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

GEOMETRY

Tuesday, June 21, 2022 — 9:15 a.m. to 12:15 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 35 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.

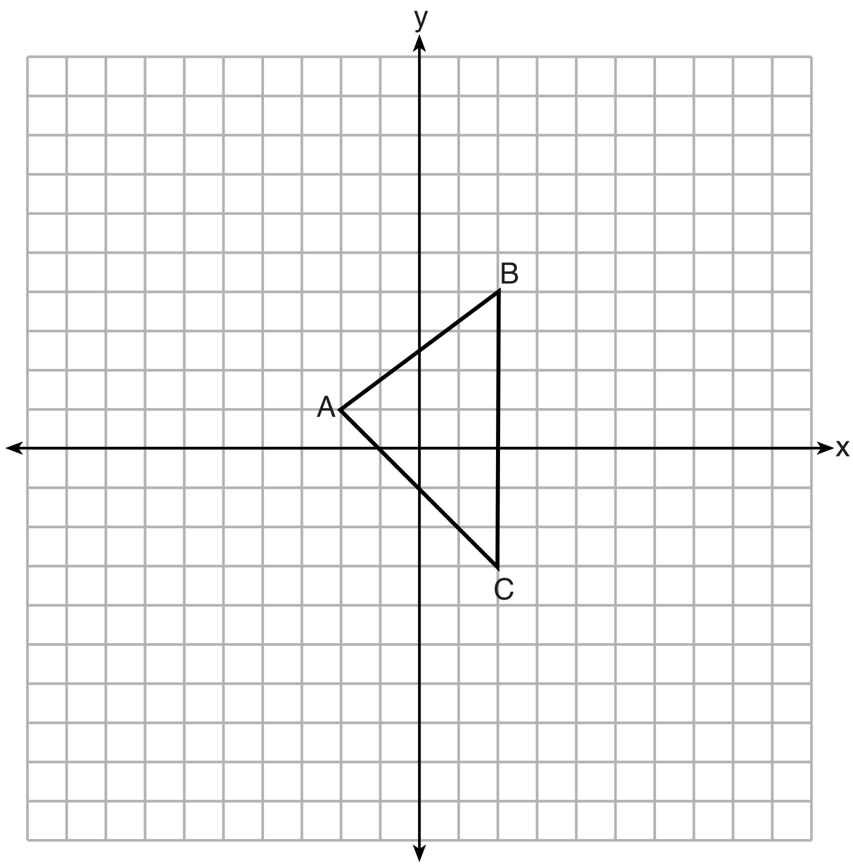
GEOMETRY

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 Triangle $A'B'C'$ is the image of $\triangle ABC$ after a dilation centered at the origin. The coordinates of the vertices of $\triangle ABC$ are $A(-2,1)$, $B(2,4)$, and $C(2,-3)$.

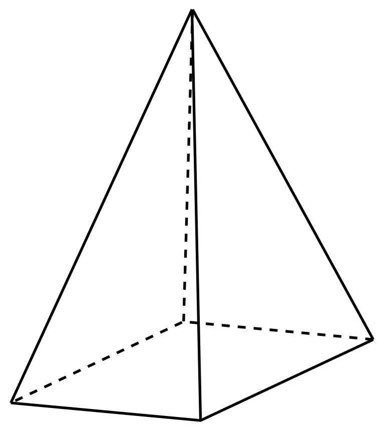


If the coordinates of A' are $(-4,2)$, the coordinates of B' are

(1) (8,4)
(2) (4,8)
(3) (4,−6)
(4) (1,2)

Use this space for computations.

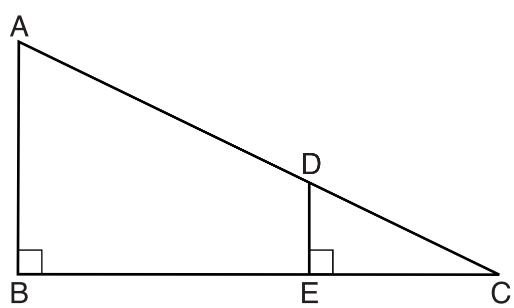
2 In the diagram below, a plane intersects a square pyramid parallel to its base.



Which two-dimensional shape describes this cross section?

(1) circle
(2) square
(3) triangle
(4) pentagon

3 In the diagram below, $\triangle CDE$ is the image of $\triangle CAB$ after a dilation of $\frac{DE}{AB}$ centered at C.



Which statement is always true?

(1) $\sin A = \frac{CE}{CD}$
(2) $\cos A = \frac{CD}{CE}$
(3) $\sin A = \frac{DE}{CD}$
(4) $\cos A = \frac{DE}{CE}$

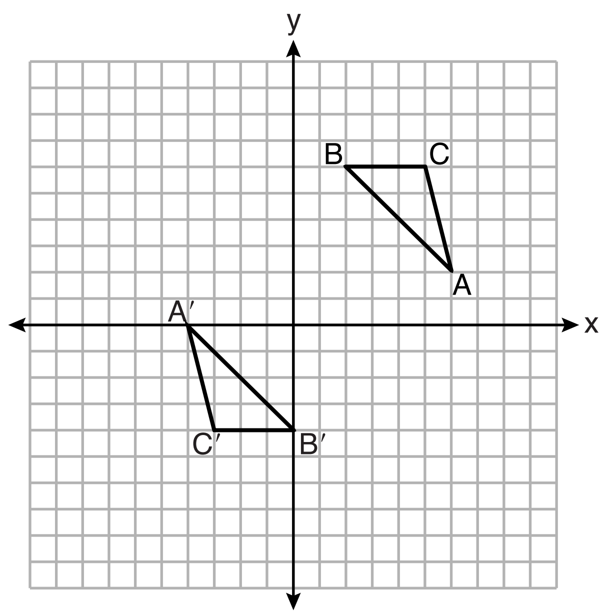
Use this space for computations.

4 A regular pentagon is rotated about its center. What is the minimum number of degrees needed to carry the pentagon onto itself?

(1) 72° (3) 144°

(2) 108° (4) 360°

5 On the set of axes below, $\triangle ABC \cong \triangle A'B'C'$.



Triangle ABC maps onto $\triangle A'B'C'$ after a

(1) reflection over the line $y = -x$

(2) reflection over the line $y = -x + 2$

(3) rotation of 180° centered at (1,1)

(4) rotation of 180° centered at the origin

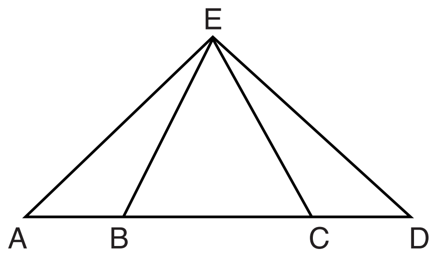
6 Right triangle TMR is a scalene triangle with the right angle at M. Which equation is true?

(1) $\sin M = \cos T$ (3) $\sin T = \cos R$

(2) $\sin R = \cos R$ (4) $\sin T = \cos M$

Use this space for computations.

7 In the diagram below of $\triangle AED$ and $\overline{ABCD}$, $\overline{AE} \cong \overline{DE}$.



Which statement is always true?

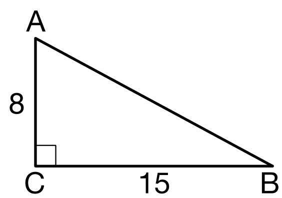
(1) $\overline{EB} \cong \overline{EC}$

(2) $\overline{AC} \cong \overline{DB}$

(3) $\angle EBA \cong \angle ECD$

(4) $\angle EAC \cong \angle EDB$

8 As shown in the diagram below, right triangle *ABC* has side lengths of 8 and 15.



If the triangle is continuously rotated about $\overline{AC}$, the resulting figure will be

(1) a right cone with a radius of 15 and a height of 8

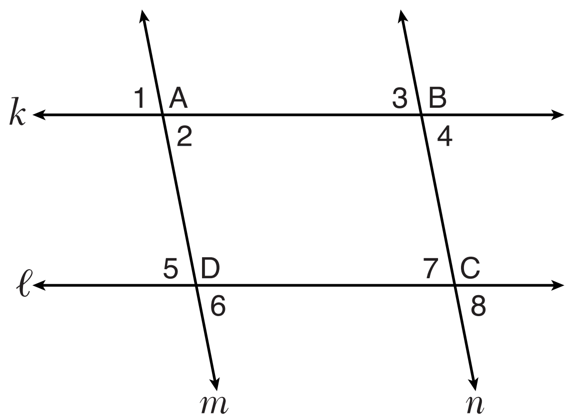
(2) a right cone with a radius of 8 and a height of 15

(3) a right cylinder with a radius of 15 and a height of 8

(4) a right cylinder with a radius of 8 and a height of 15

Use this space for computations.

9 In the diagram below, lines k and ℓ intersect lines m and n at points A, B, C, and D.



Which statement is sufficient to prove $ABCD$ is a parallelogram?

(1) $\angle 1 \cong \angle 3$

(2) $\angle 4 \cong \angle 7$

(3) $\angle 2 \cong \angle 5$ and $\angle 5 \cong \angle 7$

(4) $\angle 1 \cong \angle 3$ and $\angle 3 \cong \angle 4$

10 Which transformation does *not* always preserve distance?

(1) $(x,y) \rightarrow (x + 2, y)$

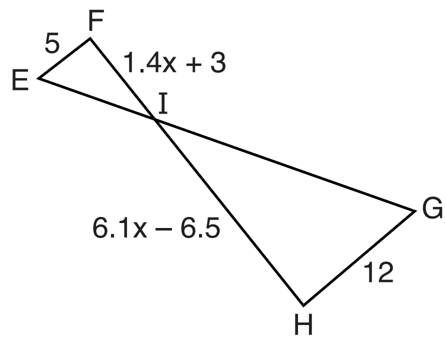
(2) $(x,y) \rightarrow (-y, -x)$

(3) $(x,y) \rightarrow (2x, y - 1)$

(4) $(x,y) \rightarrow (3 - x, 2 - y)$

Use this space for computations.

11 In the diagram below, $\overline{EF} \parallel \overline{HG}$, $EF = 5$, $HG = 12$, $FI = 1.4x + 3$, and $HI = 6.1x - 6.5$.

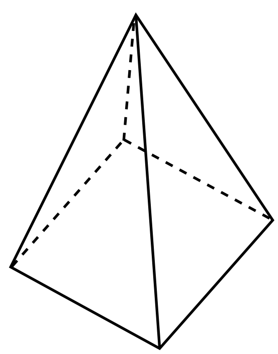


What is the length of $\overline{HI}$?

(1) 1 (3) 10

(2) 5 (4) 24

12 The square pyramid below models a toy block made of maple wood.



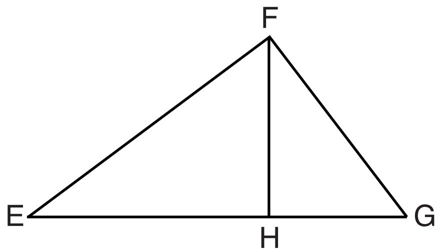
Each side of the base measures 4.5 cm and the height of the pyramid is 10 cm. If the density of maple is 0.676 g/cm^3, what is the mass of the block, to the *nearest tenth of a gram*?

(1) 45.6 (3) 136.9

(2) 67.5 (4) 202.5

Use this space for computations.

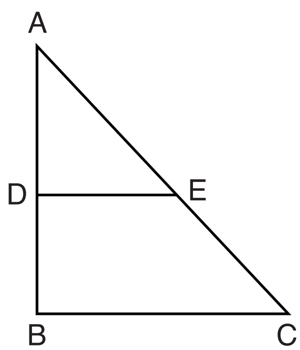
13 In the diagram below of right triangle EFG, altitude $\overline{FH}$ intersects hypotenuse $\overline{EG}$ at H.



If $FH = 9$ and $EF = 15$, what is EG?

(1) 6.75
(2) 12
(3) 18.75
(4) 25

14 In triangle ABC below, D is a point on $\overline{AB}$ and E is a point on $\overline{AC}$, such that $\overline{DE} \parallel \overline{BC}$.



Which statement is always true?

(1) $\angle ADE$ and $\angle ABC$ are right angles.
(2) $\triangle ADE \sim \triangle ABC$
(3) $DE = \frac{1}{2}BC$
(4) $\overline{AD} \cong \overline{DB}$

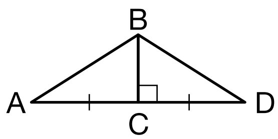
Use this space for computations.

15 If one exterior angle of a triangle is acute, then the triangle must be

(1) right (3) obtuse

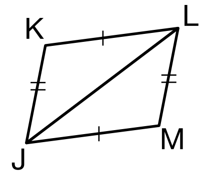
(2) acute (4) equiangular

16 Given the information marked on the diagrams below, which pair of triangles can *not* always be proven congruent?



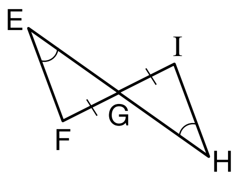
$\triangle ABC$ and $\triangle DBC$

(1)



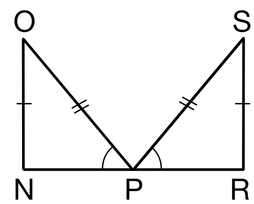
$\triangle KLJ$ and $\triangle MJL$

(3)



$\triangle EFG$ and $\triangle HIG$

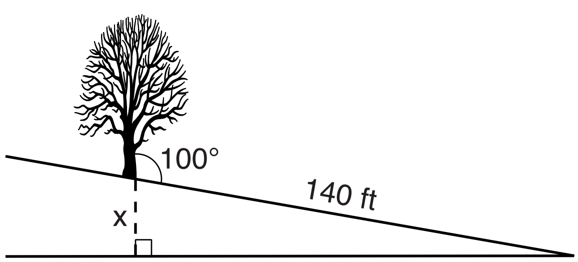
(2)



$\triangle NOP$ and $\triangle RSP$

(4)

17 The diagram below shows a tree growing vertically on a hillside. The angle formed by the tree trunk and the hillside is 100°. The distance from the base of the tree to the bottom of the hill is 140 feet.



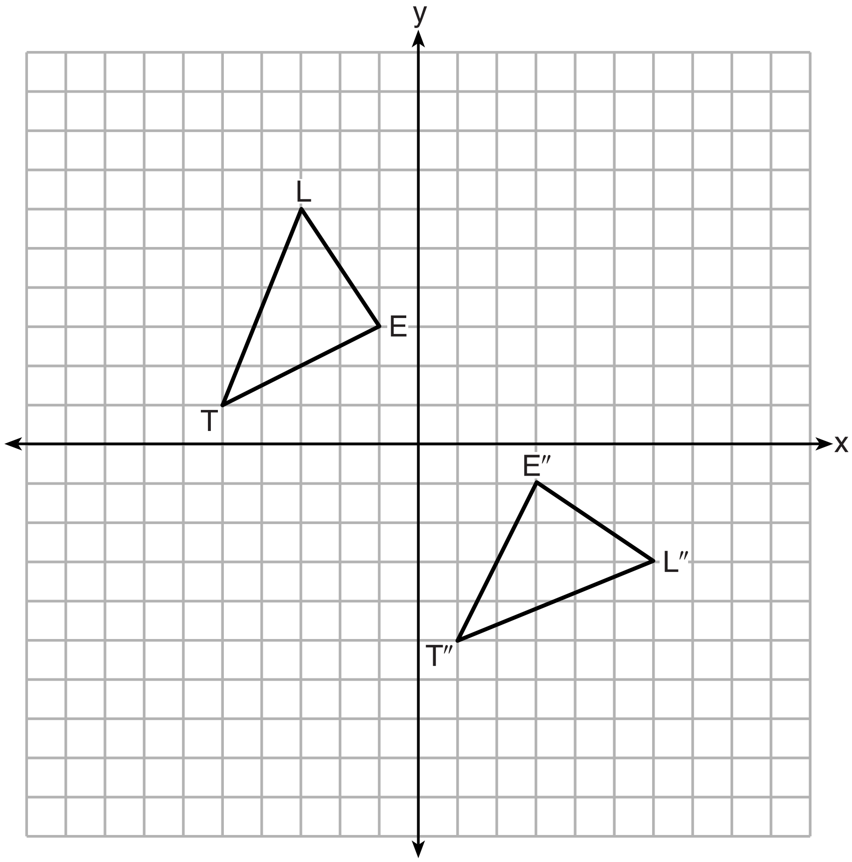
What is the vertical drop, x, to the base of the hill, to the *nearest foot*?

(1) 24 (3) 70

(2) 25 (4) 138

Use this space for computations.

18 On the set of axes below, $\triangle LET$ and $\triangle L''E''T''$ are graphed in the coordinate plane where $\triangle LET \cong \triangle L''E''T''$.



Which sequence of rigid motions maps $\triangle LET$ onto $\triangle L''E''T''$?

(1) a reflection over the y-axis followed by a reflection over the x-axis

(2) a rotation of 180° about the origin

(3) a rotation of 90° counterclockwise about the origin followed by a reflection over the y-axis

(4) a reflection over the x-axis followed by a rotation of 90° clockwise about the origin

Use this space for computations.

19 Diameter $\overline{ROQ}$ of circle O is extended through Q to point P, and tangent $\overline{PA}$ is drawn. If $m\overarc{RA} = 100°$, what is $m\angle P$?

(1) 10° (3) 40°

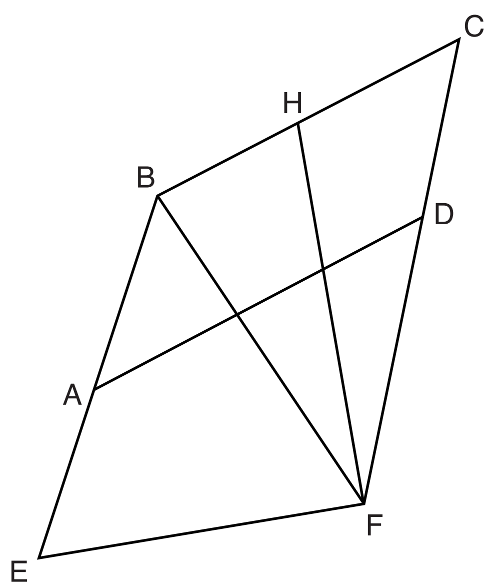
(2) 20° (4) 50°

20 Segment JM has endpoints $J(-5,1)$ and $M(7,-9)$. An equation of the perpendicular bisector of $\overline{JM}$ is

(1) $y - 4 = \frac{5}{6}(x + 1)$ (3) $y - 4 = \frac{6}{5}(x + 1)$

(2) $y + 4 = \frac{5}{6}(x - 1)$ (4) $y + 4 = \frac{6}{5}(x - 1)$

21 Quadrilateral $EBCF$ and $\overline{AD}$ are drawn below, such that $ABCD$ is a parallelogram, $\overline{EB} \cong \overline{FB}$, and $\overline{EF} \perp \overline{FH}$.



If $m\angle E = 62°$ and $m\angle C = 51°$, what is $m\angle FHB$?

(1) 79° (3) 73°

(2) 76° (4) 62°

Use this space for computations.

22 Point P divides the directed line segment from point $A(-4,-1)$ to point $B(6,4)$ in the ratio 2:3. The coordinates of point P are

(1) $(-1,1)$
(2) $(0,1)$
(3) $(1,0)$
(4) $(2,2)$

23 A line is dilated by a scale factor of $\frac{1}{3}$ centered at a point on the line. Which statement is correct about the image of the line?

(1) Its slope is changed by a scale factor of $\frac{1}{3}$.

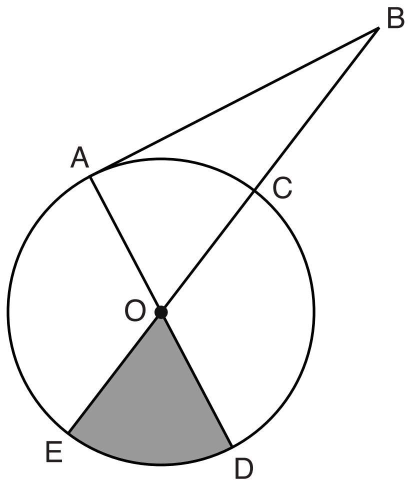
(2) Its y-intercept is changed by a scale factor of $\frac{1}{3}$.

(3) Its slope and y-intercept are changed by a scale factor of $\frac{1}{3}$.

(4) The image of the line and the pre-image are the same line.

24 In the diagram below of circle O, tangent $\overline{AB}$ is drawn from external point B, and secant $\overline{BCOE}$ and diameter $\overline{AOD}$ are drawn.

Use this space for computations.



If $m\angle OBA = 36°$ and $OC = 10$, what is the area of shaded sector DOE?

