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

GEOMETRY

Wednesday, January 22, 2025 — 9:15 a.m. to 12:15 p.m., only

Student Name: _____

School Name: _____

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

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

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

This examination has four parts, with a total of 35 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in **Parts II, III,** and **IV** directly in this booklet. All work should be written in pen, except 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.

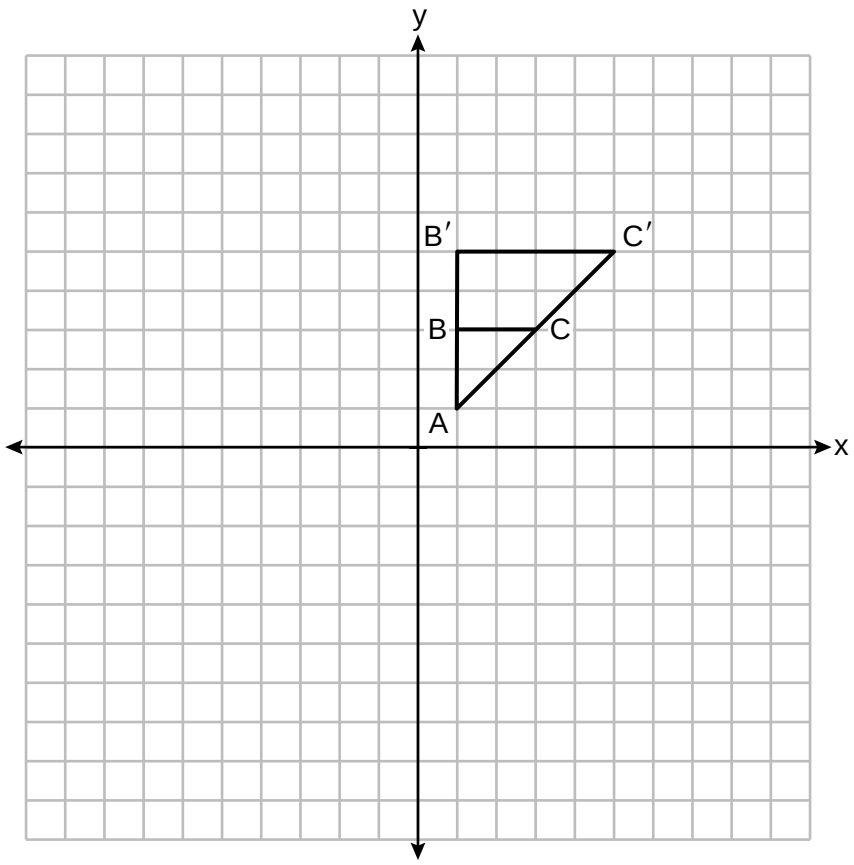
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

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, $\triangle AB'C'$ is the image of $\triangle ABC$.



What is the scale factor and center of dilation that maps $\triangle ABC$ onto $\triangle AB'C'$?

(1) $\frac{1}{2}$ and the origin

(2) 2 and the origin

(3) $\frac{1}{2}$ and vertex A

(4) 2 and vertex A

Use this space for computations.

2 Line segment PAQ has endpoints whose coordinates are $P(-2,6)$ and $Q(3,-4)$. What are the coordinates of point A, such that $PA:AQ = 2:3$?

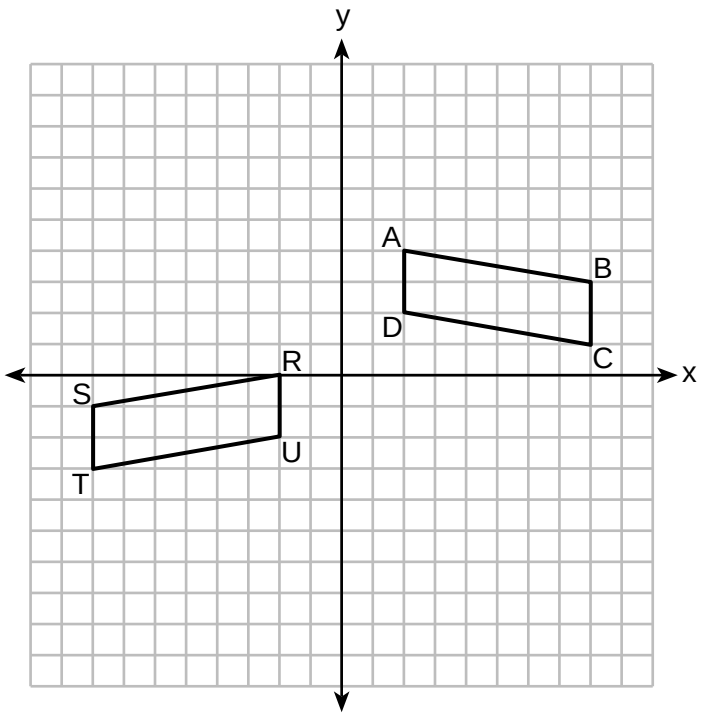
(1) $(1,0)$

(2) $(2,-2)$

(3) $(-1,4)$

(4) $(0,2)$

3 On the set of axes below, congruent parallelograms $ABCD$ and $RSTU$ are graphed.



Which sequence of transformations maps $ABCD$ onto $RSTU$?

(1) a reflection over the x-axis followed by a translation ten units to the left and one unit up

(2) a translation four units down followed by a reflection over the y-axis

(3) a reflection over the y-axis followed by a translation of two units down

(4) a translation ten units to the left followed by a reflection over the x-axis

Use this space for computations.

4 Triangle ABC has a right angle at C. If $AC = 7.7$ and $m\angle B = 24°$, what is AB, to the *nearest tenth*?

(1) 18.9
(2) 17.3
(3) 8.4
(4) 3.1

5 Given $\triangle PQR$ and $\triangle LMN$ with $\overline{PQ} \cong \overline{LM}$, which additional statement is sufficient to always prove $\triangle PQR \cong \triangle LMN$?

(1) $\overline{QR} \cong \overline{MN}$ and $\angle R \cong \angle N$
(2) $\overline{QR} \cong \overline{MN}$ and $\angle Q \cong \angle M$
(3) $\overline{QR} \cong \overline{MN}$ and $\angle P \cong \angle L$
(4) $\overline{QR} \cong \overline{MN}$ and $\angle P \cong \angle M$

6 The equation of a circle is $x^2 + 6y = 4x - y^2 + 12$.
What are the coordinates of the center and the length of the radius?

(1) center $(2,-3)$ and radius 5
(2) center $(-2,3)$ and radius 5
(3) center $(2,-3)$ and radius 25
(4) center $(-2,3)$ and radius 25

7 A square with a side length of 3 is continuously rotated about one of its sides. The resulting three-dimensional object is a

(1) cube with a volume of 9.
(2) cube with a volume of 27.
(3) cylinder with a volume of 27π.
(4) cylinder with a volume of 54π.

Use this space for computations.

8 Line k is represented by the equation $4y + 3 = 7x$. Which equation represents a line that is perpendicular to line k and passes through the point $(-5,2)$?

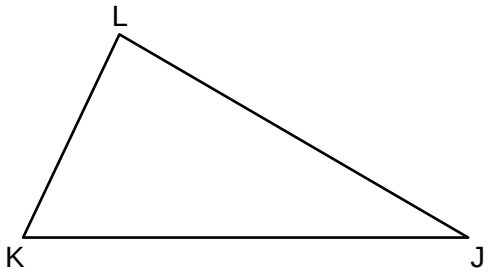
(1) $y + 2 = \frac{4}{7}(x - 5)$

(2) $y - 2 = \frac{4}{7}(x + 5)$

(3) $y + 2 = -\frac{4}{7}(x - 5)$

(4) $y - 2 = -\frac{4}{7}(x + 5)$

9 Scalene triangle JKL is drawn below.



If median $\overline{LM}$ is drawn to side $\overline{KJ}$, which statement is always true?

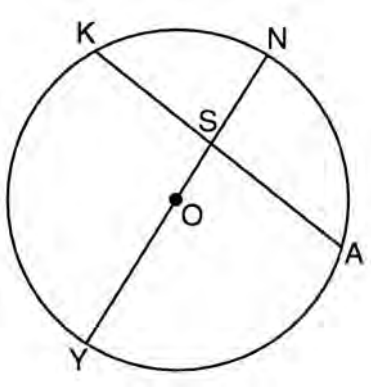
(1) $LM = KM$

(2) $KM = \frac{1}{2}KJ$

(3) $\overline{LM} \perp \overline{KJ}$

(4) $\angle KLM \cong \angle JLM$

10 In circle O, chord $\overline{KA}$ intersects diameter $\overline{YN}$ at S.



If $m\widehat{YK} = 120°$ and $m\widehat{YA} = 105°$, what is $m\angle ASN$?

(1) 22.5°

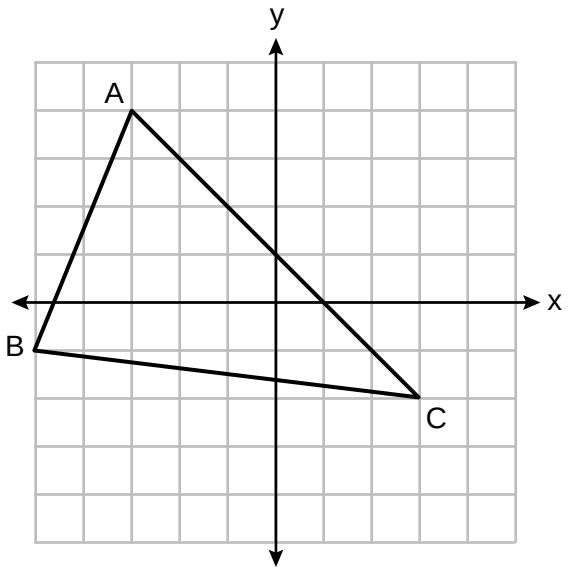
(2) 75°

(3) 97.5°

(4) 120°

Use this space for computations.

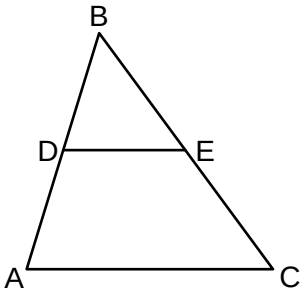
11 Triangle ABC is graphed on the set of axes below. The vertices of $\triangle ABC$ have coordinates $A(-3,4)$, $B(-5,-1)$, and $C(3,-2)$.



What is the area of $\triangle ABC$?

(1) 16
(2) 20
(3) 21
(4) 24

12 In $\triangle ABC$ below, $\overline{DE}$ is a midsegment, and $\overline{BD} \cong \overline{DE}$.

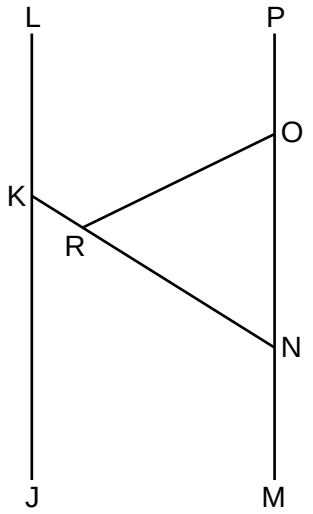


Which statement is always true?

(1) $\triangle ABC$ is isosceles
(2) $\triangle ABC$ is scalene
(3) $\overline{BD} \cong \overline{BE}$
(4) $\overline{DA} \cong \overline{EC}$

Use this space for computations.

13 As shown in the diagram below, $\overline{JKL} \parallel \overline{MNOP}$, $\overline{KRN}$, and $\overline{OR} \cong \overline{ON}$.



If $m\angle POR = 116°$, what is $m\angle LKN$?

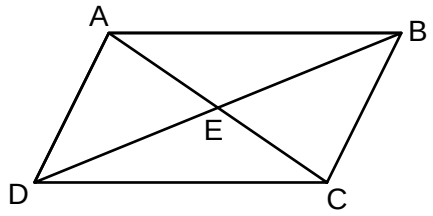
(1) 58°
(2) 116°
(3) 122°
(4) 128°

14 The ratio of similarity of square *ABCD* to square *WXYZ* is 2:5. If $AB = x + 3$ and $WX = 3x + 5$, then the perimeter of *ABCD* is

(1) 8
(2) 20
(3) 32
(4) 80

Use this space for computations.

15 In parallelogram $ABCD$ below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.



Which transformation would map $\triangle ABC$ onto $\triangle CDA$?

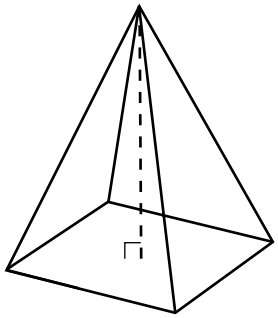
(1) a reflection over $\overline{AC}$

(2) a reflection over $\overline{DB}$

(3) a clockwise rotation of 90° about point E

(4) a clockwise rotation of 180° about point E

16 The square pyramid drawn below has a volume of 175.



If the height of the pyramid is 21, what is the perimeter of the base?

(1) 5

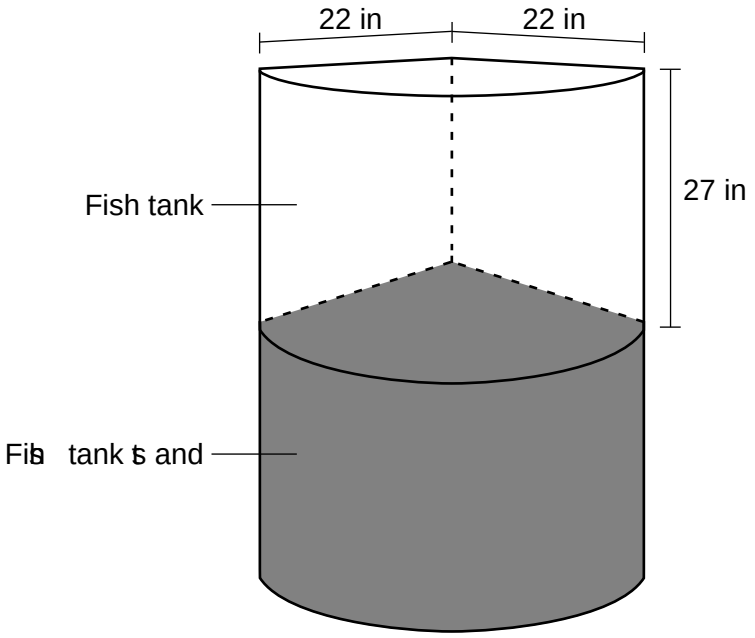
(2) 10

(3) 20

(4) 25

Use this space for computations.

17 A glass fish tank is designed to be placed on a stand in the corner of a room with perpendicular walls. The tank can be modeled using part of a cylinder, as shown below. The inner length of the fish tank along the wall is 22 inches, and the height of the tank is 27 inches.



How much water, to the *nearest gallon*, does the fish tank hold? [1 gal = 231 in^3]

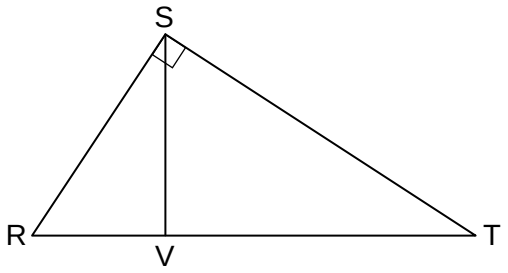
(1) 44
(2) 59
(3) 89
(4) 178

18 Line m, whose equation is $y = -2x + 8$, is dilated by a scale factor of $\frac{1}{2}$ centered at the origin. Which equation represents the image of line m?

(1) $y = -x + 4$
(2) $y = -2x + 4$
(3) $y = -x + 8$
(4) $y = -2x + 8$

Use this space for computations.

19 In right triangle RST below, altitude $\overline{SV}$ is drawn to hypotenuse $\overline{RT}$.



Which statement is always true?

(1) $\frac{RT}{ST} = \frac{ST}{VT}$

(2) $\frac{VR}{VT} = \frac{VT}{VS}$

(3) $\frac{RV}{SV} = \frac{SV}{RT}$

(4) $\frac{TR}{VR} = \frac{VR}{SR}$

20 What is the measure, in radians, of a central angle that intercepts an arc length of 12π cm in a circle with a diameter of 36 cm?

(1) $\frac{\pi}{6}$

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

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

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

21 A regular nonagon has a center point, P. What degree of rotation about point P will carry the nonagon onto itself?

(1) 60°

(2) 90°

(3) 180°

(4) 200°

Use this space for computations.

22 If two sides of a triangle have lengths of 2 and 7, the length of the third side could be

(1) 9
(2) 8
(3) 5
(4) 4

23 The car tire shown in the photograph below has a diameter of $2\frac{1}{4}$ feet.

Approximately how many rotations will the tire make in one mile?

(1) 373
(2) 747
(3) 1328
(4) 2347

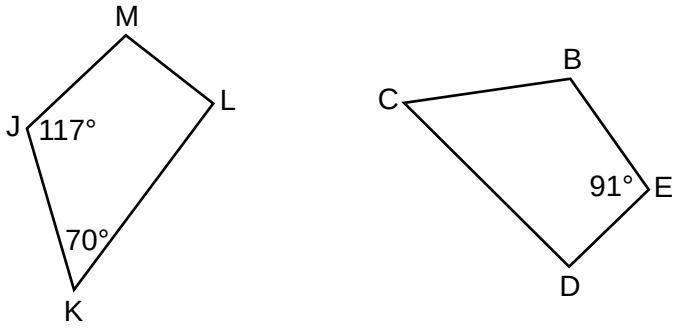
24 In quadrilateral *TOWN*, $\overline{OW} \cong \overline{TN}$ and $\overline{OT} \cong \overline{WN}$. Which additional information is sufficient to prove quadrilateral *TOWN* is a rhombus?

(1) $\overline{ON} \perp \overline{TW}$
(2) $\overline{TO} \perp \overline{OW}$
(3) $\overline{OW} \parallel \overline{TN}$
(4) $\overline{ON}$ and $\overline{TW}$ bisect each other.

Part II

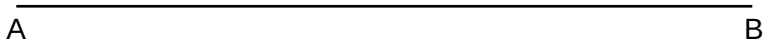
Answer all 7 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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 the diagram below, quadrilateral *BCDE* maps onto quadrilateral *JKLM* using a sequence of rigid motions.

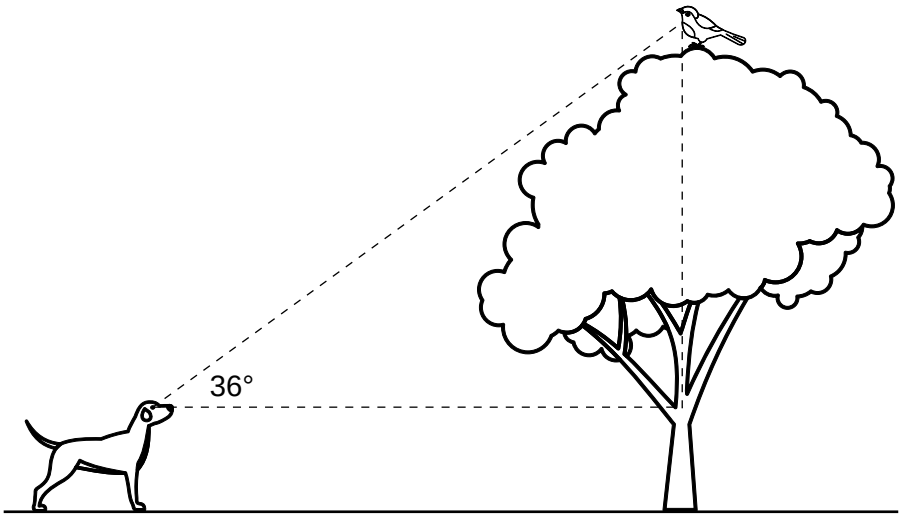


Determine and state the degree measure of angle *D*.

26 Given $\overline{AB}$ below, use a compass and a straightedge to construct a segment that is $\frac{1}{4}AB$. [Leave all construction marks.]



27 A dog sees a bird in a tree. The angle of elevation from the dog's eyes to the bird is 36°, as modeled below.

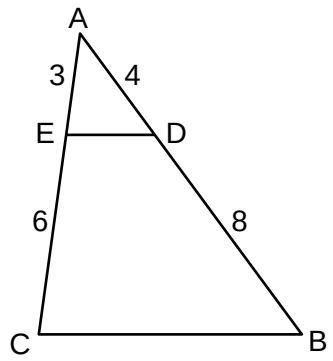


The dog is 18.5 feet away from the base of the tree, and his eyes are 2.5 feet above the ground. Determine and state how high the bird is above the ground, to the *nearest foot*.

28 Pure silver has a density of 10.5 g/cm^3. Samantha has a pure silver charm on her necklace in the shape of a sphere. The radius of the charm is 0.5 cm.

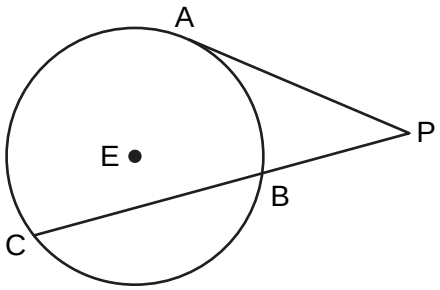
Determine and state the mass of the charm, to the *nearest tenth of a gram*.

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



Explain why $\triangle ADE \sim \triangle ABC$.

30 In circle E below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn.



If $PB = 9$ and $BC = 16$, determine and state the length of $\overline{PA}$.

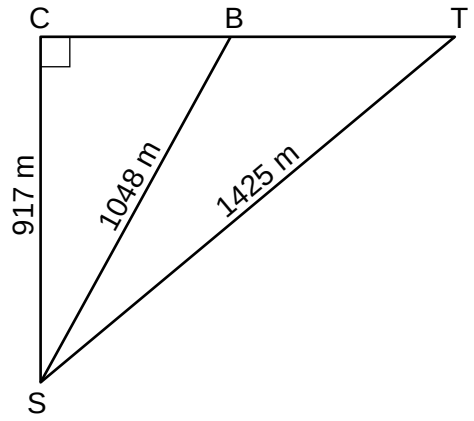
31 In a right triangle, $\sin(4x + 3)° = \cos(2x - 9)°$. Determine and state the value of x.

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 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.



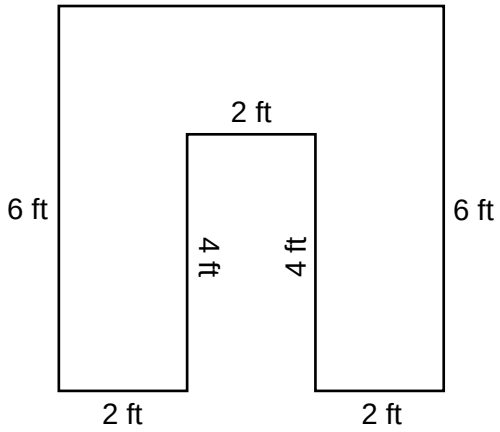
Determine and state, to the *nearest degree*, the measure of $\angle BST$.

