

GEOMETRY

Wednesday, August 14, 2019 — 12:30 to 3:30 p.m., only

Student Name: _____

School Name: _____

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

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

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

This examination has four parts, with a total of 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.

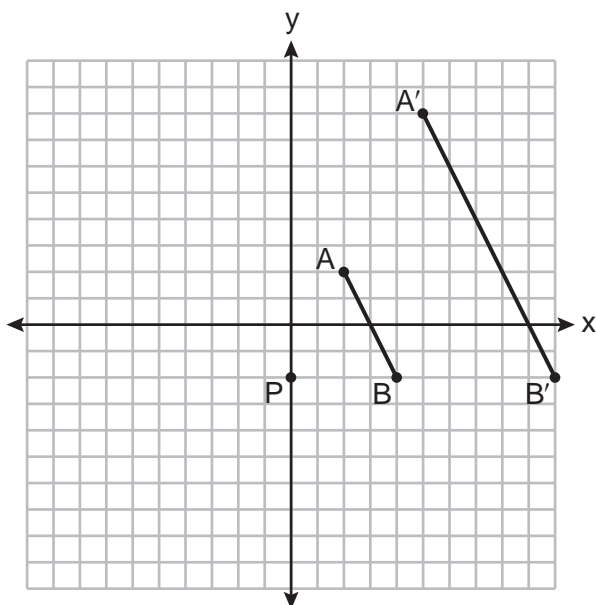
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

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 On the set of axes below, \overline{AB} is dilated by a scale factor of $\frac{5}{2}$ centered at point P .



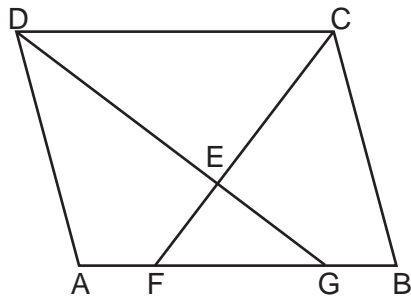
Which statement is always true?

- (1) $\overline{PA} \cong \overline{AA'}$ (3) $AB = A'B'$
 (2) $\overline{AB} \parallel \overline{A'B'}$ (4) $\frac{5}{2}(A'B') = AB$
- 2 The coordinates of the vertices of parallelogram $CDEH$ are $C(-5,5)$, $D(2,5)$, $E(-1,-1)$, and $H(-8,-1)$. What are the coordinates of P , the point of intersection of diagonals \overline{CE} and \overline{DH} ?
- (1) $(-2,3)$ (3) $(-3,2)$
 (2) $(-2,2)$ (4) $(-3,-2)$

Use this space for computations.

- 6 What are the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 = 8x - 6y + 39$?
- (1) center $(-4,3)$ and radius 64
 - (2) center $(4,-3)$ and radius 64
 - (3) center $(-4,3)$ and radius 8
 - (4) center $(4,-3)$ and radius 8

- 7 In the diagram below of parallelogram $ABCD$, \overline{AFGB} , \overline{CF} bisects $\angle DCB$, \overline{DG} bisects $\angle ADC$, and \overline{CF} and \overline{DG} intersect at E .

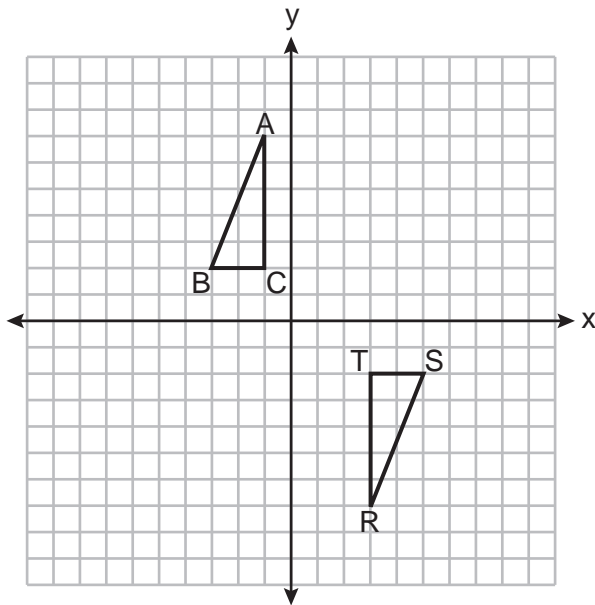


If $m\angle B = 75^\circ$, then the measure of $\angle EFA$ is

- (1) 142.5°
 - (2) 127.5°
 - (3) 52.5°
 - (4) 37.5°
- 8 What is an equation of a line that is perpendicular to the line whose equation is $2y + 3x = 1$?
- (1) $y = \frac{2}{3}x + \frac{5}{2}$
 - (2) $y = \frac{3}{2}x + 2$
 - (3) $y = -\frac{2}{3}x + 1$
 - (4) $y = -\frac{3}{2}x + \frac{1}{2}$

Use this space for computations.

9 Triangles ABC and RST are graphed on the set of axes below.



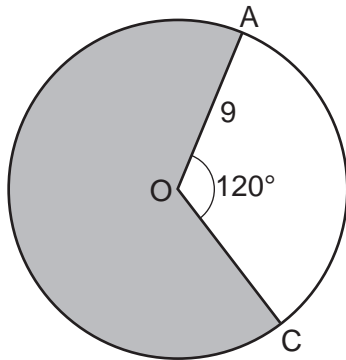
Which sequence of rigid motions will prove $\triangle ABC \cong \triangle RST$?

- (1) a line reflection over $y = x$
 - (2) a rotation of 180° centered at $(1,0)$
 - (3) a line reflection over the x -axis followed by a translation of 6 units right
 - (4) a line reflection over the x -axis followed by a line reflection over $y = 1$
- 10 If the line represented by $y = -\frac{1}{4}x - 2$ is dilated by a scale factor of 4 centered at the origin, which statement about the image is true?
- (1) The slope is $-\frac{1}{4}$ and the y -intercept is -8 .
 - (2) The slope is $-\frac{1}{4}$ and the y -intercept is -2 .
 - (3) The slope is -1 and the y -intercept is -8 .
 - (4) The slope is -1 and the y -intercept is -2 .

Use this space for computations.

- 11 Square $MATH$ has a side length of 7 inches. Which three-dimensional object will be formed by continuously rotating square $MATH$ around side \overline{AT} ?
- (1) a right cone with a base diameter of 7 inches
 - (2) a right cylinder with a diameter of 7 inches
 - (3) a right cone with a base radius of 7 inches
 - (4) a right cylinder with a radius of 7 inches

- 12 Circle O with a radius of 9 is drawn below. The measure of central angle AOC is 120° .



What is the area of the shaded sector of circle O ?

- (1) 6π
 - (2) 12π
 - (3) 27π
 - (4) 54π
- 13 In quadrilateral $QRST$, diagonals \overline{QS} and \overline{RT} intersect at M . Which statement would always prove quadrilateral $QRST$ is a parallelogram?
- (1) $\angle TQR$ and $\angle QRS$ are supplementary.
 - (2) $\overline{QM} \cong \overline{SM}$ and $\overline{QT} \cong \overline{RS}$
 - (3) $\overline{QR} \cong \overline{TS}$ and $\overline{QT} \cong \overline{RS}$
 - (4) $\overline{QR} \cong \overline{TS}$ and $\overline{QT} \parallel \overline{RS}$

Use this space for computations.

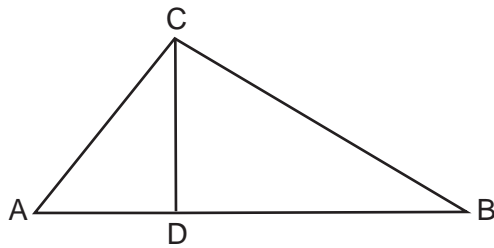
14 A standard-size golf ball has a diameter of 1.680 inches. The material used to make the golf ball weighs 0.6523 ounce per cubic inch. What is the weight, to the *nearest hundredth of an ounce*, of one golf ball?

- (1) 1.10 (3) 2.48
(2) 1.62 (4) 3.81

15 Chelsea is sitting 8 feet from the foot of a tree. From where she is sitting, the angle of elevation of her line of sight to the top of the tree is 36° . If her line of sight starts 1.5 feet above ground, how tall is the tree, to the *nearest foot*?

- (1) 8 (3) 6
(2) 7 (4) 4

16 In the diagram below of right triangle ABC , altitude \overline{CD} intersects hypotenuse \overline{AB} at D .

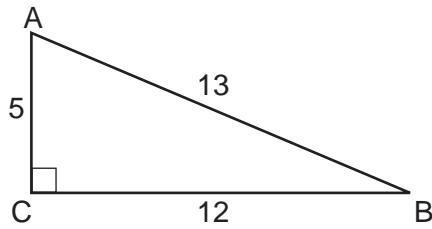


Which equation is always true?

- (1) $\frac{AD}{AC} = \frac{CD}{BC}$ (3) $\frac{AC}{CD} = \frac{BC}{CD}$
(2) $\frac{AD}{CD} = \frac{BD}{CD}$ (4) $\frac{AD}{AC} = \frac{AC}{BD}$

Use this space for
computations.

19 In $\triangle ABC$ below, angle C is a right angle.



Which statement must be true?

- (1) $\sin A = \cos B$ (3) $\sin B = \tan A$
(2) $\sin A = \tan B$ (4) $\sin B = \cos B$

20 In right triangle RST , altitude \overline{TV} is drawn to hypotenuse \overline{RS} .
If $RV = 12$ and $RT = 18$, what is the length of \overline{SV} ?

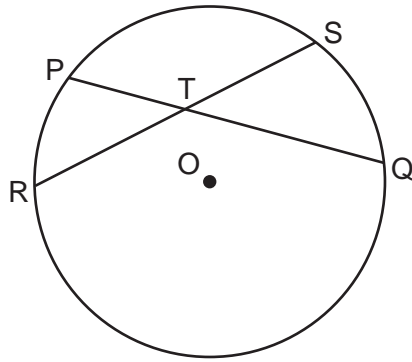
- (1) $6\sqrt{5}$ (3) $6\sqrt{6}$
(2) 15 (4) 27

21 What is the volume, in cubic centimeters, of a right square pyramid
with base edges that are 64 cm long and a slant height of 40 cm?

- (1) 8192.0 (3) 32,768.0
(2) $13,653.\bar{3}$ (4) $54,613.\bar{3}$

22 In the diagram below, chords \overline{PQ} and \overline{RS} of circle O intersect at T .

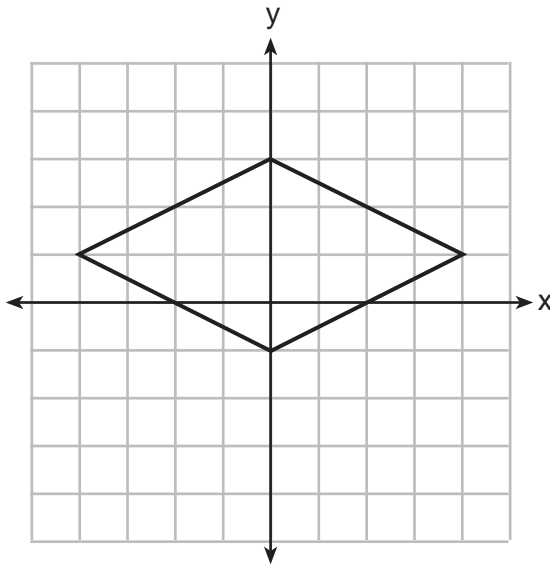
Use this space for computations.



Which relationship must always be true?

- (1) $RT = TQ$ (3) $RT + TS = PT + TQ$
(2) $RT = TS$ (4) $RT \times TS = PT \times TQ$

23 A rhombus is graphed on the set of axes below.



Which transformation would carry the rhombus onto itself?

- (1) 180° rotation counterclockwise about the origin
(2) reflection over the line $y = \frac{1}{2}x + 1$
(3) reflection over the line $y = 0$
(4) reflection over the line $x = 0$

**Use this space for
computations.**

24 A 15-foot ladder leans against a wall and makes an angle of 65° with the ground. What is the horizontal distance from the wall to the base of the ladder, to the *nearest tenth of a foot*?

(1) 6.3

(3) 12.9

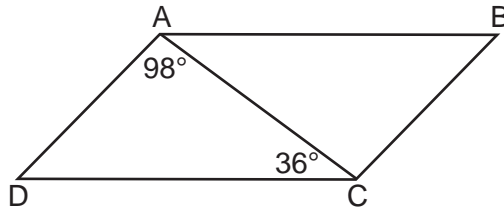
(2) 7.0

(4) 13.6

Part II

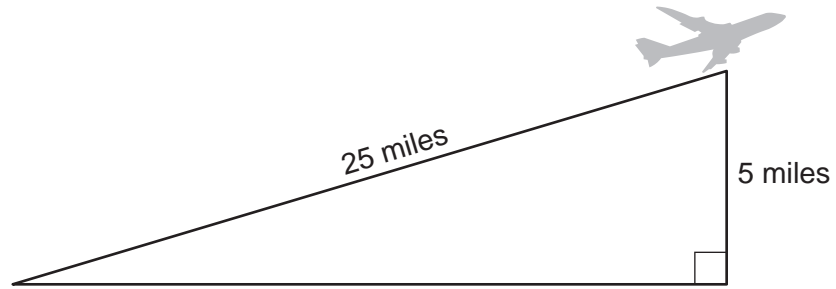
Answer all 7 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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 In parallelogram $ABCD$ shown below, $m\angle DAC = 98^\circ$ and $m\angle ACD = 36^\circ$.



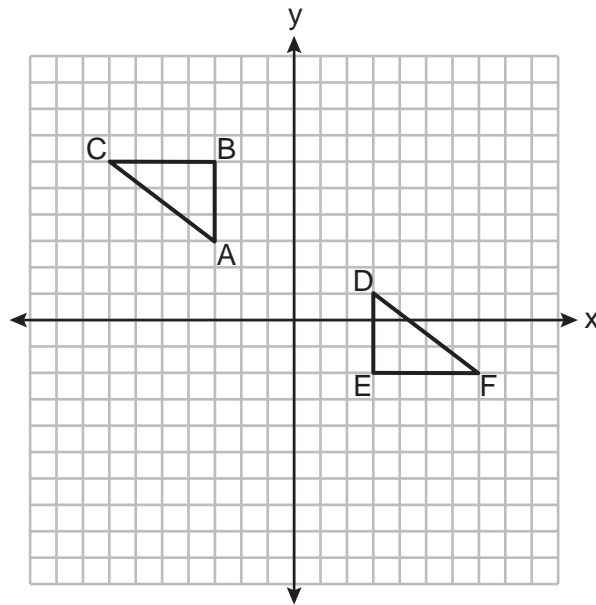
What is the measure of angle B ? Explain why.

26 An airplane took off at a constant angle of elevation. After the plane traveled for 25 miles, it reached an altitude of 5 miles, as modeled below.



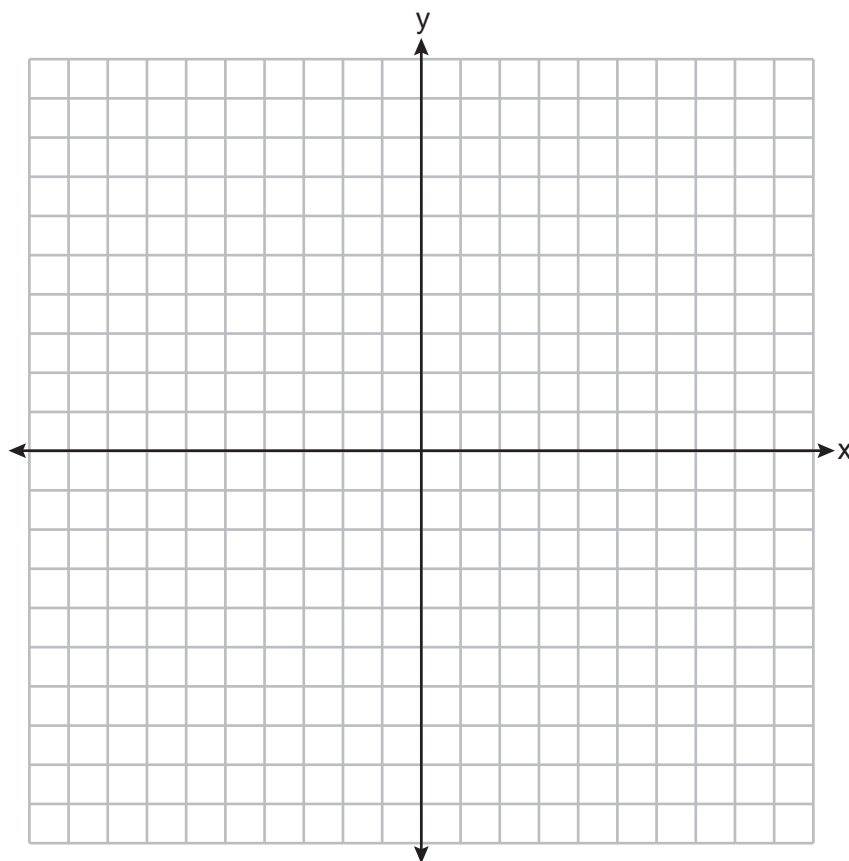
To the *nearest tenth of a degree*, what was the angle of elevation?

27 On the set of axes below, $\triangle ABC \cong \triangle DEF$.

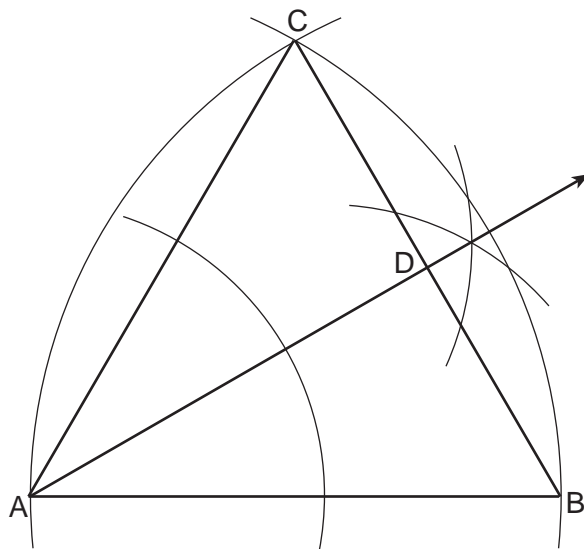


Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle DEF$.

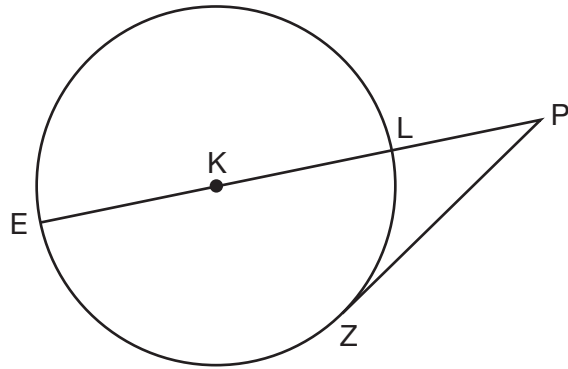
28 The vertices of $\triangle ABC$ have coordinates $A(-2, -1)$, $B(10, -1)$, and $C(4, 4)$. Determine and state the area of $\triangle ABC$. [The use of the set of axes below is optional.]



29 Using the construction below, state the degree measure of $\angle CAD$. Explain why.



30 In the diagram below of circle K , secant \overline{PLKE} and tangent \overline{PZ} are drawn from external point P .



If $m\widehat{LZ} = 56^\circ$, determine and state the degree measure of angle P .

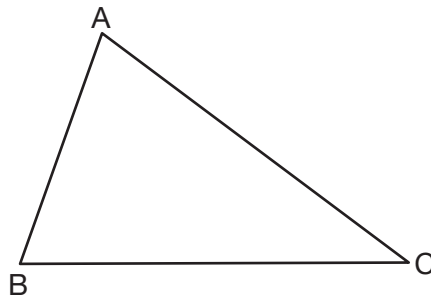
31 A large water basin is in the shape of a right cylinder. The inside of the basin has a diameter of $8\frac{1}{4}$ feet and a height of 3 feet. Determine and state, to the *nearest cubic foot*, the number of cubic feet of water that it will take to fill the basin to a level of $\frac{1}{2}$ foot from the top.

Part III

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

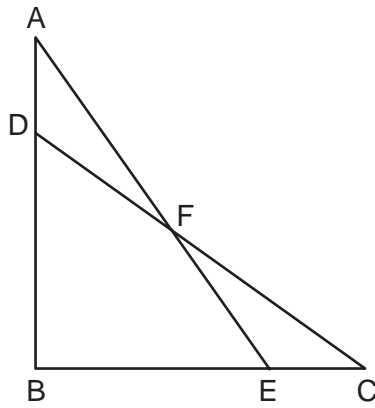
32 Triangle ABC is shown below. Using a compass and straightedge, construct the dilation of $\triangle ABC$ centered at B with a scale factor of 2.

[Leave all construction marks.]



Is the image of $\triangle ABC$ similar to the original triangle? Explain why.

33 In the diagram below, $\triangle ABE \cong \triangle CBD$.



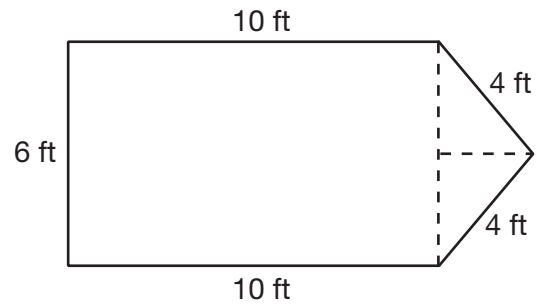
Prove: $\triangle AFD \cong \triangle CFE$

- 34 A cargo trailer, pictured below, can be modeled by a rectangular prism and a triangular prism. Inside the trailer, the rectangular prism measures 6 feet wide and 10 feet long. The walls that form the triangular prism each measure 4 feet wide inside the trailer. The diagram below is of the floor, showing the inside measurements of the trailer.

Cargo Trailer



Cargo Trailer Floor



If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the *nearest cubic foot*?

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 for the question to determine your answer. Note that diagrams are not necessarily drawn to scale. For the question 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. [6]

35 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$.

Prove that $\triangle ABC$ is isosceles.

