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

GEOMETRY

Wednesday, August 17, 2022 — 12:30 to 3:30 p.m., only

Student Name: _____

School Name: _____

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

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

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

This examination has four parts, with a total of 35 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in **Parts II, III,** and **IV** directly in this booklet. All work should be written in pen, except for graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale.

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

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

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

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

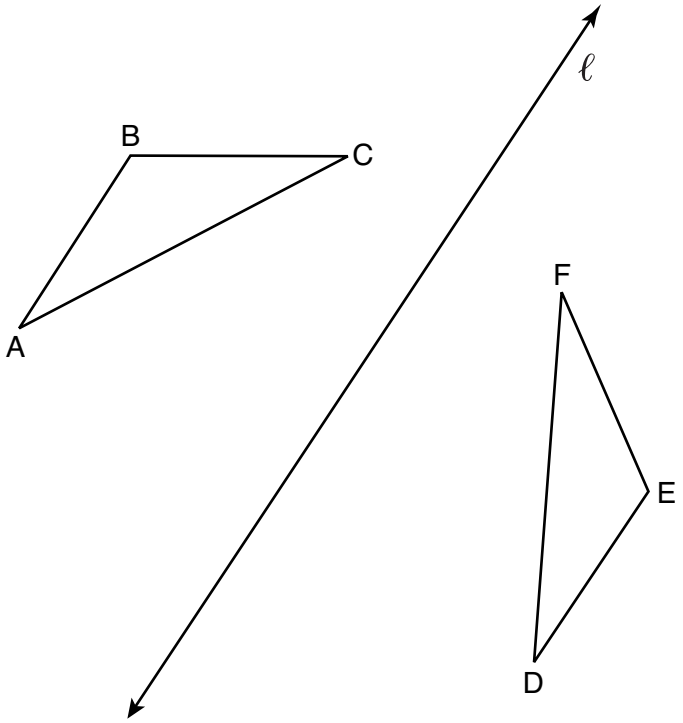
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part I

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

Use this space for computations.

1 In the diagram below, $\triangle ABC$ is reflected over line ℓ to create $\triangle DEF$.

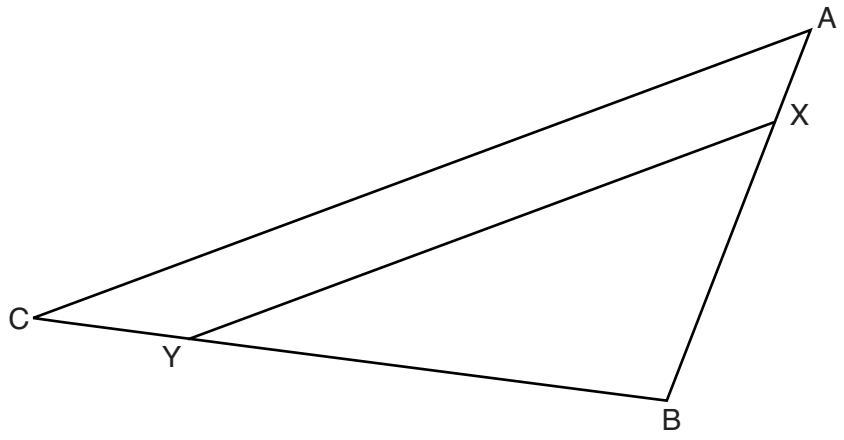


If $m\angle A = 40°$ and $m\angle B = 95°$, what is $m\angle F$?

(1) 40°
(2) 45°
(3) 85°
(4) 95°

Use this space for computations.

2 The diagram below shows triangle ABC with point X on side $\overline{AB}$ and point Y on side $\overline{CB}$.



Which information is sufficient to prove that $\triangle BXY \sim \triangle BAC$?

(1) $\angle B$ is a right angle.
(2) $\overline{XY}$ is parallel to $\overline{AC}$.
(3) $\triangle ABC$ is isosceles.
(4) $\overline{AX} \cong \overline{CY}$

3 Quadrilateral *MATH* is congruent to quadrilateral *WXYZ*. Which statement is always true?

(1) $MA = XY$
(2) $m\angle H = m\angle W$
(3) Quadrilateral *WXYZ* can be mapped onto quadrilateral *MATH* using a sequence of rigid motions.
(4) Quadrilateral *MATH* and quadrilateral *WXYZ* are the same shape, but not necessarily the same size.

4 A quadrilateral has diagonals that are perpendicular but *not* congruent. This quadrilateral could be

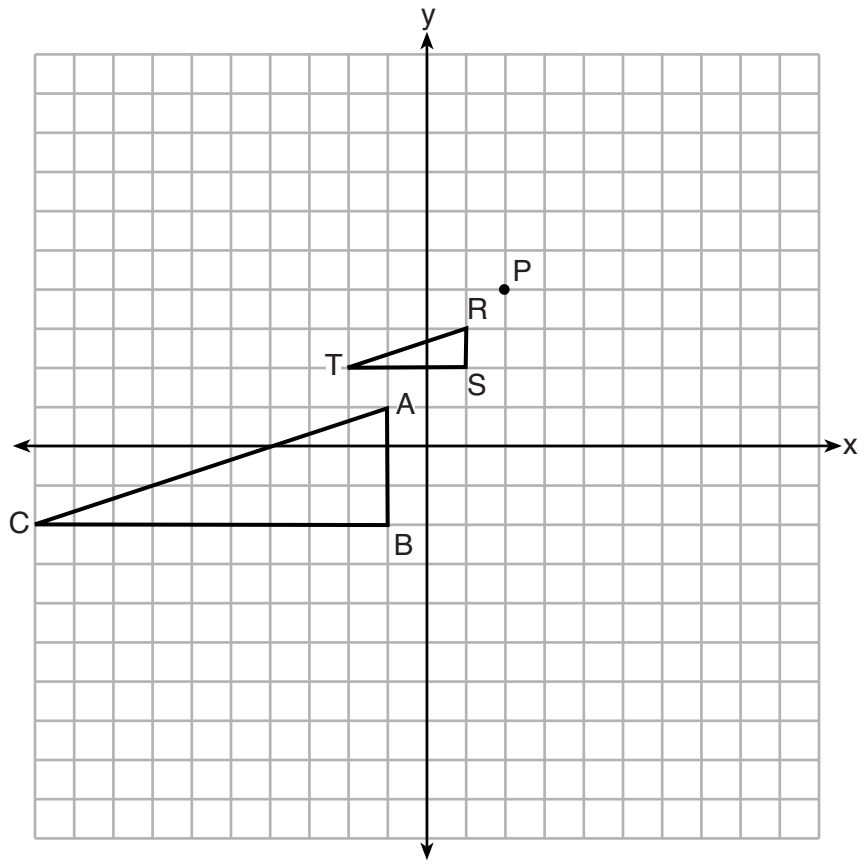
(1) a square
(2) a rhombus
(3) a rectangle
(4) an isosceles trapezoid

Use this space for computations.

5 Which regular polygon has a minimum rotation of 36° about its center that carries the polygon onto itself?

(1) pentagon
(2) octagon
(3) nonagon
(4) decagon

6 On the set of axes below, $\triangle RST$ is the image of $\triangle ABC$ after a dilation centered at point P.

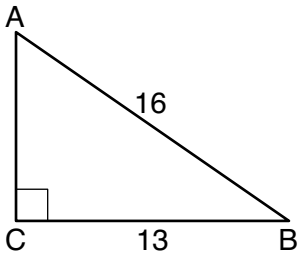


The scale factor of the dilation that maps $\triangle ABC$ onto $\triangle RST$ is

(1) $\frac{1}{3}$
(2) 2
(3) 3
(4) $\frac{2}{3}$

Use this space for computations.

7 In the diagram of $\triangle ABC$ below, $m\angle C = 90°$, $CB = 13$, and $AB = 16$.



What is the measure of $\angle A$, to the *nearest degree*?

(1) 36°
(2) 39°
(3) 51°
(4) 54°

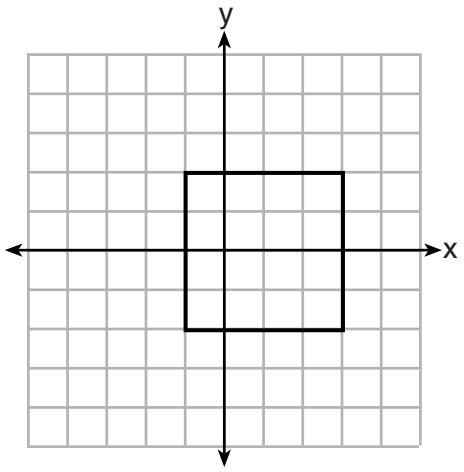
8 The Pyramid of Memphis, in Tennessee, stands 107 yards tall and has a square base whose side is 197 yards long.

What is the volume of the Pyramid of Memphis, to the *nearest cubic yard*?

(1) 751,818
(2) 1,384,188
(3) 2,076,212
(4) 4,152,563

Use this space for computations.

9 A square is graphed on the set of axes below, with vertices at $(-1,2)$, $(-1,-2)$, $(3,-2)$, and $(3,2)$.



Which transformation would *not* carry the square onto itself?

(1) reflection over the y-axis

(2) reflection over the x-axis

(3) rotation of 180 degrees around point (1,0)

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

10 If scalene triangle XYZ is similar to triangle QRS and $m\angle X = 90°$, which equation is always true?

(1) $\sin Y = \sin S$

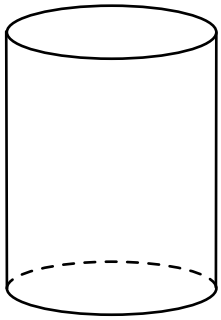
(2) $\cos R = \cos Z$

(3) $\cos Y = \sin Q$

(4) $\sin R = \cos Z$

Use this space for computations.

11 A plane intersects a cylinder perpendicular to its bases.



This cross section can be described as a

(1) rectangle
(2) parabola
(3) triangle
(4) circle

12 An equation of line p is $y = \frac{1}{3}x + 4$. An equation of line q is $y = \frac{2}{3}x + 8$. Which statement about lines p and q is true?

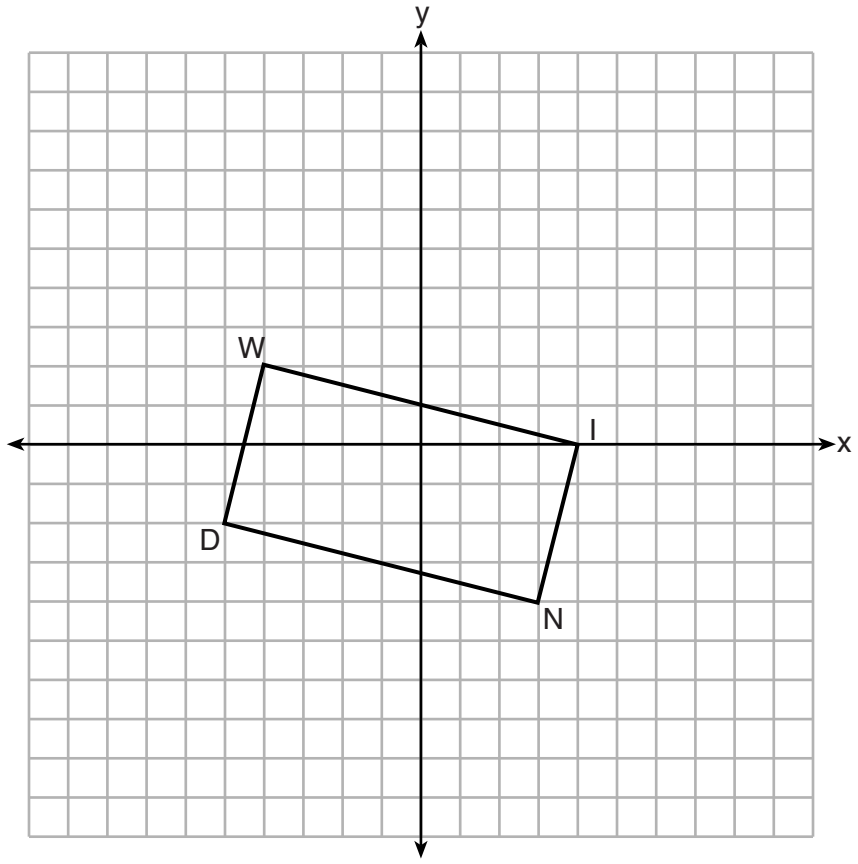
(1) A dilation of $\frac{1}{2}$ centered at the origin will map line q onto line p.
(2) A dilation of 2 centered at the origin will map line p onto line q.
(3) Line q is not the image of line p after a dilation because the lines are not parallel.
(4) Line q is not the image of line p after a dilation because the lines do not pass through the origin.

13 The coordinates of the endpoints of $\overline{SC}$ are $S(-7,3)$ and $C(2,-6)$. If point M is on $\overline{SC}$, what are the coordinates of M such that $SM{:}MC$ is 1:2?

(1) $(-4,0)$
(2) $(0,-4)$
(3) $(-1,-3)$
(4) $(-\frac{5}{2},-\frac{3}{2})$

Use this space for computations.

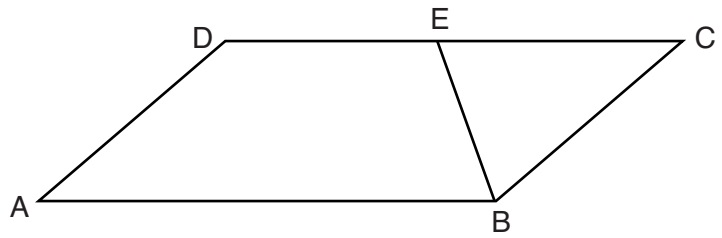
14 On the set of axes below, rectangle *WIND* has vertices with coordinates $W(-4,2)$, $I(4,0)$, $N(3,-4)$, and $D(-5,-2)$.



What is the area of rectangle *WIND*?

(1) 17
(2) 31
(3) 32
(4) 34

15 In parallelogram *ABCD* shown below, $\overline{EB}$ bisects $\angle ABC$.



If $m\angle A = 40°$, then $m\angle BED$ is

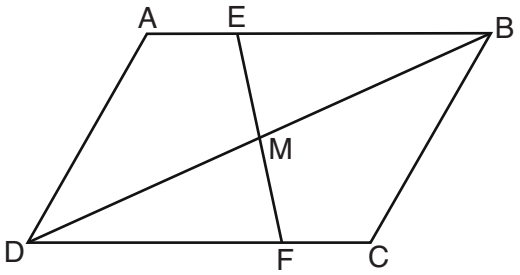
(1) 40°
(2) 70°
(3) 110°
(4) 140°

Use this space for computations.

16 In right triangles ABC and RST, hypotenuse $AB = 4$ and hypotenuse $RS = 16$. If $\triangle ABC \sim \triangle RST$, then 1:16 is the ratio of the corresponding

(1) legs
(2) areas
(3) volumes
(4) perimeters

17 Parallelogram $ABCD$ with diagonal $\overline{DB}$ is drawn below. Line segment EF is drawn such that it bisects $\overline{DB}$ at M.

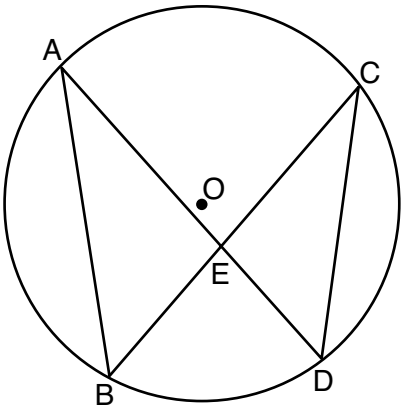


Which triangle congruence method would prove that $\triangle EMB \cong \triangle FMD$?

(1) ASA, only
(2) AAS, only
(3) both ASA and AAS
(4) neither ASA nor AAS

Use this space for computations.

18 In the diagram below of circle O, chords $\overline{AD}$ and $\overline{BC}$ intersect at E, and chords $\overline{AB}$ and $\overline{CD}$ are drawn.



Which statement must always be true?