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



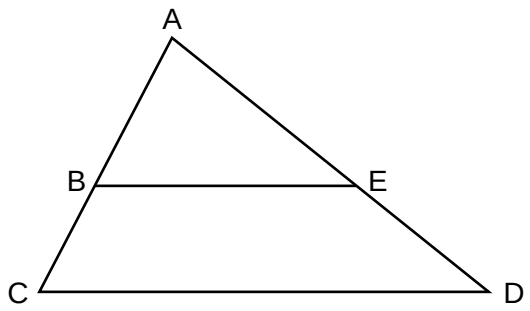
The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



Prove: $AB \bullet AD = AE \bullet AC$

Part IV

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

35 Triangle PET has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

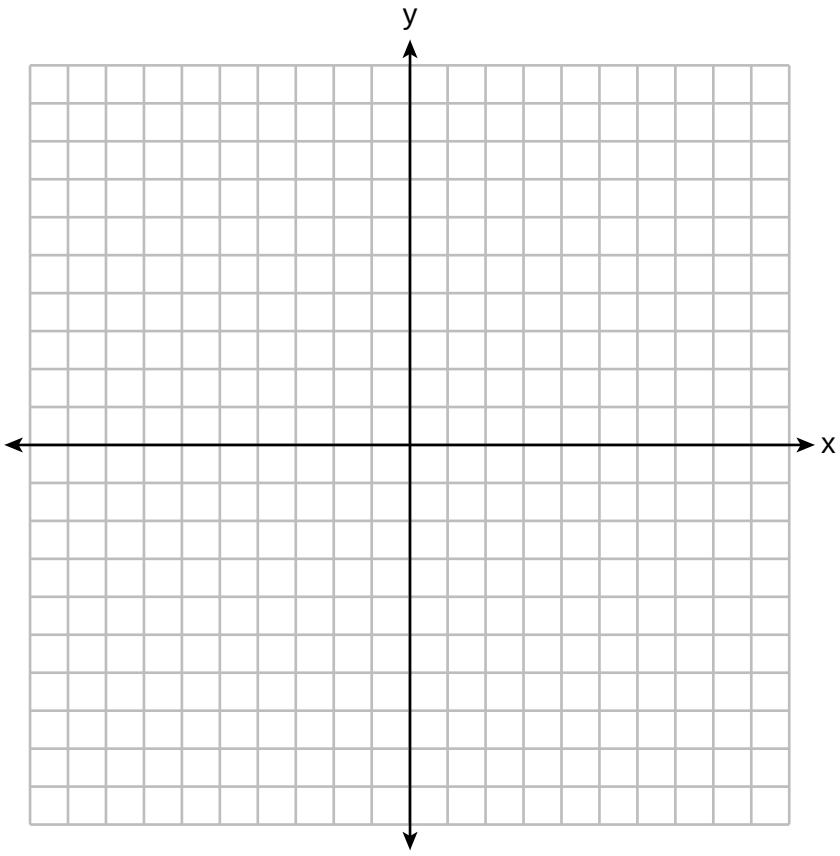
State the coordinates of N, the image of P, after a 180° rotation centered at (1,3).

Question 35 is continued on the next page.

Question 35 continued

Prove *PENT* is a rectangle.

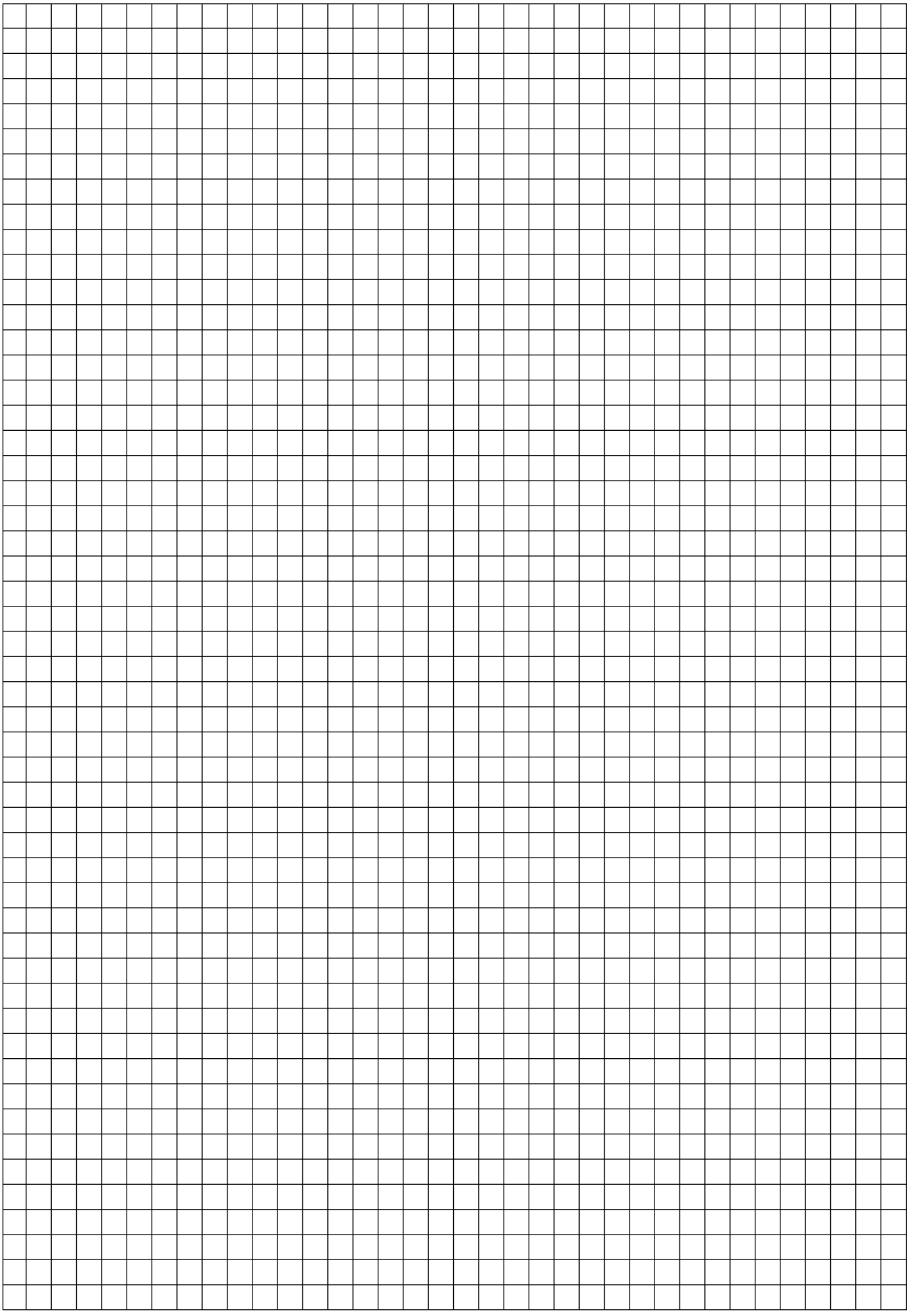
[The use of the set of axes below is optional.]



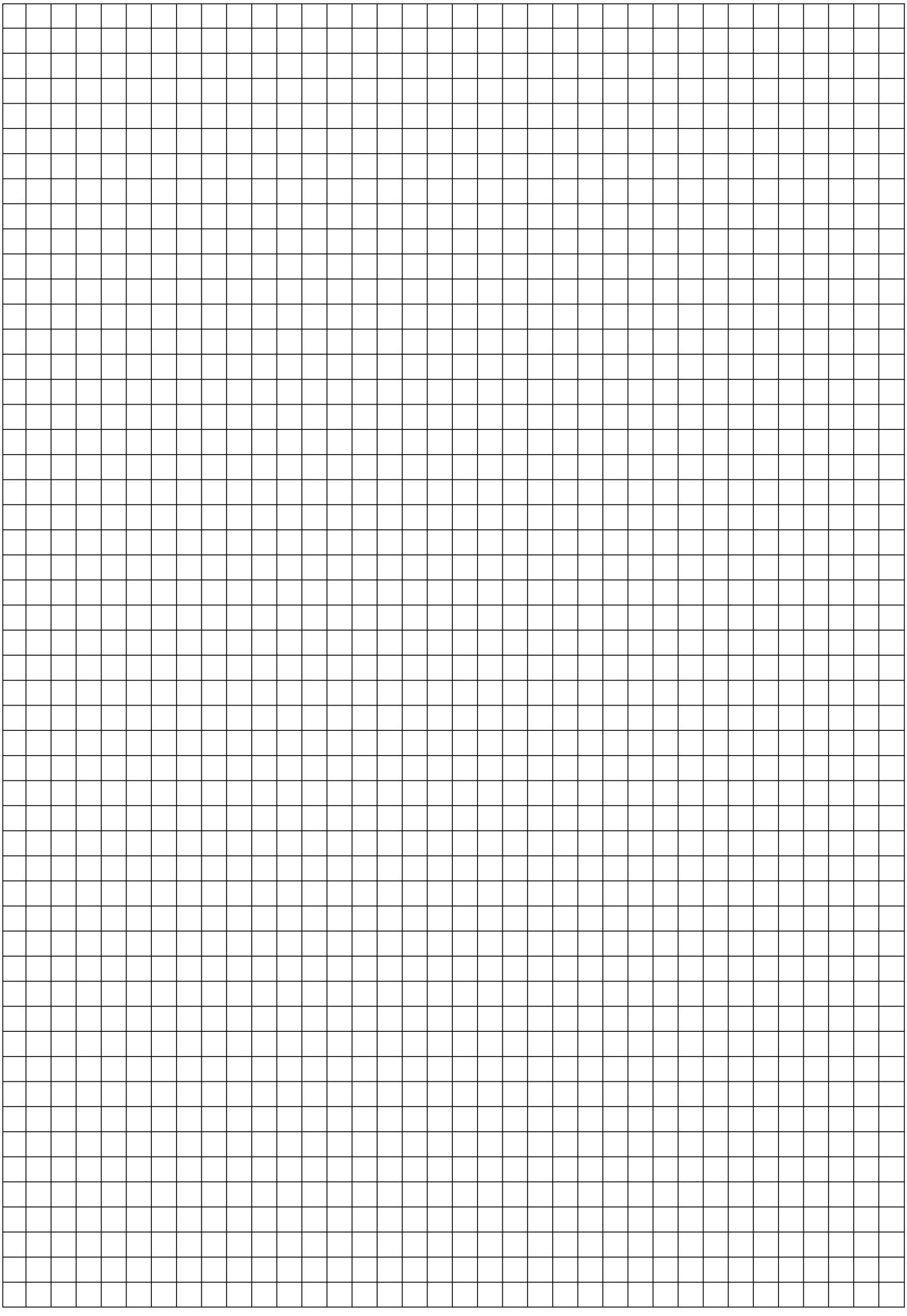
Tear Here

Tear Here

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



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



Tear Here

Tear Here

Tear Here

High School Math Reference Sheet

1 inch = 2.54 centimeters
1 meter = 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile = 1.609 kilometers

1 kilometer = 0.62 mile
1 pound = 16 ounces
1 pound = 0.454 kilogram
1 kilogram = 2.2 pounds
1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
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	$S_n = \frac{a_1 - a_1 r^n}{1 - \mathrm{r}}$ where $r \neq 1$
Radians	1 radian $= \frac{180}{\pi}$ degrees
Degrees	1 degree $= \frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$

Tear Here

GEOMETRY

The State Education Department / The University of the State of New York

Regents Examination in Geometry – January 2025

Scoring Key: Part I (Multiple-Choice Questions)

Examination	Date	Question Number	Scoring Key	Question Type	Credit
Geometry	January '25	**1**	4	MC	2
Geometry	January '25	**2**	4	MC	2
Geometry	January '25	**3**	2	MC	2
Geometry	January '25	**4**	1	MC	2
Geometry	January '25	**5**	2	MC	2
Geometry	January '25	**6**	1	MC	2
Geometry	January '25	**7**	3	MC	2
Geometry	January '25	**8**	4	MC	2
Geometry	January '25	**9**	2	MC	2
Geometry	January '25	**10**	3	MC	2
Geometry	January '25	**11**	3	MC	2
Geometry	January '25	**12**	1	MC	2
Geometry	January '25	**13**	3	MC	2
Geometry	January '25	**14**	3	MC	2
Geometry	January '25	**15**	4	MC	2
Geometry	January '25	**16**	3	MC	2
Geometry	January '25	**17**	1	MC	2
Geometry	January '25	**18**	2	MC	2
Geometry	January '25	**19**	1	MC	2
Geometry	January '25	**20**	3	MC	2
Geometry	January '25	**21**	4	MC	2
Geometry	January '25	**22**	2	MC	2
Geometry	January '25	**23**	2	MC	2
Geometry	January '25	**24**	1	MC	2

Regents Examination in Geometry – January 2025

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

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

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

The chart for determining students' final examination scores for the **January 2025 Regents Examination in Geometry** will be posted on the Department's web site at: https://www.nysedregents.org/geometryre/ on the day of the examination. Conversion charts provided for the previous administrations of the Regents Examination in Geometry must NOT be used to determine students' final scores for this administration.

FOR TEACHERS ONLY

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

GEOMETRY

Wednesday, January 22, 2025 — 9:15 a.m. to 12:15 p.m., only

RATING GUIDE

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

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

Mechanics of Rating

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

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

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

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

Raters should record the student's scores for all questions and the total raw score on the student's separate answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: https://www.nysed.gov/state-assessment/high-school-regents-examinations by Wednesday, January 22, 2025. 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]** 82, and correct work is shown, such as a correctly labeled diagram.

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

or

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

or

[1] 82, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(26) **[2]** A correct construction is drawn showing all appropriate arcs.

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

or

[1] An appropriate construction is drawn showing all appropriate arcs, but the segment indicating $\frac{1}{4}AB$ is missing.

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

or

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(27) **[2]** 16, and correct work is shown.

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

or

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

or

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

or

[1] 16, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(28) **[2]** 5.5, 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] Correct work is shown to find the volume of the sphere, but no further correct work is shown.

or

[1] 5.5, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(29) **[2]** A complete and correct explanation is written.

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

or

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

or

[1] A correct proportion is written, but the explanation is incomplete or partially correct.

[0] A correct proportion is written, but no further correct work is shown.

or

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(30) **[2]** 15, 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 length of $\overline{PA}$, but no further correct work is shown.

or

[1] 15, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(31) **[2]** 16, 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 relevant equation is written to find the value of x, but no further correct work is shown.

or

[1] 16, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, 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]** 21, 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 find the measure of at least one acute angle in both $\triangle CST$ and $\triangle CSB$, but no further correct work is shown.

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

or

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

or

[2] Correct work is shown to find the measure of at least one acute angle in $\triangle CST$ or $\triangle CSB$, but no further correct work is shown.

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

or

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

or

[1] 21, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(33) **[4]** 35, \$66.24, 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 find the number of bags of topsoil to be purchased, but no further correct work is shown.

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

or

[2] Correct work is shown to find the volume of the topsoil, but no further correct work is shown.

[1] Correct work is shown to find the area of the base, but no further correct work is shown.

or

[1] 35 and \$66.24, but no work is shown.

[0] 35 or \$66.24, but no work is shown.

or

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(34) **[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.

or

[2] $\triangle ABE \sim \triangle ACD$ is proven, but no further correct work is shown.

[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 does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, 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 *PET* is a right triangle. Point *N*(8,2) is stated, and correct work is shown to prove *PENT* is a rectangle. Correct concluding statements are written.

[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 *N*(8,2) is not stated. Correct concluding statements are written.

[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 in proving *PENT* is a rectangle. Appropriate concluding statements are written.

or

[4] *N*(8,2) is stated, correct work is shown to prove *PENT* is a rectangle, and a correct concluding statement is written. No further correct work is shown.

or

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

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

or

[3] Appropriate work is shown, but one conceptual error is made in proving *PENT* is a rectangle, and one computational or graphing error is made. Appropriate concluding statements are written.

or

[3] Correct work is shown to prove *PET* is a right triangle, and a correct concluding statement is written. Point *N*(8, 2) is stated. No further correct work is shown.

or

[3] Correct work is shown to prove *PENT* is a rectangle, and a correct concluding statement is written. No further correct work is shown.

[2] Correct work is shown to prove *PET* is a right triangle, and a correct concluding statement is written. No further correct work is shown.

or

[2] *N*(8,2) is stated, and correct work is shown to prove *PENT* is a rectangle, but the concluding statement is missing or incorrect.

[1] Correct work is shown to prove *PET* is a right triangle, but the concluding statement is missing or incorrect.

or

[1] *N*(8,2) is stated, but no further correct work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

Map to the Learning Standards
Geometry
January 2025

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

The *Chart for Determining the Final Examination Score for the January 2025 Regents Examination in Geometry* will be posted on the Department's web site at: https://www.nysed.gov/state-assessment/high-school-regents-examinations on Wednesday, January 22, 2025. 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 https://www.nysed.gov/state-assessment/teacher-feedback-state-assessments.

2. Click Regents Examinations.

3. Complete the required demographic fields.

4. Select the test title from the Regents Examination dropdown list.

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

6. 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

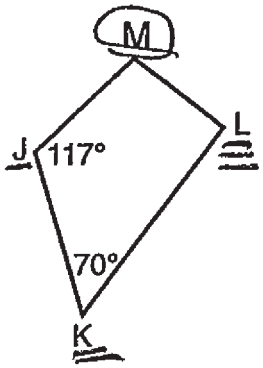
Wednesday, January 22, 2025 — 9:15 a.m. to 12:15 p.m., only

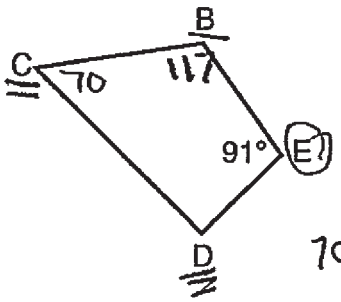
MODEL RESPONSE SET

Table of Contents

Question 25

25 In the diagram below, quadrilateral *BCDE* maps onto quadrilateral *JKLM* using a sequence of rigid motions.





70+117+91=278

360
-278
82

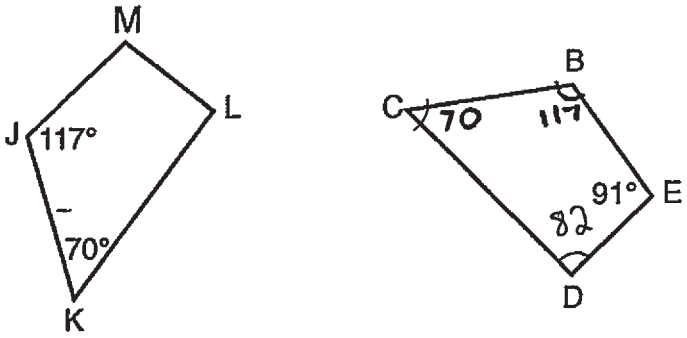
Determine and state the degree measure of angle *D*.

∠D is 82° because all quadrilateral ∠s add up to 360.

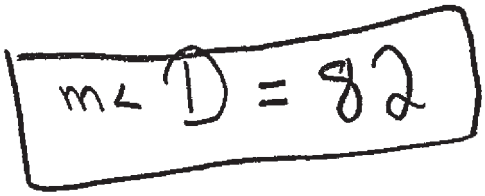
Score 2: The student gave a complete and correct response.

Question 25

25 In the diagram below, quadrilateral *BCDE* maps onto quadrilateral *JKLM* using a sequence of rigid motions.



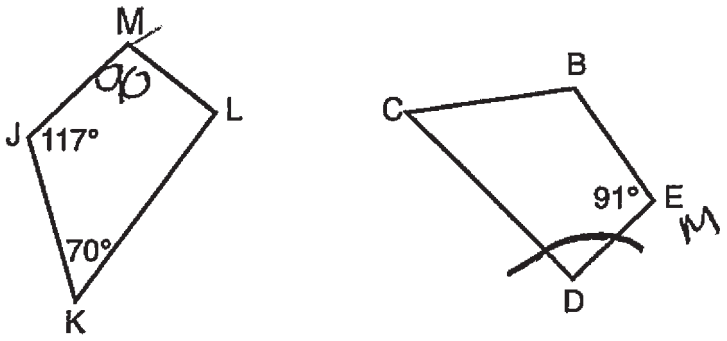
Determine and state the degree measure of angle *D*.



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

Question 25

25 In the diagram below, quadrilateral *BCDE* maps onto quadrilateral *JKLM* using a sequence of rigid motions.



Determine and state the degree measure of angle *D*.

m∠D is

90+117+70+x=360

277+x=360

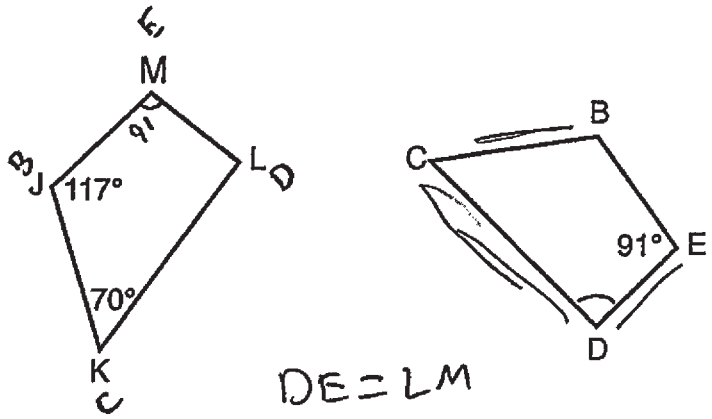
-277 -277

x=83

Score 1: The student made a transcription error stating m∠*M* = 90°.

Question 25

25 In the diagram below, quadrilateral *BCDE* maps onto quadrilateral *JKLM* using a sequence of rigid motions.



DE = LM
CD = LK
BC = JK
BE = JM

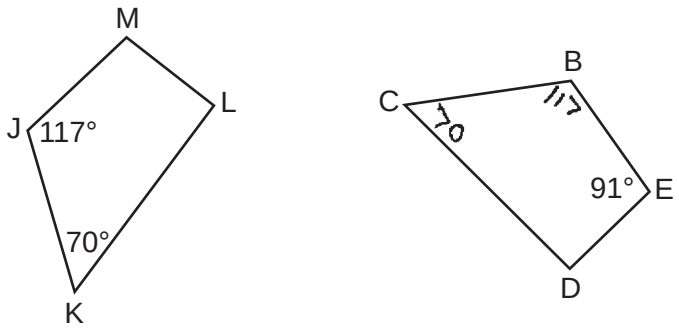
Determine and state the degree measure of angle *D*.

117 + 70 + 91 + x = 360
278 + x = 360
-278
x = 62°
∠D = 62°

Score 1: The student made a computational error.

Question 25

25 In the diagram below, quadrilateral *BCDE* maps onto quadrilateral *JKLM* using a sequence of rigid motions.



Determine and state the degree measure of angle *D*.

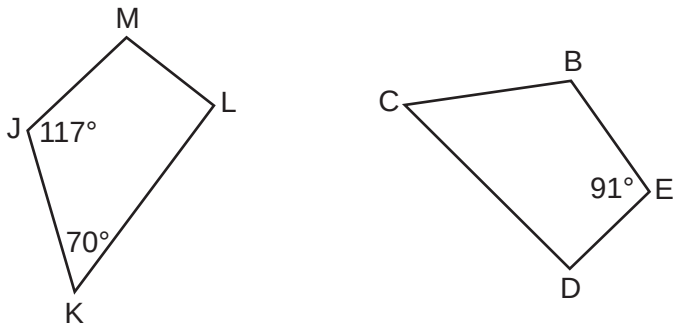
70+117+91=278

360-278= 98°

Score 1: The student made a computational error.

Question 25

25 In the diagram below, quadrilateral *BCDE* maps onto quadrilateral *JKLM* using a sequence of rigid motions.



Determine and state the degree measure of angle *D*.