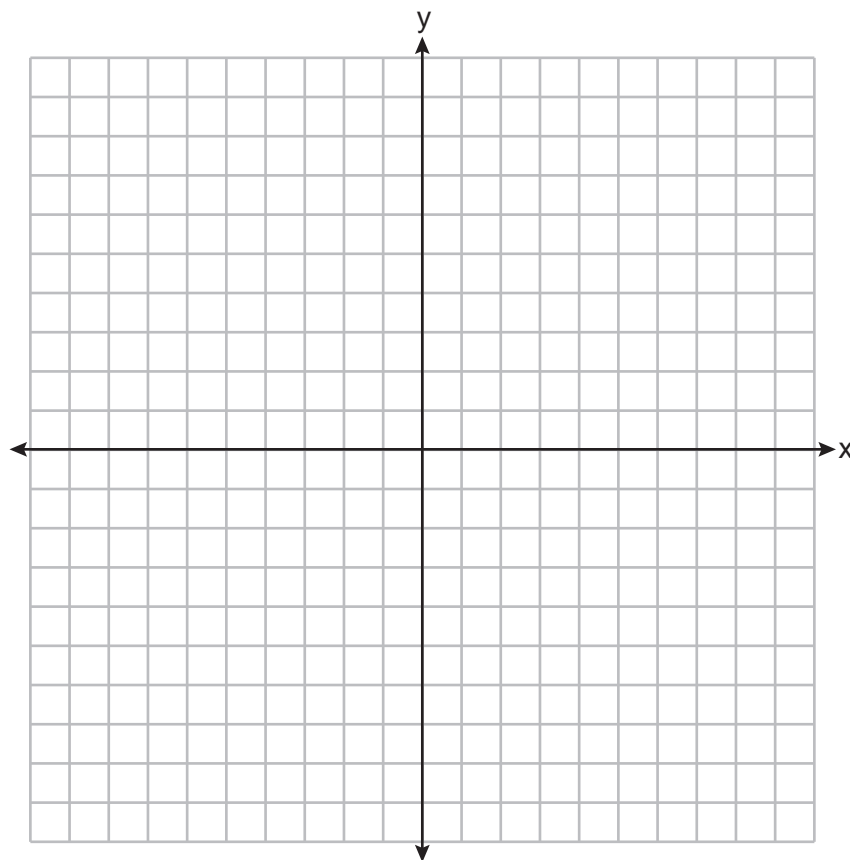
[The use of the set of axes on the next page is optional.]

State the coordinates of point D such that quadrilateral $ABCD$ is a square.

Question 35 is continued on the next page.

Question 35 continued

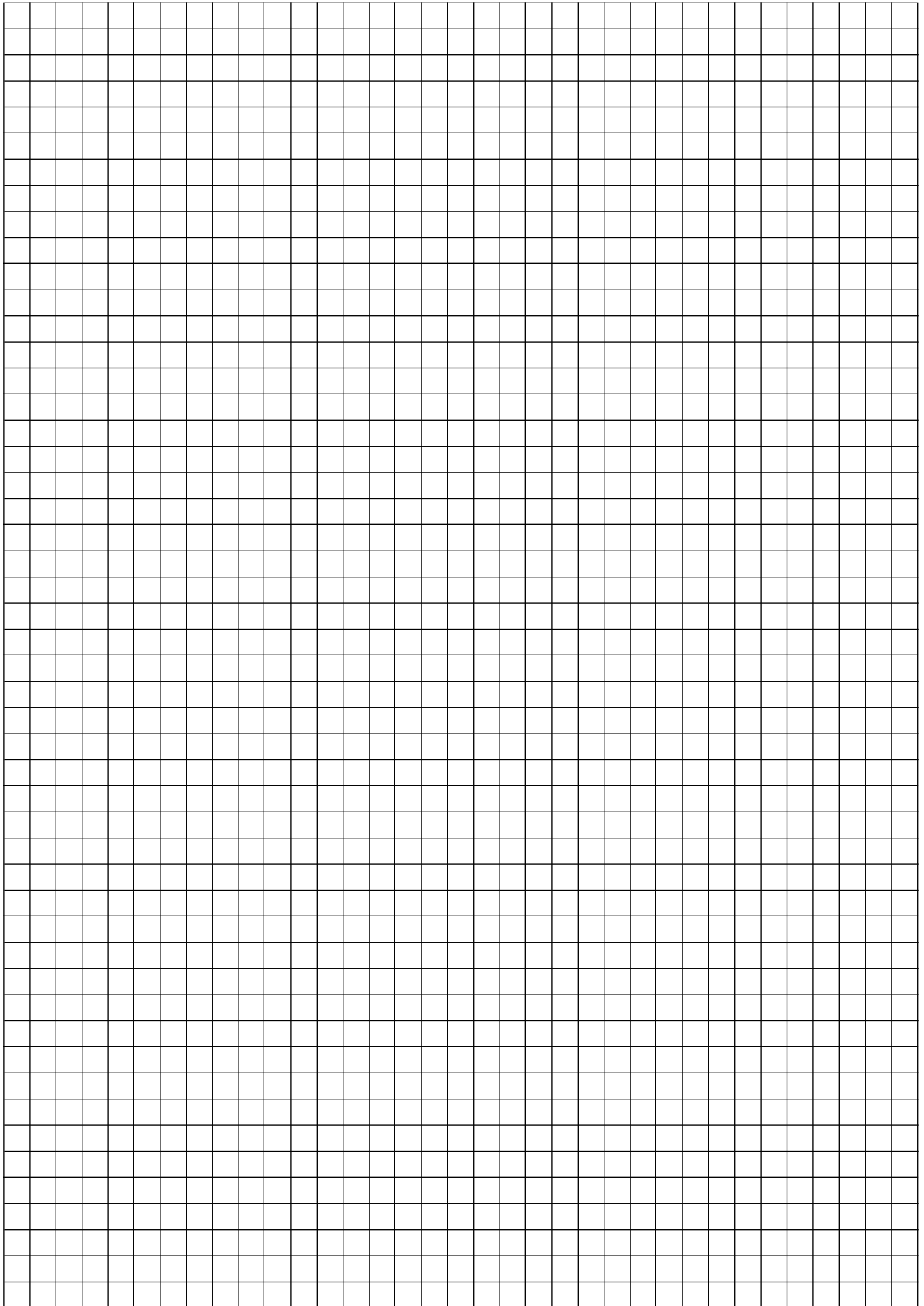
Prove that your quadrilateral $ABCD$ is a square.
[The use of the set of axes below is optional.]



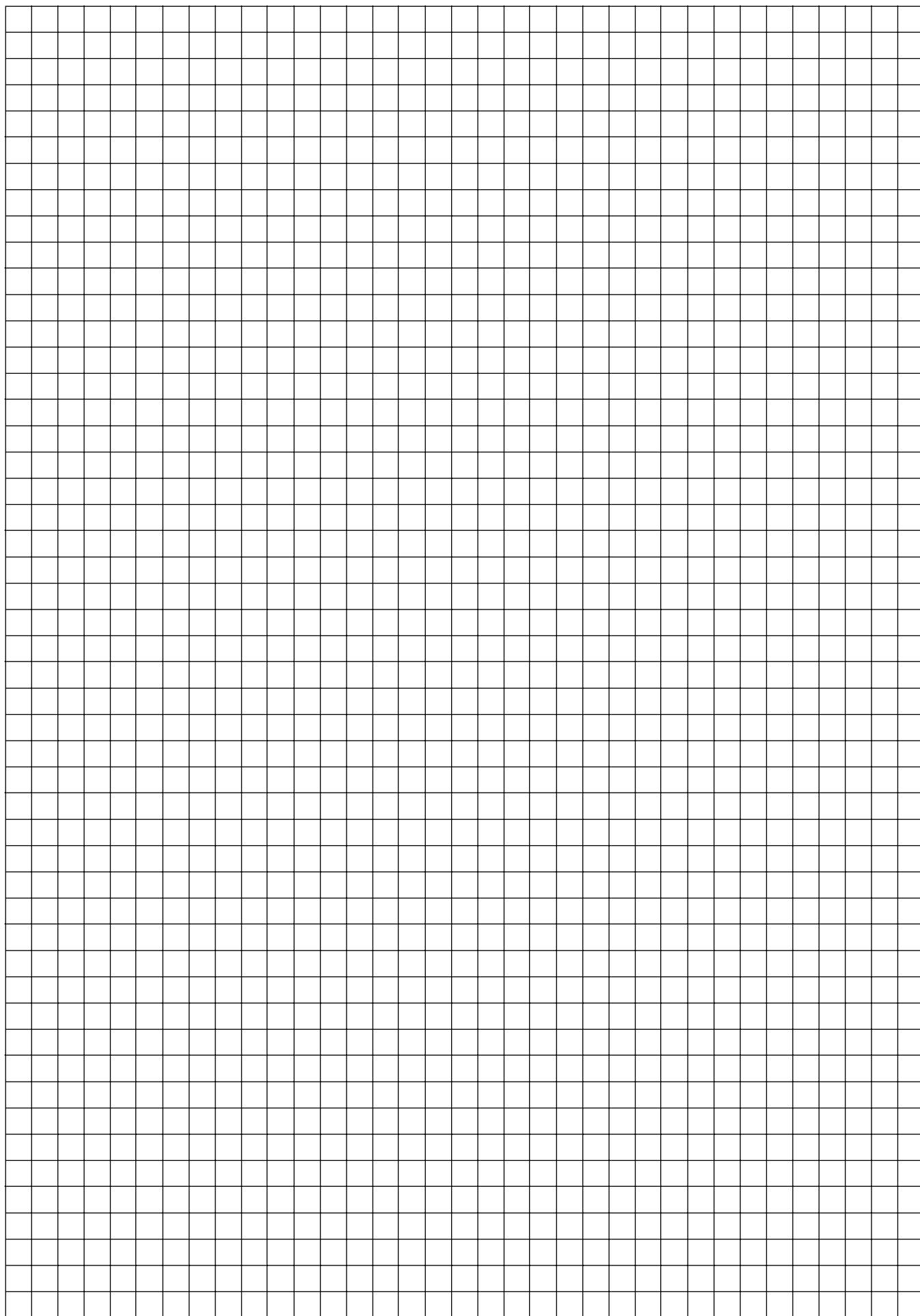
Scrap Graph Paper — This sheet will *not* be scored.

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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

Regents Examination in Geometry – August 2019

Scoring Key: Part I (Multiple-Choice Questions)

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

Regents Examination in Geometry – August 2019

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

Examination	Date	Question Number	Scoring Key	Question Type	Credit	Weight
Geometry	August '19	25	-	CR	2	1
Geometry	August '19	26	-	CR	2	1
Geometry	August '19	27	-	CR	2	1
Geometry	August '19	28	-	CR	2	1
Geometry	August '19	29	-	CR	2	1
Geometry	August '19	30	-	CR	2	1
Geometry	August '19	31	-	CR	2	1
Geometry	August '19	32	-	CR	4	1
Geometry	August '19	33	-	CR	4	1
Geometry	August '19	34	-	CR	4	1
Geometry	August '19	35	-	CR	6	1

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

The chart for determining students' final examination scores for the **August 2019 Regents Examination in Geometry** will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> 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

Wednesday, August 14, 2019 — 12:30 to 3:30 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.p12.nysed.gov/assessment/> and select the link "Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

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

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.p12.nysed.gov/assessment/> on Wednesday, August 14, 2019. 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] 46, and a correct explanation is written.

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

or

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

or

[1] An appropriate explanation is written, but $m\angle B$ is missing.

or

[1] 46, but the explanation is missing, incorrect, or incomplete.

[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] 11.5, 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 trigonometric equation is written, but no further correct work is shown.

or

[1] 11.5, but no work is shown.

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

- (27) [2] A correct sequence of rigid motions is written.
- [1] An appropriate sequence of rigid motions is written, but one conceptual error is made.
- or*
- [1] An appropriate sequence of rigid motions is written, but it is incomplete or partially correct.
- [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] 30, and correct work is shown.
- [1] Appropriate work is shown, but one computational or graphing error is made.
- or*
- [1] Appropriate work is shown, but one conceptual error is made.
- or*
- [1] 30, 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.
- (29) [2] 30, and a correct explanation is written.
- [1] 30, but the explanation is missing, incorrect, or incomplete.
- or*
- [1] An explanation identifying the construction as a construction of an equilateral triangle and an angle bisector is given, but 30 is not stated.
- [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] 34, 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] A correct equation is written to find the degree measure of angle P , but no further correct work is shown.

or

[1] 34, 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] 134, 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] 134, but no work is shown.

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

Part III

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

(32) [4] A correct construction is drawn showing all construction arcs. Yes is indicated, and a correct explanation is given.

[3] An appropriate construction is drawn, but one construction error is made. Yes, and a correct explanation is given.

or

[3] A correct construction is drawn. Yes, and an incomplete or partially correct explanation is given.

[2] A correct construction is drawn, but no further correct work is shown.

or

[2] Yes, and a correct explanation of why a dilated triangle is similar to its image is written, but no further correct work is shown.

[1] An appropriate construction is drawn, but one construction error is made. The explanation is missing or incorrect.

or

[1] All appropriate construction arcs are drawn, but the triangle is not drawn. 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.

- (33) [4] A complete and correct proof that includes a concluding statement is written.
- [3] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement and/or reason is missing or incorrect, or the concluding statement is missing.
- [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] 442, and correct work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or***
- [3] Correct work is shown to determine the total area of the base of the trailer, but no further correct work is shown.
- [2] Appropriate work is shown, but two 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 the triangular prism of the trailer, but no further correct work is shown.
- or***
- [2] Correct work is shown to determine the volume of the rectangular prism and the height of the triangular base, 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 height of the triangular base of the trailer, but no further correct work is shown.
- or***
- [1] Appropriate work is shown to find the volume of the rectangular prism, but no further correct work is shown.
- or***
- [1] 442, 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 an isosceles triangle. $D(0, -4)$ is stated, and correct work is shown to prove $ABCD$ is a square. Correct concluding statements are made.
- [5] Appropriate work is shown, but one computational or graphing error is made.
- or**
- [5] Appropriate work is shown, but one concluding statement is missing or incorrect.
- or**
- [5] Correct proofs are written, but $D(0, -4)$ is not stated. Correct concluding statements are made.
- [4] Appropriate work is shown, but two computational or graphing errors are made.
- or**
- [4] Appropriate work is shown, but one conceptual error is made.
- or**
- [4] $D(0, -4)$ is stated, and correct work is shown to prove $ABCD$ is a square, and a correct concluding statement is made. No further correct work is shown.
- [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 and one computational or graphing error are made.
- or**
- [3] Correct work is shown to prove $\triangle ABC$ is an isosceles triangle, $D(0, -4)$ is stated, and a correct concluding statement is made. No further correct work is shown.

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

or

[2] Appropriate work is shown, but two conceptual errors are made.

or

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

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

or

[1] $D(0, -4)$ is stated, but no further correct work is shown.

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

**Map to the Learning Standards
Geometry
August 2019**

Question	Type	Credits	Cluster
1	Multiple Choice	2	G-SRT.A
2	Multiple Choice	2	G-GPE.B
3	Multiple Choice	2	G-GPE.B
4	Multiple Choice	2	G-CO.C
5	Multiple Choice	2	G-CO.C
6	Multiple Choice	2	G-GPE.A
7	Multiple Choice	2	G-CO.C
8	Multiple Choice	2	G-GPE.B
9	Multiple Choice	2	G-CO.B
10	Multiple Choice	2	G-SRT.A
11	Multiple Choice	2	G-GMD.B
12	Multiple Choice	2	G-C.B
13	Multiple Choice	2	G-CO.C
14	Multiple Choice	2	G-MG.A
15	Multiple Choice	2	G-SRT.C
16	Multiple Choice	2	G-SRT.B
17	Multiple Choice	2	G-MG.A
18	Multiple Choice	2	G-SRT.B
19	Multiple Choice	2	G-SRT.C
20	Multiple Choice	2	G-SRT.B
21	Multiple Choice	2	G-GMD.A
22	Multiple Choice	2	G-SRT.B
23	Multiple Choice	2	G-CO.A
24	Multiple Choice	2	G-SRT.C
25	Constructed Response	2	G-CO.C
26	Constructed Response	2	G-SRT.C
27	Constructed Response	2	G-CO.B
28	Constructed Response	2	G-GPE.B
29	Constructed Response	2	G-CO.D
30	Constructed Response	2	G-C.A
31	Constructed Response	2	G-GMD.A
32	Constructed Response	4	G-SRT.A
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
August 2019
Chart for Converting Total Test Raw Scores to
Final Examination Scores (Scale Scores)

The *Chart for Determining the Final Examination Score for the August 2019 Regents Examination in Geometry* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Wednesday, August 14, 2019. Conversion charts provided for previous administrations of the Regents Examination in Geometry must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

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

1. Go to <http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm>.
2. Select the test title.
3. Complete the required demographic fields.
4. Complete each evaluation question and provide comments in the space provided.
5. Click the SUBMIT button at the bottom of the page to submit the completed form.

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

GEOMETRY

Wednesday, August 14, 2019 — 12:30 to 3:30 p.m.

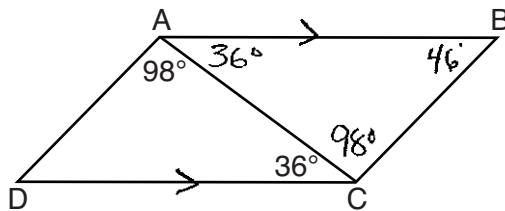
MODEL RESPONSE SET

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Question 35	75

Question 25

25 In parallelogram $ABCD$ shown below, $m\angle DAC = 98^\circ$ and $m\angle ACD = 36^\circ$.



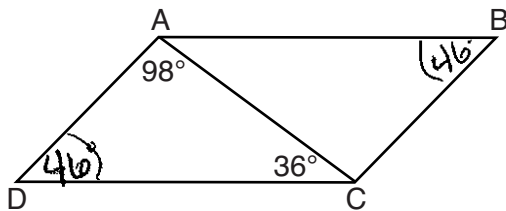
What is the measure of angle B ? Explain why.

$ABCD$ is a \parallel -gram, so $\overline{AB} \parallel \overline{CD}$
By alt. int. \angle theorem, $\angle BCA = 98^\circ$,
 $\angle BAC = 36^\circ$. \angle 's in $\triangle BAC$ must
add up to 180° , so $\angle B = 46^\circ$
Since $36 + 98 = 134$, and $180 - 134 = 46$.

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

Question 25

25 In parallelogram $ABCD$ shown below, $m\angle DAC = 98^\circ$ and $m\angle ACD = 36^\circ$.



$$\begin{array}{r} 180 \\ - 98 \\ - 36 \\ \hline 46^\circ \end{array}$$

What is the measure of angle B ? Explain why.

$\angle D = 46^\circ$ because the sum of a Δ in ΔACD .

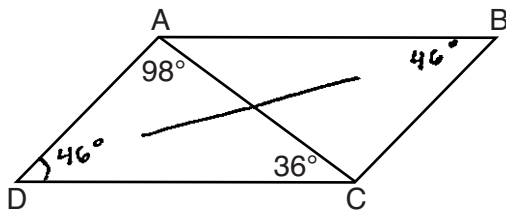
$\angle D \cong \angle B$ because in a parallelogram, opposite \angle 's are \cong .

So $\boxed{\angle B = 46^\circ}$.

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

Question 25

25 In parallelogram $ABCD$ shown below, $m\angle DAC = 98^\circ$ and $m\angle ACD = 36^\circ$.



What is the measure of angle B ? Explain why.

$$98 + 36 = 134$$

$$180 - 134 = 46$$

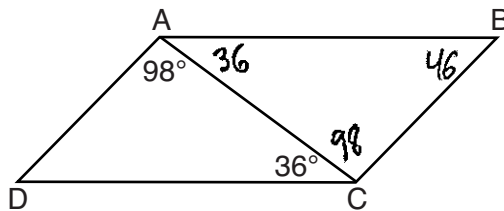
$$m\angle B = 46^\circ$$

First, I found $m\angle D$. A triangle has 180° , so I added $m\angle A$ & $m\angle C$ from $\triangle DAC$ and got 134° . Then, I subtracted that from 180 in order to get $m\angle D$. $m\angle D = 46^\circ$. Finally, I know opp. angles in a parallelogram are congruent, so $m\angle D = m\angle B$. By chain rule, $m\angle B$ would be 46° .

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

Question 25

25 In parallelogram $ABCD$ shown below, $m\angle DAC = 98^\circ$ and $m\angle ACD = 36^\circ$.



What is the measure of angle B ? Explain why.

$$98 + 36 = 134$$

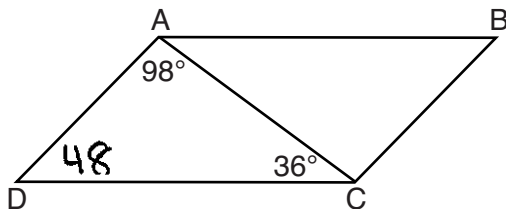
$$180 - 134 = 46$$

$m\angle B$ is 46° because of \cong alternate interior angles at $\angle A + \angle C$ and $\overline{AB} \parallel \overline{CD}$

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

Question 25

25 In parallelogram $ABCD$ shown below, $m\angle DAC = 98^\circ$ and $m\angle ACD = 36^\circ$.



What is the measure of angle B ? Explain why.

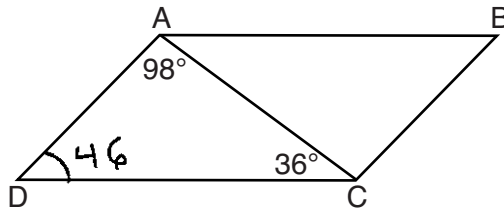
$98 + 34 = 132$
48

Angle B is 48 because in a parallelogram opposite angles are \cong . If $\angle D$ is 48, then $\angle B$ is 48.

Score 1: The student made a transcription error. The student wrote an appropriate explanation.

Question 25

25 In parallelogram $ABCD$ shown below, $m\angle DAC = 98^\circ$ and $m\angle ACD = 36^\circ$.



What is the measure of angle B ? Explain why.

$$98 + 36 = 134$$

$$\begin{array}{r} 180 \\ -134 \\ \hline 46 \end{array}$$

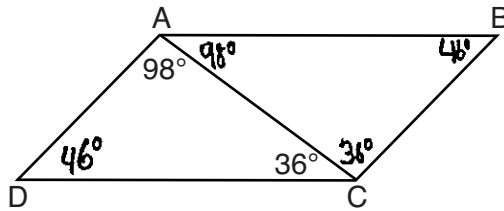
$$\angle D \cong \angle B$$

$$\angle D = 46$$

Score 1: The student found $m\angle B = 46^\circ$, but did not write an explanation.

Question 25

25 In parallelogram $ABCD$ shown below, $m\angle DAC = 98^\circ$ and $m\angle ACD = 36^\circ$.



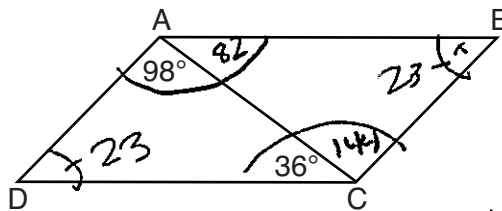
What is the measure of angle B ? Explain why.