(1) $\overline{AB} \cong \overline{CD}$

(2) $\overline{AD} \cong \overline{BC}$

(3) $\angle B \cong \angle C$

(4) $\angle A \cong \angle C$

19 What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + y^2 - 12y - 20.25 = 0$?

(1) center (0,6) and radius 7.5

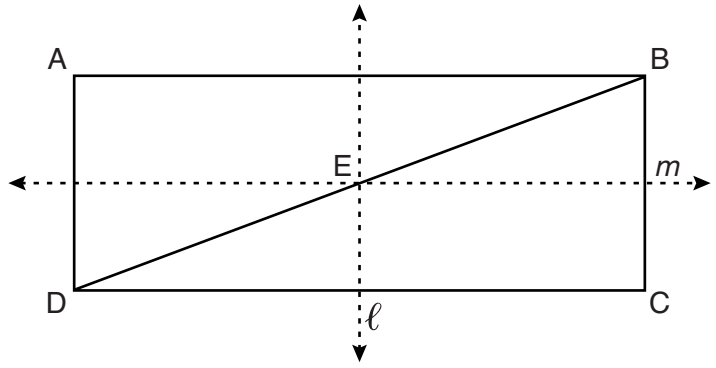
(2) center (0,−6) and radius 7.5

(3) center (0,12) and radius 4.5

(4) center (0,−12) and radius 4.5

Use this space for computations.

20 In the diagram below, $ABCD$ is a rectangle, and diagonal $\overline{BD}$ is drawn. Line ℓ, a vertical line of symmetry, and line m, a horizontal line of symmetry, intersect at point E.



Which sequence of transformations will map $\triangle ABD$ onto $\triangle CDB$?

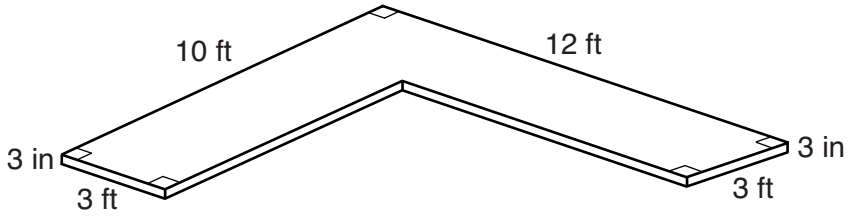
(1) a reflection over line ℓ followed by a 180° rotation about point E

(2) a reflection over line ℓ followed by a reflection over line m

(3) a 180° rotation about point B

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

21 The diagram below models a countertop designed for a kitchen. The countertop is made of solid oak and is 3 inches thick.



If oak weighs approximately 44 pounds per cubic foot, the approximate weight, in pounds, of the countertop is

(1) 630

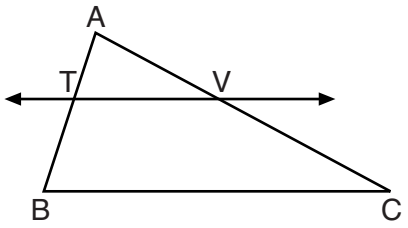
(2) 730

(3) 750

(4) 870

Use this space for computations.

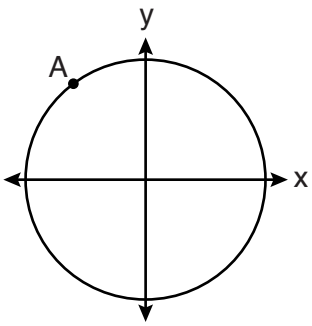
22 In the diagram below of $\triangle ABC$, $\overleftrightarrow{TV}$ intersects $\overline{AB}$ and $\overline{AC}$ at points T and V respectively, and $m\angle ATV = m\angle ABC$.



If $AT = 4$, $BC = 18$, $TB = 5$, and $AV = 6$, what is the perimeter of quadrilateral $TBCV$?

(1) 38.5
(2) 39.5
(3) 40.5
(4) 44.9

23 A circle centered at the origin passes through $A(-3,4)$.

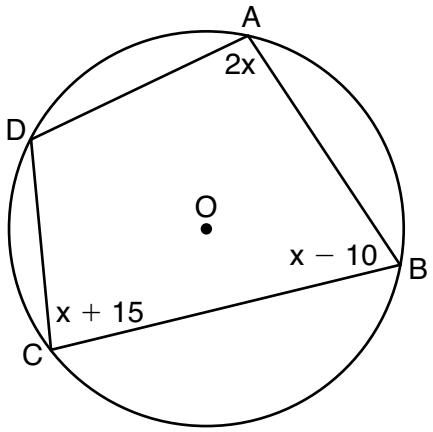


What is the equation of the line tangent to the circle at A?

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

Use this space for computations.

24 In the diagram below, quadrilateral $ABCD$ is inscribed in circle O, $m\angle A = (2x)°$, $m\angle B = (x-10)°$, and $m\angle C = (x+15)°$.



What is $m\angle D$?

(1) 55°

(2) 70°

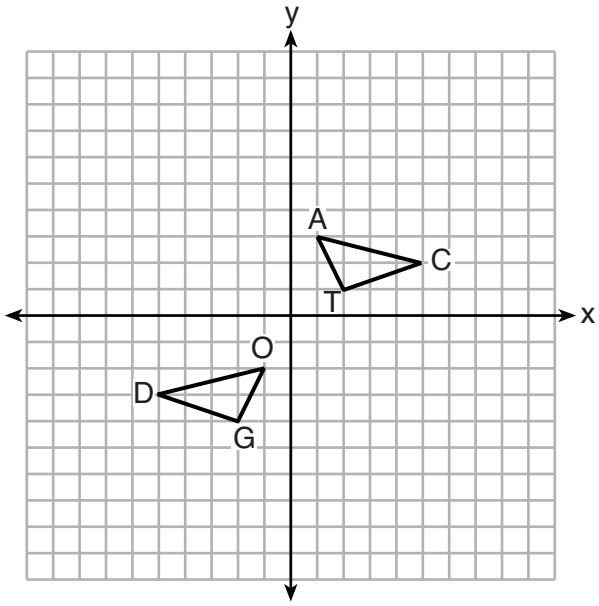
(3) 110°

(4) 135°

Part II

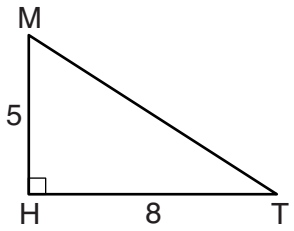
Answer all 7 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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 On the set of axes below, $\triangle DOG \cong \triangle CAT$.



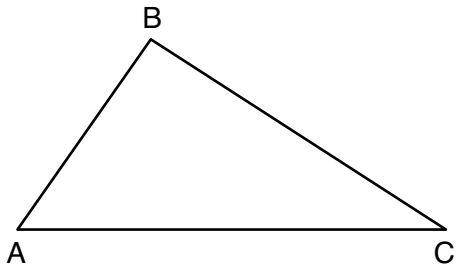
Describe a sequence of transformations that maps $\triangle DOG$ onto $\triangle CAT$.

26 In right triangle MTH shown below, $m\angle H = 90°$, $HT = 8$, and $HM = 5$.

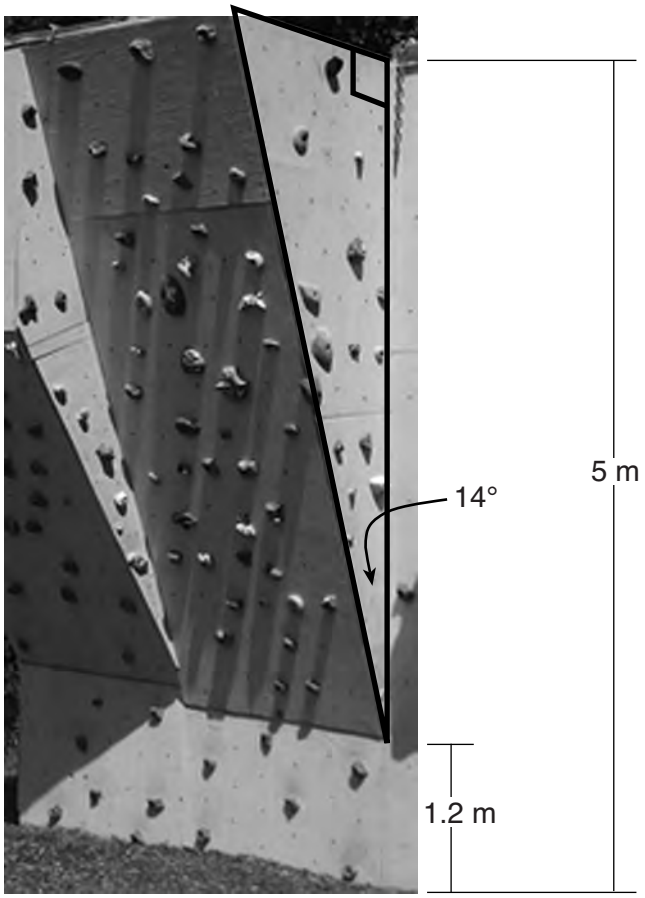


Determine and state, to the *nearest tenth*, the volume of the three-dimensional solid formed by rotating $\triangle MTH$ continuously around $\overline{MH}$.

27 Using a compass and straightedge, dilate triangle *ABC* by a scale factor of 2 centered at *C*. [Leave all construction marks.]

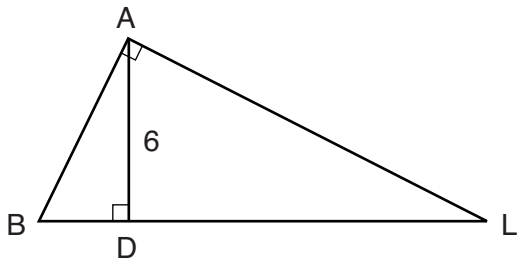


28 A rock-climbing wall at a local park has a right triangular section that slants toward the climber, as shown in the picture below. The height of the wall is 5 meters and the slanted section begins 1.2 meters up the wall at an angle of 14 degrees.



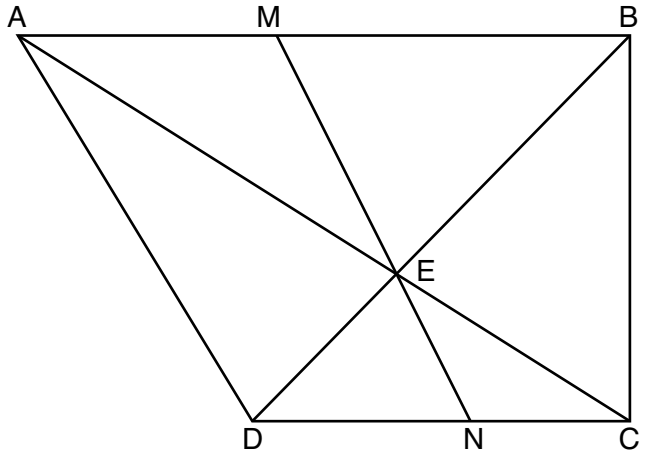
Determine and state, to the *nearest hundredth*, the number of meters in the length of the section of the wall that is slanted (hypotenuse).

29 In the diagram below of right triangle BAL, altitude $\overline{AD}$ is drawn to hypotenuse $\overline{BDL}$. The length of $\overline{AD}$ is 6.



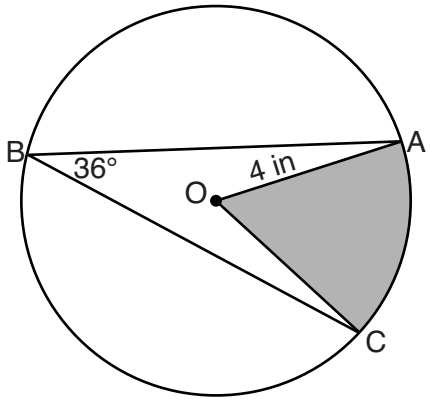
If the length of $\overline{DL}$ is four times the length of $\overline{BD}$, determine and state the length of $\overline{BD}$.

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $\overline{AD} \cong \overline{AE}$.



If $m\angle DAE = 35°$, $m\angle DCE = 25°$, and $m\angle NEC = 30°$, determine and state $m\angle ABD$.

31 In the diagram below of circle O, the measure of inscribed angle ABC is 36° and the length of $\overline{OA}$ is 4 inches.

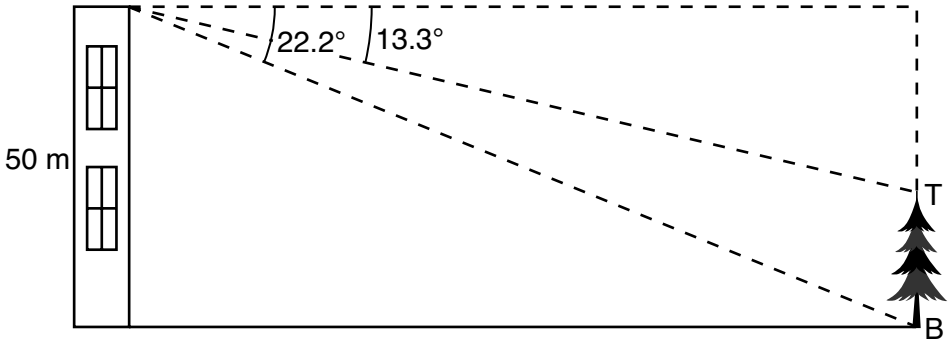


Determine and state, to the *nearest tenth of a square inch*, the area of the shaded sector.

Part III

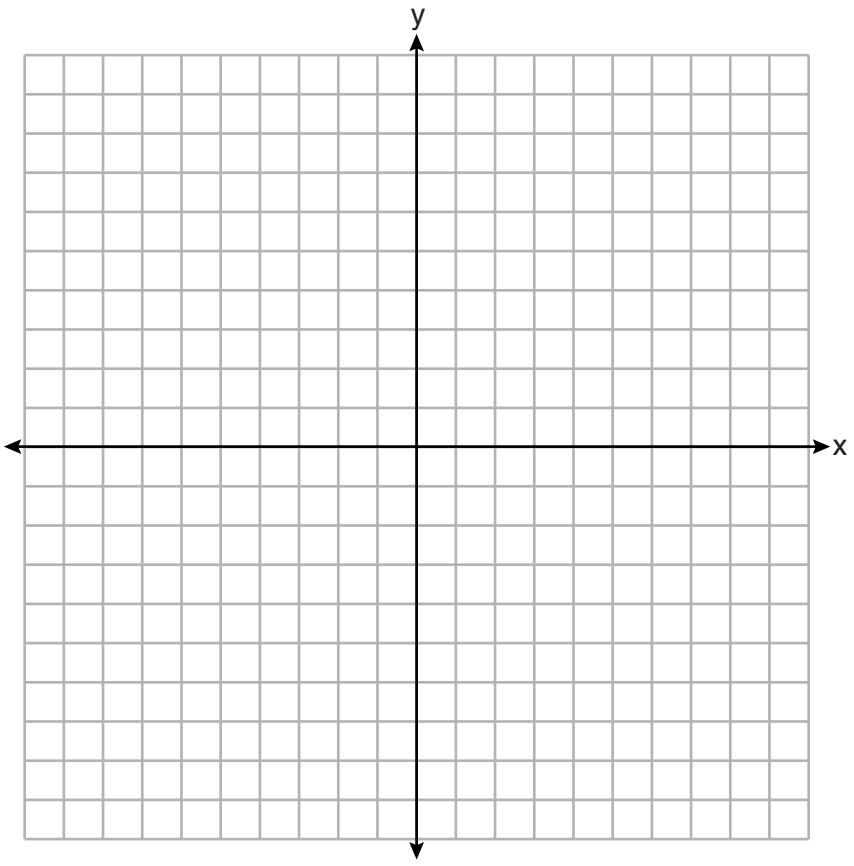
Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily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

32 As modeled in the diagram below, a building has a height of 50 meters. The angle of depression from the top of the building to the top of the tree, T, is 13.3°. The angle of depression from the top of the building to the bottom of the tree, B, is 22.2°.

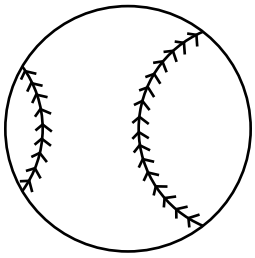


Determine and state, to the *nearest meter*, the height of the tree.

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$. Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]



34 A packing box for baseballs is the shape of a rectangular prism with dimensions of 2 ft $\times$ 1 ft $\times$ 18 in. Each baseball has a diameter of 2.94 inches.