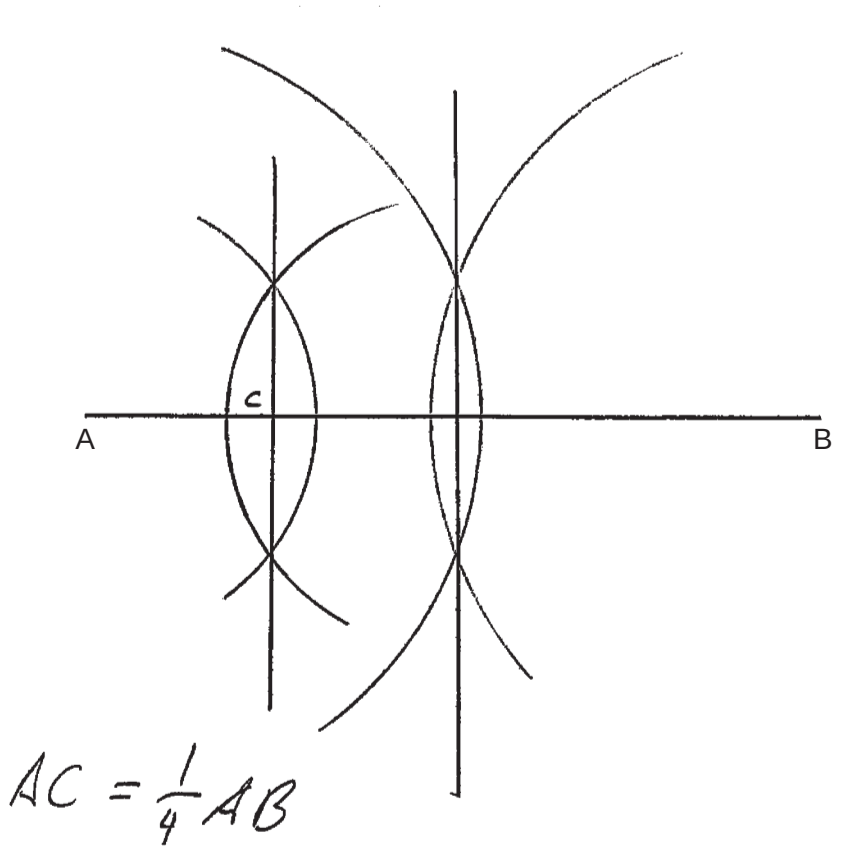
$117 + 70 + 91 = 278$

$\angle D = 278^{\circ}$

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

Question 26

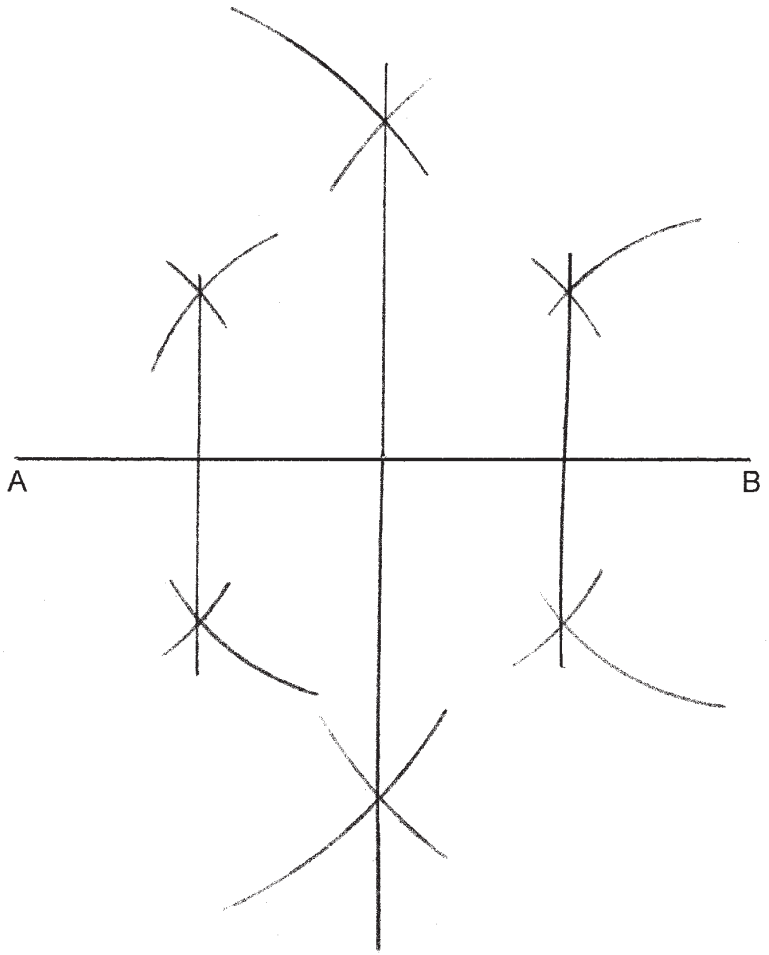
26 Given $\overline{AB}$ below, use a compass and a straightedge to construct a segment that is $\frac{1}{4}AB$. [Leave all construction marks.]



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

Question 26

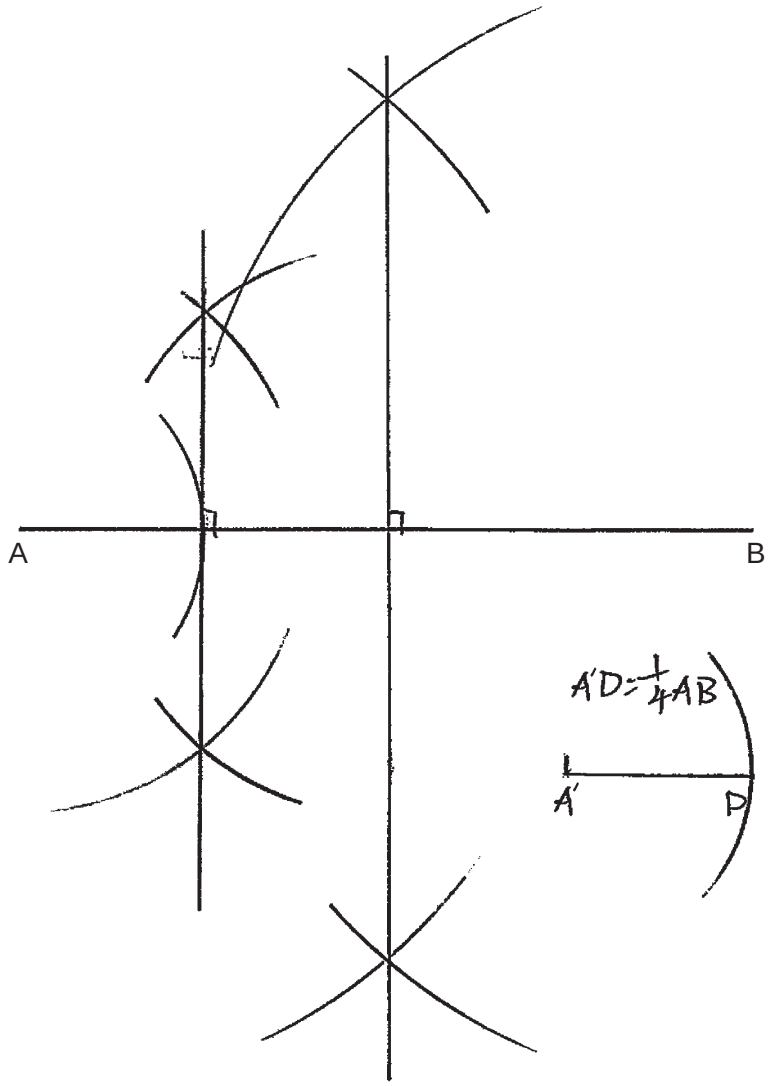
26 Given $\overline{AB}$ below, use a compass and a straightedge to construct a segment that is $\frac{1}{4}AB$. [Leave all construction marks.]



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

Question 26

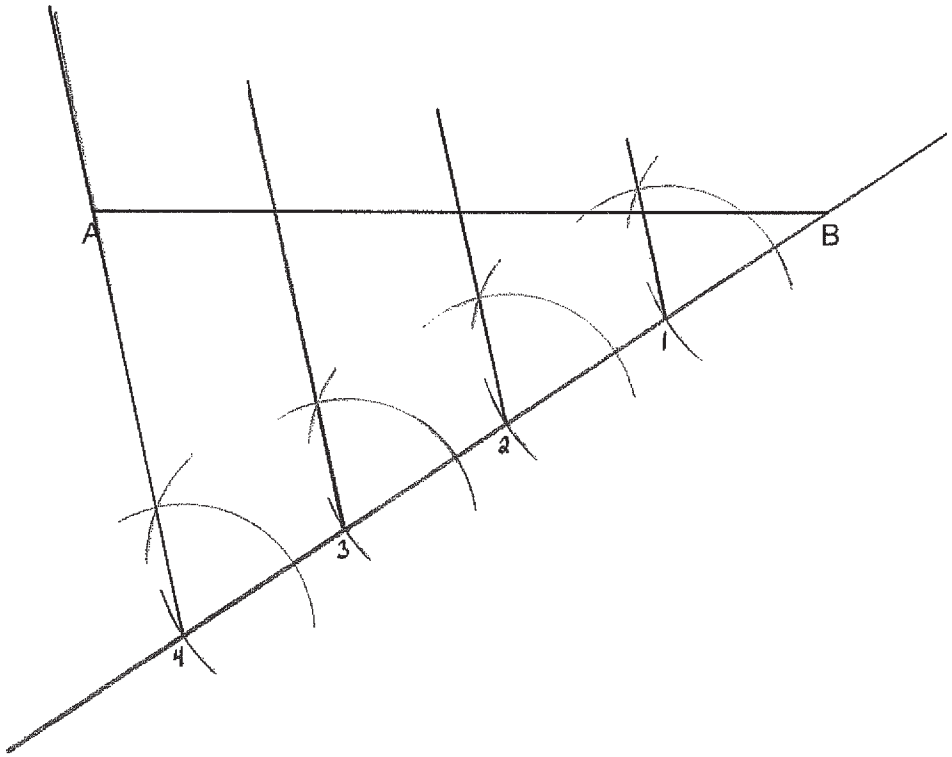
26 Given $\overline{AB}$ below, use a compass and a straightedge to construct a segment that is $\frac{1}{4}AB$. [Leave all construction marks.]



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

Question 26

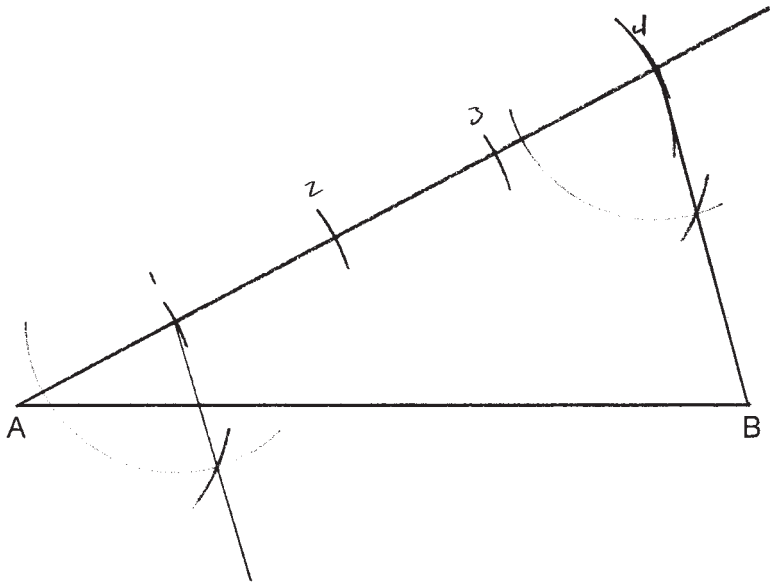
26 Given $\overline{AB}$ below, use a compass and a straightedge to construct a segment that is $\frac{1}{4}AB$. [Leave all construction marks.]



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

Question 26

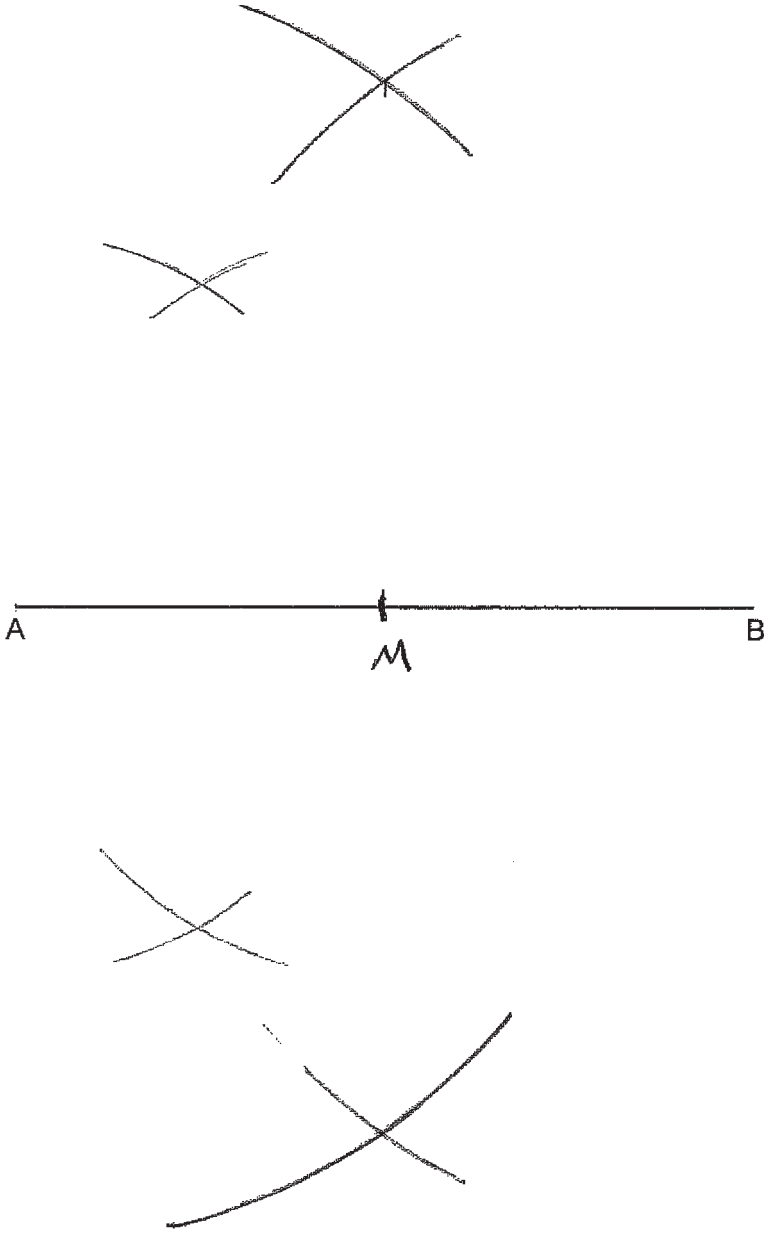
26 Given $\overline{AB}$ below, use a compass and a straightedge to construct a segment that is $\frac{1}{4}AB$. [Leave all construction marks.]



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

Question 26

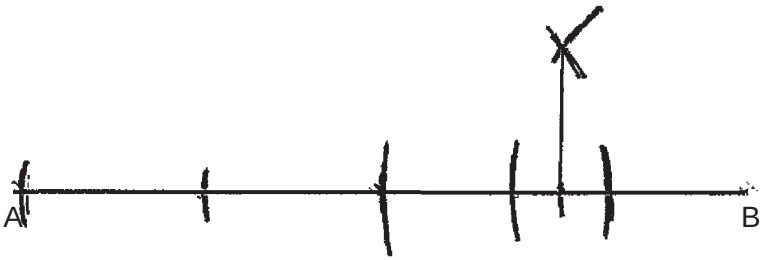
26 Given $\overline{AB}$ below, use a compass and a straightedge to construct a segment that is $\frac{1}{4}AB$. [Leave all construction marks.]

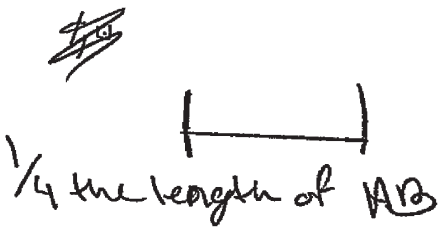


Score 1: The student constructed all appropriate arcs, but did not determine the midpoint of $\overline{AM}$.

Question 26

26 Given $\overline{AB}$ below, use a compass and a straightedge to construct a segment that is $\frac{1}{4}AB$. [Leave all construction marks.]

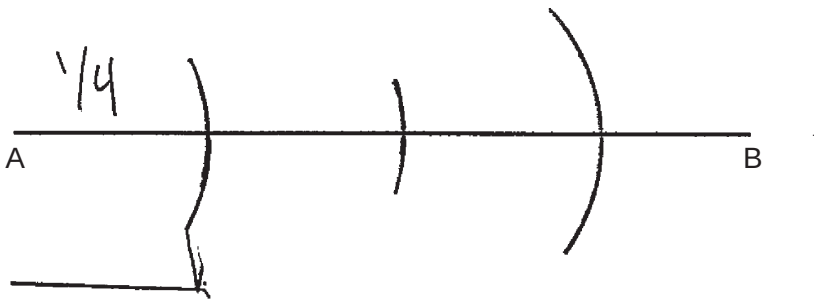




Score 0: The student did not show enough correct work to receive any credit.

Question 26

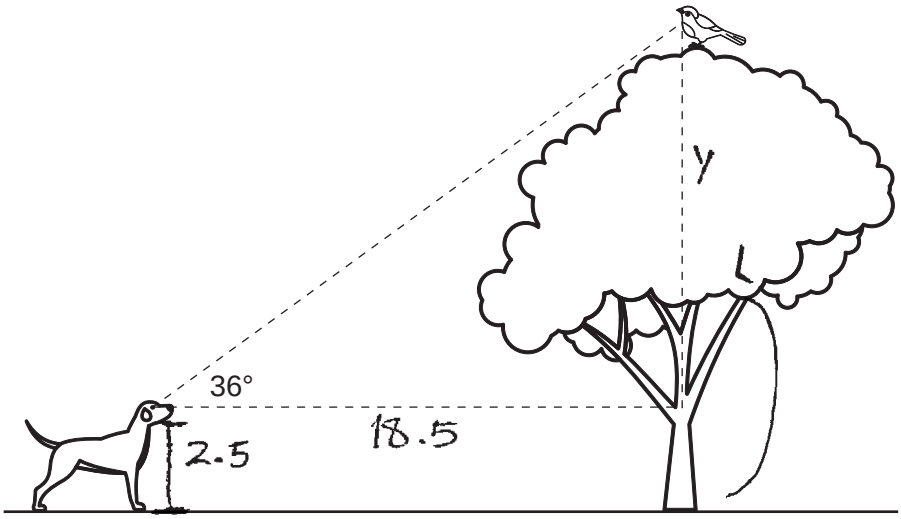
26 Given $\overline{AB}$ below, use a compass and a straightedge to construct a segment that is $\frac{1}{4}AB$. [Leave all construction marks.]



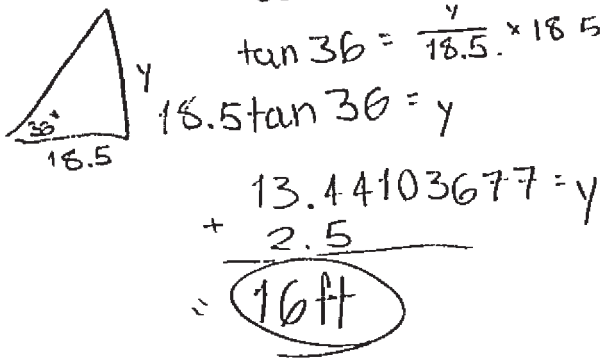
Score 0: The student did not show enough correct work to receive any credit.

Question 27

27 A dog sees a bird in a tree. The angle of elevation from the dog's eyes to the bird is 36°, as modeled below.



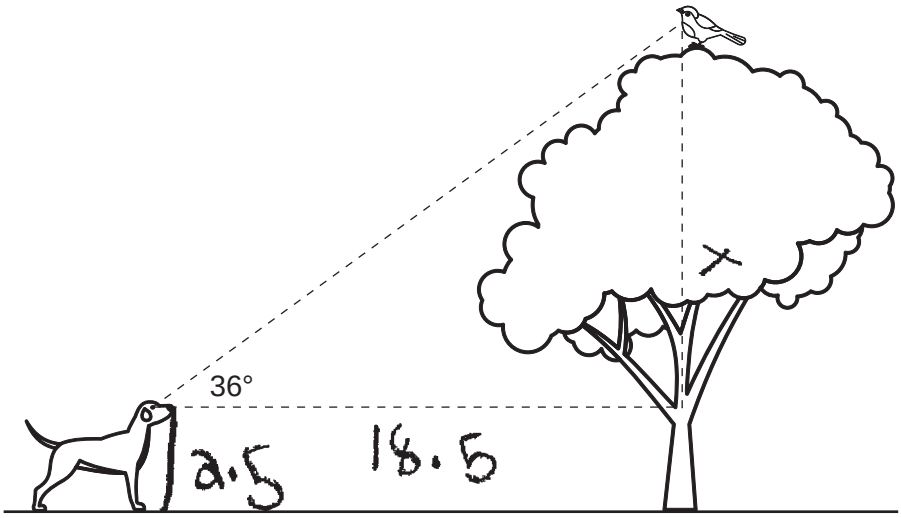
The dog is 18.5 feet away from the base of the tree, and his eyes are 2.5 feet above the ground. Determine and state how high the bird is above the ground, to the *nearest foot*.



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

Question 27

27 A dog sees a bird in a tree. The angle of elevation from the dog's eyes to the bird is 36°, as modeled below.



The dog is 18.5 feet away from the base of the tree, and his eyes are 2.5 feet above the ground. Determine and state how high the bird is above the ground, to the *nearest foot*.

13.4
+ 2.5
15.9

opp adj

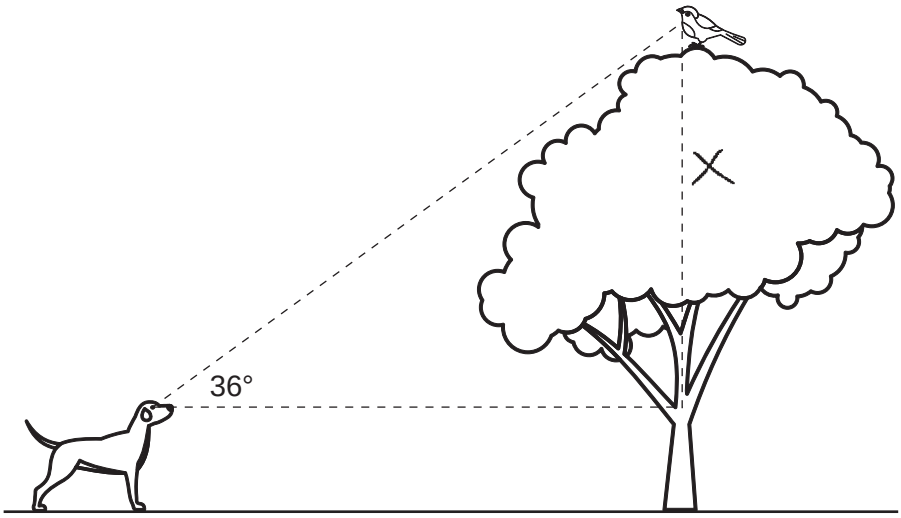
18.5 Tan (36)

16 ft

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

Question 27

27 A dog sees a bird in a tree. The angle of elevation from the dog's eyes to the bird is 36°, as modeled below.



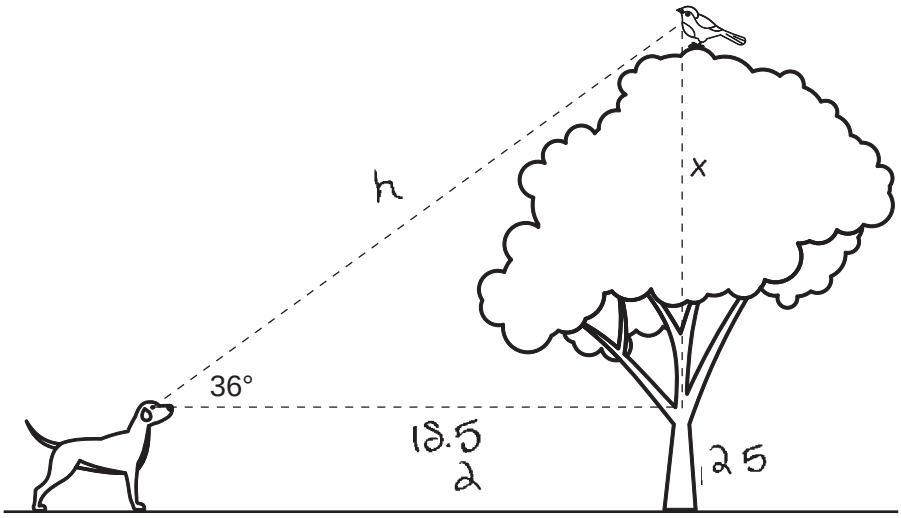
The dog is 18.5 feet away from the base of the tree, and his eyes are 2.5 feet above the ground. Determine and state how high the bird is above the ground, to the *nearest foot*.

$$\tan(36^\circ) = \frac{x}{18.5}$$

Score 1: The student wrote a correct relevant trigonometric equation.