Angle B is 46° because the two triangles are the same so they have the same angles

Score 1: The student found $m\angle B = 46^\circ$, but the explanation is incomplete.

Question 25

25 In parallelogram $ABCD$ shown below, $m\angle DAC = 98^\circ$ and $m\angle ACD = 36^\circ$.



$$\begin{array}{r} 180 \\ - 36 \\ \hline 144 \end{array}$$

What is the measure of angle B ? Explain why.

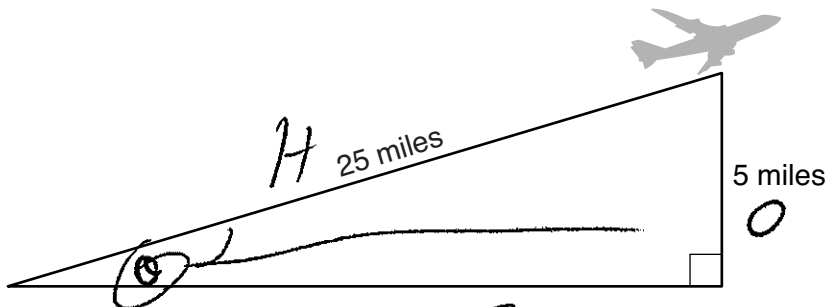
The measure of angle B is 23° because in a parallelogram, opposite sides are congruent and a triangle equals to 180° . If you add the two measures and subtract 180 you get 144 , and divided by 2 the measure is 23° .

$$\begin{array}{r} 180 \\ - 96 \\ \hline 82 \end{array}$$

Score 0: The student gave a completely incorrect response.

Question 26

26 An airplane took off at a constant angle of elevation. After the plane traveled for 25 miles, it reached an altitude of 5 miles, as modeled below.



$$\sin^{-1} = \frac{5}{25}$$

To the nearest tenth of a degree, what was the angle of elevation?

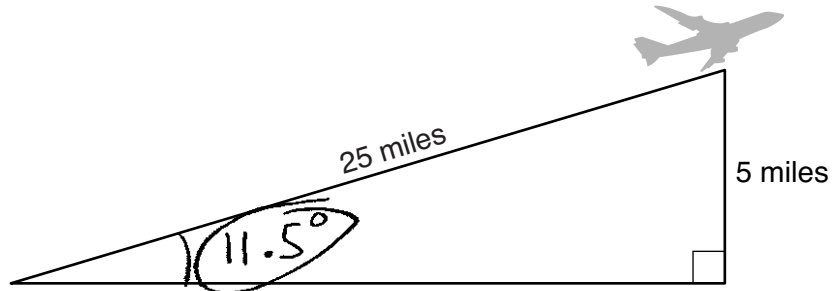
$$\sin^{-1}\left(\frac{5}{25}\right) = 11.53695903$$

11.5

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

Question 26

26 An airplane took off at a constant angle of elevation. After the plane traveled for 25 miles, it reached an altitude of 5 miles, as modeled below.



To the *nearest tenth of a degree*, what was the angle of elevation?

$$\sin x = \frac{5}{25}$$

$$\sin^{-1}\left(\frac{5}{25}\right)$$

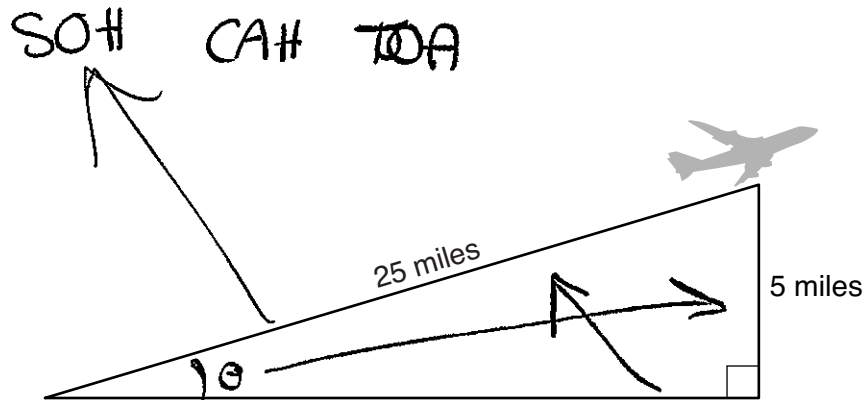
$$11.537$$

$$11.5^\circ$$

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

Question 26

- 26 An airplane took off at a constant angle of elevation. After the plane traveled for 25 miles, it reached an altitude of 5 miles, as modeled below.



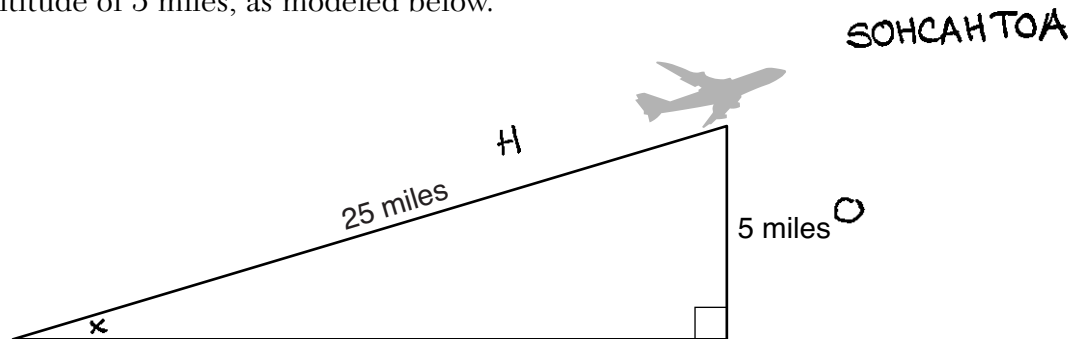
To the nearest tenth of a degree, what was the angle of elevation?

$$\sin \theta = \frac{5}{25}$$

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

Question 26

- 26 An airplane took off at a constant angle of elevation. After the plane traveled for 25 miles, it reached an altitude of 5 miles, as modeled below.



To the nearest tenth of a degree, what was the angle of elevation?

$$\sin x = \frac{5}{25}$$
$$x = \sin^{-1}\left(\frac{5}{25}\right)$$
$$x = 11.53695903$$
$$x = 12^\circ$$

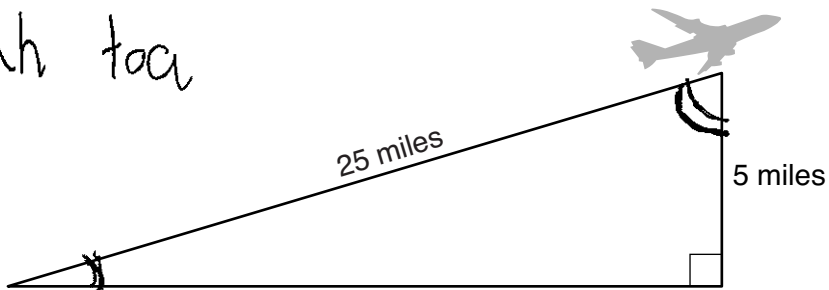
The \angle of elevation is 12°

Score 1: The student did not round the answer to the nearest tenth of a degree.

Question 26

26 An airplane took off at a constant angle of elevation. After the plane traveled for 25 miles, it reached an altitude of 5 miles, as modeled below.

soh cah toa



To the nearest tenth of a degree, what was the angle of elevation?

$$\frac{\tan x}{1} = \frac{5}{25}$$

$$25x = 5$$

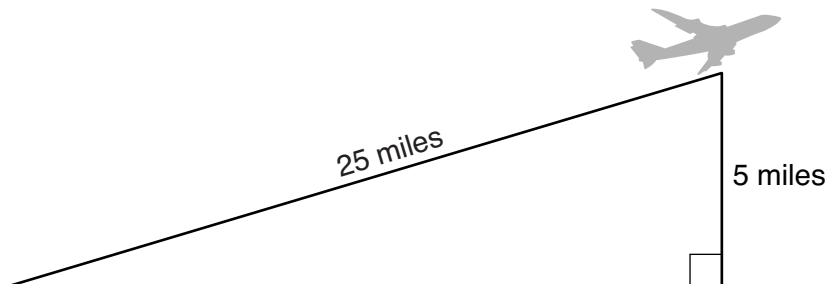
$$x = .2$$

$$x = 20^\circ$$

Score 0: The student gave a completely incorrect response.

Question 26

26 An airplane took off at a constant angle of elevation. After the plane traveled for 25 miles, it reached an altitude of 5 miles, as modeled below.



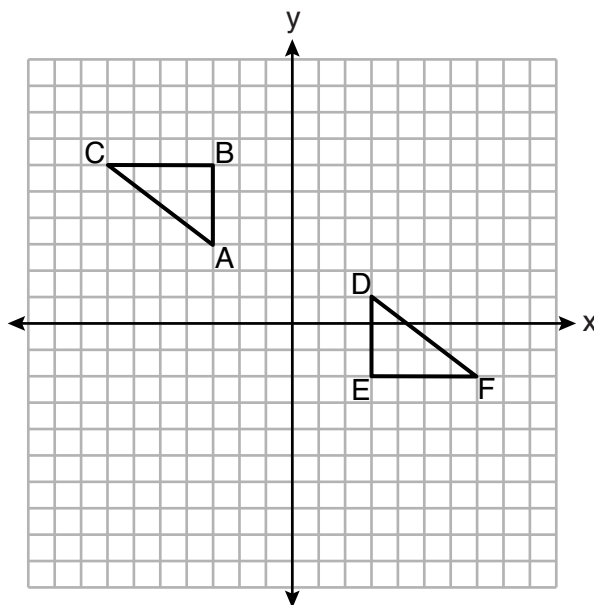
To the *nearest tenth of a degree*, what was the angle of elevation?

$$\begin{aligned} 5^2 + b^2 &= 25^2 \\ \cancel{25} + \cancel{b^2} &= 625 \\ -25 & \quad -25 \\ \hline \sqrt{b^2} &= \sqrt{600} \\ b &= 24.4 \end{aligned}$$

Score 0: The student gave a completely incorrect response.

Question 27

27 On the set of axes below, $\triangle ABC \cong \triangle DEF$.



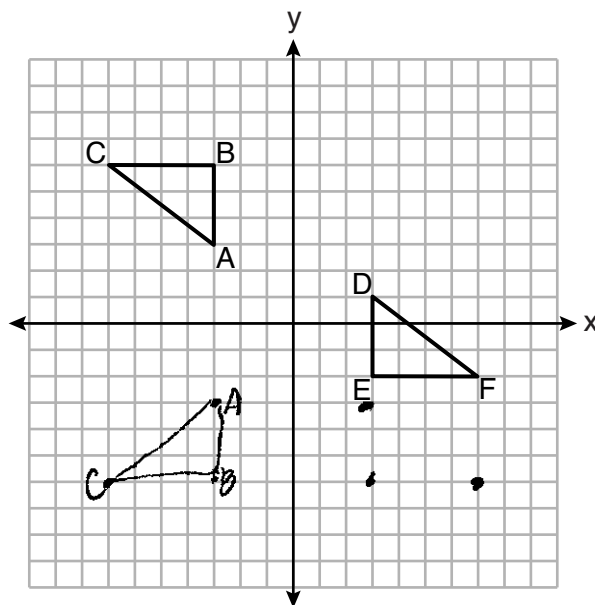
Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle DEF$.

A reflection over the y -axis
then a reflection over $y=2$.

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

Question 27

27 On the set of axes below, $\triangle ABC \cong \triangle DEF$.



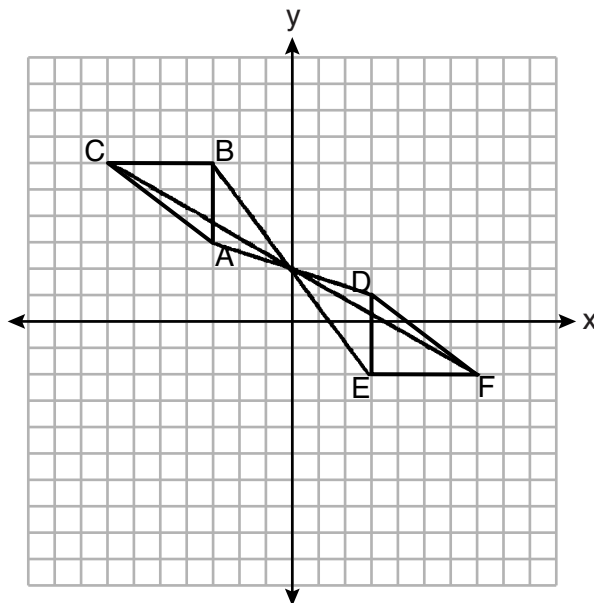
Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle DEF$.

1. reflection across the x -axis
2. reflection across y -axis
3. translation up 4 units

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

Question 27

27 On the set of axes below, $\triangle ABC \cong \triangle DEF$.



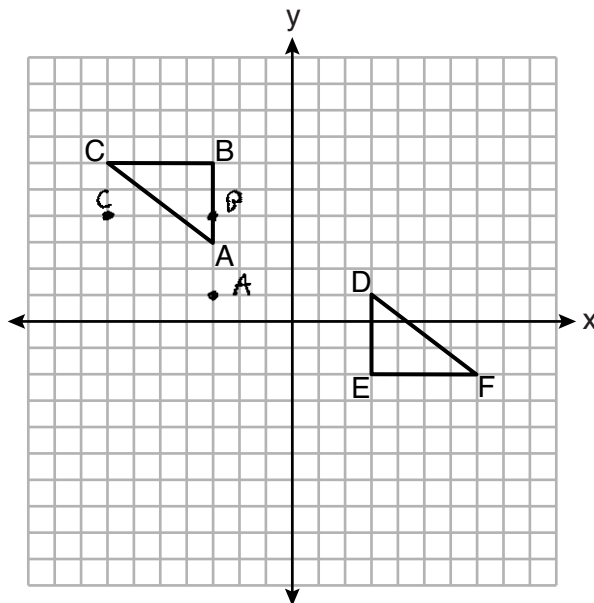
Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle DEF$.

A rotation of 180° around
the point $(0, 2)$

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

Question 27

27 On the set of axes below, $\triangle ABC \cong \triangle DEF$.



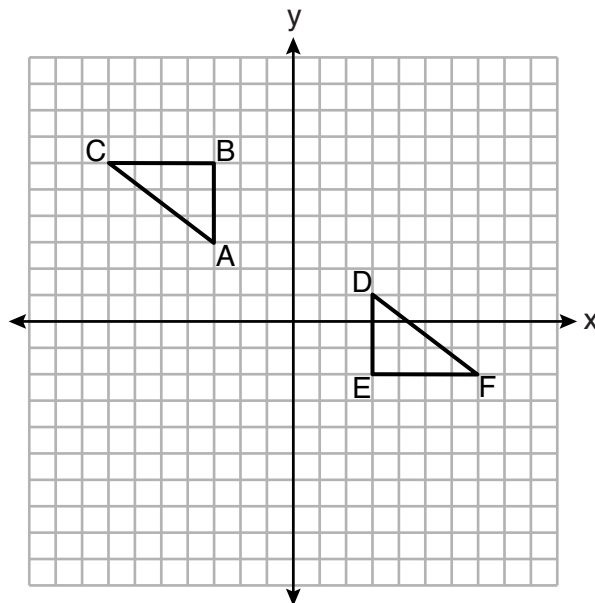
Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle DEF$.

Translate $\triangle ABC$ down 2 and right
6 then rotate it 180°

Score 1: The student did not state point D as the center of rotation.

Question 27

27 On the set of axes below, $\triangle ABC \cong \triangle DEF$.



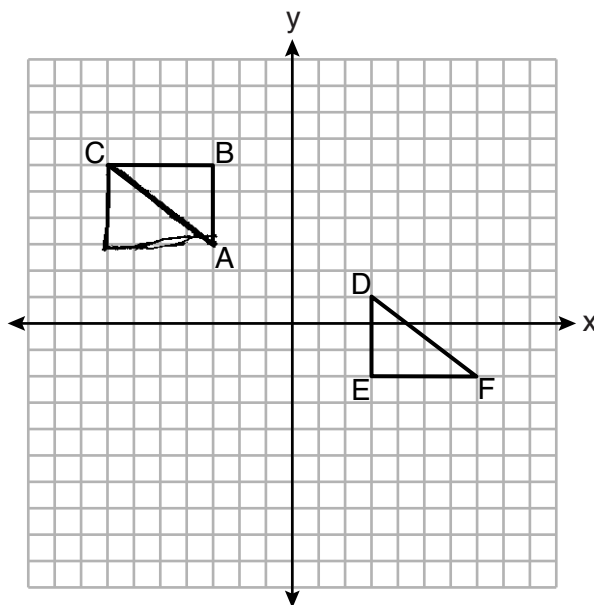
Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle DEF$.

Rotation of 180° , then a
translation 4 units up

Score 1: The student did not state the origin as the center of rotation.

Question 27

27 On the set of axes below, $\triangle ABC \cong \triangle DEF$.



Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle DEF$.

$\triangle ABC$ would have to undergo a rotation of 90° , then translated 10 and 5.

Score 0: The student gave a completely incorrect response.

Question 28

28 The vertices of $\triangle ABC$ have coordinates $A(-2, -1)$, $B(10, -1)$, and $C(4, 4)$. Determine and state the area of $\triangle ABC$. [The use of the set of axes below is optional.]

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

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

$$0 + 25$$

$$d = \sqrt{25}$$

$$d = 5$$

Height

$$d = \sqrt{(10 - (-2))^2 + (-1 - (-1))^2}$$

$$d = \sqrt{12^2 + 0}$$

$$d = \sqrt{144}$$

$$d = 12$$

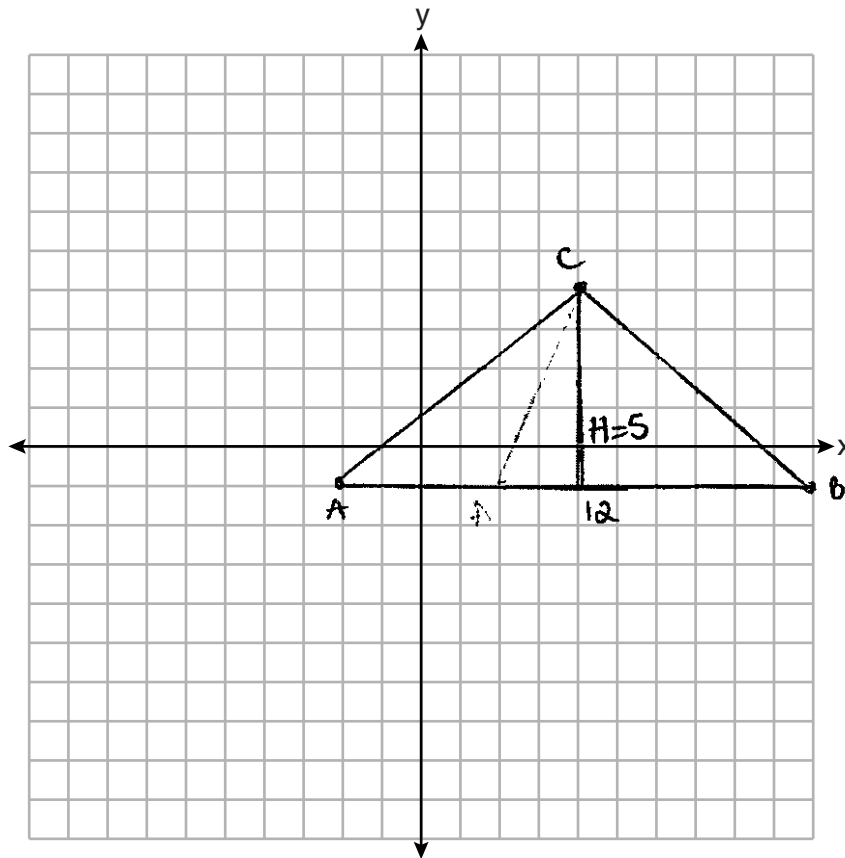
AB

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

$$A = \frac{1}{2}(12)(5)$$

$$A = \frac{1}{2}60$$

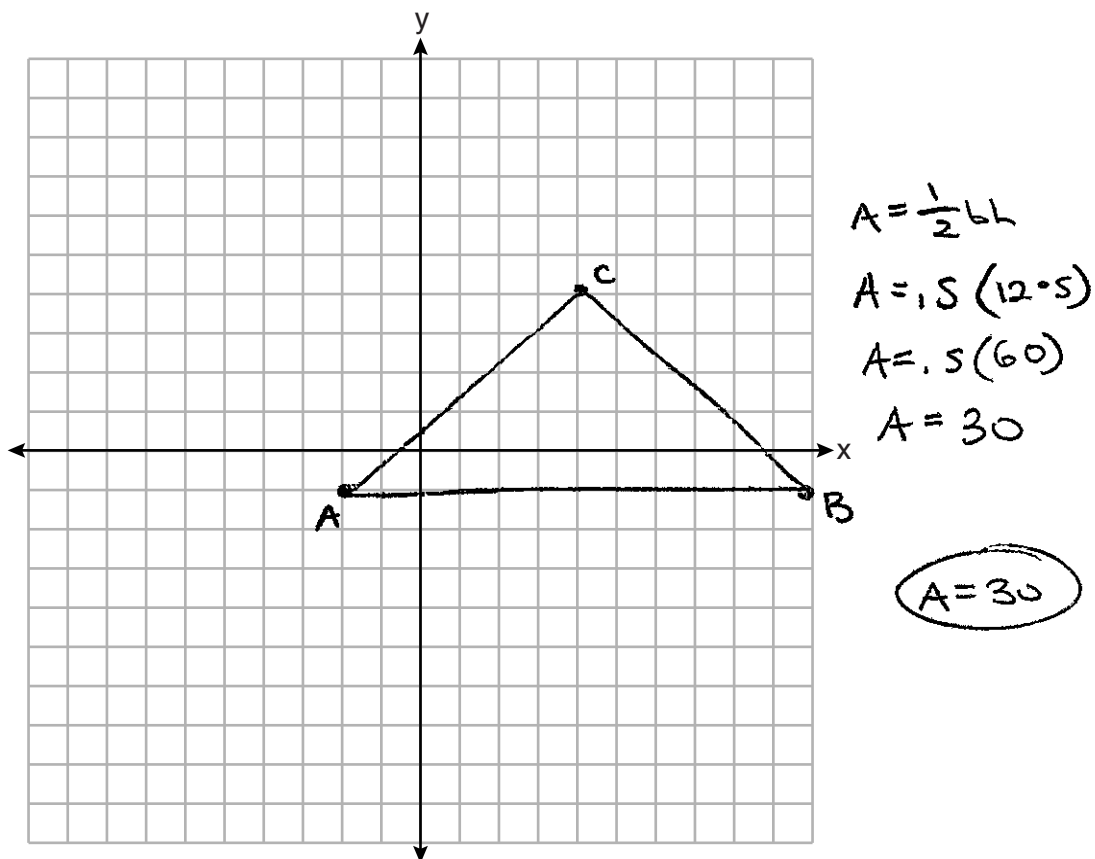
$$A = 30 \text{ units}^2$$



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

Question 28

28 The vertices of $\triangle ABC$ have coordinates $A(-2, -1)$, $B(10, -1)$, and $C(4, 4)$. Determine and state the area of $\triangle ABC$. [The use of the set of axes below is optional.]



