The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

GEOMETRY

Thursday, August 17, 2017 — 12:30 to 3:30 p.m., only

Student Name: ____

School Name: ____

The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

Print your name and the name of your school on the lines above.

A separate answer sheet for **Part I** has been provided to you. Follow the instructions from the proctor for completing the student information on your answer sheet.

This examination has four parts, with a total of 36 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in **Parts II, III,** and **IV** directly in this booklet. All work should be written in pen, except for graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale.

The formulas that you may need to answer some questions in this examination are found at the end of the examination. This sheet is perforated so you may remove it from this booklet.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this booklet as scrap paper. A perforated sheet of scrap graph paper is provided at the end of this booklet for any question for which graphing may be helpful but is not required. You may remove this sheet from this booklet. Any work done on this sheet of scrap graph paper will *not* be scored.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

Notice…
A graphing calculator, a straightedge (ruler), and a compass must be available for you to use while taking this examination.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for computations.

1 A two-dimensional cross section is taken of a three-dimensional object. If this cross section is a triangle, what can *not* be the three-dimensional object?

(1) cone (3) pyramid
(2) cylinder (4) rectangular prism

2 The image of $\triangle DEF$ is $\triangle D'E'F'$. Under which transformation will the triangles *not* be congruent?

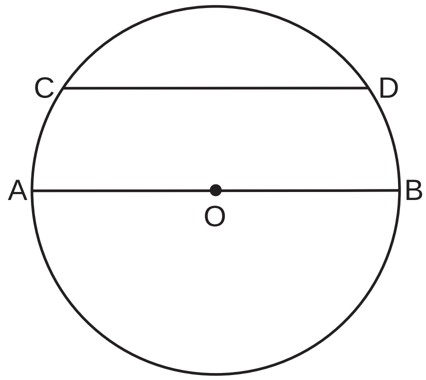
(1) a reflection through the origin
(2) a reflection over the line $y = x$
(3) a dilation with a scale factor of 1 centered at (2,3)
(4) a dilation with a scale factor of $\frac{3}{2}$ centered at the origin

3 The vertices of square $RSTV$ have coordinates $R(-1,5)$, $S(-3,1)$, $T(-7,3)$, and $V(-5,7)$. What is the perimeter of $RSTV$?

(1) $\sqrt{20}$ (3) $4\sqrt{20}$
(2) $\sqrt{40}$ (4) $4\sqrt{40}$

Use this space for computations.

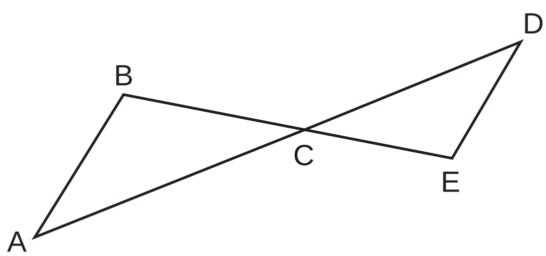
4 In the diagram below of circle O, chord $\overline{CD}$ is parallel to diameter $\overline{AOB}$ and $m\overset{\frown}{CD} = 130$.



What is $m\overset{\frown}{AC}$?

(1) 25
(2) 50
(3) 65
(4) 115

5 In the diagram below, $\overline{AD}$ intersects $\overline{BE}$ at C, and $\overline{AB} \parallel \overline{DE}$.

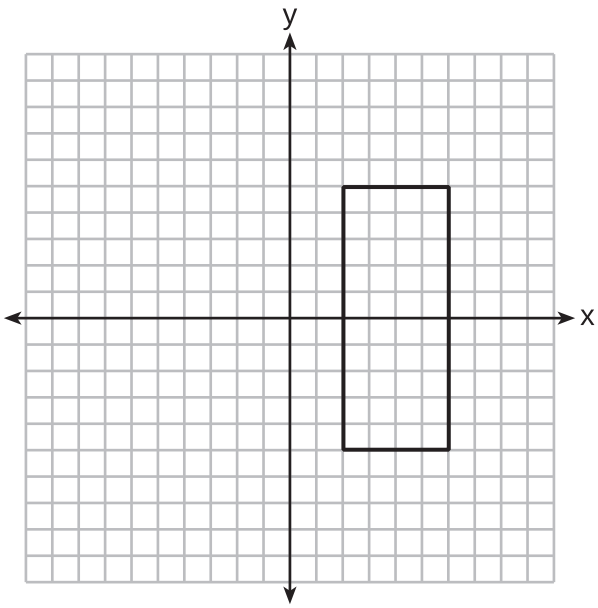


If $CD = 6.6$ cm, $DE = 3.4$ cm, $CE = 4.2$ cm, and $BC = 5.25$ cm, what is the length of $\overline{AC}$, to the *nearest hundredth of a centimeter*?

(1) 2.70
(2) 3.34
(3) 5.28
(4) 8.25

Use this space for computations.

6 As shown in the graph below, the quadrilateral is a rectangle.



Which transformation would *not* map the rectangle onto itself?

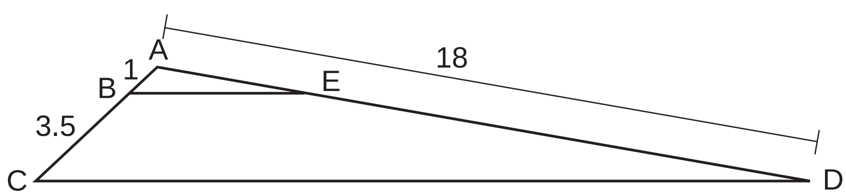
(1) a reflection over the x-axis

(2) a reflection over the line $x = 4$

(3) a rotation of 180° about the origin

(4) a rotation of 180° about the point (4,0)

7 In the diagram below, triangle ACD has points B and E on sides $\overline{AC}$ and $\overline{AD}$, respectively, such that $\overline{BE} \parallel \overline{CD}$, $AB = 1$, $BC = 3.5$, and $AD = 18$.



What is the length of $\overline{AE}$, to the *nearest tenth*?

(1) 14.0

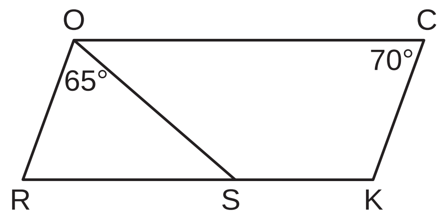
(2) 5.1

(3) 3.3

(4) 4.0

Use this space for computations.

8 In the diagram below of parallelogram $ROCK$, m$\angle C$ is 70° and m$\angle ROS$ is 65°.

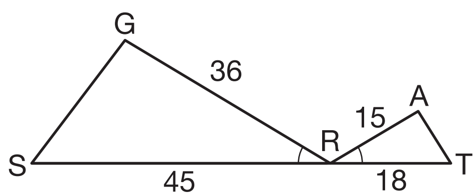


What is m$\angle KSO$?

(1) 45° (3) 115°

(2) 110° (4) 135°

9 In the diagram below, $\angle GRS \cong \angle ART$, $GR = 36$, $SR = 45$, $AR = 15$, and $RT = 18$.



Which triangle similarity statement is correct?

(1) $\triangle GRS \sim \triangle ART$ by AA. (3) $\triangle GRS \sim \triangle ART$ by SSS.

(2) $\triangle GRS \sim \triangle ART$ by SAS. (4) $\triangle GRS$ is not similar to $\triangle ART$.

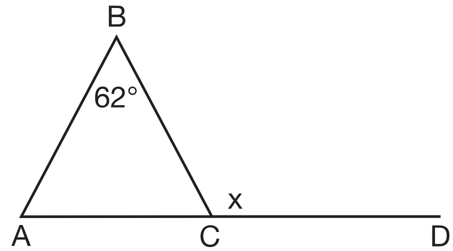
10 The line represented by the equation $4y = 3x + 7$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?

(1) $3x - 4y = 9$ (3) $4x - 3y = 9$

(2) $3x + 4y = 9$ (4) $4x + 3y = 9$

Use this space for computations.

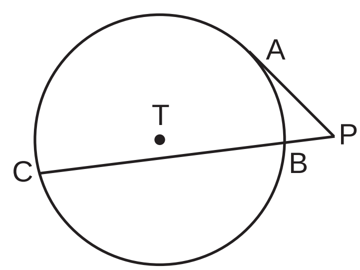
11 Given $\triangle ABC$ with $m\angle B = 62°$ and side $\overline{AC}$ extended to D, as shown below.



Which value of x makes $\overline{AB} \cong \overline{CB}$?

(1) 59°
(2) 62°
(3) 118°
(4) 121°

12 In the diagram shown below, $\overline{PA}$ is tangent to circle T at A, and secant $\overline{PBC}$ is drawn where point B is on circle T.

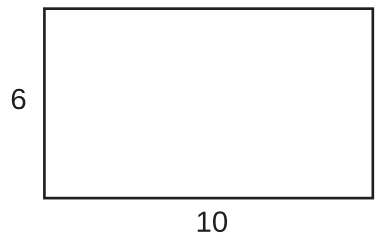


If $PB = 3$ and $BC = 15$, what is the length of $\overline{PA}$?

(1) $3\sqrt{5}$
(2) $3\sqrt{6}$
(3) 3
(4) 9

Use this space for computations.

13 A rectangle whose length and width are 10 and 6, respectively, is shown below. The rectangle is continuously rotated around a straight line to form an object whose volume is 150π.



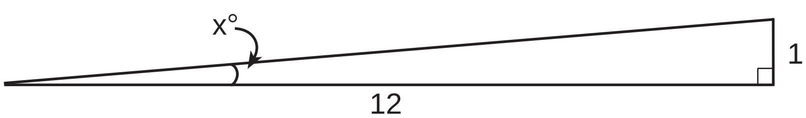
Which line could the rectangle be rotated around?

(1) a long side
(2) a short side
(3) the vertical line of symmetry
(4) the horizontal line of symmetry

14 If *ABCD* is a parallelogram, which statement would prove that *ABCD* is a rhombus?

(1) $\angle ABC \cong \angle CDA$
(2) $\overline{AC} \cong \overline{BD}$
(3) $\overline{AC} \perp \overline{BD}$
(4) $\overline{AB} \perp \overline{CD}$

15 To build a handicapped-access ramp, the building code states that for every 1 inch of vertical rise in height, the ramp must extend out 12 inches horizontally, as shown in the diagram below.

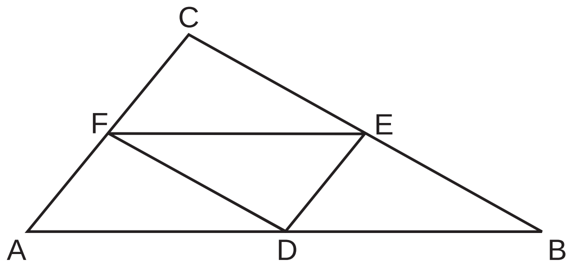


What is the angle of inclination, x, of this ramp, to the *nearest hundredth of a degree*?

(1) 4.76
(2) 4.78
(3) 85.22
(4) 85.24

Use this space for computations.

16 In the diagram below of $\triangle ABC$, D, E, and F are the midpoints of $\overline{AB}$, $\overline{BC}$, and $\overline{CA}$, respectively.



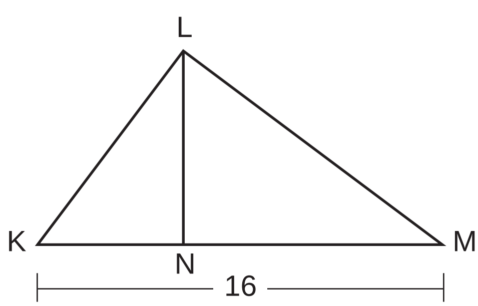
What is the ratio of the area of $\triangle CFE$ to the area of $\triangle CAB$?

(1) 1:1
(2) 1:2
(3) 1:3
(4) 1:4

17 The coordinates of the endpoints of $\overline{AB}$ are $A(-8,-2)$ and $B(16,6)$. Point P is on $\overline{AB}$. What are the coordinates of point P, such that AP:PB is 3:5?

(1) (1,1)
(2) (7,3)
(3) (9.6,3.6)
(4) (6.4,2.8)

18 Kirstie is testing values that would make triangle KLM a right triangle when $\overline{LN}$ is an altitude, and $KM = 16$, as shown below.



Which lengths would make triangle KLM a right triangle?

(1) $LM = 13$ and $KN = 6$
(2) $LM = 12$ and $NM = 9$
(3) $KL = 11$ and $KN = 7$
(4) $LN = 8$ and $NM = 10$

Use this space for computations.

19 In right triangle ABC, $m\angle A = 32°$, $m\angle B = 90°$, and $AC = 6.2$ cm. What is the length of $\overline{BC}$, to the *nearest tenth of a centimeter*?

(1) 3.3 (3) 5.3

(2) 3.9 (4) 11.7

20 The 2010 U.S. Census populations and population densities are shown in the table below.

State	Population Density $\left(\frac{\text{people}}{\text{mi}^2}\right)$	Population in 2010
Florida	350.6	18,801,310
Illinois	231.1	12,830,632
New York	411.2	19,378,102
Pennsylvania	283.9	12,702,379

Based on the table above, which list has the states' areas, in square miles, in order from largest to smallest?

(1) Illinois, Florida, New York, Pennsylvania

(2) New York, Florida, Illinois, Pennsylvania

(3) New York, Florida, Pennsylvania, Illinois

(4) Pennsylvania, New York, Florida, Illinois

21 In a right triangle, $\sin (40 - x)° = \cos (3x)°$. What is the value of x?

(1) 10 (3) 20

(2) 15 (4) 25

22 A regular decagon is rotated n degrees about its center, carrying the decagon onto itself. The value of n could be

(1) 10° (3) 225°

(2) 150° (4) 252°

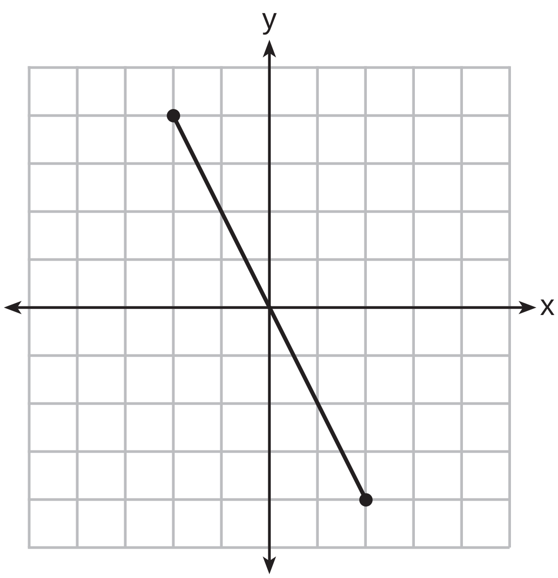
Use this space for computations.

23 In a circle with a diameter of 32, the area of a sector is $\frac{512\pi}{3}$. The measure of the angle of the sector, in radians, is

(1) $\frac{\pi}{3}$ (3) $\frac{16\pi}{3}$

(2) $\frac{4\pi}{3}$ (4) $\frac{64\pi}{3}$

24 What is an equation of the perpendicular bisector of the line segment shown in the diagram below?



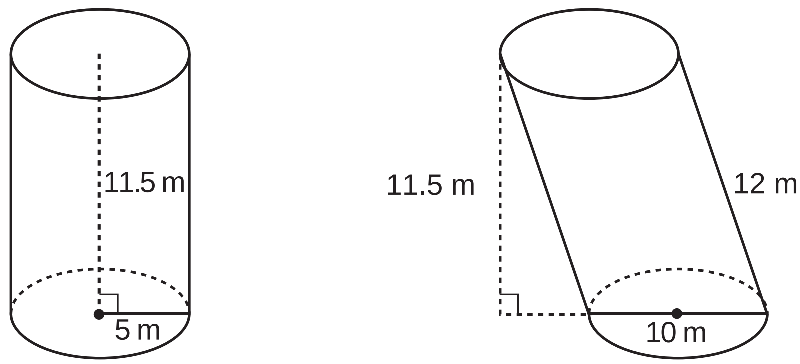
(1) $y + 2x = 0$ (3) $2y + x = 0$

(2) $y - 2x = 0$ (4) $2y - x = 0$

Part II

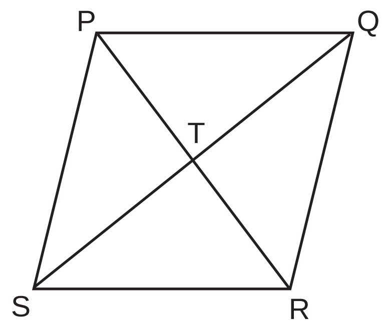
Answer all 7 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [14]

25 Sue believes that the two cylinders shown in the diagram below have equal volumes.

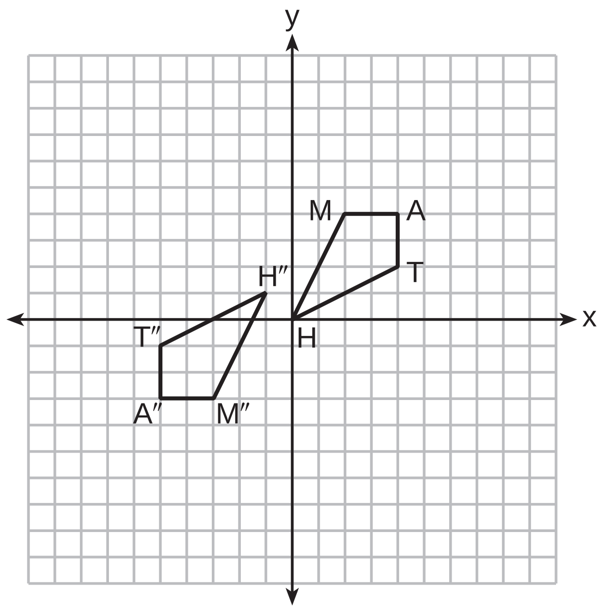


Is Sue correct? Explain why.

26 In the diagram of rhombus *PQRS* below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point *T*, $PR = 16$, and $QS = 30$. Determine and state the perimeter of *PQRS*.

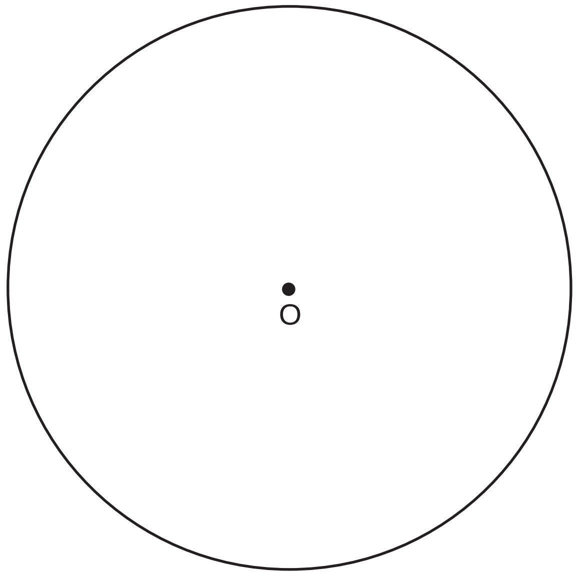


27 Quadrilateral *MATH* and its image *M″A″T″H″* are graphed on the set of axes below.



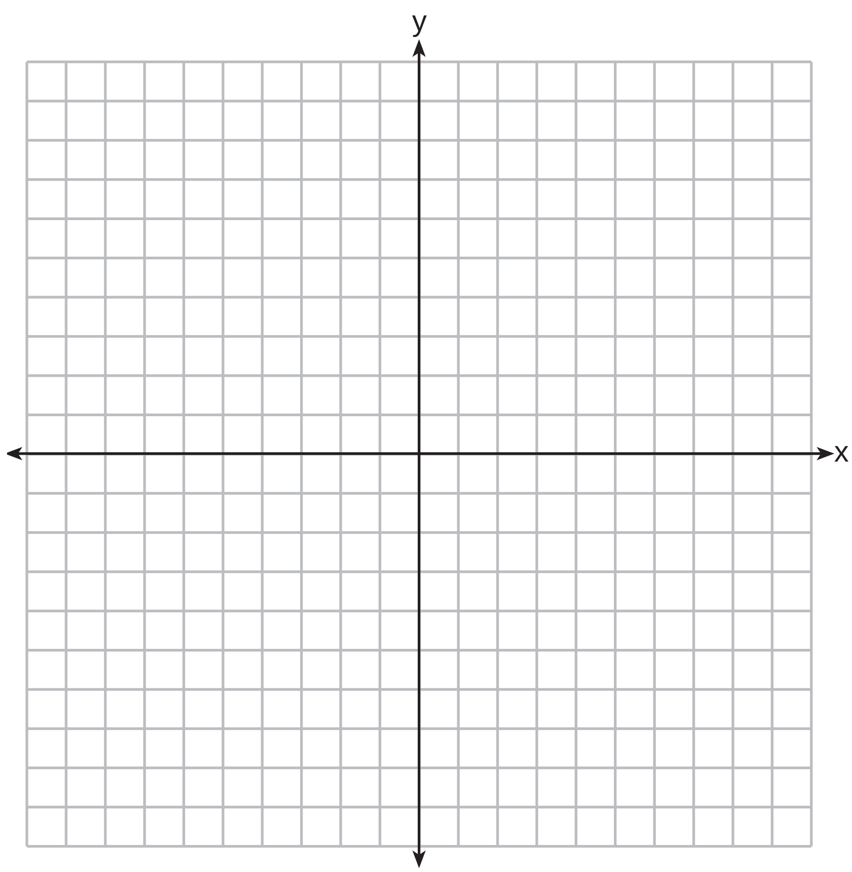
Describe a sequence of transformations that maps quadrilateral *MATH* onto quadrilateral *M″A″T″H″*.