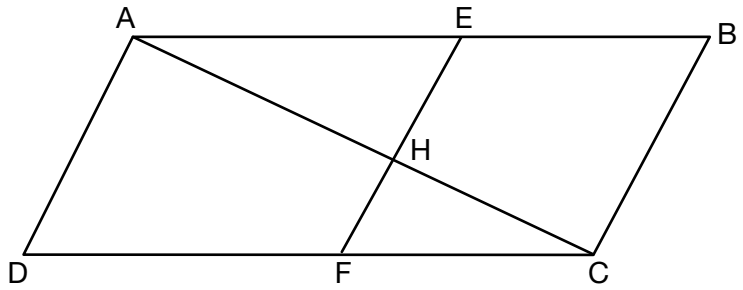
Determine and state the maximum number of baseballs that can be packed in the box if they are stacked in layers and each layer contains an equal number of baseballs.

The weight of a baseball is approximately 0.025 pound per cubic inch. Determine and state, to the *nearest pound*, the total weight of all the baseballs in the fully packed box.

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 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



Prove: $(EH)(CH) = (FH)(AH)$

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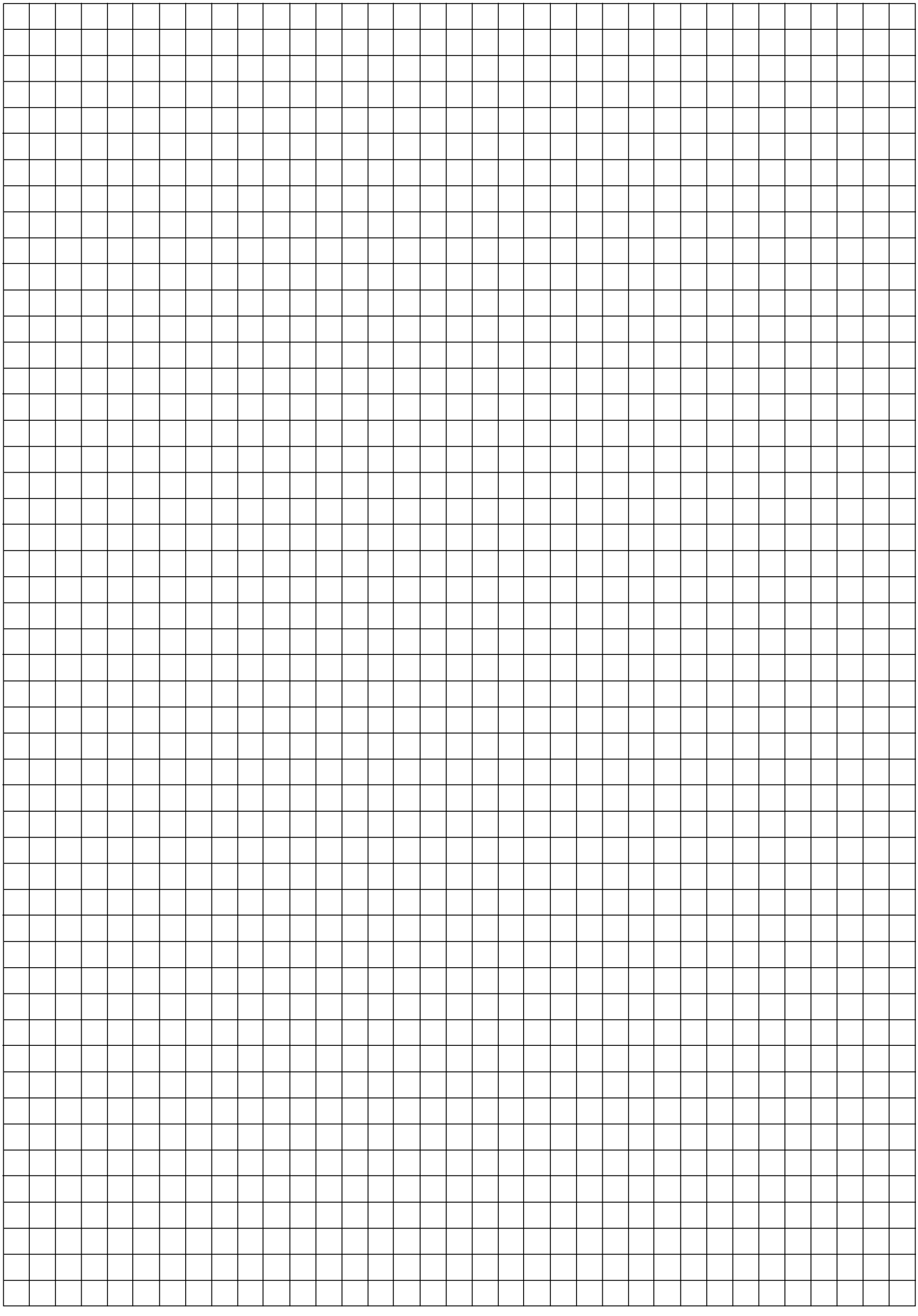
Scrap Graph Paper — This sheet will *not* be scored.



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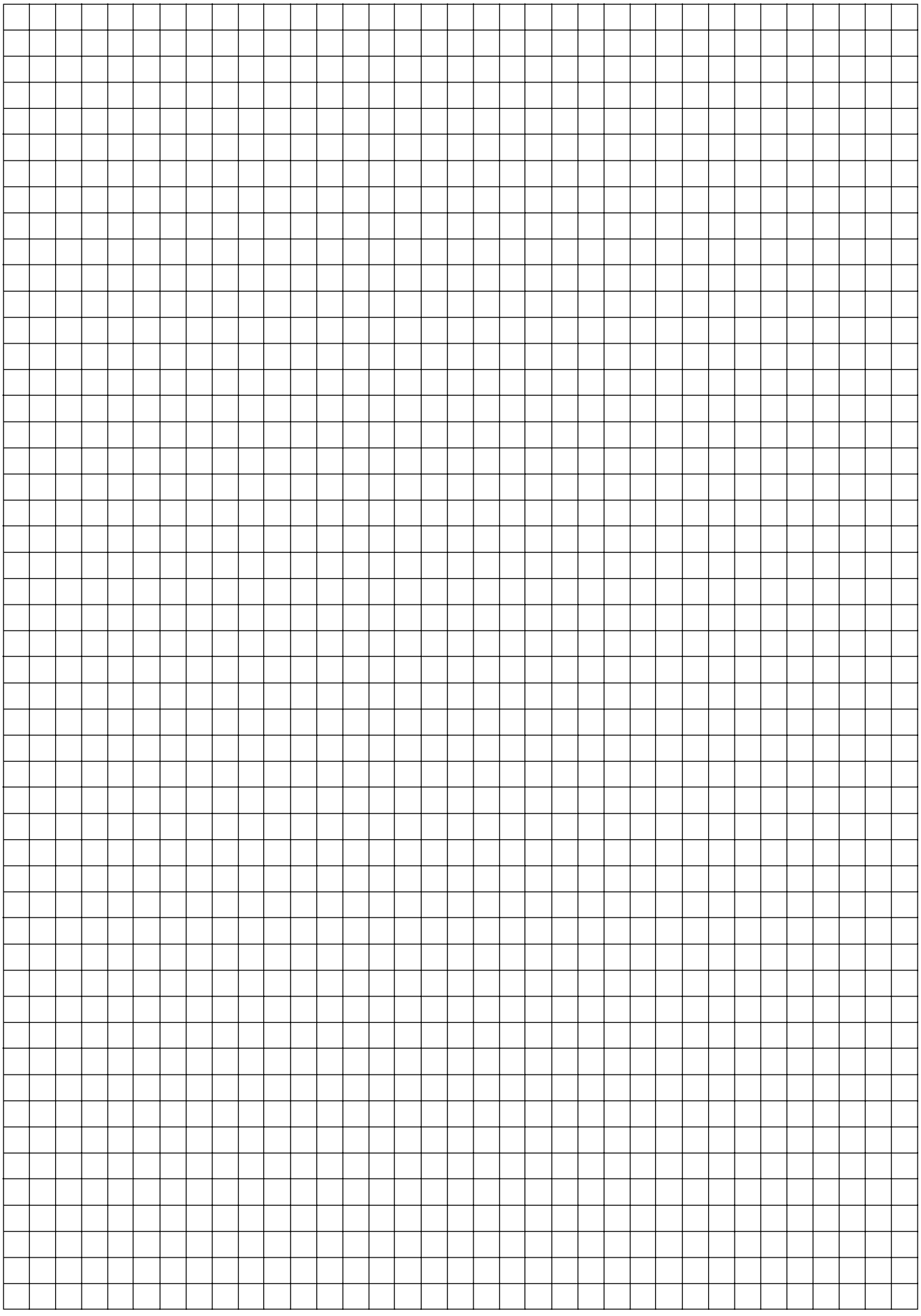

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High School Math Reference Sheet

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	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Radians	1 radian $= \frac{180}{\pi}$ degrees
Degrees	1 degree $= \frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$

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GEOMETRY

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

Regents Examination in Geometry – August 2022

Scoring Key: Part I (Multiple-Choice Questions)

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

Regents Examination in Geometry – August 2022

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

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

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

FOR TEACHERS ONLY

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

GEOMETRY

Wednesday, August 17, 2022 — 12:30 to 3:30 p.m., only

RATING GUIDE

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

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

Mechanics of Rating

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

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

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

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

Raters should record the student's scores for all questions and the total raw score on the student's separate answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: http://www.nysed.gov/state-assessment/high-school-regents-examinations on Wednesday, August 17, 2022. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

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

II. Full-Credit Responses

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

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

III. Appropriate Work

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

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

IV. Multiple Errors

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

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

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

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

Part II

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

(25) **[2]** A correct sequence of transformations is written.

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

or

[1] An appropriate sequence of transformations is written, but the description is incomplete or partially correct.

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

(26) **[2]** 335.1, 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] 335.1, but no work is shown.

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

(27) **[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, but a similar triangle with a scale factor other than 2 is drawn.

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

or

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

(28) **[2]** 3.92, 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] 3.92, but no work is shown.

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

(29) **[2]** 3, 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 $\overline{BD}$, but no further correct work is shown.

or

[1] 3, but no work is shown.

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

(30) **[2]** 47.5, 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] Correct work is shown to find m∠*ADE* and/or m∠*AED*, but m∠*ABD* is not stated.

or

[1] 47.5, but no work is shown.

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

(31) **[2]** 10.1, 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 expression/equation for the area of the sector is written, but no further correct work is shown.

or

[1] 10.1, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously 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] Appropriate work is shown to find the distance between the top of the tree to the horizontal line of sight 50 m above the ground. No further correct work is shown.

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

or

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

or

[2] Correct work is shown to determine the distance from the building to the tree, but no further correct work is shown.

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

(33) **[4]** Correct work is shown to prove *HYPE* is a rectangle, and correct concluding statements are written.

[3] Appropriate work is shown, but one computational or graphing error is made, and appropriate concluding statements are written.

or

[3] Appropriate work is shown to prove *HYPE* is a rectangle, but the concluding statement that *HYPE* is a rectangle is missing, incorrect, or incomplete.

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

or

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

or

[2] Correct work is shown to prove *HYPE* is a parallelogram, and concluding statements are written, but no further correct work is shown.

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

or

[1] Correct work is shown to find the distances and/or slopes of the four sides of *HYPE*, but no further correct work is shown.

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

(34) **[4]** 192 baseballs, 64, and correct work is shown.

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

or

[3] Correct work is shown to determine the number of baseballs and the volume of one baseball, 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 determine the number of baseballs, but no further correct work is shown.

or

[2] Appropriate work is shown to determine the weight of all the baseballs, but no further correct work is shown.

[1] Appropriate work is shown to find the volume of one baseball, but no further correct work is shown.

or

[1] 192 and 64, but no work is shown.

[0] 192 or 64, but no work is shown.

or

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

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

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

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

or

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

or

[4] $\triangle AHE \sim \triangle CHF$ is proven, but no further correct work is shown.

[3] A proof is written that demonstrates a method of proof, but three statements and/or reasons are missing or incorrect.

or

[3] A proof is written that demonstrates a method of proof, but one conceptual error is made, and one statement and/or reason is missing or incorrect.

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

or

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

or

[2] *ABCD* is a parallelogram 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 rewritten in the style of a formal proof, but no further correct relevant statements are written.

or

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

Map to the Learning Standards
Geometry
August 2022

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

Regents Examination in Geometry

August 2022

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

The *Chart for Determining the Final Examination Score for the August 2022 Regents Examination in Geometry* will be posted on the Department's web site at: http://www.nysed.gov/state-assessment/high-school-regents-examinations on Wednesday, August 17, 2022. Conversion charts provided for previous administrations of the Regents Examination in Geometry must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

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

1. Go to http://www.nysed.gov/state-assessment/teacher-feedback-state-assessments.

2. Select the test title.

3. Complete the required demographic fields.

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

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

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

GEOMETRY

Wednesday, August 17, 2022 — 12:30 to 3:30 p.m.

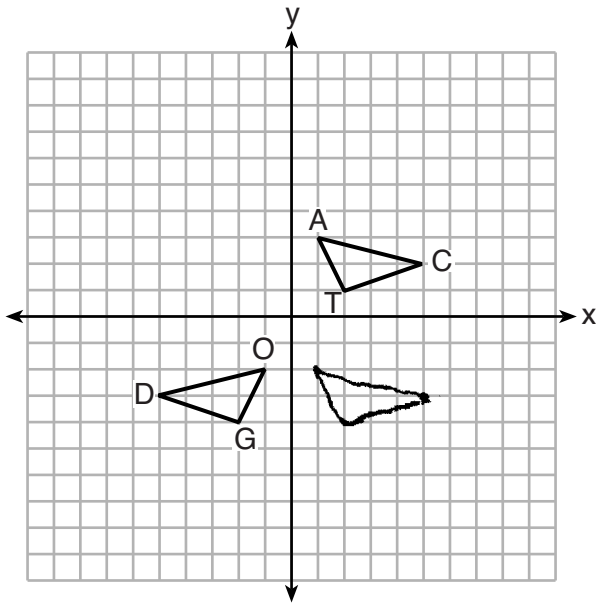
MODEL RESPONSE SET

Table of Contents

Updated 08/19/22 to correct the graphics
on pages 59 and 62.

Question 25

25 On the set of axes below, $\triangle DOG \cong \triangle CAT$.



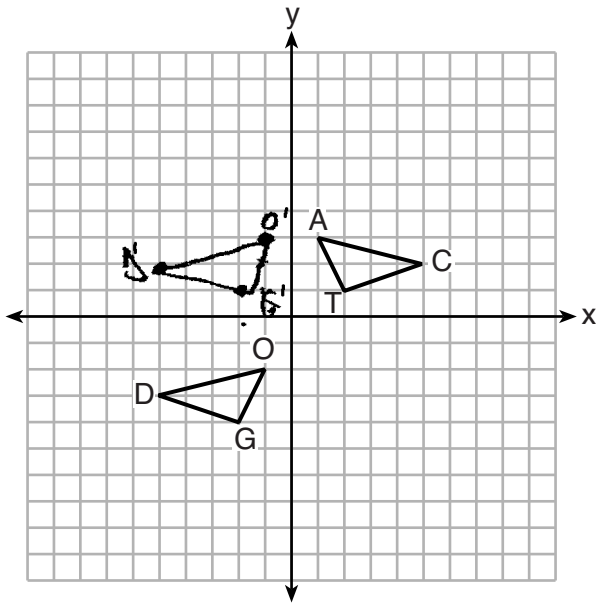
Describe a sequence of transformations that maps $\triangle DOG$ onto $\triangle CAT$.

Reflection over the y-axis
and a
translation of 0,5.
D(-5,-3) r yaxis T 0,5 C(5,2)
O(-1,-2) r yaxis T 0,5 A(1,3)
G(-2,-4) r yaxis T 0,5 T(2,1)

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

Question 25

25 On the set of axes below, $\triangle DOG \cong \triangle CAT$.



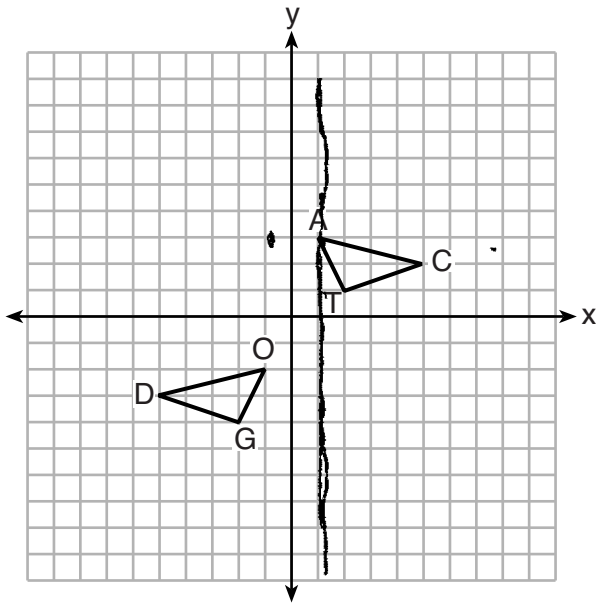
Describe a sequence of transformations that maps $\triangle DOG$ onto $\triangle CAT$.