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

Question 28

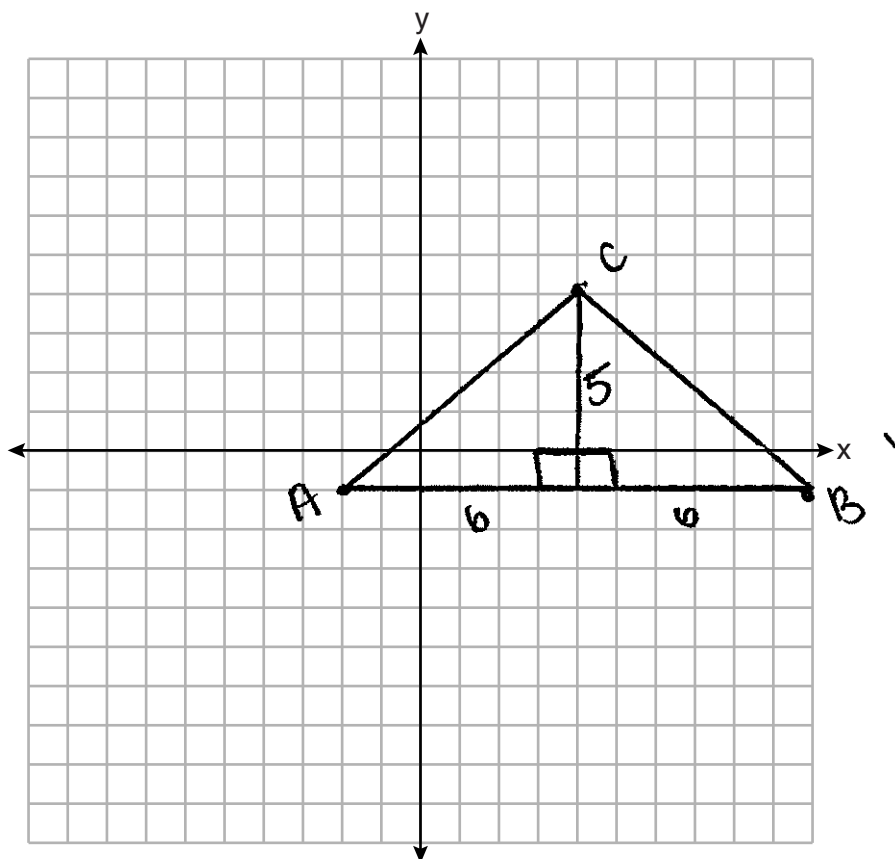
28 The vertices of $\triangle ABC$ have coordinates $A(-2, -1)$, $B(10, -1)$, and $C(4, 4)$. Determine and state the area of $\triangle ABC$. [The use of the set of axes below is optional.]

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

$$A = \frac{1}{2}(5)(6)$$

$$A = 15(2) = 30$$

$$\text{area of } \triangle ABC = 30 \text{ units}^2$$

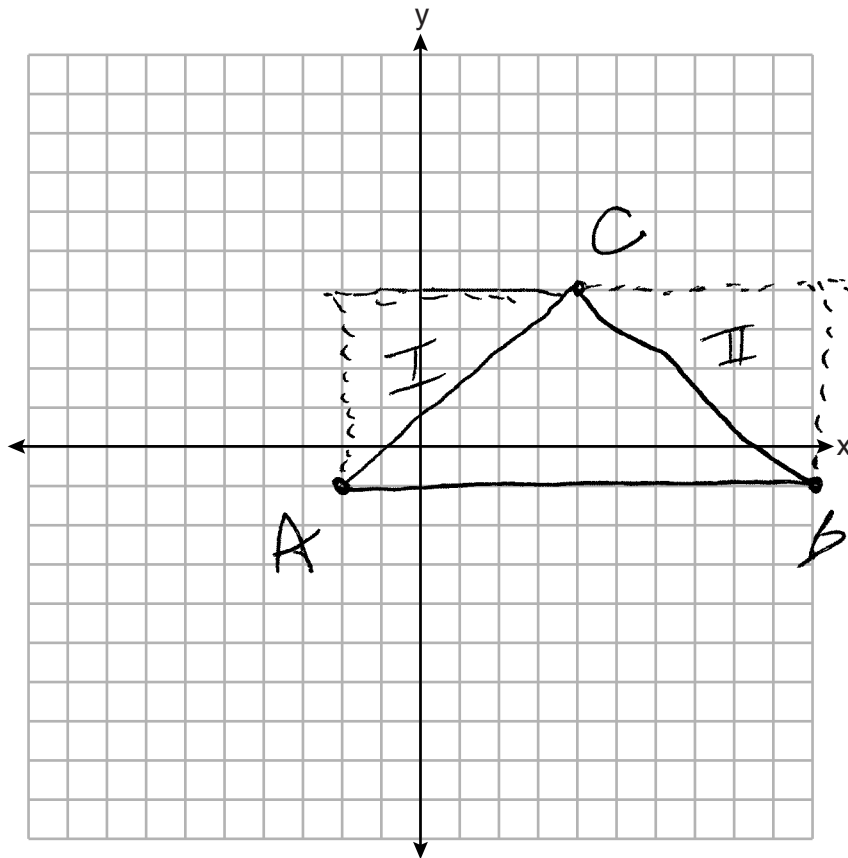


Score 2: The student gave a complete and correct response.

Question 28

28 The vertices of $\triangle ABC$ have coordinates $A(-2, -1)$, $B(10, -1)$, and $C(4, 4)$. Determine and state the area of $\triangle ABC$. [The use of the set of axes below is optional.]

Area of $\triangle ABC = 30$



$$A_{\text{rect}} = 5 \cdot 12 = 60$$

$$A_{\text{I}} = \frac{1}{2}(5)(6) = 15$$

$$A_{\text{II}} = \frac{1}{2}(5)(6) = 15$$

$$A_{\triangle ABC} = 60 - 15 - 15 = 30$$

30

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

Question 28

28 The vertices of $\triangle ABC$ have coordinates $A(-2, -1)$, $B(10, -1)$, and $C(4, 4)$. Determine and state the area of $\triangle ABC$. [The use of the set of axes below is optional.]

$\boxed{60}$

$$\sqrt{(-2+10)^2 + (-1+4)^2}$$

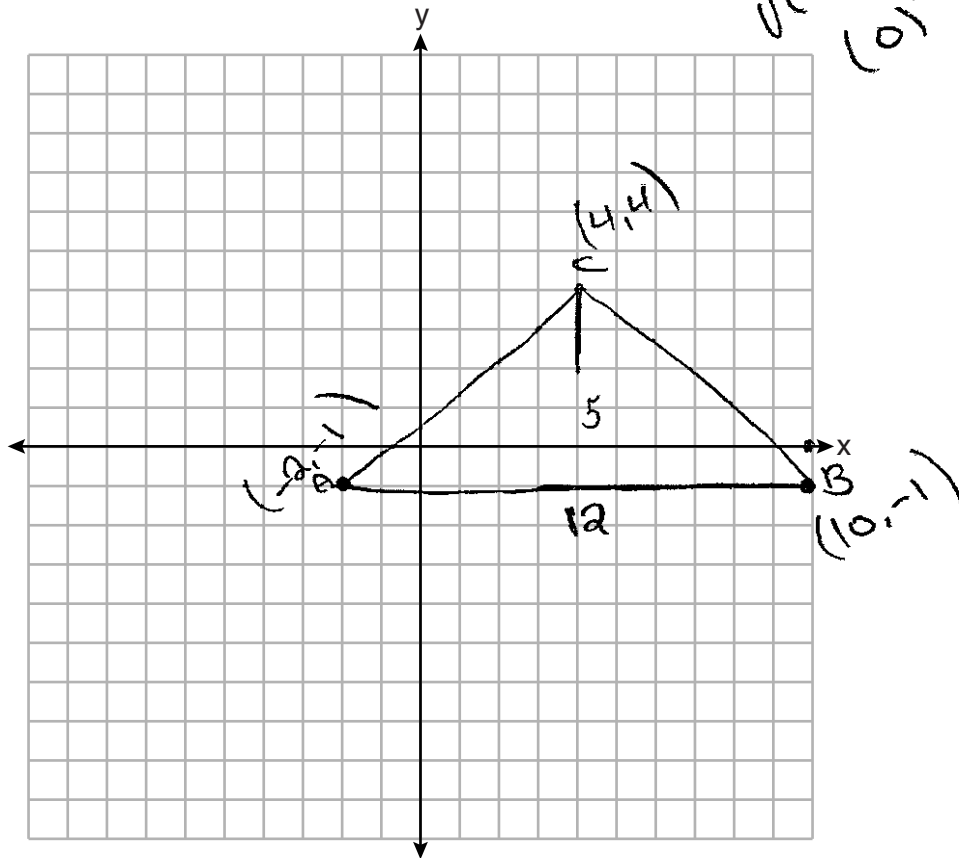
$$\sqrt{(-12)^2 + 3^2}$$

$$\sqrt{144}$$

$$\frac{12 \times 5}{2}$$

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

$$(0)^2 + (5)^2$$



Score 1: The student made an error by not multiplying the product of the base and height by $\frac{1}{2}$.

Question 28

28 The vertices of $\triangle ABC$ have coordinates $A(-2, -1)$, $B(10, -1)$, and $C(4, 4)$. Determine and state the area of $\triangle ABC$. [The use of the set of axes below is optional.]

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\sqrt{(-1 - -1)^2 + (10 - -2)^2}$$

$$\sqrt{0 + 144}$$

$$(4, -1)$$

$$(4, -4)$$

~~$$AC = \sqrt{(4 - -1)^2 + (4 - -1)^2}$$

$$\sqrt{25 + 9}$$

$$\sqrt{34}$$~~

$$12$$

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

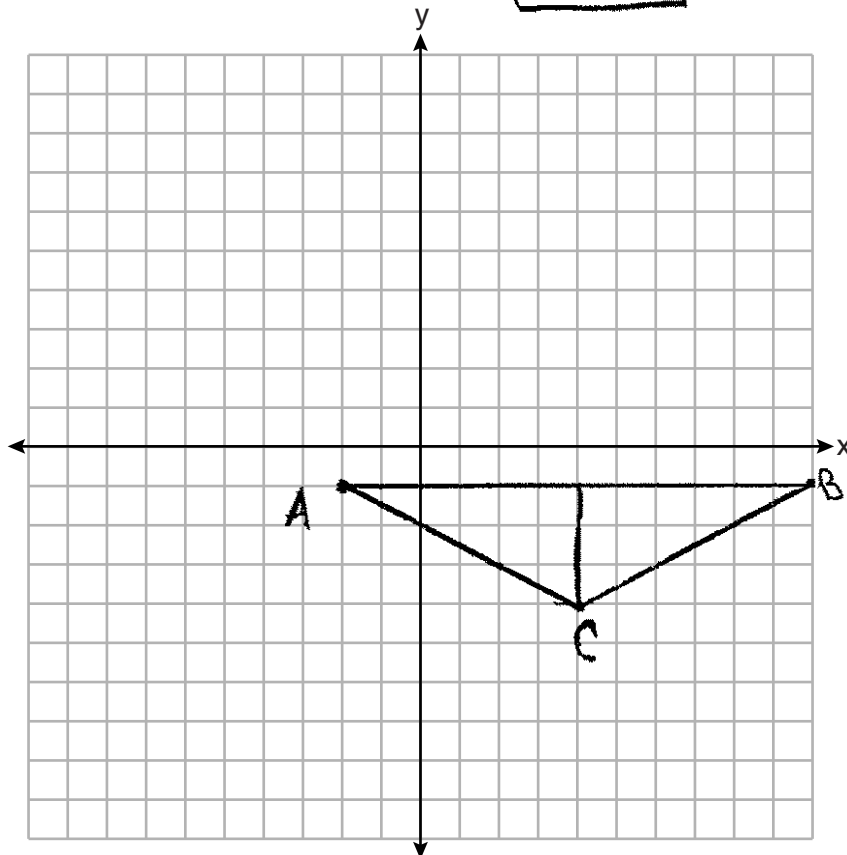
$$\sqrt{9}$$

$$3$$

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

$$A = \frac{1}{2} 12 \cdot 3$$

$$A = 18$$



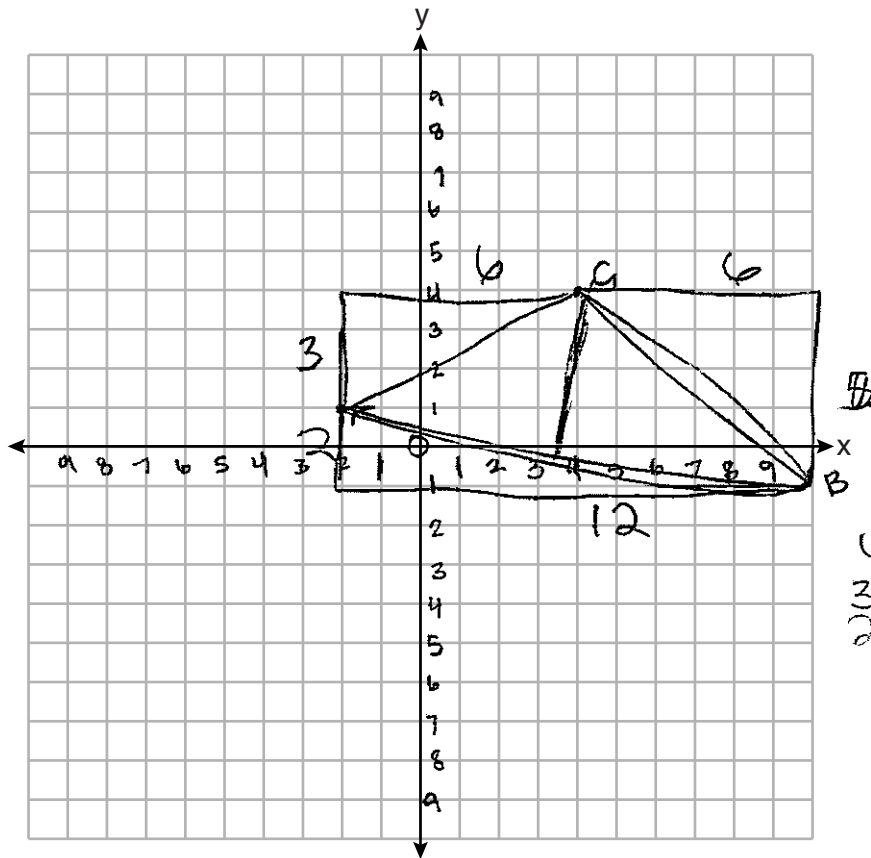
Score 1: The student graphed $\triangle ABC$ incorrectly, but found the area of the triangle of equal difficulty.

Question 28

28 The vertices of $\triangle ABC$ have coordinates $A(-2, -1)$, $B(10, -1)$, and $C(4, 4)$. Determine and state the area of $\triangle ABC$. [The use of the set of axes below is optional.]

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

$$= \frac{1}{2}(\sqrt{148})(3)$$



$$3^2 + 6^2 = c^2$$

$$9 + 36 = c^2$$

$$45 = c^2$$

$$\sqrt{45} = c$$

$$2^2 + 12^2 = c^2$$

$$4 + 144 = c^2$$

$$148 = c^2$$

$$\sqrt{148} = c$$

$$6^2 + 3^2 = c^2$$

$$36 + 9 = c^2$$

$$45 = c^2$$

$$\sqrt{45} = c$$

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

Question 28

28 The vertices of $\triangle ABC$ have coordinates $A(-2, -1)$, $B(10, -1)$, and $C(4, 4)$. Determine and state the area of $\triangle ABC$. [The use of the set of axes below is optional.]

$$d = \sqrt{(10 - (-2))^2 + (-1 - (-1))^2}$$

$$d = \sqrt{144}$$

$$d = 12$$

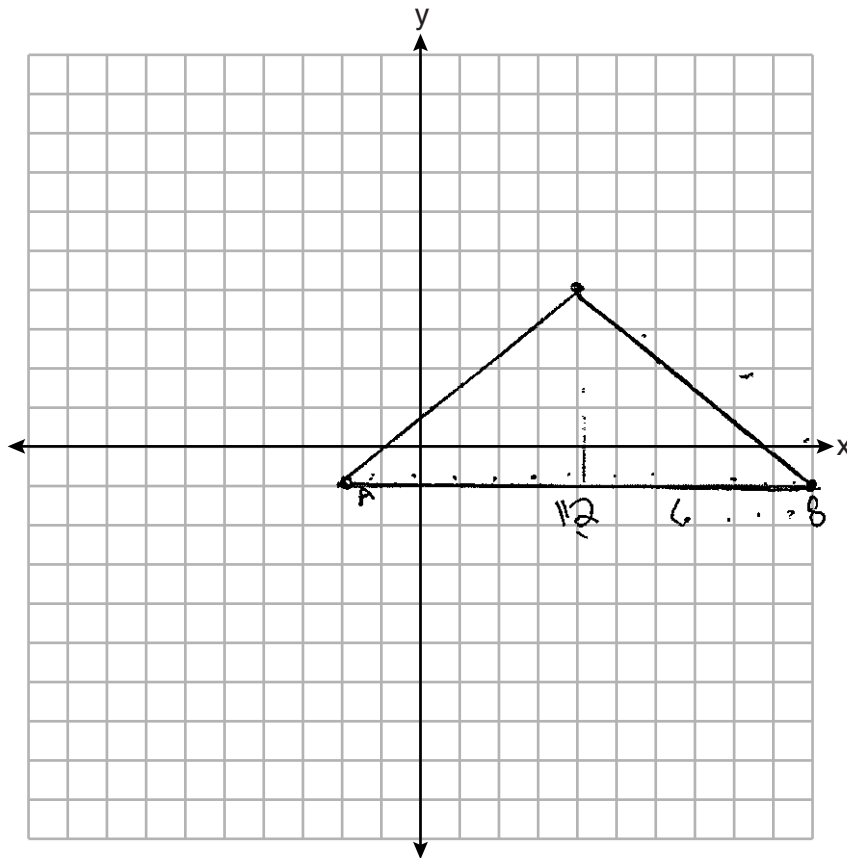
$$A_{\Delta} = \frac{1}{2}(b \cdot h)$$

$$d = \sqrt{(4 - 10)^2 + (4 - (-1))^2}$$

$$d = \sqrt{36 + 25}$$

$$d = \sqrt{61}$$

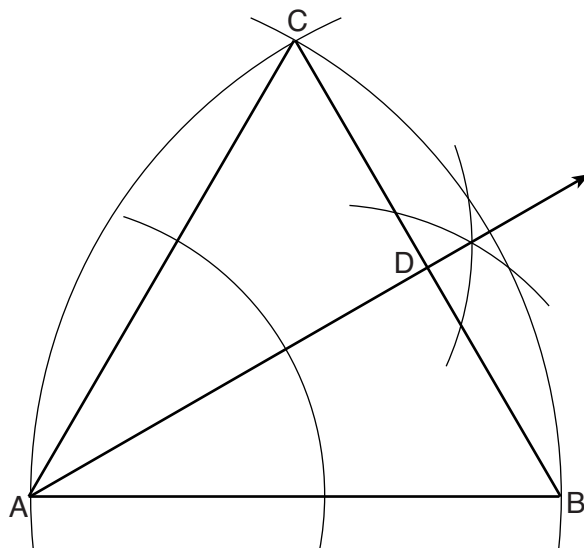
A_{Δ}



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

Question 29

29 Using the construction below, state the degree measure of $\angle CAD$. Explain why.

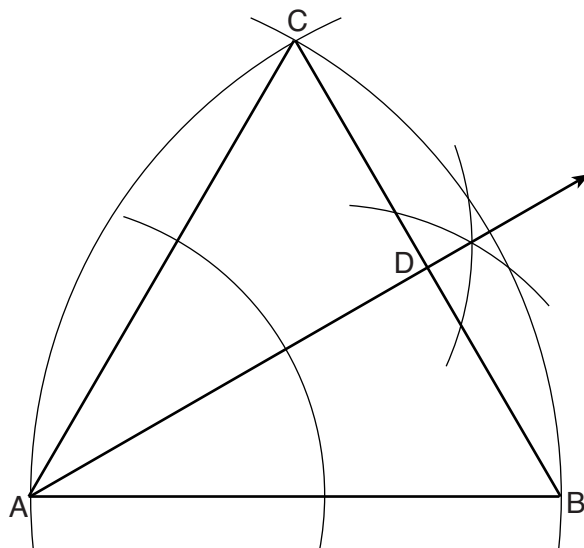


1. $\triangle CAB$ is an equilateral triangle because all its sides are the radii of congruent circles.
2. All the angle measures in an equilateral triangle are 60° .
3. $\angle CAD$ is 30° because an angle bisector was constructed, and angle bisectors cut an angle into 2 congruent pieces, so $60^\circ \div 2 = 30^\circ$.

