}{x}$.
[1] An appropriate proportion is shown, but
an incorrect solution or no solution is found.
or [1] An incorrect proportion of equal
difficulty is shown, but an appropriate
solution for the proportion written is found.
or [1] 24 feet but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[287]   incorrect procedure.

[2] 24 miles and appropriate work is shown,
such as using a proportion, showing doubling
of the sides, or using any other appropriate
method.
[1] Appropriate work is shown, but one
computational or substitution error is made.
or [1] An incorrect proportion is appropriately
solved.
or [1] 24 but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[288]   incorrect procedure.

[2] 16, and appropriate work is shown, such
as $\frac{6}{4} = \frac{24}{x}$ or a labeled diagram.
[1] Appropriate work is shown, but one
computational error is made.
or [1] Appropriate work is shown, but one
conceptual error is made.
or [1] An incorrect proportion is written, but
it is solved appropriately.
or [1] 16, but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[289]   incorrect procedure.

[290]   C

[291]   C

[292]   D

[293]   B

[294]   C

[295]   D

[296]   A

[297]   D

[2] 160, and appropriate work is shown, such
as the proportion $\frac{25}{16} = \frac{250}{x}$.
[1] Appropriate work is shown, but one
computational error or one conceptual error is
made, such as $\frac{5}{4} = \frac{250}{x}$.
or [1] 160, but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[298]   incorrect procedure.

[299]   A

[4] 63, and appropriate work is shown.
[3] Appropriate work is shown, but one
computational or rounding error is made.
or [3] Appropriate work is shown, but the
supplement of the angle is found, resulting in
an answer of 117.
[2] Appropriate work is shown, but more than
one computational or rounding error is made.
or [2] A conceptual error is made when
applying the Law of Cosines.
[1] A correctly labeled diagram is drawn, but
no further correct work is shown.
or [1] 63, but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[300]   incorrect procedure.

[4] 116, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but the supplement of the correct answer, 64, is found.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
[1] The correct substitutions are made into the Law of Cosines, but no further correct work is shown.
or [1] 116, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[301]   incorrect procedure.

[4] 65.27, and appropriate work is shown, such as $\dfrac{100}{\sin 100} = \dfrac{x}{\sin 40}$.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but calculations are performed in radians, resulting in an answer of –147.15.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as the use of an incorrect trigonometric function.
or [2] An incorrect diagram is drawn, but appropriate work is shown, and an appropriate answer is found.
[1] A correctly labeled diagram is drawn, but no further correct work is shown.
or [1] 65.27, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[302]   incorrect procedure.

[2] 49.8, 65.1, and 65.1, and the appropriate use of the area formula is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Only one or two angles are found correctly.
or [1] Cosine is used instead of sine, but appropriate work is shown.
or [1] The setup is appropriate, but incorrect work is shown, such as the sine of the angle but not the angle is found.
or [1] 49.8, 65.1, and 65.1, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[303]   incorrect procedure.

[2] 164.2, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] 164.2, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[304]   incorrect procedure.

[2] 142.5, and appropriate work is shown, such as $\dfrac{1}{2}(16)(21)(\sin 58°)$.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] An incorrect trigonometric function is used, but an appropriate answer is found, such as $\dfrac{1}{2}(16)(21)(\sin 58°)$, resulting in an answer of 89 or 89.0.
or [1] 142.5, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[305]   incorrect procedure.

[2] 56, and appropriate work is shown, such

as $\frac{1}{2} \cdot 14 \cdot 16 \cdot \sin 30.$

[1] Appropriate work is shown, but one
computational error is made.
or [1] Appropriate work is shown, but one
conceptual error is made.
or [1] 56, but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[306] incorrect procedure.

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[2] 67, and appropriate work is shown, such

as $A = \frac{1}{2}(11)(13)\sin 70°.$

[1] Appropriate work is shown, but one
computational or rounding error is made.
or [1] Appropriate work is shown, but one
conceptual error is made.
or [1] 67, but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[307] incorrect procedure.