1. Translate △DOG 5 units up
2. Reflection over y-axis

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

Question 25

25 On the set of axes below, $\triangle DOG \cong \triangle CAT$.



Describe a sequence of transformations that maps $\triangle DOG$ onto $\triangle CAT$.

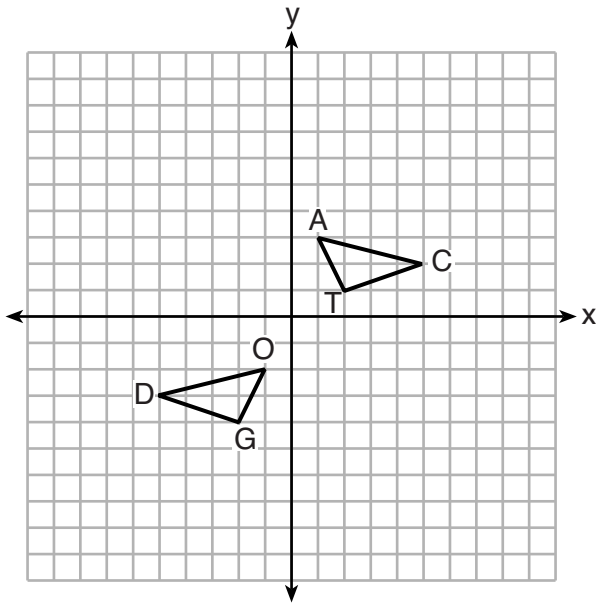
— Translate △DOG up 5 and right 1

— reflect △DOG over the line X=1

Score 1: The student translated up 5 and right 1 instead of up 5 and right 2.

Question 25

25 On the set of axes below, $\triangle DOG \cong \triangle CAT$.



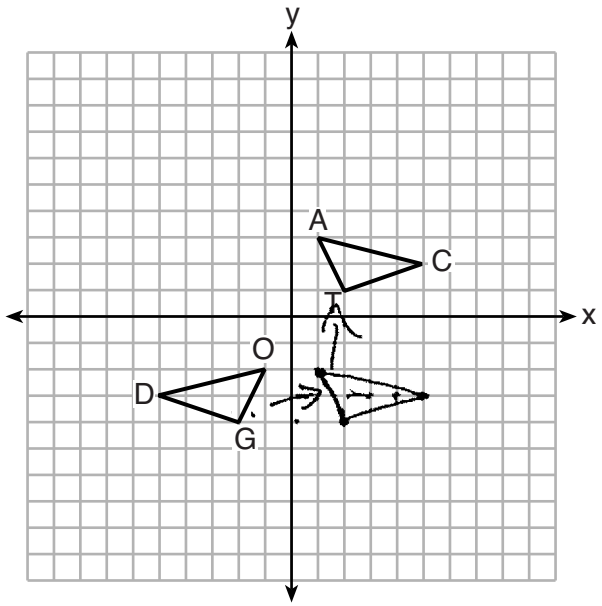
Describe a sequence of transformations that maps $\triangle DOG$ onto $\triangle CAT$.

reflection and translation

Score 1: The student identified an appropriate sequence of transformations, but did not describe the specific sequence of transformations.

Question 25

25 On the set of axes below, $\triangle DOG \cong \triangle CAT$.



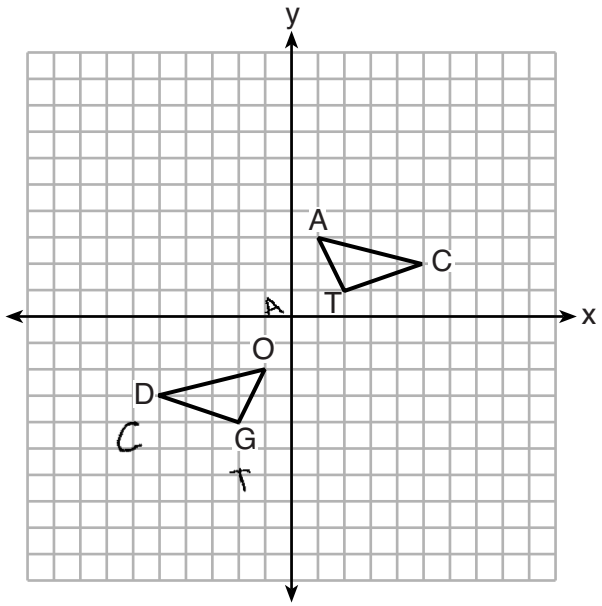
Describe a sequence of transformations that maps $\triangle DOG$ onto $\triangle CAT$.

a reflection of △DOG over the y-axis, then a translation up 3 to map onto △CAT.

Score 1: The student gave a partially correct response by stating a correct line of reflection, but the translation was not stated correctly.

Question 25

25 On the set of axes below, $\triangle DOG \cong \triangle CAT$.



Describe a sequence of transformations that maps $\triangle DOG$ onto $\triangle CAT$.

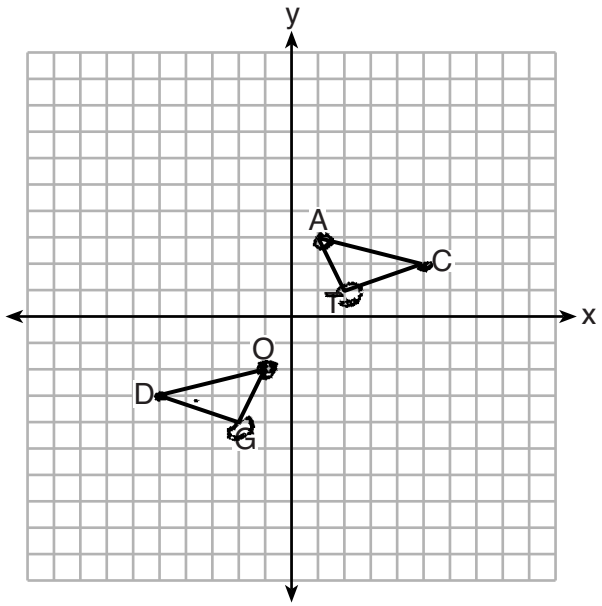
Step (1) Reflection over y axis for ΔCAT
Step (2) Transformation over x axis for ΔCAT

Now, C maps over D
A maps over O
T maps over G

Score 0: The student incorrectly mapped $\triangle CAT$ onto $\triangle DOG$, and incorrectly described the second transformation.

Question 25

25 On the set of axes below, $\triangle DOG \cong \triangle CAT$.



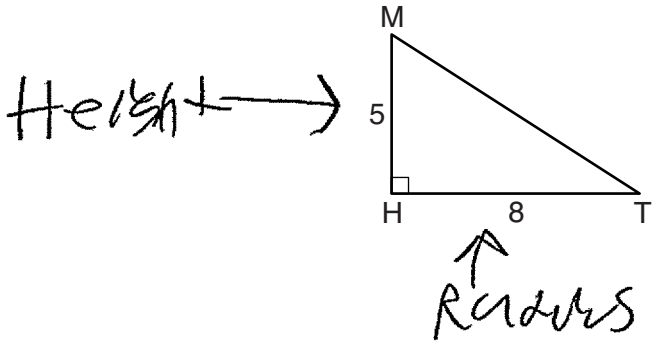
Describe a sequence of transformations that maps $\triangle DOG$ onto $\triangle CAT$.

△DOG is rotated 180° around the origin.

Score 0: The student gave a completely incorrect response.

Question 26

26 In right triangle MTH shown below, $m\angle H = 90°$, $HT = 8$, and $HM = 5$.



Determine and state, to the *nearest tenth*, the volume of the three-dimensional solid formed by rotating $\triangle MTH$ continuously around $\overline{MH}$.

Cone Volume formula $= V = \frac{1}{3}\pi R^2 H$

$V = \frac{1}{3}\pi 8^2 \cdot 5$

$V = \frac{1}{3} 64\pi \cdot 5$

$\frac{1}{3} 320\pi$

1066.6π

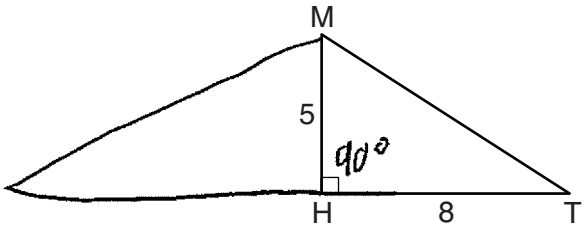
335.08

$V = 335.1$

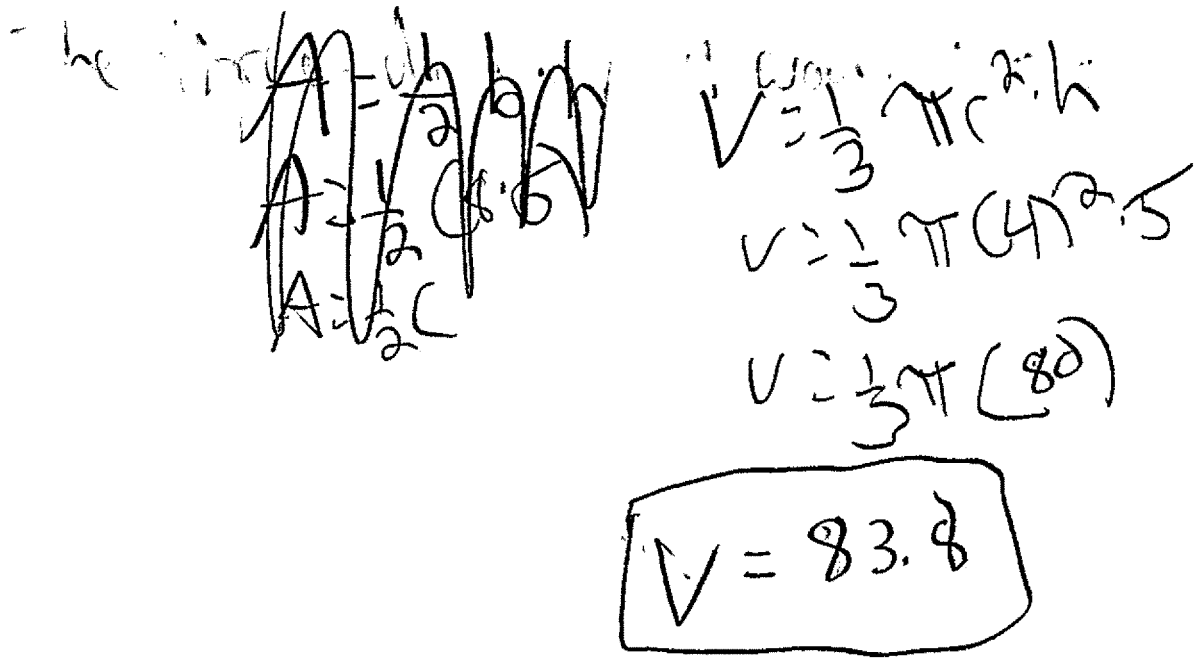
Score 2: The student gave a complete and correct response.

Question 26

26 In right triangle MTH shown below, $m\angle H = 90°$, $HT = 8$, and $HM = 5$.



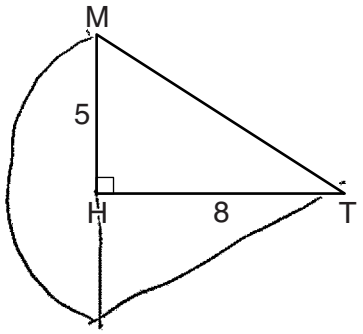
Determine and state, to the *nearest tenth*, the volume of the three-dimensional solid formed by rotating $\triangle MTH$ continuously around $\overline{MH}$.



Score 1: The student used the incorrect radius, $r = 4$, but found an appropriate volume.

Question 26

26 In right triangle MTH shown below, $m\angle H = 90°$, $HT = 8$, and $HM = 5$.



$1/3(\pi r^2 h)$

Determine and state, to the *nearest tenth*, the volume of the three-dimensional solid formed by rotating $\triangle MTH$ continuously around $\overline{MH}$.

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

$\frac{\pi(5)^2 8}{3}$

$\frac{\pi(25)8}{3}$

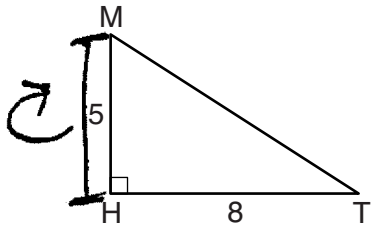
$\frac{200}{3}\pi$

$209.4 \approx V$

Score 1: The student rotated the triangle around the wrong leg, but found an appropriate volume.

Question 26

26 In right triangle MTH shown below, $m\angle H = 90°$, $HT = 8$, and $HM = 5$.



Determine and state, to the *nearest tenth*, the volume of the three-dimensional solid formed by rotating $\triangle MTH$ continuously around $\overline{MH}$.

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

$V = \frac{1}{3}\pi 8^2 (5)$

$V = 21.\overline{33}(\pi)(5)$

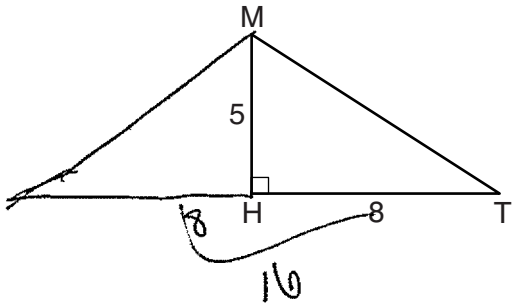
$V = 67.23(5)$

$\boxed{V = 336.2}$

Score 1: The student made a computational error when multiplying $21.\overline{33}(\pi)$.

Question 26

26 In right triangle MTH shown below, $m\angle H = 90°$, $HT = 8$, and $HM = 5$.



Determine and state, to the *nearest tenth*, the volume of the three-dimensional solid formed by rotating $\triangle MTH$ continuously around $\overline{MH}$.

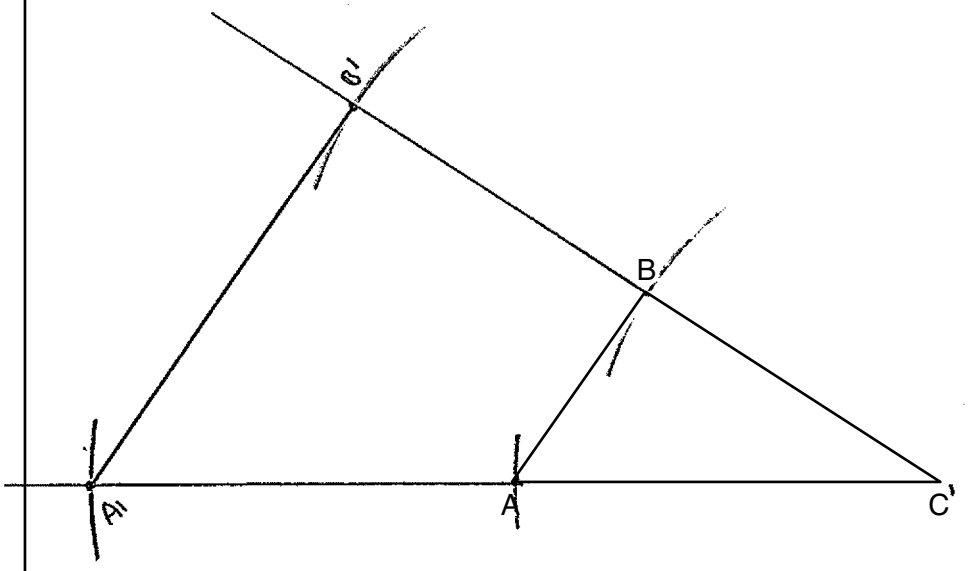
$V = \frac{1}{3}(16)(5)$

$V = 26.67$

Score 0: The student gave a completely incorrect response.