(1) $\frac{3\pi}{10}$

(2) 3π

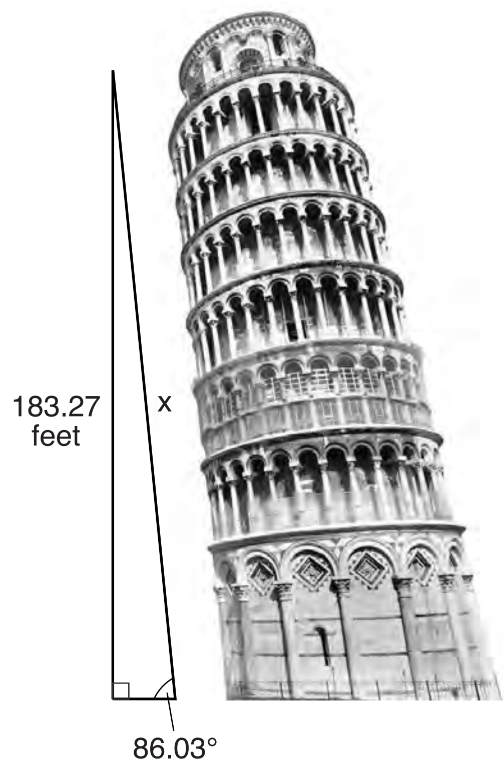
(3) 10π

(4) 15π

Part II

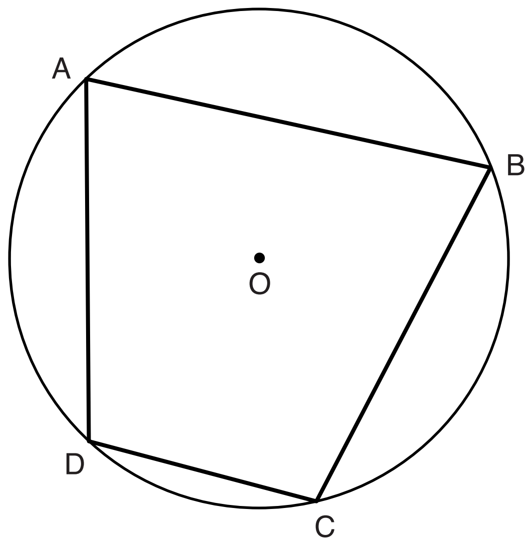
Answer all 7 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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 The Leaning Tower of Pisa in Italy is known for its slant, which occurred after its construction began. The angle of the slant is 86.03° from the ground. The low side of the tower reaches a height of 183.27 feet from the ground.



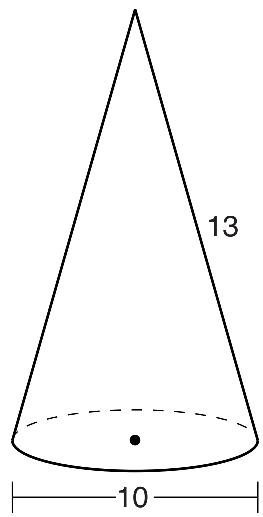
Determine and state the slant height, x, of the low side of the tower, to the *nearest hundredth of a foot*.

26 In the diagram below, quadrilateral $ABCD$ is inscribed in circle O, and $m\overset{\frown}{CD} : m\overset{\frown}{DA} : m\overset{\frown}{AB} : m\overset{\frown}{BC} = 2:3:5:5$.



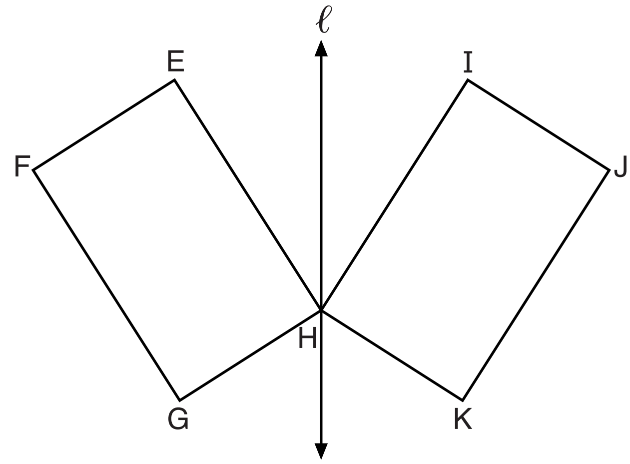
Determine and state $m\angle B$.

27 In the diagram below, a right circular cone has a diameter of 10 and a slant height of 13.



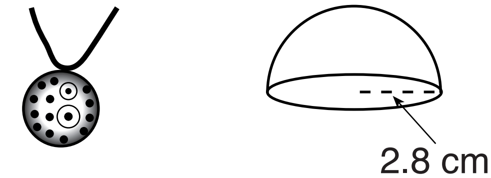
Determine and state the volume of the cone, in terms of π.

28 In the diagram below, parallelogram *EFGH* is mapped onto parallelogram *IJKH* after a reflection over line ℓ.



Use the properties of rigid motions to explain why parallelogram *EFGH* is congruent to parallelogram *IJKH*.

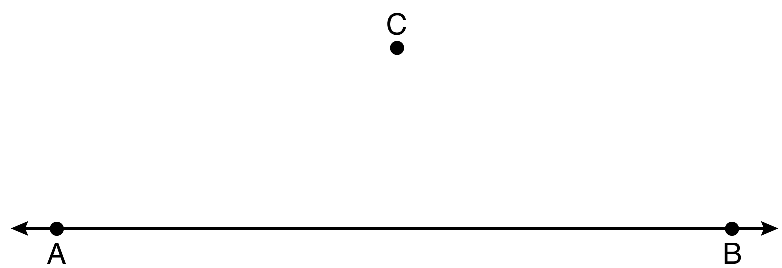
29 Izzy is making homemade clay pendants in the shape of a solid hemisphere, as modeled below. Each pendant has a radius of 2.8 cm.



How much clay, to the *nearest cubic centimeter*, does Izzy need to make 100 pendants?

30 Determine and state the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 + 6x = 6y + 63$.

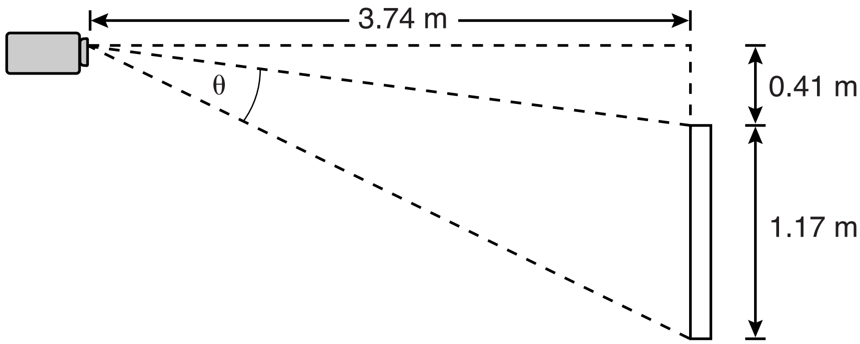
31 Use a compass and straightedge to construct a line parallel to $\overleftrightarrow{AB}$ through point C, shown below. [Leave all construction marks.]



Part III

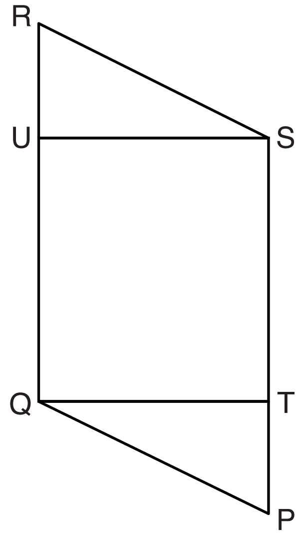
Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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 As modeled below, a projector mounted on a ceiling is 3.74 m from a wall, where a whiteboard is displayed. The vertical distance from the ceiling to the top of the whiteboard is 0.41 m, and the height of the whiteboard is 1.17 m.



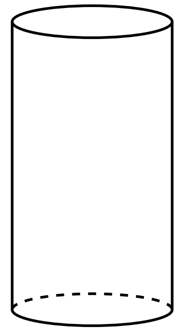
Determine and state the projection angle, θ, to the *nearest tenth of a degree*.

33 Given: Parallelogram $PQRS$, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$



Prove: $\overline{PT} \cong \overline{RU}$

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.



If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided to determine your answer. Note that diagrams are not necessarily drawn to scale. 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. [6]

35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

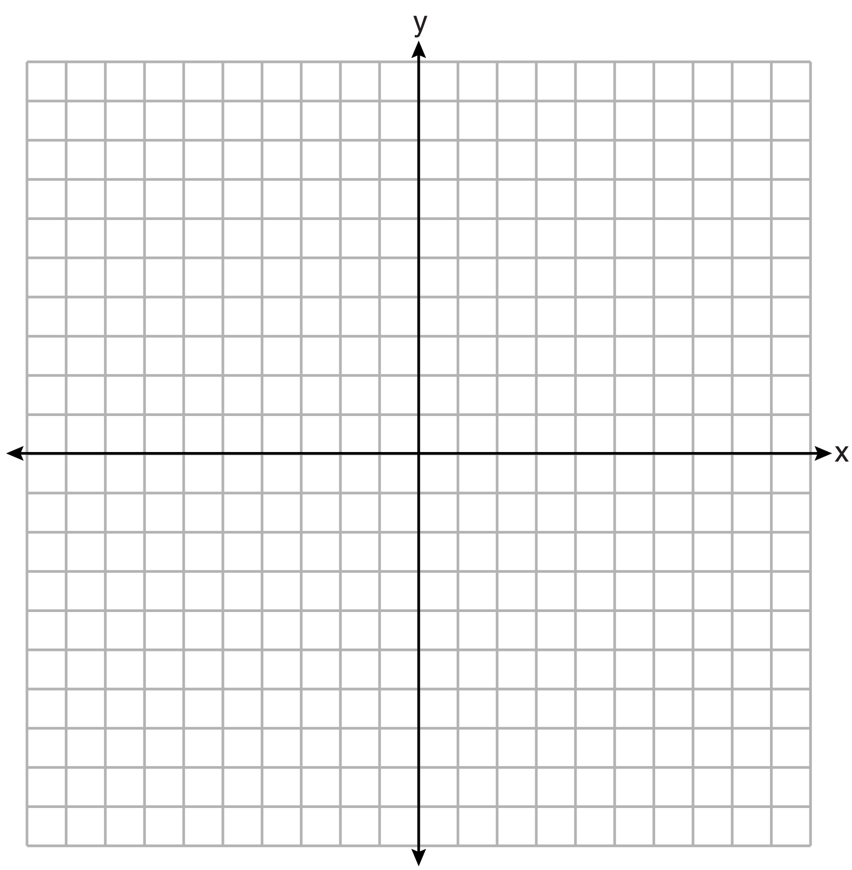
[The use of the set of axes on the next page is optional.]

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

Question 35 is continued on the next page.

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]



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

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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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GEOMETRY

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GEOMETRY

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Regents Examination in Geometry – June 2022

Scoring Key: Part I (Multiple-Choice Questions)

Examination	Date	Question Number	Scoring Key	Question Type	Credit	Weight
Geometry	June '22	**1**	2	MC	2	1
Geometry	June '22	**2**	2	MC	2	1
Geometry	June '22	**3**	1	MC	2	1
Geometry	June '22	**4**	1	MC	2	1
Geometry	June '22	**5**	3	MC	2	1
Geometry	June '22	**6**	3	MC	2	1
Geometry	June '22	**7**	4	MC	2	1
Geometry	June '22	**8**	1	MC	2	1
Geometry	June '22	**9**	3	MC	2	1
Geometry	June '22	**10**	3	MC	2	1
Geometry	June '22	**11**	4	MC	2	1
Geometry	June '22	**12**	1	MC	2	1
Geometry	June '22	**13**	3	MC	2	1
Geometry	June '22	**14**	2	MC	2	1
Geometry	June '22	**15**	3	MC	2	1
Geometry	June '22	**16**	4	MC	2	1
Geometry	June '22	**17**	1	MC	2	1
Geometry	June '22	**18**	3	MC	2	1
Geometry	June '22	**19**	1	MC	2	1
Geometry	June '22	**20**	4	MC	2	1
Geometry	June '22	**21**	1	MC	2	1
Geometry	June '22	**22**	2	MC	2	1
Geometry	June '22	**23**	4	MC	2	1
Geometry	June '22	**24**	4	MC	2	1

Regents Examination in Geometry – June 2022

Scoring Key: Parts II, III, and IV (Constructed-Response Questions)

Examination	Date	Question Number	Scoring Key	Question Type	Credit	Weight
Geometry	June '22	**25**	-	CR	2	1
Geometry	June '22	**26**	-	CR	2	1
Geometry	June '22	**27**	-	CR	2	1
Geometry	June '22	**28**	-	CR	2	1
Geometry	June '22	**29**	-	CR	2	1
Geometry	June '22	**30**	-	CR	2	1
Geometry	June '22	**31**	-	CR	2	1
Geometry	June '22	**32**	-	CR	4	1
Geometry	June '22	**33**	-	CR	4	1
Geometry	June '22	**34**	-	CR	4	1
Geometry	June '22	**35**	-	CR	6	1

Key
MC = Multiple-choice question
CR = Constructed-response question

The chart for determining students' final examination scores for the **June 2022 Regents Examination in Geometry** will be posted on the Department's web site at: https://www.nysedregents.org/geometryre/ on the day of the examination. Conversion charts provided for the previous administrations of the Regents Examination in Geometry must NOT be used to determine students' final scores for this administration.

FOR TEACHERS ONLY

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

GEOMETRY

Tuesday, June 21, 2022 — 9:15 a.m. to 12:15 p.m., only

RATING GUIDE

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.nysed.gov/state-assessment/high-school-regents-examinations 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: https://www.nysedregents.org/geometryre/.

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 constructed-response 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 constructed-response 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 constructed-response 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.nysed.gov/state-assessment/high-school-regents-examinations on Tuesday, June 21, 2022. 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.

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]** 183.71, and correct work is shown.

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

or

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

or

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

or

[1] 183.71, 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.

(26) **[2]** 60, 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] Appropriate work is shown to find the measures of $\overset{\frown}{AD}$ and $\overset{\frown}{CD}$ or $\overset{\frown}{ADC}$, but no further correct work is shown.

or

[1] 60, but no work is shown.

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

(27) **[2]** 100π, 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 the height of the cone, but no further correct work is shown.

or

[1] 100π, 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.

(28) **[2]** A complete and correct explanation is written.

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

or

[1] An incomplete or partially correct explanation is written.

or

[1] An appropriate explanation is written, but it does not use the properties of rigid motions.

[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]** 4598, and correct work is shown.

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

or

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

or

[1] Appropriate work is shown to find the volume of one bead.

or

[1] 4598, 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.

(30) **[2]** $(-3,3)$ and 9, 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 $(x + 3)^2 + (y - 3)^2 = 81$, but no further correct work is shown.

or

[1] Correct work is shown to find $(-3,3)$ or 9.

or

[1] $(-3,3)$ and 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.

(31) **[2]** A correct construction is drawn showing all appropriate arcs.

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

[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.

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]** 16.6, and correct work is shown.

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

or

[3] The measure of both angles of depression are found correctly, but no further correct work is shown.

[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] The measure of one angle of depression is found correctly, but no further correct work is shown.

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

or

[1] At least one correct relevant trigonometric equation is written, but no further correct work is shown.

or

[1] 16.6, but no work is shown.

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

(33) **[4]** A complete and correct proof that includes a conclusion 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 $\triangle QPT \cong \triangle SRU$, but 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.

[1] Only one correct relevant statement and reason are 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.

(34) **[4]** 48, and correct work is shown.

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

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

or

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

or

[2] Correct work is shown to determine the volume of 10 footings, but no further correct work is shown.

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

or

[1] Correct work is shown to determine the volume of one footing, but no further correct work is shown.

or

[1] 48, 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 this 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]** Correct work is shown to prove $\triangle ABC$ is isosceles, $A'(3,-1)$, $B'(-2,-6)$, and $C'(2,-8)$ are stated, correct work is shown to prove $AA'C'C$ is a rhombus, and correct concluding statements are made.

[5] Appropriate work is shown, but one computational or graphing error is made. Appropriate concluding statements are made.

or

[5] Appropriate work is shown, but one concluding statement is missing or incorrect.

or

[5] Correct work is shown to prove $\triangle ABC$ is isosceles, $AA'C'C$ is a rhombus, and correct concluding statements are made. The coordinates of $\triangle A'B'C'$ are not stated or are stated incorrectly.

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

or

[4] Appropriate work is shown, but one conceptual error is made when proving $AA'C'C$ is a rhombus. Appropriate concluding statements are made.

or

[4] Appropriate work is shown, but both concluding statements are missing or incorrect.

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

or

[3] Appropriate work is shown, but one conceptual error is made when proving $AA'C'C$ is a rhombus, and one computational or graphing error is made. Appropriate concluding statements are made.

or

[3] Appropriate work is shown, but two computational or graphing errors are made, and one concluding statement is missing or incorrect.

or

[3] Correct work is shown to prove $\triangle ABC$ is isosceles, and $A'(3,-1)$, $B'(-2,-6)$, and $C'(2,-8)$ are stated. No further correct work is shown.

or

[3] Correct work is shown to prove $AA'C'C$ is a rhombus, and a correct concluding statement is made. No further correct work is shown.

[2] Correct work is shown to prove $\triangle ABC$ is isosceles, and a correct concluding statement is made. No further correct work is shown.

[1] Correct work is shown to find the lengths of $\overline{AB}$ and $\overline{AC}$, but no further correct work is shown.

or

[1] $A'(3,-1)$, $B'(-2,-6)$, and $C'(2,-8)$ are stated. 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.

Map to the Learning Standards
Geometry
June 2022

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

Regents Examination in Geometry

June 2022

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

The *Chart for Determining the Final Examination Score for the June 2022 Regents Examination in Geometry* will be posted on the Department's web site at: http://www.nysed.gov/state-assessment/high-school-regents-examinations on Tuesday, June 21, 2022. 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.nysed.gov/state-assessment/teacher-feedback-state-assessments.
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

Tuesday, June 21, 2022 — 9:15 a.m. to 12:15 p.m.

MODEL RESPONSE SET

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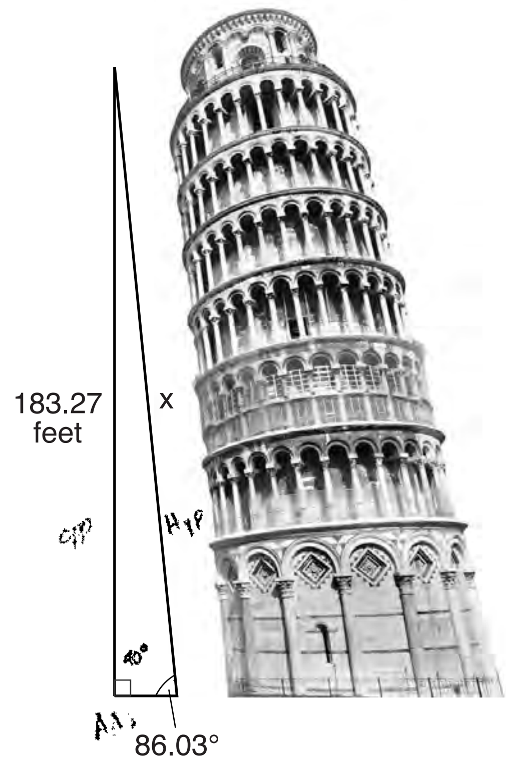
Question 25

25 The Leaning Tower of Pisa in Italy is known for its slant, which occurred after its construction began. The angle of the slant is 86.03° from the ground. The low side of the tower reaches a height of 183.27 feet from the ground.



Determine and state the slant height, *x*, of the low side of the tower, to the *nearest hundredth of a foot*.

$$\frac{\sin 86.03}{1} = \frac{183.27}{x}$$

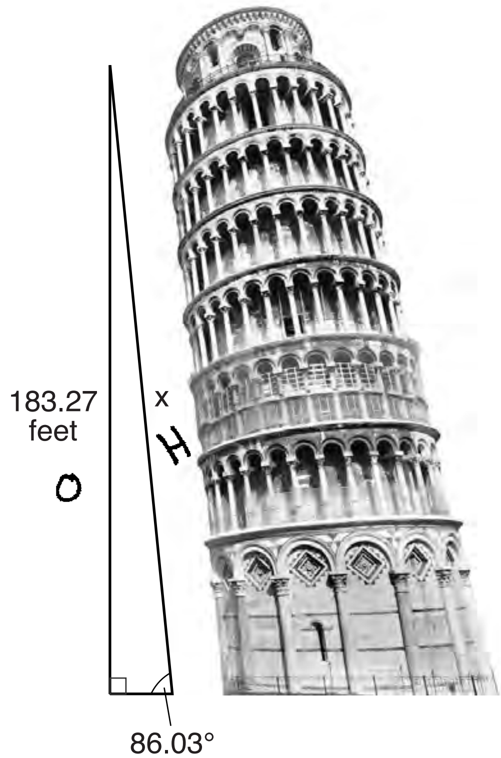
$$\frac{x \sin 86.03}{\sin 86.03} = \frac{183.27}{\sin 86.03}$$

$$x = 183.71 \text{ feet}$$

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

Question 25

25 The Leaning Tower of Pisa in Italy is known for its slant, which occurred after its construction began. The angle of the slant is 86.03° from the ground. The low side of the tower reaches a height of 183.27 feet from the ground.



Determine and state the slant height, x, of the low side of the tower, to the *nearest hundredth of a foot*.