Question 27

27 A dog sees a bird in a tree. The angle of elevation from the dog's eyes to the bird is 36°, as modeled below.



The dog is 18.5 feet away from the base of the tree, and his eyes are 2.5 feet above the ground. Determine and state how high the bird is above the ground, to the *nearest foot*.

$\tan(36) = \frac{x}{18.5}$

$0.726542528 = \frac{x}{18.5}$ $\cdot 18.5$

18.5

13.44103677

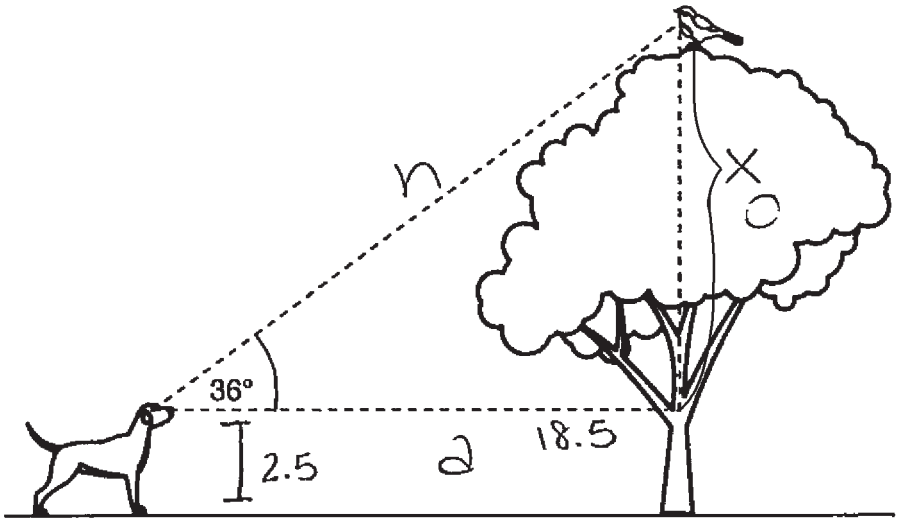
$+ 2.5$

15.9ft

Score 1: The student made a rounding error.

Question 27

27 A dog sees a bird in a tree. The angle of elevation from the dog's eyes to the bird is 36°, as modeled below.



$S\frac{O}{H}\ C\frac{A}{H}\ T\frac{O}{A}$

The dog is 18.5 feet away from the base of the tree, and his eyes are 2.5 feet above the ground. Determine and state how high the bird is above the ground, to the *nearest foot*.

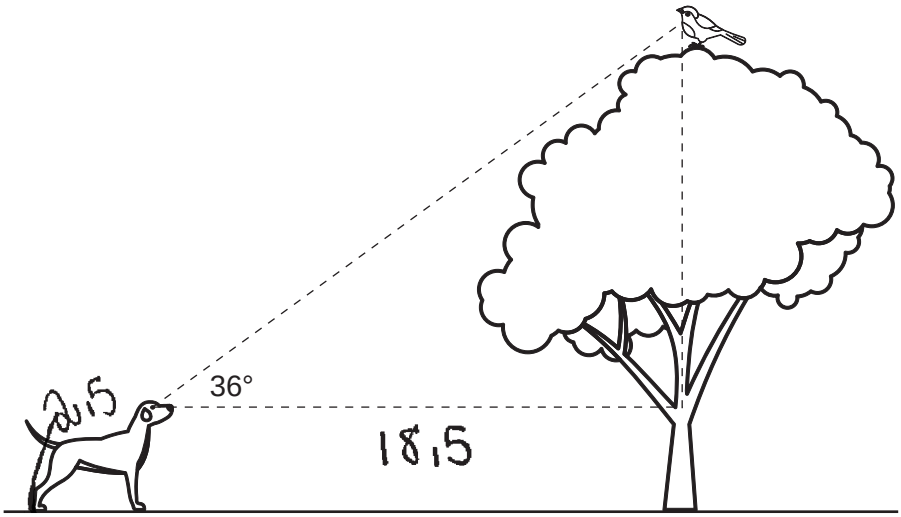
$$\frac{\tan(36)}{1} = \frac{x}{18.5}$$

$x = 13$ feet

Score 1: The student did not add 2.5 when determining the height.

Question 27

27 A dog sees a bird in a tree. The angle of elevation from the dog's eyes to the bird is 36°, as modeled below.



The dog is 18.5 feet away from the base of the tree, and his eyes are 2.5 feet above the ground. Determine and state how high the bird is above the ground, to the *nearest foot*.

SOH CAH TOA

$36 = \cos(18.5)(x)$

$36 = .95(x)$

$\frac{36}{.95} = \frac{.95x}{.95}$

$x = 37.89$

37.89
2.5
40.39 → 40

40 feet

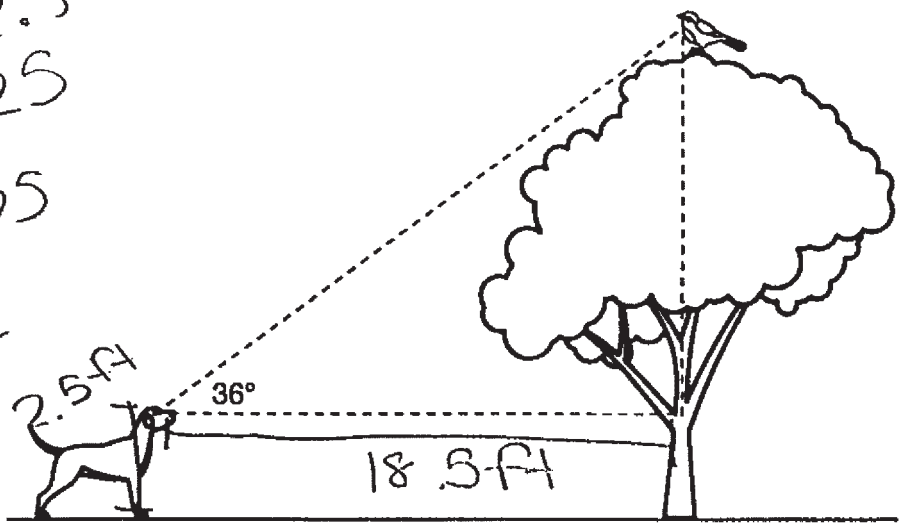
Score 0: The student did not show enough correct relevant course-level work to receive any credit.

Question 27

27 A dog sees a bird in a tree. The angle of elevation from the dog's eyes to the bird is 36°, as modeled below.

18.5 x 2.5
= 46.25

90 - 46.25
= 43.72



The dog is 18.5 feet away from the base of the tree, and his eyes are 2.5 feet above the ground. Determine and state how high the bird is above the ground, to the *nearest foot*.

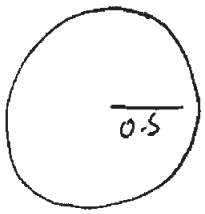
The bird is 44 feet high above the ground

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

Question 28

28 Pure silver has a density of 10.5 g/cm^3. Samantha has a pure silver charm on her necklace in the shape of a sphere. The radius of the charm is 0.5 cm.

Determine and state the mass of the charm, to the *nearest tenth of a gram*.



Density = $\frac{m}{V}$

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

$\frac{4}{3} \cdot \pi \cdot (0.5)^3$

$\frac{4}{3} \cdot 0.125 \pi$

0.523

$10.5 = \frac{m}{0.523}$

$\times 0.523 \quad \times 0.523$

$5.49779 = m$

$\sim$

$\boxed{5.5}$

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

Question 28

28 Pure silver has a density of 10.5 g/cm^3. Samantha has a pure silver charm on her necklace in the shape of a sphere. The radius of the charm is 0.5 cm.

Determine and state the mass of the charm, to the *nearest tenth of a gram*.

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

$V = \frac{4}{3}(0.5)^3\pi$

$10.5 = \frac{m}{.5235987757}$

$m = 5.497787145$

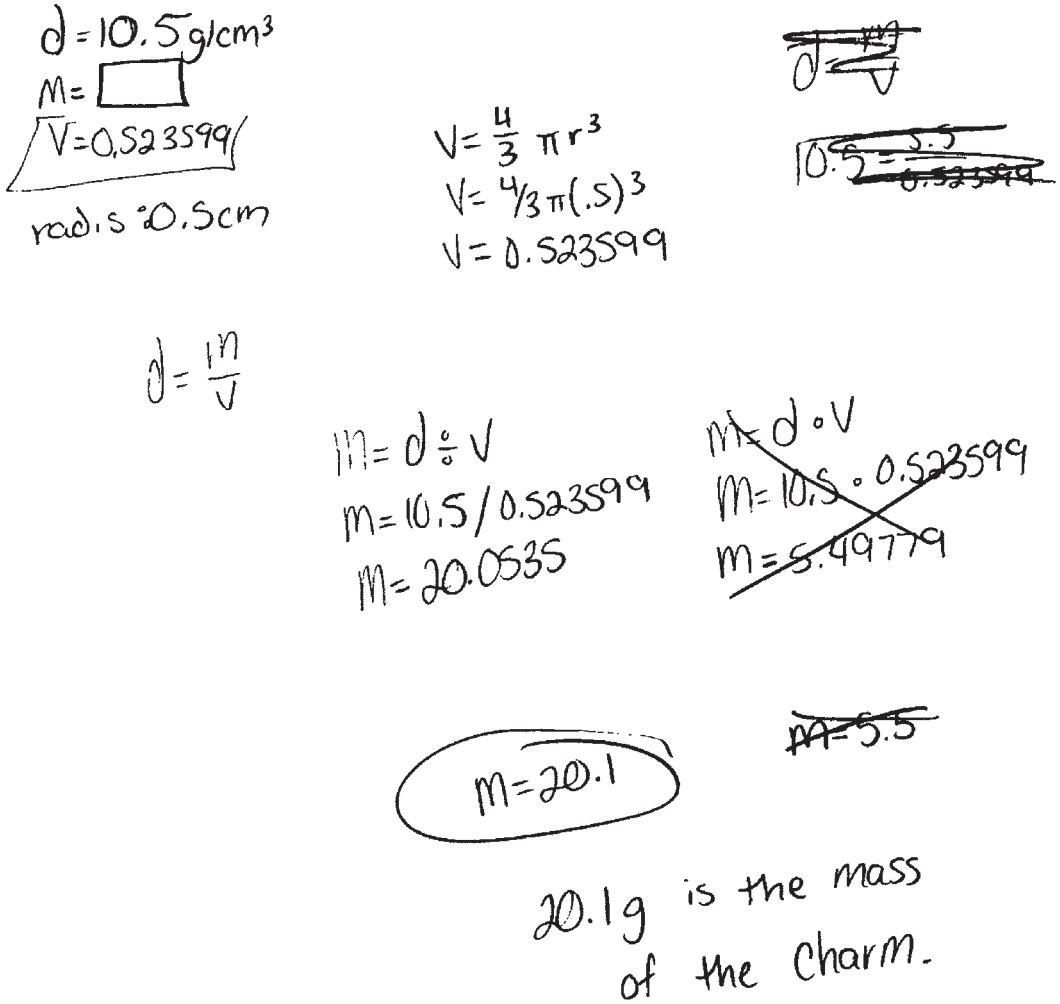
$m = 5.5$

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

Question 28

28 Pure silver has a density of 10.5 g/cm^3. Samantha has a pure silver charm on her necklace in the shape of a sphere. The radius of the charm is 0.5 cm.

Determine and state the mass of the charm, to the *nearest tenth of a gram*.



Score 1: The student made an error when determining the mass by dividing instead of multiplying.

Question 28

28 Pure silver has a density of 10.5 g/cm^3. Samantha has a pure silver charm on her necklace in the shape of a sphere. The radius of the charm is 0.5 cm.

Determine and state the mass of the charm, to the *nearest tenth of a gram*.

$A = \pi r^2$

$A = \pi(0.5)^2$

$A = .25\pi$

$A = .785$

$m = 10.5(.785)$

$m = 8.2$ grams

Score 1: The student made an error when determining the volume, but found an appropriate mass.

Question 28

28 Pure silver has a density of 10.5 g/cm^3. Samantha has a pure silver charm on her necklace in the shape of a sphere. The radius of the charm is 0.5 cm.

Determine and state the mass of the charm, to the *nearest tenth of a gram*.

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

$V = \frac{4}{3} \cdot \pi \cdot 0.5^3$

$V = 0.5235987756 \text{ cm}^3$

$\times \quad 10.5 \text{ g/cm}^3$

5.497787144 g

$D = \frac{M}{V}$

$5.497787 = \frac{M}{0.523598}$

$M \approx 2.9 \text{ g}$

The mass of the charm is about 2.9 grams.

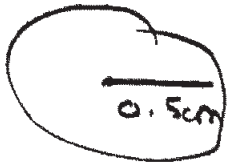
Score 1: The student correctly determined the volume, but made an error when determining the mass.

Question 28

28 Pure silver has a density of 10.5 g/cm^3. Samantha has a pure silver charm on her necklace in the shape of a sphere. The radius of the charm is 0.5 cm.

Determine and state the mass of the charm, to the *nearest tenth of a gram*.

$10.5\ g/cm^3$



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

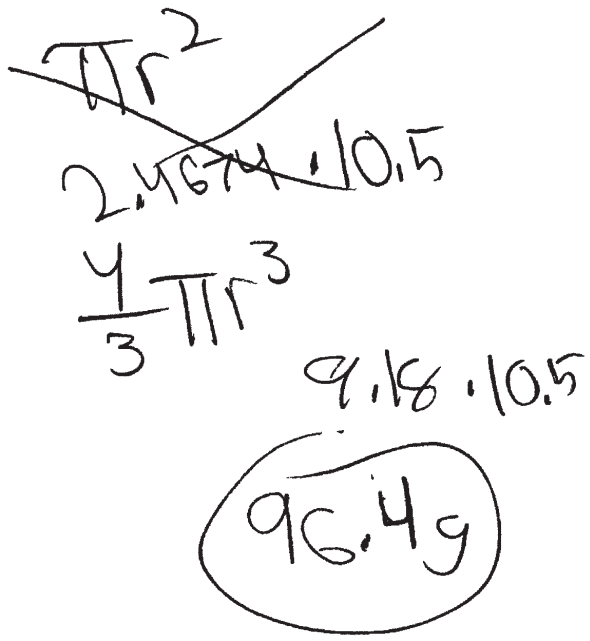
$\frac{4}{3}\ 3.14\ (0.5)^3$

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

Question 28

28 Pure silver has a density of 10.5 g/cm^3. Samantha has a pure silver charm on her necklace in the shape of a sphere. The radius of the charm is 0.5 cm.

Determine and state the mass of the charm, to the *nearest tenth of a gram*.



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

Question 28

28 Pure silver has a density of 10.5 g/cm^3. Samantha has a pure silver charm on her necklace in the shape of a sphere. The radius of the charm is 0.5 cm.

Determine and state the mass of the charm, to the *nearest tenth of a gram*.

$D = \frac{m}{V}$ $\quad 10.5 = \frac{m}{0.5}$

$10.5 \cdot 0.5 = 5.25$

$m = 5.25$

Check:

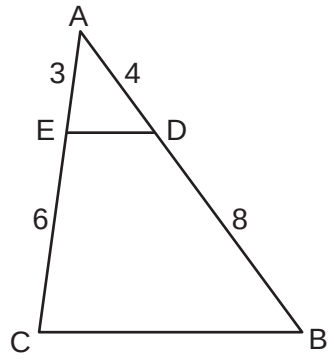
$\frac{5.25}{0.5} = 10.5$

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

Question 29

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.

3/6
= 1/2



4/8
1/2
AE/EC = AD/DB

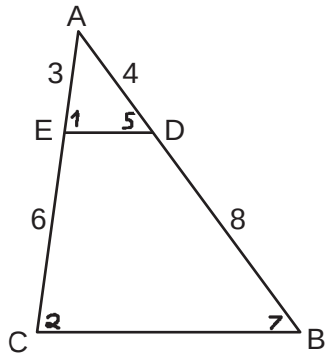
Explain why $\triangle ADE \sim \triangle ABC$.

$\overline{DE}$ cuts the left and right proportionally which results in $\overline{ED} \parallel \overline{CB}$ the corresponding angles of $\triangle ADE$ and $\triangle ABC$ are $\cong$ ($\angle AED \cong \angle ACB$ and $\angle ADE \cong \angle ABC$), making them $\sim$ by AA $\sim$

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

Question 29

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



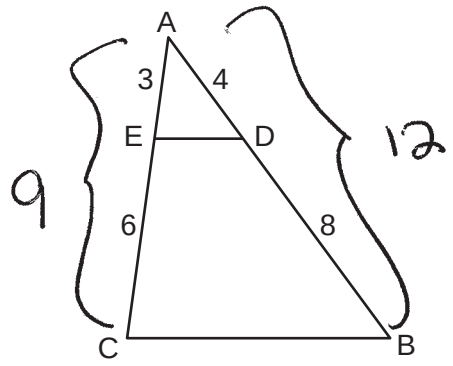
Explain why $\triangle ADE \sim \triangle ABC$.

Its a dilation with Scale factor = 3 centered at A and dilations preserve angle measure so $\angle 1 \cong \angle 2$ and $\angle 5 \cong \angle 7$. By AA~, $\triangle ADE \sim \triangle ABC$.

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

Question 29

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



Explain why $\triangle ADE \sim \triangle ABC$.

$\measuredangle A \cong \measuredangle A$ and the ratio of the sides is the same making the sides proportional $\frac{AE}{AC} = \frac{AD}{AB}$, $\frac{3}{9} = \frac{4}{12}$

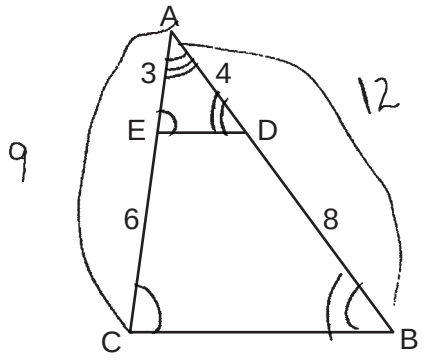
$36 = 36$

$\triangle ADE \sim \triangle ABC$ by SAS similarity.

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

Question 29

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



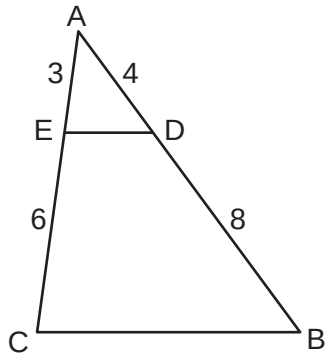
Explain why $\triangle ADE \sim \triangle ABC$.

$\triangle ADE$ is a $\frac{1}{3}$ dilation of $\triangle ABC$ centered at A
so $\triangle ADE \sim \triangle ABC$

Score 1: The student wrote an incomplete explanation.

Question 29

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



Explain why $\triangle ADE \sim \triangle ABC$.

$\frac{3}{6} = \frac{4}{8}$

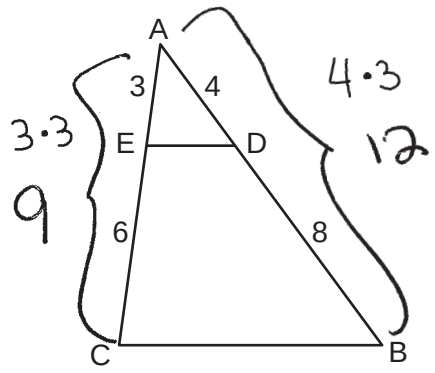
$\frac{1}{2} = \frac{1}{2}$ ✓

They are ~ because the sides are divided proportionally

Score 1: The student wrote an incomplete explanation.

Question 29

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



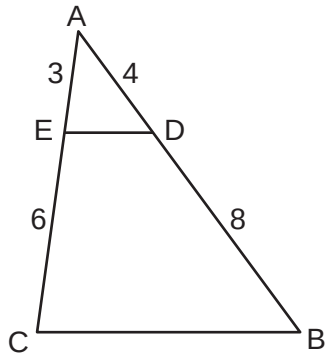
Explain why $\triangle ADE \sim \triangle ABC$.

ΔADE and ΔABC are similar because the ratio of 3:4 and 9:12 are the same.

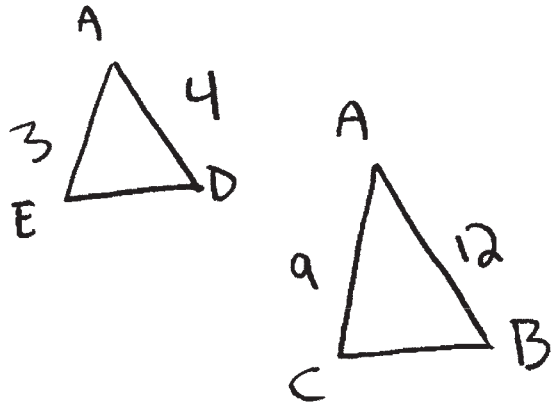
Score 1: The student wrote an incomplete explanation.

Question 29

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



Explain why $\triangle ADE \sim \triangle ABC$.



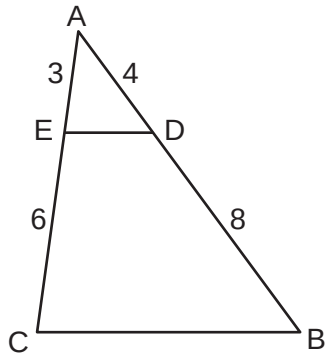
$\frac{9}{3} = \frac{12}{4}$

$27 = 36$ $27 \sim 36$

Score 0: The student wrote a correct proportion, but no further correct work is shown.

Question 29

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



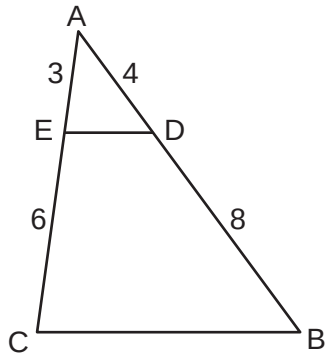
Explain why $\triangle ADE \sim \triangle ABC$.

Because the side lengths are proportional

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

Question 29

29 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



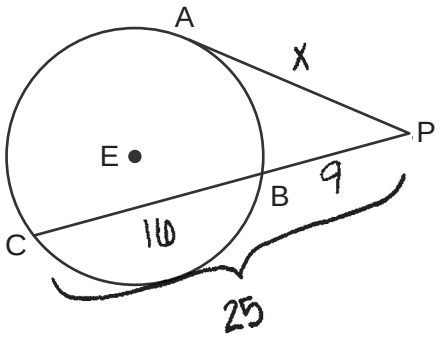
Explain why $\triangle ADE \sim \triangle ABC$.

$\triangle ADE$ is $\sim \triangle ABC$ because $\triangle ADE$ is just a dilation of $\frac{1}{2}\triangle ABC$

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

Question 30

30 In circle E below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn.



If $PB = 9$ and $BC = 16$, determine and state the length of $\overline{PA}$.

$x^2 = (25)(9)$

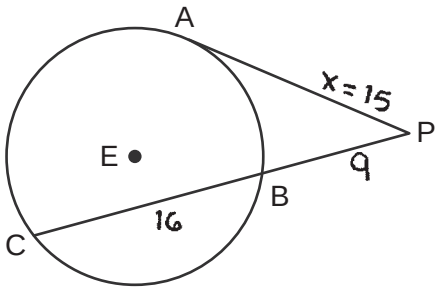
$\sqrt{x^2} = \sqrt{225}$

$x = 15$

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

Question 30

30 In circle E below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn.



If $PB = 9$ and $BC = 16$, determine and state the length of $\overline{PA}$.