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

Question 29

29 Using the construction below, state the degree measure of $\angle CAD$. Explain why.

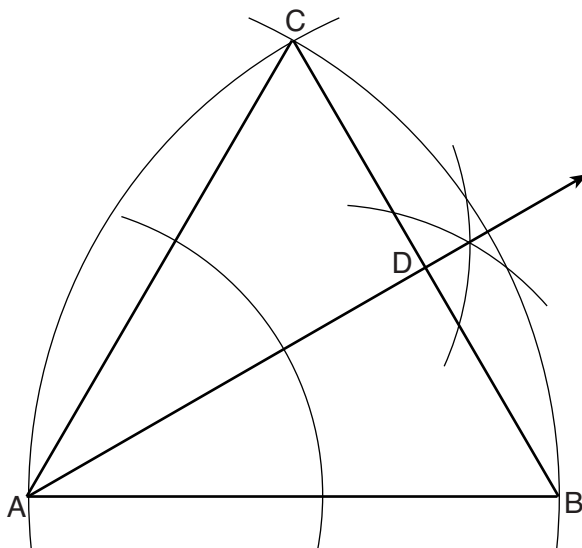


$m\angle CAD$ is 30° because
 $\angle CAB$ is 60° because $\triangle ABC$ is
equilateral. Then $\angle CAB$ was
cut in half making $\angle CAD$
equal to 30°

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

Question 29

29 Using the construction below, state the degree measure of $\angle CAD$. Explain why.



$\triangle ABC$ is equilateral

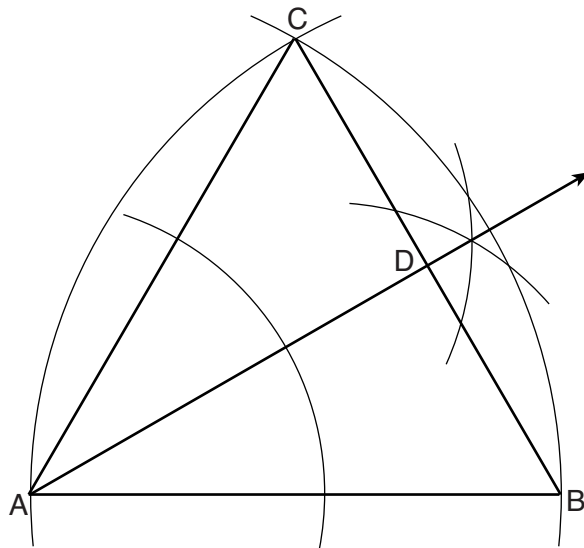
$$\angle CAD = \frac{1}{2} \angle CAB$$

$\angle CAD$ is half of $\angle CAB$
because it was bisected

Score 1: The student wrote a correct explanation, but did not state that the angle measures 30° .

Question 29

29 Using the construction below, state the degree measure of $\angle CAD$. Explain why.

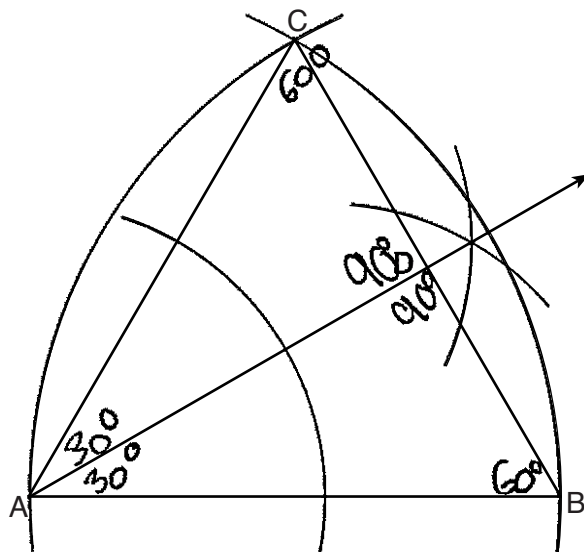


This is a 30° angle because the compass was open to a little more than half of \overline{AB} .

Score 1: The student stated that the angle measures 30° , but the explanation is incorrect.

Question 29

29 Using the construction below, state the degree measure of $\angle CAD$. Explain why.

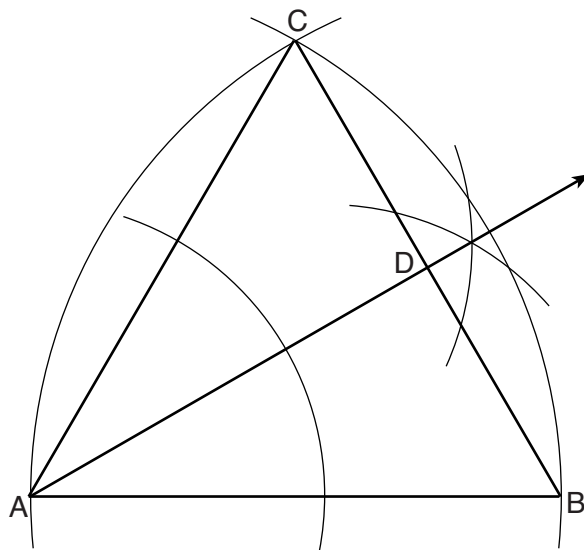


Its an equilateral triangle
So $\angle A$, $\angle C$ and $\angle B$ is 60° .

Score 1: The student stated that the angle measures 30° , but the explanation is incomplete.

Question 29

29 Using the construction below, state the degree measure of $\angle CAD$. Explain why.

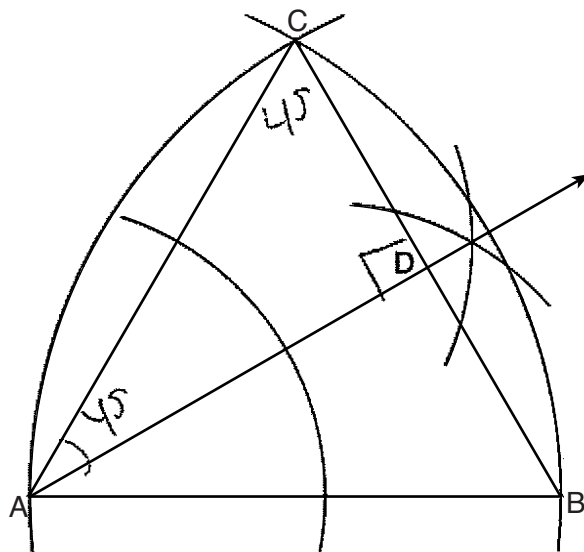


60° . It is an equilateral triangle so all \angle 's
= 60° .

Score 1: The student wrote an incomplete response.

Question 29

29 Using the construction below, state the degree measure of $\angle CAD$. Explain why.

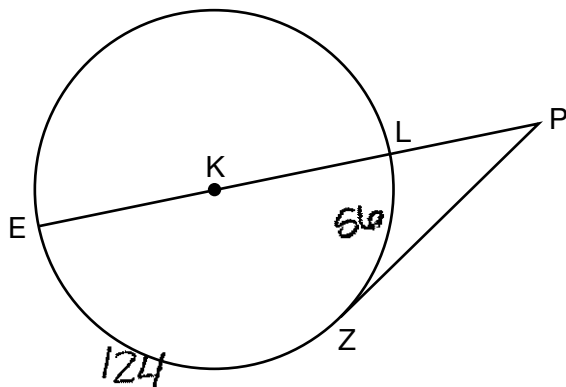


$\angle CAD$ is 45° b/c $\triangle CAD$
is a $45, 45, 90$ triangle

Score 0: The student gave a completely incorrect response.

Question 30

30 In the diagram below of circle K , secant \overline{PLKE} and tangent \overline{PZ} are drawn from external point P .



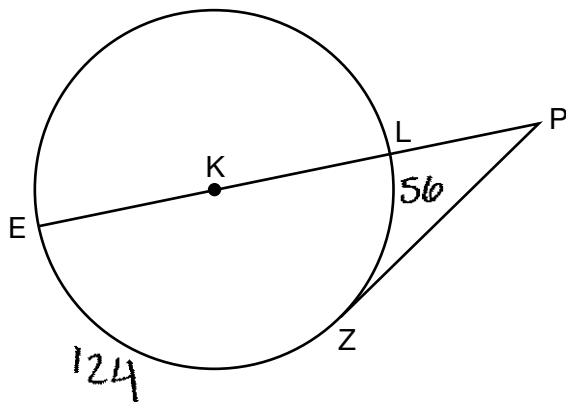
If $m\widehat{LZ} = 56^\circ$, determine and state the degree measure of angle P .

$$m\angle P = \frac{1}{2} (\widehat{EZ} - \widehat{LZ})$$
$$m\angle P = \frac{1}{2} (124 - 56)$$
$$m\angle P = \frac{1}{2} (68)$$
$$m\angle P = 34$$

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

Question 30

30 In the diagram below of circle K , secant \overline{PLKE} and tangent \overline{PZ} are drawn from external point P .



If $m\widehat{LZ} = 56^\circ$, determine and state the degree measure of angle P .

$$P = \frac{1}{2}(124 - 56)$$

$$P = \frac{1}{2}(68)$$

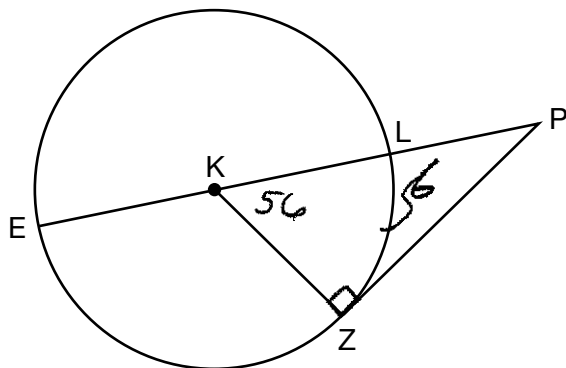
$$P = 34^\circ$$

$$m\angle P = 34^\circ$$

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

Question 30

30 In the diagram below of circle K , secant \overline{PLKE} and tangent \overline{PZ} are drawn from external point P .



If $m\widehat{LZ} = 56^\circ$, determine and state the degree measure of angle P .

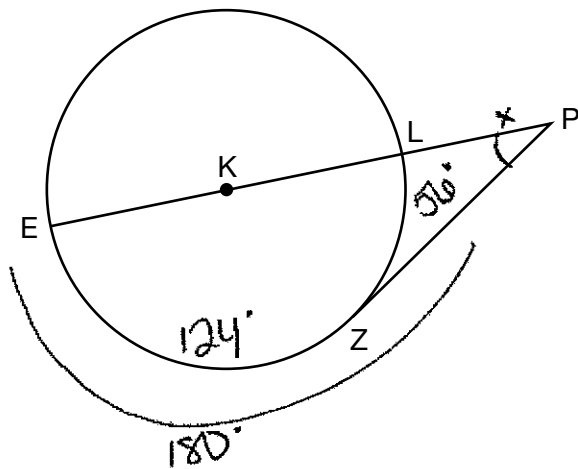
$$\begin{array}{r} 90 \\ - 56 \\ \hline 34 \end{array}$$

$$m\angle P = 34$$

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

Question 30

30 In the diagram below of circle K , secant \overline{PLKE} and tangent \overline{PZ} are drawn from external point P .



$$\begin{array}{r} 180 \\ - 56 \\ \hline 124 \end{array}$$

If $m\widehat{LZ} = 56^\circ$, determine and state the degree measure of angle P .

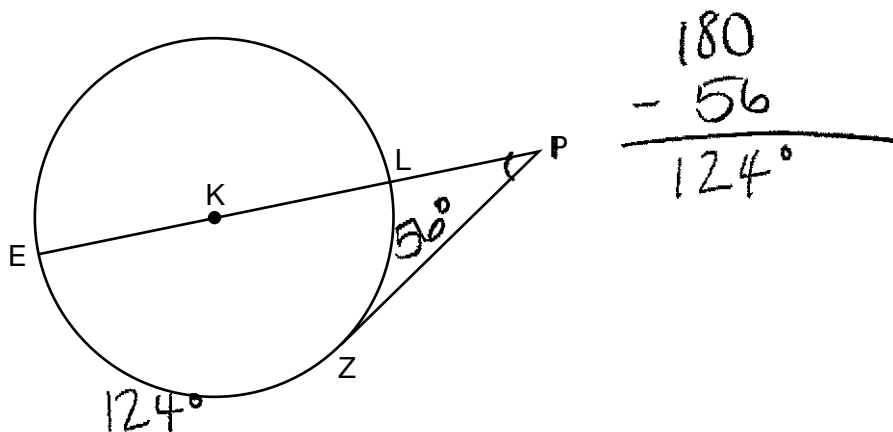
$$2 \sqrt{124}$$

angle P has 62°

Score 1: The student made an error by thinking $m\angle P = \frac{1}{2}(m\widehat{EZ})$.

Question 30

30 In the diagram below of circle K , secant \overline{PLKE} and tangent \overline{PZ} are drawn from external point P .



If $m\widehat{LZ} = 56^\circ$, determine and state the degree measure of angle P .

$$m\angle P = \text{major arc} - \text{minor arc}$$

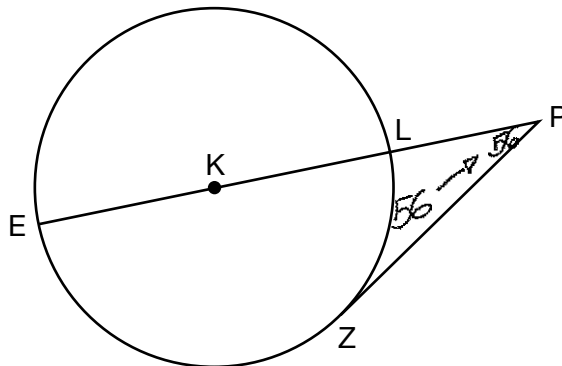
$$m\angle P = 124 - 56$$

$$m\angle P = 68^\circ$$

Score 1: The student made an error by thinking $m\angle P = m\widehat{EZ} - m\widehat{LZ}$.

Question 30

30 In the diagram below of circle K , secant \overline{PLKE} and tangent \overline{PZ} are drawn from external point P .



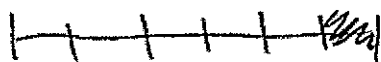
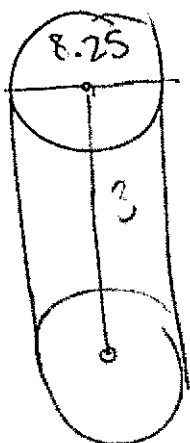
If $m\widehat{LZ} = 56^\circ$, determine and state the degree measure of angle P .

measure of angle $P \rightarrow 56^\circ$

Score 0: The student gave a completely incorrect response.

Question 31

31 A large water basin is in the shape of a right cylinder. The inside of the basin has a diameter of $8\frac{1}{4}$ feet and a height of 3 feet. Determine and state, to the *nearest cubic foot*, the number of cubic feet of water that it will take to fill the basin to a level of $\frac{1}{2}$ foot from the top.



↓
 $\frac{1}{2}$ of basin

$$V = \pi r^2 h$$

$$V = \pi (4.125)^2 (2.5)$$

$$V = 42.5390625\pi$$

$$V = 134 \text{ ft}^3$$

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

Question 31

31 A large water basin is in the shape of a right cylinder. The inside of the basin has a diameter of $8\frac{1}{4}$ feet and a height of 3 feet. Determine and state, to the *nearest cubic foot*, the number of cubic feet of water that it will take to fill the basin to a level of $\frac{1}{2}$ foot from the top.

Handwritten student work showing two diagrams of cylinders and calculations.

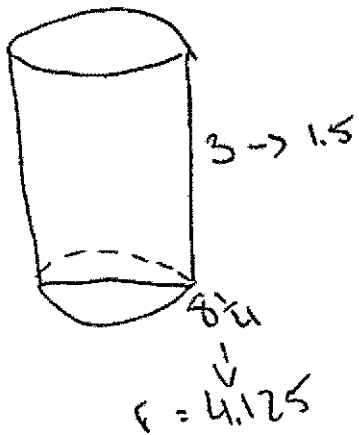
Diagram 1 (Left): A cylinder with a diameter of $8\frac{1}{4}$ feet and a height of 3 feet. The formula $V = \pi r^2 h$ is written above it. The calculation is $V = \pi (4\frac{1}{8})^2 \cdot 3 = 160.2368487989$. The final answer is 134 feet^3 .

Diagram 2 (Right): A cylinder with a diameter of $8\frac{1}{4}$ feet and a height of $2\frac{1}{2}$ feet. The formula $V = \pi r^2 h$ is written above it. The calculation is $V = \pi (4\frac{1}{8})^2 \cdot 2.5 = 26.72808124167$. The final answer is 134 .

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

Question 31

- 31 A large water basin is in the shape of a right cylinder. The inside of the basin has a diameter of $8\frac{1}{4}$ feet and a height of 3 feet. Determine and state, to the *nearest cubic foot*, the number of cubic feet of water that it will take to fill the basin to a level of $\frac{1}{2}$ foot from the top.

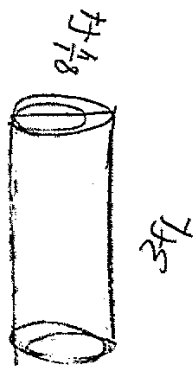


$$V_{\text{Cylinder}} = \pi r^2 h$$
$$V = \pi (4.125)^2 (1.5)$$
$$V \approx 80 \text{ ft}^3$$

Score 1: The student used a height of 1.5 feet to find the volume of the water in the basin.

Question 31

- 31 A large water basin is in the shape of a right cylinder. The inside of the basin has a diameter of $8\frac{1}{4}$ feet and a height of 3 feet. Determine and state, to the *nearest cubic foot*, the number of cubic feet of water that it will take to fill the basin to a level of $\frac{1}{2}$ foot from the top.



$$V = \pi r^2 h$$
$$\pi (4.125)^2 (3 \text{ ft})$$

$$V = 160.4 \text{ ft}^3$$
$$3 \div \frac{1}{2} = 6$$

$$6 \sqrt{160.4}$$
$$= 26.7 \text{ ft}^3$$

Score 1: The student found the volume of the whole cylinder and the volume of the empty space, but did not subtract to find the volume of water.

Question 31

31 A large water basin is in the shape of a right cylinder. The inside of the basin has a diameter of $8\frac{1}{4}$ feet and a height of 3 feet. Determine and state, to the *nearest cubic foot*, the number of cubic feet of water that it will take to fill the basin to a level of $\frac{1}{2}$ foot from the top.

$$V = \pi r^3 h$$

$$V = \pi \left(\frac{33}{8}\right)^3 (2.5)$$

$$V = 551 \text{ ft}^3$$

$$d = 8\frac{1}{4}$$

$$r = \frac{33}{8}$$

Score 1: The student made an error by cubing the radius to find the volume of the water in the basin.

Question 31

- 31 A large water basin is in the shape of a right cylinder. The inside of the basin has a diameter of $8\frac{1}{4}$ feet and a height of 3 feet. Determine and state, to the nearest cubic foot, the number of cubic feet of water that it will take to fill the basin to a level of $\frac{1}{2}$ foot from the top.

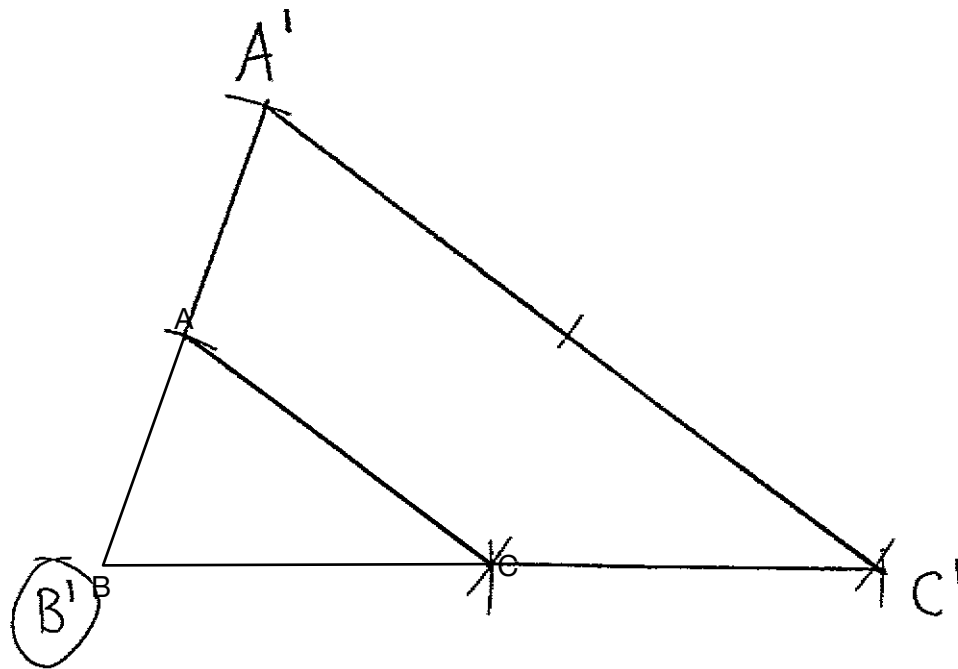


$$V = \pi r^2 h$$
$$V = \pi (4.125)^2 (3)$$
$$V = \pi (17.0156) (3)$$
$$V = 160 \text{ ft}$$

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

Question 32

32 Triangle ABC is shown below. Using a compass and straightedge, construct the dilation of $\triangle ABC$ centered at B with a scale factor of 2.
[Leave all construction marks.]



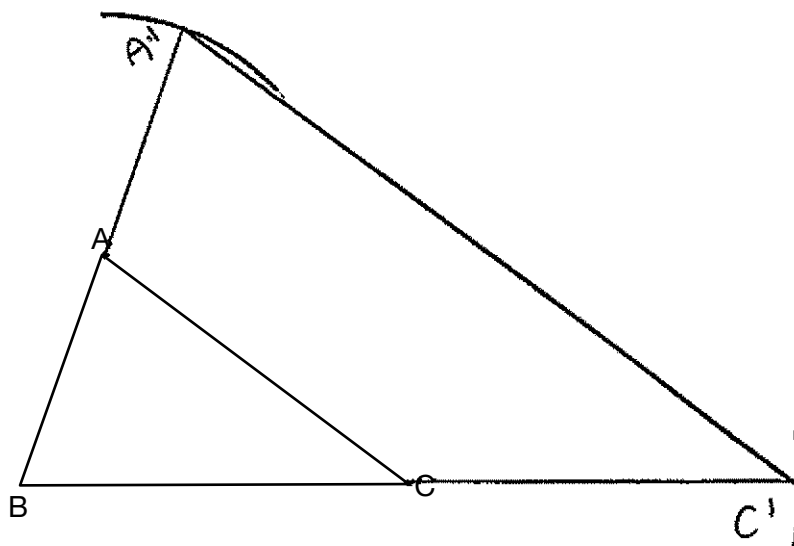
Is the image of $\triangle ABC$ similar to the original triangle? Explain why.

Yes, $\triangle A'B'C'$ is similar to $\triangle ABC$!
A dilation of 2 means that all sides
are multiplied by 2!
*Similar \triangle 's have side lengths that
are in proportion.*

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

Question 32

- 32** Triangle ABC is shown below. Using a compass and straightedge, construct the dilation of $\triangle ABC$ centered at B with a scale factor of 2.
[Leave all construction marks.]