$\sin(86.03) = \frac{183.27}{x}$ $\frac{O}{H}$

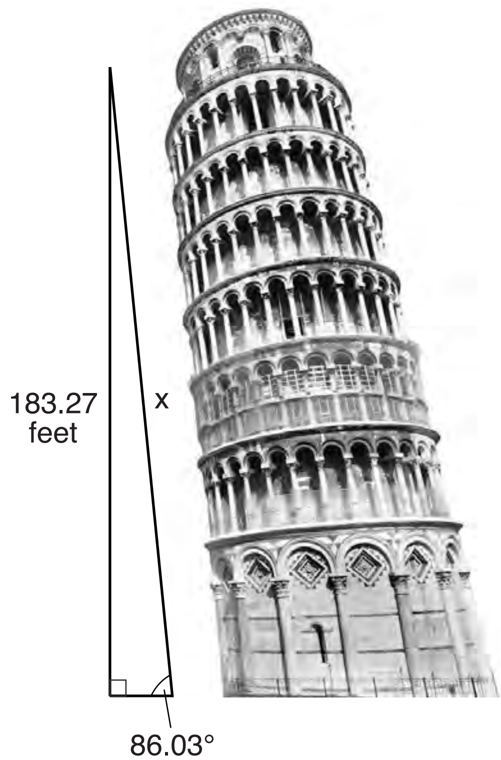
$\frac{183.27}{\sin(86.03)}$

$x = 1837.711$ feet

Score 1: The student wrote a correct equation, but no further correct work was shown.

Question 25

25 The Leaning Tower of Pisa in Italy is known for its slant, which occurred after its construction began. The angle of the slant is 86.03° from the ground. The low side of the tower reaches a height of 183.27 feet from the ground.



Determine and state the slant height, x, of the low side of the tower, to the *nearest hundredth of a foot*.

$$\sin 86.03 = \frac{x}{183.27}$$

$$x = 183.27(\sin 86.03)$$

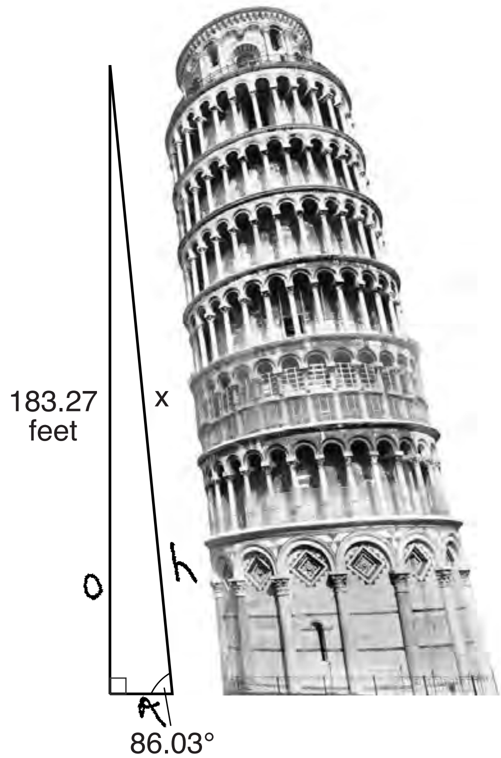
$$x = 182.83$$

Score 1: The student used an incorrect equation, but found an appropriate length.

Question 25

25 The Leaning Tower of Pisa in Italy is known for its slant, which occurred after its construction began. The angle of the slant is 86.03° from the ground. The low side of the tower reaches a height of 183.27 feet from the ground.

SOH
CAH
TOA



Determine and state the slant height, *x*, of the low side of the tower, to the *nearest hundredth of a foot*.

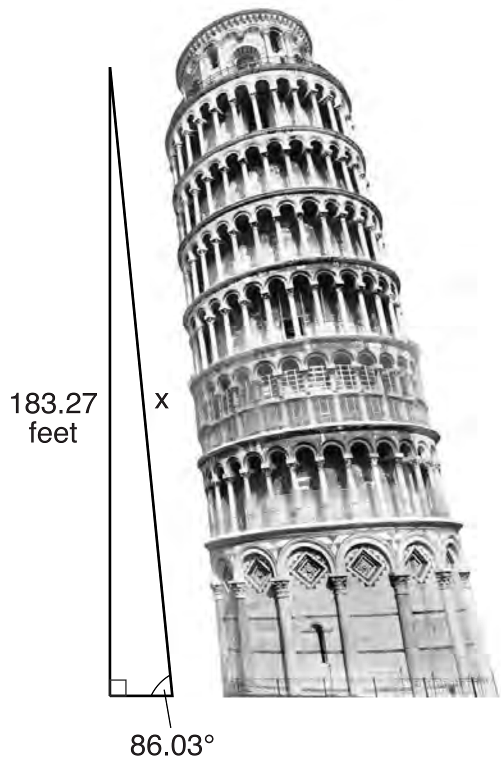
$$\frac{x \cdot \cancel{\sin(86.03)}}{\cancel{\sin(86.03)}} = \frac{\frac{183.27}{\cancel{x}} \cancel{x}}{\sin(86.03}$$

$$\boxed{x = 183.7}$$

Score 1: The student made one rounding error.

Question 25

25 The Leaning Tower of Pisa in Italy is known for its slant, which occurred after its construction began. The angle of the slant is 86.03° from the ground. The low side of the tower reaches a height of 183.27 feet from the ground.



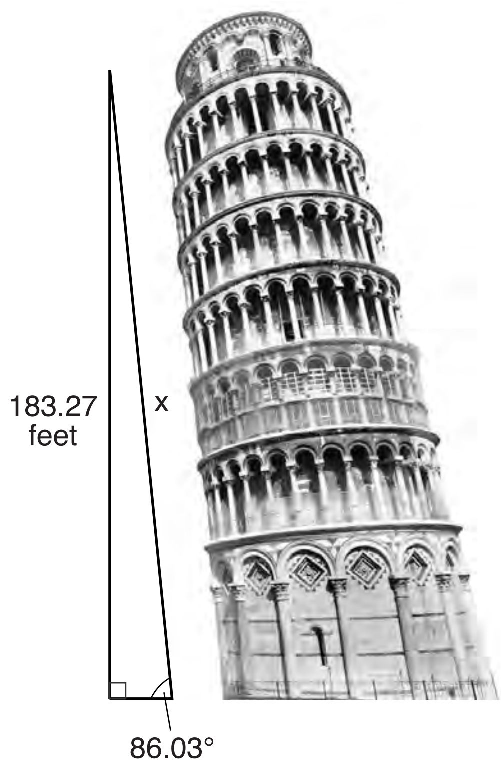
Determine and state the slant height, x, of the low side of the tower, to the *nearest hundredth of a foot*.

$$\frac{183.27\text{ft}}{x} \rightarrow \frac{\text{opp}}{\text{hyp}} \rightarrow (\sin)$$

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

Question 25

25 The Leaning Tower of Pisa in Italy is known for its slant, which occurred after its construction began. The angle of the slant is 86.03° from the ground. The low side of the tower reaches a height of 183.27 feet from the ground.



Determine and state the slant height, x, of the low side of the tower, to the *nearest hundredth of a foot*.

$$\text{Tan} = \frac{\text{opp}}{\text{adj}}$$

$$\frac{183.27}{86.03}$$

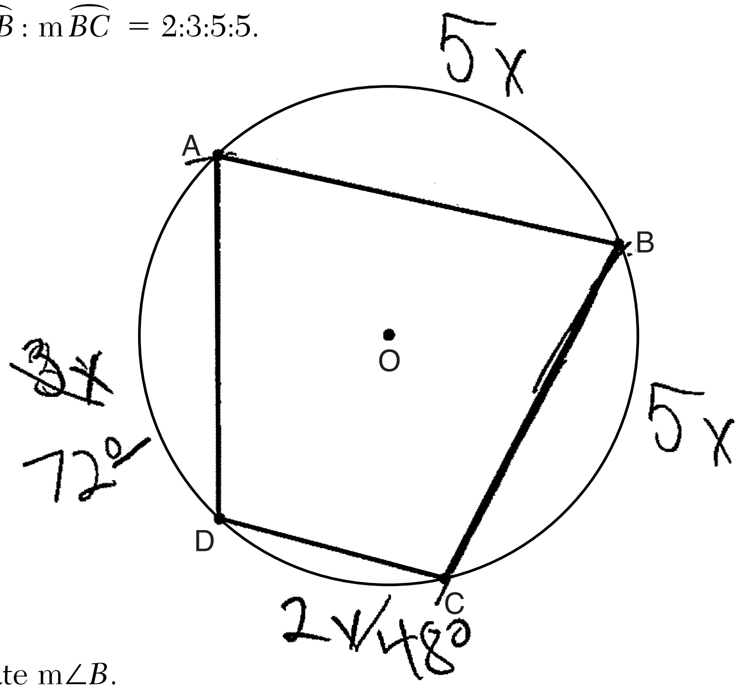
48.383

$$\boxed{x = 48\text{ feet}}$$

Score 0: The student gave a completely incorrect response.

Question 26

26 In the diagram below, quadrilateral *ABCD* is inscribed in circle *O*, and $m\widehat{CD} : m\widehat{DA} : m\widehat{AB} : m\widehat{BC} = 2:3:5:5$.



$$\frac{15x}{15} = \frac{360}{15}$$

$$x = 24$$

Determine and state m∠*B*.

$\widehat{AD}$ 72
$\widehat{DC}$ + 48
$\overline{\quad 120 \quad}$
$120 \div 2 = 60$

$m\angle B = \frac{1}{2}\widehat{AC}$

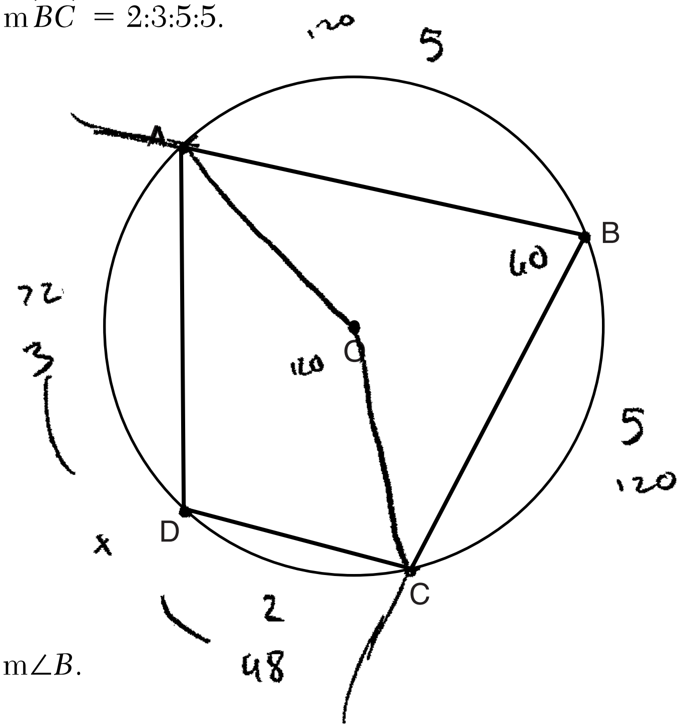
$$\boxed{m\angle B = 60°}$$

You need to find half the measure of $\widehat{AC}$ to find the measure of ∠B.

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

Question 26

26 In the diagram below, quadrilateral *ABCD* is inscribed in circle *O*, and $m\widehat{CD} : m\widehat{DA} : m\widehat{AB} : m\widehat{BC} = 2{:}3{:}5{:}5$.



Determine and state m∠*B*.

$\boxed{\angle B = 60^\circ}$

$120 \div 2 = 60$

$\frac{360}{15} = 24$

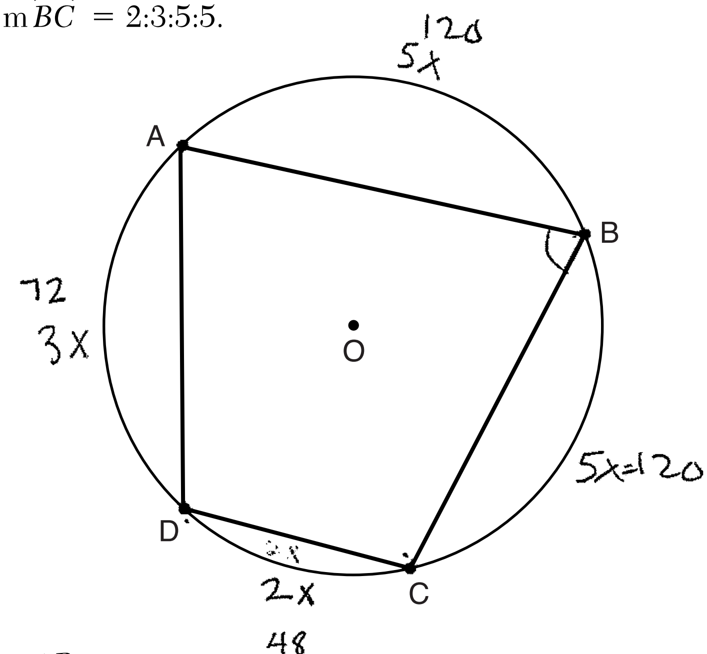
$2 : 3 : 5 : 5$

$48^\circ : 72 : 120 : 120$

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

Question 26

26 In the diagram below, quadrilateral $ABCD$ is inscribed in circle O, and $m\overset{\frown}{CD} : m\overset{\frown}{DA} : m\overset{\frown}{AB} : m\overset{\frown}{BC} = 2:3:5:5$.



Determine and state $m\angle B$.

$3x+5x+5x+2x=360$

$\frac{15x}{15}=\frac{360}{15}$

$x=24$

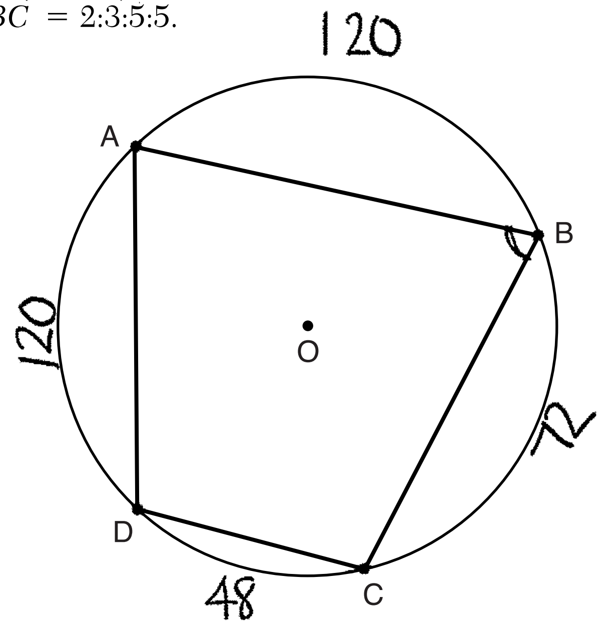
$72-48=24$

$\boxed{\measuredangle B=24}$

Score 1: The student correctly found the measure of $\overset{\frown}{DC}$ and $\overset{\frown}{AD}$.

Question 26

26 In the diagram below, quadrilateral $ABCD$ is inscribed in circle O, and $m\overset{\frown}{CD} : m\overset{\frown}{DA} : m\overset{\frown}{AB} : m\overset{\frown}{BC} = 2:3:5:5$.



Determine and state $m\angle B$.

$2x+3x+5x+5x=360$

$15x=360$

$x=24$

$\angle B = 84^\circ$

$\overset{\frown}{CD}: 48$

$\overset{\frown}{DA}: 72$

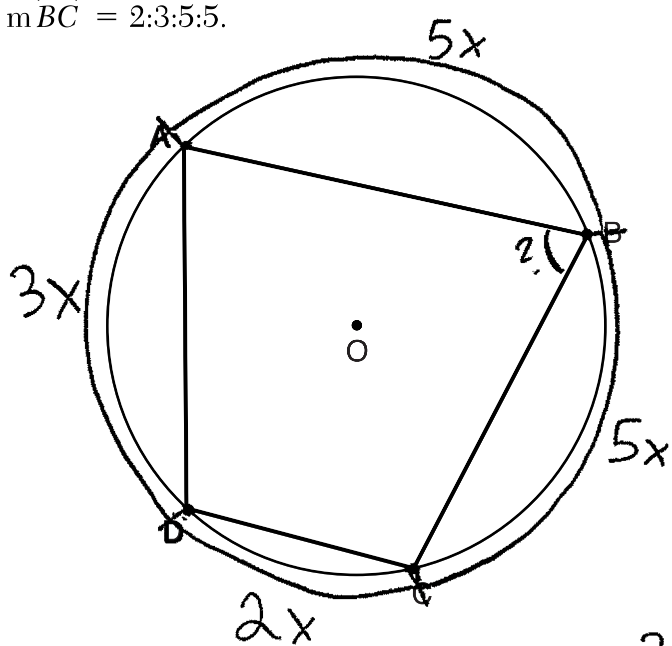
$\overset{\frown}{AB}: 120$

$\overline{BC}: 120$

Score 1: The student mislabeled $\overset{\frown}{AD}$ and $\overset{\frown}{BC}$ in the diagram, but found an appropriate measure for angle B.

Question 26

26 In the diagram below, quadrilateral *ABCD* is inscribed in circle *O*, and $m\widehat{CD} : m\widehat{DA} : m\widehat{AB} : m\widehat{BC} = 2:3:5:5$.



Determine and state m∠*B*.

3

$3x + 2x + 5x + 5x$

$15x$

$\frac{360}{15} = \frac{15x}{15} =$

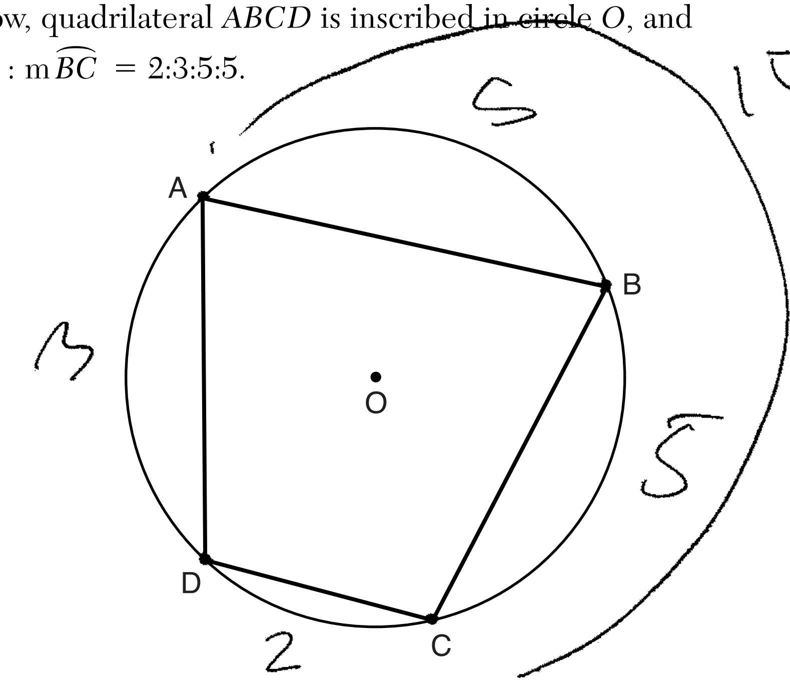
$24 = x$

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

Question 26

26 In the diagram below, quadrilateral *ABCD* is inscribed in circle *O*, and $m\widehat{CD} : m\widehat{DA} : m\widehat{AB} : m\widehat{BC} = 2:3:5:5$.

10/2 = 5



Determine and state m∠B.

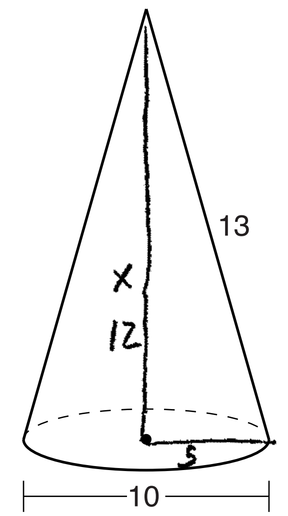
5+5 = 10/2 = 5

m∠B = 5

Score 0: The student gave a completely incorrect response.

Question 27

27 In the diagram below, a right circular cone has a diameter of 10 and a slant height of 13.



Determine and state the volume of the cone, in terms of π.

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\pi(5)^2(12)$

$\boxed{V = 100\pi}$

$x^2 + 5^2 = 13^2$

$-5^2 \quad -5^2$

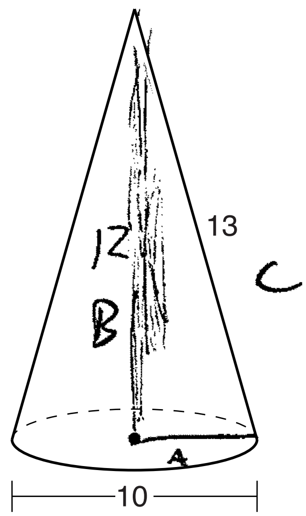
$\sqrt{x^2} = \sqrt{144}$

$x = 12$

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

Question 27

27 In the diagram below, a right circular cone has a diameter of 10 and a slant height of 13.



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

$5^2 + b^2 = 13^2$

$25 + b^2 = 169$

$\sqrt{144} = 12$

Determine and state the volume of the cone, in terms of π.

$169 - 25 = 144$

$\sqrt{144} =$

$R = 5$

$B = 12$

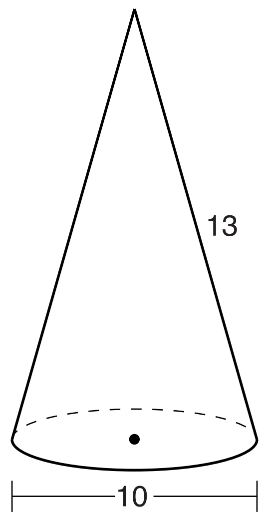
$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\pi 5^2 (12)$

Score 1: The student showed correct work to find the height of the cone.