28 Using a compass and straightedge, construct a regular hexagon inscribed in circle O. [Leave all construction marks.]

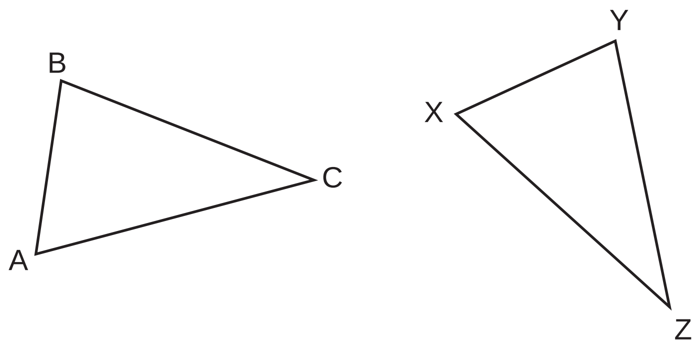


29 The coordinates of the endpoints of $\overline{AB}$ are $A(2,3)$ and $B(5,-1)$. Determine the length of $\overline{A'B'}$, the image of $\overline{AB}$, after a dilation of $\frac{1}{2}$ centered at the origin.

[The use of the set of axes below is optional.]



30 In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and $\overline{AC}$ onto $\overline{XZ}$.



Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

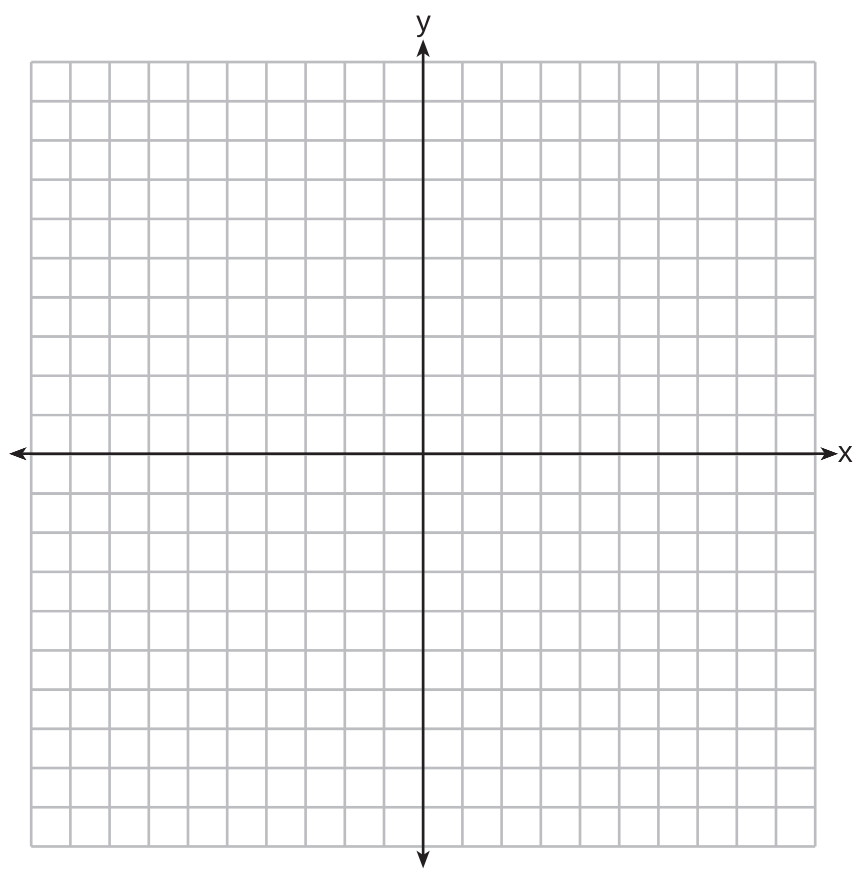
31 Determine and state the coordinates of the center and the length of the radius of a circle whose equation is $x^2 + y^2 - 6x = 56 - 8y$.

Part III

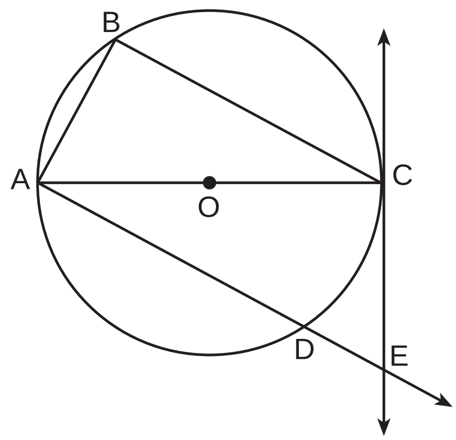
Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

32 Triangle PQR has vertices $P(-3,-1)$, $Q(-1,7)$, and $R(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$.

[The use of the set of axes below is optional.]

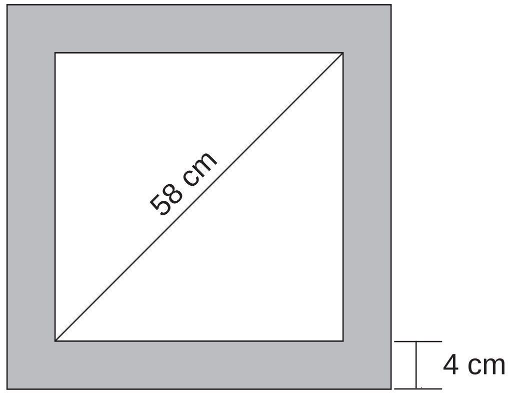


33 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overrightarrow{ADE}$, and chord $\overline{AB}$ is drawn.



Prove: $\dfrac{BC}{CA} = \dfrac{AB}{EC}$

34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.

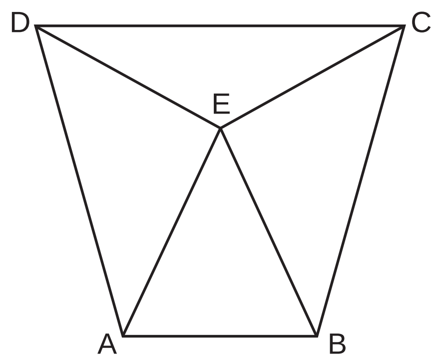


Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter.*

Part IV

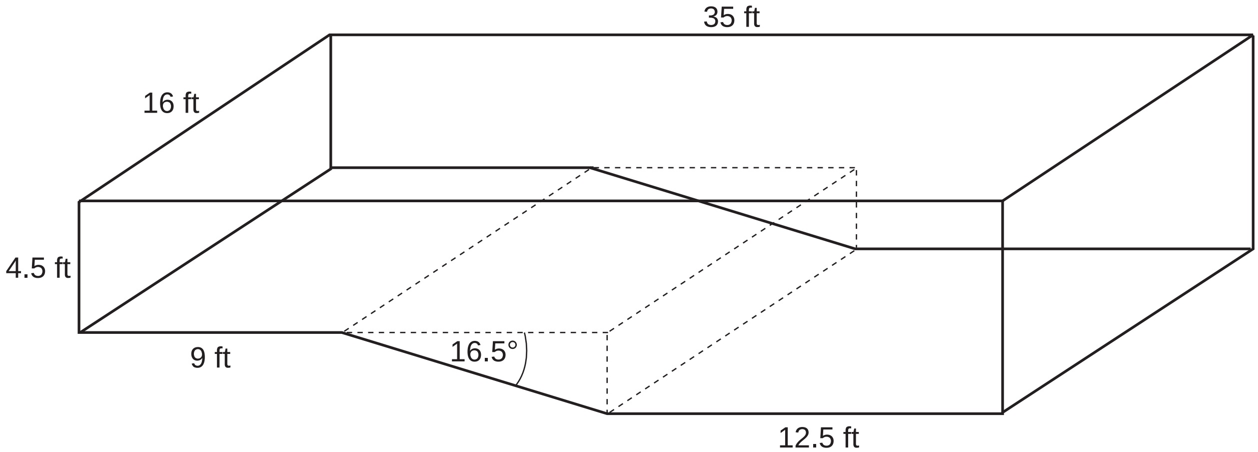
Answer the 2 questions in this part. Each correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

Find the volume of the inside of the pool to the *nearest cubic foot.*

Question 36 is continued on the next page.

Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour,* will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

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Scrap Graph Paper — This sheet will *not* be scored.

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High School Math Reference Sheet

1 inch = 2.54 centimeters	1 kilometer = 0.62 mile	1 cup = 8 fluid ounces
1 meter = 39.37 inches	1 pound = 16 ounces	1 pint = 2 cups
1 mile = 5280 feet	1 pound = 0.454 kilogram	1 quart = 2 pints
1 mile = 1760 yards	1 kilogram = 2.2 pounds	1 gallon = 4 quarts
1 mile = 1.609 kilometers	1 ton = 2000 pounds	1 gallon = 3.785 liters
		1 liter = 0.264 gallon
		1 liter = 1000 cubic centimeters

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$

Pythagorean Theorem	$a^2 + b^2 = c^2$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Radians	1 radian $= \frac{180}{\pi}$ degrees
Degrees	1 degree $= \frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$

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FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

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Thursday, August 17, 2017 — 12:30 to 3:30 p.m., only

SCORING KEY AND RATING GUIDE

Mechanics of Rating

The following procedures are to be followed for scoring student answer papers for the Regents Examination in Geometry. More detailed information about scoring is provided in the publication *Information Booklet for Scoring the Regents Examination in Geometry*.

Do *not* attempt to correct the student's work by making insertions or changes of any kind. In scoring the open-ended questions, use check marks to indicate student errors. Unless otherwise specified, mathematically correct variations in the answers will be allowed. Units need not be given when the wording of the questions allows such omissions.

Each student's answer paper is to be scored by a minimum of three mathematics teachers. No one teacher is to score more than approximately one-third of the open-ended questions on a student's paper. Teachers may not score their own students' answer papers. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.

Raters should record the student's scores for all questions and the total raw score on the student's separate answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ on Thursday, August 17, 2017. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

If the student's responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.

Part I

Allow a total of 48 credits, 2 credits for each of the following. Allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 2	(9) 4	(17) . . . . . 1 . . . . .
(2) 4	(10) 1	(18) . . . . . 2 . . . . .
(3) 3	(11) 4	(19) . . . . . 1 . . . . .
(4) 1	(12) 2	(20) . . . . . 1 . . . . .
(5) 4	(13) 3	(21) . . . . . 4 . . . . .
(6) 3	(14) 3	(22) . . . . . 4 . . . . .
(7) 4	(15) 1	(23) . . . . . 2 . . . . .
(8) 4	(16) 4	(24) . . . . . 4 . . . . .

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Check this web site at: http://www.p12.nysed.gov/assessment/ and select the link "Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

The Department is providing supplemental scoring guidance, the "Model Response Set," for the Regents Examination in Geometry. This guidance is intended to be part of the scorer training. Schools should use the Model Response Set along with the rubrics in the Scoring Key and Rating Guide to help guide scoring of student work. While not reflective of all scenarios, the Model Response Set illustrates how less common student responses to constructed-response questions may be scored. The Model Response Set will be available on the Department's web site at: http://www.nysedregents.org/geometryre/.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examination in Geometry are designed to provide a systematic, consistent method for awarding credit. The rubrics are not to be considered all-inclusive; it is impossible to anticipate all the different methods that students might use to solve a given problem. Each response must be rated carefully using the teacher's professional judgment and knowledge of mathematics; all calculations must be checked. The specific rubrics for each question must be applied consistently to all responses. In cases that are not specifically addressed in the rubrics, raters must follow the general rating guidelines in the publication *Information Booklet for Scoring the Regents Examination in Geometry*, use their own professional judgment, confer with other mathematics teachers, and/or contact the State Education Department for guidance. During each Regents Examination administration period, rating questions may be referred directly to the Education Department. The contact numbers are sent to all schools before each administration period.

II. Full-Credit Responses

A full-credit response provides a complete and correct answer to all parts of the question. Sufficient work is shown to enable the rater to determine how the student arrived at the correct answer.

When the rubric for the full-credit response includes one or more examples of an acceptable method for solving the question (usually introduced by the phrase "such as"), it does not mean that there are no additional acceptable methods of arriving at the correct answer. Unless otherwise specified, mathematically correct alternative solutions should be awarded credit. The only exceptions are those questions that specify the type of solution that must be used; e.g., an algebraic solution or a graphic solution. A correct solution using a method other than the one specified is awarded half the credit of a correct solution using the specified method.

III. Appropriate Work

Full-Credit Responses: The directions in the examination booklet for all the constructed-response questions state: "Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc." The student has the responsibility of providing the correct answer ***and*** showing how that answer was obtained. The student must "construct" the response; the teacher should not have to search through a group of seemingly random calculations scribbled on the student paper to ascertain what method the student may have used.

Responses With Errors: Rubrics that state "Appropriate work is shown, but…" are intended to be used with solutions that show an essentially complete response to the question but contain certain types of errors, whether computational, rounding, graphing, or conceptual. If the response is incomplete; i.e., an equation is written but not solved or an equation is solved but not all of the parts of the question are answered, appropriate work has ***not*** been shown. Other rubrics address incomplete responses.

IV. Multiple Errors

Computational Errors, Graphing Errors, and Rounding Errors: Each of these types of errors results in a 1-credit deduction. Any combination of two of these types of errors results in a 2-credit deduction. No more than 2 credits should be deducted for such mechanical errors in a 4-credit question and no more than 3 credits should be deducted in a 6-credit question. The teacher must carefully review the student's work to determine what errors were made and what type of errors they were.

Conceptual Errors: A conceptual error involves a more serious lack of knowledge or procedure. Examples of conceptual errors include using the incorrect formula for the area of a figure, choosing the incorrect trigonometric function, or multiplying the exponents instead of adding them when multiplying terms with exponents.

If a response shows repeated occurrences of the same conceptual error, the student should not be penalized twice. If the same conceptual error is repeated in responses to other questions, credit should be deducted in each response.

For 4- and 6-credit questions, if a response shows one conceptual error and one computational, graphing, or rounding error, the teacher must award credit that takes into account both errors. Refer to the rubric for specific scoring guidelines.

Part II

For each question, use the specific criteria to award a maximum of 2 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(25) **[2]** Yes, and a correct explanation is written.

[1] Appropriate work is shown, but one computational error is made. An appropriate explanation is written.

or

[1] Appropriate work is shown, but one conceptual error is made. An appropriate explanation is written.

or

[1] Appropriate work is shown, but an incomplete explanation is written.

[0] Yes, 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 incorrect procedure.

(26) **[2]** 68, and correct work is shown.

[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] Correct work is shown to find 17, the length of one side of *PQRS*, but no further correct work is shown.

or

[1] 68, 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.

(27) **[2]** A correct sequence of transformations is written.

[1] An appropriate sequence of transformations is written, but one computational error is made.

or

[1] An appropriate sequence of transformations is written, but one conceptual error is made.

or

[1] An appropriate sequence of transformations is written, but it is incomplete.

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

(28) **[2]** A correct construction is drawn showing all appropriate arcs, and the hexagon is drawn.

[1] An appropriate construction is drawn showing all appropriate arcs, but the hexagon is not drawn.

[0] A drawing that is not an appropriate construction is shown.

or

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

(29) **[2]** 2.5, and appropriate work is shown.

[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 to find 5, the length of $\overline{AB}$, but no further correct work is shown.

or

[1] Appropriate work is shown to find (1,1.5) and (2.5,−0.5), 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.

(30) **[2]** $\overline{BC} \cong \overline{YZ}$ is indicated, and a correct explanation is written.

[1] An appropriate answer is stated, but one conceptual error is made.

or

[1] $\overline{BC} \cong \overline{YZ}$ is indicated, but the explanation is incomplete or partially correct.

[0] $\overline{BC} \cong \overline{YZ}$ is indicated, but the explanation is missing or incorrect.

or

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

(31) **[2]** Center $(3,-4)$ and radius 9, and correct work is shown.

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

or

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

or

[1] Correct work is shown to find $(x - 3)^2 + (y + 4)^2 = 81$ and/or to find the coordinates of the center or length of the radius, but no further correct work is shown.

or

[1] Center $(3,-4)$ and radius 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 incorrect procedure.

Part III

For each question, use the specific criteria to award a maximum of 4 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(32) **[4]** Correct work is shown to prove that the midsegment is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$, and concluding statements are written.

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

or

[3] Correct work is shown to find the slopes and lengths of $\overline{PR}$ and the midsegment, but one concluding statement is incomplete, incorrect, or missing.

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

or

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

or

[2] Correct work is shown to prove that the midsegment is parallel to $\overline{PR}$, but no further correct work is shown.

or

[2] Correct work is shown to prove that the midsegment is half the length of $\overline{PR}$, 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 slopes and lengths are stated, 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.

(33) **[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 statement and/or reason is missing or incorrect, or the concluding statement is missing.

or

[3] A proof is written that shows $\triangle ABC \sim \triangle ECA$. No further correct work is shown.

[2] 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 incorrect.

or

[2] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.

or

[2] A proof is written that shows $\angle ABC \cong \angle ECA$ and $\angle BCA \cong \angle EAC$. No further correct work is shown.

[1] Some correct relevant statements about the proof are made, but three or more statements and/or reasons are missing or incorrect.

or

[1] A proof is written that shows $\angle ABC \cong \angle ECA$ or $\angle BCA \cong \angle EAC$. No further correct work is shown.

[0] The "given" and/or the "prove" statements are written, 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 obviously incorrect procedure.

(34) **[4]** 2402.2, and correct work is shown.

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

or

[3] A correct answer is written in radical form for the total area of the poster and frame.

[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] Correct work is shown to find the length of the side of the frame and/or the length of the diagonal of the frame. 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] Correct work is shown to find the length of the poster and/or the area of the poster. No further correct work is shown.

or

[1] 2402.2, 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.

Part IV

For each question, use the specific criteria to award a maximum of 6 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(35) **[6]** A complete and correct proof that includes a concluding statement 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 incorrect.

or

[5] $\triangle ADE \cong \triangle BCE$ and $\overline{EA} \cong \overline{EB}$ are proven, but no further correct work is shown.

or

[5] $\triangle ADE \cong \triangle BCE$ and $\angle EAB \cong \angle EBA$ are proven, but no further correct work is shown.

[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 incorrect.

or

[4] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made in proving $\triangle ADE \cong \triangle BCE$.

or

[4] $\triangle ADE \cong \triangle BCE$ is proven, but no further correct work is shown.

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

or

[3] A proof is written that demonstrates a method of proof, but one conceptual error is made in proving $\triangle ADE \cong \triangle BCE$. One statement and/or reason is missing or incorrect.

[2] Some correct relevant statements about the proof are made, but four statements and/or reasons are missing or incorrect.

or

[2] $\angle DEA \cong \angle CEB$ or $\triangle DEA$ and $\triangle CEB$ are right triangles is proven, but no further correct work is shown.

[1] One relevant statement and reason about the proof is written.

[0] The "given" and/or the "prove" statements are written, 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 obviously incorrect procedure.

(36) **[6]** 8.5, 3752, 41, and correct work is shown.

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

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

or

[4] Correct work is shown to find 8.5 and 3752, but no further correct work is shown.

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

[2] Correct work is shown to find 8.5, but no further correct work is shown.

[1] Tan $16.5 = \frac{x}{13.5}$, or an equivalent equation is written, but no further correct work is shown.

or

[1] 8.5, 3752, and 41, 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.

Map to the Learning Standards
Geometry
August 2017

Question	Type	Credits	Cluster
1	Multiple Choice	2	G-GMD.B
2	Multiple Choice	2	G-CO.B
3	Multiple Choice	2	G-GPE.B
4	Multiple Choice	2	G-C.A
5	Multiple Choice	2	G-SRT.B
6	Multiple Choice	2	G-CO.A
7	Multiple Choice	2	G-SRT.B
8	Multiple Choice	2	G-CO.C
9	Multiple Choice	2	G-SRT.B
10	Multiple Choice	2	G-SRT.A
11	Multiple Choice	2	G-CO.C
12	Multiple Choice	2	G-C.A
13	Multiple Choice	2	G-GMD.B
14	Multiple Choice	2	G-SRT.C
15	Multiple Choice	2	G-CO.C
16	Multiple Choice	2	G-CO.C
17	Multiple Choice	2	G-GPE.B
18	Multiple Choice	2	G-SRT.B
19	Multiple Choice	2	G-SRT.C
20	Multiple Choice	2	G-MG.A
21	Multiple Choice	2	G-SRT.C
22	Multiple Choice	2	G-CO.A
23	Multiple Choice	2	G-C.B
24	Multiple Choice	2	G-GPE.B
25	Constructed Response	2	G-GMD.A
26	Constructed Response	2	G-CO.C
27	Constructed Response	2	G-CO.A
28	Constructed Response	2	G-CO.D
29	Constructed Response	2	G-SRT.A
30	Constructed Response	2	G-CO.B
31	Constructed Response	2	G-GPE.A
32	Constructed Response	4	G-GPE.B
33	Constructed Response	4	G-SRT.B
34	Constructed Response	4	G-SRT.C
35	Constructed Response	6	G-CO.C
36	Constructed Response	6	G-MG.A

Regents Examination in Geometry

August 2017

Chart for Converting Total Test Raw Scores to Final Examination Scores (Scale Scores)

The *Chart for Determining the Final Examination Score for the August 2017 Regents Examination in Geometry* will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ on Thursday, August 17, 2017. Conversion charts provided for previous administrations of the Regents Examination in Geometry must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm.

2. Select the test title.

3. Complete the required demographic fields.

4. Complete each evaluation question and provide comments in the space provided.

5. Click the SUBMIT button at the bottom of the page to submit the completed form.

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

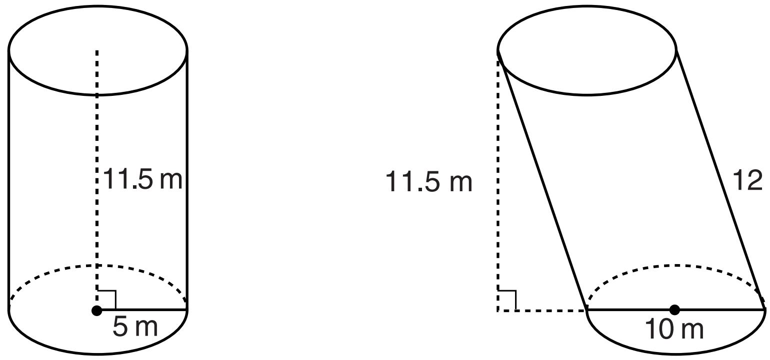
GEOMETRY

Thursday, August 17, 2017 — 12:30 to 3:30 p.m.

MODEL RESPONSE SET

Table of Contents

25 Sue believes that the two cylinders shown in the diagram below have equal volumes.



$r=5,\ h=11.5$ $r=5,\ h=11.5$

Is Sue correct? Explain why.