$x^2 = 9(9+16)$

$x^2 = 81 + 144$

$x^2 = 225$

$x = \sqrt{225}$

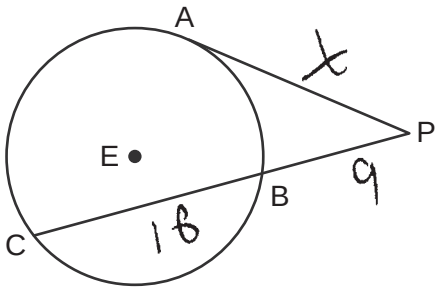
$= 15$

PA = 15

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

Question 30

30 In circle E below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn.



If $PB = 9$ and $BC = 16$, determine and state the length of $\overline{PA}$.

$(16+9)(9) = (x)(x)$

$\sqrt{225} \quad \sqrt{x^2}$

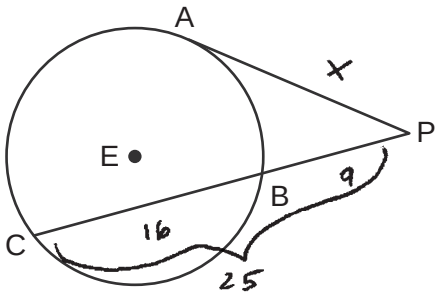
$15 = x$

$x = 15$

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

Question 30

30 In circle E below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn.



If $PB = 9$ and $BC = 16$, determine and state the length of $\overline{PA}$.

$16 + 9 = 25$

$x^2 = 16 \cdot 9$

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

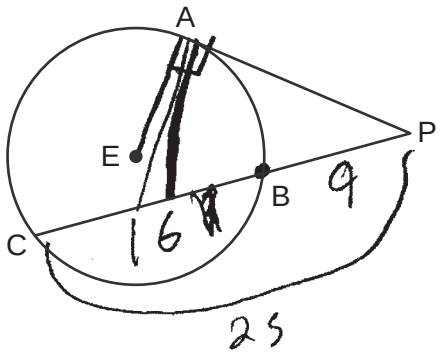
$x = 12$

$PA = 12$

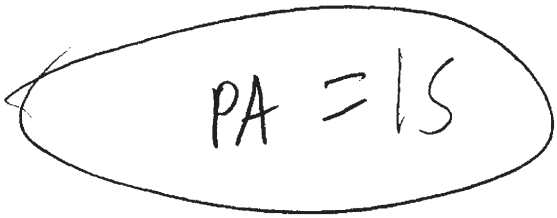
Score 1: The student made an error in not using the length of the entire secant.

Question 30

30 In circle E below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn.



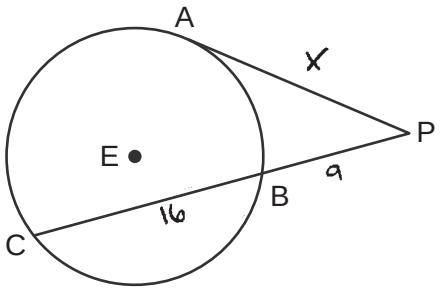
If $PB = 9$ and $BC = 16$, determine and state the length of $\overline{PA}$.



Score 1: The student wrote a correct answer, but did not show work.

Question 30

30 In circle E below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn.



If $PB = 9$ and $BC = 16$, determine and state the length of $\overline{PA}$.

$16 + 9 = 25$

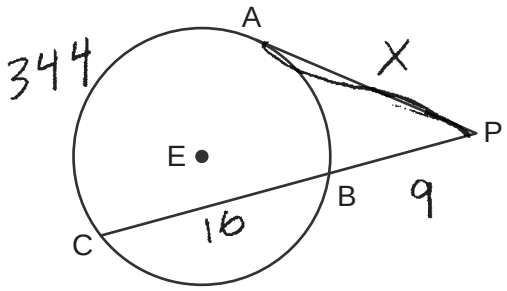
$\frac{25}{2} = 12.5$

12.5

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

Question 30

30 In circle E below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn.



If $PB = 9$ and $BC = 16$, determine and state the length of $\overline{PA}$.

360 - 16 = 344

$\overline{PA} = 1/2(344 - 9)$

$\overline{PA} = 167.5$

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

Question 31

31 In a right triangle, $\sin(4x + 3)° = \cos(2x - 9)°$. Determine and state the value of x.

$(4x+3)+(2x-9)=90$

$6x-6=90$

$+6 \quad +6$

$\frac{6x}{6}=\frac{96}{6}$

$x=16$

$\sin(4x+3)=\cos(2x-9)$ ✓

$\sin(4(16)+3)=\cos(2(16)-9)$

$\sin(64+3)=\cos(32-9)$

$\sin(67)=\cos(23)$

$0.92=0.92$

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

Question 31

31 In a right triangle, $\sin(4x + 3)° = \cos(2x - 9)°$. Determine and state the value of x.

$4x+3+2x-9=90$

$6x-6=90$

$+6 \quad +6$

$\frac{6x}{6} = \frac{96}{6}$

$x=16$

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

Question 31

31 In a right triangle, $\sin(4x + 3)° = \cos(2x - 9)°$. Determine and state the value of x.

$4x+3+2x-9=90^\circ$

$6x+6=90^\circ$

$-6 \quad -6$

$\frac{6x}{6} = \frac{84}{6}$

$x = 14$

Score 1: The student made a computational error.

Question 31

31 In a right triangle, $\sin(4x + 3)° = \cos(2x - 9)°$. Determine and state the value of x.

$4x+3 = 90-(2x-9)$

$4x+3 = 90-2x+9$

$4x+3 = 99-2x$

$6x = 102$

$x = 17$

Score 1: The student made a computational error.

Question 31

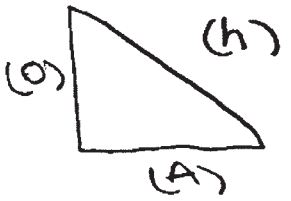
31 In a right triangle, $\sin(4x + 3)° = \cos(2x - 9)°$. Determine and state the value of x.

$4x+3=2x-9$
$-2x \quad -2x$
$2x+3=-9$
$-3 \quad -3$
$\frac{2x}{2} = \frac{-12}{2}$
$x=-6$

Score 1: The student made a conceptual error by applying the cofunction relationship incorrectly, but solved their equation appropriately.

Question 31

31 In a right triangle, $\sin(4x + 3)° = \cos(2x - 9)°$. Determine and state the value of x.



$\sin(4x+3) = 90$
$-3 \quad -3$
$\sin 4x = 87$

$\sin 4x = 87$
$\sin 4x \quad \sin 4$
$x = 1247.19$

$\sin 3 = 4x$
$4 \quad 4$
$x = .01308$

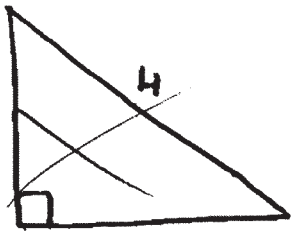
$x = 673.1251$
$\boxed{x = 673}$

$\cos(2x-9) = 90$
$+9 \quad +9$
$\cos 2x = 99$
$\cos 2 \quad \cos 2$
$x = 99.0603$

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

Question 31

31 In a right triangle, $\sin(4x + 3)° = \cos(2x - 9)°$. Determine and state the value of x.



$4x+3=2x-9$

$6x+3=-9$

$-3 \quad -3$

$\frac{6x}{6} = \frac{-12}{6}$

$x=-2$

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

Question 32

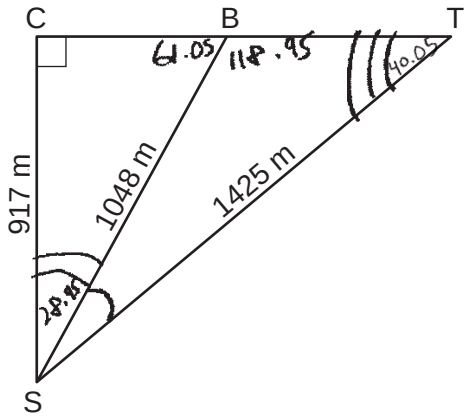
32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.

$m\angle BSC = \cos^{-1}\left(\frac{917}{1048}\right) = 28.95$

$90 + 28.95 = 118.95$

$m\angle SBC = 180 - 118.95 = 61.05$



Determine and state, to the *nearest degree*, the measure of $\angle BST$.

$m\angle T \sin^{-1}\left(\frac{917}{1425}\right) = 40.05$

$118.95 + 40.05 = 159$

$180 - 159 = 21$

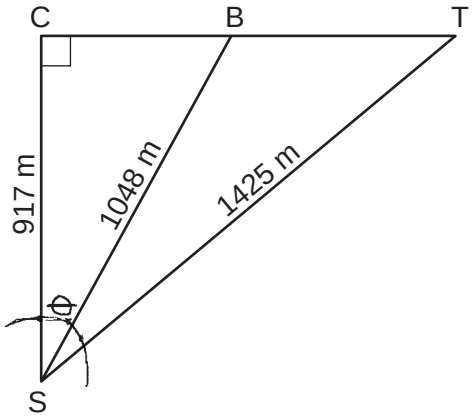
$m\angle BST = 21^\circ$

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

Question 32

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.



Determine and state, to the *nearest degree*, the measure of $\angle BST$.

$\cos \frac{9}{h} = \frac{917}{1425}$

$49.946 = \angle CST$

$\angle CSB: \cos \emptyset = \frac{917}{1048}$

$\emptyset = 28.955°$

$49.946° - 28.955° = 20.991°$

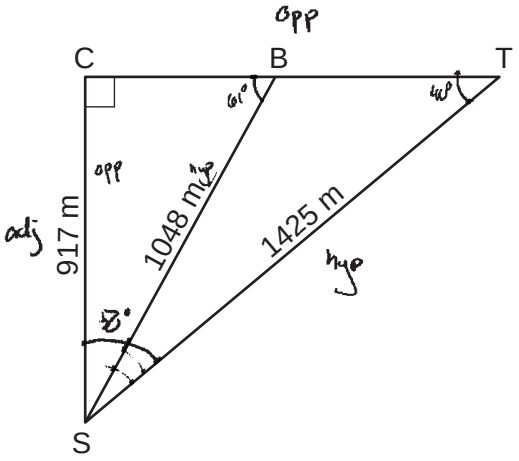
$\angle BST = 21°$

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

Question 32

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.



Determine and state, to the *nearest degree*, the measure of $\angle BST$.

$\cos(CST) = \frac{917}{1425}$

$\frac{917}{1425} = \frac{1425(\cos(CST))}{1425}$

$0.643508719 = \cos(CST)$

$m\angle CST = 49.946$

$90 + 49.946 = 139.946$

$180 - 139.946 = 40.054$

$\sin(SBC) = \frac{917}{1048}$

$\frac{917}{1048} = \frac{1048(\sin(SBC))}{1048}$

$0.875 = \sin(SBC)$

$m\angle(SBC) = 61.045$

$90 + 61.045 = 151.045$

$180 - 151.045 = 28.995$

$49.946 - 28.995 = 20.991$

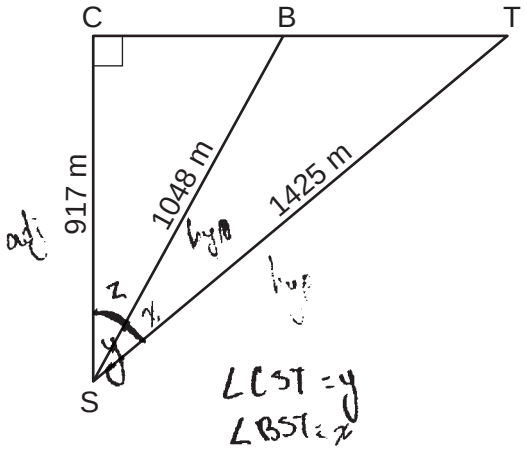
$\angle BST = 21°$

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

Question 32

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.



Determine and state, to the *nearest degree*, the measure of $\angle BST$.

$\cos(y) = \frac{971}{1425}$

$y^\circ = \cos^{-1}\left(\frac{971}{1425}\right)$

$y = 47.04658424$

$z^\circ = \cos^{-1}\left(\frac{971}{1048}\right)$

$z^\circ = 22.10029138$

$y^\circ - z^\circ = x^\circ$

$x^\circ = 25^\circ$

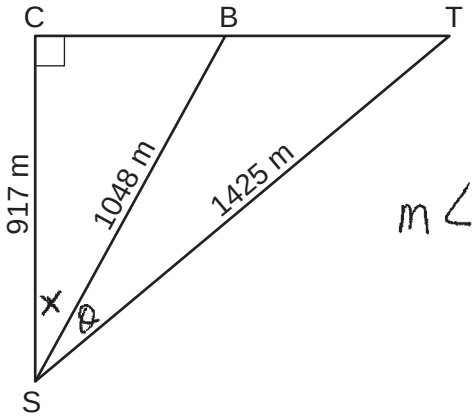
$\angle BST = 25^\circ$

Score 3: The student made a transcription error using 971 instead of 917.

Question 32

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.



$m\angle S + m\angle T = 90$

Determine and state, to the *nearest degree*, the measure of $\angle BST$.

$\sin T = \frac{917}{1425}$ $\quad$ $m\angle CSB$ $\cos X = \frac{917}{1048}$

$T = \sin^{-1}(917/1425)$ $\quad$ $X = \cos^{-1}(917/1048)$

$m\angle T = 40.0539...$ $\quad$ $m\angle CSB = 28.955$

$41 + 29 \rightarrow 70$

$\theta = 90 - (X + T)$

$= 90 - 70$

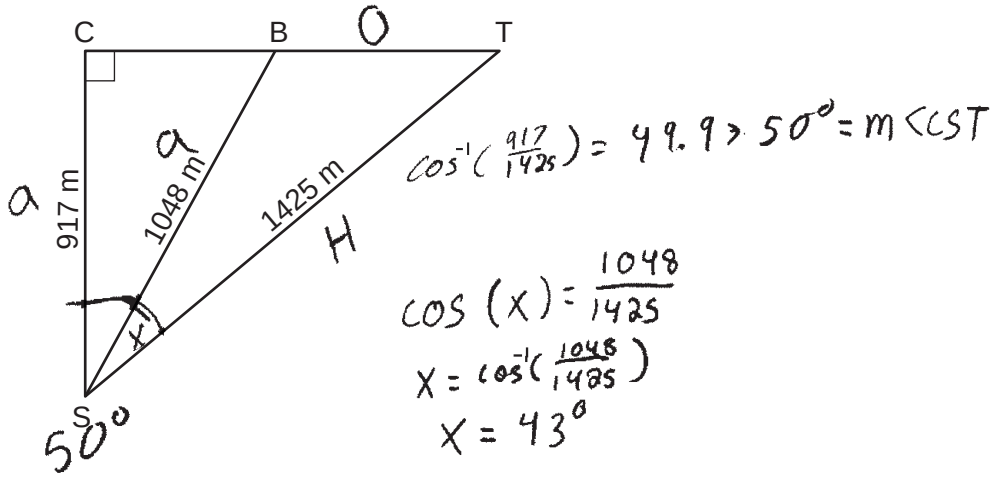
$\boxed{20}$

Score 3: The student made a rounding error when determining the measure of $\angle T$.

Question 32

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.



Determine and state, to the *nearest degree*, the measure of $\angle BST$.

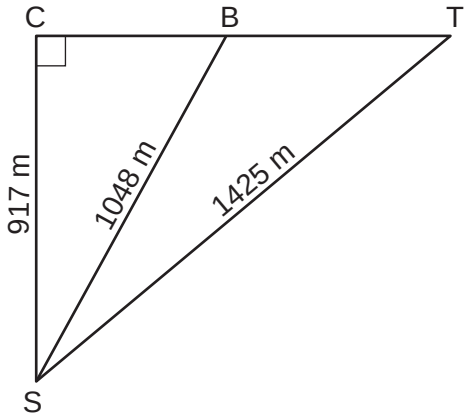
$m\angle BST = 23°$

Score 2: The student correctly determined the measure of $\angle CST$.

Question 32

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.



Determine and state, to the *nearest degree*, the measure of $\angle BST$.

$m\angle CST = \cos(x) = \frac{917}{1425}$

$\cos^{-1}\left(\frac{917}{1425}\right) = 49.9 = 50^\circ$

$50 \div 2 = 25$

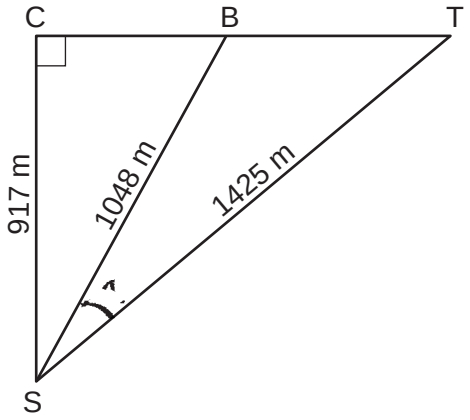
$m\angle BST = 25^\circ$

Score 2: The student correctly determined the measure of $\angle CST$.

Question 32

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.



Determine and state, to the *nearest degree*, the measure of $\angle BST$.

$\cos^{-1}(1048/1425) = 42.655710066$

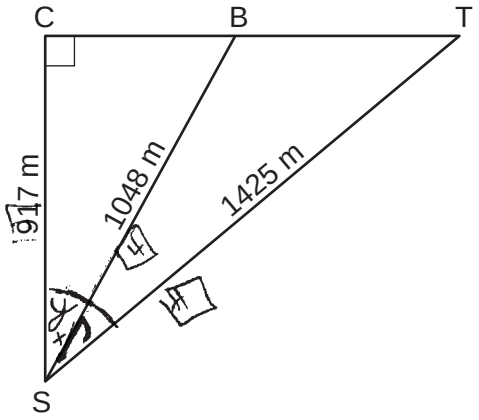
$\angle BST = 42.655710066$

Score 1: The student made a conceptual error in using right triangle trigonometry in a non-right triangle. The student made a rounding error.

Question 32

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.



Determine and state, to the *nearest degree*, the measure of $\angle BST$.

132°

$\cos x = \frac{917}{1425}$ 949

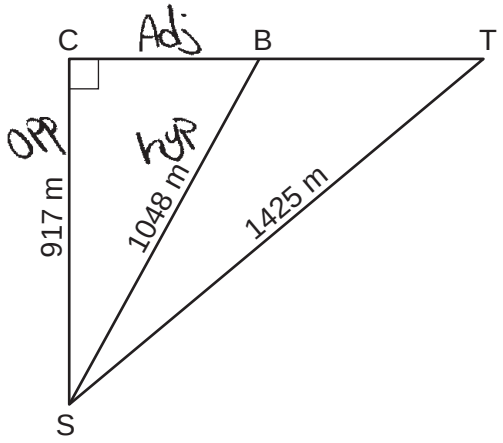
$\cos y = \frac{917}{1048}$

Score 1: The student wrote at least one correct relevant trigonometric equation.

Question 32

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.



Determine and state, to the *nearest degree*, the measure of $\angle BST$.

SOHCAHTOA

$\sin\left(\frac{917}{1048}\right) = .0152$

$1425(.0152) = 21.66$

$BST = 22$

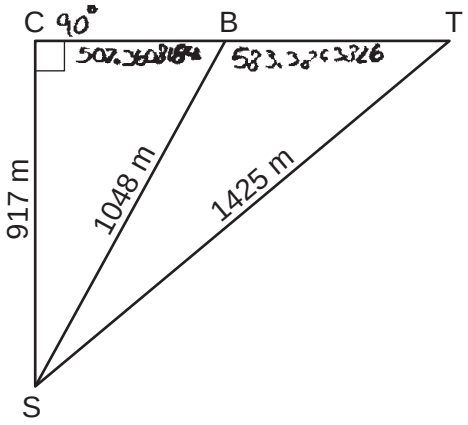
Score 0: The student did not show enough correct relevant course-level work to receive any credit.

Question 32

32 Modeled by right triangles below, a surveyor (S) is taking land measurements using a cabin (C), a boulder (B), and a tree (T) as fixed points of reference. The cabin, boulder, and tree are collinear.

The surveyor is 917 meters from the cabin, 1048 meters from the boulder, and 1425 meters from the tree.

1090.75021m



$A^2+B^2=C^2$
$917^2+B^2=1425^2$
$840889+B^2=2030625$
$B^2=\sqrt{1189736}$
$B=1090.750201$

$A^2+B^2=C^2$
$917^2+B^2=1048^2$
$840889+B^2=1098304$
$B^2=257415$

Determine and state, to the *nearest degree*, the measure of $\angle BST$.

Adj / Hyp

$\frac{\tan(S)}{1}=\frac{1048}{1425}$

$1425\tan(S)=1048$

$1425\tan$

$S=42.133298\,98$

$\angle BST=42.1°$

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

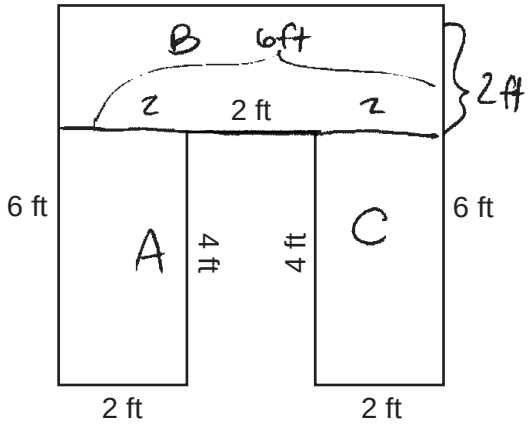
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

$V_A = (4)(2)(1.25) = 10\ ft^3$

$V_B = (6)(2)(1.25) = 15\ ft^3$

$V_C = (4)(2)(1.25) = 10\ ft^3$

total volume = $35\ ft^3$

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

$35/2 = 17.5 \approx 18$ bags

$18 \cdot 3.68 = \$66.24$

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

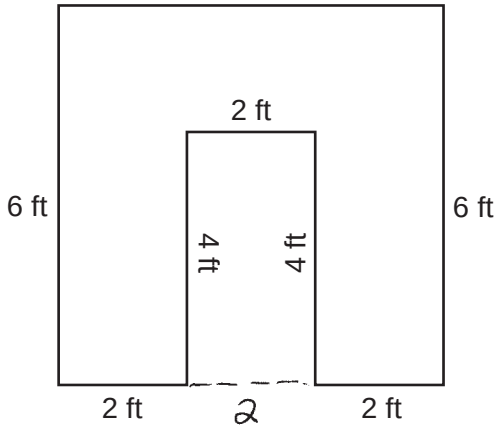
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



The garden bed is filled with topsoil to a uniform height of 1.25 feet.

$6 \cdot 6 = 36$
$2 \cdot 4 = 8$

Determine and state the volume of the topsoil, in cubic feet.

$V = bh$
$V = (36)(1.25)$
$V = 45$

$V = bh$
$V = (8)(1.25)$
$V = 10$

$V = 35\ ft^3$

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

$\frac{35}{2} = 17.5$

$18 * 3.68$
66.24

$66.24
18 bags

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

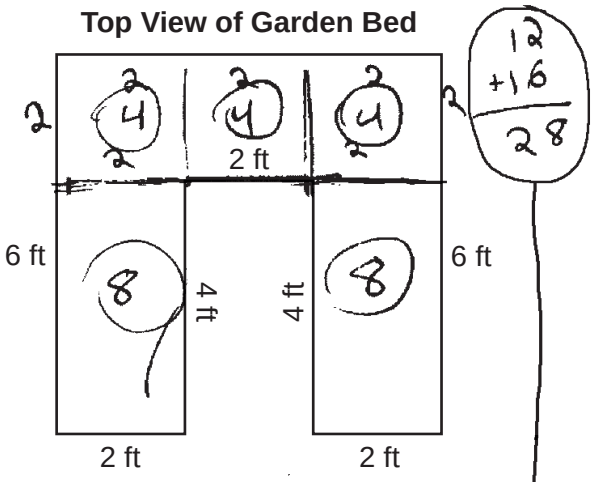
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

28

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

$\frac{28}{2} = 14$ $14(3.68) = \$51.52$ for total cost of soil.

Score 3: The student correctly determined the area of the base of the garden bed and determined an appropriate cost.