Question 27

27 In the diagram below, a right circular cone has a diameter of 10 and a slant height of 13.



Determine and state the volume of the cone, in terms of π.

$V = \frac{1}{3}\pi r^2 h$

$\frac{10}{2} = 5$

$V = \frac{1}{3}\pi 5^2(13)$

$V = \frac{1}{3}\pi 25(13)$

$V = \frac{1}{3}\pi(325)$

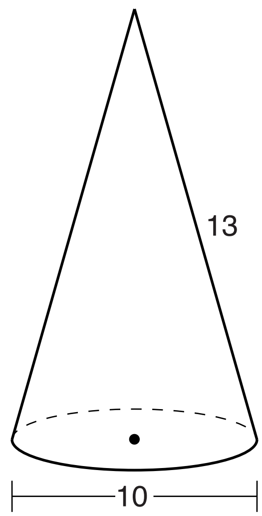
$V = 108.\bar{3}\pi$

$\boxed{\text{Volume: } 108.\bar{3}\pi}$

Score 1: The student used the slant height, but found an appropriate volume.

Question 27

27 In the diagram below, a right circular cone has a diameter of 10 and a slant height of 13.



Determine and state the volume of the cone, in terms of π.

$V=\frac{1}{3}\pi r^2 h$

$V=\frac{1}{3}\pi(5)^2(13)$

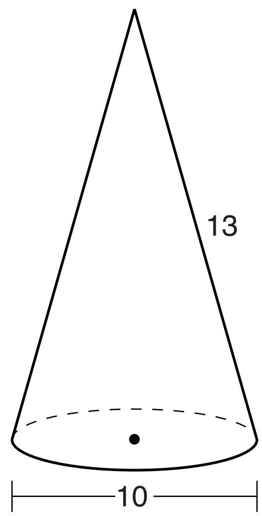
$V=\frac{1}{3}\pi 325$

$\boxed{V=975\pi}$

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

Question 27

27 In the diagram below, a right circular cone has a diameter of 10 and a slant height of 13.



Determine and state the volume of the cone, in terms of π.

$V = \frac{1}{2}\pi r^2 h$

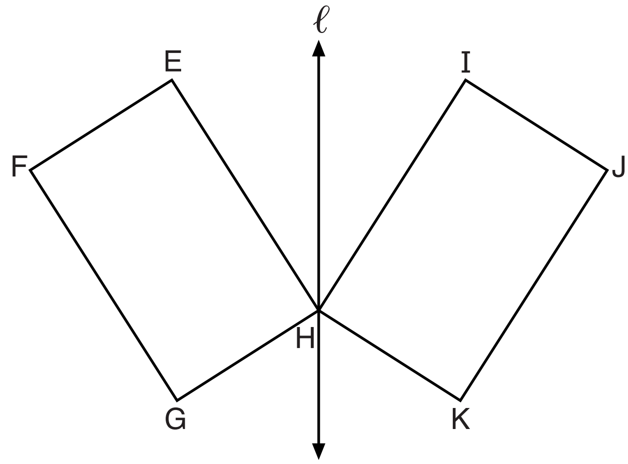
$V = \frac{1}{2}(10)\cdot(13)$

$= \boxed{65}$

Score 0: The student gave a completely incorrect response.

Question 28

28 In the diagram below, parallelogram *EFGH* is mapped onto parallelogram *IJKH* after a reflection over line ℓ.



Use the properties of rigid motions to explain why parallelogram *EFGH* is congruent to parallelogram *IJKH*.

Under a line reflection, distance is preserved and angle measure is preserved.

$\overline{EF} \cong \overline{IJ}$ $\quad \angle E \cong \angle I$

$\overline{FG} \cong \overline{JK}$ $\quad \angle F \cong \angle J$

$\overline{GH} \cong \overline{KH}$ $\quad \angle G \cong \angle K$

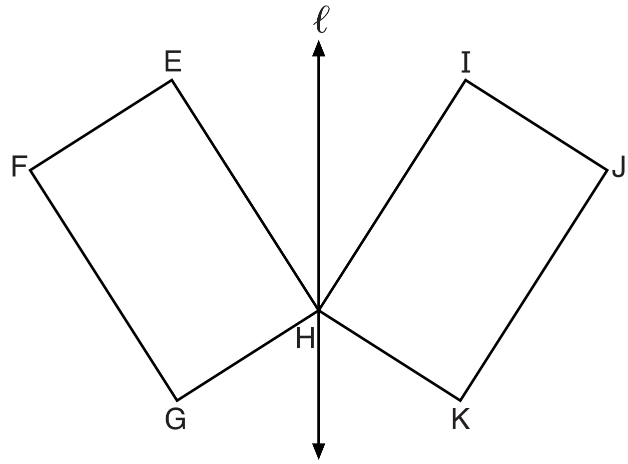
$\overline{HE} \cong \overline{HI}$ $\quad \angle H \cong \angle H$

Since all the corresponding sides and angles are $\cong$, $\square EFGH \cong \square IJKH$

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

Question 28

28 In the diagram below, parallelogram *EFGH* is mapped onto parallelogram *IJKH* after a reflection over line ℓ.



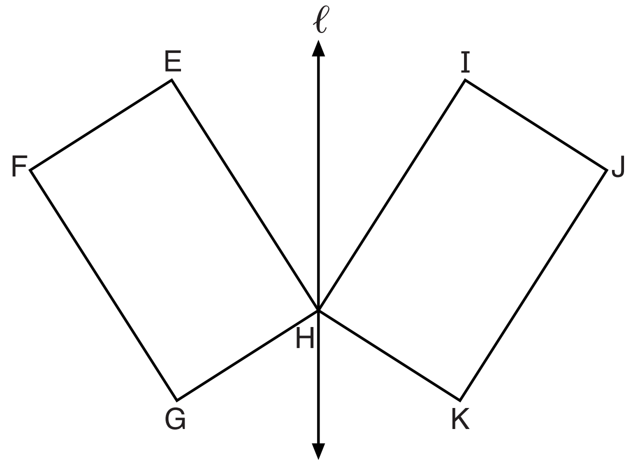
Use the properties of rigid motions to explain why parallelogram *EFGH* is congruent to parallelogram *IJKH*.

A reflection is a rigid motion and all rigid motions preserve distance and angle measure which also preserves congruence. So parallelogram EFGH is congruent to parallelogram IJKH after a line reflection.

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

Question 28

28 In the diagram below, parallelogram *EFGH* is mapped onto parallelogram *IJKH* after a reflection over line ℓ.



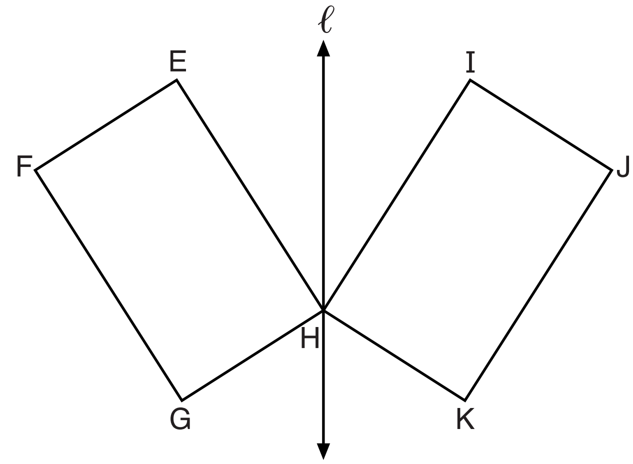
Use the properties of rigid motions to explain why parallelogram *EFGH* is congruent to parallelogram *IJKH*.

as you can see above a reflection has occured, a reflection is a rigid moton, meaning that distance is preserved, so EFGH has to be congruent to IJKH.

Score 1: The student wrote an incomplete explanation by not stating that rigid motions preserve angle measure.

Question 28

28 In the diagram below, parallelogram *EFGH* is mapped onto parallelogram *IJKH* after a reflection over line ℓ.



Use the properties of rigid motions to explain why parallelogram *EFGH* is congruent to parallelogram *IJKH*.

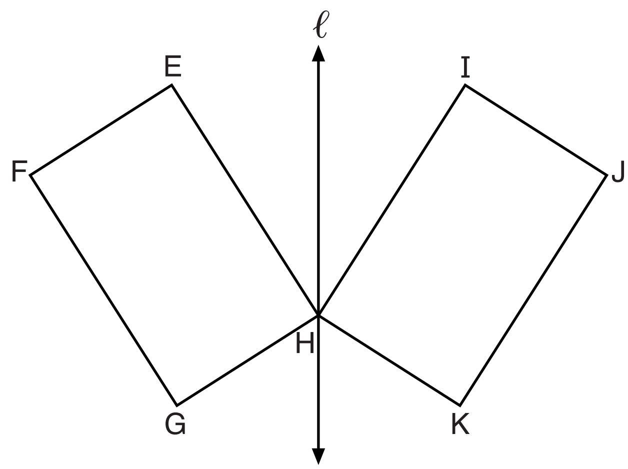
Since a rigid motion is being used here the size or numbers dont change.

The size only changes when a dilation is being used. But since this is a reflection its just mirrored to the other axis and the dimensions dont change

Score 1: The student wrote an incomplete explanation.

Question 28

28 In the diagram below, parallelogram *EFGH* is mapped onto parallelogram *IJKH* after a reflection over line ℓ.



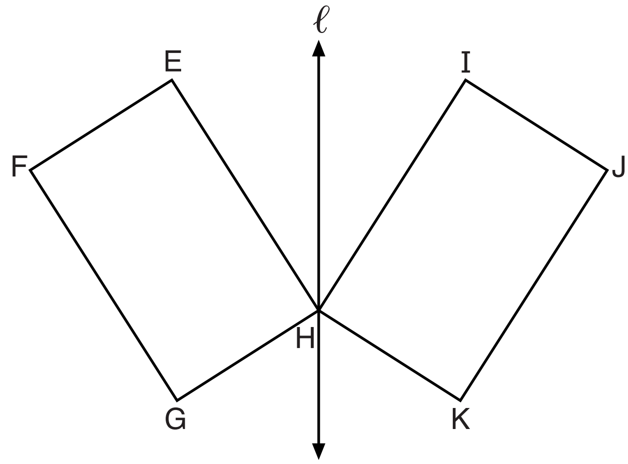
Use the properties of rigid motions to explain why parallelogram *EFGH* is congruent to parallelogram *IJKH*.

Since EFGH was reflected over line ℓ, and this didn't cause any dilations, parallelogram EFGH is congruent to parallelogram IJKH.

Score 0: The student wrote an incorrect explanation.

Question 28

28 In the diagram below, parallelogram *EFGH* is mapped onto parallelogram *IJKH* after a reflection over line ℓ.



Use the properties of rigid motions to explain why parallelogram *EFGH* is congruent to parallelogram *IJKH*.

The reflective Property was used, and each of the points are the same, only opposite eachother.

Score 0: The student gave a completely incorrect response.

Question 29

29 Izzy is making homemade clay pendants in the shape of a solid hemisphere, as modeled below. Each pendant has a radius of 2.8 cm.

How much clay, to the *nearest cubic centimeter*, does Izzy need to make 100 pendants?

$V = \frac{2}{3}\pi r^3$

$V = \frac{2}{3}\pi (2.8)^3$

$V = \frac{2}{3}\pi (21.952)$

$V = \frac{2}{3}(68.9642)$

$V = 45.9761$

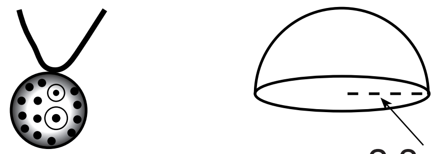
$(45.9761)100 = 4597.61$

4598 cm^3

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

Question 29

29 Izzy is making homemade clay pendants in the shape of a solid hemisphere, as modeled below. Each pendant has a radius of 2.8 cm.



How much clay, to the *nearest cubic centimeter*, does Izzy need to make 100 pendants?

$V = 1/2(4/3)\pi r^3$

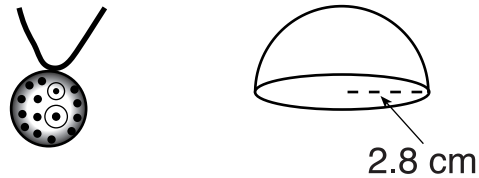
$V = 1/2(4/3)\pi(2.8)^3 = 45.97616129\ (100)$

4598 cm^3

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

Question 29

29 Izzy is making homemade clay pendants in the shape of a solid hemisphere, as modeled below. Each pendant has a radius of 2.8 cm.



How much clay, to the *nearest cubic centimeter*, does Izzy need to make 100 pendants?

$V = \frac{4}{3}\pi r^3 / 2$

$V = 4/3\,\pi\,(2.8)^3/2$

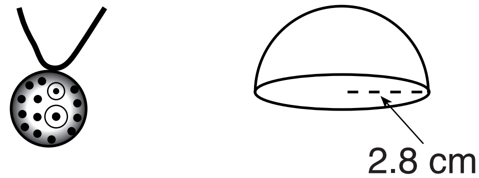
$V = 91.95232/2$

$V = 45.97616$ for 1

She needs 4,597 Cubic Centimeters of Clay to make 100 pendants.

Score 1: The student made one rounding error.

29 Izzy is making homemade clay pendants in the shape of a solid hemisphere, as modeled below. Each pendant has a radius of 2.8 cm.



How much clay, to the *nearest cubic centimeter*, does Izzy need to make 100 pendants?

$V = \frac{4}{3} \pi r^3$

$V = \frac{4}{3} \pi 2.8^3$

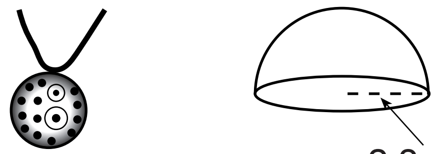
$V = 92/2$

$V = 46 \text{ cm}^3$

$46 \cdot 100 = 4600 \text{ cm}^3$

Score 1: The student made one rounding error.

29 Izzy is making homemade clay pendants in the shape of a solid hemisphere, as modeled below. Each pendant has a radius of 2.8 cm.



How much clay, to the *nearest cubic centimeter*, does Izzy need to make 100 pendants?

$V = \frac{4}{3}\pi r^2$

$V = \frac{4}{3}\pi 2.8^2$

$32.8401 \div 2 = 16.4200$

$17 * 100 = \boxed{1700}$

Score 0: The student used an incorrect volume formula (squared the radius) and made a rounding error.

Question 30

30 Determine and state the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 + 6x = 6y + 63$.

$$x^2 + 6x + \underline{9} + y^2 - 6y + \underline{9} = 63^{+9+9}$$

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

Center $= (-3, 3)$
Radius $= 9$

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

30 Determine and state the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 + 6x = 6y + 63$.

$-6 \quad -6y$

$x^2 + y2 + 6x - 6y = 63$

$x^2 + 6x + 9 = 63 + 9 - 3$

	x	3
x	x^2	$3x$
3	$3x$	9

	y	-3
y	y^2	$-3y$
-3	$-3y$	9

$(x+3)^2 + (y-3)^2 = 69$

$(-3, 3) =$ center

radius $= 8.3$

Score 1: The student made one error when writing minus 3 instead of plus 9 to get 69.

Question 30

30 Determine and state the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 + 6x = 6y + 63$.

$\left(\frac{b}{2}\right)^2$

$x^2 + 6x + y^2 - 6y = 63$

$x^2 + 6x + 9 \quad y^2 - 6y + 9$

$(x+3)^2 + (y-3)^2 = 63$

coordinate of the center = $(-3, 3)$

radius $= \sqrt{63}$

Score 1: The student made an error by not adding 18 to both sides of the equation.

Question 30

30 Determine and state the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 + 6x = 6y + 63$.

$-6y\ 6y$

$x^2 + 6x + y^2 - 6y = 63$

$x^2 + 6x + \underline{9} + y^2 - 6y + \underline{9} = 63 + \underline{9} + \underline{9}$

$x^2 + 6x + 9 + y^2 - 6y + 9 = 81$

$(x+3)^2 + (y-3)^2 = 9$

$r = 81$

$c = (-3, 3)$

Score 1: The student made an error when determining the length of the radius.

30 Determine and state the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 + 6x = 6y + 63$.

$x^2 + 6x + \underline{9} + y^2 + 6y + \underline{9} = 63 + \underline{9} + \underline{9}$

$x^2 + 6x + 18 + y^2 + 6y = 81$

$-18 \quad -18$

$x^2 + 6x + y^2 + 6y = 63$

$(x + 3x)(x + 3x) + (y + 3)(y + 3) = 63$

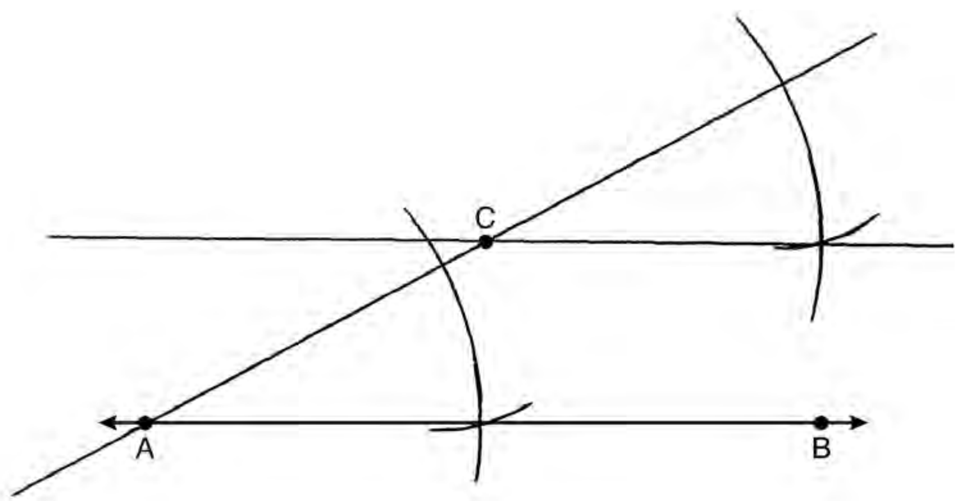
center - 3,3

radius =

Score 0: The student made multiple computational and factoring errors.

Question 31

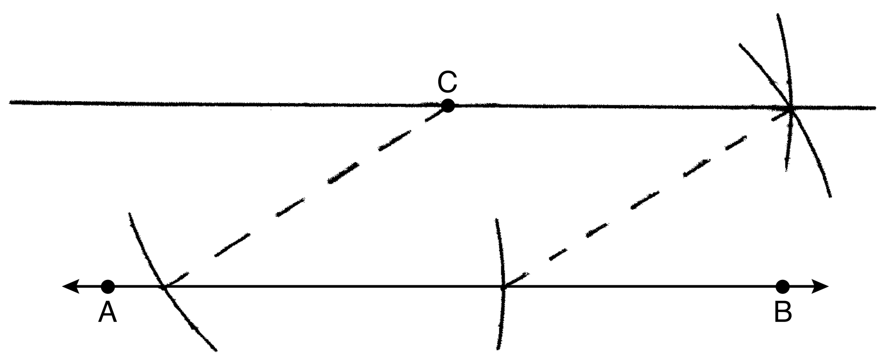
31 Use a compass and straightedge to construct a line parallel to $\overleftrightarrow{AB}$ through point C, shown below. [Leave all construction marks.]



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

Question 31

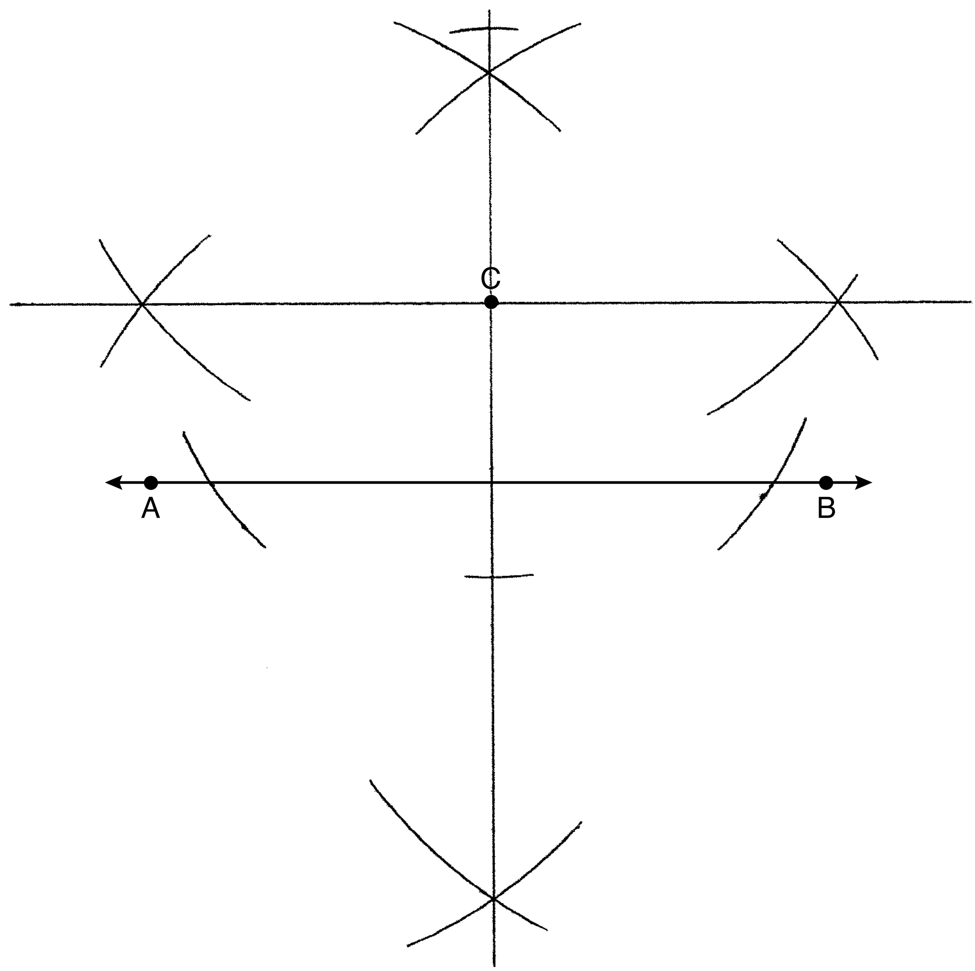
31 Use a compass and straightedge to construct a line parallel to $\overleftrightarrow{AB}$ through point C, shown below. [Leave all construction marks.]