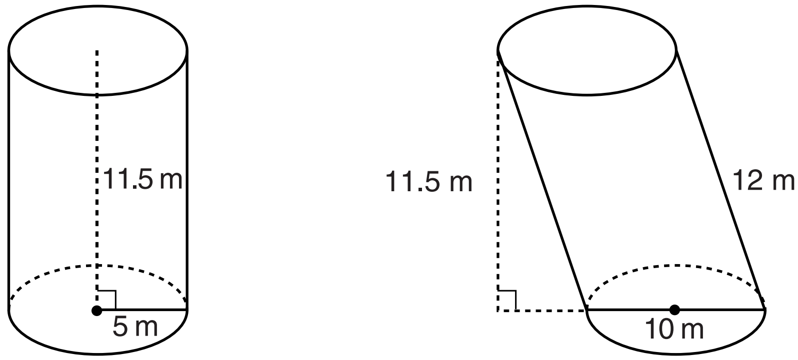
Yes, Sue is correct because when two cylinders have the same base areas and the same height, the two Cylinders must have the same volume.

Score 2: The student gave a complete and correct response.

Question 25

25 Sue believes that the two cylinders shown in the diagram below have equal volumes.

$V = \pi r^2 \cdot h$
$= \pi 5^2 \cdot 11.5$
$= 287.5\pi\, m^3$



$V = \pi r^2 \cdot h$
$= \pi 5^2 \cdot 11.5$
$= 287.5\pi\, m^3$

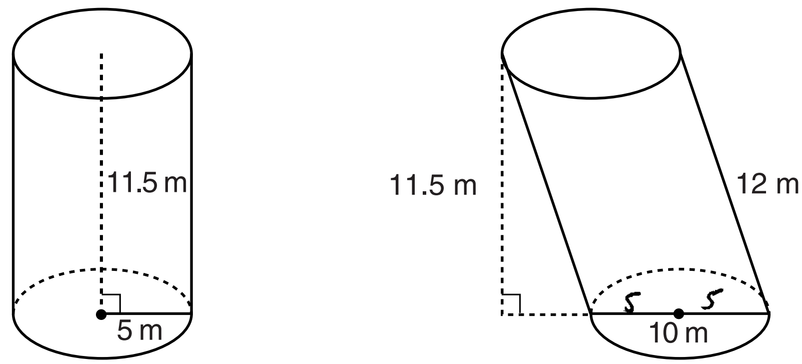
Is Sue correct? Explain why.

Sue is correct, Both cylinders' radii and hights are equal causing their volumes to be the same

Score 2: The student gave a complete and correct response.

Question 25

25 Sue believes that the two cylinders shown in the diagram below have equal volumes.



Is Sue correct? Explain why.

$V = \pi r^2 h$
$= \pi 5^2 \times 11.5$
$= 287.5\pi$

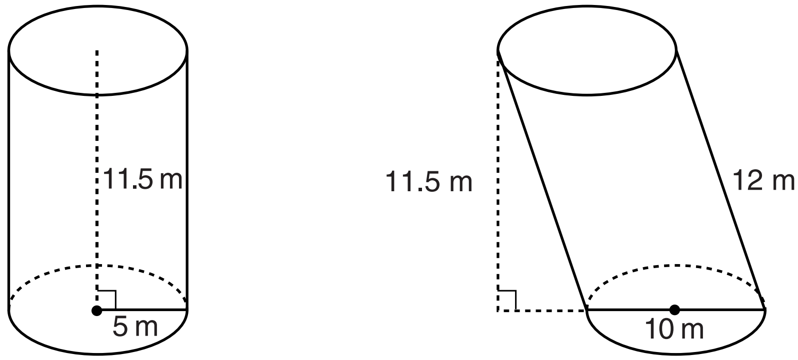
$V = \pi r^2 h$
$V = \pi 5^2 \times 11.5$
$= 287.5\pi$

Yes Sue is correct – the 2 cylinders have the same volume

Score 1: The student found the volumes of both cylinders, but did not write an explanation for why the volumes are the same.

Question 25

25 Sue believes that the two cylinders shown in the diagram below have equal volumes.



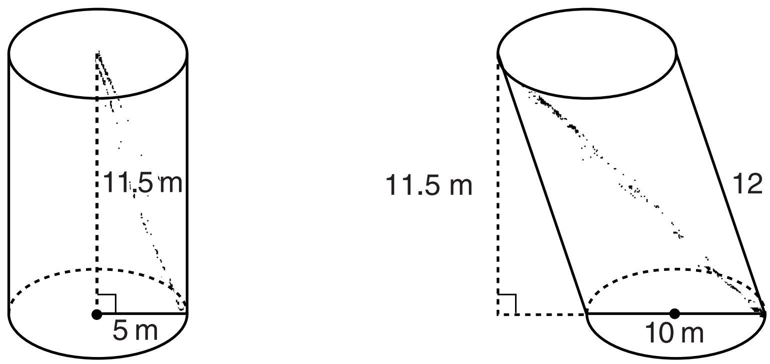
Is Sue correct? Explain why.

Yes because the cylinders have the same measurements one is just tilted

Score 0: The student did not show enough correct relevant work to receive any credit.

Question 25

25 Sue believes that the two cylinders shown in the diagram below have equal volumes.



Is Sue correct? Explain why.

$V = \frac{1}{3}\, 10 \cdot 11.5$

$a^2 + b^2 = c^2$

$5^2 + b^2 = 11.5^2$

$25 + b^2 = 132.25$

$V = \frac{1}{3} B \cdot h$

$V = \frac{1}{3}\, 5 \cdot 11.5$

$V = 19.16$

$V = \frac{1}{3}\, 10 \cdot 11.5$

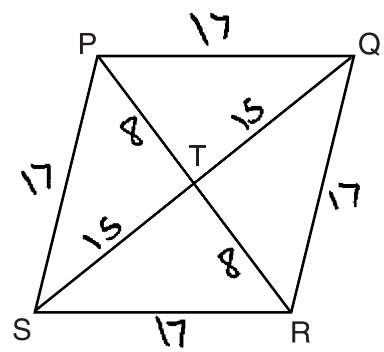
$V = 40$

Sue is incorrect, their volumes are not equal.

Score 0: The student gave a completely incorrect response.

Question 26

26 In the diagram of rhombus $PQRS$ below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point T, $PR = 16$, and $QS = 30$. Determine and state the perimeter of $PQRS$.



$a^2 + b^2 = c^2$

$8^2 + 15^2 = c^2$

$64 + 225 = c^2$

$\sqrt{289} = \sqrt{c^2}$

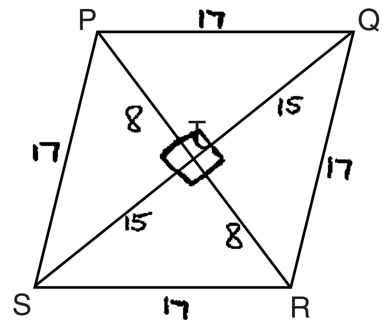
$17 = c$

perimeter = 68

Score 2: The student gave a complete and correct response.

Question 26

26 In the diagram of rhombus $PQRS$ below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point T, $PR = 16$, and $QS = 30$. Determine and state the perimeter of $PQRS$.



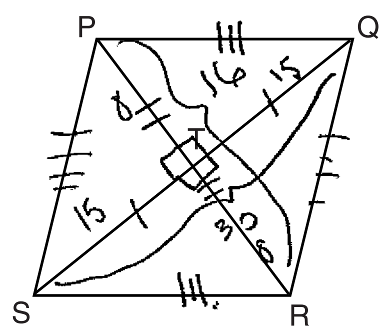
P = 68

Score 2: The student gave a complete and correct response.

26 In the diagram of rhombus *PQRS* below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point *T*, $PR = 16$, and $QS = 30$. Determine and state the perimeter of *PQRS*.

$8\sqrt{5}$

Diagonals bisect each other and are $\perp$.



$8\sqrt{5}$

Opposite sides are $\cong$

$\overline{PQ} \cong \overline{RS}$ and $\overline{QR} \cong \overline{SP}$

$a^2+b^2=c^2$
$8^2+16^2=PQ^2$
$64+256=PQ^2$
$\sqrt{320}=\sqrt{PQ^2}$
$\sqrt{320}=PQ$
$\sqrt{64}\sqrt{5}=PQ$
$8\sqrt{5}=PQ$

$a^2+b^2=c^2$
$8^2+15^2=SP^2$
$64+225=SP^2$
$\sqrt{289}=\sqrt{SP^2}$
$17=SP$

$QR=SP$
$QR=17$

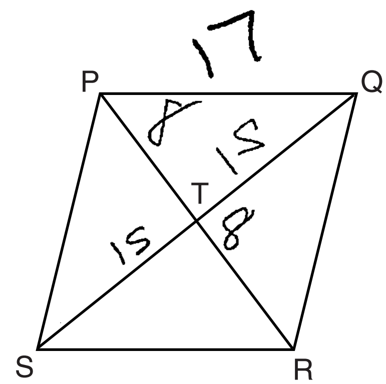
$SP=PQ$
$SP=8\sqrt{5}$

$P=PQ+QR+RS+SP$
$=8\sqrt{5}+17+8\sqrt{5}+17$
$P=16\sqrt{5}+34$

Score 1: The student made an error in finding the lengths of sides $\overline{PQ}$ and $\overline{RS}$.

Question 26

26 In the diagram of rhombus *PQRS* below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point T, $PR = 16$, and $QS = 30$. Determine and state the perimeter of *PQRS*.

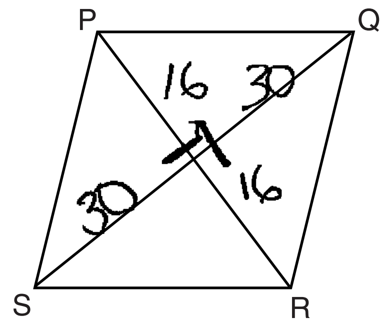


$$8^2 + 15^2 = c^2$$
$$64 + 225 = c^2$$
$$\sqrt{289} = \sqrt{c^2}$$
$$c = 17$$

Score 1: The student found the length of the side of the rhombus, but did not find the perimeter of the rhombus.

Question 26

26 In the diagram of rhombus $PQRS$ below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point T, $PR = 16$, and $QS = 30$. Determine and state the perimeter of $PQRS$.



16 + 16
30 + 30
32
× 60

A = d' + d²

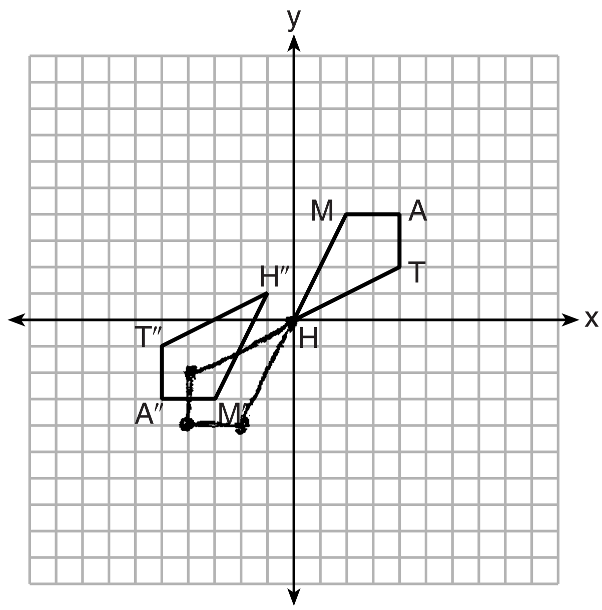
P = 92

32
× 60
1,920

Score 0: The student gave a completely incorrect response.

Question 27

27 Quadrilateral *MATH* and its image *M″A″T″H″* are graphed on the set of axes below.

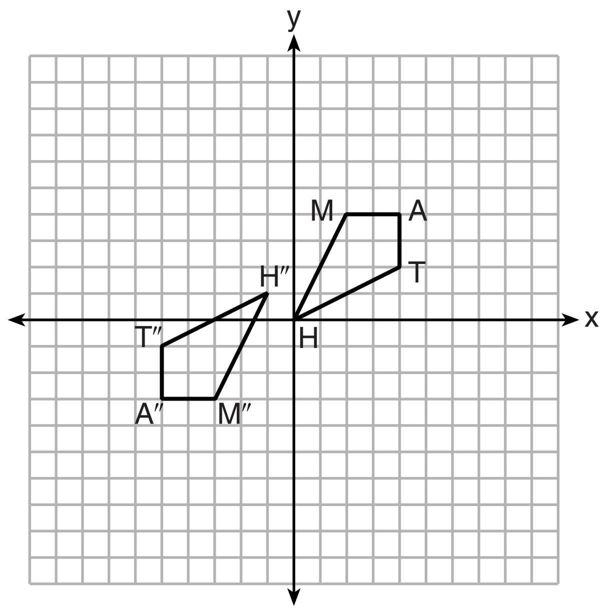


Describe a sequence of transformations that maps quadrilateral *MATH* onto quadrilateral *M″A″T″H″*.

a reflection over the origin → a translation of (x-1, y+1)

Score 2: The student gave a complete and correct response.

27 Quadrilateral *MATH* and its image *M″A″T″H″* are graphed on the set of axes below.



Describe a sequence of transformations that maps quadrilateral *MATH* onto quadrilateral *M″A″T″H″*.

$\boxed{T_{-1,1} \circ D_{H,-1}}$

M (2,4)
A (4,4)
T (4,2)
H (0,0)

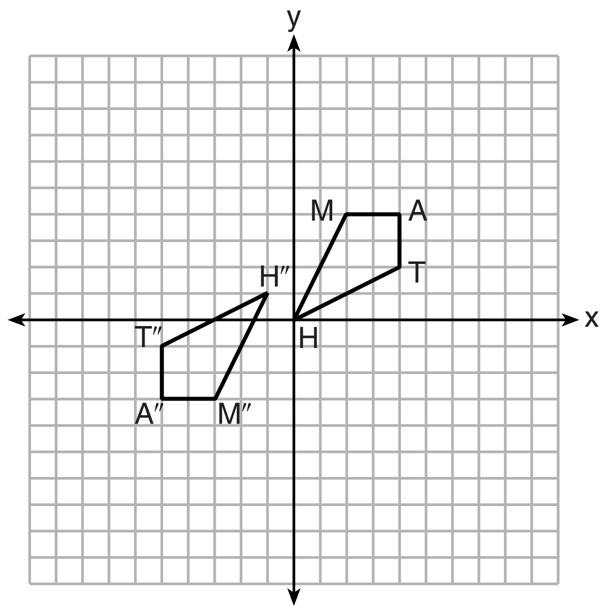
M' (−2,−4)
A' (−4,−4)
T' (−4,−2)
H' (0,0)

M'' (−3,−3)
A'' (−5,−3)
T'' (−5,−1)
H' (−1,1)

Score 2: The student gave a complete and correct response.

Question 27

27 Quadrilateral *MATH* and its image *M″A″T″H″* are graphed on the set of axes below.



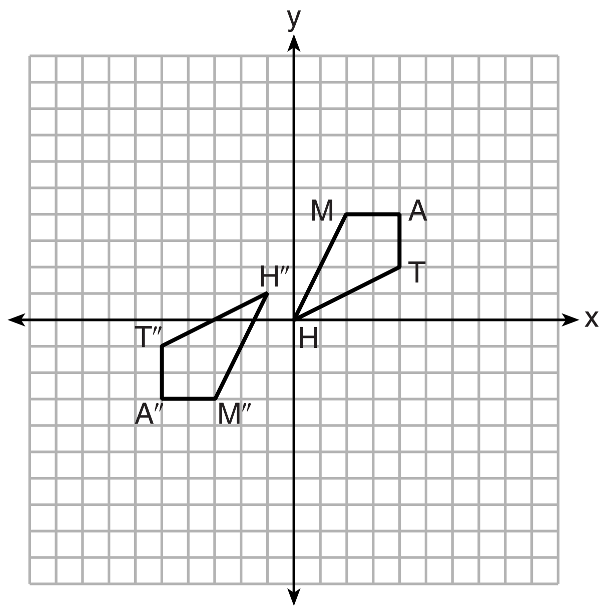
Describe a sequence of transformations that maps quadrilateral *MATH* onto quadrilateral *M″A″T″H″*.

Rotate quadrilateral MATH 180° about point $\left(-\frac{1}{2}, \frac{1}{2}\right)$.

Score 2: The student gave a complete and correct response.

Question 27

27 Quadrilateral *MATH* and its image *M″A″T″H″* are graphed on the set of axes below.



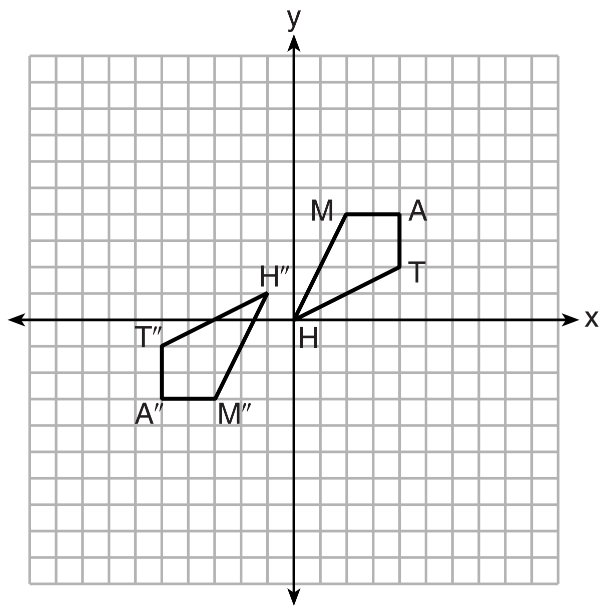
Describe a sequence of transformations that maps quadrilateral *MATH* onto quadrilateral *M″A″T″H″*.

- MATH was translated up one unit.
- MATH was translated to the left one unit.
- MATH was rotated 180° clockwise.

Score 1: The student wrote an incomplete transformation by not stating the center of rotation.

Question 27

27 Quadrilateral *MATH* and its image *M″A″T″H″* are graphed on the set of axes below.



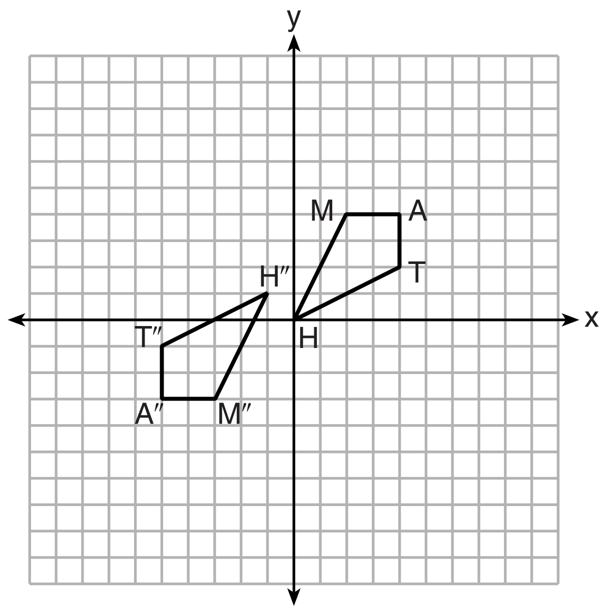
Describe a sequence of transformations that maps quadrilateral *MATH* onto quadrilateral *M″A″T″H″*.

Rotate 180° from Point H. Then translate down 1 and right 1

Score 1: The student had a partially correct sequence of transformations.

Question 27

27 Quadrilateral *MATH* and its image *M″A″T″H″* are graphed on the set of axes below.



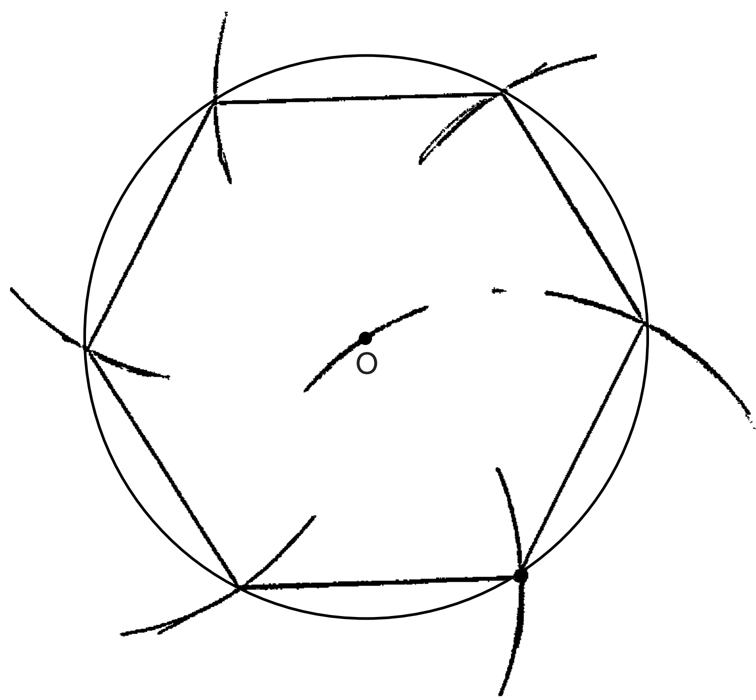
Describe a sequence of transformations that maps quadrilateral *MATH* onto quadrilateral *M″A″T″H″*.

Spin it and move it over

Score 0: The student gave an incomplete description of the rotation (spin) and described the translation (move) incorrectly.