___

[4] 2, and appropriate work is shown, such as
determining that the 108 square feet and the
new length of AB is 16 feet.
[3] Appropriate work is shown, but one
computational error is made.
or [3] The area of the original triangle and the
new length of side AB are found correctly, but
the length is not subtracted to find the
difference.
[2] Appropriate work is shown, but two or
more computational errors are made.
or [2] Appropriate work is shown, but one
conceptual error is made.
or [2] Appropriate work is shown, but one
computational error is made, and the length is
not subtracted to find the difference.
[1] Appropriate work is shown, but one
conceptual error and one computational error
are made.
or [1] The area of the original triangle is
found correctly, but no further correct work is
shown.
or [1] 2, but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[308] incorrect procedure.

___

[309] C

___

[310] A

___

a [2] A correct circle is sketched with its
center at (2,1) and a radius of 3 and the line
2x + y = 8 is drawn.
[1] Only one of the graphs is sketched
correctly.
b [1] 2
or [1] The correct number of intersections is
found, based on the incorrect graphs drawn in
part a.
a and b [0] A zero response is completely
incorrect, irrelevant, or incoherent of is a
correct response that was obtained by an
[311] obviously incorrect procedure.

___

[3] The circle is graphed correctly, and appropriate work shows that (5,–2) does not lie on the circle.
[2] The circle is graphed correctly, but the work fails to show that (5,–2) does not lie on the circle.
[1] The circle is graphed incorrectly, but the location of (5,–2) is determined appropriately, based on the incorrect graph.
[0] Yes or no, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[312] obviously incorrect procedure.

[2] (5,1), and appropriate work is shown, such as a graph using the slope or $2 = \dfrac{x-1}{2}$ and $3 = \dfrac{y+5}{2}$.
[1] Both (2,3) and (-1,5) are plotted correctly, but one graphing error is made in finding the other endpoint.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] Appropriate work is shown, but only x = 5 or y = 1 is found.
or [1] Appropriate work is shown, and the correct endpoint is designated, but the coordinates are not stated.
or [1] (5,1), but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[313] incorrect procedure.

[314] D

[315] C

[316] A

a [2] The student draws a circle with its center at (0,0) and a radius of 3.
[1] The student draws a circle, but it has an incorrect center or radius.
b [2] 28, and appropriate work or the expression 9π is shown, which rounds to 28.
or [2] An appropriate area is shown for the incorrect figure in part a.
[1] The correct expression is shown, but the answer is left as 9π, not rounded, or not rounded correctly.
or [1] An incorrect radius is used, but the area is rounded appropriately.
a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[317] obviously incorrect procedure.

[318] B

[319] C

[320] C

[4] (3,4) and (–3,–4), and a correct algebraic or graphic solution is shown.
[3] Appropriate work is shown, but one computational or graphing error is made.
or [3] Appropriate work is shown for an algebraic or graphic solution, but only one correct ordered pair is found or the correct values are found only for x or for y.
[2] Appropriate work is shown, but two or more computational or graphing errors are made.
or [2] Both equations are graphed correctly, but neither ordered pair is identified.
or [2] The line is graphed correctly, but the circle is graphed as a semicircle, and only one correct solution is identified.
or [2] An incorrect quadratic equation of equal difficulty is solved appropriately, and an appropriate solution or solutions are found.
or [2] The linear equation is graphed correctly and correct points of the circle are graphed, but the points are connected to form a quadrilateral, but appropriate ordered pairs are identified.
[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
or [1] One equation is graphed correctly, but no further correct work is shown.
or [1] An incorrect equation of a lesser degree of difficulty, such as a linear equation, is solved appropriately, and an appropriate solution or solutions are found.
or [1] A correct quadratic equation is set equal to zero, but no further correct work is shown.
or [1] (3,4) and (–3,–4), but no work is shown.
[0] (3,4) or (–3,–4), but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[321]   obviously incorrect procedure.

[322]   A

[323]   B

[324]   C

[2] 1.5 and a correct diagram is drawn, and appropriate work is shown.
[1] Appropriate work is shown and a correct answer is found, but an incorrect diagram is drawn.
or [1] A correct diagram is drawn, but no further correct work is shown.
or [1] An incorrect diagram is drawn, but an appropriate answer is found.
or [1] 1.5, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[325]   incorrect procedure.