Score 2: The student gave a complete and correct response. (The student constructed a rhombus to construct the parallel line through C.)

Question 31

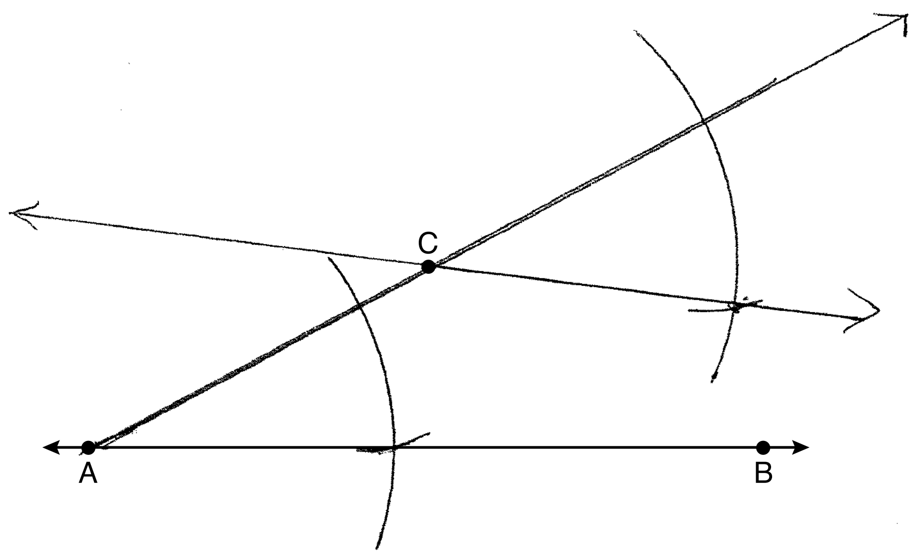
31 Use a compass and straightedge to construct a line parallel to $\overleftrightarrow{AB}$ through point C, shown below. [Leave all construction marks.]



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

Question 31

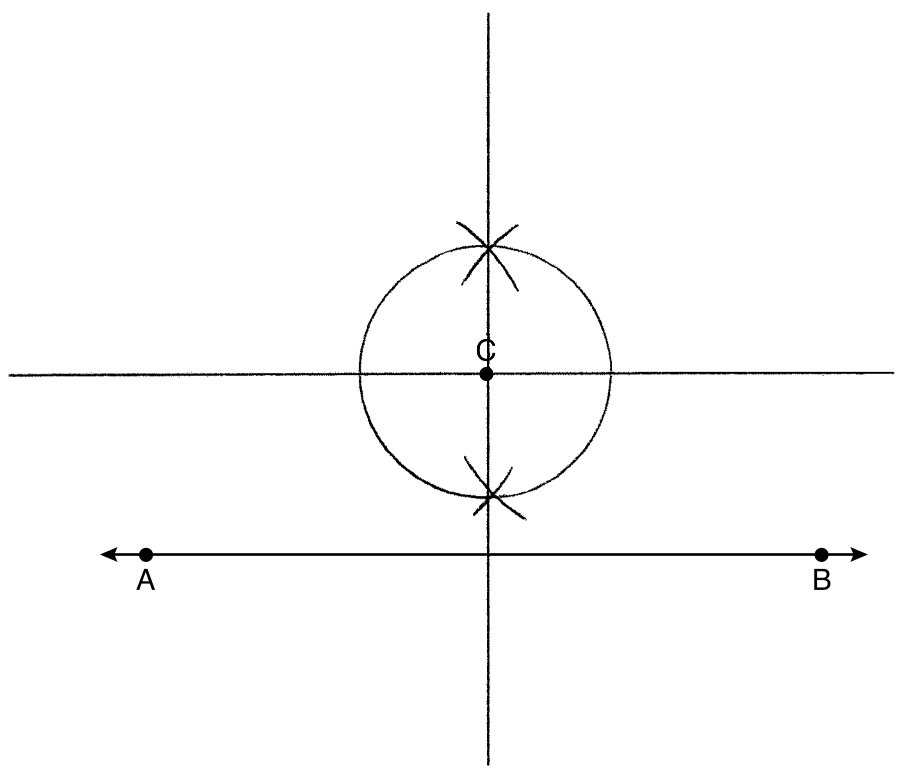
31 Use a compass and straightedge to construct a line parallel to $\overleftrightarrow{AB}$ through point C, shown below. [Leave all construction marks.]



Score 1: The student constructed corresponding angles, but they are not congruent.

Question 31

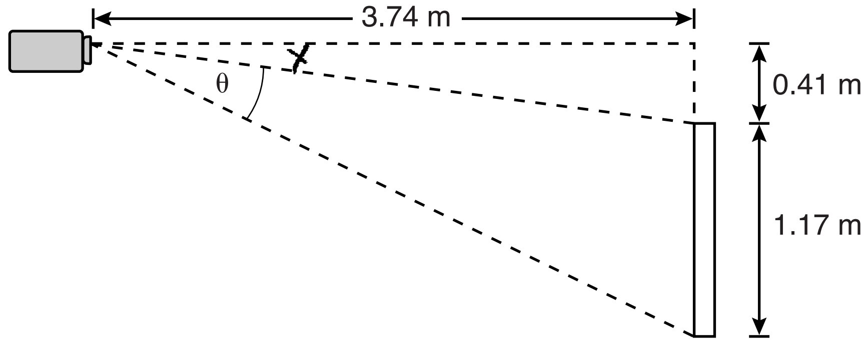
31 Use a compass and straightedge to construct a line parallel to $\overleftrightarrow{AB}$ through point C, shown below. [Leave all construction marks.]



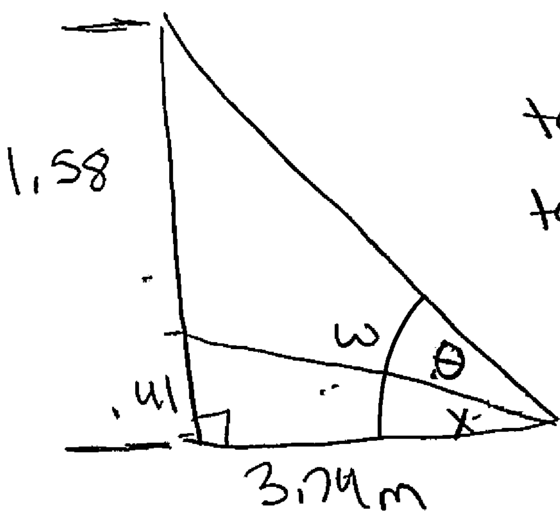
Score 0: The student gave a completely incorrect response.

Question 32

32 As modeled below, a projector mounted on a ceiling is 3.74 m from a wall, where a whiteboard is displayed. The vertical distance from the ceiling to the top of the whiteboard is 0.41 m, and the height of the whiteboard is 1.17 m.



Determine and state the projection angle, θ, to the *nearest tenth of a degree*.



$\tan(w) = \frac{1.58}{3.74}$ $\quad w = 22.902107$

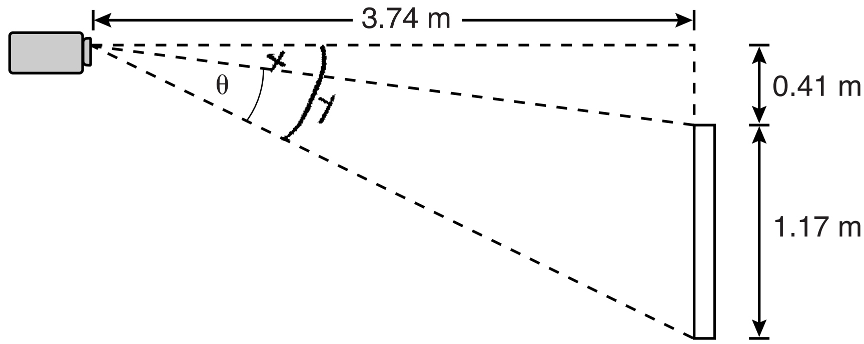
$\tan(x) = \frac{.41}{3.74}$ $\quad x = 6.2561064$

$\theta = 16.64600146$

θ $\boxed{16.6^\circ}$

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

32 As modeled below, a projector mounted on a ceiling is 3.74 m from a wall, where a whiteboard is displayed. The vertical distance from the ceiling to the top of the whiteboard is 0.41 m, and the height of the whiteboard is 1.17 m.



$$\begin{array}{r} .41 \\ +1.17 \\ \hline 1.58 \end{array}$$

Determine and state the projection angle, θ, to the *nearest tenth of a degree*.

$\tan(x) = \frac{0.41}{3.74}$

$\tan^{-1}(.41/3.74) = 6.256106424$

$\tan(y) = \frac{1.58}{3.74}$

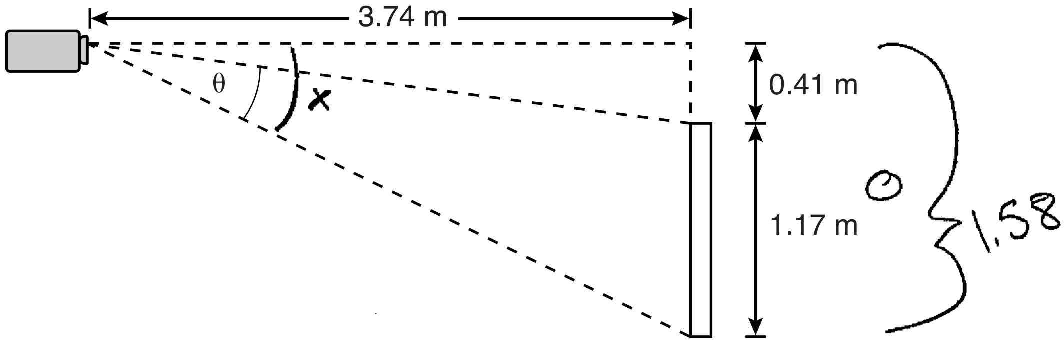
$\tan^{-1}(1.58/3.74) = 22.90210788$

$$\begin{array}{r} 22.90210788 \\ -\ 6.256106424 \\ \hline 17^\circ \end{array}$$

Score 3: The student made one rounding error.

32 As modeled below, a projector mounted on a ceiling is 3.74 m from a wall, where a whiteboard is displayed. The vertical distance from the ceiling to the top of the whiteboard is 0.41 m, and the height of the whiteboard is 1.17 m.

a



Determine and state the projection angle, θ, to the *nearest tenth of a degree*.

$\tan x = \frac{1.58}{3.74}$

$\tan^{-1}\left(\frac{1.58}{3.74}\right) = x$

$22.9^\circ = x$

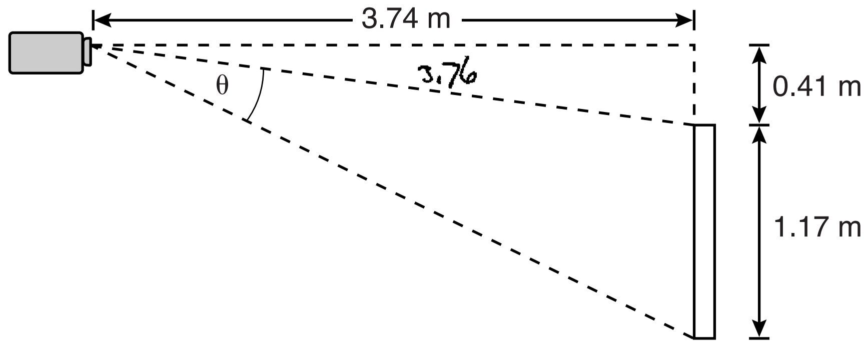
$22.9 - 0.41 = 22.49$

$\theta = 22.5^\circ$

Score 2: The student found the larger angle of depression correctly, but no further correct work was shown.

Question 32

32 As modeled below, a projector mounted on a ceiling is 3.74 m from a wall, where a whiteboard is displayed. The vertical distance from the ceiling to the top of the whiteboard is 0.41 m, and the height of the whiteboard is 1.17 m.



Determine and state the projection angle, θ, to the *nearest tenth of a degree*.

$3.74^2 + 0.41^2 = c^2$

$\sqrt{14.1557} = \sqrt{c^2}$

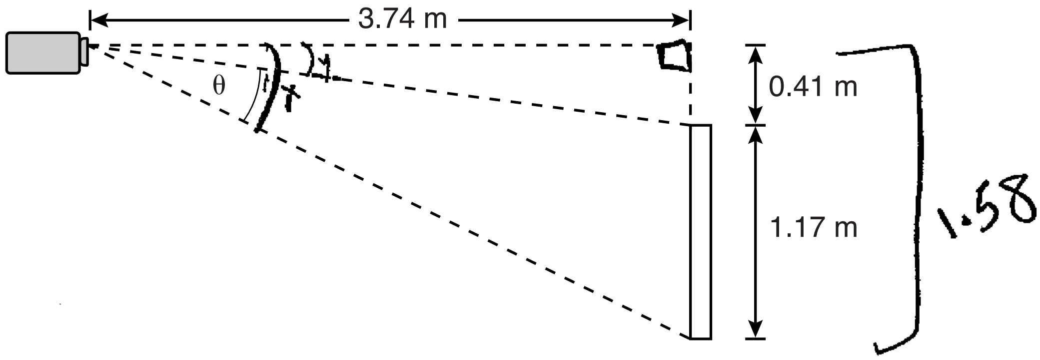
$c = 3.76$

$\tan^{-1}(1.17/3.76) = 17.3^\circ$

Score 2: The student made a conceptual error by using tangent in a non-right triangle.

Question 32

32 As modeled below, a projector mounted on a ceiling is 3.74 m from a wall, where a whiteboard is displayed. The vertical distance from the ceiling to the top of the whiteboard is 0.41 m, and the height of the whiteboard is 1.17 m.



Determine and state the projection angle, θ, to the *nearest tenth of a degree*.

$\frac{\tan x}{1} = \frac{1.58}{3.74}$

$\frac{\tan y}{1} = \frac{.41}{3.74}$

$\frac{1.58 = 75x}{75}$

$y = .002$

$x = .021$

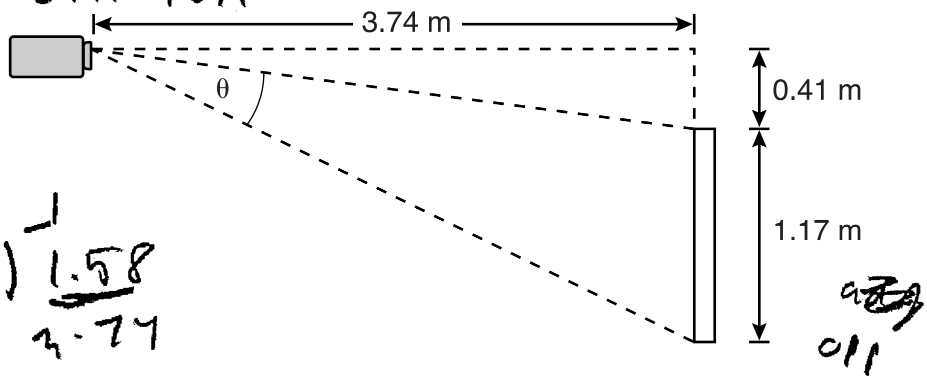
$\theta = .019$

Score 1: The student wrote two correct relevant trigonometric equations, but no further correct work was shown.

Question 32

32 As modeled below, a projector mounted on a ceiling is 3.74 m from a wall, where a whiteboard is displayed. The vertical distance from the ceiling to the top of the whiteboard is 0.41 m, and the height of the whiteboard is 1.17 m.

SOH CAH TOA adj



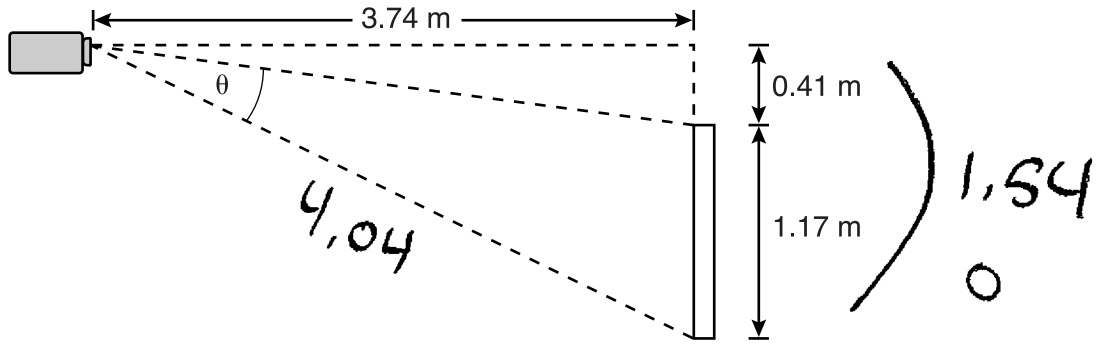
$\tan^{-1}(x)\ \frac{1.58}{3.74}$

Determine and state the projection angle, θ, to the *nearest tenth of a degree*.

The anrwer ir 23°.

Score 1: The student wrote a correct relevant trigonometric equation, but made a rounding error when finding the larger angle of depression.

32 As modeled below, a projector mounted on a ceiling is 3.74 m from a wall, where a whiteboard is displayed. The vertical distance from the ceiling to the top of the whiteboard is 0.41 m, and the height of the whiteboard is 1.17 m. a



Determine and state the projection angle, θ, to the *nearest tenth of a degree*.

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

$(3.94)^2+(1.54)^2=c^2$

$13.9876+2.3716=c^2$

$16.3592=c^2$

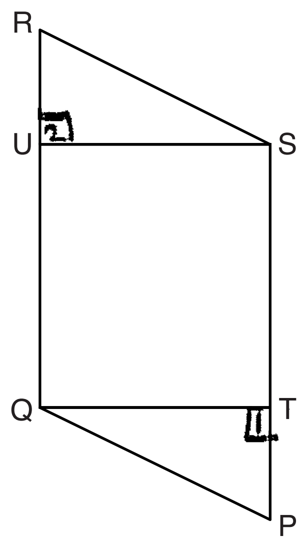
$c=4.04$

$\theta=12.11$

Score 0: The student gave a completely incorrect response.

Question 33

33 Given: Parallelogram $PQRS$, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$



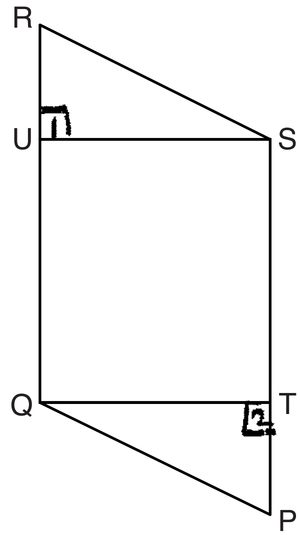
Prove: $\overline{PT} \cong \overline{RU}$

Statements	Reasons
1. Parallelogram $PQRS$, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$	1. Given
2. $\overline{RS} \cong \overline{QP}$	2. opposite sides of a parralelogram are $\cong$
3. $\angle P \cong \angle R$	3. opposite $\angle$'s of a parralelogran are $\cong$
4. $\angle 1$ and $\angle 2$ are right $\angle$'s	4. def $\perp$
5. $\angle 1 \cong \angle 2$	5. all right $\angle$'s are $\cong$
6. $\triangle SUR \cong \triangle QTP$	6. AAS $\cong$ AAS
7 $\overline{PT} \cong \overline{RU}$	7. CPCTC

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

Question 33

33 Given: Parallelogram $PQRS$, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$

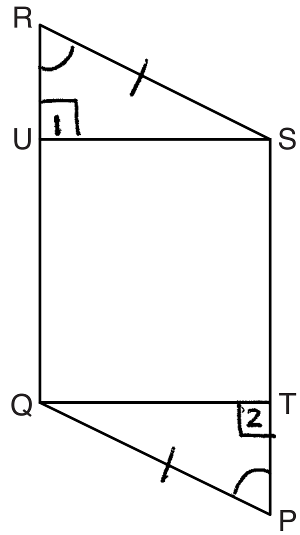


Prove: $\overline{PT} \cong \overline{RU}$

A S
$\angle R \cong \angle P$ and $\overline{RS} \cong \overline{PQ}$ because parallelograms have both pairs of opposite angles and opposite sides congruent. A $\angle 1 \cong \angle 2$ because $\overline{QT} \perp \overline{PS}$ and $\overline{SU} \perp \overline{QR}$ and $\perp$ lines form right angles and all right angles are congruent. So, $\triangle RUS \cong \triangle PTQ$ by AAS, therefore $\overline{PT} \cong \overline{RU}$ by CPCTC.