Question 28

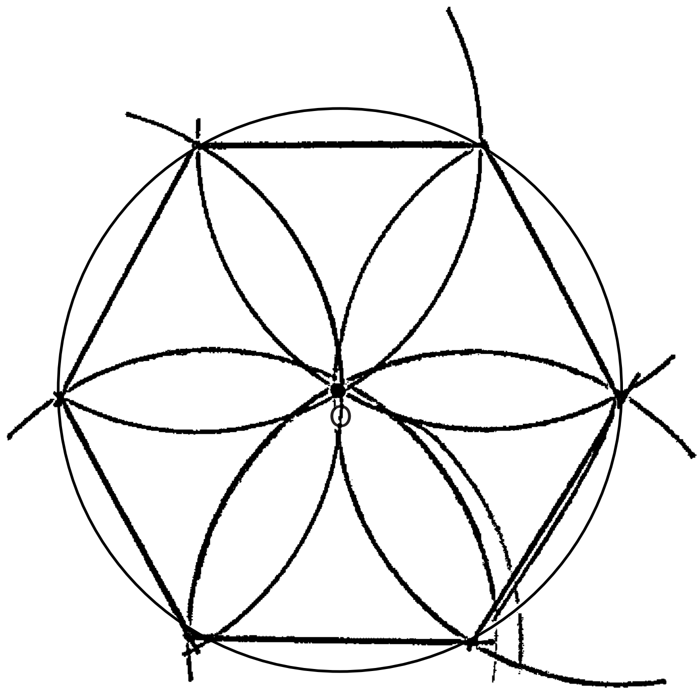
28 Using a compass and straightedge, construct a regular hexagon inscribed in circle O. [Leave all construction marks.]



Score 2: A correct construction is drawn showing all appropriate arcs.

Question 28

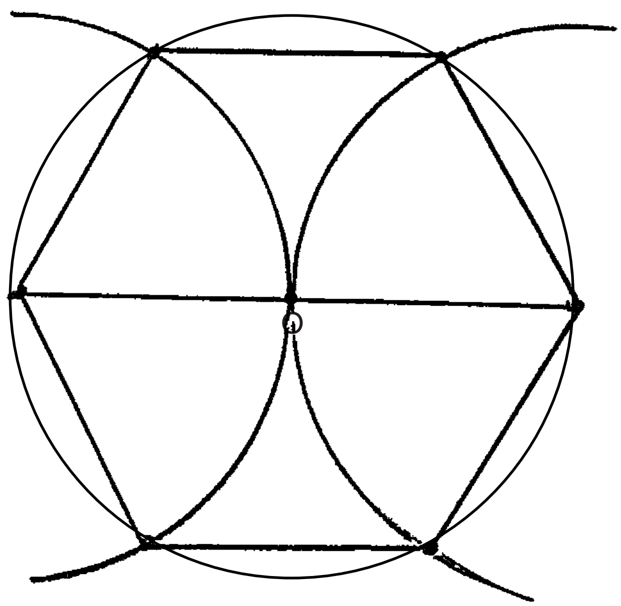
28 Using a compass and straightedge, construct a regular hexagon inscribed in circle *O*. [Leave all construction marks.]



Score 2: A correct construction is drawn showing all appropriate arcs.

Question 28

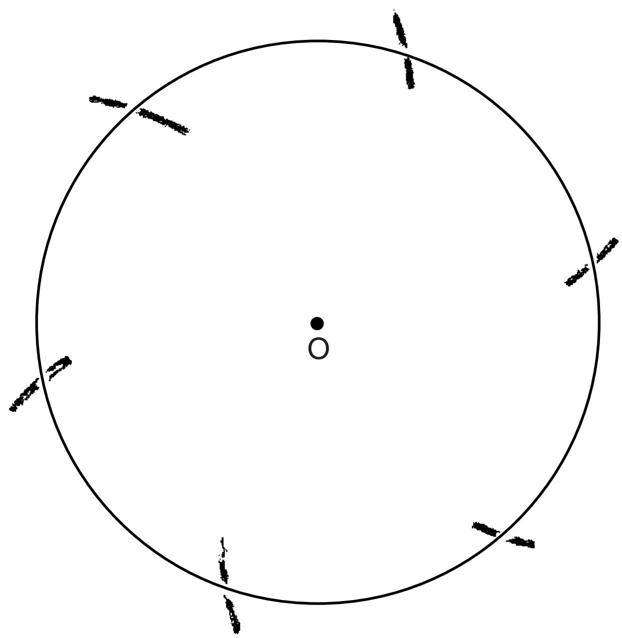
28 Using a compass and straightedge, construct a regular hexagon inscribed in circle *O*.
[Leave all construction marks.]



Score 2: A correct construction is drawn showing all appropriate arcs.

Question 28

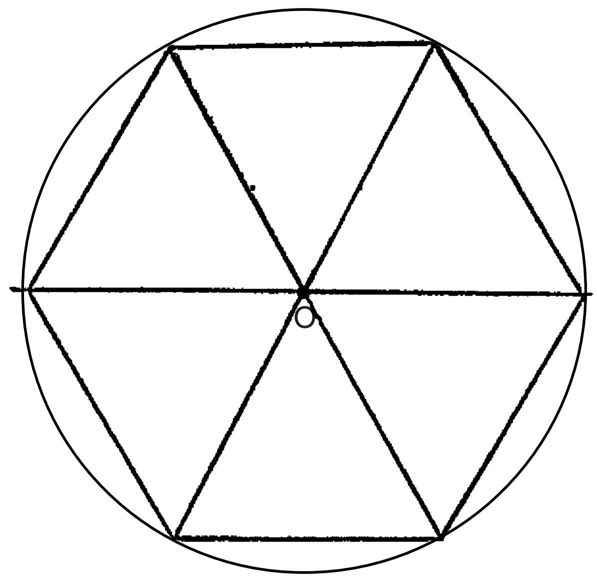
28 Using a compass and straightedge, construct a regular hexagon inscribed in circle *O*. [Leave all construction marks.]



Score 1: The student drew an appropriate construction, but did not draw the hexagon.

Question 28

28 Using a compass and straightedge, construct a regular hexagon inscribed in circle *O*.
[Leave all construction marks.]



Score 0: The student had a drawing that is not a construction.

29 The coordinates of the endpoints of $\overline{AB}$ are $A(2,3)$ and $B(5,-1)$. Determine the length of $\overline{A'B'}$, the image of $\overline{AB}$, after a dilation of $\frac{1}{2}$ centered at the origin.

[The use of the set of axes below is optional.]

$A' = (1, 1.5)$
$B' = (2.5, -.5)$

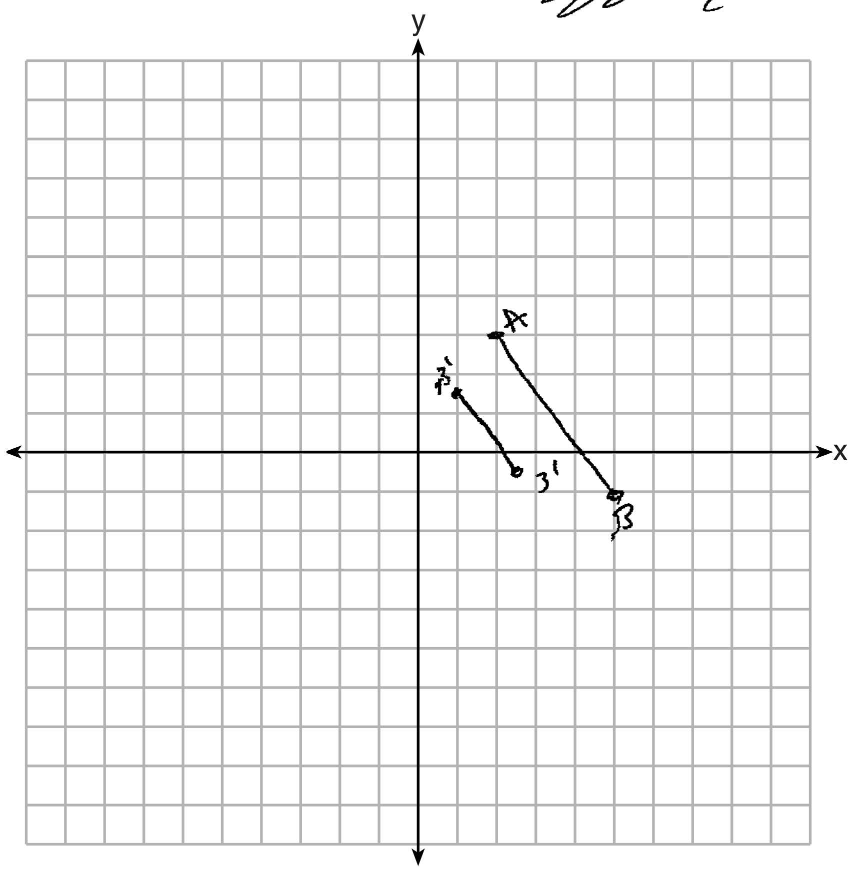
$d = \sqrt{(2.5-1)^2 + (-.5-1.5)^2}$

$d = \sqrt{(1.5)^2 + (-2)^2}$

$d = \sqrt{2.25 + 4}$

$\cancel{d = \sqrt{6.25}}$

$d = 2.5$



Score 2: The student gave a complete and correct response.

Question 29

29 The coordinates of the endpoints of $\overline{AB}$ are $A(2,3)$ and $B(5,–1)$. Determine the length of $\overline{A'B'}$, the image of $\overline{AB}$, after a dilation of $\frac{1}{2}$ centered at the origin.

[The use of the set of axes below is optional.]

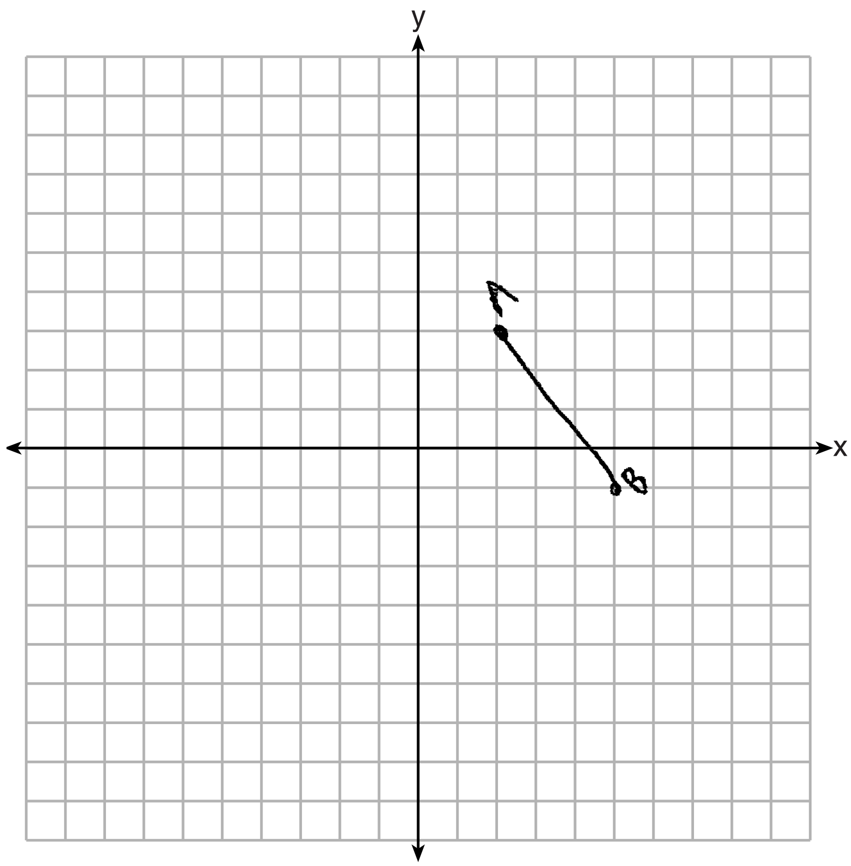
$$d = \sqrt{(x-x)^2 + (y-y)^2}$$

$$= \sqrt{(5-2)^2 + (3-{-1})^2}$$

$$= \sqrt{3^2 + 4^2} = \sqrt{9+16} = \sqrt{25}$$

$$= \boxed{5} \cdot \tfrac{1}{2} = 2.5$$

$$\boxed{\text{Length of } \overline{A'B'} = 2.5 \text{ units}}$$



Score 2: The student gave a complete and correct response.

29 The coordinates of the endpoints of $\overline{AB}$ are $A(2,3)$ and $B(5,-1)$. Determine the length of $\overline{A'B'}$, the image of $\overline{AB}$, after a dilation of $\frac{1}{2}$ centered at the origin.

[The use of the set of axes below is optional.]

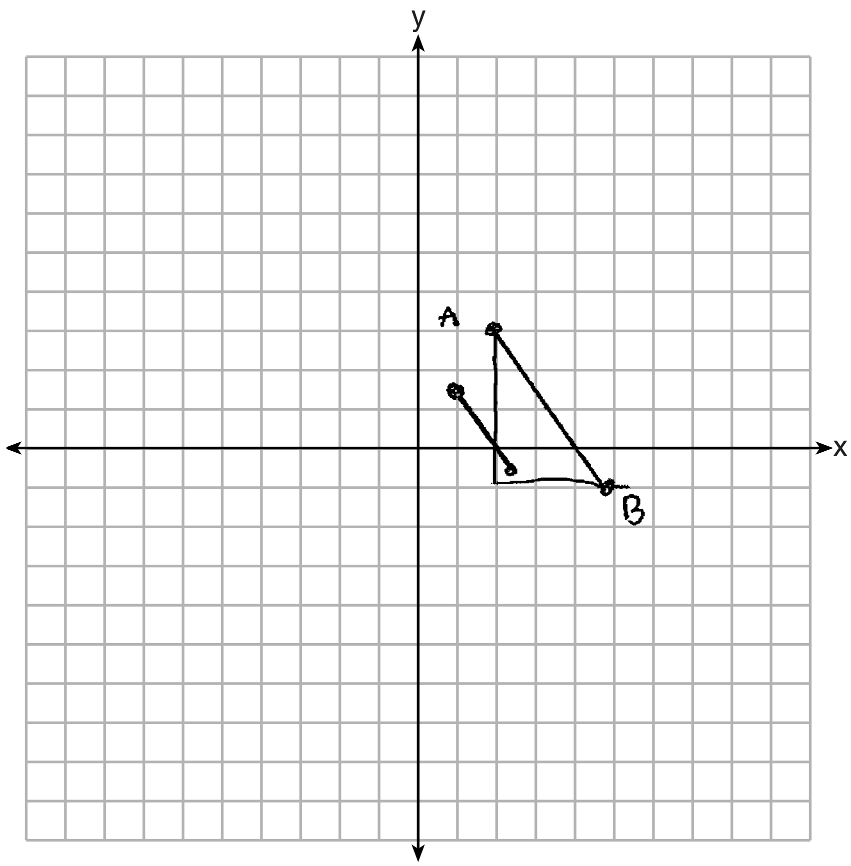
$\boxed{\overline{A'B'} = 2.5}$

$4^2+3^2=c^2$

$16+9=c^2$

$\sqrt{25}=\sqrt{c^2}$

$c=5$



Score 2: The student gave a complete and correct response.

Question 29

29 The coordinates of the endpoints of $\overline{AB}$ are $A(2,3)$ and $B(5,-1)$. Determine the length of $\overline{A'B'}$, the image of $\overline{AB}$, after a dilation of $\frac{1}{2}$ centered at the origin.

[The use of the set of axes below is optional.]

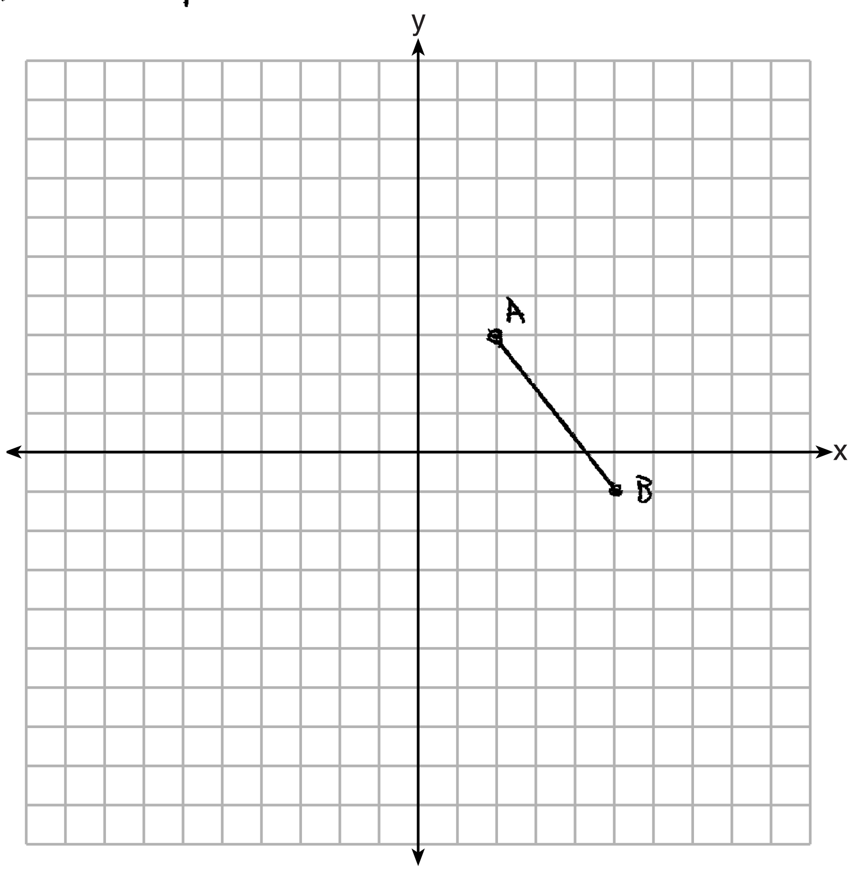
$d=\sqrt{(2-5)^2+(3-+1)^2}$

$\sqrt{(3)^2+(4)^2}$

$\sqrt{9+16}$

$\sqrt{25}$

$d=5$



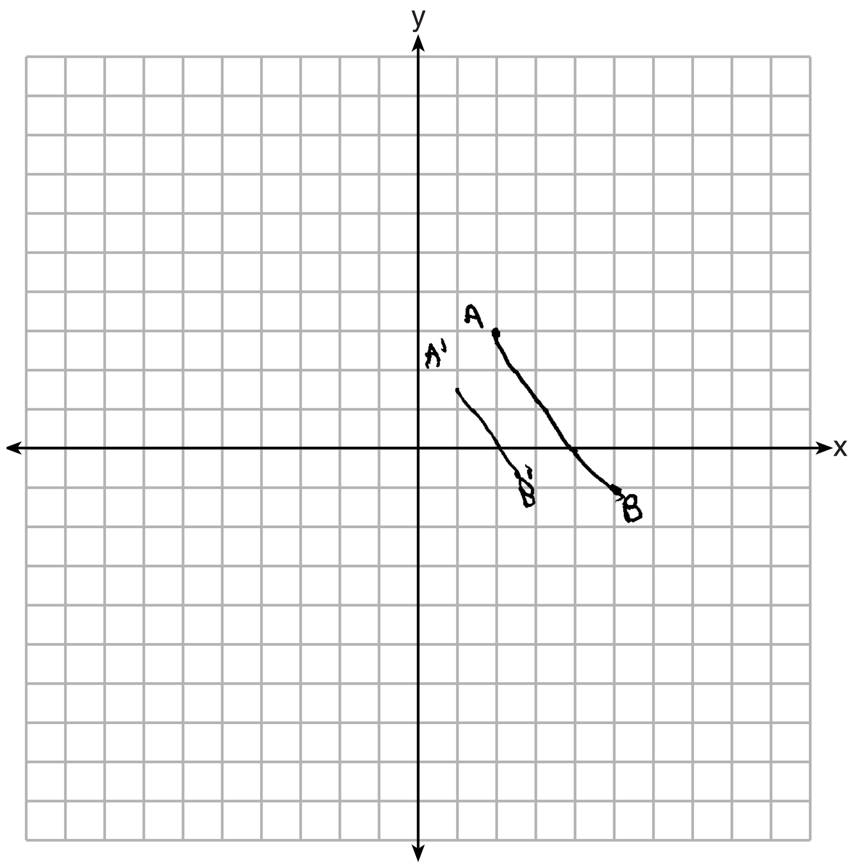
Score 1: The student found the length of $\overline{AB}$, but no further correct work is shown.

Question 29

29 The coordinates of the endpoints of $\overline{AB}$ are $A(2,3)$ and $B(5,-1)$. Determine the length of $\overline{A'B'}$, the image of $\overline{AB}$, after a dilation of $\frac{1}{2}$ centered at the origin.

[The use of the set of axes below is optional.]

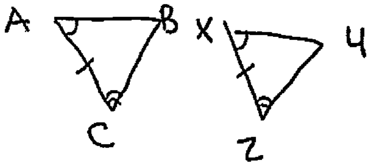
$\overline{A'B'}$ is shorter than $\overline{AB}$

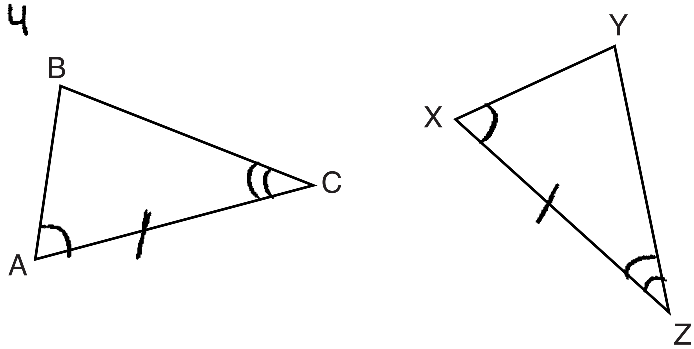


Score 0: The student did not show enough correct relevant work to receive any credit.

Question 30

30 In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and $\overline{AC}$ onto $\overline{XZ}$.





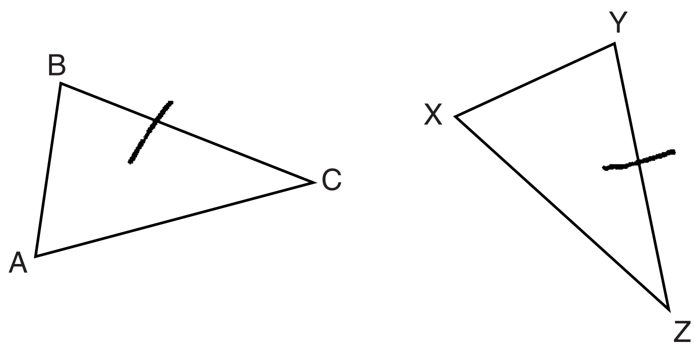
Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

$\overline{BC} \cong \overline{YZ}$ since the $\triangle$s are $\cong$ by ASA since $\angle A \cong \angle X$, $\overline{AC} \cong \overline{XZ}$ and $\angle C \cong \angle Z$ because they can be mapped on to eachothr in a series of rigid motions which preserve side length + angle measure. So since $\triangle ABC \cong \triangle XYZ$, $\overline{BC} \cong \overline{YZ}$ because corresponding sides of $\cong$ $\triangle$s are $\cong$

Score 2: The student gave a complete and correct response.