Question 27

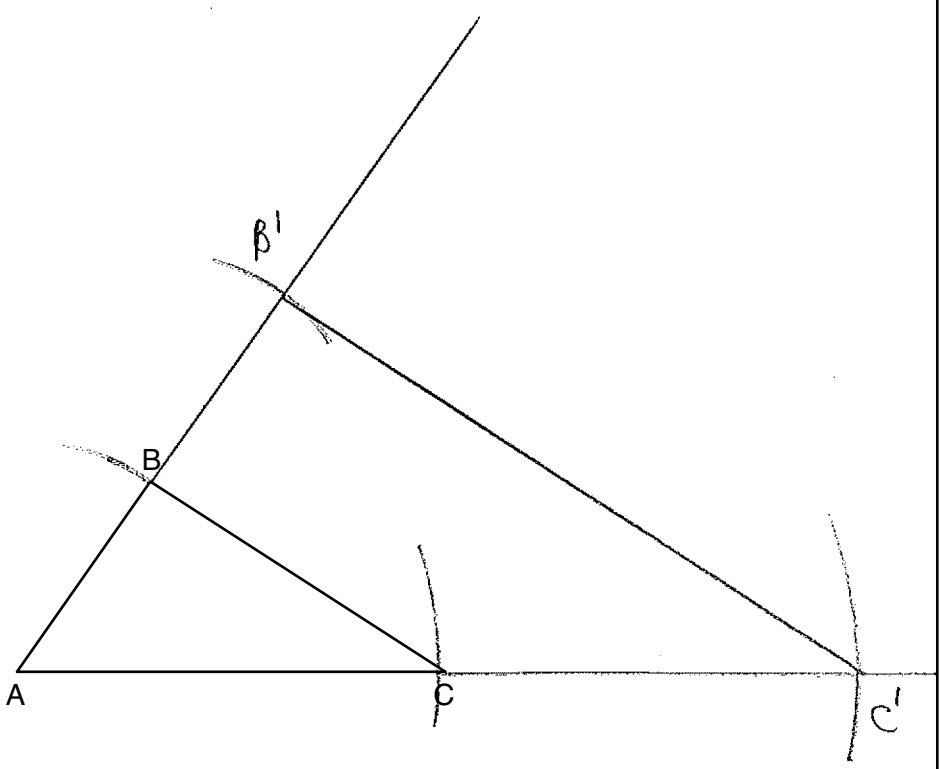
27 Using a compass and straightedge, dilate triangle *ABC* by a scale factor of 2 centered at *C*. [Leave all construction marks.]



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

Question 27

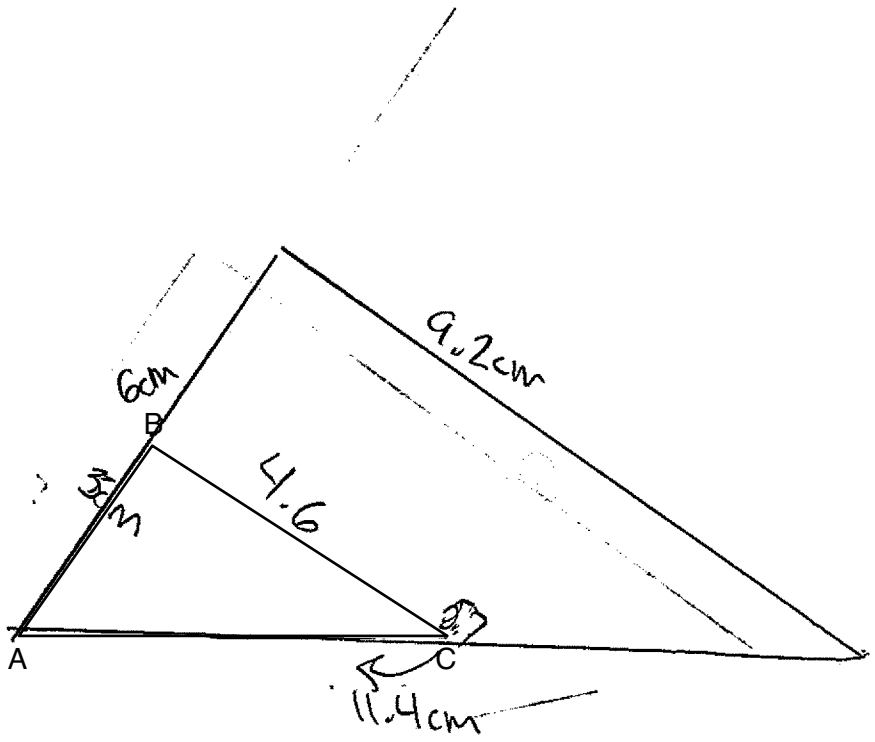
27 Using a compass and straightedge, dilate triangle *ABC* by a scale factor of 2 centered at *C*. [Leave all construction marks.]



Score 1: The student made an appropriate construction, but used vertex *A* as the center of dilation.

Question 27

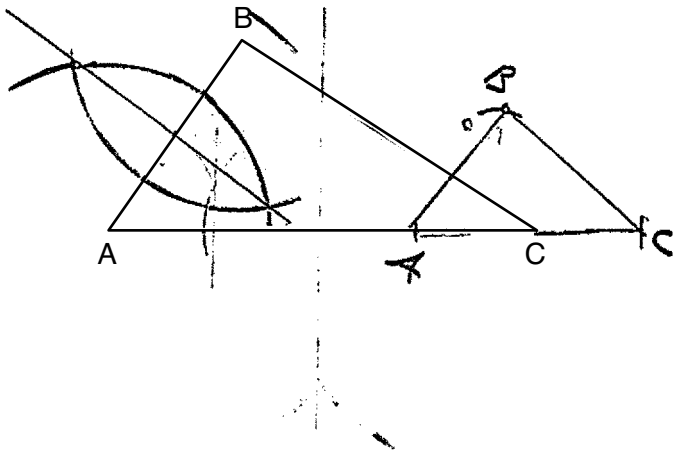
27 Using a compass and straightedge, dilate triangle *ABC* by a scale factor of 2 centered at *C*. [Leave all construction marks.]



Score 0: The student gave a completely incorrect response.

Question 27

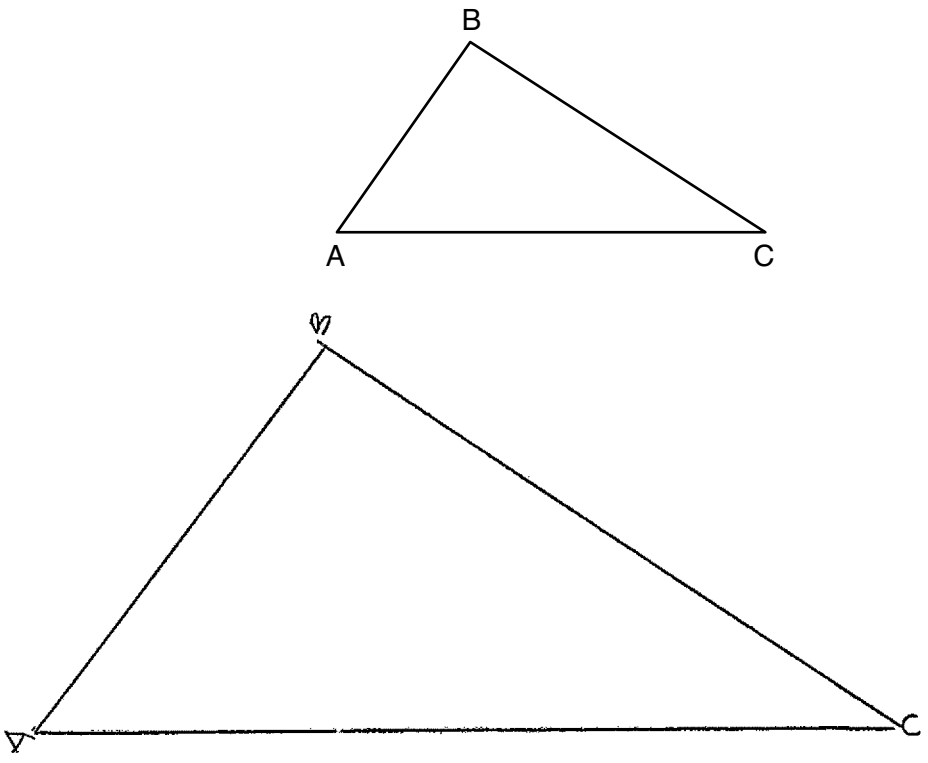
27 Using a compass and straightedge, dilate triangle *ABC* by a scale factor of 2 centered at *C*. [Leave all construction marks.]



Score 0: The student gave a completely incorrect response.

Question 27

27 Using a compass and straightedge, dilate triangle *ABC* by a scale factor of 2 centered at *C*. [Leave all construction marks.]

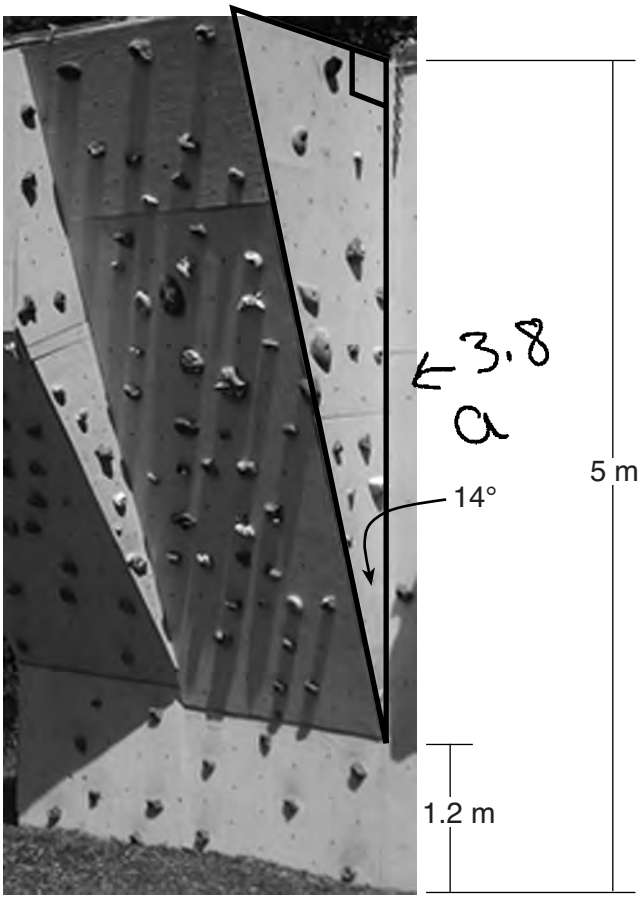


Score 0: The student gave a completely incorrect response.

Question 28

28 A rock-climbing wall at a local park has a right triangular section that slants toward the climber, as shown in the picture below. The height of the wall is 5 meters and the slanted section begins 1.2 meters up the wall at an angle of 14 degrees.

O SOH CAH TOA



Determine and state, to the *nearest hundredth*, the number of meters in the length of the section of the wall that is slanted (hypotenuse).

$\frac{\cos 14}{1} = \frac{3.8}{x}$ = $x = 3.92$ m.

$x \cos 14 = 1(3.8)$

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

Question 28

28 A rock-climbing wall at a local park has a right triangular section that slants toward the climber, as shown in the picture below. The height of the wall is 5 meters and the slanted section begins 1.2 meters up the wall at an angle of 14 degrees.

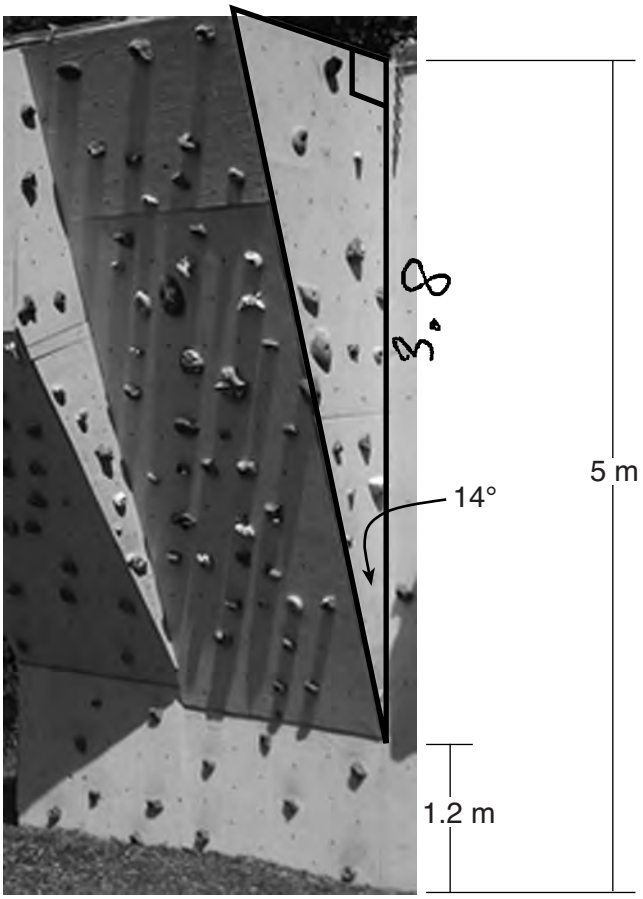
Let:
Hypotenuse = x

$\frac{\cos(14)}{1} = \frac{3.8}{x}$

$.97024573x = 3.8$
$.97024573 \quad .97024573$

$x = 3.916331741$

$x \approx 3.92$



Length
$5 - 1.2 = 3.8$

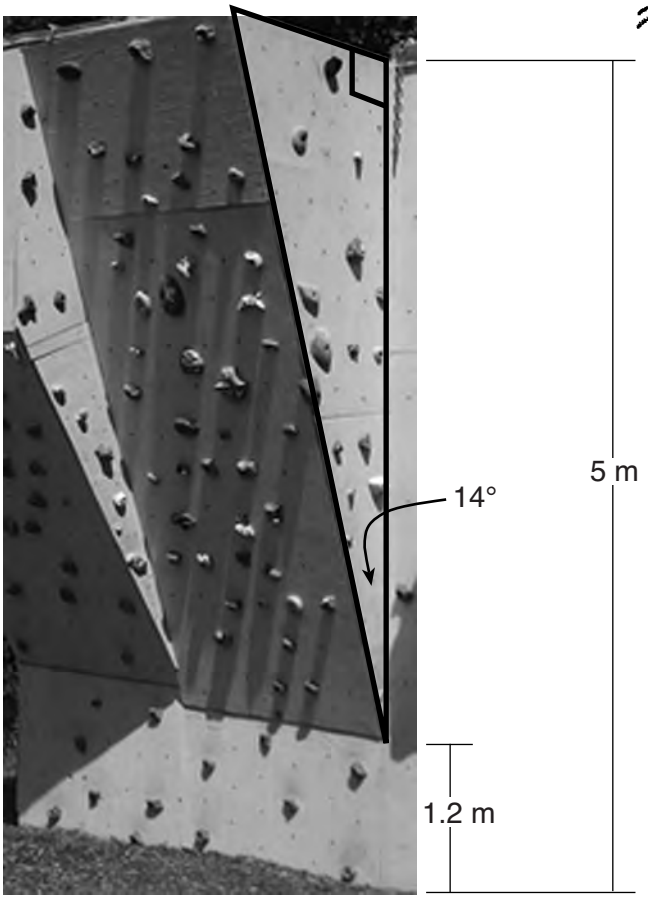
Determine and state, to the *nearest hundredth*, the number of meters in the length of the section of the wall that is slanted (hypotenuse).

Length of section of slanted wall is 3.92 meters

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

Question 28

28 A rock-climbing wall at a local park has a right triangular section that slants toward the climber, as shown in the picture below. The height of the wall is 5 meters and the slanted section begins 1.2 meters up the wall at an angle of 14 degrees.