[326]   A

[327]   C

[328]   C

[329]   B

[330]   D

[6] $m\angle ACB = 36$ and $DOE = 39$, and appropriate work is shown. [If trigonometry is used to find that $m\angle ACB = 35.98138002$, allow full credit for the full display of the calculator or any correctly rounded response.]
[5] Appropriate work is shown, but one computational or rounding error is made.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
[3] Appropriate work is shown, but one conceptual error is made.
or [3] $m\angle ACB = 36,$ and appropriate work is shown, but no further correct work is shown.
or [3] $DOE = 39,$ and appropriate work is shown, but no further correct work is shown.
[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [2] $m\angle ACB = 36$ and $DOE = 39,$ but no work is shown.
[1] The measures of the arcs are found correctly, but no further correct work is shown.
or [1] $m\angle ACB = 36$ or $DOE = 39,$ but no work is shown.
[0] 36 and 39, but no work is shown and the answers are not labeled.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[331]   obviously incorrect procedure. _____

[332]   A _____

[4] 60°, and an appropriate sketch is drawn, and appropriate work is shown.
[3] A correct sketch is shown, and $m\overarc{AB}$ is correct.
or [3] A correct sketch is shown, but one computational error is made, leading to an incorrect $m\overarc{AB}$, but $m\overarc{CB}$ is appropriate, based on the incorrect $m\overarc{AB}$.
[2] A correct sketch is shown, but an incorrect procedure is used to find either the correct or incorrect $m\overarc{AB}$, but $m\overarc{CB}$ is appropriate, based on the incorrect $m\overarc{AB}$.
or [2] An incorrect sketch is shown, but an appropriate $m\overarc{CB}$ is found, based on the incorrect sketch.
[1] Only a correct sketch is shown.
or [1] 60°, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[333]   incorrect procedure. _____

[334]   A _____

[6] 80 and 9.2, and appropriate work is shown.
[5] Appropriate work is shown, but one computational or rounding error is made.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
or [4] Appropriate work is shown, but one conceptual error is made in solving for one of the values.
or [4] 80, and appropriate work is shown, but the length of $\overline{PT}$ is not found or is found incorrectly.
or [4] The measure of all three arcs and the length of $\overline{PT}$ are found correctly, but the measure of $\angle P$ is not found or is found incorrectly.
[3] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
[2] Appropriate work is shown, but one conceptual error is made in solving for each value.
or [2] 80 and 9.2, but no work is shown.
or [2] 9.2, and appropriate work is shown, but no further correct work is shown.
or [2] The measures of all three arcs are found correctly, but no further correct work is shown.
[1] 80 or 9.2, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[335]   incorrect procedure.

[2] 8, and appropriate work is shown, such as $(PA)^2 = 4 \times 16 = 64$.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as failing to reject the negative root.
or [1] 8, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[336]   incorrect procedure.

[6] $\frac{2}{1}$ or 2:1 or an equivalent ratio, and appropriate work is shown.
[5] Appropriate work is shown, but one computational error is made, but an appropriate ratio is found.
or [5] Appropriate work is shown, but the answer is not written as a ratio.
or [5] Appropriate work is shown, but the ratio is reversed or is simplified incorrectly.
[4] Appropriate work is shown, but two or more computational errors are made, but an appropriate ratio is found.
or [4] Correct measures are found for all the arcs and the angles, and appropriate work is shown, but no ratio is found.
or [4] Correct measures are found for all the arcs, but the measure of one angle is found incorrectly, but an appropriate ratio is found.
[3] One conceptual error is made, but appropriate work is shown, and an appropriate ratio is found.
or [3] Correct measures are found for all the arcs, but the measures of both angles are found incorrectly, but an appropriate ratio is found.
[2] Correct measures are found for all the arcs, but no further correct work is shown.
[1] Only the value of x is found correctly, and appropriate work is shown.
or [1] $\frac{2}{1}$ or 2:1 or an equivalent ratio, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[337]   incorrect procedure.

[4] An appropriate diagram is drawn, and a correct proof is written in statement-reason or paragraph form, such as stating that ΔAOB cannot have two right angles or that two perpendiculars cannot be drawn to $\overline{PA}$ from point O.