Question 30

30 In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and $\overline{AC}$ onto $\overline{XZ}$.



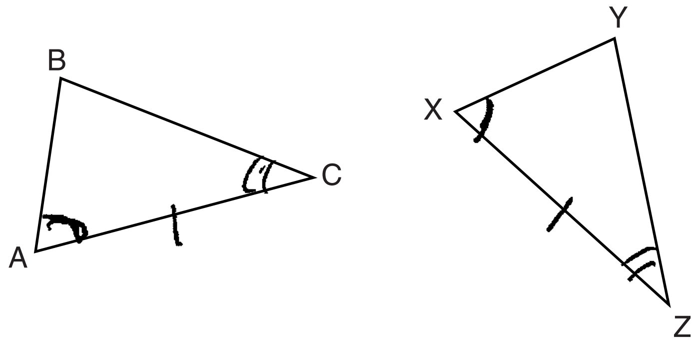
Determine and state whether $\boxed{\overline{BC} \cong \overline{YZ}}$. Explain why.

yes because basic rigid motions preserve segment length and angle measurement.

Score 1: The student gave an incomplete explanation by not stating the triangle congruency and not stating corresponding congruent sides.

Question 30

30 In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and $\overline{AC}$ onto $\overline{XZ}$.



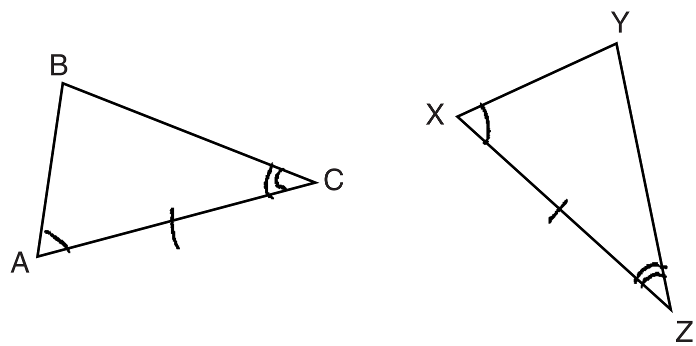
Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

$\overline{BC} \cong \overline{YZ}$ because corresponding parts of congruent triangles are congruent

Score 1: The student gave an incomplete explanation.

Question 30

30 In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and $\overline{AC}$ onto $\overline{XZ}$.



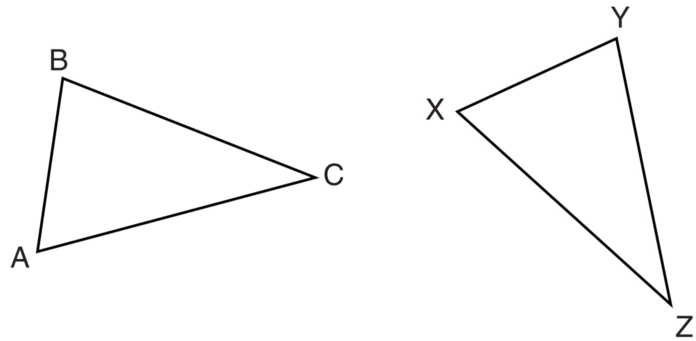
Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

yes $\overline{BC} \cong \overline{YZ}$ because of ASA ≅ ASA.

Score 1: The student gave an incomplete explanation.

Question 30

30 In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and $\overline{AC}$ onto $\overline{XZ}$.



Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

$\overline{BC} \cong YZ$ because the triangles look the same.

Score 0: The student wrote an incorrect explanation.

Question 31

31 Determine and state the coordinates of the center and the length of the radius of a circle whose equation is $x^2 + y^2 - 6x = 56 - 8y$.

$\frac{6}{2} = 3^2 = 9$

$x^2 - 6x + y^2 + 8y = 56$

$x^2 - 6x + 9 + y^2 + 8y + 16 = 56 + 9 + 16$

$(x-3)^2 + (x+4)^2 = 81$

$\sqrt{81} = 9$

radius = 9
center = (3, −4)

Score 2: The student gave a complete and correct response.

Question 31

31 Determine and state the coordinates of the center and the length of the radius of a circle whose equation is $x^2 + y^2 - 6x = 56 - 8y$.

$(x^2 - 6x) + (y^2 + 8y) = 56$

$(x^2 - 6x + 9) + (y^2 + 8y + 16) = 81$

$(x - 3)^2 + (y + 4)^2 = 81$

center $= (-3, 4)$

radius $= 9$

Score 1: The student had incorrect signs on the coordinates for the center of the circle.

Question 31

31 Determine and state the coordinates of the center and the length of the radius of a circle whose equation is $x^2 + y^2 - 6x = 56 - 8y$.

$$x^2+y^2-6x=56-8y$$
$$+8y \quad +8y$$
$$x^2-6x+y^2+8y=56$$
$$x^2-6x+9+y^2+8y+16=56$$
$$(x-3)(x-3)+(y+4)(y+4)=56$$
$$(x-3)^2+(y+4)^2=56$$
$$x=-3 \quad y=+4$$

Score 0: The student did not show enough correct relevant work to receive any credit.

Question 32

32 Triangle PQR has vertices $P(-3,-1)$, $Q(-1,7)$, and $R(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$.

[The use of the set of axes below is optional.]

Mid of $\overline{PQ} = \left(\frac{-3+-1}{2}, \frac{-1+7}{2}\right)$

$= \left(\frac{-4}{2}, \frac{6}{2}\right)$

$A = (-2, 3)$

$B = \left(\frac{3+-1}{2}, \frac{7+3}{2}\right)$

$= \left(\frac{2}{2}, \frac{10}{2}\right)$

$B = (1, 5)$

Slope $_{\overline{AB}} = \frac{5-3}{1-(-2)}$

$= \frac{2}{3}$

Slope $_{\overline{PR}} = \frac{3-(-1)}{3-(-3)}$

$= \frac{4}{6}$

$= \frac{2}{3}$

Since the slopes of $\overline{AB}$ and $\overline{PR}$ are the same, $\overline{AB} \parallel \overline{PR}$

$AB = \sqrt{(1-(-2))^2+(5-3)^2}$

$= \sqrt{(3)^2+(2)^2}$

$= \sqrt{9+4}$

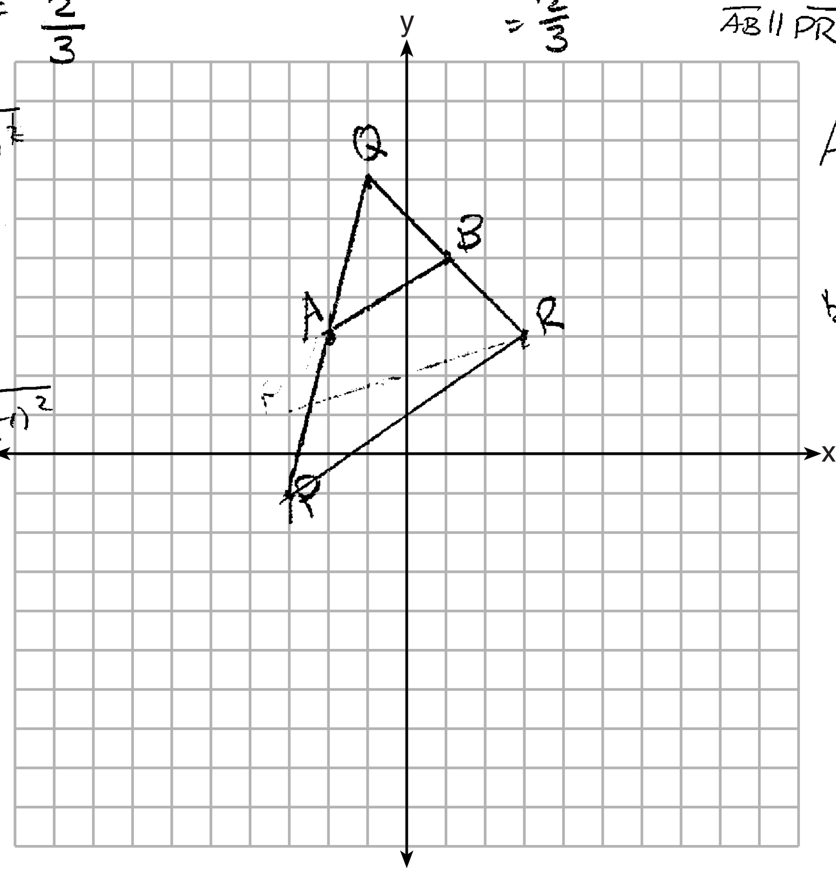
$= \sqrt{13}$

$PR = \sqrt{(3-(-3))^2+(3-(-1))^2}$

$= \sqrt{(6)^2+(4)^2}$

$= \sqrt{36+16}$

$= \sqrt{52}$



AB is half the length of PR because $\sqrt{13}$ is half of $\sqrt{52}$.

Score 4: The student gave a complete and correct response.

Question 32

32 Triangle PQR has vertices $P(-3,-1)$, $Q(-1,7)$, and $R(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$.

[The use of the set of axes below is optional.]

A(-1, 3)

B(0, 1)

slope

AB : $-\frac{1}{1} = -1$

QR : $-\frac{1}{1}$ -1

$\therefore \overline{AB} \parallel \overline{QR}$ since both segments have equal slopes

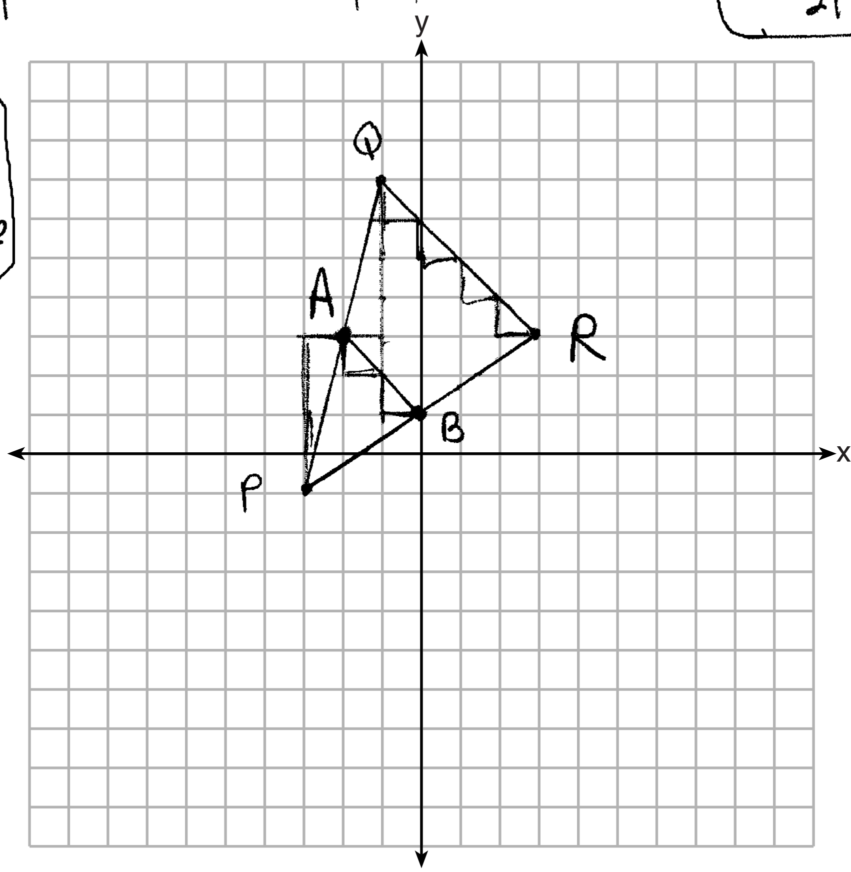
length

$|AB| = \sqrt{2^2+2^2} = \sqrt{8}$

$|QR| = \sqrt{4^2+4^2} = \sqrt{32}$

$\frac{1}{2}|QR| = \frac{1}{2}\sqrt{32} = \frac{1}{2}\cdot 4\sqrt{2} = 2\sqrt{2}$

$|AB| = \sqrt{8} = 2\sqrt{2}$ $\boxed{\therefore \frac{1}{2}|QR| = |AB|}$



Score 3: The student did correct work to show that the midsegment of a triangle is parallel and half the length to the third side of the triangle, but used the wrong midsegment.

Question 32

32 Triangle PQR has vertices $\boxed{P}(-3,-1)$, $Q(-1,7)$, and $\boxed{R}(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$.

[The use of the set of axes below is optional.]

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

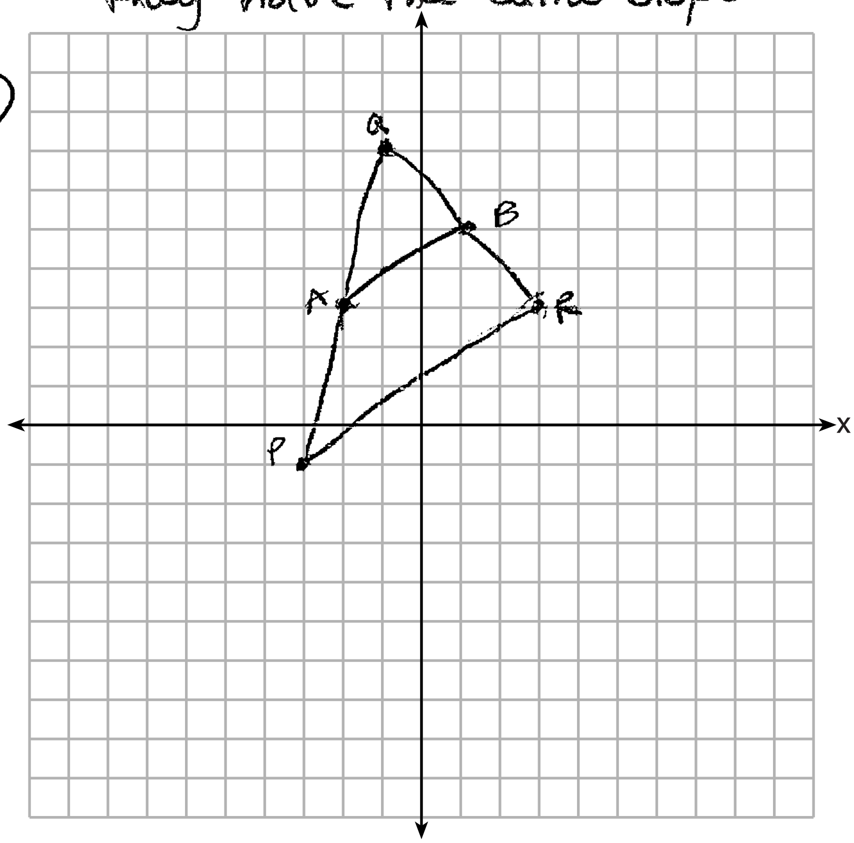
$$PR = \frac{3 - -1}{3 - -3} = \frac{3+1}{3+3} = \frac{4}{6} = \boxed{\frac{2}{3}}$$

$$AB = \frac{5 - 3}{1 - -2} = \boxed{\frac{2}{3}}$$

$\overline{PR}$ and $\overline{AB}$ are $\parallel$ because they have the same slope.

$A(-2, 3)$

$B(1, 5)$



Score 2: The student proved $\overline{AB} \parallel \overline{PR}$, but no further correct work is shown.

Question 32

32 Triangle PQR has vertices $P(-3,-1)$, $Q(-1,7)$, and $R(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$.

[The use of the set of axes below is optional.]

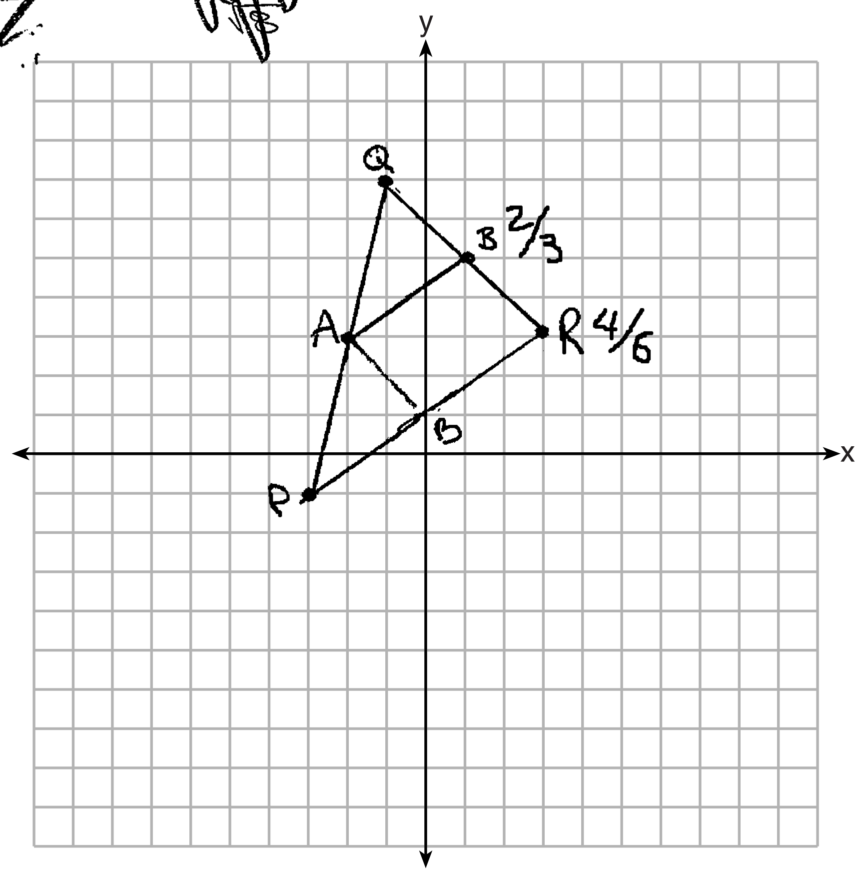
$M_{PQ} = \left(\frac{-3-1}{2}, \frac{-1+7}{2}\right)$

$M_{PQ} = (-2, 3)$

$M_{PR} = \left(\frac{-3+3}{2}, \frac{-1+3}{2}\right)$

$M_{PR} = (0, 1)$

$\overline{AB}$ is parallel to $\overline{PR}$ because their slopes are 2/3 for $\overline{AB}$ and 2/3 for $\overline{PR}$. $\overline{AB}$ is half of $\overline{PR}$ because $\overline{AB}$ is a midsegment.



Score 2: The student proved $\overline{AB} \parallel \overline{PR}$, but no further correct work is shown.

Question 32

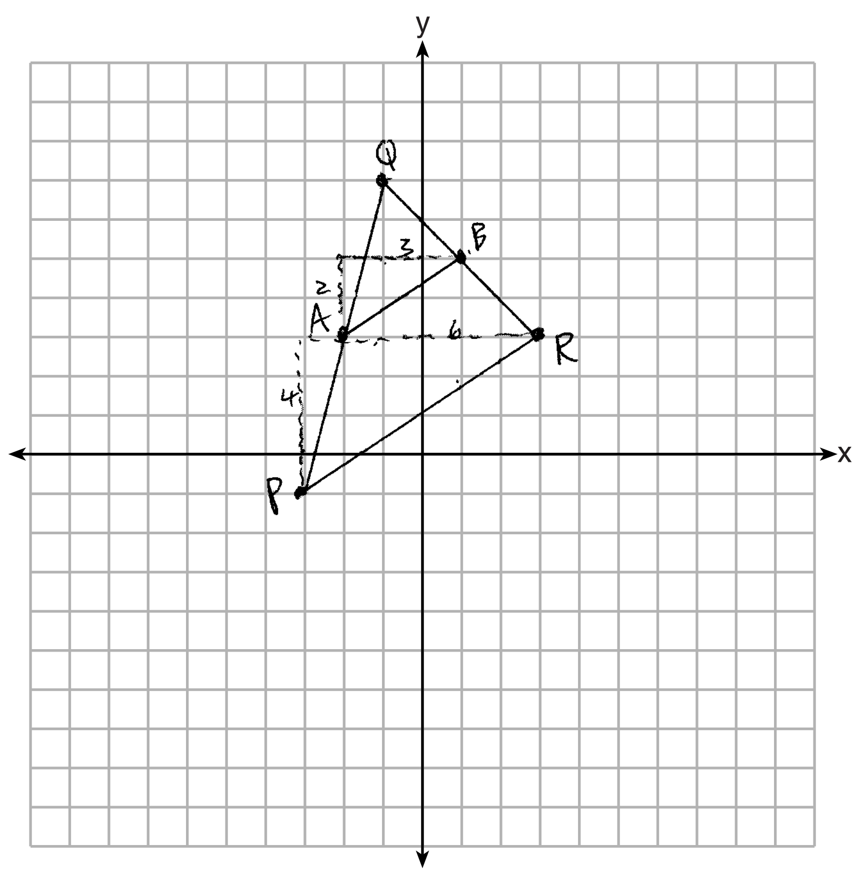
32 Triangle PQR has vertices $P(-3,-1)$, $Q(-1,7)$, and $R(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$.

[The use of the set of axes below is optional.]

$A(-2,3)$
$B(1,5)$

Slope $\overline{AB} = \frac{2}{3}$

Slope $\overline{PR} = \frac{4}{6} = \frac{2}{3}$



Score 1: The student found the slopes of $\overline{AB}$ and $\overline{PR}$, but no concluding statement is written.