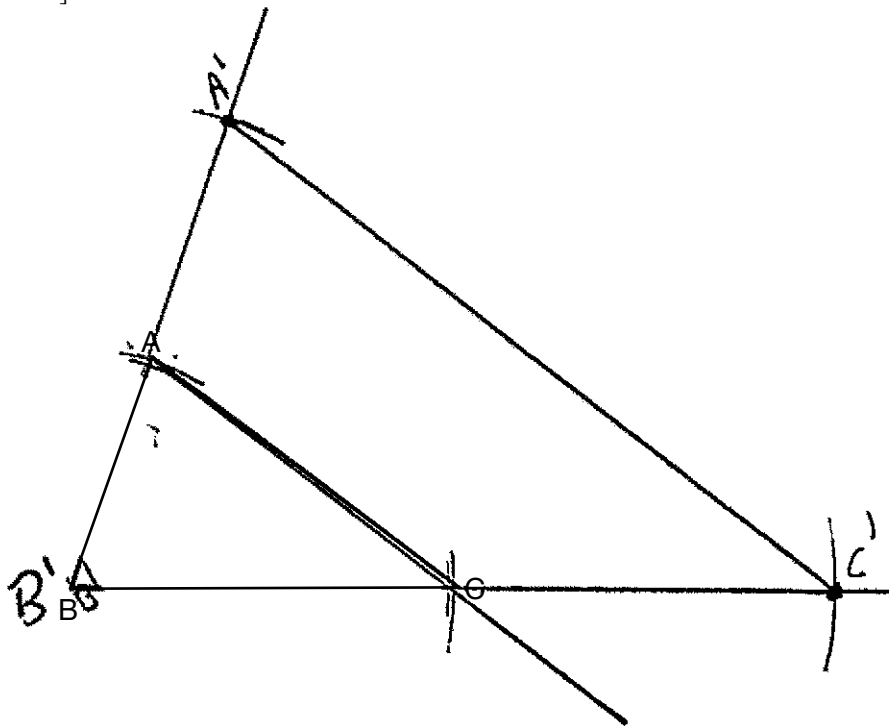
Is the image of $\triangle ABC$ similar to the original triangle? Explain why.

The image of $\triangle ABC$ is similar to the triangle because since a dilation isn't a rigid motion, it preserves the angle measures but creates proportional side lengths. Similar triangles have congruent angles and proportional side lengths, meaning that a dilation creates an image similar to the original triangle.

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

Question 32

32 Triangle ABC is shown below. Using a compass and straightedge, construct the dilation of $\triangle ABC$ centered at B with a scale factor of 2.
[Leave all construction marks.]



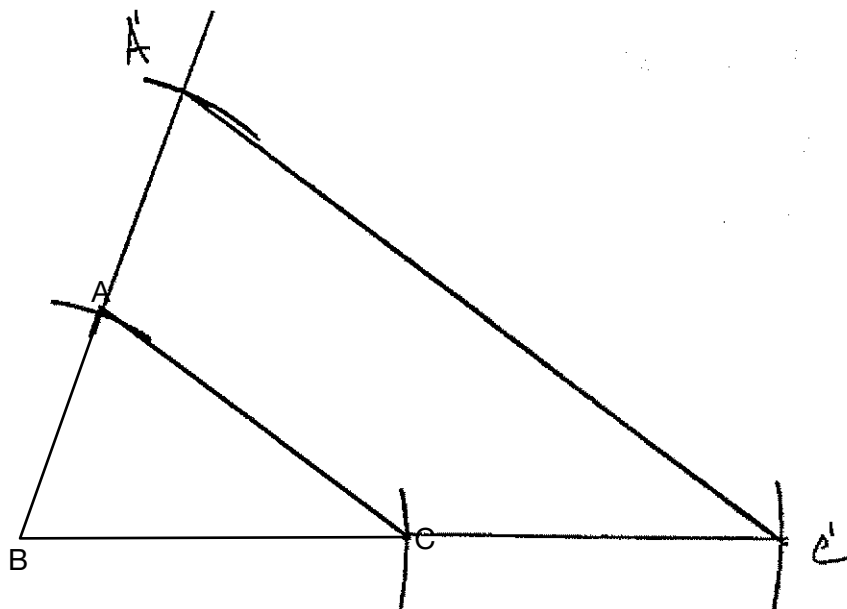
Is the image of $\triangle ABC$ similar to the original triangle? Explain why.

Yes because ~~this is~~ a dilation preserves
angle measure, so this could be similar by the
AA~thm

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

Question 32

32 Triangle ABC is shown below. Using a compass and straightedge, construct the dilation of $\triangle ABC$ centered at B with a scale factor of 2.
[Leave all construction marks.]



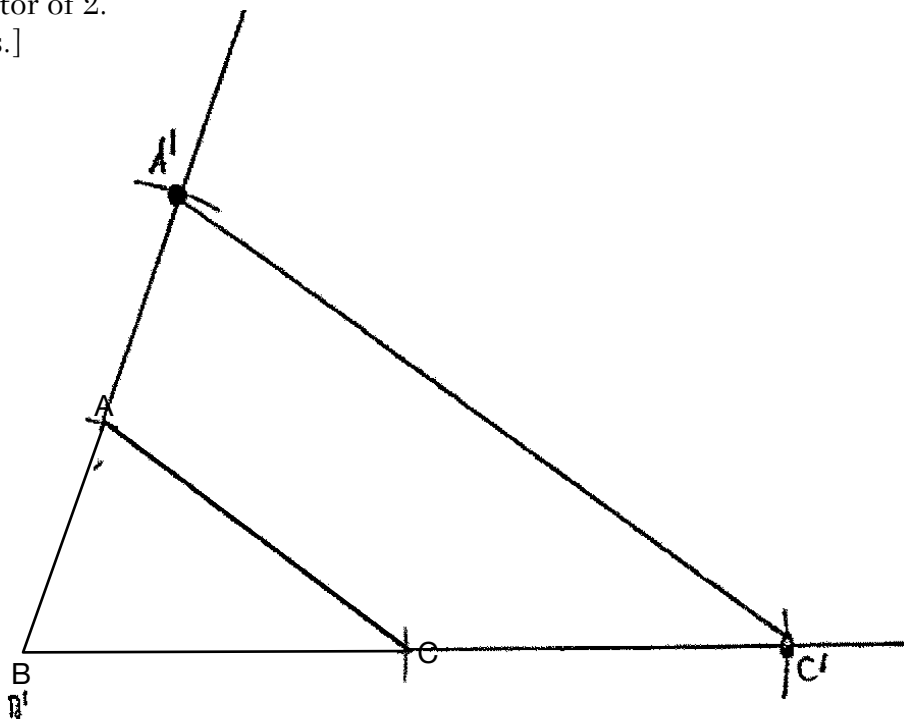
Is the image of $\triangle ABC$ similar to the original triangle? Explain why.

yes because a dialation is not isometric, it doesn't change sides. Also, the sides would be porportial.

Score 3: The student wrote a partially incorrect explanation by stating that the dilation doesn't change the sides.

Question 32

32 Triangle ABC is shown below. Using a compass and straightedge, construct the dilation of $\triangle ABC$ centered at B with a scale factor of 2.
[Leave all construction marks.]

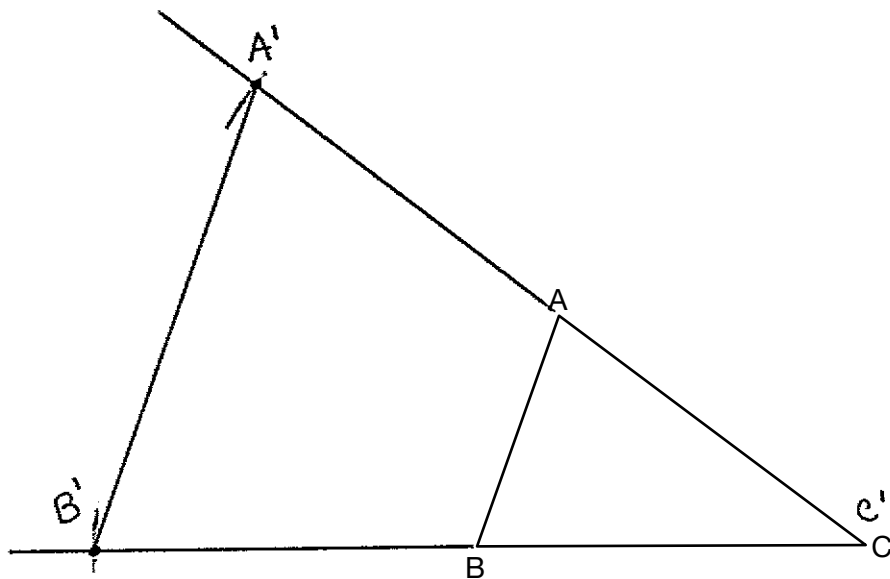


Is the image of $\triangle ABC$ similar to the original triangle? Explain why.

Score 2: The student made a correct construction, but no further correct work was shown.

Question 32

32 Triangle ABC is shown below. Using a compass and straightedge, construct the dilation of $\triangle ABC$ centered at B with a scale factor of 2.
[Leave all construction marks.]



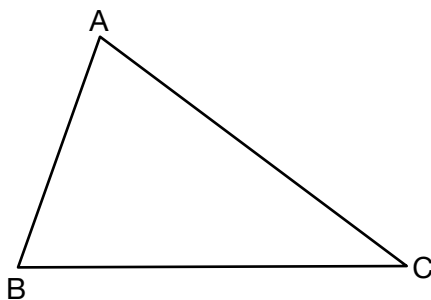
Is the image of $\triangle ABC$ similar to the original triangle? Explain why.

$\triangle ABC$ is similar to $\triangle A'B'C'$ because dilations preserve shape.

Score 1: The student made an appropriate construction centered at a point other than B .
The student wrote an incorrect explanation.

Question 32

- 32** Triangle ABC is shown below. Using a compass and straightedge, construct the dilation of $\triangle ABC$ centered at B with a scale factor of 2.
[Leave all construction marks.]



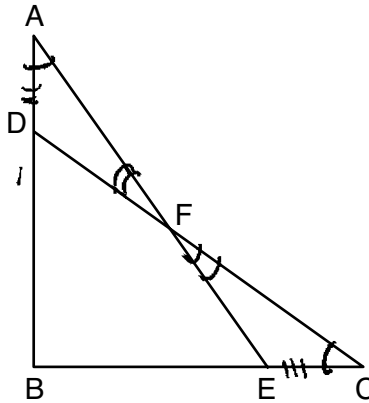
Is the image of $\triangle ABC$ similar to the original triangle? Explain why.

No. Dilation is the only rigid motion that does not preserve size of a image. This transformation does not lead the triangle to be similar or remain the same as the original triangle.

Score 0: The student gave a completely incorrect response.

Question 33

33 In the diagram below, $\triangle ABE \cong \triangle CBD$.



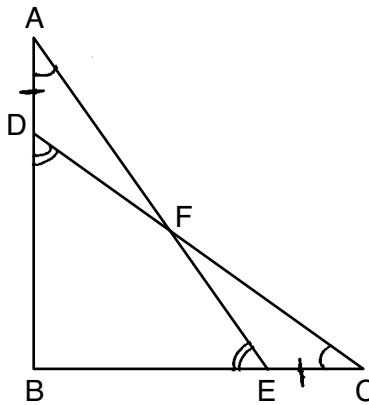
Prove: $\triangle AFD \cong \triangle CFE$

Statement	Reason
1. $\triangle ABE \cong \triangle CBD$	1. Given
2. $\angle A \cong \angle C$	2. CPCTC
3. $\angle AFD \cong \angle CFE$	3. Vertical \angle s are \cong ,
4. $\overline{AB} \cong \overline{CB}$; $\overline{DB} \cong \overline{EB}$	4. CPCTC
5. $\overline{AD} \cong \overline{CE}$	5. Subtraction (4)
6. $\triangle AFD \cong \triangle CFE$	6. AAS

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

Question 33

33 In the diagram below, $\triangle ABE \cong \triangle CBD$.



Prove: $\triangle AFD \cong \triangle CFE$

① $\triangle ABE \cong \triangle CBD$
 Given

② $\angle A \cong \angle C$
 CPCTC

③ $\angle BDC \cong \angle BEA$
 CPCTC

④ $\angle ADF; \angle BDC$
 $\angle CEF; \angle BEA$ } Both pairs are linear pairs and supplement angles

⑤ $\angle ADF \cong \angle CEF$
 supplements of \cong angles are \cong

⑥ $\overline{AB} \cong \overline{CB}$
 CPCTC

⑦ $\overline{BD} \cong \overline{BE}$
 CPCTC

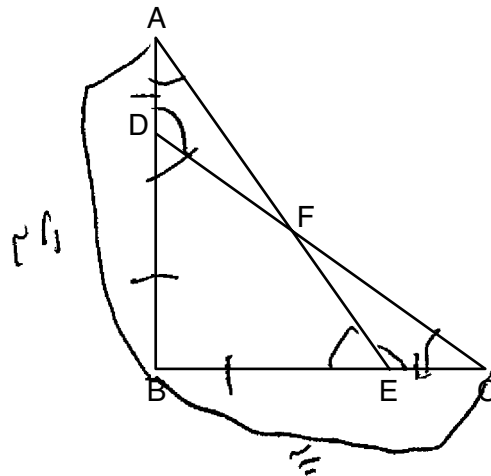
⑧ $\overline{AD} \cong \overline{CE}$
 Subtraction

$\triangle AFD \cong \triangle CFE$
 ASA

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

Question 33

33 In the diagram below, $\triangle ABE \cong \triangle CBD$.



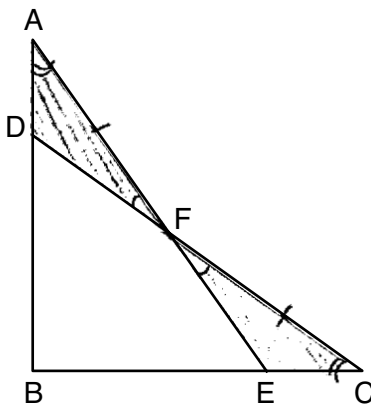
Prove: $\triangle AFD \cong \triangle CFE$

Statement	Reason
1. $\triangle ABE \cong \triangle CBD$	1. Given
2. $\angle A \cong \angle C$	2. CPCTC
3. $\angle BDC \cong \angle BEA$	3. CPCTC
4. $\angle ADF \cong \angle CEF$	4. They are supplements of two congruent angles so they must be congruent
5. $\overline{AB} \cong \overline{CB}$	5. CPCTC
6. $\overline{BD} \cong \overline{BE}$	6. CPCTC
7. $\overline{AD} \cong \overline{CE}$	7. subtraction
8. $\triangle AFD \cong \triangle CFE$	8. ASA postulate

Score 3: The student is missing a statement and reason to prove $\angle ADF \cong \angle CEF$.

Question 33

33 In the diagram below, $\triangle ABE \cong \triangle CBD$.



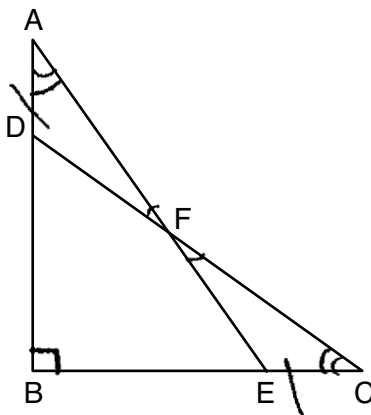
Prove: $\triangle AFD \cong \triangle CFE$

- | | |
|--|------------------------------------|
| 1. $\triangle ABE \cong \triangle CBD$ | 1. Given |
| 2. $\angle A \cong \angle C$ | 2. CPCTC |
| 3. $\angle AFD$ & $\angle CFE$ vertical \angle s | 3. vertical \angle definition |
| 4. $\angle AFD \cong \angle CFE$ | 4. vertical \angle s are \cong |
| 5. $\overline{AE} \cong \overline{CD}$ | 5. CPCTC |
| 6. $\overline{AF} \cong \overline{FC}$ | 6. segment subtraction |
| 7. $\triangle AFD \cong \triangle CFE$ | 7. ASA (2, 4, 6) |

Score 2: The student wrote two correct statements and reasons, but two statements and/or reasons are missing or incorrect.

Question 33

33 In the diagram below, $\triangle ABE \cong \triangle CBD$.



Prove: $\triangle AFD \cong \triangle CFE$

Statements:

1. $\triangle ABE \cong \triangle CBD$
2. $\angle B \cong \angle B$
3. $\angle AFD \cong \angle CFE$
4. $\angle A \cong \angle C$
5. $BA - DB \cong BC - BE$
6. $\triangle AFD \cong \triangle CFE$

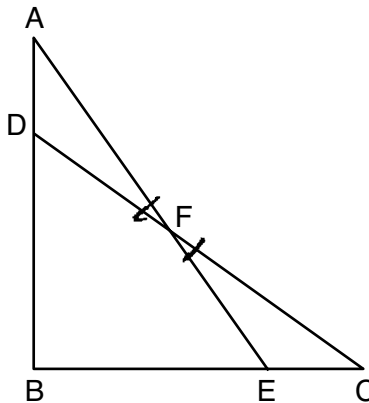
Reasons:

1. Given
2. Reflexive Property.
3. Vertical angles are congruent
4. CPCTC
5. Subtraction postulate
6. AAS

Score 2: The student wrote two correct statements and reasons, but is missing two statements and reasons to prove $\overline{AD} \cong \overline{CE}$.

Question 33

33 In the diagram below, $\triangle ABE \cong \triangle CBD$.



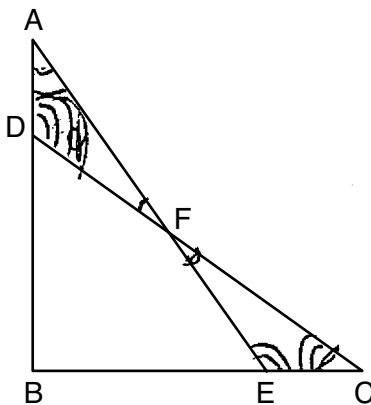
Prove: $\triangle AFD \cong \triangle CFE$

Statement	Reason
1.) $\triangle ABE \cong \triangle CBD$	1.) Given.
2.) $\angle AFD \cong \angle CFE$	2.) Vertical \angle s are \cong .
3.) $\overline{DE} \cong \overline{EF}$	3.) OPCTC
4.) $\overline{DC} - \overline{FC} = \overline{DF}$ $\overline{AE} - \overline{FE} = \overline{AF}$ $\overline{DC} = \overline{DF} = \overline{FC}$ $\overline{AE} - \overline{AF} = \overline{FE}$	4.) Subtraction property
5.) $\overline{AF} \cong \overline{FC}$ $\overline{EF} \cong \overline{DF}$	5.) Substitution
6.) $\triangle AFD \cong \triangle CFE$	6.) SAS.

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

Question 33

33 In the diagram below, $\triangle ABE \cong \triangle CBD$.



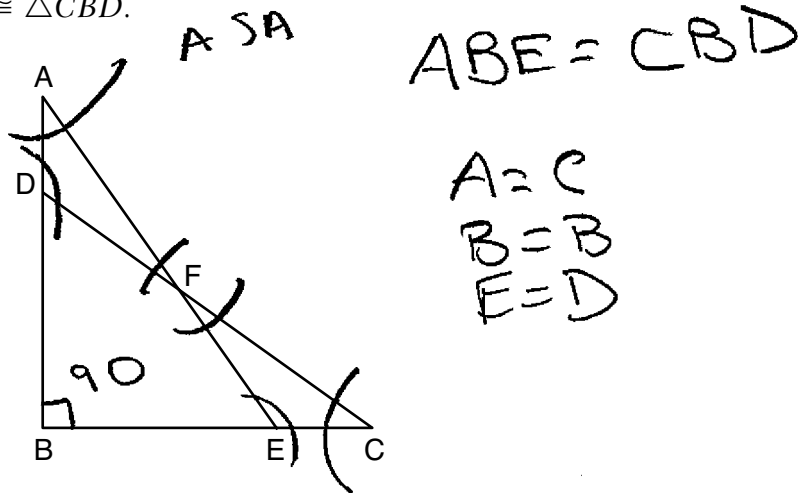
Prove: $\triangle AFD \cong \triangle CFE$

$\angle AFD \cong \angle CFE$ / vertical \angle 's
 $\angle FAD \cong \angle FEC$ / opposite interior \angle 's
 $\angle ADF \cong \angle FCE$ / opposite interior \angle 's
 $\triangle AFD \cong \triangle CFE$ / SSS

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

Question 33

33 In the diagram below, $\triangle ABE \cong \triangle CBD$.



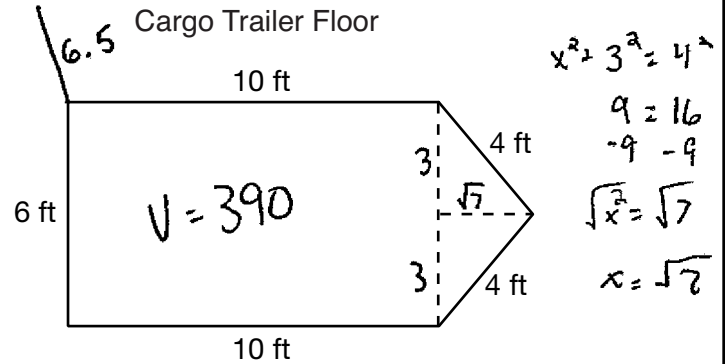
Prove: $\triangle AFD \cong \triangle CFE$

Statement	reason
$\triangle ABE \cong \triangle CBD$	Given
$B \cong B$	reflexive property. its its own $\Delta = 90^\circ$ right triangle
$A \cong C$ $B \cong B$ $E \cong D$	supplementary \angle 's $\triangle ABE \cong \triangle CBD$
$F \cong F$	reflexive property
$\overline{AF} \cong \overline{CF}$ $\overline{DF} \cong \overline{EF}$	F is intersection point for all line segments
$\triangle AFD \cong \triangle CFE$	ASA

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

Question 34

34 A cargo trailer, pictured below, can be modeled by a rectangular prism and a triangular prism. Inside the trailer, the rectangular prism measures 6 feet wide and 10 feet long. The walls that form the triangular prism each measure 4 feet wide inside the trailer. The diagram below is of the floor, showing the inside measurements of the trailer.



If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the *nearest cubic foot*?