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

33 Given: Parallelogram $PQRS$, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$



Prove: $\overline{PT} \cong \overline{RU}$

$\boxed{\square PQRS}$ Given

$\boxed{\overline{QT} \perp \overline{PS}}$ Given

$\boxed{\overline{SU} \perp \overline{QR}}$

$\boxed{\angle R \cong \angle P}$ $\square \rightarrow$ opposite $\angle$'s are $\cong$

$\boxed{\overline{RS} \cong \overline{PQ}}$ $\square \rightarrow$ opposite sides $\cong$

$\boxed{\angle 1 \text{ and } \angle 2 \text{ are right } \angle\text{'s}}$ $\perp \rightarrow$ right $\angle$'s

$\boxed{\angle 1 \cong \angle 2}$ All right $\angle$'s are $\cong$

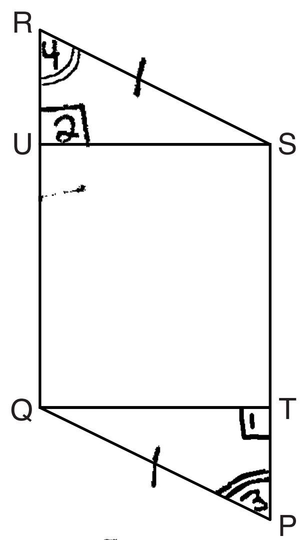
$\boxed{\triangle PQT \cong \triangle RSU}$ AAS

$\boxed{\overline{PT} \cong \overline{RU}}$ CPCTC

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

Question 33

33 Given: Parallelogram $PQRS$, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$

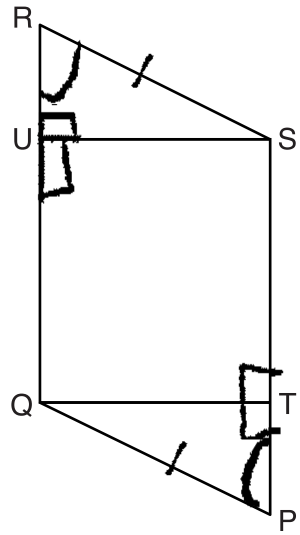


Prove: $\overline{PT} \cong \overline{RU}$

1) $\boxed{P}$ PQRS, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$	1) given
2) $\angle 1$ and $\angle 2$ are rt $\angle$s	2) def $\perp$
3) $\angle 1 \cong \angle 2$	3) all rt $\angle$s are $\cong$
4) $\angle 3 \cong \angle 4$	4) $\boxed{P}$ has opp. $\angle$s $\cong$
5) $\overline{RS} \cong \overline{PQ}$	5) def $\boxed{P}$
6) $\triangle URS \cong \triangle TPQ$	6) AAS
7) $\overline{PT} \cong \overline{RU}$	7) CPCTC

Score 3: The student wrote an incorrect reason in step 5.

33 Given: Parallelogram $PQRS$, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$



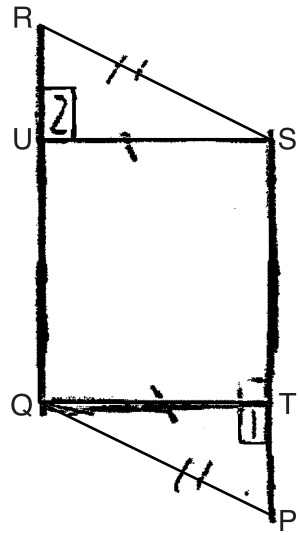
Prove: $\overline{PT} \cong \overline{RU}$

Statements	Reasons
1. Parallelogram PQRS $\overline{QT} \perp \overline{PS}$; $\overline{SU} \perp \overline{QR}$	1. Given
2. $\angle P \cong \angle R$; $\overline{RS} \cong \overline{QP}$	2. Def. of Parallelogram
3. $\angle QTP$ & $\angle SUR$ are right $\angle$'s	3. Def. of perpendicular
4. $\triangle QTP \cong \triangle SUR$	4. AAS
5. $\overline{PT} \cong \overline{RU}$	5. CPCTC

Score 2: The student wrote an incorrect reason in step 2 and did not state $\angle QTP \cong \angle SUR$.

Question 33

33 Given: Parallelogram $PQRS$, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$



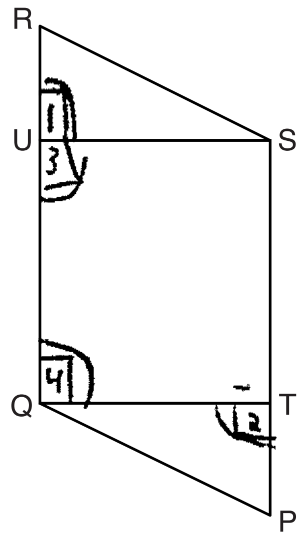
Prove: $\overline{PT} \cong \overline{RU}$

1. ▱PQRS, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$	1 Given
2. ∡1, ∡2 rt ∡'s.	2. Def ⊥
A 3. ∡1 ≅ ∡2	3. All rt ∡'s ≅
S 4. $\overline{US} \cong \overline{QT}$	4. Opp sides of a ▱ ≅
S 5. $\overline{RS} \cong \overline{PQ}$	5. Def ▱
6. △QPT ≅ △SRU	6. SAS
7. $\overline{PT} \cong \overline{RU}$	7. Parts are ≅

Score 1: The student only proved ∠1≅∠2.

Question 33

33 Given: Parallelogram $PQRS$, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$



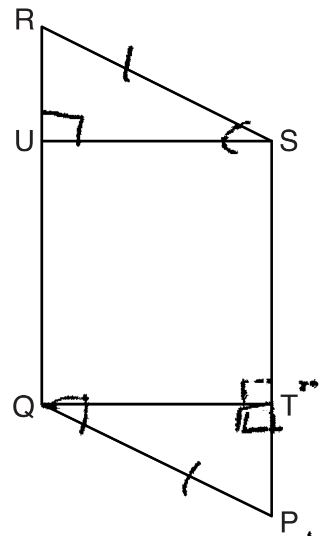
Prove: $\overline{PT} \cong \overline{RU}$

S	R.
1. parallelogram PQRS $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$	1. given
2. $\angle 1, \angle 2, \angle 3, \angle 4$ are right angles	2. a right angle is formed when a line is drawn perpendicular to the other line
3. $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$	3. all right angles are congruent

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

Question 33

33 Given: Parallelogram $PQRS$, $\overline{QT} \perp \overline{PS}$, $\overline{SU} \perp \overline{QR}$



Prove: $\overline{PT} \cong \overline{RU}$

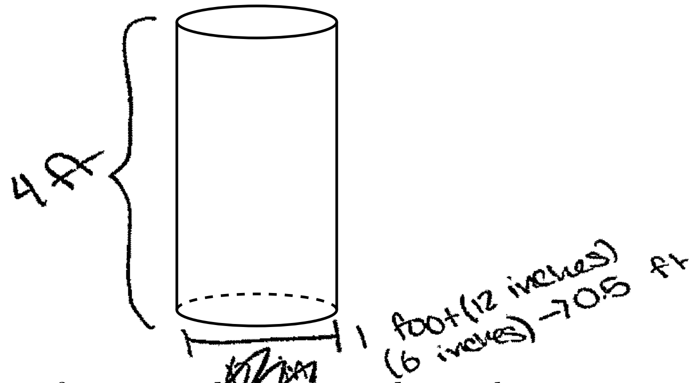
Statement	Reason
① ▱ PQRS, QT ⊥ PS, SU ⊥ QR	① Given
② ∠Q ≅ ∠S	② Corresponding ∠'s are ≅
③ $\overline{QP} \cong \overline{RS}$	③ In a ▱ all sides are congruent
④ △RUS ≅ QPT	④ ASA
⑤ $\overline{PT} \cong \overline{RU}$	⑤ CPCTP

Score 0: The student gave a completely incorrect response.

Question 34

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.

1 foot



If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

$$\boxed{\text{48 bags}}$$

$V = \pi r^2 h$

$V = \pi(0.5)^2(4)$

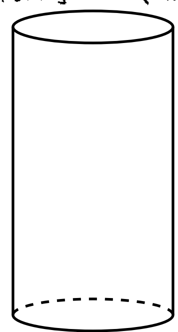
$V = \pi$

$$\frac{10\pi}{(2/3)} \approx 48$$

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

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.

r = 6 inches r = $\frac{1}{2}$ ft



4 $\frac{1}{2}$ $\frac{6}{12} = .5$ .5

.5 $\frac{1}{2}$ .5

If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

$\pi(.5)^2(4) = V$

$V \cdot 10 = 31.415$

$\frac{\frac{2}{3}x}{\frac{2}{3}} = \frac{31.415}{\frac{2}{3}} =$

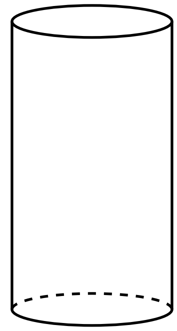
~~[illegible]~~

$\boxed{48}$

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

Question 34

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.



If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

$V = \pi r^2 h$

$V = \pi(.5)^2(4)$

$V = \pi(.25)(4)$

$V = \pi(1)$

$V = 3.141592653 \times 10 =$

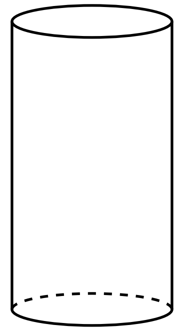
$31.41592653 \div \frac{2}{3}$

48 bags of concrete

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

Question 34

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.



If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

$V = \pi(0.5)^2(4)$

$V = \pi(0.25)(4)$

$V = 1\pi$

$10(1\pi) = 31.41592$

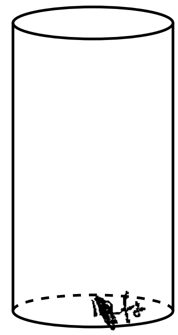
$\frac{31.41592}{2/3} = 47.12388$

47 bags

Score 3: The student incorrectly interpreted the number of bags.

Question 34

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.



4 48

6

6 inches

If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

$V = \pi r^2 h$

$V = \pi (6)^2 (48)$

$V = \pi (36)(48)$

$V = \frac{1728\pi}{12}$

$V = 144\pi$

$V = 452.3893421 \times 10$

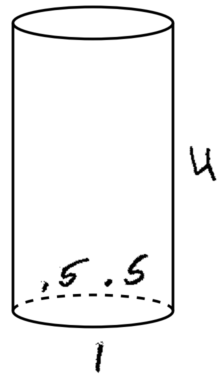
$= \frac{4523.893421}{.6}$

10 foots need = 6786

~~6[illegible].811~~ bags of concrete

Score 3: The student made a conversion error when converting from cubic inches to cubic feet.

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.



If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

$V = \pi r^2 h$

$V = \pi .5^2 \cdot 4$

$V = 3.141592654$

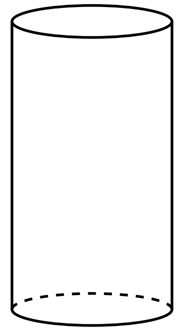
3.141592654
$\times\ 10$
31.41592654
$\times\ \frac{2}{3}$

21 bags

Score 3: The student made an error by multiplying by $\frac{2}{3}$.

Question 34

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.



If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

$V = \pi(6)^2(4)$

$V = \pi(144)$

$V = 452.3893421$

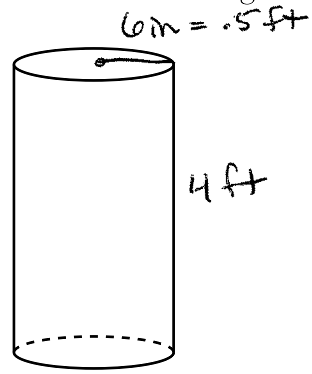
$\frac{452.3893421}{\frac{2}{3}} = 678.6$

679

Score 2: The student did not convert and did not find the volume of 10 footings.

Question 34

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.



If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

$V = \pi(.5)^2(4)$

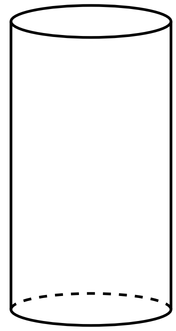
$V = 1\pi$ 1 footing

10 footing = 10π

$10\pi\left(\frac{2}{3}\right) = 20.94395102$

Score 2: The student found the volume of ten footings, but no further correct work was shown.

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.



If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

$V = Bh$

$\cancel{V = \pi(12^2)48}$

$\cancel{V = \frac{21714.68842 \text{ in}^3}{1} = \frac{?\text{ ft}^3}{}}$

$V = \pi r^2 h$

$V = \pi(6)^2(48)$

$= \frac{5428.672105 \text{ in}^3}{1728} = 3.14592654 \text{ ft}$

$3.14592654 \cdot \frac{2}{3} = (2.094395)10 =$

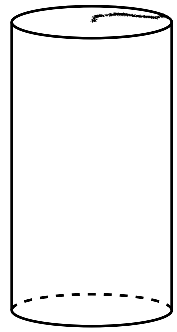
20.9439

$\approx \boxed{29 \text{ bags}}$

Score 2: The student made 2 errors in calculating the number of bags of concrete.

Question 34

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.



If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

Footings will be $(0.5)^2 \times (4)\pi = 3.141592$

$\frac{2}{3} \times 3.141592$

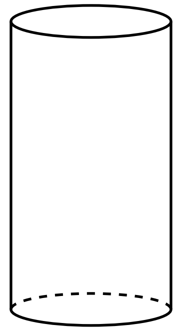
2.09439

2 bags

Score 1: The student found the volume of one footing, but no further correct work is shown.

Question 34

34 A concrete footing is a cylinder that is placed in the ground to support a building structure. The cylinder is 4 feet tall and 12 inches in diameter. A contractor is installing 10 footings.



If a bag of concrete mix makes $\frac{2}{3}$ of a cubic foot of concrete, determine and state the minimum number of bags of concrete mix needed to make all 10 footings.

$V = \pi r^2 h$

$V = \pi(6)^2(4)$

$V = \pi\, 36\, (4$

$V = \pi\, 144$

$V = 452.3893421 * .5 = 226.1946711$

$x \qquad 10$

Score 0: The student gave a completely incorrect response.

35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

$AB = \sqrt{(-2-{-7})^2+(4-{-1})^2}$

$AB = \sqrt{25+25}$

$AB = \sqrt{50}$

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

$AC = \sqrt{1+49}$

$AC = \sqrt{50}$

Since $\triangle ABC$ has two equal side lengths then $\triangle ABC$ is isosceles.

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

$+5 \quad -5$

$A(-2,4) \longrightarrow A'(3,-1)$

$B(-7,-1) \longrightarrow B'(-2,-6)$

$C(-3,-3) \longrightarrow C'(2,-8)$

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

Question 35

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus. [The use of the set of axes below is optional.]

$A(-2,4)$, $A'(3,-1)$, $C'(2,-8)$, $C(-3,-3)$

$AC = \sqrt{50}$

$A'C' = \sqrt{50}$ since rigid motions preserve side length

$AA' = \sqrt{(3-{}^-2)^2+(-1-4)^2}$

$AA' = \sqrt{25+25}$

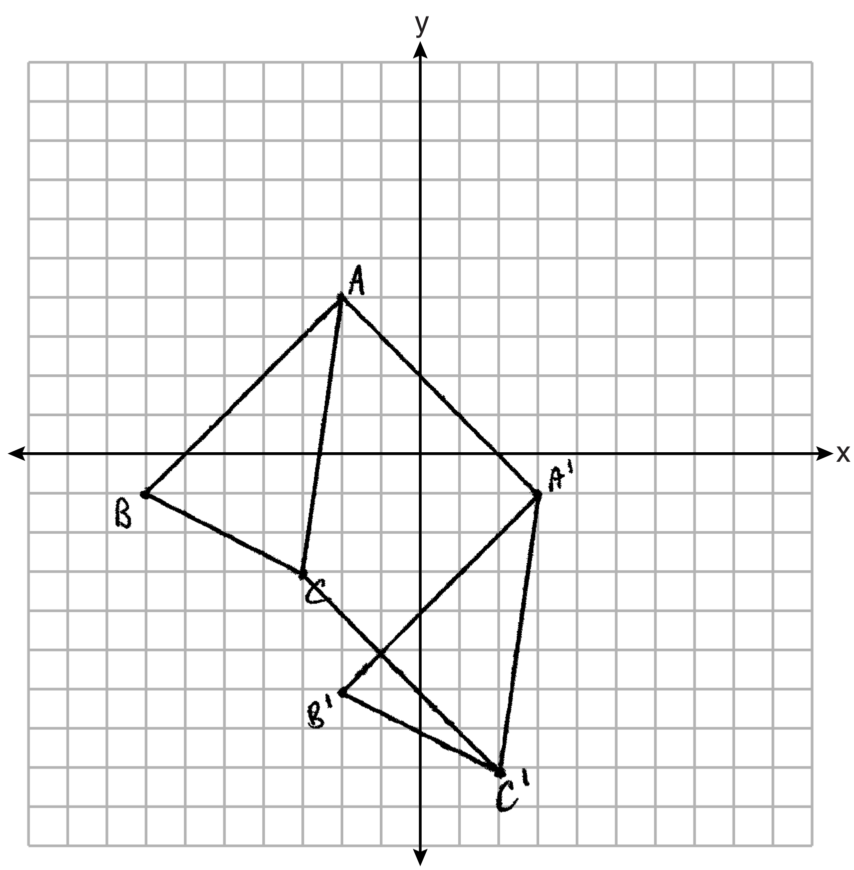
$AA' = \sqrt{50}$

$CC' = \sqrt{(2-{}^-3)^2+({}^-8-{}^-3)^2}$

$CC' = \sqrt{25+25}$

$CC' = \sqrt{50}$

Since all 4 sides of Quad ~~the~~ $AA'C'C$ are equal then $AA'C'C$ is a rhombus



35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

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

$d_{\overline{AB}}$: $5^2+5^2=x^2$

$\sqrt{50}=\sqrt{x^2}$

$d_{\overline{AB}}=\sqrt{50}$

$d_{\overline{AC}}$: $7^2+1^2=x^2$

$\sqrt{50}=\sqrt{x^2}$

$d_{\overline{AC}}=\sqrt{50}$

$\triangle ABC$ is isosceles because it has 2 $\cong$ sides. $\overline{AB}\cong\overline{AC}$, $d=\sqrt{50}$

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

A' $(3,-1)$

B' $(-2,-6)$

C' $(2,-8)$

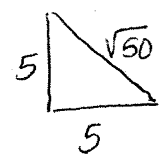
Score 6: The student gave a complete and correct response.

Question 35 continued

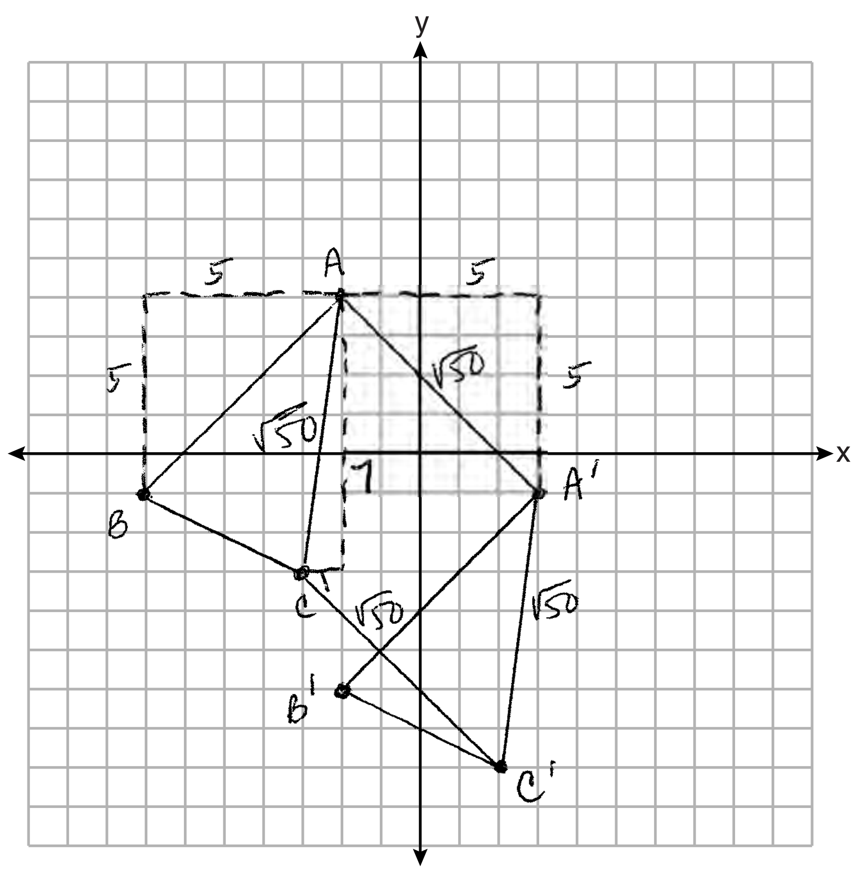
Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

- $AC = \sqrt{50}$, so its image $A'C' = \sqrt{50}$ because translations preserve distance.

- Point A is translated down 5 and right 5, so its distance from A to A' must be $\sqrt{50}$. Under the same ~~translation~~ translation, the same is true for C to $C' = \sqrt{50}$.