Question 32

32 Triangle PQR has vertices $P(-3,-1)$, $Q(-1,7)$, and $R(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$.

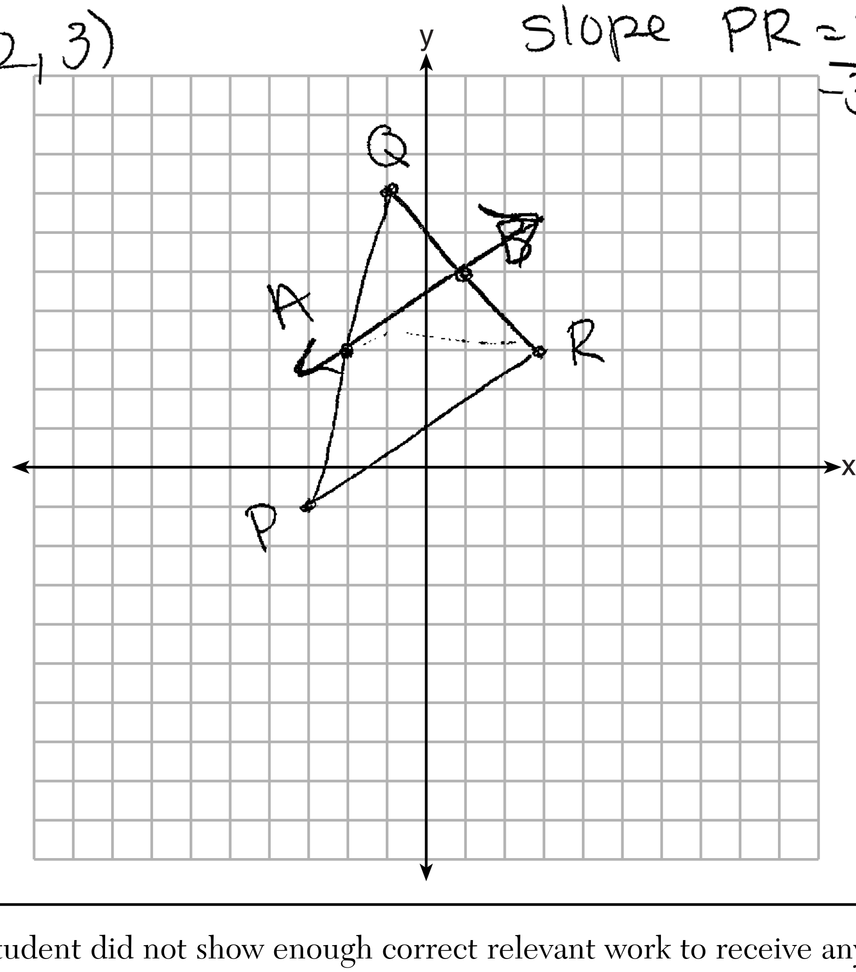
[The use of the set of axes below is optional.]

$$m=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)=\left(\frac{-3+-1}{2},\frac{-1+7}{2}\right)=\left(\frac{-4}{2},\frac{6}{2}\right)=(-2,3)$$

$$m=\left(\frac{-1+3}{2},\frac{7+3}{2}\right)=\left(\frac{2}{2},\frac{10}{2}\right)=(1,5)$$

$$\text{slope } AB=\frac{5-3}{1+2}=\frac{2}{3}$$

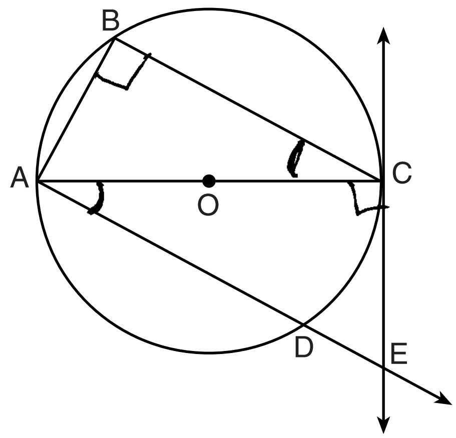
$$\text{slope } PR=\frac{3-1}{-3+3}=\frac{2}{0}?$$



Score 0: The student did not show enough correct relevant work to receive any credit.

Question 33

33 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overrightarrow{ADE}$, and chord $\overline{AB}$ is drawn.



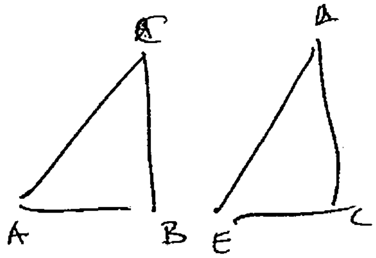
Prove: $\frac{BC}{CA} = \frac{AB}{EC}$

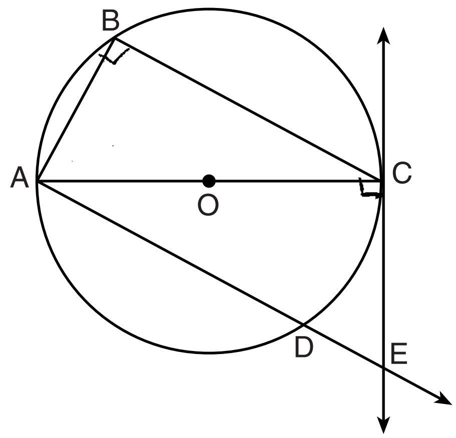
1. Circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overrightarrow{ADE}$. Chord $\overline{AB}$ is drawn	1. Given
2. $\angle B$ is a right $\angle$	2. An angle inscribed in a semicircle is a right $\angle$.
3. $\overleftrightarrow{EC} \perp \overline{OC}$	3. A radius is perpendicular to a tangent at the point of contact.
4. $\angle ECA$ is a right $\angle$	4. Perpendicular lines form right angles
5. $\angle B \cong \angle ECA$	5. All right angles are $\cong$
6. $\angle BCA \cong \angle CAE$	6. If 2 parallel lines are cut by a transversal, the alternate interior angles are $\cong$
7. $\triangle ABC \sim \triangle ECA$	7. $AA \cong AA$
8. $\frac{BC}{CA} = \frac{AB}{EC}$	8. Corresponding sides of similar triangles are in proportion

Score 4: The student gave a complete and correct response.

Question 33

33 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overleftrightarrow{ADE}$, and chord $\overline{AB}$ is drawn.





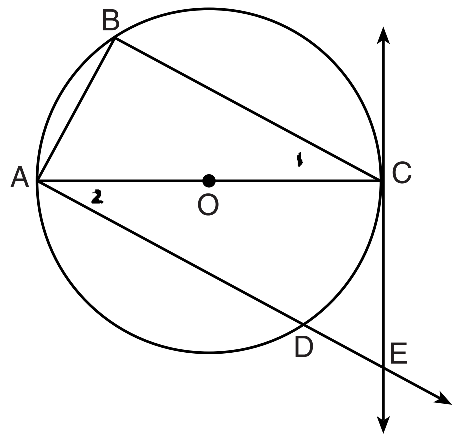
Prove: $\frac{BC}{CA} = \frac{AB}{EC}$

Statements	Reasons
1) In circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overleftrightarrow{ADE}$, and chord $\overline{AB}$ is drawn	1) Given.
2) ∠ABC is a right angle (a)	2) Since $\widehat{AOC}$ is the diameter, it splits the circle into two congruent arcs measuring 180°, as a circle has 360°. Then ∠ABC is the inscribed angle of $\widehat{ADC}$, which should measure 180°. Inscribed angles are half the measure of the arc, therefore, ∠ABC is a right angle as it measures 90°.
3) ∠ACE is a right angle.	3) A tangent intersecting with a diameter forms a 90° angle
4) ∠ACE ≅ ∠ABC (a)	4) Right angles are congruent.
5) ∠BCA ≅ ∠EAC (a)	5) Parallel lines intersected by a transversal forms congruent alternate interior angles
6) △BCA ~ △CAE	6) AA (4,5)
7) $\frac{BC}{CA} = \frac{AB}{EC}$	7) Similar triangles have proportional relationships with corresponding sides.

Score 4: The student gave a complete and correct response.

Question 33

33 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overrightarrow{ADE}$, and chord $\overline{AB}$ is drawn.



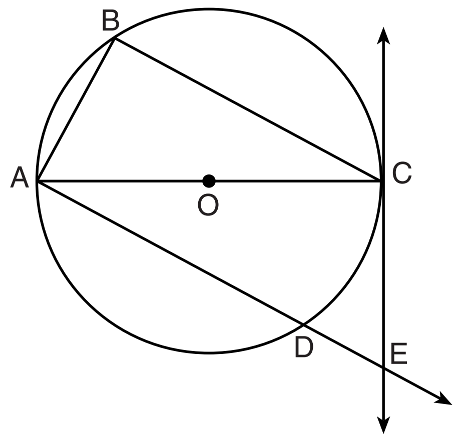
Prove: $\frac{BC}{CA} = \frac{AB}{EC}$

Statement	Reason
① In Circle O, tangent EC is drawn to diameter AC Chord $\overline{BC}$ // secant $\overline{ADE}$	① Given
② $\angle 1 \cong \angle 2$	② If 2 // lines are cut by a transversal, alt int ∠'s are ≅
③ ∠B is a rt. ∠	③ An angle inscribed in a semi-circle is a rt. ∠
④ $\overline{AC} \perp \overline{CE}$	④ A tangent is ⊥ to a diameter at its point of tangency
⑤ ∠ECA is a rt. ∠	⑤ ⊥ Lines form rt. ∠'s
⑥ ∠B ≅ ∠ECA	⑥ All rt. ∠'s are ≅
⑦ △ABC ~ △ECA	⑦ AA
✗ ⑧ BC × EC = AB × CA	⑧ Corr. sides of similar △'s are proportional
⑨ $\frac{BC}{CA} = \frac{AB}{EC}$	⑨ The product of the means equals the product of the extremes

Score 3: The student proved $\triangle ABC \sim \triangle ECA$, but no further correct work is shown.

Question 33

33 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overrightarrow{ADE}$, and chord $\overline{AB}$ is drawn.



Prove: $\frac{BC}{CA} = \frac{AB}{EC}$

$\angle BCA \cong \angle EAC$ because $\overline{BC} \parallel \overline{AE}$ cut by a transversal makes $\cong$ alternate interior angles

$\angle ABC$ is a right angle because its an inscribed angle that intercepts a semi-circle of circle O.

$\overline{AC} \perp \overline{CE}$ because a diameter ~~a~~ that intersects a tangent forms $\perp$ lines

$\angle ACE$ is a right angle because $\perp$ lines form right angles

$\angle BC \cong \angle ACE$ because all right angles are $\cong$

$\overline{AC} \cong \overline{AC}$ by reflexive property

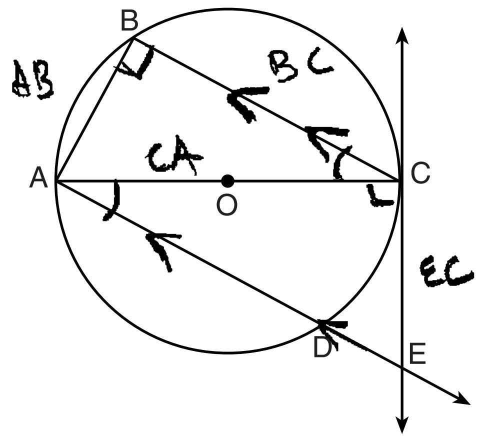
$\triangle ABC \cong \triangle ACE$ by AAS

$\frac{BC}{CA} = \frac{AB}{EC}$ because CPCTC

Score 2: The student proved $\angle BCA \cong \angle EAC$ and $\angle ABC \cong \angle ACE$, but no further correct work is shown.

Question 33

33 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overleftrightarrow{ADE}$, and chord $\overline{AB}$ is drawn.



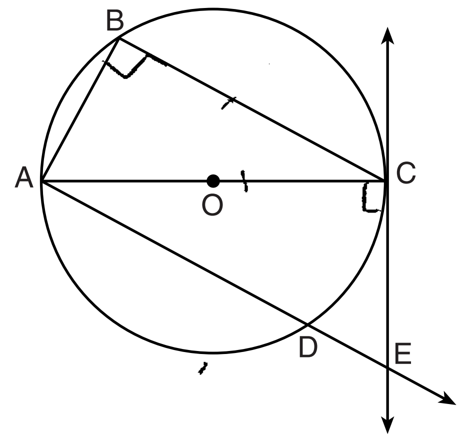
Prove: $\dfrac{BC}{CA} = \dfrac{AB}{EC}$

S	R
1.) $\angle BCA \cong \angle CAD$	1.) Alternate interior angles of parallel lines are equal
2.) $\angle ABC = 90°$	2.) any point on a circle connected to two end points of a diameter in the circle, creating a triangle, is a right angle in which it = 90°
3.) $\angle ACE = 90°$	3.) A radius to a line that passes through the circle once at a point makes two right angles.
4.) $\angle ABC = \angle ACE$	4.) Right angles are equal to Right angles
5.) $\triangle BCA \sim \triangle CAE$	5.) AA theorem.
6.) $\dfrac{BC}{CA} = \dfrac{AB}{EC}$	6.) proportions for sides lengths that apply to the same opposite congruent angles may be used in the same place of the lines

Score 2: The student did not include the given and had an incorrect reason in step 6.

Question 33

33 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overrightarrow{ADE}$, and chord $\overline{AB}$ is drawn.



Prove: $\frac{BC}{CA} = \frac{AB}{EC}$

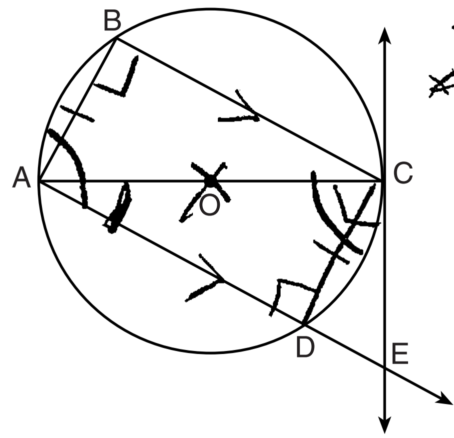
① $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$, $\overline{BC} \parallel \overrightarrow{ADE}$, $\overline{AB}$ is drawn	① Given
② $\angle ABC$ is a right angle	② If an angle is inscribed in the semicircle, it is a right angle
③ $\angle ACE$ is a right angle	③ If a tangent is drawn to a circle, then the angle formed is a right angle
④ $\triangle ABC$ is a right triangle, $\triangle ACE$ is a right triangle	④ Definition of a right triangle
⑤ $\triangle ABC \sim \triangle ACE$	⑤ AA~
⑥ $BC \cdot EC = CA \cdot AB$	⑥ Product of the means is equal to the product of the extremes
⑦ $\frac{BC}{CA} = \frac{AB}{EC}$	⑦ Substitution

Q.E.D

Score 1: The student had one correct relevant statement and reason in step 2.

Question 33

33 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overrightarrow{ADE}$, and chord $\overline{AB}$ is drawn.



∠ABC = 90° b/c opp diamiter

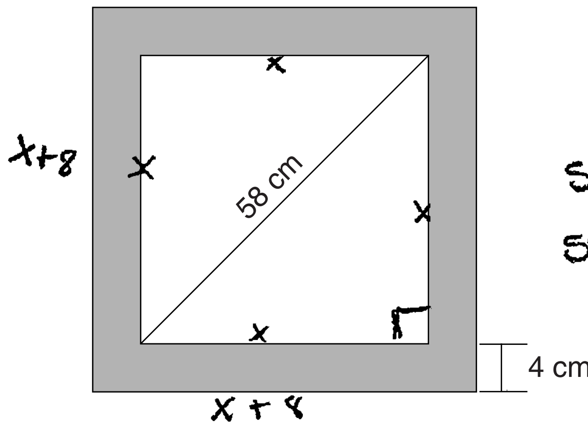
∠ACE = 90° b/c tangents are 90° from diameter

Prove: $\frac{BC}{CA} = \frac{AB}{EC}$

Statement	Reasons
1) $\overleftrightarrow{EC}$ is tangent to circle O's diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overrightarrow{ADE}$, Chord $\overline{AB}$ is drawn	1) Givens
2) $\overline{AC} \cong \overline{AC}$	2) Reflexive
3) $\overline{CD} \cong \overline{AB}$	3) if 2 parrallel lines are cut by a cord then that Cord length is congruent to any other cord that are cut to the same parrallel lines
4) ∠BAC ≅ ∠ACD	4) if 2 parralel lines are cut by a transversal

Score 0: The student did not show enough correct relevant work to receive any credit.

34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.



$\sin = \frac{O}{H}$

$\sin(45) = \frac{x}{58}$

$58(\sin(45)) = x$

$x = 41.0121\ldots$

Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter.*

$TA = (x+8)(x+8)$

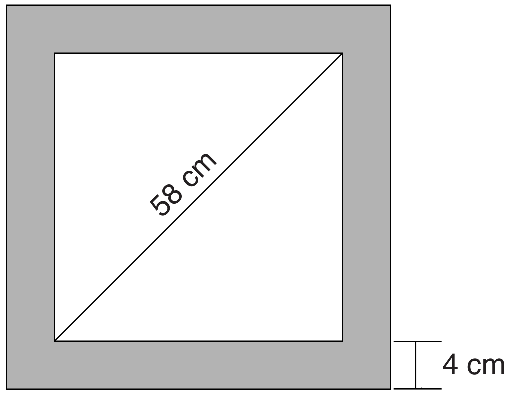
$TA = (41.0121+8)(41.0121+8)$

$TA \approx \boxed{2402.2 \text{ cm}}$

Score 4: The student gave a complete and correct response.

Question 34

34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.



Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter.*

$A = \frac{1}{2}d^2$

$A = \frac{1}{2}(58)^2$

$A = 1682 \text{ cm}^2$

$A = (\sqrt{1682} + 8)^2$

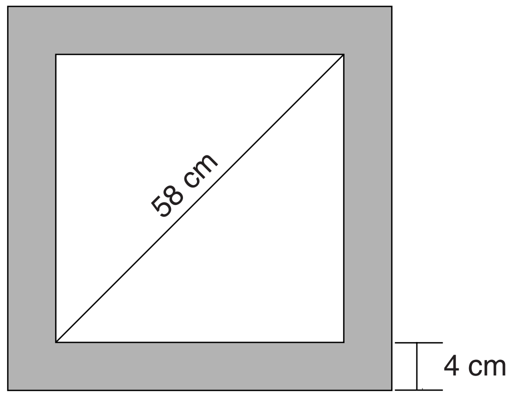
$A = 2402.195093...$

$A = 2402.2 \text{ cm}^2$

Score 4: The student gave a complete and correct response.

Question 34

34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.



Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter.*

$A = l \cdot w$

$$\begin{array}{r} 41.01219 \\ +8 \\ \hline 49.01219 \end{array}$$

$(58)^2 = x^2 + x^2$

$\frac{3364}{2} = \frac{\cancel{2}x^2}{\cancel{2}}$

$\sqrt{1682} = \sqrt{x^2}$

$41.01219 = x$

$A = s^2$

$A = 49.01219^2$

$A = 2402.2$

$\boxed{\begin{array}{l} \text{Poster Area} = 1682.0 \\ \text{Frame Area} = 720.2 \\ \hline \text{Total Area} = 2402.2 \end{array}}$

$A = s^2$

$A = 41.01219^2$

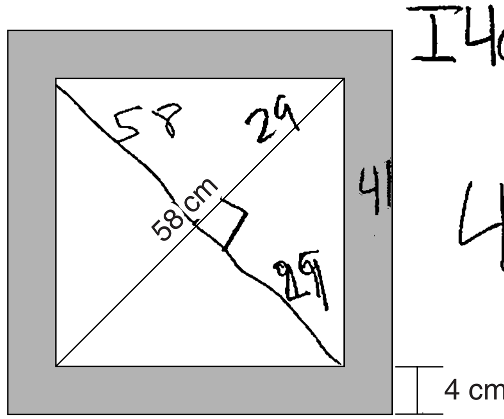
$A = 1682.0$

$$\begin{array}{r} 2402.2 \\ -1682.0 \\ \hline 720.2 \end{array}$$

Score 4: The student gave a complete and correct response.

Question 34

34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.



I4cm

49

Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter.*

$a^2+b^2=c^2$

$29^2+29^2=c^2$

$841+841=c^2$

$\sqrt{1682}=\sqrt{c^2}$

$\sqrt{1681}=c$

$41=c$

$A=s^2$

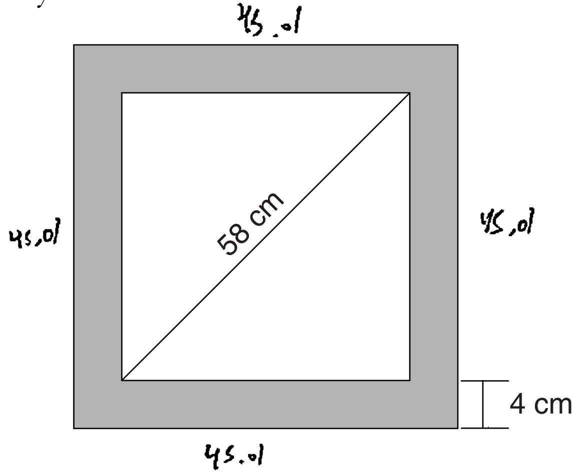
$A=49^2$

$\boxed{A=2401\text{ cm}^2}$

Score 3: The student made a transcription error by writing $\sqrt{1681}$.

Question 34

34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.



Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter.*

$a^2+b^2=c^2$

$x^2+x^2=58^2$

$2x^2=58^2$

$2x^2=3384$

$x^2=1682$

$x\approx 41.01$

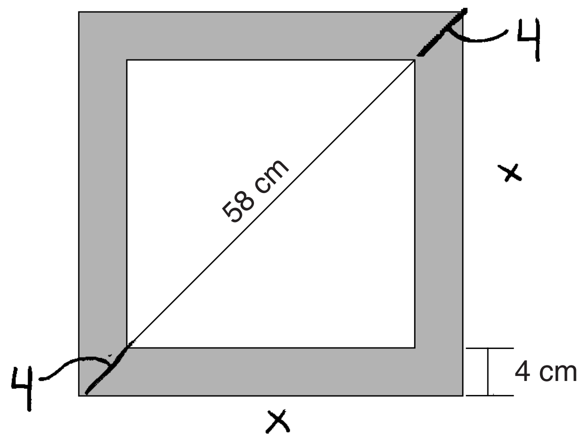
$A=45.01\cdot 45.01$

$A\approx 2025.9$ cm

Score 2: The student made an error in rounding $\sqrt{1682}$ early and another error by adding 4 rather than 8 to find the length of the frame.

Question 34

34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.



Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter.*

$x^2 + x^2 = 66^2$

$2x^2 = 4356$

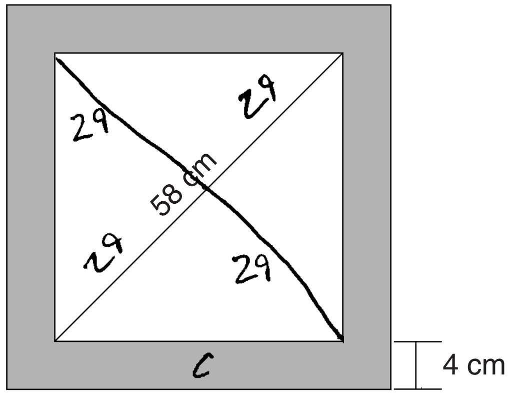
$x^2 = 2178 = \text{Area}$

$$\begin{array}{r} 58 \\ +\ 8 \\ \hline 66 \end{array}$$

Score 2: The student made a conceptual error in finding the length of the diagonal.

Question 34

34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.



Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter.*

poster area = 1682 cm²

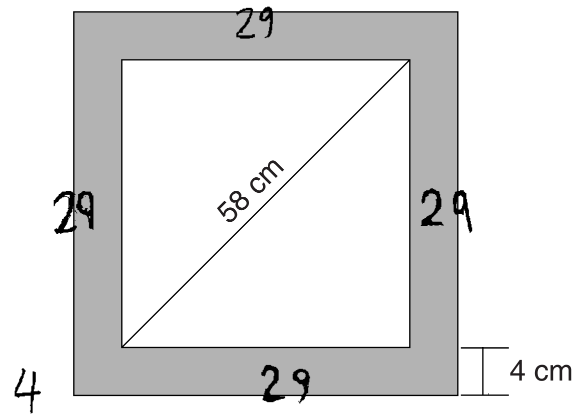
$29^2+29^2=c^2=\sqrt{1682}=41.01\text{cm}$

41.01 cm

Score 1: The student found the area of the poster, but no further correct work is shown.

Question 34

34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.



Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter.*

$a^2+b^2=c^2$

$29^2+b^2=58^2$

$841+b^2=3364$

$\cancel{-841} \quad -841$

$b^2=2523$

$\sqrt{b^2}=\sqrt{2523}$

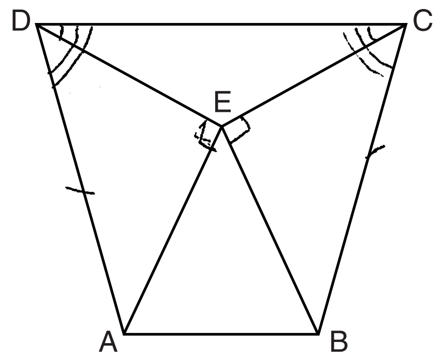
$b=50.23$

1456.67 —area of frame

$\overset{3}{29} \times 4 = 116$ ← area of poster

Score 0: The student gave a completely incorrect response.

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



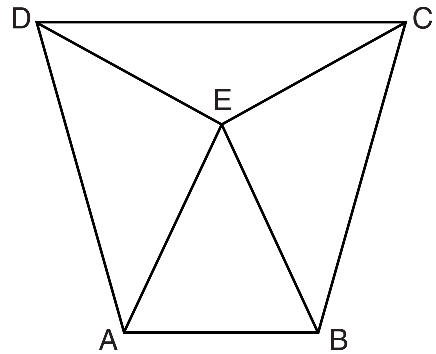
Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

	Statements	Reasons
	1. ABDC is an isosceles trapezoid	1. given
S≅S	2. $\overline{AD} \cong \overline{BC}$	2. Legs in an isosceles trapezoid are =
	3. $\overline{AE} \perp \overline{DE}$ $\overline{BE} \perp \overline{CE}$	3 given
	4. ∠DEA is a right angle ∠CEB is a right angle	4. ⊥ lines form right angles.
A≅A	5. $\angle DEA \cong \angle CEB$	5. All right angles are ≅
	6. $\angle CDE \cong \angle DCE$	6 given
	7. $\angle CDA \cong \angle DCB$	7. Base angles of Isosceles trapezoid are ≅
A=A	8. $\angle CDA - \angle CDE \cong \angle DCB - \angle DCE$ $\angle EDA \cong \angle ECB$	8. Subtraction Postulate
	9. $\triangle ADE \cong \triangle BCE$	9. SAA ≅ SAA
	10. $\overline{EA} \cong \overline{EB}$	10. CPCTC
	11. △AEB is an isosceles △	11. Isosceles △ has 2 ≅ sides.

Score 6: The student gave a complete and correct response.

Question 35

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

$\overline{AE} \perp \overline{DE}$
$\overline{BE} \perp \overline{CE}$
Given

$\angle DEA$ is a rt $\angle$
$\angle CEB$ is a rt $\angle$
$\perp$ lines form rt $\angle$'s

$\angle DEA \cong \angle CEB$
All rt $\angle$'s are $\cong$

$\triangle DEA$ & $\triangle CEB$ are rt $\triangle$'s
A rt $\triangle$ contains a rt $\angle$

Iso Trap $ABCD$ w/ base $\overline{DC}$ & $\overline{AB}$
Given

$\overline{AD} \cong \overline{BC}$
non-∥ sides of Iso Trap are $\cong$

$\angle CDE \cong \angle DCE$
Given

$\overline{DE} \cong \overline{CE}$
sides opp $\cong$ $\angle$'s are $\cong$ in a $\triangle$

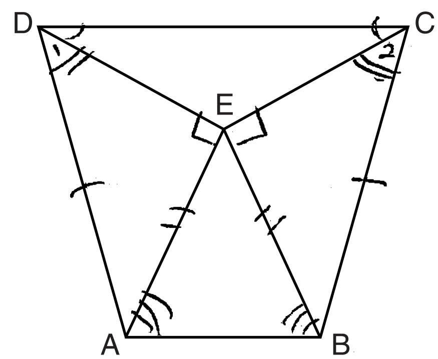
$\triangle DEA \cong \triangle CEB$
HL

$\overline{EA} \cong \overline{EB}$
CPCTC

$\triangle AEB$ is Isosc
A $\triangle$ w/ 2 sides $\cong$ is Isosc.

Score 6: The student gave a complete and correct response.

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



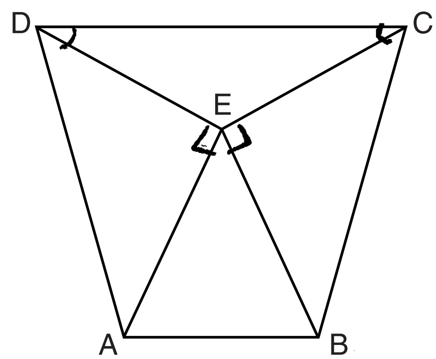
Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

Statement	Reason
1. Isosceles trapezoid ABCD has bases $\overline{DC}$ + $\overline{AB}$	1. given
2. $\angle CDE \cong \angle DCE$	2. given
3. $\overline{AE} \perp \overline{DE}$	3. given
4. $\overline{BE} \perp \overline{CE}$	4. given
5. $\angle AED$ is a right $\angle$ $\angle BEC$ is a right $\angle$	5. perpendicular lines form right $\angle$'s.
6. $\angle AED \cong \angle BEC$	6. All right $\angle$'s are $\cong$
7. $\angle ADC \cong \angle BCD$	7. Angles opposite of two $\cong$ sides are also $\cong$.
8. $\angle 1 \cong \angle 2$	8. Subtraction
9. $\overline{AD} \cong \overline{BC}$	9. legs of an isosceles trapezoid are $\cong$.
10. $\triangle ADE \cong \triangle BCE$	10. SAA $\cong$ SAA
11. $\overline{AE} \cong \overline{BE}$	11. CPCTC
12. $\triangle AEB$ is an isosceles $\triangle$	12. A triangle w/ 2 $\cong$ sides is isosceles

Score 5: The student had an incorrect reason in step 7.

Question 35

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



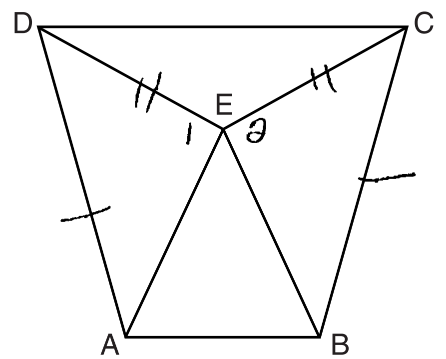
Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

S	R
Isosceles Trapezoid ABCD $\measuredangle CDE \cong \measuredangle DCE$ $\overline{AE} \perp \overline{DE}$, $\overline{BE} \perp \overline{CE}$	Given
$\measuredangle DEA$ and $\measuredangle CEB$ are right angles	Perpendicular lines form right angles
$\measuredangle DEA \cong \measuredangle CEB$	All right angles are congruent
$\overline{DE} \cong \overline{EC}$	If the base angles of a triangle are congruent then the sides opposite them are congruent
$\overline{DA} \cong \overline{CB}$	Properties of Isosceles trapezoid
$\triangle DEA \cong \triangle CEB$	HL≅AL/High leg Theorm
$\overline{EA} \cong \overline{EB}$	CPCTC
$\triangle AEB$ is an Isosceles triangle	If the base angles of a triangle are congruent the triangle is Isosceles.

Score 4: The student did not prove $\triangle DEA$ and $\triangle CEB$ are right triangles and wrote an incorrect last reason by referencing base angles when the student proved congruent sides.

Question 35

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



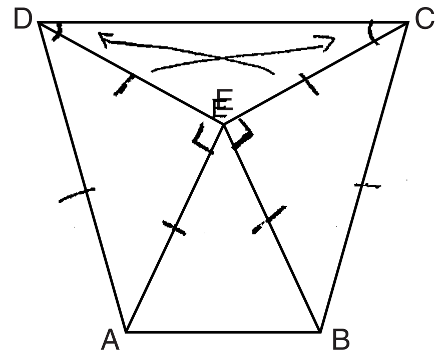
Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

statements	reasons
1 isosceles trapezoid $ABCD$, $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, $\overline{BE} \perp \overline{CE}$	1 given
2 $\overline{DA} \cong \overline{CB}$	2 An isosceles trapezoid has 2 ≅ legs
3 $\angle 1$, $\angle 2$ are Right $\angle$s	3 ⊥ lines intersect to form rt $\angle$s
4 $\angle 1 \cong \angle 2$	4 Rt $\angle$s are ≅.
5 $\overline{DE} \cong \overline{CE}$	5 In a $\triangle$, sides opposite ≅ $\angle$s are ≅
6 $\triangle ADE \cong \triangle BCE$	6 SAS ≅ SAS
7 $\overline{AE} \cong \overline{BE}$	7 If 2 $\triangle$'s are ≅, corresponding parts are ≅
8 $\triangle AEB$ is isosceles	8 an isosceles $\triangle$ is a $\triangle$ w/ 2 ≅ sides.

Score 4: The student made one conceptual error in proving $\triangle ADE \cong \triangle BCE$ by SAS.

Question 35

35 Isosceles trapezoid *ABCD* has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments *AE*, *BE*, *CE*, and *DE* are drawn in trapezoid *ABCD* such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



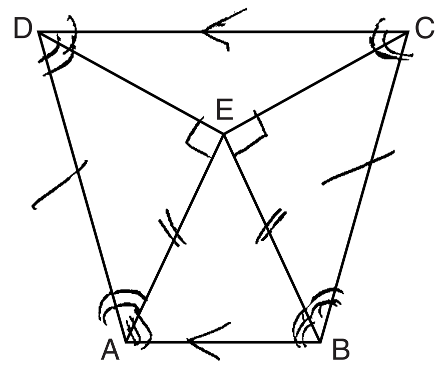
Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

Statements	Reasons
① trapezoid ABCD $\measuredangle CDE \cong \measuredangle DCE$ $\overline{AE} \perp \overline{DE}$ $\overline{BE} \perp CE$	① given
② $\overline{DA} \cong \overline{CB}$	② def of trapazoid
③ $\triangle DEC$ is an iscosole $\triangle$	③ has 2 congruent sides
④ $\triangle ADE$ and $\triangle BCE$ are right $\triangle$s	④ have right $\measuredangle$s
⑤ $\triangle ADE \cong \triangle BCE$	⑤ HL $\cong$ HL
⑥ $\overline{AE} \cong \overline{BE}$	⑥ CPCTC
⑦ $\triangle AEB$ is an iscosceles $\triangle$	⑦ has 2 congruent sides

Score 3: The student did not prove $\overline{DE} \cong \overline{CE}$ and that $\angle DEA$ and $\angle CEB$ are right angles. The student also had an incorrect reason in step 2.

Question 35

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.

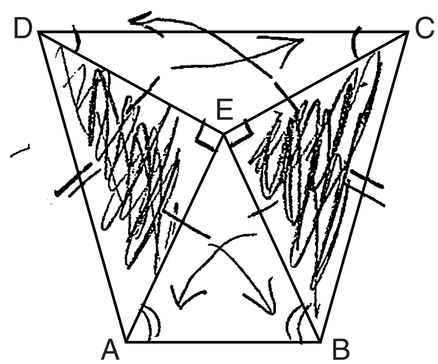


Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

Statement	Reason
① Isosceles trapezoid ABCD has bases $\overline{DC}$ and $\overline{AB}$, $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$	① Given
② $\overline{DC} \parallel \overline{AB}$	② Isosceles trapezoids have one pair of ∥ lines
③ ∠AED & ∠BEC are rt∠'s	③ ⊥ lines form rt ∠'s
④ ∠AED ≅ ∠BEC	④ All rt ∠'s are ≅.
⑤ ∠ECB and ∠CBE, ∠EDA and ∠ADE are corresponding ∠'s.	⑤ when ∥ lines are cut by a transversal corresponding ∠'s are formed.
⑥ △ADE ≅ △BCE	⑥ S.A.S
⑦ △AEB is an isosceles △.	⑦ ≅ base ∠'s create an isosceles △.

Score 2: The student proved $\angle AED \cong \angle BEC$, but no further correct relevant work is shown.

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



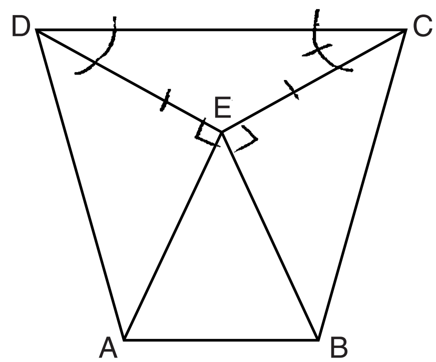
Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

Statements	Proofs
1) Isosceles trapezoid ABCD bases $\overline{DC}$, $\overline{AB}$ $\angle CDE \cong \angle DCE$ $\overline{AE} \perp \overline{DE}$ $\overline{BE} \perp \overline{CE}$	1) Given
2) $\angle DEA$ and $\angle CEB$ are right $\angle$s	2) perpendicular bisector form right angles
3) $\angle DEA \cong \angle CEB$	3) right angles are always congruent
4) $\overline{DA} \cong \overline{CB}$	4) Given
5) $\triangle DEC$ is an isosceles $\triangle$	5) Isosceles triangles have 2 congruent angles.
6) DE ≅ EC	6) Isosceles triangles are triangles with 2 sides with equal length.
7) $\triangle DEA \cong \triangle CEB$	7) SAS = SAS
8) $\overline{AE} \cong \overline{BE}$	8) corresponding parts of congruent triangles are congruent
9) $\triangle AEB$ is an isosceles triangle	9) If two sides are congruent, then the angles opposite of the sides in the triangle are congruent.

Score 2: Some correct relevant statements about the proof are made in steps 3, 6, and 8, but four or more statements and/or reasons are missing or incorrect.

Question 35

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.

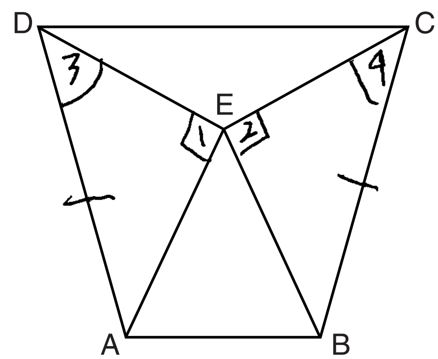


Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

Statements	Reasons
1. $\measuredangle CDE \cong \measuredangle DCE$	1. Given
2. $\overline{DE} \cong \overline{EC}$	2. In a triangle, ≅ line lay opposite ≅ sides.
3. $\overline{AE} \perp \overline{DE}$; $\overline{BE} \perp \overline{CE}$	3. Given
4. $\measuredangle$ DEA and $\measuredangle$CEB are right angles	4. ⊥ lines intersect to form right angles.
5.	

Score 1: The student had one correct statement and reason in step 4.

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.

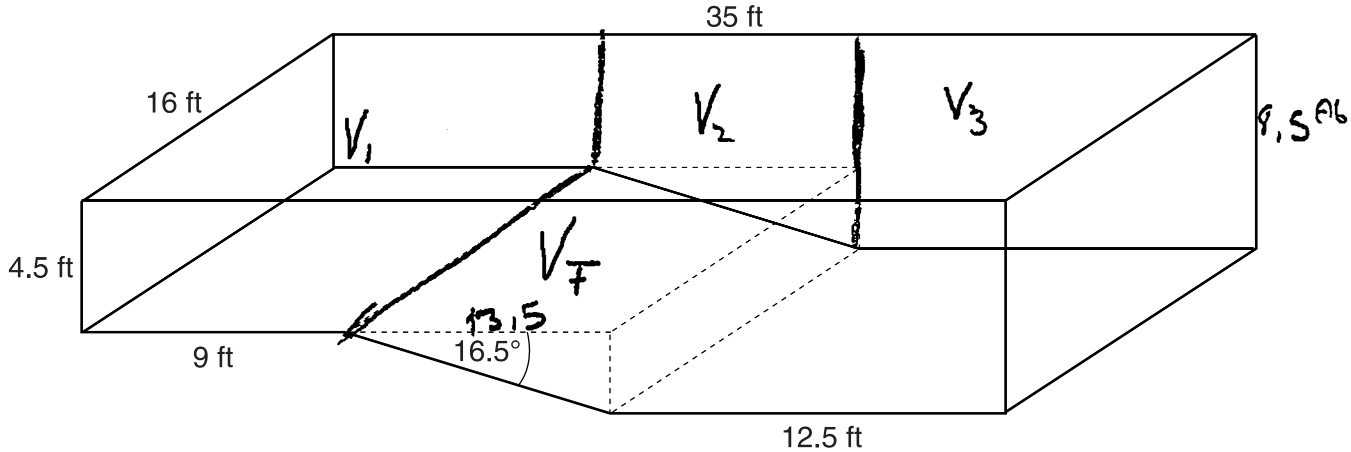


Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

Statements	Reasons
① isoc trap ABCD has bases $\overline{DC}$ and $\overline{AB}$ with non parallel legs $\overline{AD}$ and $\overline{BC}$	① given
② $\angle CDE \cong \angle DCE$ $AE \perp DE$ & $BE \perp CE$	② given
③ $\angle 1 \cong \angle 2$	③ verticle angles are congruent
④ $\overline{DA} \cong \overline{CB}$	④ Opp. sides of a trap.
⑤ $\angle 3 \cong \angle 4$	⑤ substitution
⑥ $\triangle ADE \cong \triangle BCE$	⑥ ASA
⑦ $\triangle AEB$ is an isoc $\triangle$	⑦ CPCTC

Score 0: The student gave a completely incorrect response.

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

13.5
16.5° x

$35 - 9 - 12.5 = h$
$13.5 = h$

$4.5 + x = \boxed{8.5}$

$\tan(16.5) = \frac{x}{13.5}$
$13.5 \tan(16.5) = x$

$x = 3.998882182$

$\boxed{8.5 \text{ ft}}$

Find the volume of the inside of the pool to the *nearest cubic foot.*

$V_1 = 4.5 \cdot 16 \cdot 9 = \boxed{648}$

$V_3 = 12.5 \cdot 16 \cdot 8.5 = \boxed{1700}$

$V_2 = 13.5 \cdot 4.5 \cdot 16 = \boxed{972}$

$V_T = \frac{13.5 \cdot 4}{2} \cdot 16$
$V_T = \boxed{432}$

$V_1 + V_2 + V_3 + V_T = \boxed{3752}$

$\boxed{3752 \text{ ft}^3}$

Question 36 is continued on the next page.

Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour,* will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

$A_{air} = 16 \cdot 35 \cdot .5 = \boxed{280}$

$3752 - 280 = 3472 \; ft^3$

$3472 \cdot 7.48 = \boxed{25970.56 \text{ gallons}}$

$25970.56 / 10.5 = 2473.386666 7$

$$\frac{2473.386667 \text{ minutes}}{60}$$

$=$

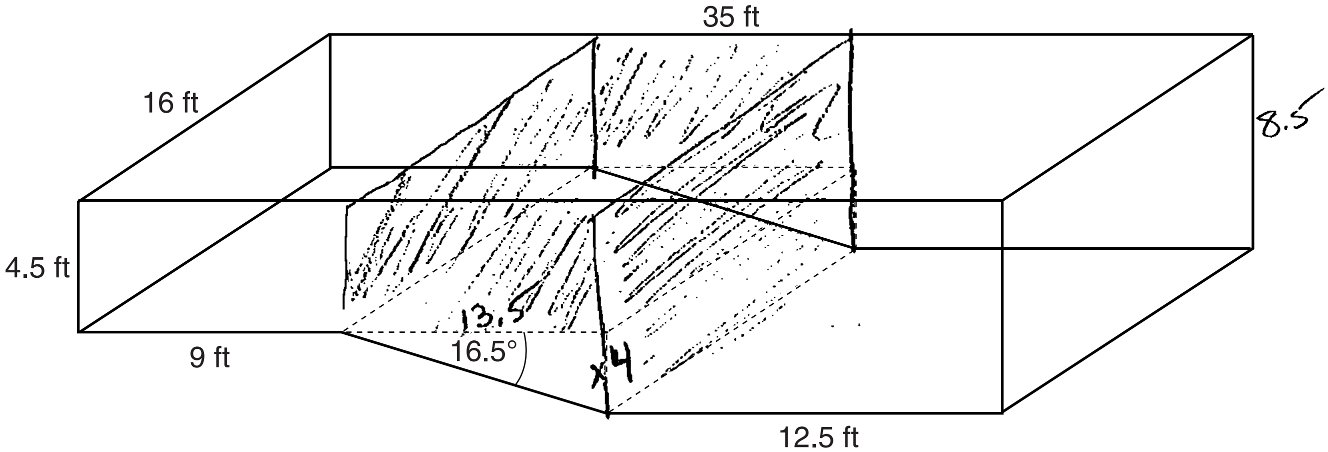
41.2231111

$\boxed{41 \text{ hours}}$

Score 6: The student gave a complete and correct response.