441.5921

442 ft³

$10 \times 6 \times 6.5 = 390$

$2 \left(\frac{1}{2} (3)(\sqrt{7})(6.5) \right)$

51.59215057

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

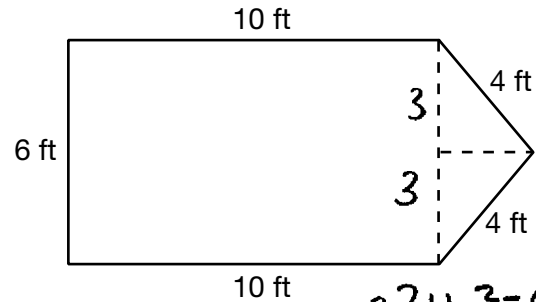
Question 34

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Cargo Trailer



Cargo Trailer Floor



$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 x^2 + 3^2 &= 4^2 \\
 \sqrt{x^2} &= \sqrt{7} \\
 x &= 2.645751311
 \end{aligned}$$

If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the nearest cubic foot?

$$\begin{aligned}
 V_{\text{rect}} &= lwh \\
 11 &= 10 \cdot 6 \cdot 6.5 \\
 &= 390
 \end{aligned}$$

$$\begin{aligned}
 V_{\text{tri}} &= \frac{1}{2}bh \\
 &= \frac{1}{2}(6x)(6.5) \\
 &= \frac{1}{2}(6 \cdot 2.645751311)(6.5) \\
 &= 51.59215056
 \end{aligned}$$

$$\begin{aligned}
 V + V &= 441.5921506 \\
 &= 442 \text{ ft}^3
 \end{aligned}$$

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

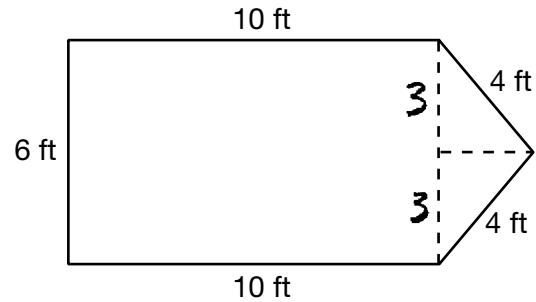
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Cargo Trailer



Cargo Trailer Floor



If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the nearest cubic foot?

$$A = b \cdot h$$

$$A = 6 \cdot 10$$

$$A = 60$$

$$A = \frac{1}{2} b \cdot h$$

$$A = \frac{1}{2} 6 \cdot 2.65$$

$$A = 7.95$$

$$a^2 + 3^2 = 4^2$$

$$a^2 + 9 = 16$$

$$\sqrt{a^2} = \sqrt{7}$$

$$a = 2.65$$

$$\begin{array}{r} 67.95 \\ \times 6.50 \\ \hline \end{array}$$

$$V = 442 \text{ ft}^3$$

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

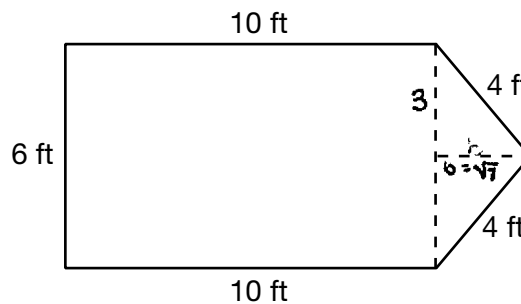
Question 34

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Cargo Trailer



Cargo Trailer Floor



If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the nearest cubic foot?

rectangular prism $V = Bh$ $V = 6 \times 6.5 \times 10 = 390 \text{ ft}^3$

triangular prism $V = Bh$ $V = \frac{1}{2} \cdot 6 \times \sqrt{7} \times 6.5 = 8.598691761 + 390 =$

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

$$3^2 + b^2 = 4^2$$

$$9 + b^2 = 16$$

$$-9 \quad -9$$

$$b^2 = 7$$

$$b = \sqrt{7}$$

$$398.5986918$$

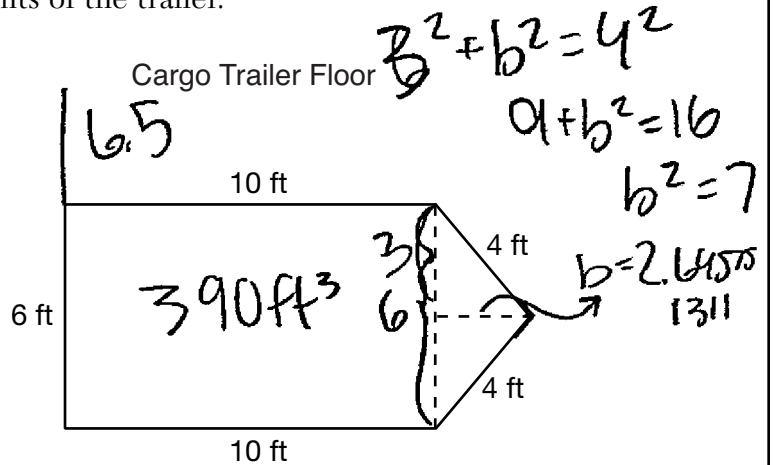
Volume of the trailer:
399

Score 3: The student made an error when determining the volume of the triangular prism.

Question 34

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Cargo Trailer



If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the nearest cubic foot?

Triangle = $V = \frac{1}{2} \cdot b \cdot h$
 $V = \frac{1}{2} \cdot 3 \cdot 2.645751311$
 $V = 3.968626967 \times 2 = 7.937253933$

Rectangle = $V = Bh$
 $V = 60 \cdot 6.5$
 $V = 390$

Volume of trailer = 398 ft^3

Score 3: The student did not multiply by the height of the trailer to determine the volume of the triangular prism.

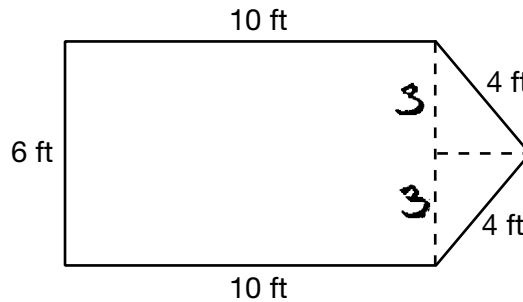
Question 34

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Cargo Trailer



Cargo Trailer Floor



$$\begin{aligned}
 3^2 + x^2 &= 4^2 \\
 9 + x^2 &= 16 \\
 -9 & \quad -9 \\
 \hline
 x^2 &= 7 \\
 x &\approx \sqrt{7} \\
 x &\approx 2.6458
 \end{aligned}$$

If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the nearest cubic foot?

$$\begin{aligned}
 V_{\Delta} &= \frac{1}{3}(6)(10)(2.6458) \\
 V_{\Delta} &= 52.916
 \end{aligned}$$

$$\begin{aligned}
 V_{\square} &= 6(10)(6.5) \\
 V_{\square} &= 390
 \end{aligned}$$

$$\begin{array}{r}
 390 \\
 + 52.916 \\
 \hline
 442.916
 \end{array}$$

443

Score 2: The student found the height of the triangular base and the volume of the rectangular prism, but no further correct work was shown.

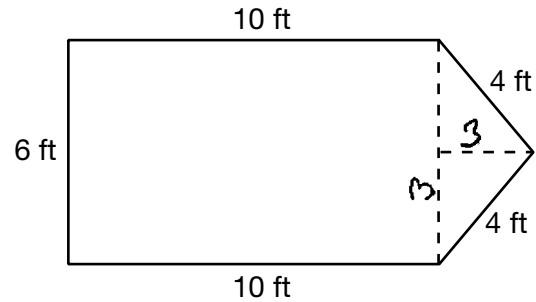
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Cargo Trailer



Cargo Trailer Floor



If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the nearest cubic foot?

$$10 \times 6 \times 6.5 = 390$$

$$\frac{3 \times 3 \times 6.5}{2} = 29.25$$

$$419 \text{ ft}^3$$

$$390 + 29.25$$

$$\checkmark$$

$$419.25$$

$$419$$

Score 2: The student used an incorrect height of the base of the triangular prism. The student also incorrectly calculated by finding the volume of only half of the triangular prism.

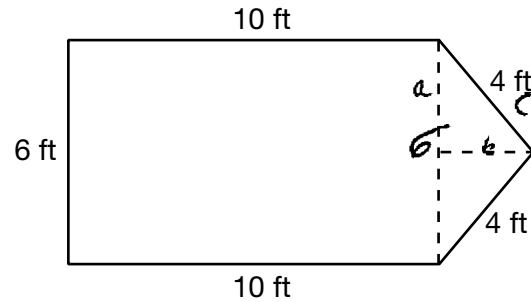
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Cargo Trailer



Cargo Trailer Floor



If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the nearest cubic foot?

$$V_{RP} = Ah$$

$$V_{RP} = (10)(10)(6)$$

$$V_{RP} = 600 \text{ cu ft}$$

$$V_{RP} = (10)(10)(6.5)$$

$$V_{RP} = 650$$

$$V_{TP} = \frac{1}{2}bh$$

$$V_{TP} = \frac{1}{2}(6)(5.7)$$

$$V_{TP} = 7.937$$

$$650 + 7.937 =$$

$$\boxed{657.937 \text{ cu ft}}$$

$$3^2 + 4^2 = 5^2$$

$$9 + 16 = 25$$

$$25 - 9 = 16$$

$$\sqrt{16} = 4$$

$$b = 5.7$$

Score 1: The student found the height of the triangular base, but no further correct work was shown.

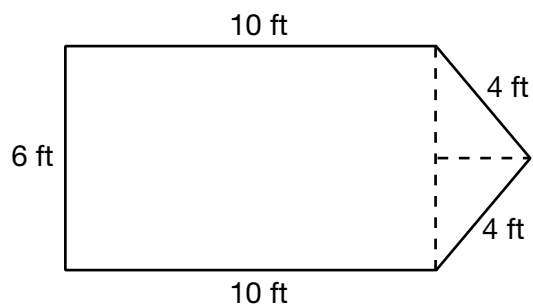
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Cargo Trailer



Cargo Trailer Floor



If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the nearest cubic foot?

$$V = Bh$$

$$V = 6 \cdot 10 \cdot 6.5$$

$$V = 390$$

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

$$V = 8 \cdot 6.5$$

$$V = 52$$

Volume is 442 ft.

Score 1: The student found the volume of the rectangular prism, but no further correct work was shown.

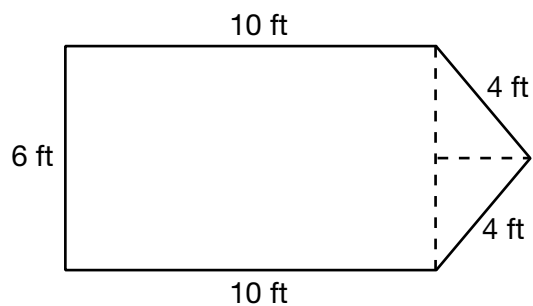
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Cargo Trailer



Cargo Trailer Floor



If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the *nearest cubic foot*?

$$V = bh$$

$$V = 10(6.5)$$
$$V = 65$$

$$V = 4(6.5)$$
$$V = 26$$

$$65 + 26 = 91$$

The total volume is 91 ft^3 .

Score 0: The student gave a completely incorrect response.

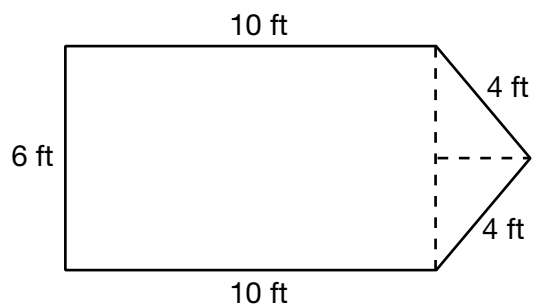
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Cargo Trailer



Cargo Trailer Floor



If the inside height of the trailer is 6.5 feet, what is the total volume of the inside of the trailer, to the nearest cubic foot?

$$B = 6 + 10 + 10 + 4 + 4$$
$$B = 34$$

$$V = Bh$$

$$V = 34(6.5)$$

$$V = 221$$

The volume of the trailer is
 221 ft^3

Score 0: The student gave a completely incorrect response.

Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$.

Prove that $\triangle ABC$ is isosceles.

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

$$AB = \sqrt{(-5-1)^2 + (3-2)^2} = \sqrt{37}$$

$$BC = \sqrt{(-5--6)^2 + (3--3)^2} = \sqrt{37}$$

$\triangle ABC$ is isosceles b/c $AB = BC$

State the coordinates of point D such that quadrilateral $ABCD$ is a square.

$(0, -4)$

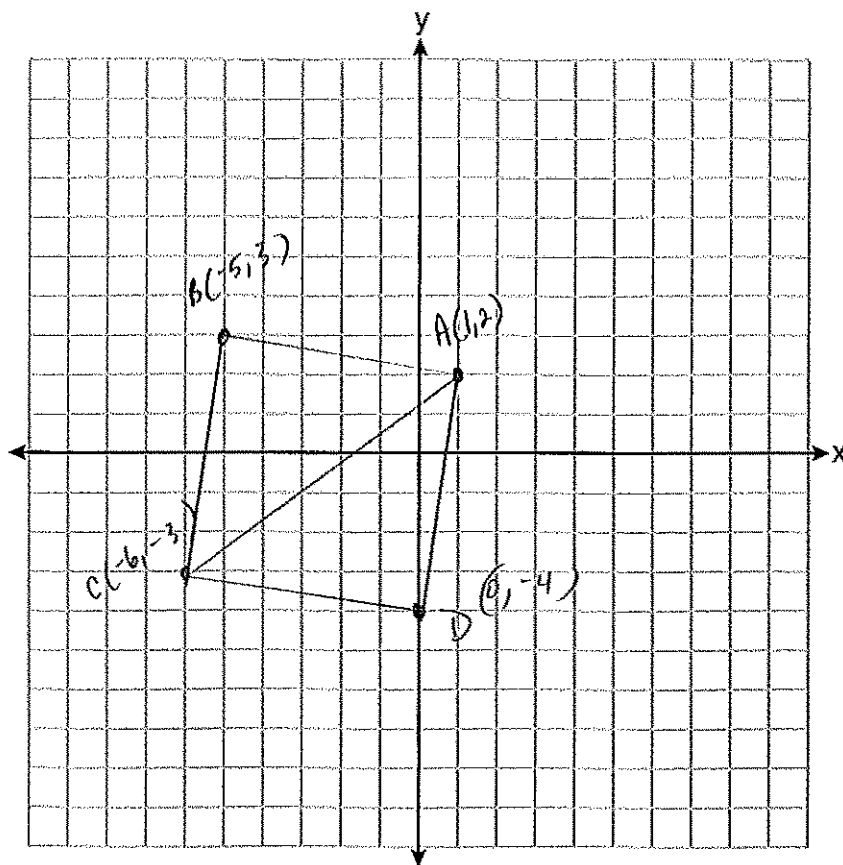
Score 6: The student gave a complete and correct response.

Question 35 continued

Prove that your quadrilateral $ABCD$ is a square.
[The use of the set of axes below is optional.]

$$AD = \sqrt{1^2 + (2 - -4)^2} = \sqrt{37}$$
$$CD = \sqrt{(-6 - 0)^2 + (-3 - -4)^2} = \sqrt{37}$$
$$\text{slope of } AB = \frac{3 - 2}{-5 - 1} = \frac{-1}{6}$$
$$CB = \frac{3 - -3}{-5 - -6} = 6$$

$ABCD$ is a square b/c all 4 sides are \cong
and consecutive sides are \perp since their slopes
are opp. signed reciprocals, so $\angle B$ is a right \angle .



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$.

Prove that $\triangle ABC$ is isosceles.

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

$$\begin{aligned} \text{distance from } A \text{ to } B &= \sqrt{(-5-1)^2 + (3-2)^2} = \sqrt{36+1} = \sqrt{37} \\ \text{distance from } B \text{ to } C &= \sqrt{(-6-5)^2 + (-3-3)^2} = \sqrt{1+36} = \sqrt{37} \end{aligned}$$

Since there are two congruent sides, $\triangle ABC$ is isosceles.

State the coordinates of point D such that quadrilateral $ABCD$ is a square.

$$D = (0, -4)$$

Score 5: The student did not write the concluding statement when proving the square.

Question 35 continued

Prove that your quadrilateral $ABCD$ is a square.
 [The use of the set of axes below is optional.]

$$\overline{AB} = \sqrt{37}$$

$$\overline{BC} = \sqrt{37}$$

$$\overline{CD} = \sqrt{37}$$

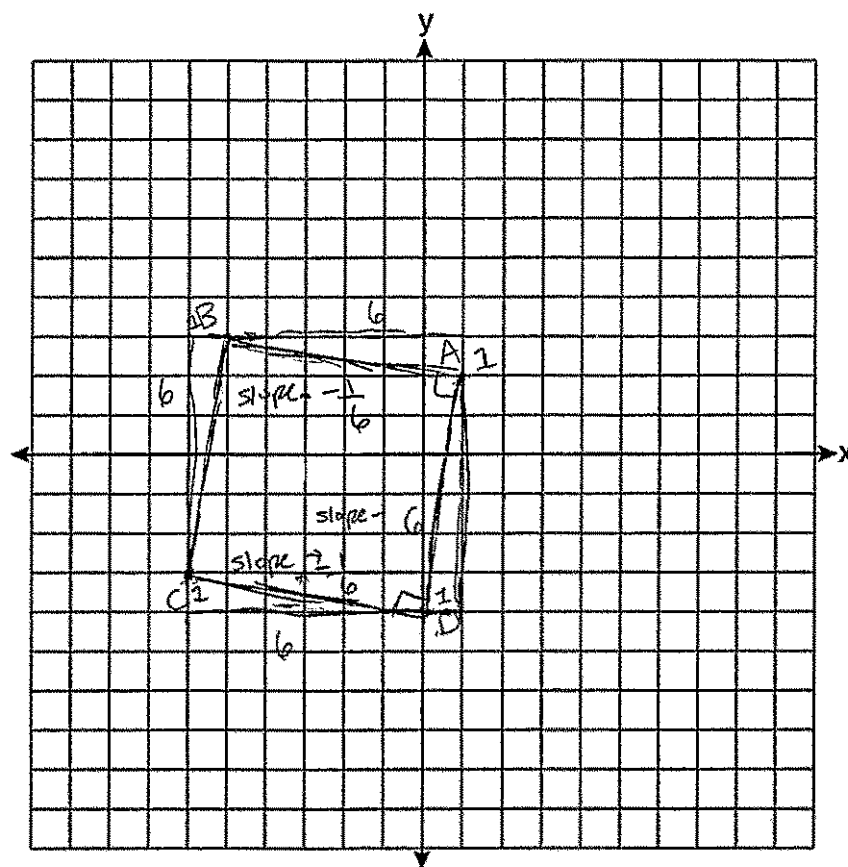
$$\overline{DA} = \sqrt{37}$$

$$\angle BAD = 90^\circ$$

$$\angle ADC = 90^\circ$$

(slopes are negative reciprocals, making them perpendicular)

$-\frac{1}{6}, 6$
 $6, -\frac{1}{6}$ } slopes are negative reciprocals



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$.

Prove that $\triangle ABC$ is isosceles.

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

$$\begin{aligned} AB - d &= \sqrt{(-5-1)^2 + (3-2)^2} \\ d &= \sqrt{36+1} \\ d &= \sqrt{37} \end{aligned}$$

\overline{AB} and \overline{BC} are
congruent so $\triangle ABC$
is isosceles.

$$\begin{aligned} BC - d &= \sqrt{(-6+5)^2 + (-3-3)^2} \\ d &= \sqrt{1+36} \\ d &= \sqrt{37} \end{aligned}$$

State the coordinates of point D such that quadrilateral $ABCD$ is a square.

$$D(0, -4)$$

Score 4: The student made a conceptual error by stating that all sides with the same length is a square.

Question 35 continued

Prove that your quadrilateral $ABCD$ is a square.
[The use of the set of axes below is optional.]

$$AB \sim d = \sqrt{37}$$

$$BC \sim d = \sqrt{37}$$

$$CD \sim d = \sqrt{(-6-0)^2 + (-3+4)^2}$$

$$d = \sqrt{36+1}$$

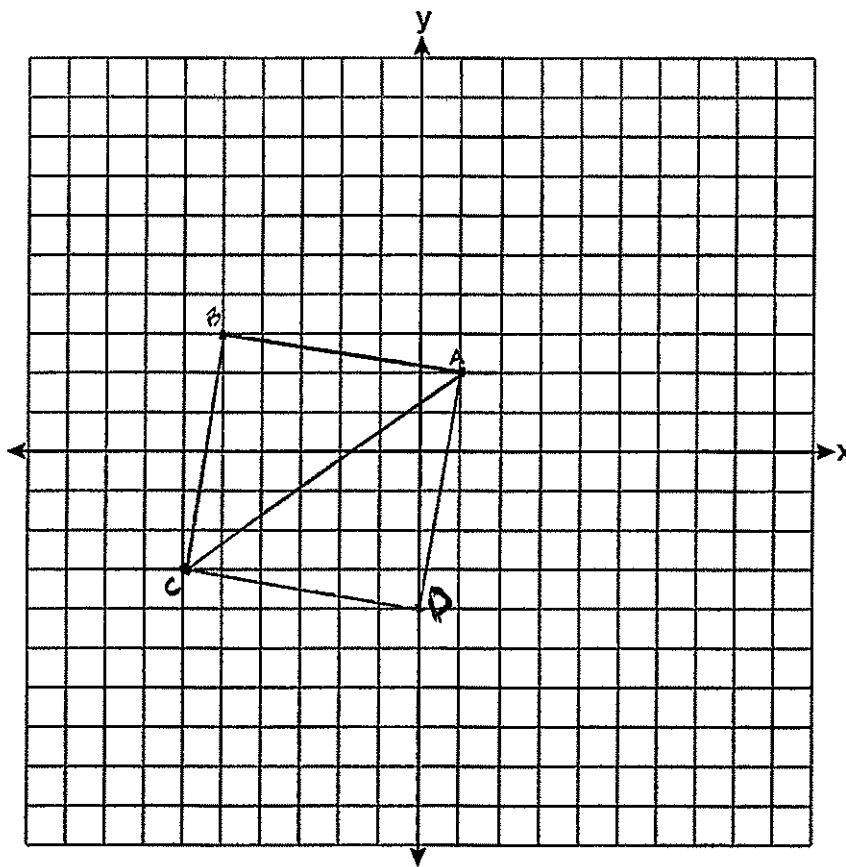
$$d = \sqrt{37}$$

$$DA \sim d = \sqrt{(0-1)^2 + (-4-2)^2}$$

$$d = \sqrt{1+36}$$

$$d = \sqrt{37}$$

All sides have the same length therefore it is a square.



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$.

Prove that $\triangle ABC$ is isosceles.

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

$$AB = \sqrt{(1 - (-5))^2 + (2 - 3)^2} = \sqrt{(6)^2 + (-1)^2} = \sqrt{36 + 1} = \sqrt{37}$$

$$BC = \sqrt{(-5 - (-6))^2 + (3 - (-3))^2} = \sqrt{(1)^2 + (6)^2} = \sqrt{1 + 36} = \sqrt{37}$$

$$CA = \sqrt{(-6 - 1)^2 + (-3 - 2)^2} = \sqrt{(-7)^2 + (-5)^2} = \sqrt{49 + 25} = \sqrt{74}$$

$\therefore \triangle ABC$ is isosceles b/c
two sides are congruent

State the coordinates of point D such that quadrilateral $ABCD$ is a square.

$(-1, -4)$

Score 3: The student proved $\triangle ABC$ is isosceles. The student graphed points C and D incorrectly, which resulted in a quadrilateral that is not a square. The student made an appropriate concluding statement based on their work, but the level of difficulty was significantly reduced.