Therefore, all 4 sides $= \sqrt{50}$. $AA'C'C$ is a rhombus



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

$AB = \sqrt{(-7-(-2))^2 + (-1-4)^2}$
$= \sqrt{(-5)^2 + (-5)^2}$
$= \sqrt{25+25}$
$AB = \sqrt{50}$

$BC = \sqrt{(-3-(-7))^2 + (-3-(-1))^2}$
$= \sqrt{4^2 + (-2)^2}$
$= \sqrt{16+4}$
$BC = \sqrt{20}$

$AC = \sqrt{(-3-(-2))^2 + (-3-4)^2}$
$= \sqrt{(-1)^2 + (-7)^2}$
$= \sqrt{1+49}$
$AC = \sqrt{50}$

$\overline{AB} \cong \overline{AC}$

Since 2 sides of $\triangle ABC$ are $\cong$, it is isosceles

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

$T_{5,-5}$

$A(-2,4) \rightarrow A'(3,-1)$
$B(-7,-1) \rightarrow B'(-2,-6)$
$C(-3,-3) \rightarrow C'(2,-8)$

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

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

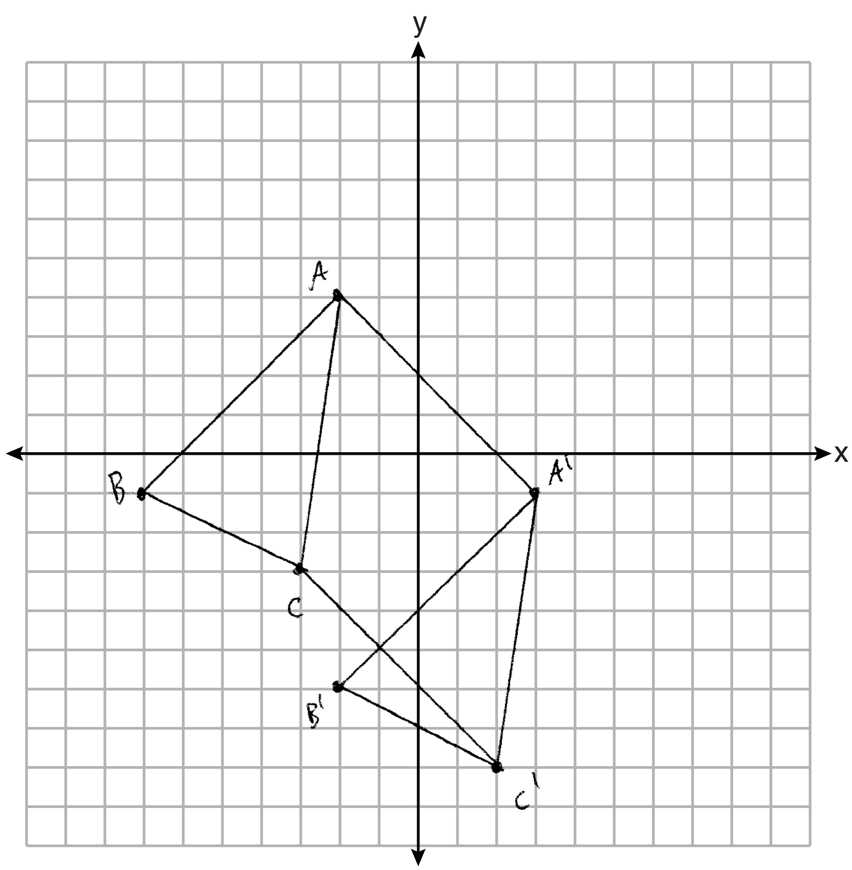
$AC = \sqrt{50}$

$AA' = \sqrt{(3-(-2))^2 + (-1-4)^2}$
$= \sqrt{5^2 + (-5)^2}$
$= \sqrt{25+25}$
$AA' = \sqrt{50}$

$A'C' = \sqrt{(3-2)^2 + (-1-(-8))^2}$
$= \sqrt{1^2 + 7^2}$
$= \sqrt{1+49}$
$A'C' = \sqrt{50}$

$CC' = \sqrt{(2-(-3))^2 + (-8-(-3))^2}$
$= \sqrt{5^2 + (-5)^2}$
$= \sqrt{25+25}$
$CC' = \sqrt{50}$

Since all 4 sides of quad $AA'C'C$ are $\cong$, it is a rhombus



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

$$AB = \sqrt{(-7-(-2))^2 + (-1-4)^2}$$
$$= \sqrt{(-5)^2 + (-5)^2}$$
$$= \sqrt{25+25}$$
$$= \boxed{\sqrt{50}}$$

$$AC = \sqrt{(-3-(-2))^2 + (-3-4)^2}$$
$$= \sqrt{(-1)^2 + (-7)^2}$$
$$= \sqrt{1+49}$$
$$= \boxed{\sqrt{50}}$$

$\overline{AB} \cong \overline{AC}$ since 2 sides of ΔABC are $\cong$, it is isosceles.

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

$T_{5,-5}$

$A(-2,4) \longrightarrow A'(3,-1)$

$B(-7,-1) \longrightarrow B'(-2,-6)$

$C(-3,-3) \longrightarrow C'(2,-8)$

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

Question 35

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

Midpoint $\overline{AC'} = \left(\frac{-2+2}{2}, \frac{4+(-8)}{2}\right)$
$= \left(\frac{0}{2}, \frac{-4}{2}\right)$
$= (0,-2)$

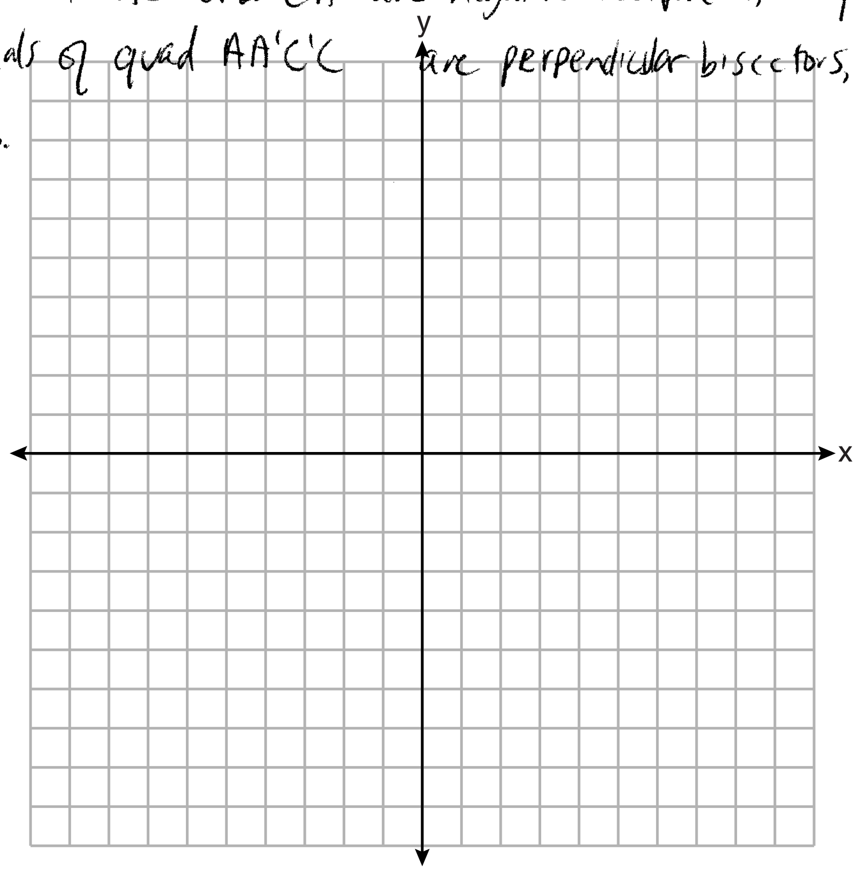
Midpoint $\overline{CA'} = \left(\frac{-3+3}{2}, \frac{-3+(-1)}{2}\right)$
$= \left(\frac{0}{2}, \frac{-4}{2}\right)$
$= (0,-2)$

Since diagonals $\overline{AC'}$ and $\overline{CA'}$ have the same midpoint, they bisect each other.

Slope $\overline{AC'} = \frac{4-(-8)}{-2-2} = \frac{12}{-4} = \frac{-3}{1}$

Slope $\overline{CA'} = \frac{-1-(-3)}{3-(-3)} = \frac{2}{6} = \frac{1}{3}$

Since the slopes of $\overline{AC'}$ and $\overline{CA'}$ are negative reciprocals, they are perpendicular. Since the diagonals of quad $AA'C'C$ are perpendicular bisectors, quad $AA'C'C$ is a rhombus.



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

$\overline{AB} = \sqrt{(-7+2)^2 + (-1-4)^2}$

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

$\sqrt{25+25}$

$\sqrt{50}$

$\overline{AC} = \sqrt{(-3+2)^2 + (-3-4)^2}$

$\sqrt{1+49}$

$\sqrt{50}$

$\overline{AB}$ and $\overline{AC}$ are congruent, there fore making $\triangle ABC$ isosceles because a $\triangle$ with at least two congruent side is a isosceles triangle

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

$A'(3,-1)$

$B'(-2,-6)$

$C'(2,-8)$

Score 5: The student's concluding statement of "all sides congruent" doesn't match the work of showing that two consecutive sides are congruent.

Question 35

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

$A(-2,4)$ $C'(2,-8)$
$A'(3,-1)$ $C(-3,-3)$

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

$$AA' = \frac{-1-4}{3+2} = \frac{-5}{5} = \frac{-1}{1}$$

$$CC' = \frac{-3+8}{-3-2} = \frac{5}{-5} = \frac{-1}{1}$$

$$AC = \frac{-3-4}{-3+2} = \frac{-7}{-1} = \frac{7}{1}$$

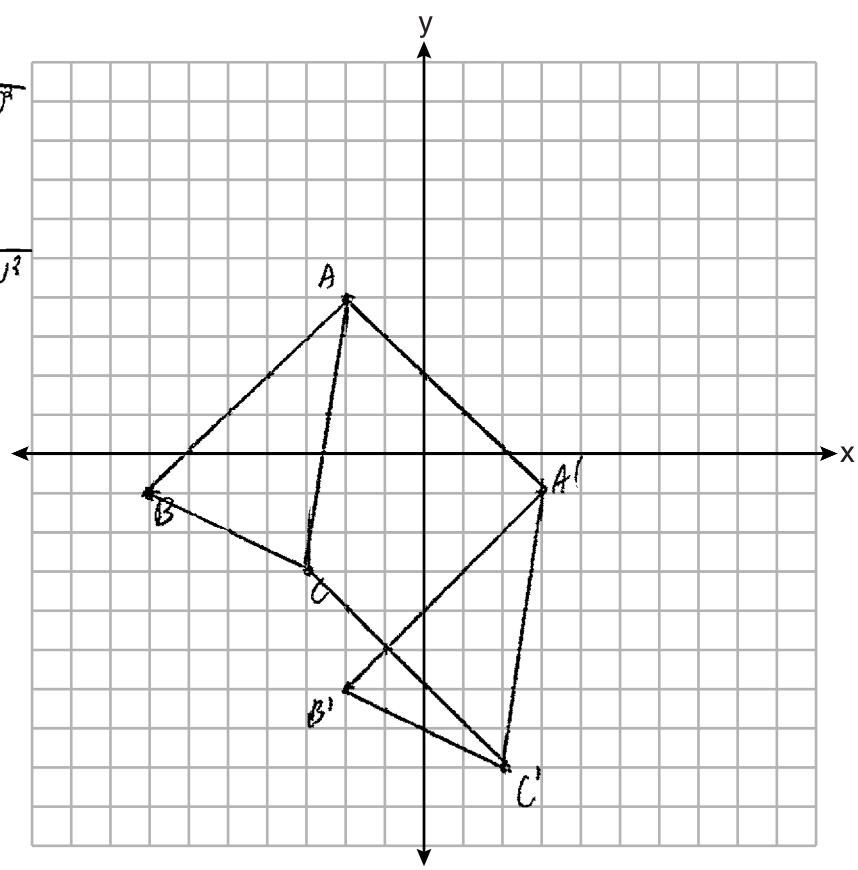
$$A'C' = \frac{-8+1}{2-3} = \frac{-7}{-1} = \frac{7}{1}$$

$\parallel$ $\parallel$ $\square$

$AA'C'C$ is a rhombus because opposite sides are parallel to each other and all sides are congruent to each other.

$AA' \sqrt{(-1-4)^2+(3+2)^2}$
$\sqrt{50}$

$AC \sqrt{(-3-4)^2+(-3+2)^2}$
$\sqrt{50}$



35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

$\triangle ABC$ is isosceles because sides $\overline{BA}$ and $\overline{AC}$ are $\cong$

$\overline{BA}$

$B(-7,-1)\ A(-2,4)$

$x_1\ y_1\ x_2\ y_2$

$d\sqrt{(-2+7)^2+(4+1)^2}$

$d\sqrt{5^2+5^2}$

$d\sqrt{50}$

$d=\sqrt{25}\sqrt{2}$

$d=5\sqrt{2}$

$\overline{AC}$

$A(-2,4)\ C(-3,-3)$

$x_1\ y_1\ x_2\ y_2$

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

$d=\sqrt{1+(-7)^2}$

$d=\sqrt{50}$

$d=5\sqrt{2}$

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

$A'(3,-1)$

$B'(-2,-6)$

$C'(2,-8)$

Score 4: The student made a conceptual error by stating $AA'C'C$ is a rhombus. The work only proves it is a parallelogram.

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

AA'

$A(-2,4)\ A'(3,-1)$

$m = \frac{y_2 - y_1}{x_2 - x_1} = -5$

$m = \frac{-1-4}{3+2} = \frac{-5}{5}$

CC'

$C(-3,-3)\ C'(2,-8)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{-8+3}{2+3}\ \frac{-5}{5}$

One pair of opposite sides are ∥ since they share the same slope.

AA'

$A(-2,4)\ A'(3,-1)$

$d\sqrt{(3+2)^2 + (-1-4)^2}$

$d = \sqrt{25+25}$

$d = 5\sqrt{2}$

CC'

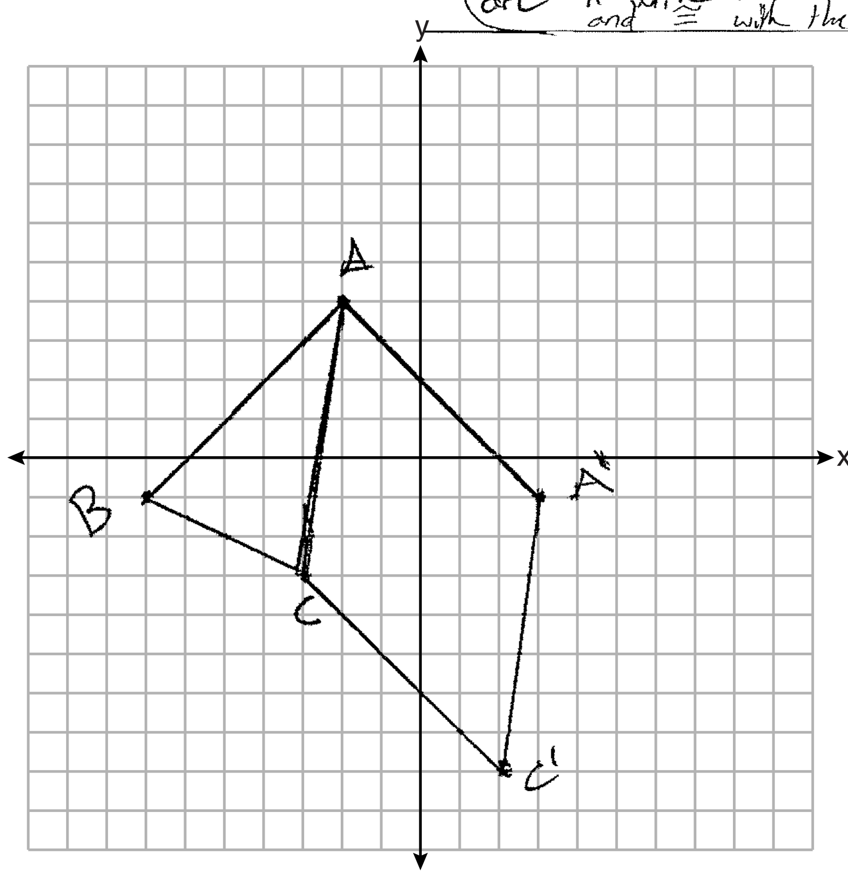
$C(-3,-3)\ C'(2,-8)$

$d\sqrt{(2+3)^2 + (-8+3)^2}$

$d = \sqrt{25+25}$

$d = 5\sqrt{2}$

Is a rhombus because one pair of opposite sides are ∥ with the same slope and ≅ with the same distance



35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

$d_{AB} = \sqrt{\Delta x^2 + \Delta y^2}$
$= \sqrt{(-5)^2 + (-5)^2}$
$= \sqrt{25 + 25}$
$d_{AB} = \sqrt{50}$

$d_{AC} = \sqrt{\Delta x^2 + \Delta y^2}$
$= \sqrt{(-1)^2 + (-7)^2}$
$= \sqrt{1 + 49}$
$d_{AC} = \sqrt{50}$

$\boxed{\text{Isosceles }\triangle\text{s have two} \cong \text{sides and } \triangle ABC \text{ has two} \cong \text{sides so } \triangle ABC \text{ is isosceles}}$

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

$A' = (3,-1)$
$B' = (-2,-6)$
$C' = (2,-8)$

Score 4: The student made a conceptual error in proving the rhombus by proving the diagonals are perpendicular without including that the quadrilateral is a parallelogram.

Question 35 continued

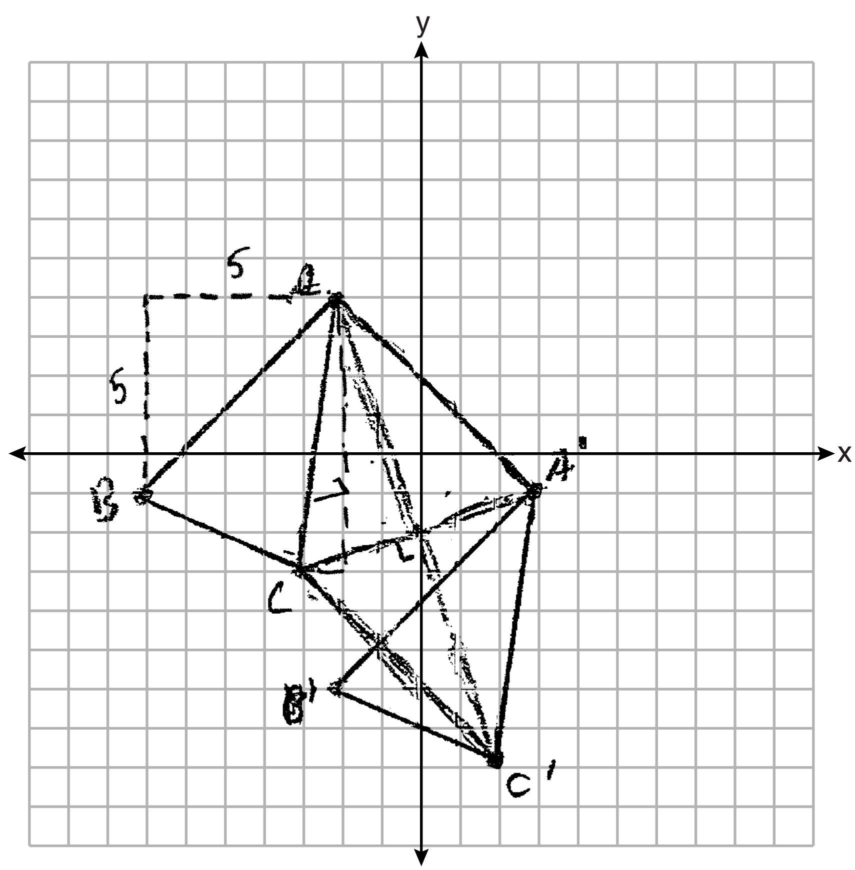
Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

slope $\overline{AC'} = \frac{\Delta y}{\Delta x} = \frac{-12}{4} = \frac{-3}{1}$

slope $\overline{CA'} = \frac{\Delta y}{\Delta x} = \frac{2}{6} = \frac{1}{3}$

negative reciprocals

AA'C'C is a rhombus because rhombus' have ⊥ diagonals and if two slopes lines have negative reciprocals they are ⊥, and shape AA'C'C has ⊥ diagonals.



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

$d(AB) = \sqrt{(-7-(-2))^2+(-1-4)^2}$
$= \sqrt{(-5)^2+(-5)^2}$
$= \sqrt{50}$

$d(BC) = \sqrt{(-3-(-7))^2+(-3-(-1))^2}$
$= \sqrt{(4)^2+(-2)^2}$
$= \sqrt{20}$

$d(AC) = \sqrt{(-3-(-2))^2+(-3-4)^2}$
$= \sqrt{1+49}$
$= \sqrt{50}$

$\triangle ABC$ is isoceles because two sides are congruent.