SOHCAHTOA

5 − 1.2 = 3.8

Y

X

3.8 m

14°

$\frac{\tan 14}{1} = \frac{Y}{3.8}$

$Y = .95$

$3.8^2 + .95^2 = x^2$

$14.44 + .9025 = x^2$

$\sqrt{15.3425} = \sqrt{x^2}$

$x = 3.916$

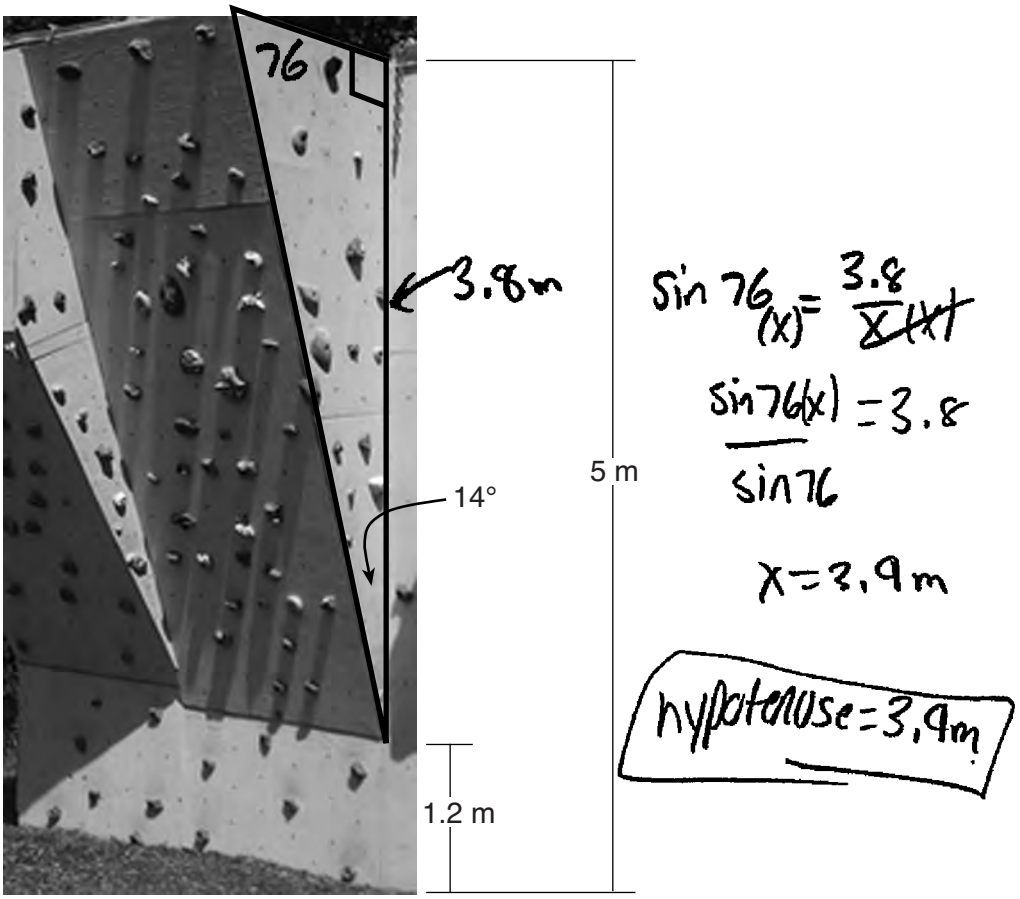
$x = 3.92$

Determine and state, to the *nearest hundredth*, the number of meters in the length of the section of the wall that is slanted (hypotenuse).

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

Question 28

28 A rock-climbing wall at a local park has a right triangular section that slants toward the climber, as shown in the picture below. The height of the wall is 5 meters and the slanted section begins 1.2 meters up the wall at an angle of 14 degrees.

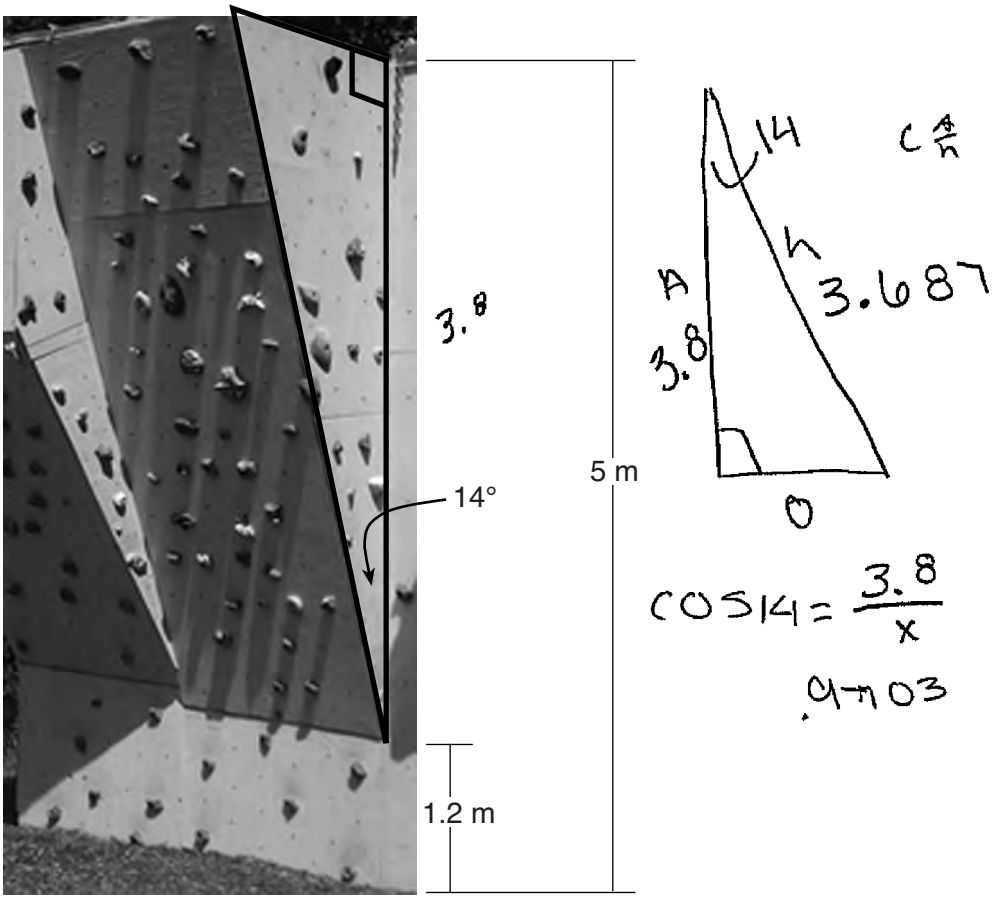


Determine and state, to the *nearest hundredth*, the number of meters in the length of the section of the wall that is slanted (hypotenuse).

Score 1: The student made a rounding error.

Question 28

28 A rock-climbing wall at a local park has a right triangular section that slants toward the climber, as shown in the picture below. The height of the wall is 5 meters and the slanted section begins 1.2 meters up the wall at an angle of 14 degrees.



Determine and state, to the *nearest hundredth*, the number of meters in the length of the section of the wall that is slanted (hypotenuse).

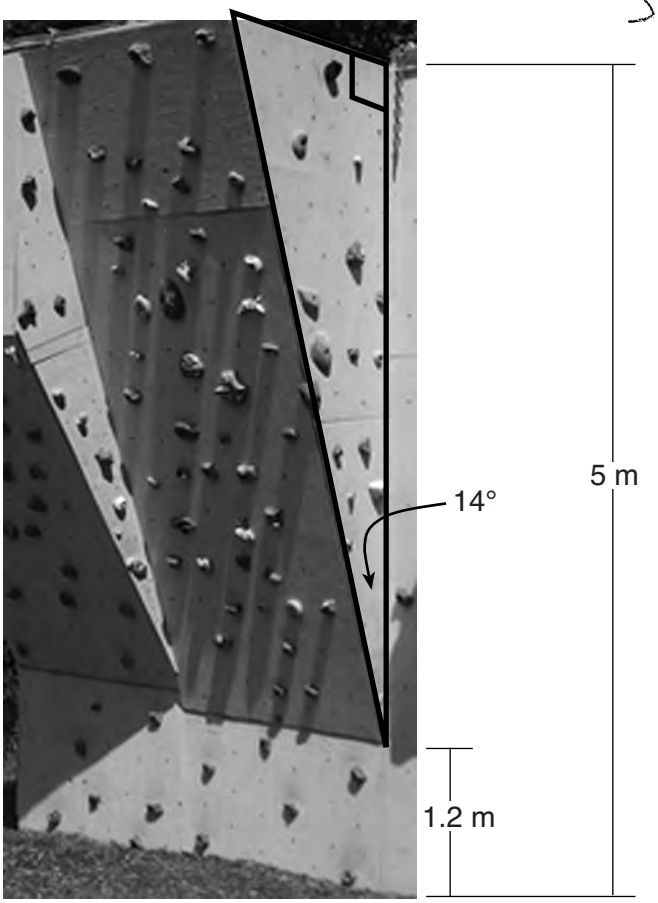
3.687 meters

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

Question 28

28 A rock-climbing wall at a local park has a right triangular section that slants toward the climber, as shown in the picture below. The height of the wall is 5 meters and the slanted section begins 1.2 meters up the wall at an angle of 14 degrees.

soh cah toa



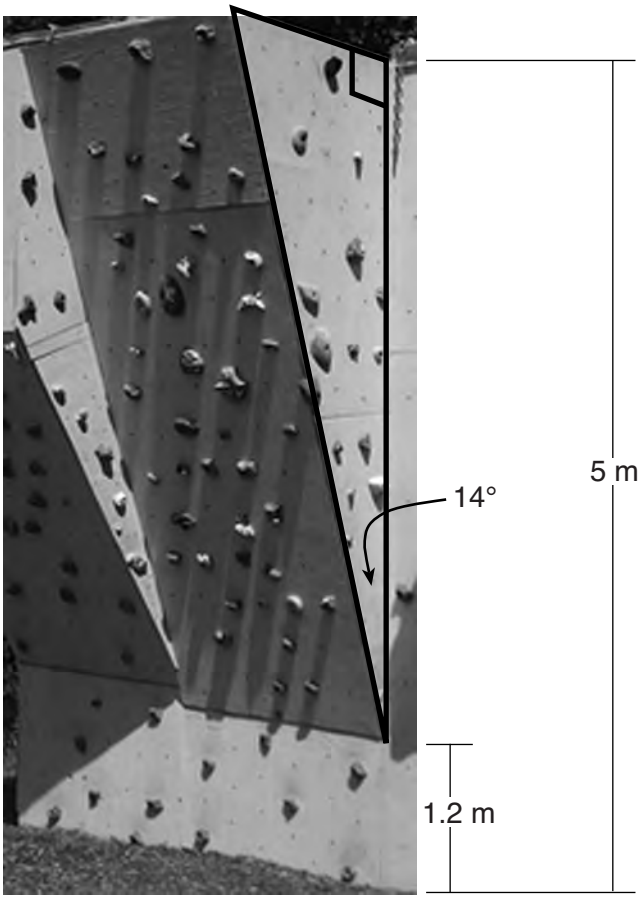
Determine and state, to the *nearest hundredth*, the number of meters in the length of the section of the wall that is slanted (hypotenuse).

$\cos 14 = \frac{5}{x}$ $x = 5.15$ m

Score 1: The student used the incorrect height, but found an appropriate hypotenuse length.

Question 28

28 A rock-climbing wall at a local park has a right triangular section that slants toward the climber, as shown in the picture below. The height of the wall is 5 meters and the slanted section begins 1.2 meters up the wall at an angle of 14 degrees.



Determine and state, to the *nearest hundredth*, the number of meters in the length of the section of the wall that is slanted (hypotenuse).

3.8m

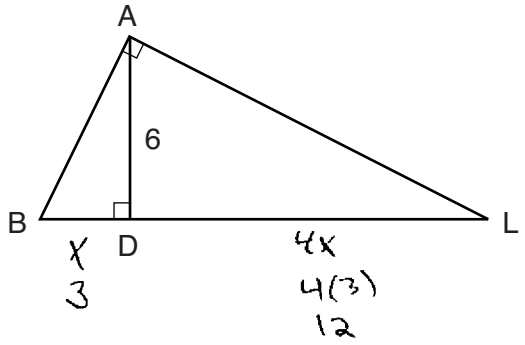
$\frac{\sin(90)}{1} = \frac{3.8}{x}$

$3.8 = x(\sin(90)$ $x = 3.8$

Score 0: The student gave a completely incorrect response.

Question 29

29 In the diagram below of right triangle BAL, altitude $\overline{AD}$ is drawn to hypotenuse $\overline{BDL}$. The length of $\overline{AD}$ is 6.



If the length of $\overline{DL}$ is four times the length of $\overline{BD}$, determine and state the length of $\overline{BD}$.

$\frac{6}{x} = \frac{4x}{6}$

$4x^2 = 36$

$-36 \quad -36$

$4x^2 - 36 = 0$

$4(x^2 - 9) = 0$

$4(x+3)(x-3) = 0$

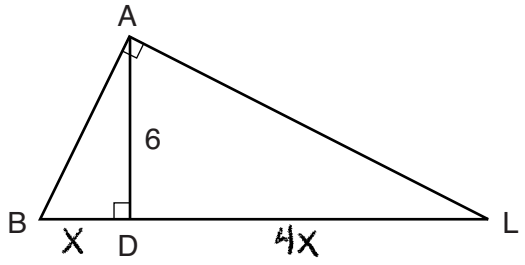
$x = -3$ reject $\quad x = 3$

$BD = 3$

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

Question 29

29 In the diagram below of right triangle BAL, altitude $\overline{AD}$ is drawn to hypotenuse $\overline{BDL}$. The length of $\overline{AD}$ is 6.



If the length of $\overline{DL}$ is four times the length of $\overline{BD}$, determine and state the length of $\overline{BD}$.

$(AB)^2 = x^2 + 36$

$(AL)^2 = 16x^2 + 36$

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

$25x^2 = 16x^2 + 36 + x^2 + 36$

$8x^2 - 72 = 0$

$8(x^2 - 9) = 0$

~~$8 = 0$~~ $x^2 - 9 = 0$

$(x + 3)(x - 3) = 0$

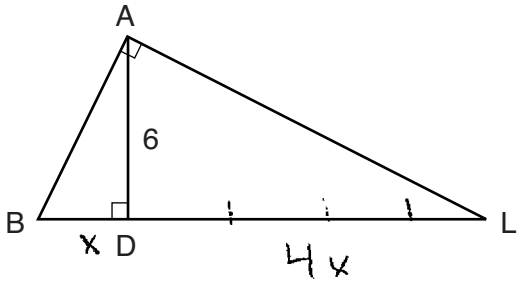
~~$x = -3$~~ $x = 3$

$BD = 3$

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

Question 29

29 In the diagram below of right triangle BAL, altitude $\overline{AD}$ is drawn to hypotenuse $\overline{BDL}$. The length of $\overline{AD}$ is 6.



If the length of $\overline{DL}$ is four times the length of $\overline{BD}$, determine and state the length of $\overline{BD}$.

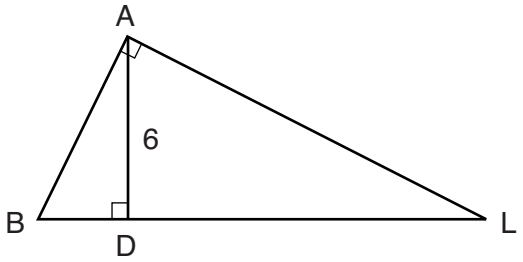
$\frac{x}{6} = \frac{6}{4x}$

$4x$

Score 1: The student wrote a correct equation to find the length of $\overline{BD}$, but no further correct work was shown.

Question 29

29 In the diagram below of right triangle BAL, altitude $\overline{AD}$ is drawn to hypotenuse $\overline{BDL}$. The length of $\overline{AD}$ is 6.



If the length of $\overline{DL}$ is four times the length of $\overline{BD}$, determine and state the length of $\overline{BD}$.

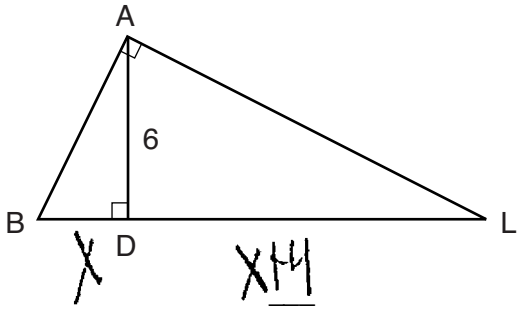
$\overline{BD} = 3$

$\overline{DL} = 12$

Score 1: The student found the length of $\overline{BD}$, but no work was shown.

Question 29

29 In the diagram below of right triangle BAL, altitude $\overline{AD}$ is drawn to hypotenuse $\overline{BDL}$. The length of $\overline{AD}$ is 6.



If the length of $\overline{DL}$ is four times the length of $\overline{BD}$, determine and state the length of $\overline{BD}$.