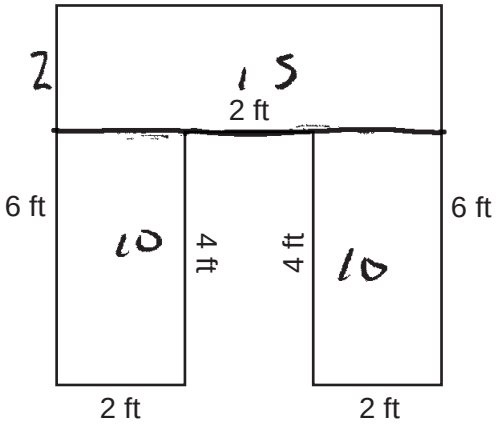
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

$V = Bh$
$V = (4 \cdot 2)(1.25)$
$V = 10$

$V = Bh$
$V = (6 \cdot 2)(1.25)$
~~$x = 24$~~
15

$10 + 10 + 15 = 35 \text{ ft}^3$

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

$\frac{35}{2} = 17.5$

$3.68 \cdot 17 = 62.56$

$62.56

Score 3: The student made an error in using 17 bags to determine the cost.

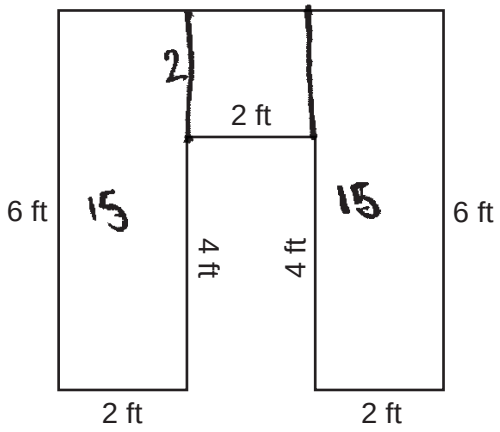
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

$6 \cdot 2 \cdot 1.25 = 12 \cdot 1.25 = 15\ ft^3$
$2 \cdot 2 \cdot 1.25 = 4 \cdot 1.25 = 5\ ft^3$

$15 + 15 + 5 = 35\ ft^3$

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

$\frac{35}{2} = 17.5$ 18 bags $18 \cdot 3.68 =$

Score 3: The student did not determine the cost of the number of bags of topsoil.

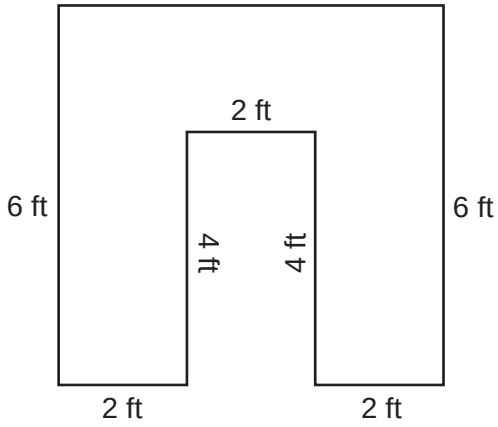
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

6+6+2+4+2+4+2+6
32

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

$\frac{32}{2} = 16$ 3.68 x 16
$58.88

Score 2: The student did not determine the volume, but found an appropriate cost.

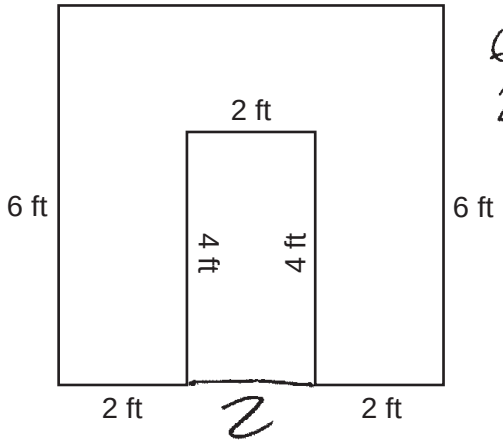
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



6·6 = 36
2·4 = 8

The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

36 − 8 = 28

28.

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

$\frac{28}{2} = 14$ 14 × 3.68

= 51.52 bags

Score 2: The student correctly determined the area of the base of the garden bed. The student made an error when labeling the cost.

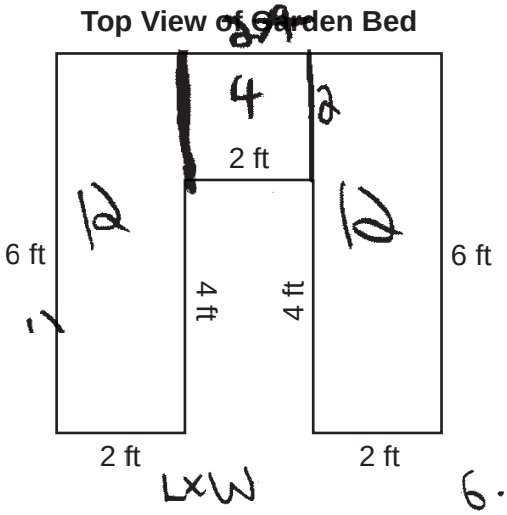
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



LxW

6 · 2 = 12

2 · 2 = 4

The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

12 + 4 + 12 = 28

28 x 1.25

35 cuFt

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

Score 2: The student correctly determined the volume of the topsoil in the garden bed.

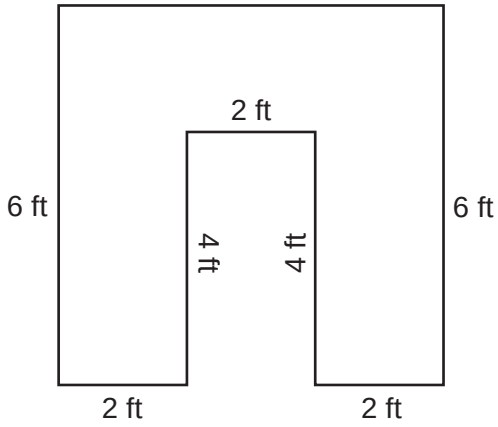
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

$V = 35 ft^3$

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

18 bags

$66.24

Score 1: The student wrote correct answers, but did not show work.

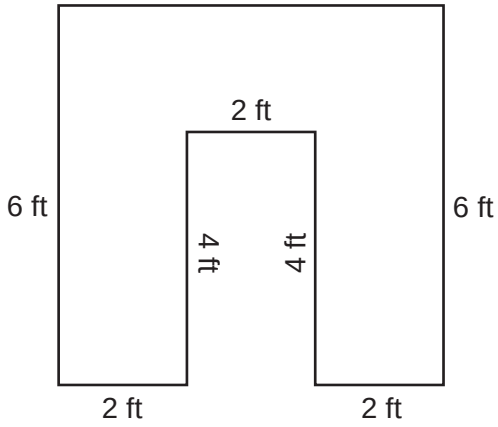
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

$6 \cdot 6 = 36$
$4 \cdot 2 = 8$ = 28

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

$28 \cdot 2 = 56$ bags needed

Score 1: The student correctly determined the area of the base of the garden bed.

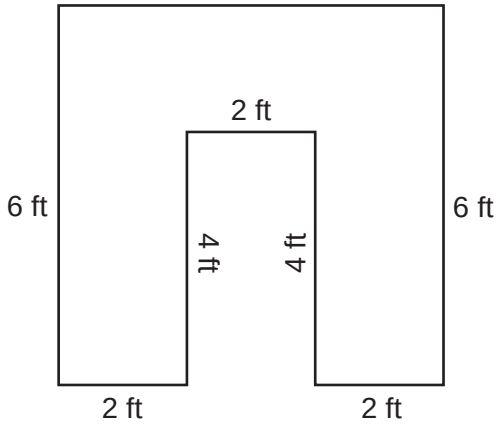
Question 33

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

$V = L \cdot W \cdot H$

$L = 2 \quad W = 4 \quad H = 6$

$2 + 2 + 2 = 6$
$4 + 4 = 8$
$6 + 6 + 6 = 18$

$V = (6)(8)(18)$
$V = 846 \text{ ft}^3$

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

3.68×2
$= \$7.38$

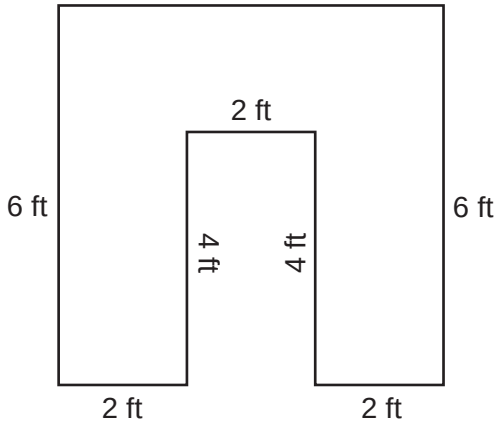
Score 0: The student did not show enough correct relevant course-level work to receive any credit.

33 A garden bed, pictured below, is a square prism with a rectangular prism taken out. The inside length of the square prism is 6 feet. The rectangular prism taken out has a width of 2 feet and a length of 4 feet.

The diagram below shows the top view of the garden bed with its inside measurements.

Garden Bed

Top View of Garden Bed



The garden bed is filled with topsoil to a uniform height of 1.25 feet.

Determine and state the volume of the topsoil, in cubic feet.

$6 \times 2 \times 4 \times 1.25 = 60$

$V = 60$

Each bag of topsoil sells for $3.68 and contains 2 cubic feet of topsoil.

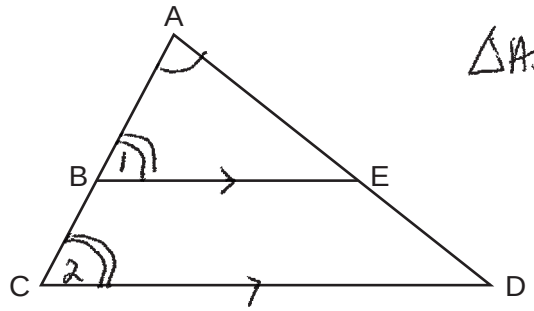
Determine and state the total cost of the bags of topsoil that must be purchased to fill the garden.

$3.68 \times 2 = \$7.36$

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

Question 34

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



$\triangle ABE \sim \triangle ACD$

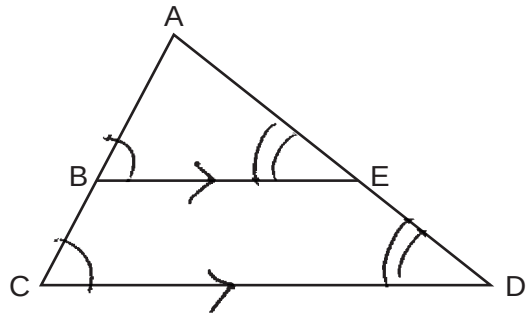
Prove: $AB \cdot AD = AE \cdot AC$

Statements	Reasons
1) $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$	1) Given
2) $\angle A \cong \angle A$	2) reflexive prop.
3) $\angle 1 \cong \angle 2$	3) $\parallel$ lines cut by a transversal form $\cong$ corresponding $\angle$s.
4) $\triangle ABE \sim \triangle ACD$	4) AA $\sim$
5) $\frac{AB}{AE} = \frac{AC}{AD}$	5) corresponding sides of $\sim \triangle$'s are proportional
6) $AB \cdot AD = AE \cdot AC$	6) The product of the means = the product of the extremes.

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

Question 34

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



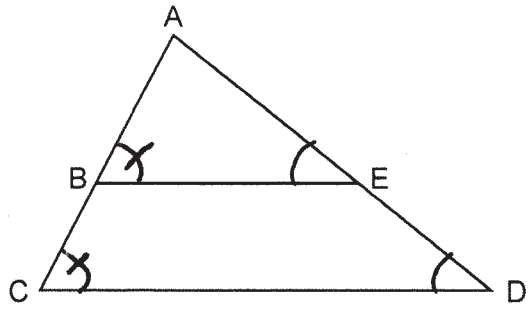
Prove: $AB \cdot AD = AE \cdot AC$

Statements	Reasons
(1) $\triangle ACD$, $\overline{ABC}$, $\overline{AED}$, $\overline{BE} \parallel \overline{CD}$	(1) Given
(2) $\angle ABE \cong \angle ACD$ $\angle AEB \cong \angle ADC$	(2) $\parallel \rightarrow \cong$ corresponding $\angle$'s
(3) $\triangle ABE \sim \triangle ACD$	(3) AA $\sim$
(4) $\frac{AB}{AC} = \frac{AE}{AD}$	(4) Similar $\triangle$s $\rightarrow$ proportional corresponding sides
(5) $AB \cdot AD = AE \cdot AC$	(5) Product of the means = Product of the extremes

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

Question 34

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



Prove: $AB \cdot AD = AE \cdot AC$

$\triangle ACD, \overline{ABC}, \overline{AED}, \overline{BE} \parallel \overline{CD}$

Given

$\measuredangle ABE \cong \measuredangle C, \measuredangle AEB \cong \measuredangle D$

Parallel lines form congruent corresponding angles

$\triangle ABE \sim \triangle ACD$

AA Similarity

$\frac{AB}{AE} = \frac{AC}{AD}$

Corresponding Sides of Similar Triangles are proportional

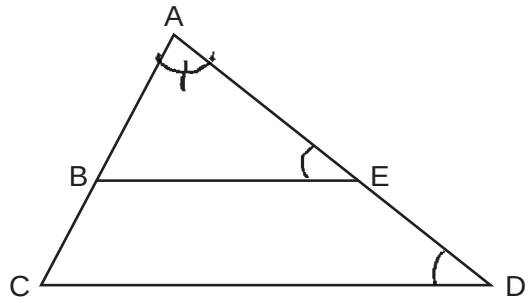
$AB \cdot AD = AE \cdot AC$

Product of Means = Product of Extremes

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

Question 34

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



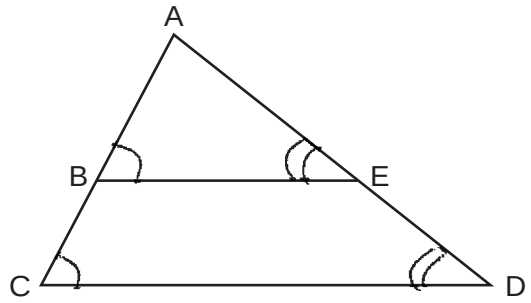
Prove: $AB \cdot AD = AE \cdot AC$

Statements	Reasons
$\triangle ACD$	
1. $\overline{BE} \parallel \overline{CD}$, $\overline{ABC}$, $\overline{AED}$	1. Given
2. $\angle A \cong \angle A$	2. Reflexive
3. $\angle AEB \cong \angle ADC$	3. If lines are $\parallel$, consecutive exterior $\angle$s are $\cong$
4. $\triangle ABE \sim \triangle ACD$	4. AA Similarity
5. $\frac{AB}{AE} = \frac{AC}{AD}$	5. corresponding sides of similar triangles are proportional.
6. $AB \cdot AD = AE \cdot AC$	6. product of means = product of extremes

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

Question 34

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



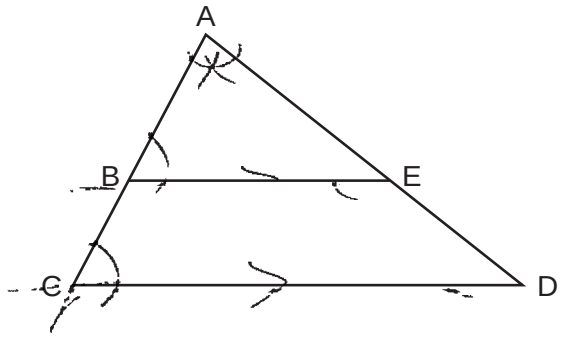
Prove: $AB \cdot AD = AE \cdot AC$

1. $\triangle ACD$, $\overline{ABC}$, $\overline{AED}$ $\overline{BE} \parallel \overline{CD}$	1. Given
2. $\angle ABE \cong \angle C$ $\angle AEB \cong \angle D$	2. If 2 parallel lines are cut by a transversal, the corresponding angles are $\cong$.
3. $\triangle ABE \sim \triangle ACD$	3. AA $\cong$ AA
4. $\frac{AE}{AB} = \frac{AD}{AC}$	4. CPCTC
5. $AB \cdot AD = AE \cdot AC$	5. In a proportion, the product of the means equals the product of the extremes.

Score 3: The student wrote an incorrect reason in step 4.

Question 34

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



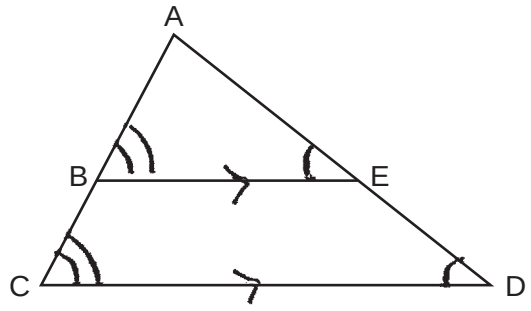
Prove: $AB \cdot AD = AE \cdot AC$

Statement	Reason
1) $\triangle ACD$ w/ $\overline{ABC}$, $\overline{AED}$, & $\overline{BE} \parallel \overline{CD}$	1) Given
2) $\measuredangle ABE \cong \measuredangle ACD$	2) corresp parts of $\cong \triangle$'s are $\cong$
3) $\measuredangle AEB \cong \measuredangle ADC$ $\measuredangle A \cong \measuredangle A$	3) reflexive property
4) $\triangle ABE \cong \triangle ACD$	4) AA~ AA
5) $\frac{AB}{AE} = \frac{AC}{AD}$	5) in similar $\triangle$'s all corresp sides are in proportion
6) $AB \cdot AD = AE \cdot AC$	6) Product of the means = product of the extremes

Score 2: The student wrote an incorrect reason in step 2 and an incorrect statement in step 4.

Question 34

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



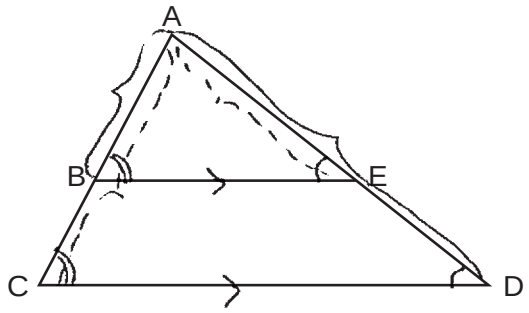
Prove: $AB \cdot AD = AE \cdot AC$

statements	reasons
1. $\triangle ACD$, $\overline{ABC}$, $\overline{AED}$, $\overline{BE} \parallel \overline{CD}$	1. Given
2. $\angle A \cong \angle A$	2. Reflexive property
3. $\angle AEB \cong \angle ADC$	3. $\parallel \rightarrow$ corresponding $\angle$'s are $\cong$
4. $\triangle ABE \sim \triangle ACD$	4. AA$\sim$
5. $\frac{AB}{AC} = \frac{AE}{AD}$	5. Similar shapes have similar corresponding sides.
6. $AC \cdot AE = AB \cdot AD$	6. Cross multipication

Score 2: The student wrote incorrect reasons in steps 5 and 6.

Question 34

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



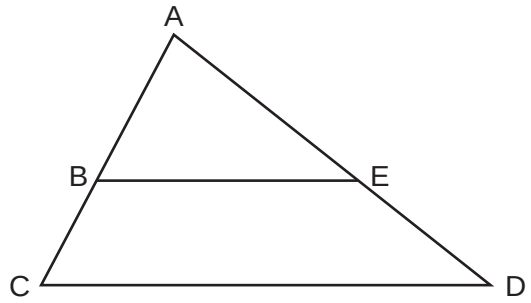
Prove: $AB \cdot AD = AE \cdot AC$

statement	reasoning
① $\triangle ACD$ w/ $\overline{ABC}$ $\overline{AED}$, $\overline{BE} \parallel \overline{CD}$	① Given
② $\angle AEB \cong \angle ADC$ $\angle ABE \cong \angle ACD$	② alternate interior $\angle$s are $\cong$
③ $\angle A \cong \angle A$	③ reflexive
④ $\triangle ABE \sim \triangle ACD$	④ AAA~
⑤ $AE : AD = AB : AC$	⑤ they are proportionate to each other
⑥ $AB \cdot AD = AE \cdot AC$	⑥ In similar $\triangle$s, the sides are proportionate to each other

Score 1: The student wrote incorrect reasons in steps 2, 5, and 6.

Question 34

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



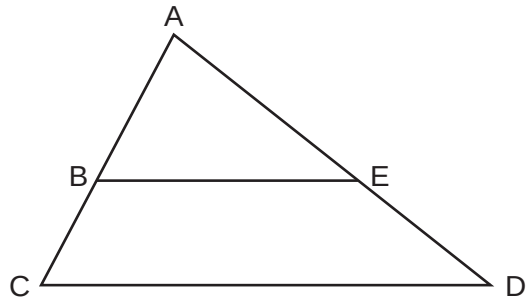
Prove: $AB \cdot AD = AE \cdot AC$

Statement	Reason
(1) $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$ and $\overline{BE} \parallel \overline{CD}$	(1) given
(2) $\angle A \cong \angle A$	(2) Reflexive prop
(3) $\angle ABE \cong \angle ACD$	(3) $\parallel$ lines $\rightarrow \cong \angle$'s
(4) $\triangle ABE \sim \triangle ACD$	(4) AA$\sim$
(5) $AB \cdot AD = AE \cdot AC$	(5) Similar $\triangle$'s $\rightarrow$ • sides

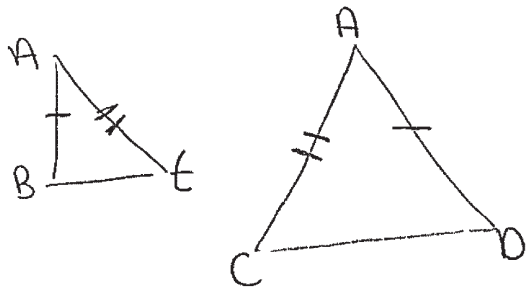
Score 1: The student wrote incorrect reasons in steps 3 and 5. The student was missing a statement and reason to prove step 5.

Question 34

34 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$



Prove: $AB \cdot AD = AE \cdot AC$



AB • AD = AE • AC Because AB • AD and AE • AC are both set to a proportion. AB (smaller leg of Δ) times AD (longer leg of opposite side of Δ). And AE (smaller leg of Δ) times AC (longer leg of opposite side of Δ.) so setting up an equal propotion will make them equal.

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

Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

Slope of $\overline{PT}$: $m = \frac{4+2}{-6+4} = \frac{6}{-2} = -3$

Slope of $\overline{PE}$: $m = \frac{8-4}{6+6} = \frac{4}{12} = \frac{1}{3}$

The slope of $\overline{PT}$ is a negative reciprocal of the slope of $\overline{PE}$ which indicates that $\overline{PT} \perp \overline{PE}$.

$\perp$ lines forms right angle P so $\triangle PET$ is a right triangle.

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

N: (8, 2)

Question 35 is continued on the next page.

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

Prove *PENT* is a rectangle.