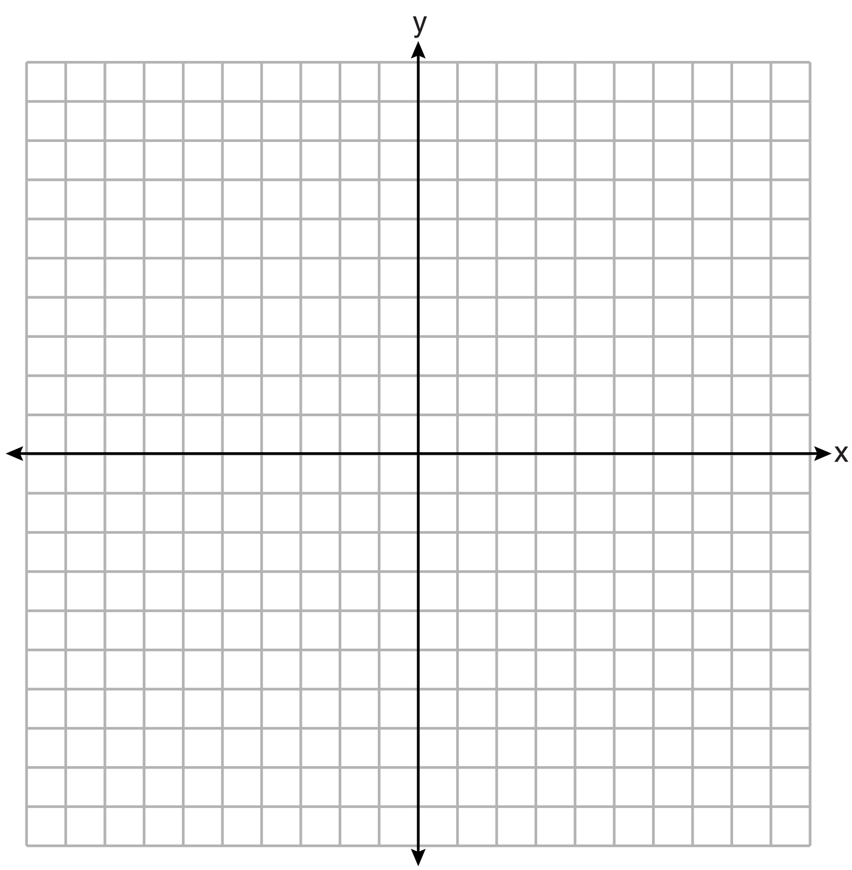
State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

$A(-2,4) \rightarrow A'(3,-1)$
$B(-7,-1) \rightarrow B'(-2,-6)$
$C(-3,-3) \rightarrow C'(2,-8)$

Score 3: The student correctly proved triangle *ABC* is isosceles and stated the coordinates of the image of triangle *ABC*.

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

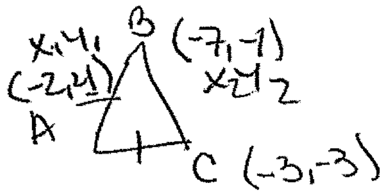


Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]



$\triangle ABC$ is isosceles b/c the distance of $\overline{AC}$ = distance of $\overline{AB}$

$d_{AC} = \sqrt{(-3+2)^2 + (-3-4)^2}$

$d_{AC} = \sqrt{50}$

$d_{AB} = \sqrt{(-7+2)^2 + (-1-4)^2}$

$= \sqrt{50}$

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

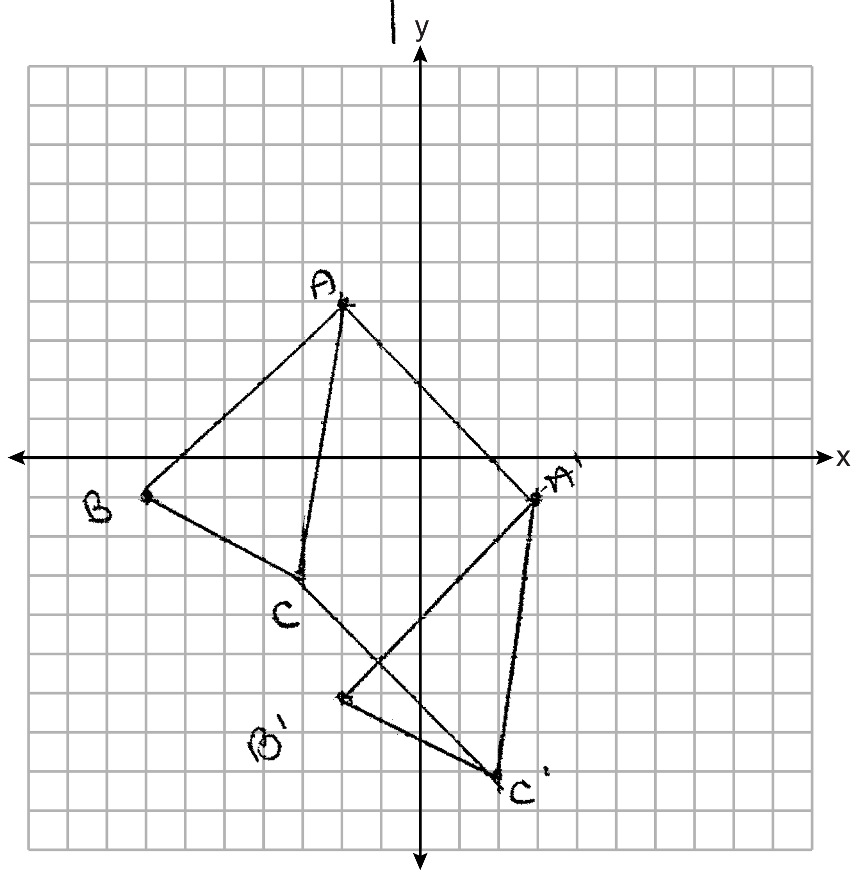
A' (3,-1)
B' (-2,-6)
C' (2,-8)

Score 3: The student correctly proved $\triangle ABC$ is isosceles. The student stated the coordinates of the image of triangle ABC correctly. Not enough correct work to prove the rhombus was shown to earn any additional credit.

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

Statements	Reasons.
① Figure $AA'C'C$	① Given
② $\overline{AA'} \parallel \overline{C'C}$, $\overline{AC} \parallel \overline{A'C'}$	② Slopes that are the same make $\parallel$ lines.
③ $\overline{AA'} \cong \overline{C'C}$, $\overline{AC} \cong \overline{A'C'}$	③ distance was preserved b/c translation is a rigid motion.
④ $AA'C'C$ is a rhombus.	④ opp sides are $\parallel$ and $\cong$



35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

x y   x y   x y

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

$AB = \sqrt{(-2+7)^2 + (4+1)^2}$

25 + 25

$\sqrt{50}$

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

1 + 49

$\sqrt{50}$

∴ $\triangle ABC$ is a isosceles triangle because two sides have equal lengths

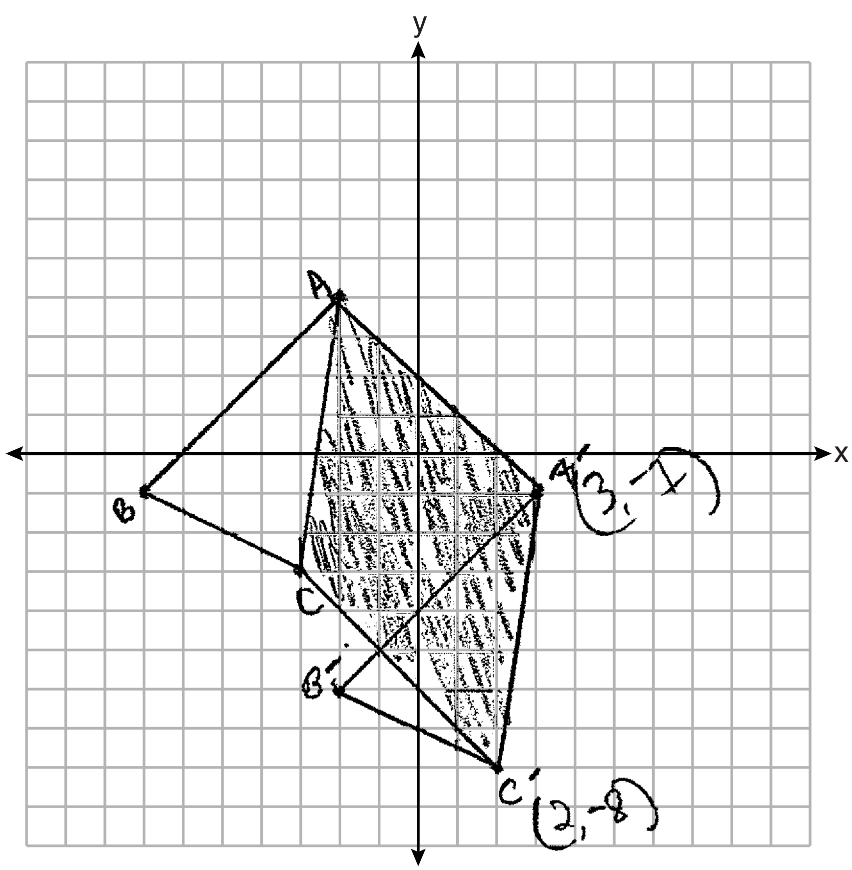
State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

(5,5)

Score 2: The student correctly proved triangle *ABC* is isosceles, but did not state the coordinates of B'. Rhombus $AA'C'C$ was not proven.

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

$\overline{AB} = \sqrt{(-2--7)^2 + (-2--1)^2}$

$5^2 + -1^2$

$25 + 1$

$\sqrt{26}$

$\overline{BC} = \sqrt{(-7--3)^2 + (-1--3)}$

$(-4)^2 + (2)^2$

$16 + 4$

$\sqrt{20}$

$\overline{CA} = \sqrt{(-2--3) + (4+-3)}$

$(1)^2 + (7)^2$

$\sqrt{50}$

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

A' (3, -1)

B' (-2, -6)

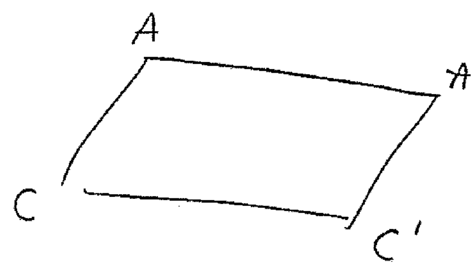
C' (2, -8)

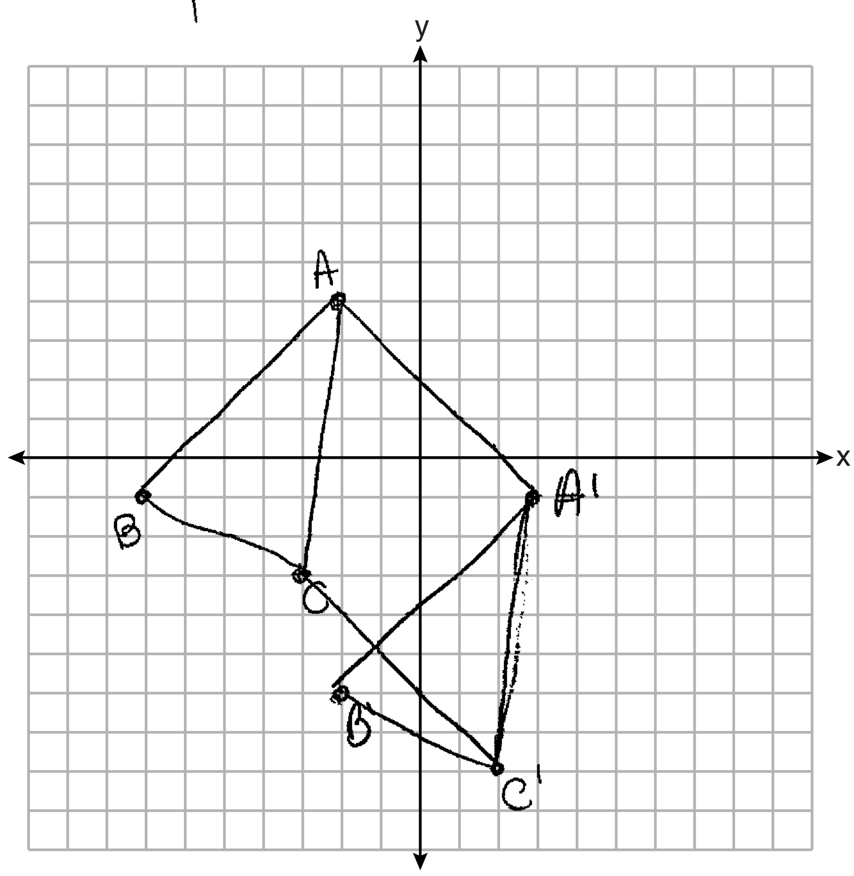
Score 1: The student stated the coordinates of the image of triangle ABC, but not enough correct relevant work was shown to receive more credit.

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

Statement	reason





Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

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

$\overline{AB}$ $d=\sqrt{(\Delta x)^2+(\Delta y)^2}$ $d=\sqrt{(-2+7)^2+(4+1)^2}$

$d=\sqrt{25+25}$

$d=\sqrt{50}$

$AC= d=\sqrt{(-2+3)^2+(4+3)^2}$

$d=\sqrt{1^2+49}$ $d=\sqrt{50}$

$\overline{AC}\cong\overline{AB}$

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

A - (-2,4)

A - (3,-1)

C - (-3,-3)

C' - (-2,8)

Score 1: The student showed correct work to find the lengths of AB and AC, but the coordinates of C' were stated incorrectly and B' was not stated. The student made a conceptual error in proving the rhombus and made computational errors.

Question 35

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

$m = \frac{\Delta y}{\Delta x}$

$A \quad d = \sqrt{(\Delta x)^2 + (\Delta y)^2}$

$\overline{AA'} \quad \frac{\Delta y}{\Delta x} \quad \frac{(4+1)}{(-2-3)} \quad \frac{5}{-5} = -1$

$\overline{A'C'} \quad \frac{\Delta y}{\Delta x} = \frac{-1-8}{3+2} \quad \frac{-9}{5} =$

$\overline{AA'}$ is not perpendicular to $\overline{A'C'}$

$\overline{AA'} \quad d = \sqrt{(5)^2 + (-5)^2} \quad d = \sqrt{25+25} \quad d = \sqrt{50}$

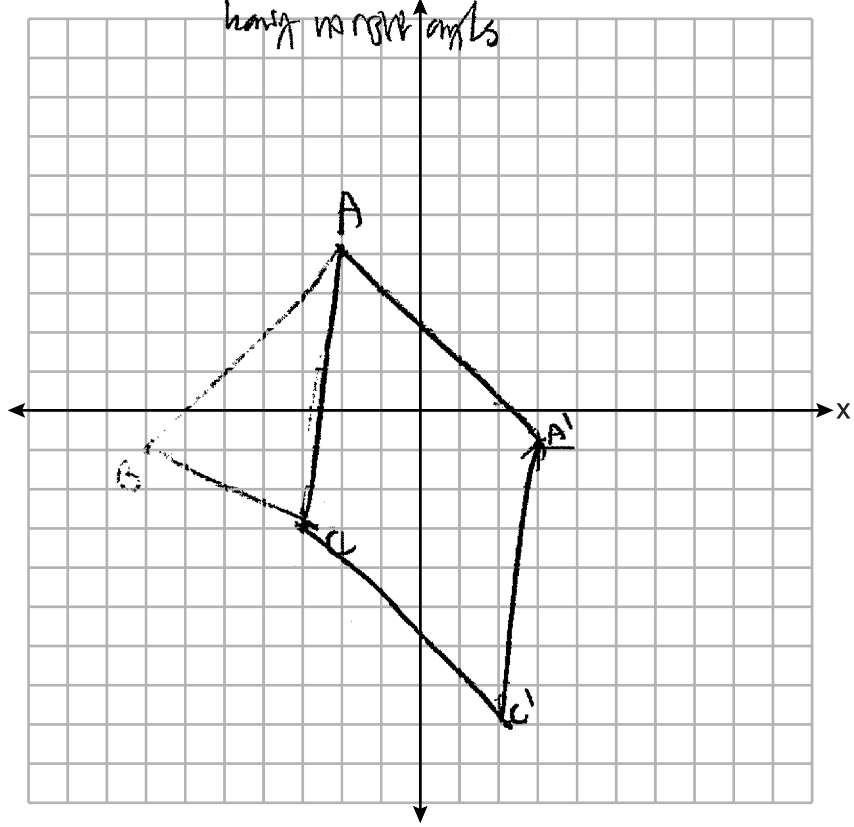
$\overline{CC'} \quad d = \sqrt{(-5)^2 + 5^2} \quad d = \sqrt{25+25} \quad d = \sqrt{50}$

$\overline{AA'} \cong \overline{CC'}$

$\overline{CC'} \parallel \overline{AA'}$

$\overline{CC'} \quad \frac{\Delta y}{\Delta x} = \frac{-3-8}{-3+2} = \frac{-11}{-1} = 11$

$AA'C'C$ is a rhombus due to the opposite parallel congruent sides and having no right angles



35 The coordinates of the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-7,-1)$, and $C(-3,-3)$.

Prove that $\triangle ABC$ is isosceles.

[The use of the set of axes on the next page is optional.]

$\triangle ABC$ is isosceles it has 2 $\cong$ sides, and 2 $\cong$ $\measuredangle$s in the $\triangle$.

State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$, after a translation 5 units to the right and 5 units down.

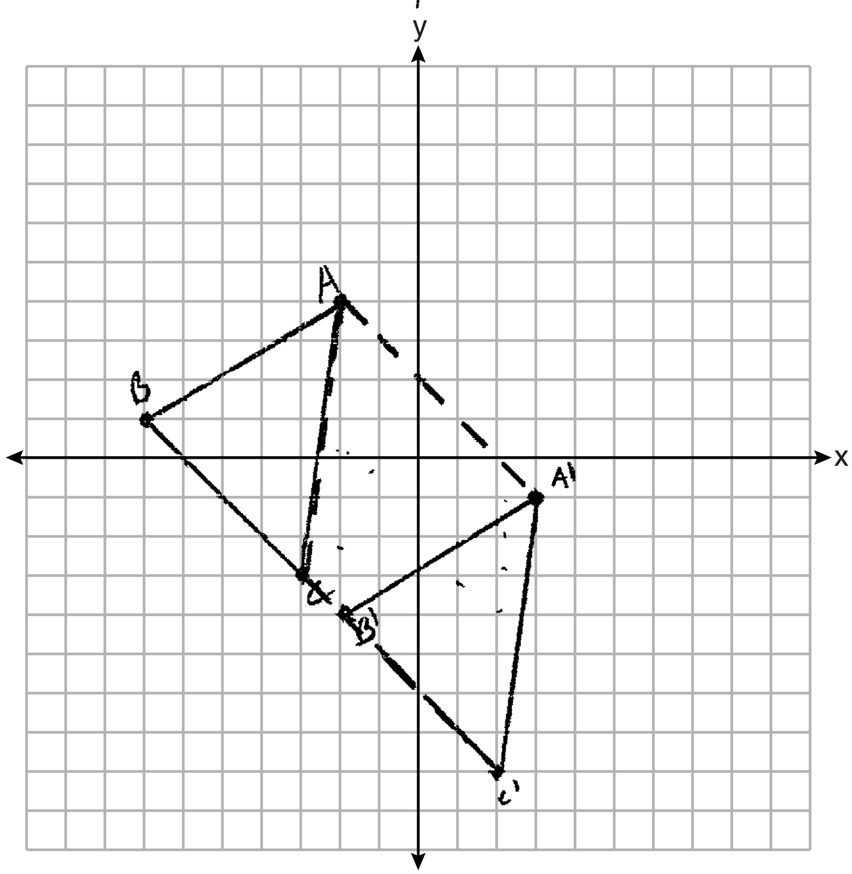
$A' = (3,-1)$
$B' = (-2,-5)$
$C' = (2,-8)$

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

Question 35 continued

Prove that quadrilateral $AA'C'C$ is a rhombus.
[The use of the set of axes below is optional.]

Statements	Reasons
1.)	1.) Given



Regents Examination in Geometry – June 2022

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

(Use for the June 2022 exam only.)

Raw Score	Scale Score	Performance Level
80	**100**	5
79	**98**	5
78	**97**	5
77	**96**	5
76	**95**	5
75	**94**	5
74	**93**	5
73	**92**	5
72	**91**	5
71	**90**	5
70	**89**	5
69	**88**	5
68	**88**	5
67	**87**	5
66	**86**	5
65	**86**	5
64	**85**	5
63	**84**	4
62	**84**	4
61	**83**	4
60	**83**	4
59	**82**	4
58	**82**	4
57	**81**	4
56	**81**	4
55	**80**	4
54	**80**	4

Raw Score	Scale Score	Performance Level
53	**79**	3
52	**79**	3
51	**78**	3
50	**78**	3
49	**77**	3
48	**77**	3
47	**76**	3
46	**76**	3
45	**75**	3
44	**75**	3
43	**74**	3
42	**74**	3
41	**73**	3
40	**72**	3
39	**72**	3
38	**71**	3
37	**70**	3
36	**70**	3
35	**69**	3
34	**68**	3
33	**67**	3
32	**66**	3
31	**65**	3
30	**64**	2
29	**63**	2
28	**62**	2
27	**61**	2

Raw Score	Scale Score	Performance Level
26	**60**	2
25	**59**	2
24	**57**	2
23	**56**	2
22	**55**	2
21	**53**	1
20	**52**	1
19	**50**	1
18	**48**	1
17	**47**	1
16	**45**	1
15	**43**	1
14	**41**	1
13	**39**	1
12	**37**	1
11	**34**	1
10	**32**	1
9	**29**	1
8	**27**	1
7	**24**	1
6	**21**	1
5	**18**	1
4	**15**	1
3	**11**	1
2	**8**	1
1	**4**	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.