$\frac{X}{6} = \frac{6}{X+4}$

$\overline{BD} = 6$

$S = 4$

$P = 6$

$X^2 + 4X = 36$

$X^2 - 4X - 36 = 0$

$(X+4)(X-6)$

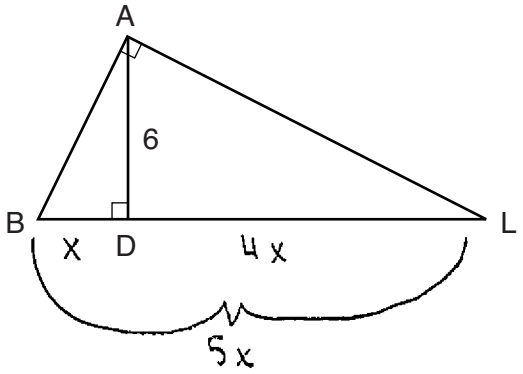
$X - 6 = 0$
$+6 \quad +6$
$X = 6$ ✓

$X + 4 = 0$
$-4 \quad -4$
$X = -4$ ✗

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

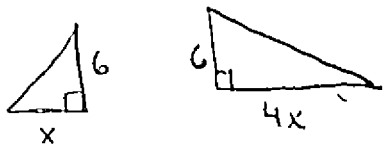
Question 29

29 In the diagram below of right triangle BAL, altitude $\overline{AD}$ is drawn to hypotenuse $\overline{BDL}$. The length of $\overline{AD}$ is 6.



If the length of $\overline{DL}$ is four times the length of $\overline{BD}$, determine and state the length of $\overline{BD}$.

find $\overline{BD}$ $BD = x$



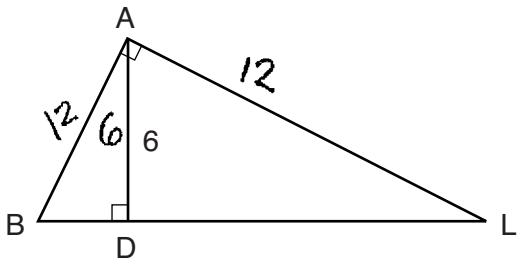
$$\frac{x}{6} = \frac{4x}{6}$$

$$6x = 24x$$

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

Question 29

29 In the diagram below of right triangle BAL, altitude $\overline{AD}$ is drawn to hypotenuse $\overline{BDL}$. The length of $\overline{AD}$ is 6.



If the length of $\overline{DL}$ is four times the length of $\overline{BD}$, determine and state the length of $\overline{BD}$.

12 6 = 72

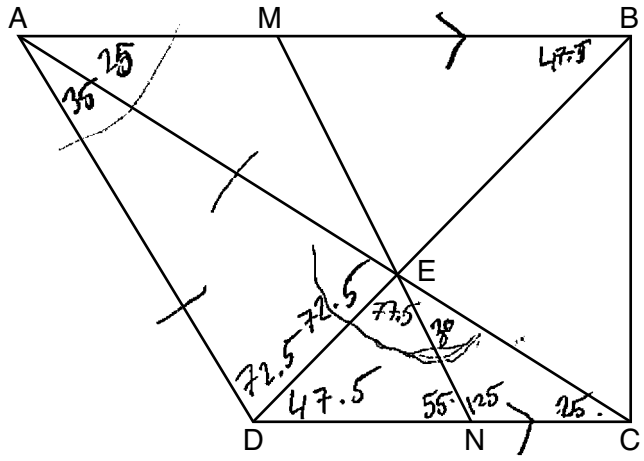
72 ÷ 3 = 24

BD = 24

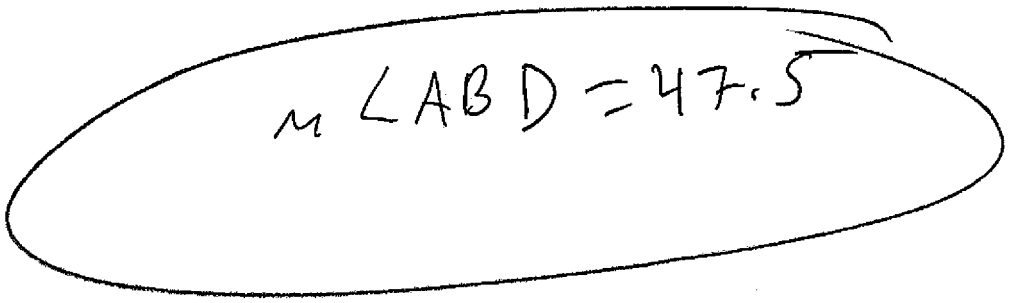
Score 0: The student gave a completely incorrect response.

Question 30

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $\overline{AD} \cong \overline{AE}$.



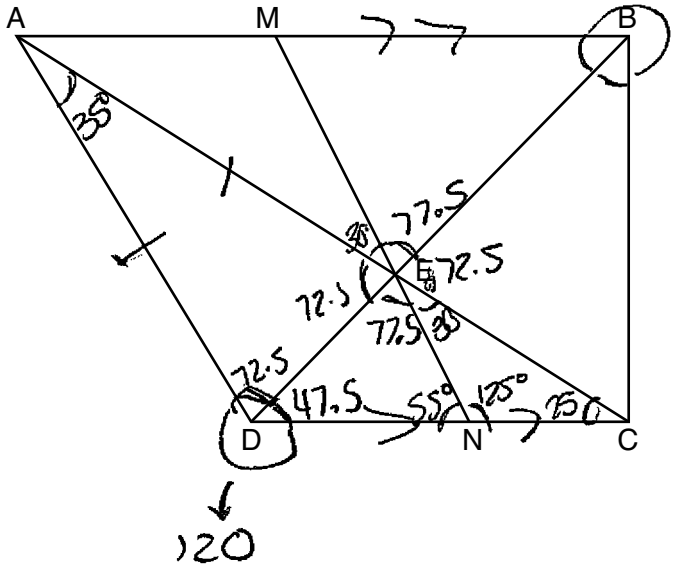
If m$\angle DAE = 35°$, m$\angle DCE = 25°$, and m$\angle NEC = 30°$, determine and state m$\angle ABD$.



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

Question 30

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $\overline{AD} \cong \overline{AE}$.



If m∠DAE = 35°, m∠DCE = 25°, and m∠NEC = 30°, determine and state m∠ABD.

180
-35
145
2
72.5

30
+25
55
180
-55
125

180
125°
55

72.5
+30
102.5
180
-102.5
77.5

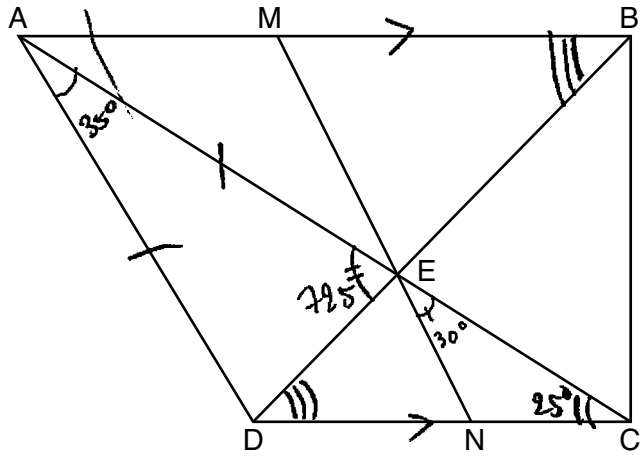
77.5
+55
132.5
180
-132.5
47.5

72.5
+47.5
120

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

Question 30

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $\overline{AD} \cong \overline{AE}$.



If m$\angle DAE$ = 35°, m$\angle DCE$ = 25°, and m$\angle NEC$ = 30°, determine and state m$\angle ABD$.

$\overline{AD} \cong \overline{AE} \Rightarrow$ ADE is a isosceles triangle

$m\angle DEA = \frac{180^\circ - m\angle DAE}{2} = \frac{180^\circ - 35^\circ}{2} = 72.5^\circ$

$m\angle AED = m\angle EDC + m\angle ECD$

$\Rightarrow 72.5^\circ = m\angle EDC + 25^\circ$

$\Rightarrow m\angle EDC = 47.5^\circ$

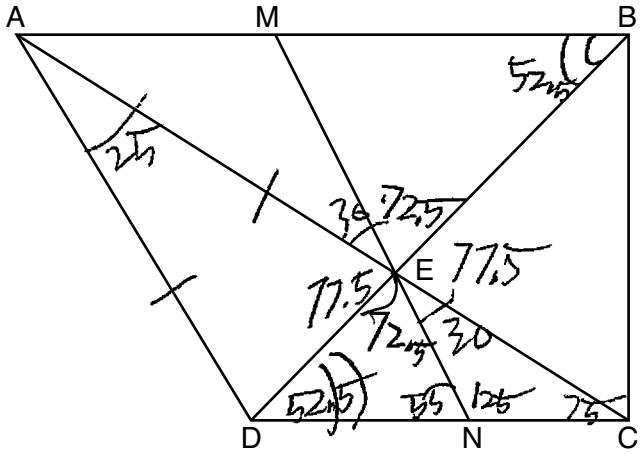
$AB \parallel CD \Rightarrow m\angle ABD = m\angle EDC$ (alternate interior angles)

$\Rightarrow m\angle ABD = 47.5^\circ$

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

Question 30

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $\overline{AD} \cong \overline{AE}$.



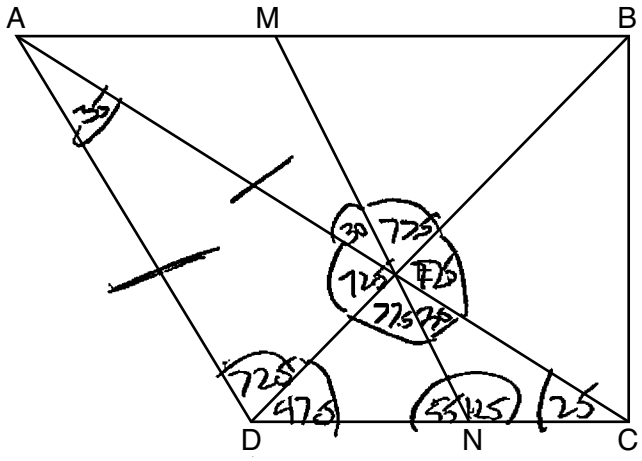
If $m\angle DAE = 35°$, $m\angle DCE = 25°$, and $m\angle NEC = 30°$, determine and state $m\angle ABD$.

$\angle ABD = 52.5$

Score 1: The student mislabeled $\angle DAE$ in the diagram, but found an appropriate measure of $\angle ABD$.

Question 30

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $\overline{AD} \cong \overline{AE}$.

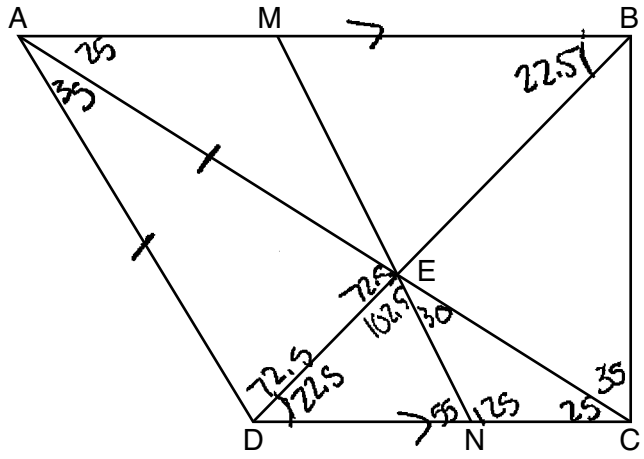


If $m\angle DAE = 35°$, $m\angle DCE = 25°$, and $m\angle NEC = 30°$, determine and state $m\angle ABD$.

Score 1: The student appropriately labeled the diagram, but did not state $m\angle ABD$.

Question 30

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $\overline{AD} \cong \overline{AE}$.



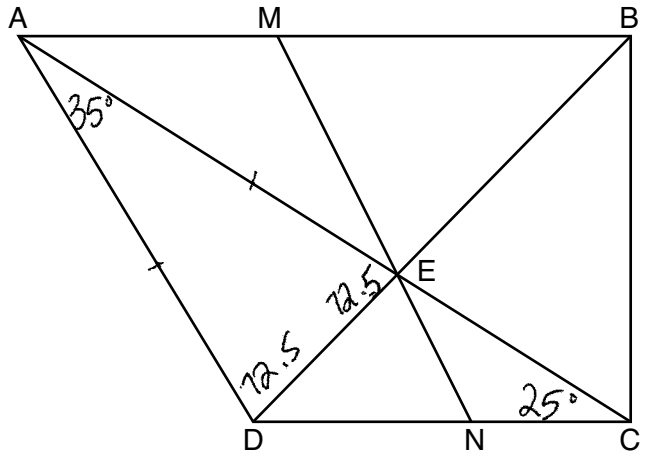
If m$\angle DAE = 35°$, m$\angle DCE = 25°$, and m$\angle NEC = 30°$, determine and state m$\angle ABD$.

m∠ABD = 22.5

Score 1: The student made an error when finding m$\angle DEN$, but an appropriate measure was found for angle ABD. The measure of angle BCE is not necessary in finding m$\angle ABD$.

Question 30

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $\overline{AD} \cong \overline{AE}$.



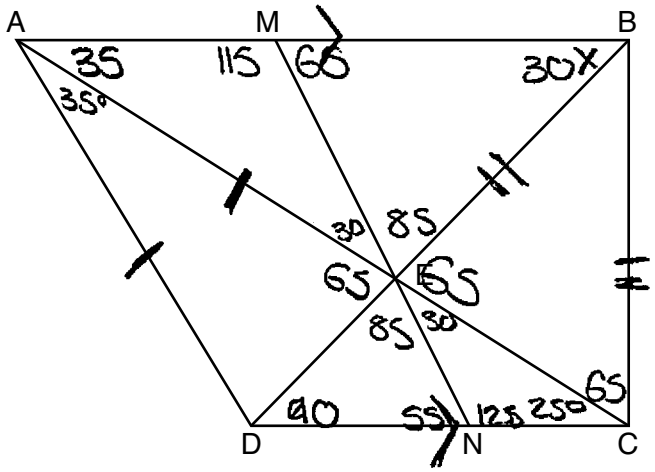
If m∠DAE = 35°, m∠DCE = 25°, and m∠NEC = 30°, determine and state m∠ABD.

$$180 - 35 = \frac{145}{2} = 72.5$$

Score 1: The student found m∠ADE and m∠AED, but m∠ABD was not stated.

Question 30

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $AD \cong AE$.



30+65=95

180-95=85

85+55=140

30+25=55

180-55=125

35+30=65

180-65=115

90-25=65

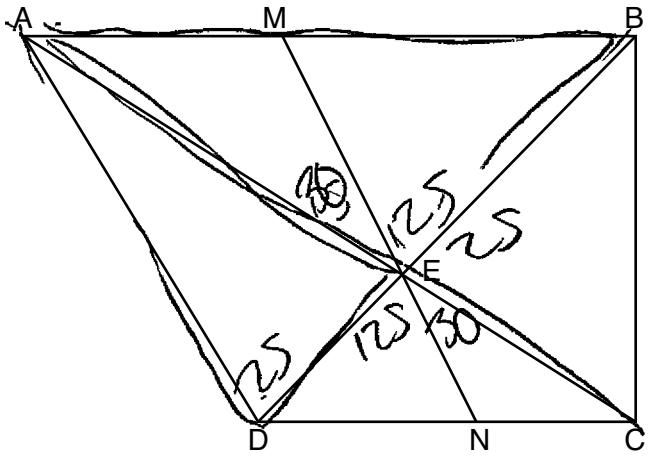
If $m\angle DAE = 35°$, $m\angle DCE = 25°$, and $m\angle NEC = 30°$, determine and state $m\angle ABD$.

$m\angle ABD = 30°$

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

Question 30

30 Trapezoid $ABCD$, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at E, and $\overline{AD} \cong \overline{AE}$.



If $m\angle DAE = 35°$, $m\angle DCE = 25°$, and $m\angle NEC = 30°$, determine and state $m\angle ABD$.