[3] An appropriate diagram is drawn and an appropriate reason is written to show $\overline{OA} \perp \overline{PA}$, but one statement or one reason is incomplete or is incorrect, but an appropriate conclusion is drawn.

or [3] The diagram is not drawn, but a complete and correct proof is written.

[2] An appropriate diagram is drawn, and an appropriate reason is written to show $\overline{OA} \perp \overline{PA}$, but one statement and one reason are incomplete or are incorrect, but an appropriate conclusion is drawn.

[1] An appropriate diagram is drawn, but the proof contains circular reasoning.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[338]

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[6] A complete and correct proof is shown, such as the example below:

Statements	Reasons
1 Chords $\overline{AB}$ and $\overline{CD}$ of circle O intersect at E, and chords $\overline{AB}$ and $\overline{CD}$ are drawn.	1 Given
2 $\angle A \cong \angle C$	2 Inscribed angles of a circle that intercept the same arc are congruent.
3 $\angle AED \cong \angle CEB$	3 Vertical angles are congruent.
4 $\triangle AED \sim \triangle CEB$	4 AA $\cong$ AA
5 $\frac{AE}{CE} = \frac{ED}{EB}$	5 Corresponding sides of similar triangles are in proportion.
6 $(AE)(EB) = (CE)(ED)$	6 In a proportion, the product of the means equals the product of the extremes.

[5] ΔAED and ΔCEB are correctly proved to be similar, and the appropriate proportion is written with justification.

or [5] A correct proof is shown, but one of the justifications is missing or is incorrect.

[4] ΔAED and ΔCEB are correctly proved to be similar, but no further work is shown.

[3] A correct proof is shown, but more than one justification is missing or is incorrect.

[2] The triangles are said to be similar, and the conclusion is written.

[1] Only one correct statement and justification are given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[339]

[4] A complete and correct proof that includes a concluding statement is written.

[3] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one reason is missing or is incorrect or the concluding statement is missing.

or [3] Two pairs of angles are proven congruent, but the triangles are not proven similar.

[2] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements or reasons are missing or are incorrect.

or [2] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made, such as using an incorrect method to prove that two angles are congruent.

or [2] $\angle E$ and $\angle ABC$ are proven congruent, but the remainder of the proof is missing or is incorrect.

[1] Some correct relevant statements about the proof are made, such as showing that $\angle CAB$ and $\angle ABE$ are congruent, but the remainder of the proof is missing or is incorrect.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[340]   incorrect procedure.

[4] 6.8, and appropriate work is shown, such as using the Law of Cosines or the Law of Sines or right triangle trigonometry.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] 3.4, and appropriate work is shown, such as $\cos 70 = \dfrac{x}{10}$ or $\sin 20 = \dfrac{x}{10}$.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric function.

or [2] Correct substitution is made into the Law of Sines or the Law of Cosines, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] The measures of $\overset{\frown}{EA}$ and $\overset{\frown}{SA}$ are found correctly, but no further correct work is shown.

or [1] The measures of the three angles of triangle *SEA* are found correctly, but no further correct work is shown.

or [1] 6.8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[341]   incorrect procedure.

[6] $m\widehat{GF} = 30,\ m\angle BHD = 65,$
$m\angle BDG = 75,\ m\angle GDE = 55,\ m\angle C = 35,$
and $m\angle BOD = 100,$ and appropriate work is
shown.
[5] $m\widehat{GF}$ is determined correctly, but $m\widehat{BD}$
is determined incorrectly, but all five of the
angle measures are determined appropriately.
or [5] $m\widehat{GF}$ is determined incorrectly, but all
five of the angle measures are determined
appropriately, based on the incorrect arc
measure.
or [5] $m\widehat{GF}$ is determined correctly, but only
four of the angle measures are determined
correctly.
[4] $m\widehat{GF}$ is determined incorrectly, and only
four of the angle measures are determined
appropriately, based on the incorrect arc
measure.
or [4] $m\widehat{GF}$ is determined correctly, but only
three of the angle measures are determined
correctly.
[3] $m\widehat{GF}$ is determined incorrectly, and only
three of the angle measures are determined
appropriately, based on the incorrect arc
measure.
or [3] $m\widehat{GF}$ is determined correctly, but only
two of the angle measures are determined
correctly.
[2] $m\widehat{GF}$ is determined incorrectly, and only
two of the angle measures are determined
appropriately, based on the incorrect arc
measure.
or [2] $m\widehat{GF}$ is determined correctly, but only
one angle measure is determined correctly.
[1] rnGF is determined incorrectly, and only
one angle measure is determined
appropriately.
or [1] $m\widehat{GF}$ is determined correctly, but no
further correct work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[342] incorrect procedure.