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

Slope of $\overline{PT}$: $m = \frac{4+2}{-6+4} = \frac{6}{-2} = -3$

Slope of $\overline{PE}$: $m = \frac{8-4}{6+6} = \frac{1}{3}$

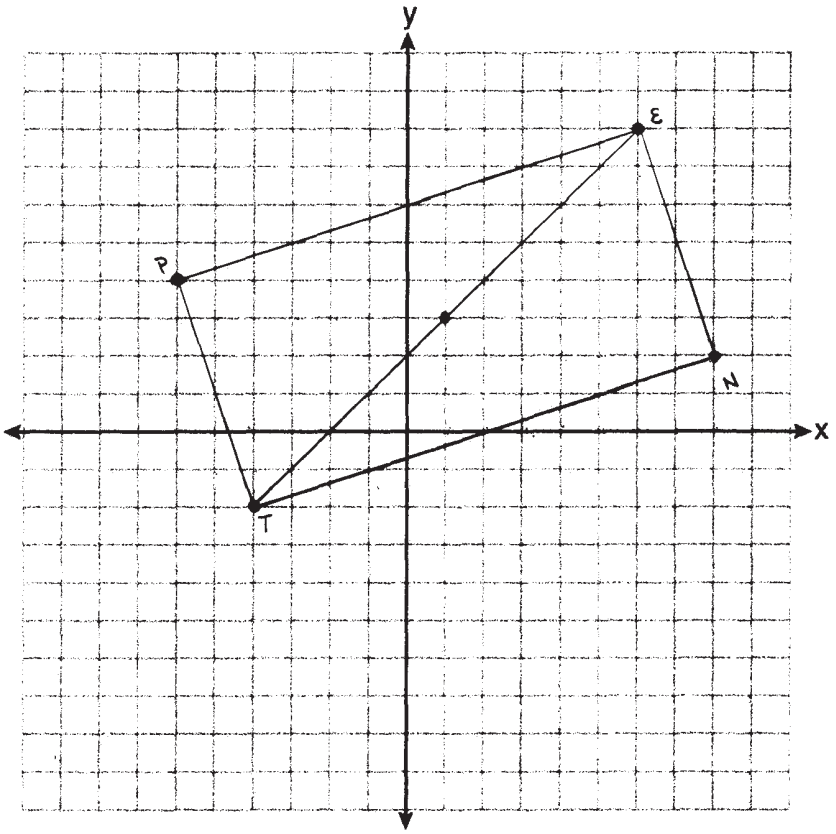
Slope of $\overline{EN}$: $m = \frac{8-2}{6-8} = \frac{6}{-2} = -3$

Slope of $\overline{NT}$: $m = \frac{2+2}{8+4} = \frac{4}{12} = \frac{1}{3}$

Since the slopes are negative reciprocals $\overline{PT} \perp \overline{PE}$, $\overline{PE} \perp \overline{EN}$, $\overline{EN} \perp \overline{NT}$, $\overline{NT} \perp \overline{PT}$

So $\angle P, \angle E, \angle N, + \angle T$ are right $\angle$'s

PENT contains 4 right angles so PENT is a rectangle



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

$PE = \sqrt{(6--6)^2 + (8-4)^2} = \sqrt{144+16} = \sqrt{160}$

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

$TE = \sqrt{(-4-6)^2 + (-2-8)^2} = \sqrt{100+100} = \sqrt{200}$

Since $(\sqrt{160})^2 + (\sqrt{40})^2 = (\sqrt{200})^2$, Then ΔPET is a right triangle

$160 + 40 = 200$

$200 = 200$

because the Pythagorean Theorem holds true.

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

$N(8,2)$

Question 35 is continued on the next page.

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

Prove *PENT* is a rectangle.

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

$m_{\overline{PT}} = \frac{-2-4}{-4-(-6)} = \frac{-6}{2} = -3$

$m_{\overline{EN}} = \frac{8-2}{6-8} = \frac{+6}{-2} = -3$

Same slopes $\Rightarrow \overline{PT} \parallel \overline{EN}$

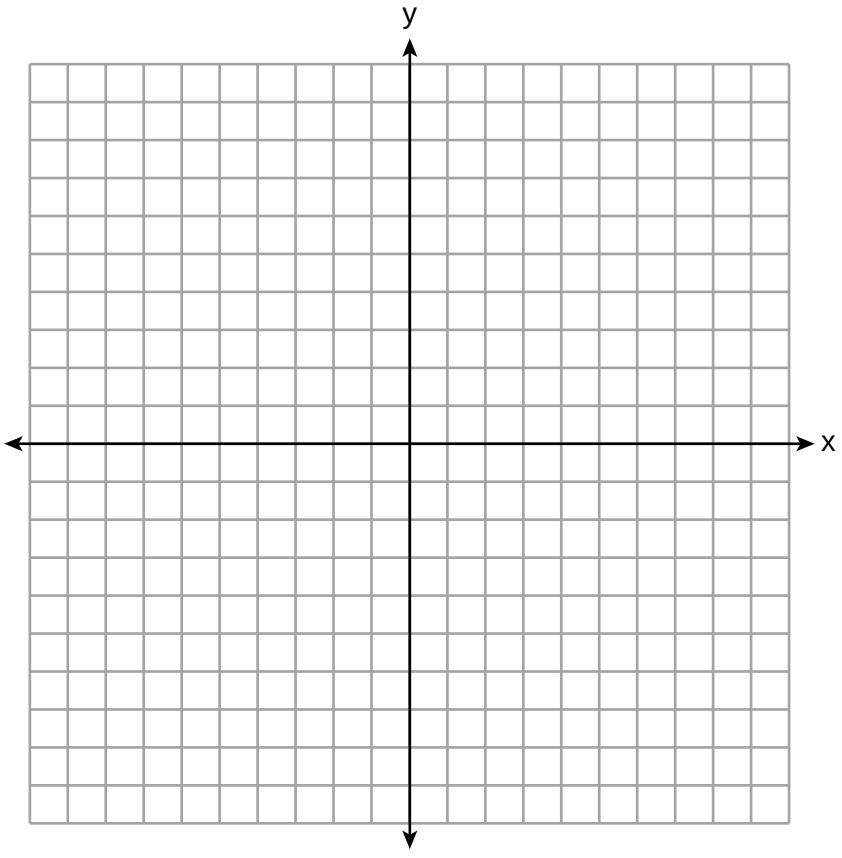
$m_{\overline{PE}} = \frac{8-4}{6-(-6)} = \frac{4}{12} = \frac{1}{3}$

$m_{\overline{TN}} = \frac{-2-2}{-4-8} = \frac{-4}{-12} = \frac{1}{3}$

Same slopes $\Rightarrow \overline{PE} \parallel \overline{TN}$

* Since both pairs of opp. sides are $\parallel$, PENT is a $\parallel$ogram.
* Since the slopes of $\overline{PT}$ and $\overline{PE}$ are negative reciprocals, $\overline{PT} \perp \overline{PE}$ making $\angle P$ a right $\angle$.

$\Rightarrow$ A $\parallel$ogram w/ a right $\angle$ is a rectangle, therefore PENT is a rectangle.



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

slope of $\overline{PE}$ = $^{-6,4}_{6,8}$ $\quad \frac{8-4}{6-(-6)} \rightarrow \frac{4}{12} \rightarrow \boxed{\frac{1}{3}}$

slope of $\overline{PT}$ = $^{-6,4}_{-4,-2}$ $\quad \frac{-2-4}{-4-(-6)} \rightarrow \frac{-6}{2} \rightarrow -3$

△PET is a right triangle.

since $\overline{PE}$ and $\overline{PT}$ are ⊥, ∠EPT is right.
A triangle with a right angle is a right triangle.

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

(8,2)

Question 35 is continued on the next page.

Score 5: The student had an incomplete concluding statement in not stating the slopes of $\overline{PE}$ and $\overline{PT}$ were negative reciprocals.

Question 35 continued.

Prove *PENT* is a rectangle.

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

slope $\overline{PE} = \frac{8-4}{6-(-6)} \rightarrow \frac{1}{3}$

slope $\overline{PT} = \frac{-2-4}{-4-(-6)} \rightarrow -3$

slope $\overline{TN} = \frac{2-(-2)}{8-(-4)} \rightarrow \frac{1}{3}$

slope $\overline{EN} = \frac{2-8}{8-6} \rightarrow \frac{-6}{2} \rightarrow -3$

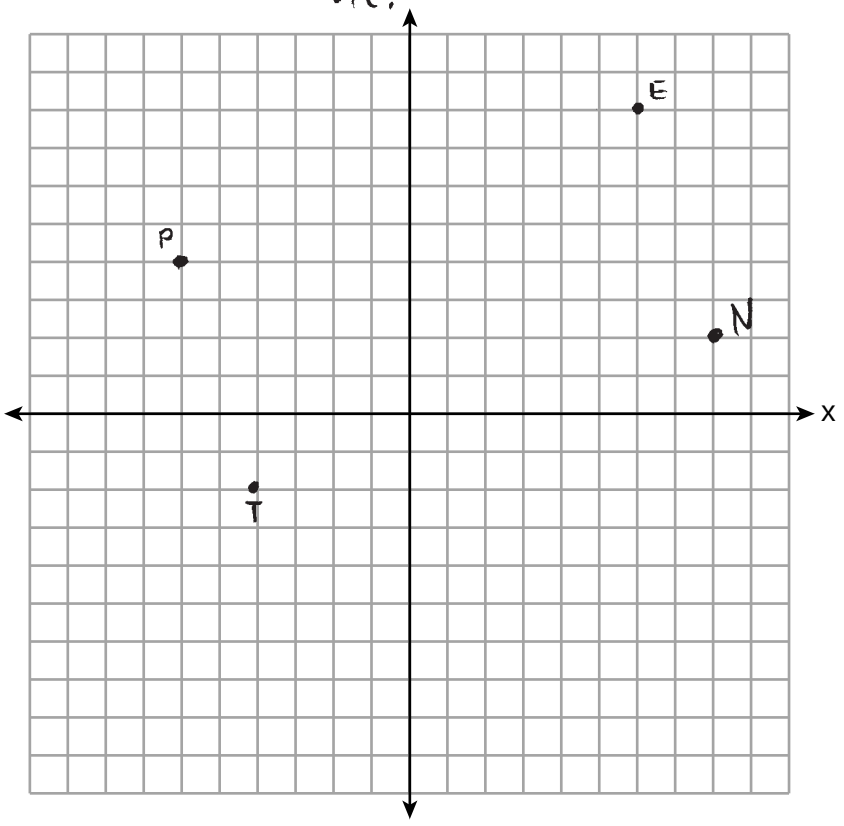
$\overline{PE} \perp \overline{PT}$

$\angle EPT = 90^\circ$

$\overline{PE} \parallel \overline{TN}$

$\overline{EN} \parallel \overline{PT}$

Quadrilateral PENT is a parallelogram because opposite sides are parallel, ($\overline{PE} \parallel \overline{TN}$ and $\overline{EN} \parallel \overline{PT}$) since two sides $\overline{PE}$ and $\overline{PT}$ are $\perp$ $\angle EPT$ is a right angle, A parallelogram with a right angle is a rectangle so PENT is a rectangle.



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

$m = \frac{RISE}{RUN}$ $m_{\overline{PE}} = \frac{4}{12} = \frac{1}{3}$ $m_{\overline{PT}} = \frac{-6}{2} = -3$ $>\ \perp$ neg recip slopes $\Rightarrow \perp$ $\therefore \angle P$ is a right $\angle$

$\triangle PET$ is a right $\triangle$ because it has a right angle ($\overline{PE} \perp \overline{PT}$)

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

$N(8, 2)$

Question 35 is continued on the next page.

Score 5: The student wrote an incomplete concluding statement when proving the rectangle.

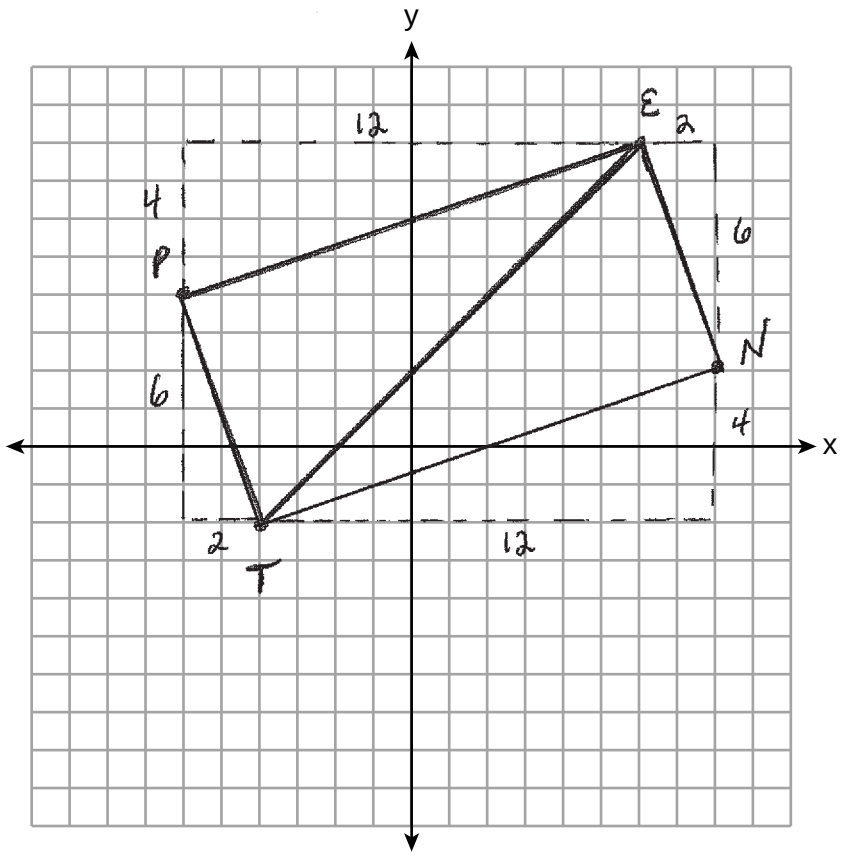
Question 35 continued.

Prove *PENT* is a rectangle.

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

$m_{\overline{PE}} = \frac{1}{3}$ $\quad m_{\overline{TN}} = \frac{4}{12} = \frac{1}{3}$ $\quad \| \quad$ $m_{\overline{EN}} = \frac{-6}{2} = -3$ $\quad m_{\overline{PT}} = -3$ $\quad \| \quad$

$\therefore$ PENT is a rectangle because it has a pair of opp. sides $\|$ and it has a right $\angle$ at P.



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

$PE = \sqrt{(6-(-6))^2 + (8-4)^2}$
$= \sqrt{12^2 + 4^2}$
$= \sqrt{144+16}$
$PE = \sqrt{160}$

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

$ET = \sqrt{(-4-6)^2 + (-2-8)^2}$
$= \sqrt{(-10)^2 + (-10)^2}$
$= \sqrt{100+100}$
$ET = \sqrt{200}$

$\sqrt{160}^2 + \sqrt{40}^2 = \sqrt{200}^2$

$160 + 40 = 200$

$200 = 200$ ✓

Since the pythagorean Theorem works, $\triangle PET$ is a right triangle

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

$N(8,2)$

Question 35 is continued on the next page.

Score 5: The student wrote an incorrect concluding statement when proving *PENT* was a parallelogram.

Prove *PENT* is a rectangle.

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

$PN = \sqrt{(8-(-6))^2+(2-4)^2}$

$= \sqrt{14^2+(-2)^2}$

$= \sqrt{196+4}$

$PN = \sqrt{200}$

$ET = \sqrt{200}$

Diagonals

$\overline{PN} \cong \overline{NT}$

$EN = \sqrt{(8-6)^2+(2-8)^2}$

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

$= \sqrt{4+36}$

$= \sqrt{40}$

$TN = \sqrt{(8-(-4))^2+(2-(-2))^2}$

$= \sqrt{12^2+4^2}$

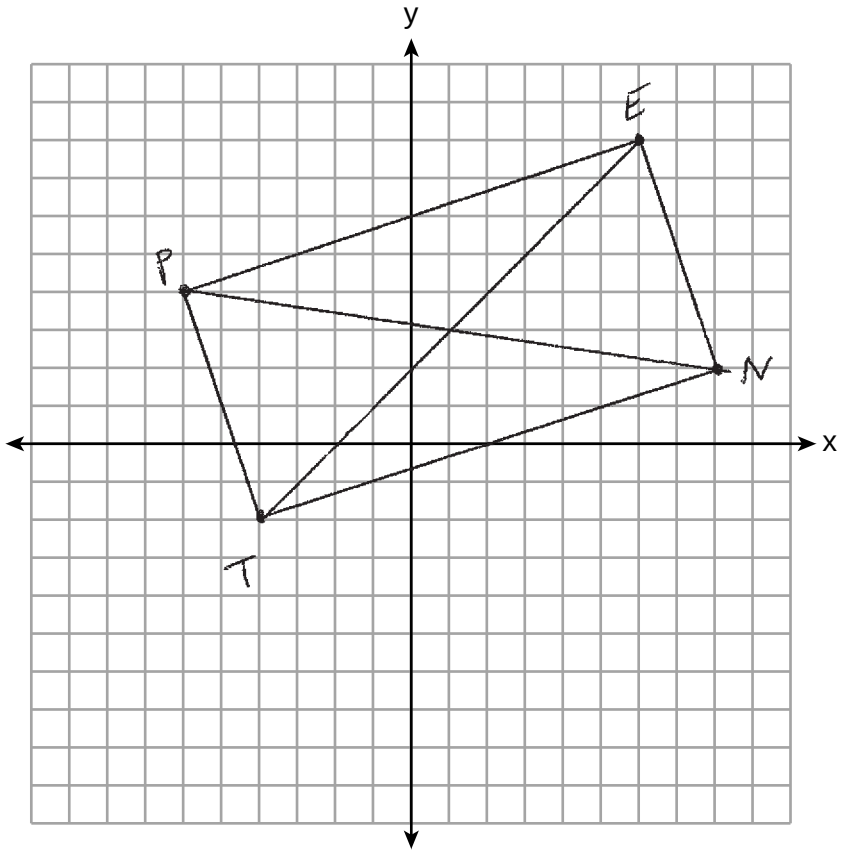
$= \sqrt{144+16}$

$= \sqrt{160}$

$\overline{PT} \cong \overline{EN}$

$\overline{PE} \cong \overline{TN}$

Since both pairs of opposite sides of quad PENT are ||, it is a parallelogram. Since ▱ PENT has ≅ diagonals, it is a rectangle



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

$m\overline{PE}$ $\frac{4}{12} = \frac{1}{3}$

$m\overline{ET}$ $\frac{10}{10} = 1$

$m\overline{TP}$ $\frac{-6}{2} = \frac{-3}{1}$

- reciprocal slopes

$\therefore \overline{PE} \perp \overline{TP}$

$\triangle PET$ is a right $\triangle$ b/c $\perp \rightarrow$ right $\angle P$

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

$N(8,3)$

Question 35 is continued on the next page.

Score 4: The student wrote an incorrect coordinate for point *N* and had an incomplete conclusion when proving the rectangle.

Prove *PENT* is a rectangle.

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

$m\overline{PE} = \frac{4}{12} = \frac{1}{3}$

$m\overline{EN} = \frac{-6}{2} = \frac{-3}{1}$

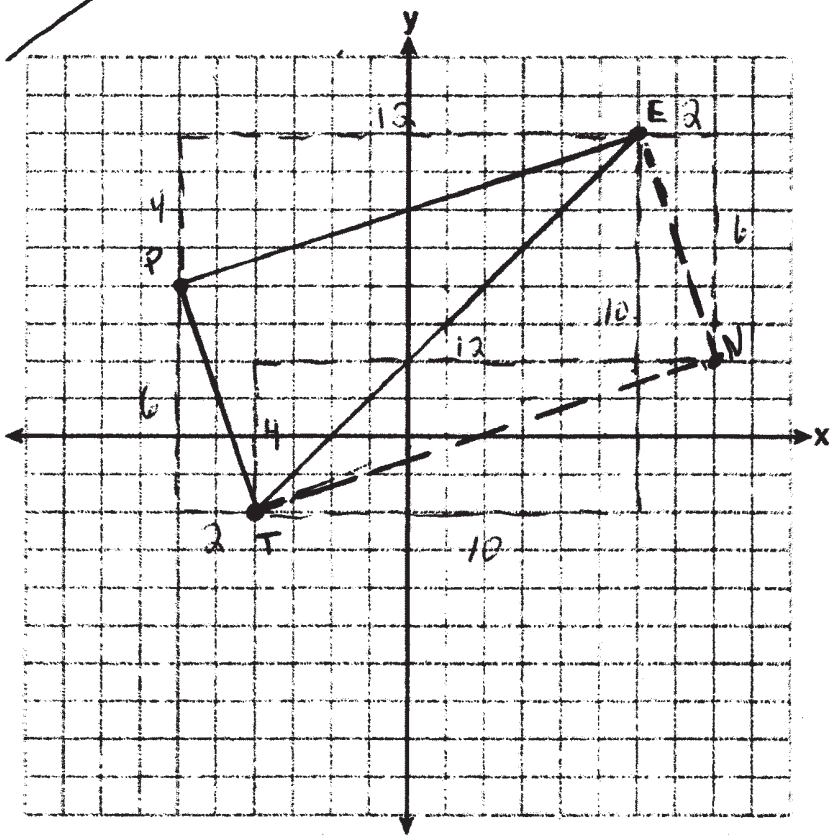
$m\overline{NT} = \frac{4}{12} = \frac{1}{3}$

$m\overline{TP} = \frac{-6}{2} = \frac{-3}{1}$

- reciprocal slopes ⊥

Same slope ∥

PENT is a rectangle b/c ⊥ ⇒ rt ∠'s & same slope ⇒ ∥



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

$10^2 + 10^2 = ET^2$

$100 + 100 = ET^2$

$\sqrt{200} = \sqrt{ET^2}$

$ET = \sqrt{200}$

$12^2 + 4^2 = PE^2$

$144 + 16 = PE^2$

$\sqrt{160} = \sqrt{PE^2}$

$PE = \sqrt{160}$

$6^2 + 2^2 = PT^2$

$36 + 4 = PT^2$

$\sqrt{40} = \sqrt{PT^2}$

$PT = \sqrt{40}$

$\triangle PET$ is a right triangle because it has three unequal sized.

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

N (8, 2)

Question 35 is continued on the next page.

Score 3: The student wrote an incorrect conclusion when proving the right triangle and made a conceptual error when proving the rectangle.

Prove *PENT* is a rectangle.

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

$4^2 + 12^2 = PE^2$

$\sqrt{160} = \sqrt{PE^2}$

$PE = \sqrt{160}$

$6^2 + 2^2 = EN^2$

$\sqrt{40} = EN$

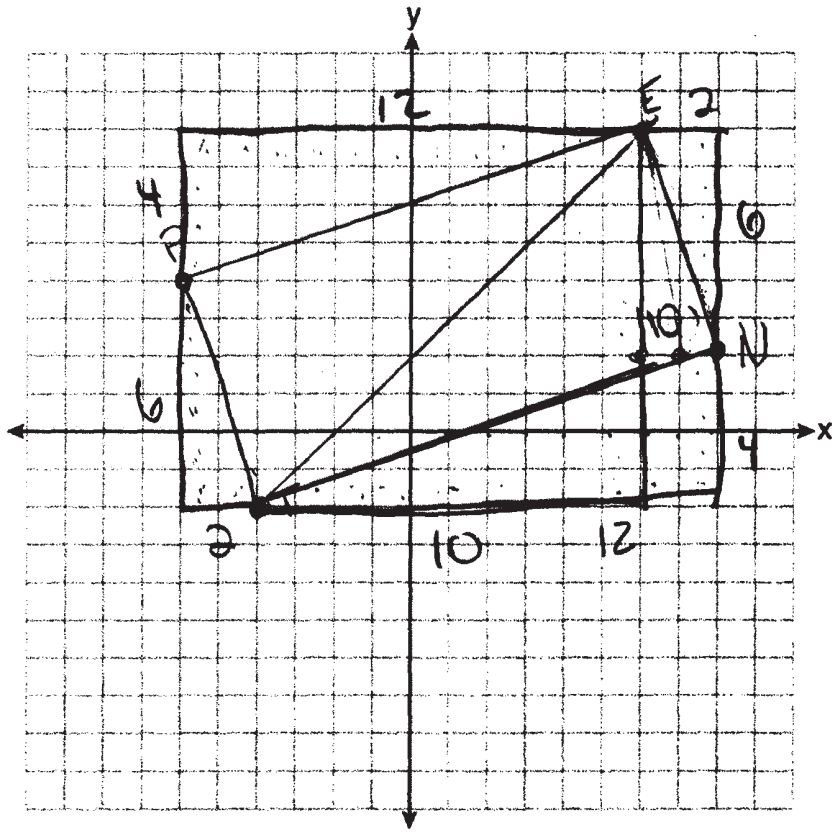
$12^2 + 4^2 = TN^2$

$\sqrt{160} = TN$

$6^2 + 2^2 = PT^2$

$\sqrt{40} = PT$

there are two pair of congruent opposite sides therefore PENT is a rectangle



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

Slope
$\overline{PT}$ $\frac{-2-4}{-4+6} = \frac{-6}{2} = 3$
$\overline{PE}$ $\frac{8-4}{6+6} = \frac{4}{12} = \frac{1}{3}$
neg recip slopes
$\overline{PT} \perp \overline{PE}$
$\angle P$ is a Right $\angle$
Since $\angle P$ is a Right angle $\triangle PET$ is a Right $\triangle$

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

N (8, 2)

Question 35 is continued on the next page.