Question 36

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

$$\text{Tan}(16.5) = \frac{x}{13.5} = 3.99 = 4$$

$$4 + 4.5 = 8.5$$

Find the volume of the inside of the pool to the *nearest cubic foot.*

$(16)(4.5)(9) = 648$

$(12.5)(8.5)(16) = 1700$

$(13.5)(4.5)(16) = 972$

$\frac{1}{2}(4)(13.5)(16) = 432$

volume 3752

Question 36 is continued on the next page.

Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour,* will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

3752 volume of pool

volume of air

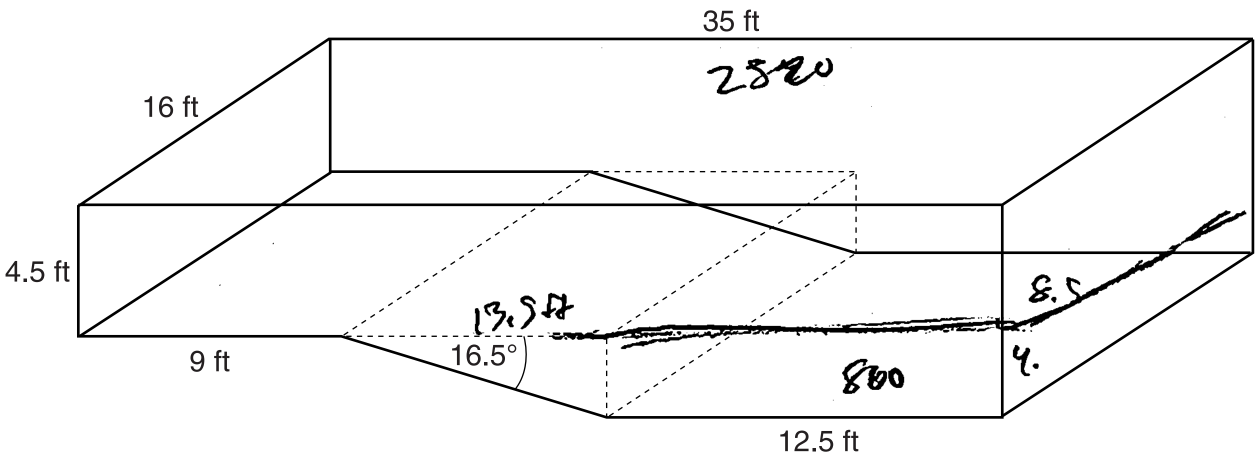
$(.5)(16)(35) = 280$

$$\begin{array}{r} 3752 \\ -\ 280 \\ \hline 3472 \end{array} \cdot 7.48 = \frac{25970.5}{(10.5)(60)} = 41.223$$

41.2 hours

Score 5: The student made a rounding error when finding the time.

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

~~4.5·16=72~~ $\tan(16.5)\frac{x}{13.5}$

$\tan = 3.99885218199 + 4.5$

The depth is 8.5 ft

Find the volume of the inside of the pool to the *nearest cubic foot.*

$4.5 \cdot 16 = 72$

$72 \cdot 35 = 2520$

$12.5 \cdot 16 = 200 \times 4 = 800$

$13.5 \cdot 16 = 216 \cdot 4 = \frac{864}{2} = 432$

$2520 + 800 + 432 = 3752$ ft

Question 36 is continued on the next page.

Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour,* will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

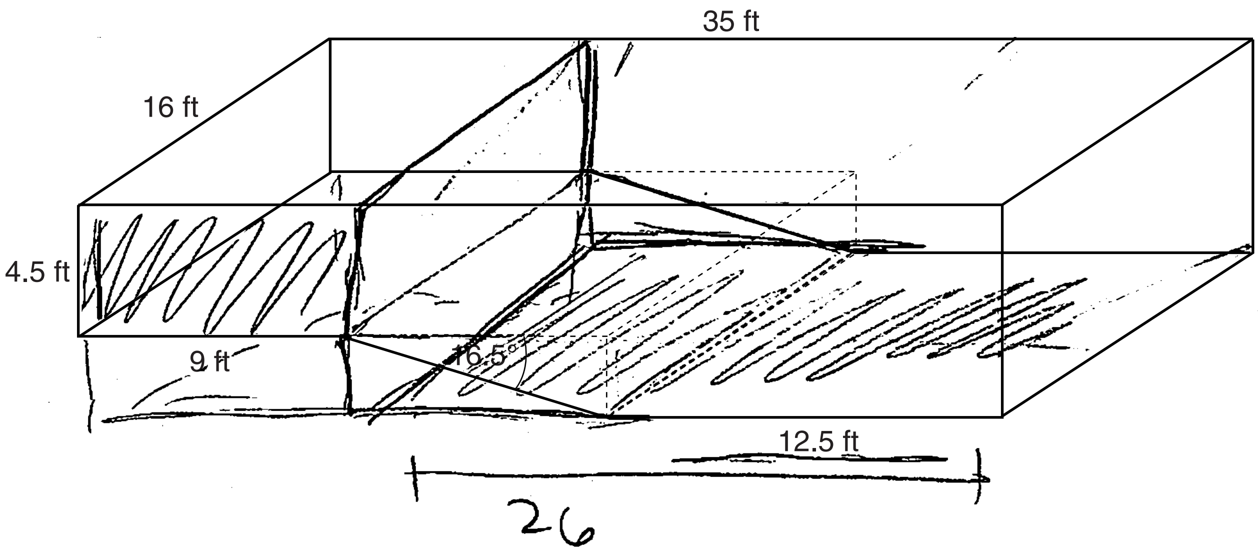
$$\frac{3752}{7.48} = \frac{501.6042780 7 \text{ gallons}}{10.5}$$

47.7.

Score 4: The student found 8.5 and 3752, but no further correct work is shown.

Question 36

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.

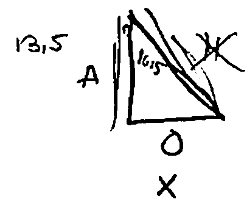


If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

4.5 + 3.9988821

$13.5\left(\tan 16.5 = \frac{x}{13.5}\right)$

3.9988821 = x



Depth of pool = 8.5 ft

Find the volume of the inside of the pool to the *nearest cubic foot.*

$\boxed{A}$ x height

4.5 x 9 x 16

648

$\boxed{A}$ x height

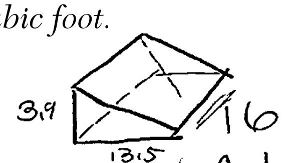
16 x 26 x 8.5

3536

3536 − 431.8793

3104.1207 + 648

V = 3752



A x height

(3.9988821 x 13.5) ÷ 2 x 16

26.99245418 x 16

431.8

Question 36 is continued on the next page.

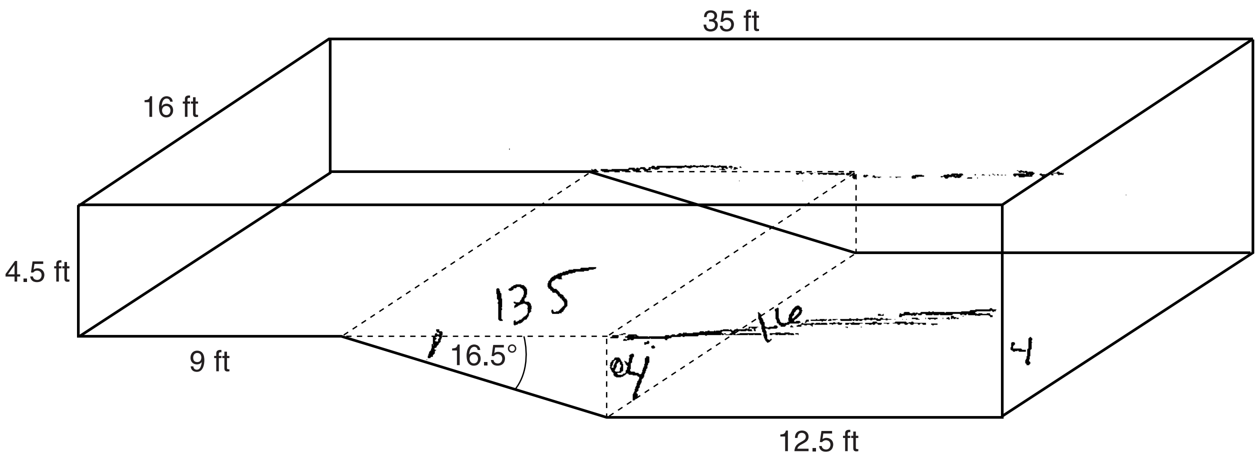
Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour,* will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

Score 4: The student did not find the time.

Question 36

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

$\tan 16.5 = \frac{O}{13.5}$

$13.5 \tan 16.5 = O$

$O = 4ft$

the depth of the pool is 4ft.

Find the volume of the inside of the pool to the *nearest cubic foot*.

$V = Bh$

$V = (16)(4.5)(35)$

$V = 2520$

$+ 800$

432

$\boxed{V = 3752ft^3}$

$V = (4)(16)(12.5)$

$V = 800$

$V = \frac{1}{2}Bh$

$V = \frac{1}{2}(16)(4)(13.5)$

$V = 432$

Question 36 is continued on the next page.

Question 36

Question 36 continued

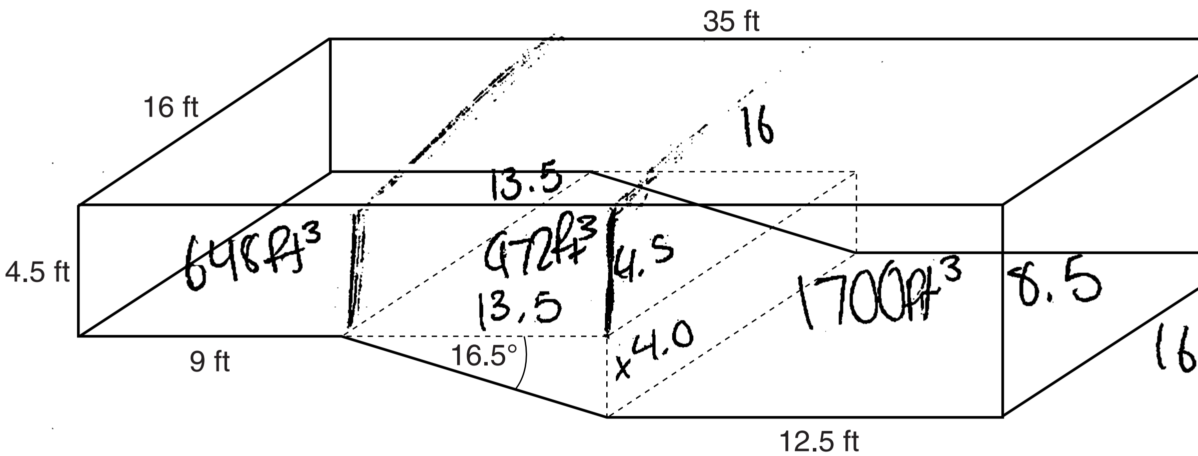
A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour,* will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

$$\frac{10.5}{7.48} = \frac{6}{1}$$

$$\cancel{44.88 = 10.5}$$

Score 3: The student correctly found the volume of the pool, but did not add 4.5 when finding the depth, and did not find the time correctly.

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

$35-(9+12.5)=13.5$ $\left(\tan 16.5 = \frac{x}{13.5}\right)13.5$

$13.5\tan 16.5 = x$

$3.99 = x$

$4.0 = x$

$4.0 + 4.5 = \boxed{8.5\text{ ft}}$

Find the volume of the inside of the pool to the *nearest cubic foot.*

$V = \frac{1}{2}bh$

$V = \frac{1}{2}(13.5 \cdot 4)$

$V = \frac{1}{2}(54)$

$V = 27\text{ft}^3$

$648 + 972 + 27 + 1700 =$

$\boxed{3347\text{ ft}^3}$

Question 36 is continued on the next page.

Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour,* will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

3347 · 7.48 = 25,035.56 gallons

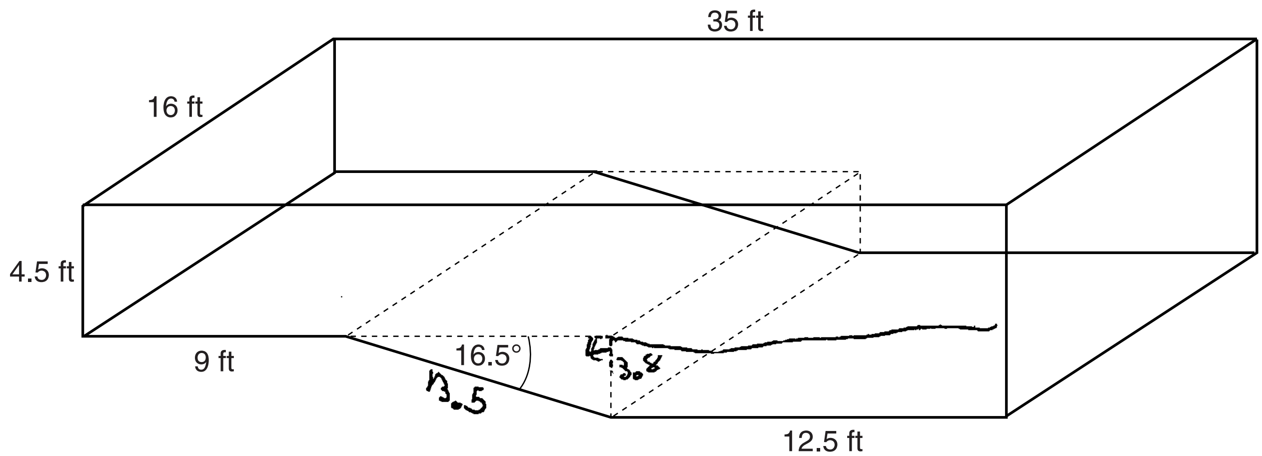
10.5 · 25,0035 = 262,873.38

$\boxed{\text{262,873 minutes}}$

Score 3: The student did not multiply by 16 when finding the volume of the triangular prism and did not find the time correctly.

Question 36

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

sin 16.5 = $\frac{a}{13.5}$

3.834207159 + 4.5

8.33

8.3 feet

Find the volume of the inside of the pool to the *nearest cubic foot.*

2

4.5(16)(35) = 2520

(3.8)(16)(12.5) = 760

18.99 (16) = 207

3487

Question 36 is continued on the next page.

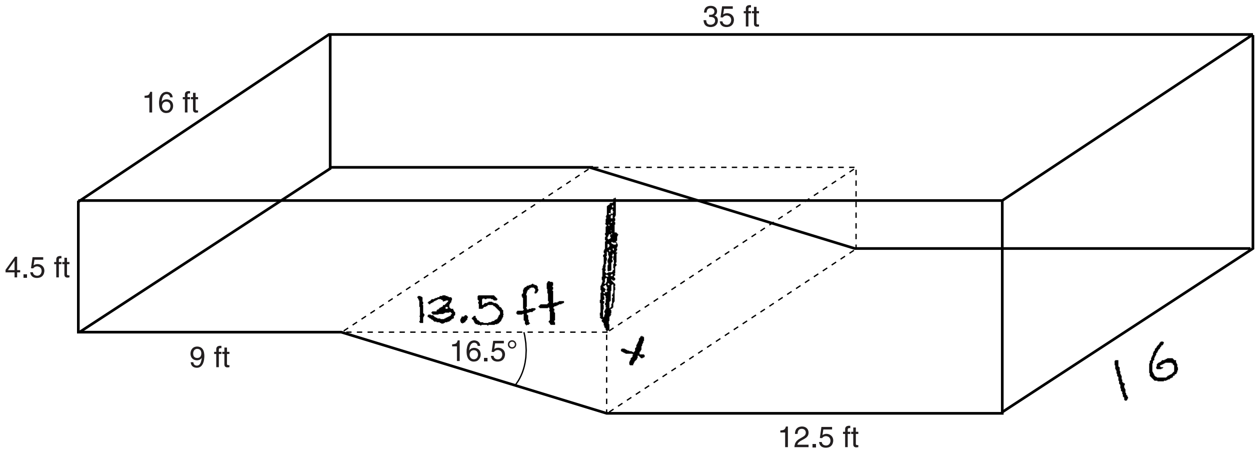
Question 36

Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour,* will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

Score 2: The student made an error when labeling 13.5 in the diagram, made an error when finding the volume of the triangular prism, and did not find the time.

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

SOH CHH TOA

x 16.5° 13.5

$\tan \frac{16.5}{1} = \frac{x}{13.5}$

$x = 18.2396$

$\boxed{x \approx 18.2 \text{ ft}}$

Find the volume of the inside of the pool to the *nearest cubic foot.*

$A = \frac{bh}{2}$

$A = \frac{13.5 \times 18.2}{2}$

$A = \frac{245.2}{2}$

$V = 122.85 \approx 123$

$A = lxwh$

$A = 4.5 \times 9 \times 16$

$V = 648$

$\cancel{A = 12.5 \times 16 \times 22.7}$

$A = 4540$

Question 36 is continued on the next page.

Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour,* will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

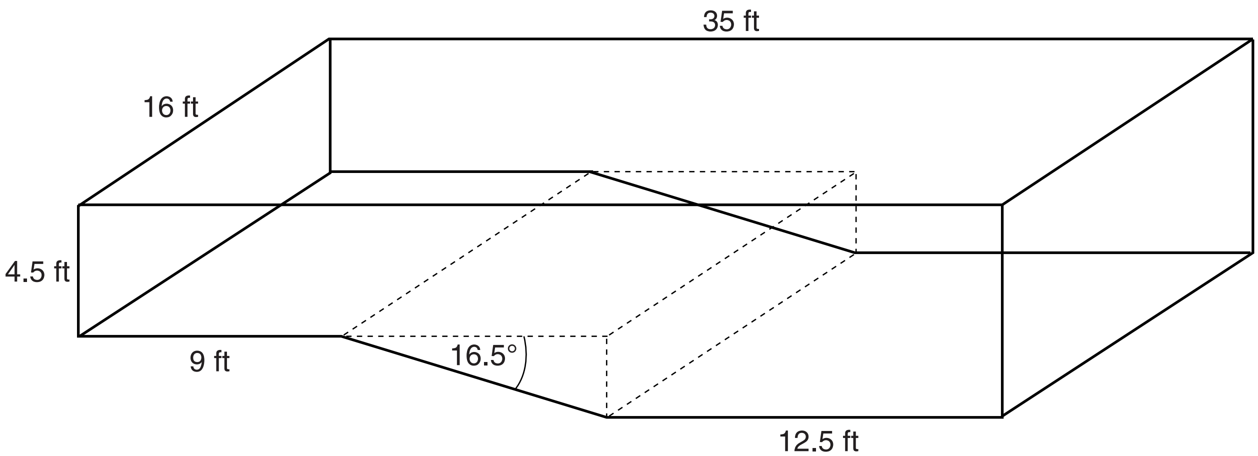
$$\frac{10.5\text{g}}{1\text{ min}} = \frac{x}{60\text{ min}}$$

$x = 630$ gallons in an hour

Score 1: The student wrote a correct trigonometric equation to find the depth of the pool. The student did not show enough correct work to find the total volume of the pool. The student did not find the time to fill the pool.

Question 36

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

4.5

Find the volume of the inside of the pool to the *nearest cubic foot.*

V = lwh
= 9 · 16 · 35
= 5040 ft³

$\frac{5040}{10.5} = 480$ ANS 480 hrs

Question 36 is continued on the next page.

Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour,* will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

Score 0: The student showed no correct relevant work.

Regents Examination in Geometry – August 2017

Chart for Converting Total Test Raw Scores to Final Exam Scores (Scale Scores)

(Use for the August 2017 exam only.)

Raw Score	Scale Score	Performance Level
86	**100**	5
85	**99**	5
84	**97**	5
83	**96**	5
82	**95**	5
81	**94**	5
80	**93**	5
79	**92**	5
78	**91**	5
77	**90**	5
76	**90**	5
75	**89**	5
74	**88**	5
73	**87**	5
72	**87**	5
71	**86**	5
70	**86**	5
69	**86**	5
68	**85**	5
67	**84**	4
66	**83**	4
65	**83**	4
64	**82**	4
63	**82**	4
62	**82**	4
61	**81**	4
60	**81**	4
59	**80**	4
58	**80**	4
57	**79**	3
56	**79**	3
55	**78**	3
54	**78**	3
53	**77**	3
52	**77**	3
51	**76**	3
50	**76**	3
49	**75**	3
48	**75**	3
47	**74**	3
46	**74**	3
45	**73**	3
44	**73**	3
43	**72**	3
42	**72**	3
41	**71**	3
40	**70**	3
39	**70**	3
38	**69**	3
37	**68**	3
36	**67**	3
35	**66**	3
34	**66**	3
33	**65**	3
32	**64**	2
31	**63**	2
30	**61**	2
29	**60**	2
28	**59**	2
27	**58**	2
26	**57**	2
25	**55**	2
24	**54**	1
23	**53**	1
22	**51**	1
21	**50**	1
20	**48**	1
19	**47**	1
18	**45**	1
17	**43**	1
16	**42**	1
15	**40**	1
14	**38**	1
13	**36**	1
12	**34**	1
11	**32**	1
10	**30**	1
9	**28**	1
8	**25**	1
7	**23**	1
6	**20**	1
5	**18**	1
4	**15**	1
3	**12**	1
2	**8**	1
1	**5**	1
0	**0**	1

To determine the student’s final examination score (scale score), find the student’s total test raw score in the column labeled “Raw Score” and then locate the scale score that corresponds to that raw score. The scale score is the student’s final examination score. Enter this score in the space labeled “Scale Score” on the student’s answer sheet.

Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.

Because scale scores corresponding to raw scores in the conversion chart change from one administration to another, it is crucial that for each administration the conversion chart provided for that administration be used to determine the student’s final score. The chart above is usable only for this administration of the Regents Examination in Geometry.