Question 35 continued

Prove that your quadrilateral $ABCD$ is a square.
[The use of the set of axes below is optional.]

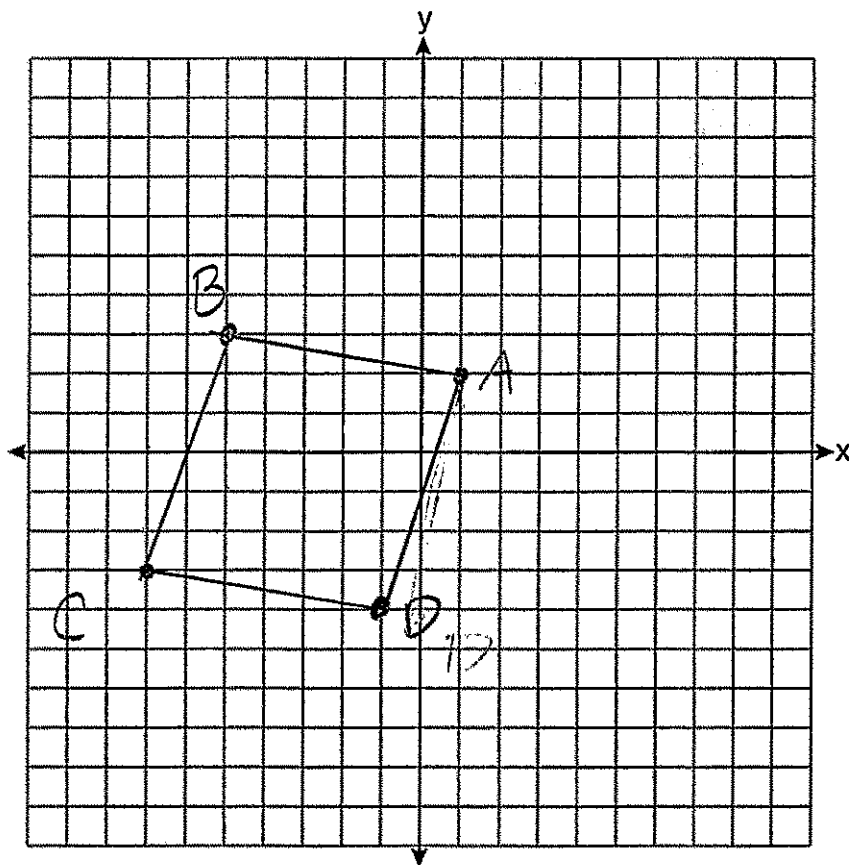
$$\overline{AB} =$$

$$\overline{BC} =$$

$$\overline{CD} = \sqrt{(-6 - (-1))^2 + (-3 - (-4))^2} = \sqrt{(-5)^2 + (1)^2} = \sqrt{25 + 1} = \sqrt{26}$$

$$\overline{DA} = \sqrt{(-1 - 1)^2 + (-4 - 2)^2} = \sqrt{(-2)^2 + (-6)^2} = \sqrt{4 + 36} = \sqrt{40}$$

$\therefore ABCD$ is not a square
b/c all sides are not congruent



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$.

Prove that $\triangle ABC$ is isosceles.

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

$$\begin{aligned} \overline{AB} \quad d &= \sqrt{\Delta X^2 + \Delta Y^2} \\ d &= \sqrt{(1+5)^2 + (2-3)^2} = \sqrt{36+1} = \sqrt{37} \\ \overline{BC} \quad d &= \sqrt{(-5+6)^2 + (3+3)^2} = \sqrt{1+36} = \sqrt{37} \\ \overline{CA} \quad d &= \sqrt{(-6-1)^2 + (-3-2)^2} = \sqrt{49+25} = \sqrt{74} \end{aligned} \quad \left. \vphantom{\begin{aligned} \overline{AB} \\ \overline{BC} \\ \overline{CA} \end{aligned}} \right\} \cong$$

$\triangle ABC$ is isosceles because it has 2 \cong sides and 1 non- \cong side

State the coordinates of point D such that quadrilateral $ABCD$ is a square.

Score 3: The student proved $\triangle ABC$ is isosceles, but one computational error was made. The coordinates of point D were not stated. In proving $ABCD$ is a square, the student was missing the length of \overline{AD} .

Question 35 continued

Prove that your quadrilateral $ABCD$ is a square.
 [The use of the set of axes below is optional.]

$$\overline{CD} \quad d = \sqrt{(-6+1)^2 + (-5+4)^2} = \sqrt{25+2} = \sqrt{27}$$

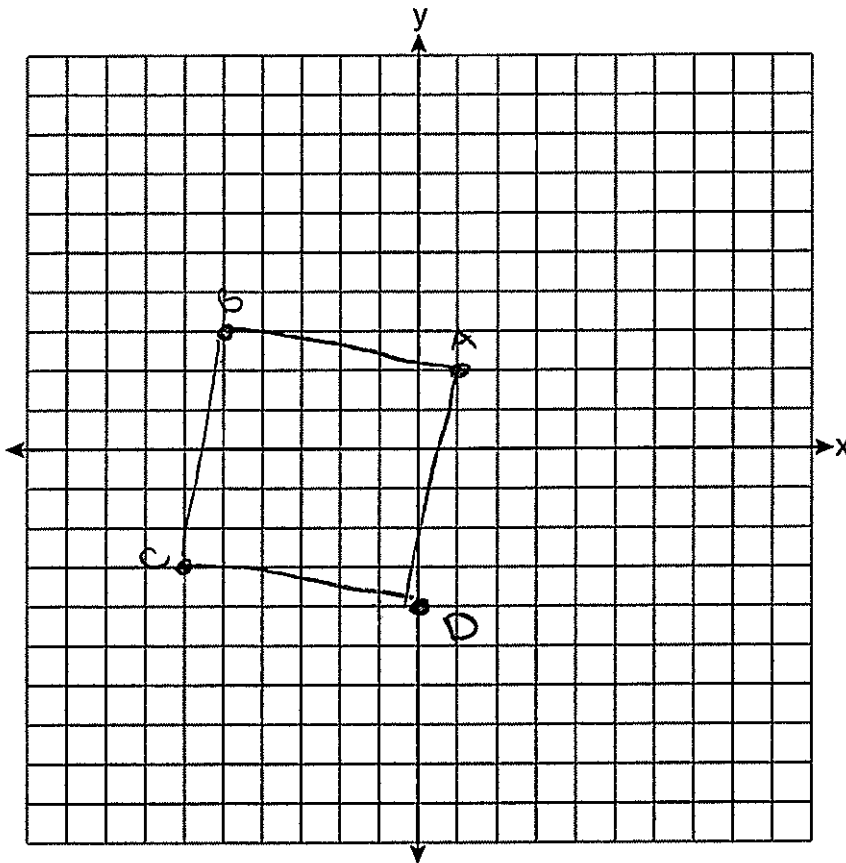
$$d = \sqrt{(-6-0)^2 + (-3+4)^2} = \sqrt{36+2} = \sqrt{38} \quad \checkmark$$

$$\sqrt{38} = \sqrt{38} = \sqrt{38}$$

$$\overline{CD} \cong \overline{CB} \cong \overline{BA} \cong \overline{AD}$$

$\overline{CB} \quad \frac{\Delta y}{\Delta x} = \frac{-3+4}{-6-0} = \frac{1}{-6}$
 $\overline{AD} \quad \frac{\Delta y}{\Delta x} = \frac{2+4}{1-0} = \frac{6}{1}$

all sides are equal
 and have rt \angle 's
 \perp slopes
 \perp lines form rt \angle 's



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$.

Prove that $\triangle ABC$ is isosceles.

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

$$d_{AB} = \sqrt{(-5-1)^2 + (3-2)^2} = \sqrt{(-6)^2 + (1)^2} = \sqrt{36+1} = \sqrt{37}$$

$$d_{BC} = \sqrt{(-6-5)^2 + (-3-3)^2} = \sqrt{(-11)^2 + (-6)^2} = \sqrt{121+36} = \sqrt{157}$$

$\overline{AB} \neq \overline{BC}$ therefore $\triangle ABC$
is ~~isosc.~~

State the coordinates of point D such that quadrilateral $ABCD$ is a square.

?

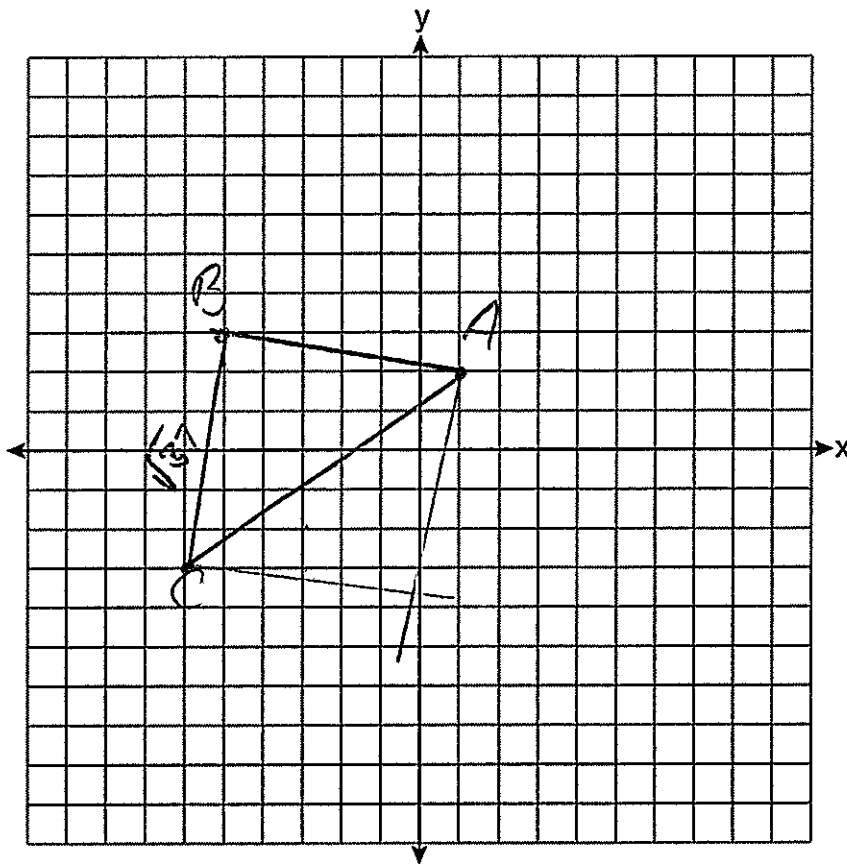
Score 2: The student proved $\triangle ABC$ is isosceles, but no further correct work was shown.

Question 35 continued

Prove that your quadrilateral $ABCD$ is a square.
[The use of the set of axes below is optional.]

?

$$\sqrt{37} = \sqrt{(x-1)^2 + (y-2)^2}$$



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$.

Prove that $\triangle ABC$ is isosceles.

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

$$\begin{array}{l} A(1,2) \quad \frac{2-3}{1-(-5)} = \frac{-1}{6} \\ B(-5,3) \end{array} \quad -1^2 + 6^2 = \sqrt{37}$$

$$\begin{array}{l} B(-5,3) \quad \frac{3-(-3)}{-5-(-6)} = \frac{6}{1} \\ C(-6,-3) \end{array} \quad 6^2 + 1^2 = \sqrt{37}$$

$$\begin{array}{l} C(-6,-3) \quad \frac{-3-2}{-6-1} = \frac{-5}{-7} \\ A(1,2) \end{array} \quad -5^2 + -7^2 = \sqrt{74}$$

$\therefore \triangle ABC$ is isosceles
because 2 sides are
equal, they have
similar slopes

State the coordinates of point D such that quadrilateral $ABCD$ is a square.

$$D(0, -4)$$

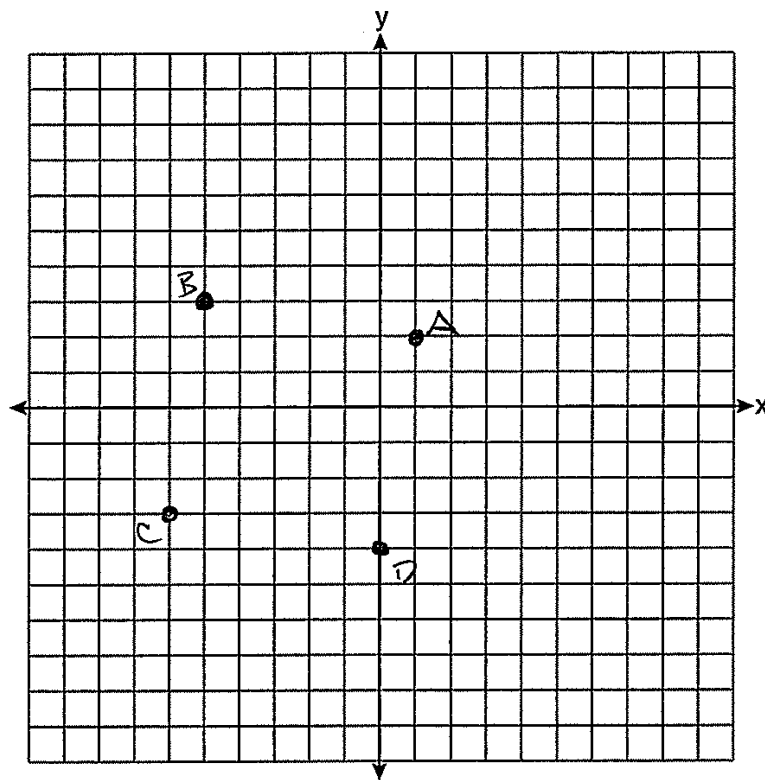
Score 2: The student showed the appropriate work to prove $\triangle ABC$ is isosceles, but the concluding statement included an incorrect phrase. The student stated the coordinates of point D . The student did not show enough additional correct work to earn more credit.

Question 35 continued

Prove that your quadrilateral $ABCD$ is a square.
[The use of the set of axes below is optional.]

$$\begin{array}{l} C(-6, -3) \quad \frac{-3+4}{-6-0} \quad \frac{1}{-6} \\ D(0, 4) \\ CD(-D(0, 4) \quad \frac{4-2}{0-1} \quad \frac{2}{-1} \\ DA \quad A(1, 2) \end{array}$$

\therefore Quad $ABCD$ is
a square because
all the slopes are equal.



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$.

Prove that $\triangle ABC$ is isosceles.

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

Triangle ABC is isosceles because the length of \overline{BA} is equal to the length of \overline{BC}

State the coordinates of point D such that quadrilateral $ABCD$ is a square.

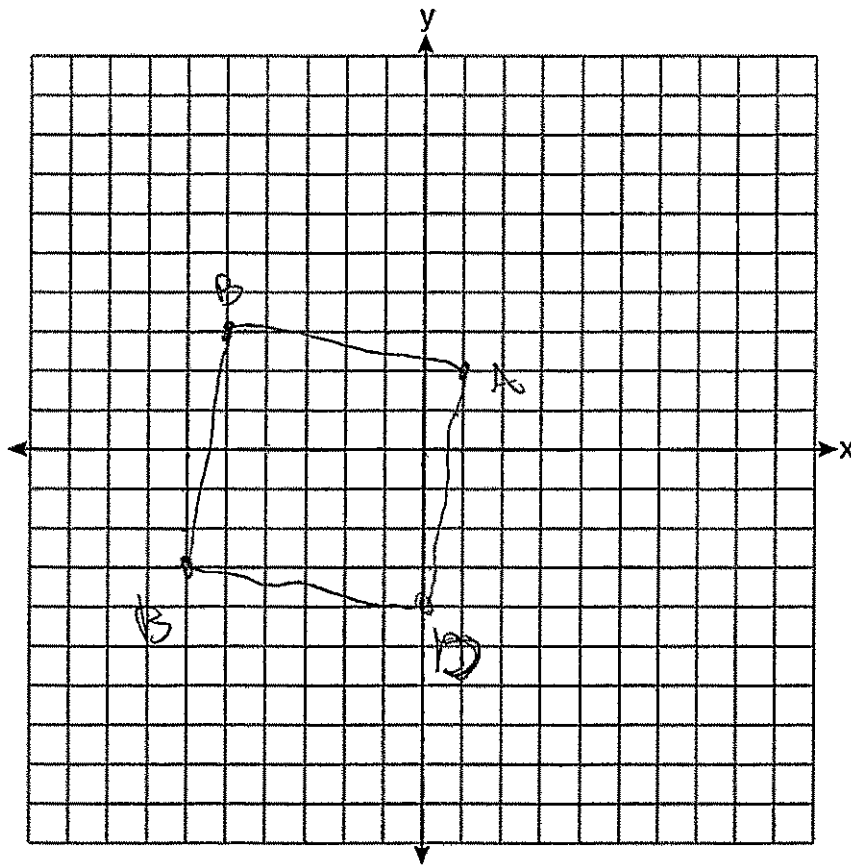
$(0, -4)$

Score 1: The student stated the coordinates of point D , but no further correct work was shown.

Question 35 continued

Prove that your quadrilateral $ABCD$ is a square.
[The use of the set of axes below is optional.]

quadrilateral $ABCD$ is a square because the
distance from \overline{AB} , \overline{BC} , \overline{CD} , \overline{DA} are the same
and all angle meet to form 90° angles



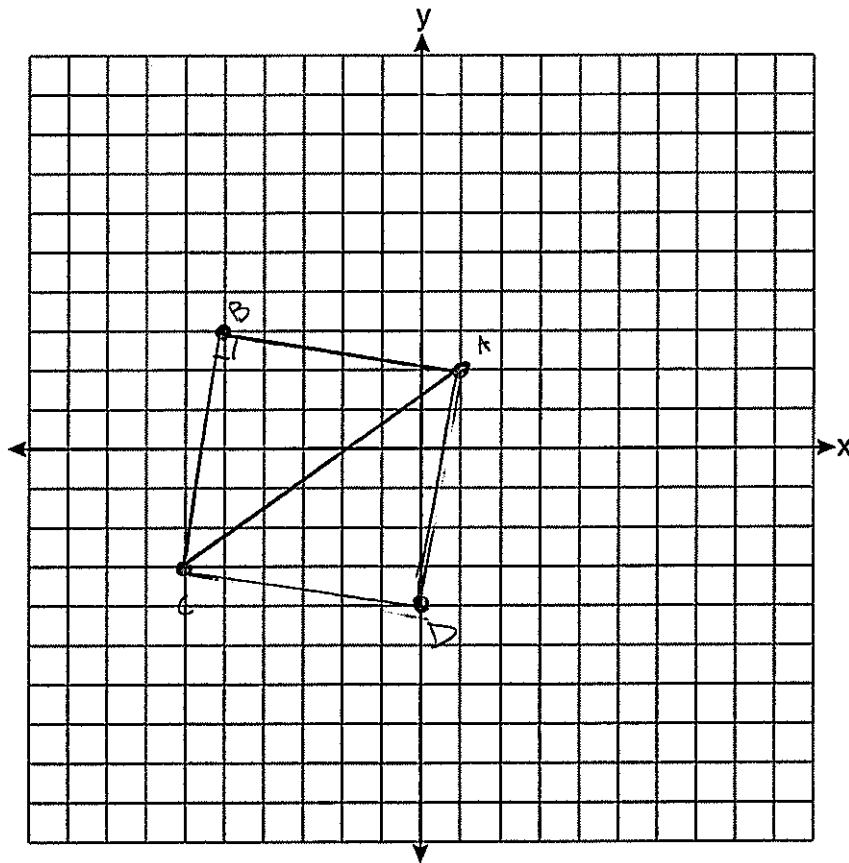
Question 35 continued

Prove that your quadrilateral $ABCD$ is a square.
[The use of the set of axes below is optional.]

4 90° angles

same slope
 $\frac{6}{1} + \frac{-1}{6}$

↑
negative reciprocals



Question 35

35 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-5,3)$, and $C(-6,-3)$.

Prove that $\triangle ABC$ is isosceles.

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

$$D = \sqrt{(y_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$A(1,2) \quad B(-5,3) \quad C(-6,-3)$$
$$\begin{matrix} x_1 & y_1 & x_2 & y_2 \end{matrix}$$
$$BC = \sqrt{(-6 - (-5))^2 + (-3 - 3)^2}$$

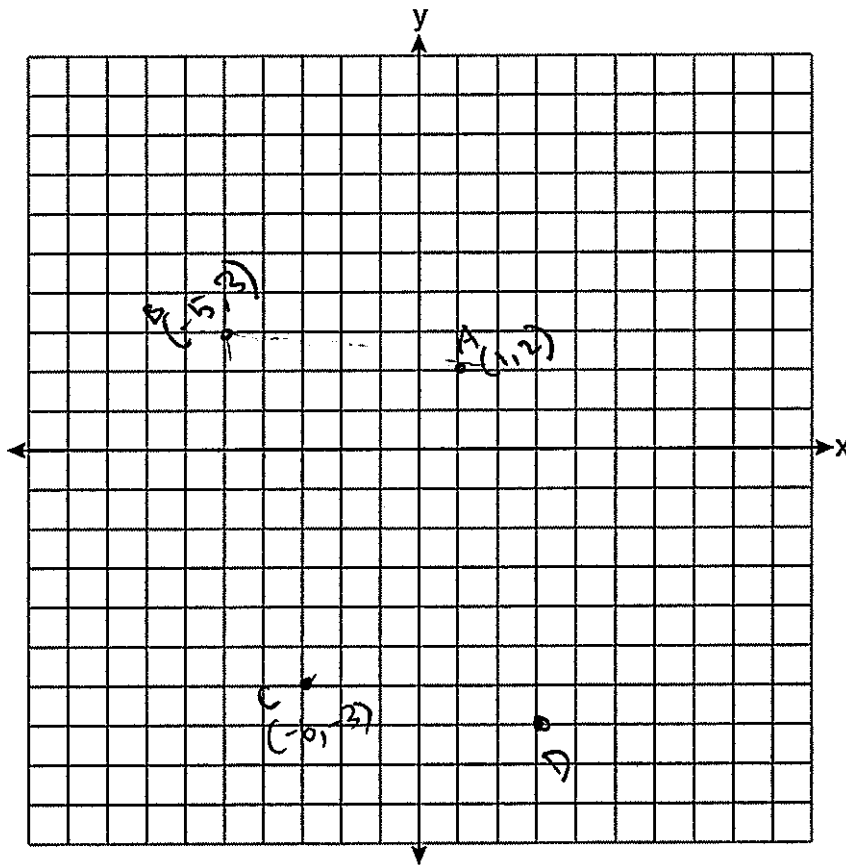
State the coordinates of point D such that quadrilateral $ABCD$ is a square.

$$D(-2, -)$$

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

Question 35 continued

Prove that your quadrilateral $ABCD$ is a square.
[The use of the set of axes below is optional.]



Regents Examination in Geometry – August 2019

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

(Use for the August 2019 exam only.)

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