Score 3: The student made a computational error when reducing $-\frac{6}{2}$ and made a conceptual error stating a quadrilateral with congruent diagonals was a rectangle.

Prove *PENT* is a rectangle.

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

P(-6,4) E(6,8) N(8,2) T(-4,-2)

$PN = \sqrt{(6-8)^2 + (4-2)^2}$

$PN = \sqrt{196 + 4}$

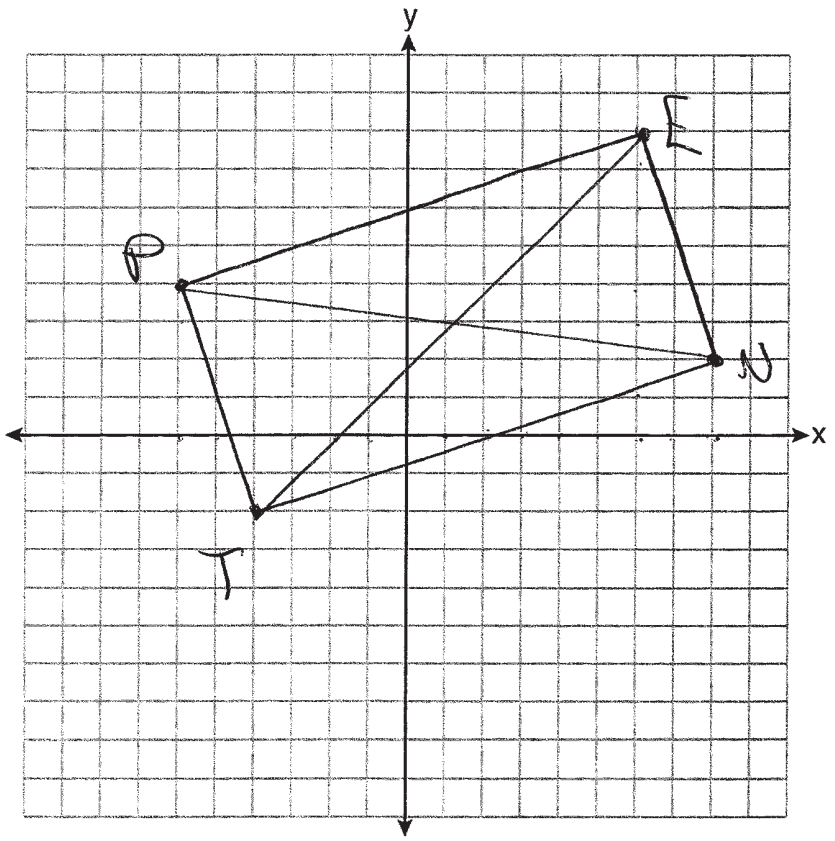
$PN = \sqrt{200}$

$TE = \sqrt{(6+4)^2 + (8+2)^2}$

$TE = \sqrt{100 + 100}$

$TE = \sqrt{200}$

Since the diagonals are congruent, PENT is a Rectangle.



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

forgot how to prove angles

State the coordinates of N, the image of P, after a 180° rotation centered at (1,3).

N (8, 2)

Question 35 is continued on the next page.

Score 2: The student correctly determined the coordinates of point N and determined the lengths of the four sides of *PENT*.

Prove *PENT* is a rectangle.

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

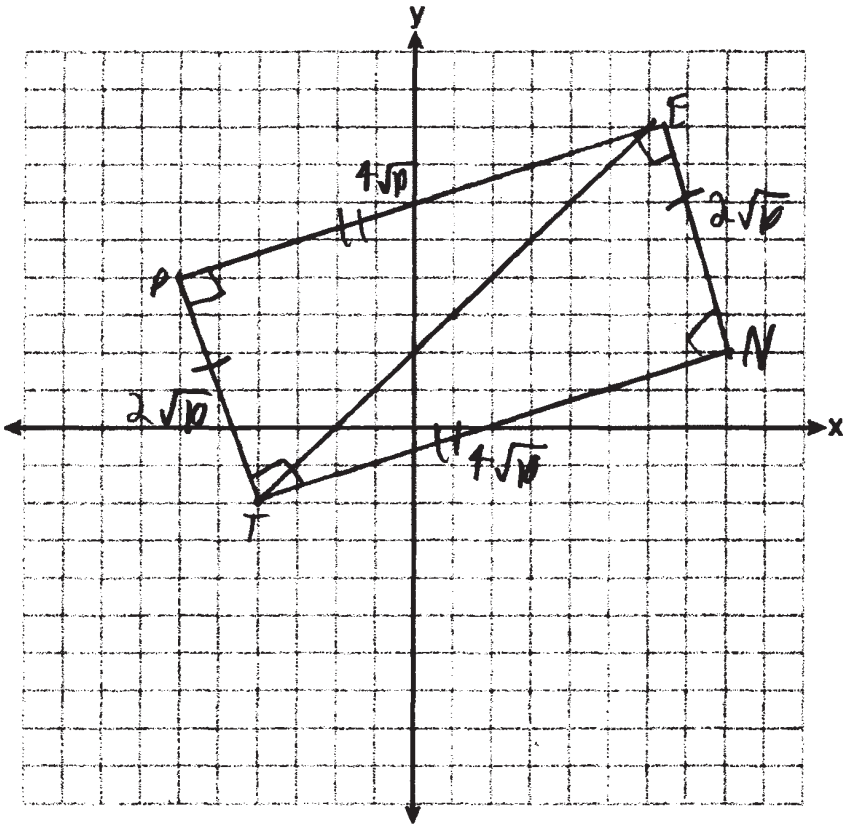
$\overline{PE} = \sqrt{(1+6)^2+(8-1)^2} = 7\sqrt{2}$

$\overline{TN} = \sqrt{(8+4)^2+(2+2)^2} = 4\sqrt{10}$

$\overline{TP} = \sqrt{(-6+4)^2+(1+2)^2} = 2\sqrt{10}$

$\overline{EN} = \sqrt{(6-8)^2+(8-2)^2} = 2\sqrt{10}$

PENT has 4 right angles and 2 pairs of congruent sides.



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

$\overline{PE}$ $\frac{4-8}{-6-6}=\frac{-4}{-12}=\frac{1}{3}$

$\overline{ET}$ $\frac{8+2}{6+4}=\frac{10}{10}$ $\overline{PT}$ $\frac{4+2}{-6+4}=\frac{6}{-2}=\frac{3}{1}$

$\angle P$ is a right angle because slopes of $\overline{PE}$ & $\overline{PT}$ are negative reciprocals

Forming $\overline{PE} \perp \overline{PT}$ and $\triangle PET$ is a right $\triangle$.

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

(8,2)

Question 35 is continued on the next page.

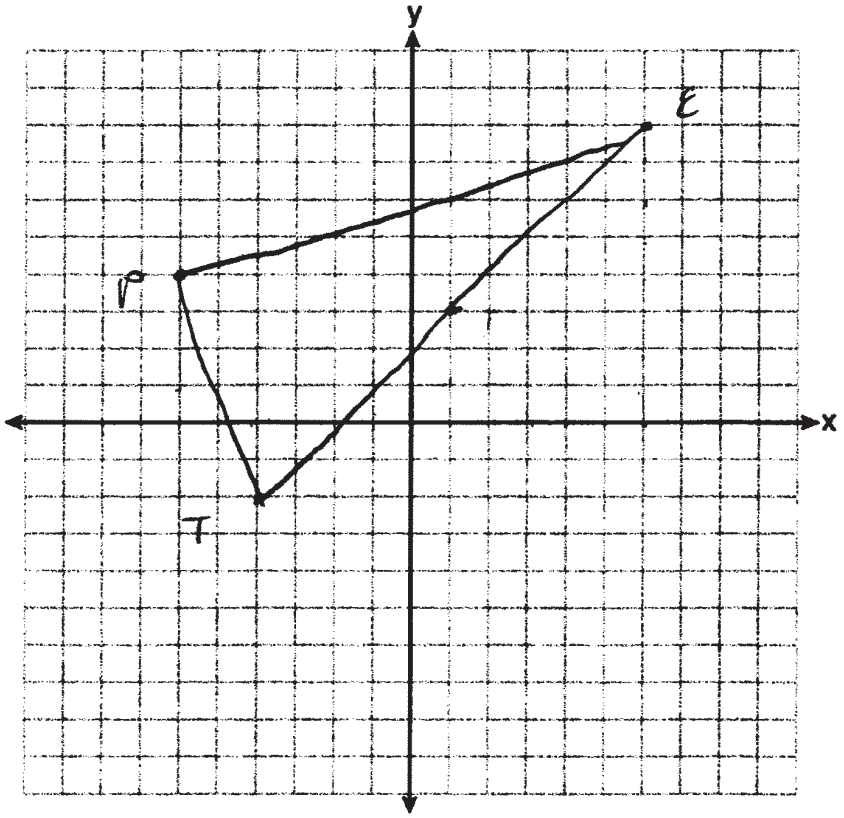
Score 2: The student made a computational error when reducing $\frac{6}{-2}$. The student correctly determined the coordinates of point *N*. No further correct work was shown.

Prove *PENT* is a rectangle.

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

∠P is a right angle since $\overline{PE}$ & $\overline{PT}$ are negative reciprocals

So since it has 4 sides that also makes it a rectangle



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

$m\overline{PT}$ $\frac{4-(-2)}{-6-(-4)} = \frac{6}{-2} = \frac{3}{-1}$

$m\overline{PE}$ $\frac{8-4}{6-(-6)} = \frac{4}{12} = \frac{1}{3}$

$\overline{PT}$ and $\overline{PE}$ have negative reciprocal slopes of $\frac{3}{-1}$ and $\frac{1}{3}$, making them $\perp$. Since $\perp$ lines form right $\angle$'s $\triangle PET$ is a right $\triangle$

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

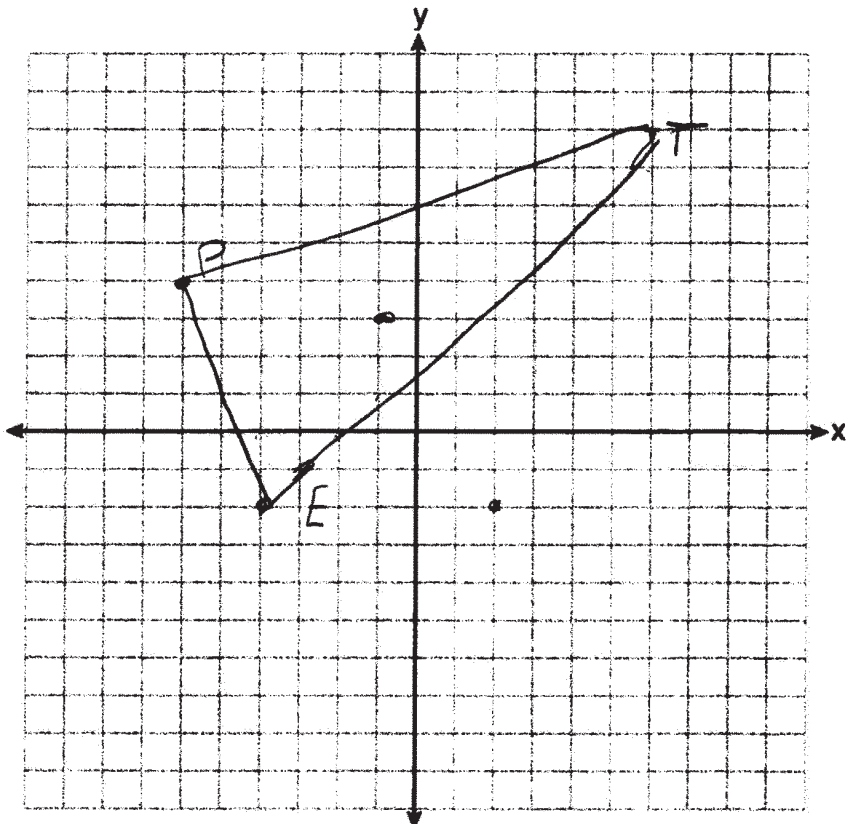
$N(2,-2)$

Question 35 is continued on the next page.

Score 2: The student correctly proved $\triangle PET$ was a right triangle. No further correct work was shown.

Prove *PENT* is a rectangle.

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



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

Statement	Reason
$\triangle PET$ has vertices with coordinates P, E, and T	Given
$\overline{PE} \perp \overline{PT}$	Definition of perpendicular lines
$\angle EPT$ is a right angle	Definition of right angle
$\triangle PET$ is a right triangle	Definition of a right triangle

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

N (8, 2)

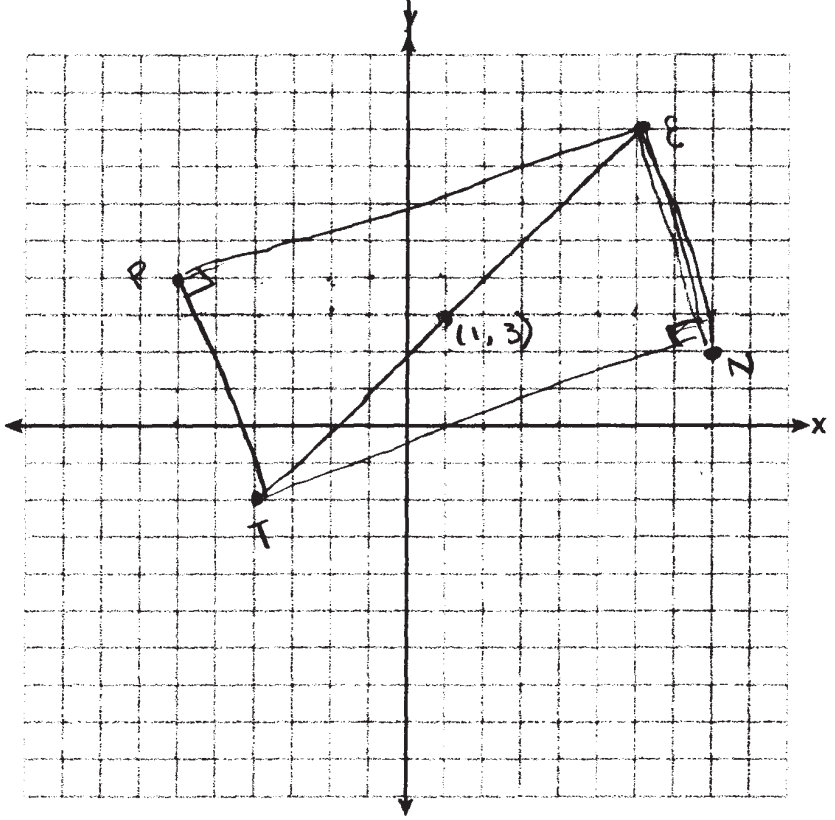
Question 35 is continued on the next page.

Score 1: The student correctly determined the coordinates of point *N*.

Prove *PENT* is a rectangle.

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

Statement	Reason
$\overline{EN} \perp \overline{TN}$	Definition of perpendicular lines
$\angle ENT$ is a right angle	Definition of right angle
PENT is a rectangle	Definition of a rectangle

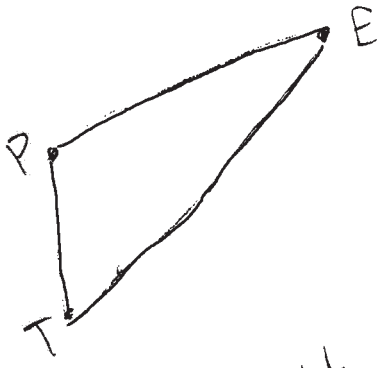


Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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



△PET is a right triangle because $\overline{TP}$ and $\overline{EP}$ are perpendicular

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

(8,2)

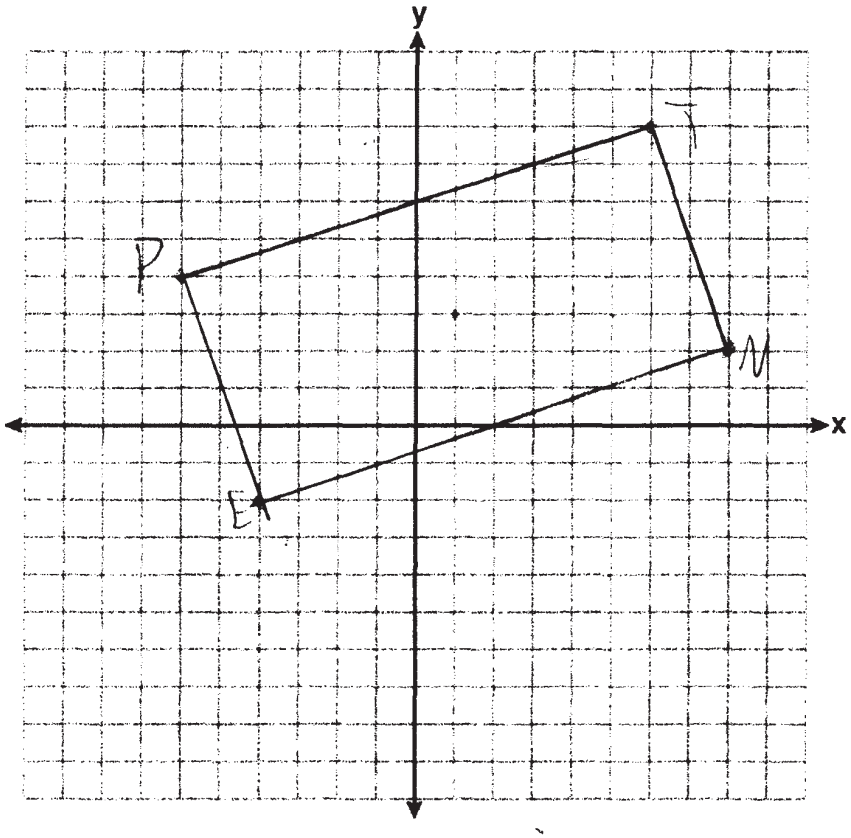
Question 35 is continued on the next page.

Score 1: The student correctly determined the coordinates of point *N*.

Prove *PENT* is a rectangle.

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

All of the lines have perpendicular slopes to the lines they touch



Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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

△PET is a right triangle because it has a 90° angle.

State the coordinates of *N*, the image of *P*, after a 180° rotation centered at (1,3).

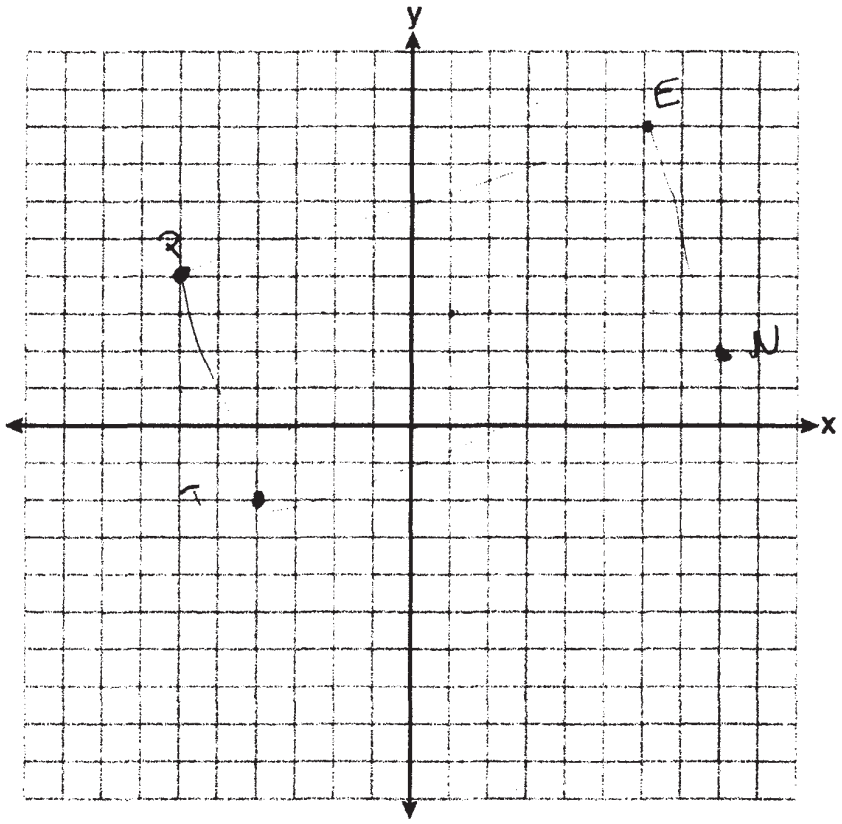
Question 35 is continued on the next page.

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

Prove *PENT* is a rectangle.

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

PENT is a rectangle because $\overline{PT} \cong \overline{EN}$, and $\overline{PE} \cong \overline{TN}$

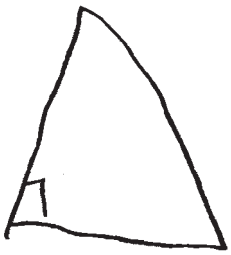


Question 35

35 Triangle *PET* has vertices with coordinates $P(-6,4)$, $E(6,8)$, and $T(-4,-2)$.

Prove $\triangle PET$ is a right triangle.

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



State the coordinates of N, the image of P, after a 180° rotation centered at (1,3).

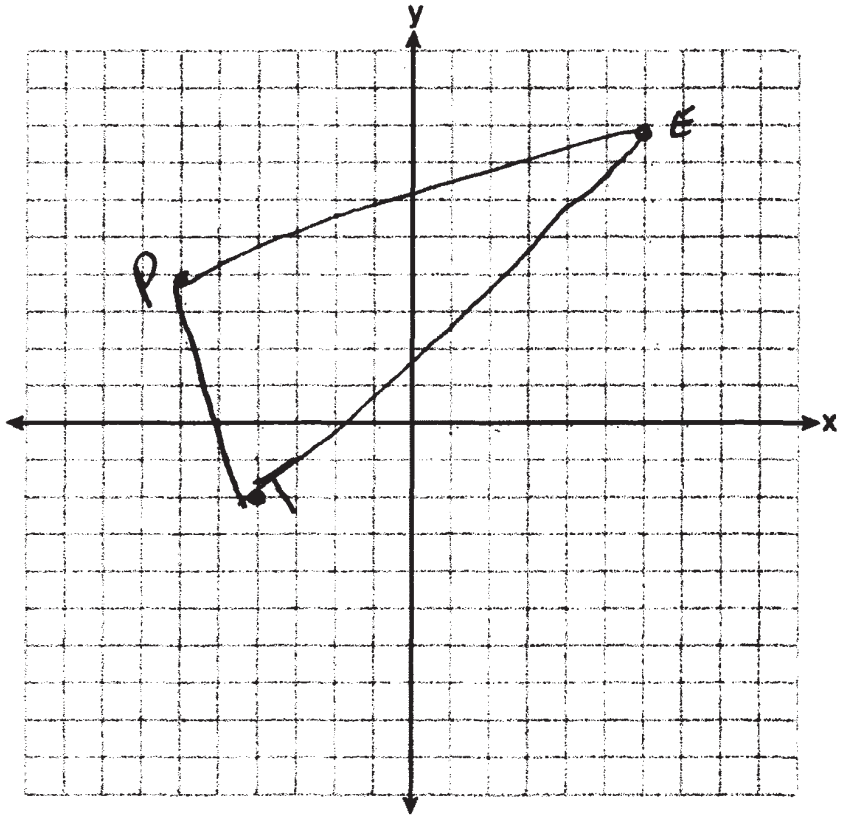
P(-6,4)
E(6,8)
T(-4,-2)
P'(8,2) E'(-4,-6) T'(4,8)

Question 35 is continued on the next page.

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

Prove *PENT* is a rectangle.

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



The State Education Department / The University of the State of New York

Regents Examination in Geometry – January 2025

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

(Use for the January 2025 exam only.)

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

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

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

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