[2] $\sqrt{171}$ or 13 or 13.1 or 13.08 or an
equivalent answer, and appropriate work is
shown, such as the use of the equation of a
circle $(x^2 + y^2 = r^2)$ or the Pythagorean
theorem.
[1] Appropriate work is shown, but one
computational error is made.
or [1] Incorrect analysis is shown, such as x =
5 and y = 14, but the work is concluded
appropriately.
or [1] A correct answer is found, but no work
is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[343] incorrect procedure.

[344] B

[345] A

[346] B

[347] D

[348] A

[349] A

[2] 57°, and appropriate work is shown, such
as determining that $m\angle FYD \cong m\angle BXY$ and
$\angle AXY$ is supplementary to $\angle BXY$.
or [2] 57°, and a correctly labeled diagram
with appropriate angles is shown.
[1] $\angle CYX$ or $\angle BXY$ is determined, but one
computational error is made in subtracting to
find $m\angle AXY$.
or [1] An angle is determined incorrectly, but
an appropriate solution is found.
or [1] 57°, but no work is shown.
[0] A zero response is completely incorrect,
irrelevant, or incoherent or is a correct
response that was obtained by an obviously
[350] incorrect procedure.

[2] 31, and appropriate work is shown, such as $5x + 25 = 180$.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as setting the given angles equal to each other.
or [1] A correct equation is written, but no further correct work is shown.
or [1] 31, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[351]   incorrect procedure.

[3] 65, and appropriate work is shown, such as setting the given angles equal to each other and determining the value of x to be 16, and correct substitution is shown.
[2] The given angles are set equal to each other, the correct value of x is determined, but no substitution is shown.
or [2] The given angles are set equal to each other, and substitution is shown, but one computational or substitution error is made.
[1] The given angles are set equal to each other, but no further work is shown.
or [1] An incorrect equation is solved appropriately, such as $5x – 15 + 2x + 33 = 180$.
or [1] 65, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[352]   incorrect procedure.

[4] 146, and appropriate work is shown, such as solving the equation $2x = 5x - 51$.
[3] Appropriate work is shown, but one computational error is made.
or [3] The measure of $\angle FHB$ or $\angle DGH$ is found to be 34, and appropriate work is shown, but no further correct work is shown.
[2] Appropriate work is shown, but two or more computational errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as solving the equation $2x + 5x - 51 = 180$.
or [2] The correct equation is solved for x = 17, but no further correct work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational error are made.
or [1] The correct equation is written, but no further correct work is shown.
or [1] 146, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[353]   incorrect procedure.

[354]   D

[355]   B

[356]   D

[2] 23, and appropriate work is shown.
[1] Appropriate work is shown, but no answer or an incorrect answer is found.
or [1] 23, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[357]   incorrect procedure.

[358]   A

[359]   A

[360]   B

[361]   D

[362]   A

[2] False, and an appropriate explanation is given.
[1] Appropriate work is shown, but the truth value is missing or is incorrect.
[0] False, but no explanation is given.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[363]   obviously incorrect procedure.

[3] At least one example is shown that makes the statement true, such as 2, 3, 5, 7, 9, or a defined variable; and one example is shown that makes the statement false, such as any even number other than 2, with a correct explanation that shows that the student can recognize odd numbers and prime numbers. The explanation can be in words or as a Venn diagram.
[2] Two correct examples are shown, one that shows the statement is true and one that shows the statement is false, but no explanation or an inappropriate explanation is given.
or [2] Only one correct example is shown, but an appropriate explanation is given.
[1] Only one correct example is shown, and no explanation or an incorrect explanation is given.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[364]   incorrect procedure.