$m\angle ABD = 180°$

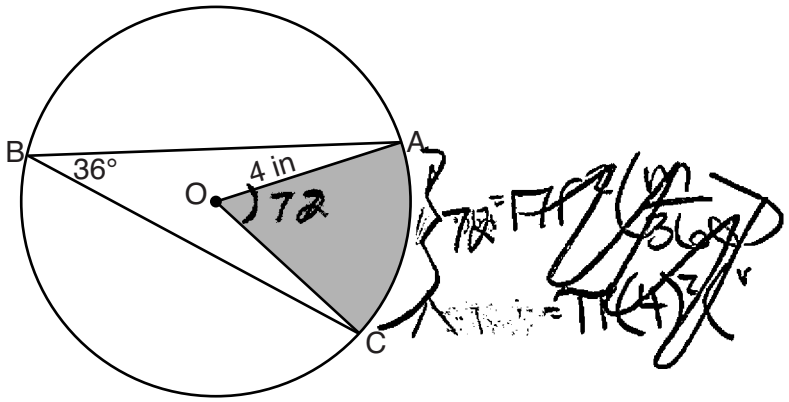
$25 + 30 = 55$

$180 - 55 = 125$

Score 0: The student gave a completely incorrect response.

Question 31

31 In the diagram below of circle O, the measure of inscribed angle ABC is 36° and the length of $\overline{OA}$ is 4 inches.



Determine and state, to the *nearest tenth of a square inch*, the area of the shaded sector.

$A_{shade} = \pi r^2 \left(\frac{m}{360}\right)$

$A_{shad} = \pi(4)^2 \left(\frac{72}{360}\right)$

$A_{shade} = 16\pi(.2)$

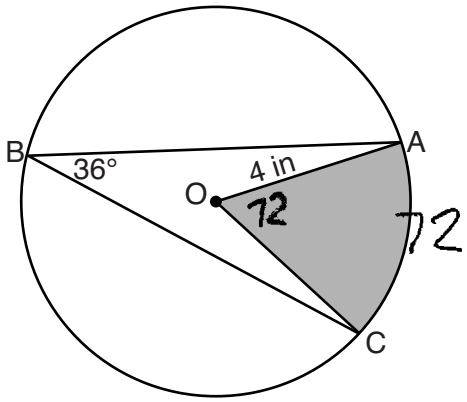
$A_{shade} = 3.2\pi$

$A_{shade} = 10.1 \text{ in}^2$

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

Question 31

31 In the diagram below of circle O, the measure of inscribed angle ABC is 36° and the length of $\overline{OA}$ is 4 inches.



Determine and state, to the *nearest tenth of a square inch*, the area of the shaded sector.

$A = \pi r^2 \cdot \frac{x}{360}$

$A = \pi 4^2 \cdot \frac{72}{360}$

$A = \pi 16 \cdot \frac{1}{5}$

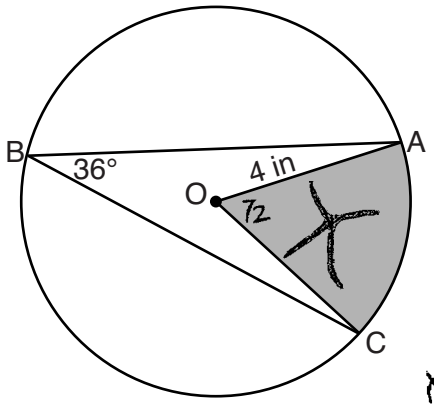
$A = \pi \frac{16}{5}$

$A = 10.1 in^2$

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

Question 31

31 In the diagram below of circle O, the measure of inscribed angle ABC is 36° and the length of $\overline{OA}$ is 4 inches.



X = area of shaded sector

Determine and state, to the *nearest tenth of a square inch*, the area of the shaded sector.

$$\frac{72}{360} = \frac{x}{16\pi}$$

$$\frac{1}{5} = \frac{x}{16\pi}$$

$$\frac{16\pi}{5} = x$$

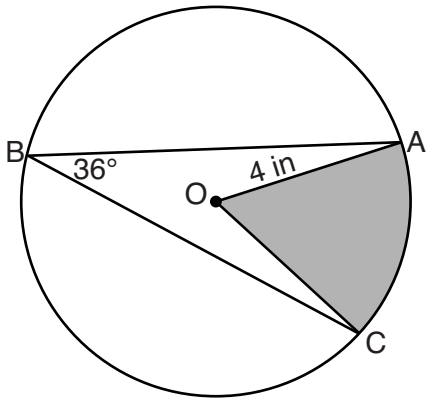
$$x = \frac{16\pi}{5}\ in^2$$

$$x = 10.1\ in^2$$

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

Question 31

31 In the diagram below of circle O, the measure of inscribed angle ABC is 36° and the length of $\overline{OA}$ is 4 inches.



Determine and state, to the *nearest tenth of a square inch*, the area of the shaded sector.

Area of sector = $\left(\frac{m\text{Arc}}{360°}\right)\pi r^2$

Area of sector = $\left(\frac{36}{360°}\right)\pi \cdot 4^2$

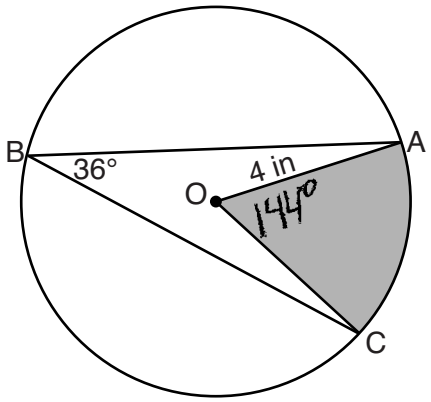
Area of sector = $\left(\frac{36°}{360°}\right)\pi \cdot 16$

Area of sector = 5.0

Score 1: The student used an incorrect measure for arc AC.

Question 31

31 In the diagram below of circle O, the measure of inscribed angle ABC is 36° and the length of $\overline{OA}$ is 4 inches.



$\frac{n}{360} \cdot \pi r^2$

$\frac{n}{360} \cdot \pi(4)^2$

$\frac{n}{360} \cdot 50.26$

Determine and state, to the *nearest tenth of a square inch*, the area of the shaded sector.

$\frac{144}{360} \cdot 50.26$

$.4 \cdot 50.26$

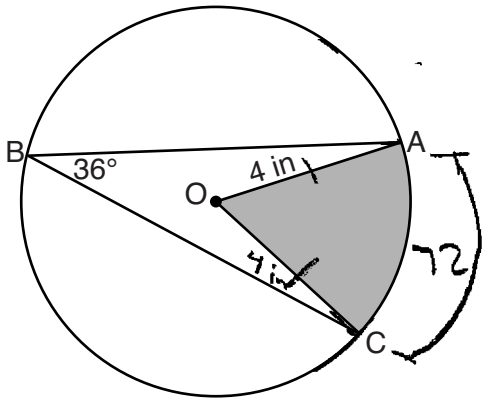
20.104

20.1 in^2

Score 1: The student used an incorrect measure for angle AOC.

Question 31

31 In the diagram below of circle O, the measure of inscribed angle ABC is 36° and the length of $\overline{OA}$ is 4 inches.



$\frac{36}{1/2} = 72$

$\overset{\frown}{AC} = 72$

$AO = 4$

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

$A = \frac{1}{2}72 \cdot 4$

$A = \frac{1}{2}288$

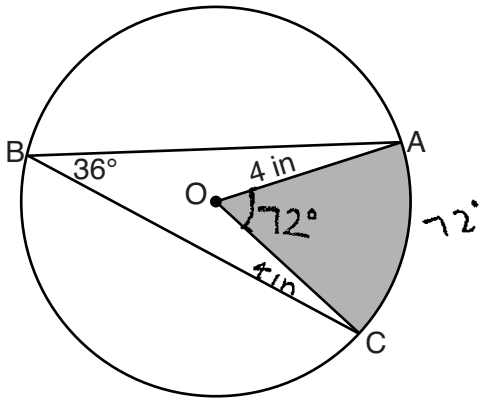
$A = 144$

Determine and state, to the *nearest tenth of a square inch*, the area of the shaded sector.

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

Question 31

31 In the diagram below of circle O, the measure of inscribed angle ABC is 36° and the length of $\overline{OA}$ is 4 inches.



$A = \pi r^2$

$= \pi(4)^2$

$= 16\pi$

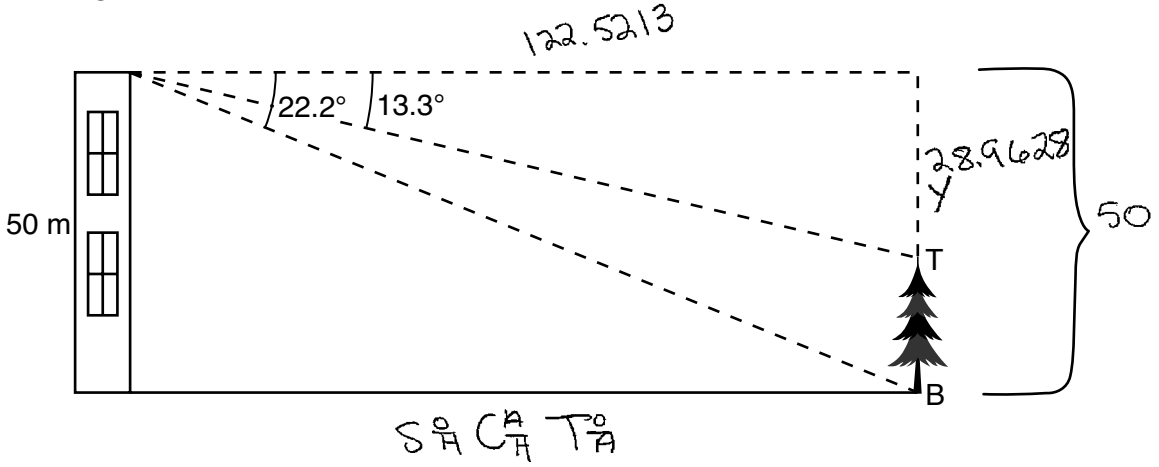
$A = 50.26548$

Determine and state, to the *nearest tenth of a square inch*, the area of the shaded sector.

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

Question 32

32 As modeled in the diagram below, a building has a height of 50 meters. The angle of depression from the top of the building to the top of the tree, T, is 13.3°. The angle of depression from the top of the building to the bottom of the tree, B, is 22.2°.



Determine and state, to the *nearest meter*, the height of the tree.

$\tan 22.2 = \frac{50}{x}$

$\tan 22.2 x = 50$

$\frac{\tan 22.2 x}{\tan 22.2} = \frac{50}{\tan 22.2}$

$x = 122.5213$

$\tan 13.3 = \frac{y}{122.5213}$

$28.9628 = y$

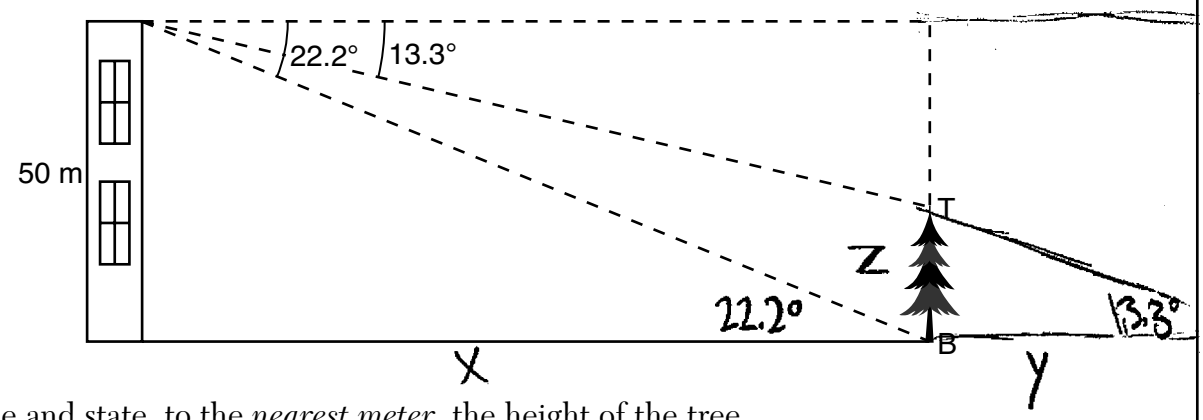
$50 - 28.9628 = 21.0372$

The tree is 21 meters tall.

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

Question 32

32 As modeled in the diagram below, a building has a height of 50 meters. The angle of depression from the top of the building to the top of the tree, T, is 13.3°. The angle of depression from the top of the building to the bottom of the tree, B, is 22.2°.



Determine and state, to the *nearest meter*, the height of the tree.

$\tan 22.2 = \frac{50}{x}$

$x = \frac{50}{\tan 22.2}$

$x = 122.521$

$\tan 13.3 = \frac{50}{x+y}$

$x+y = \frac{50}{\tan 13.3}$

$x+y = 211.515$

$122.521 + y = 211.515$

$y = 88.994$

$\tan 13.3 = \frac{z}{88.994}$

$z = 88.994 \cdot \tan 13.3$

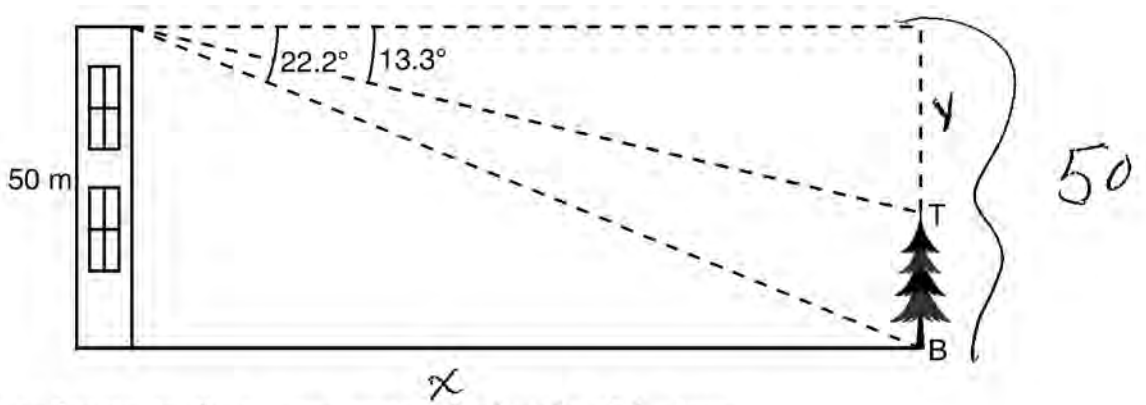
$z = 21.0373$

The tree is about 21 m tall.

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

Question 32

32 As modeled in the diagram below, a building has a height of 50 meters. The angle of depression from the top of the building to the top of the tree, T, is 13.3°. The angle of depression from the top of the building to the bottom of the tree, B, is 22.2°.



Determine and state, to the *nearest meter*, the height of the tree.

$\tan 22.2 = \frac{50}{x}$

$\tan 13.3 = \frac{y}{122.52125}$

$x = 122.52125$

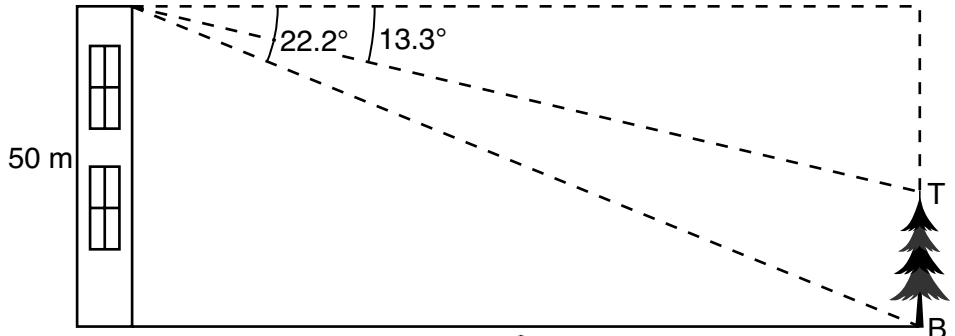
$y = 28$

$50 - 28 = 22\text{ m}$

Score 3: The student made a rounding error.

Question 32

32 As modeled in the diagram below, a building has a height of 50 meters. The angle of depression from the top of the building to the top of the tree, T, is 13.3°. The angle of depression from the top of the building to the bottom of the tree, B, is 22.2°.



SOH-CAH-TOA

Determine and state, to the *nearest meter*, the height of the tree.

$\tan(22.2) = \frac{50}{x}$ ~~$\cdot x$~~

$\frac{50}{\tan(22.2)} = 122.5212599$

$\tan(22.2) = \frac{13.3}{x} \cdot x$

$\frac{13.3}{\tan(22.2)} = 32.59065513$

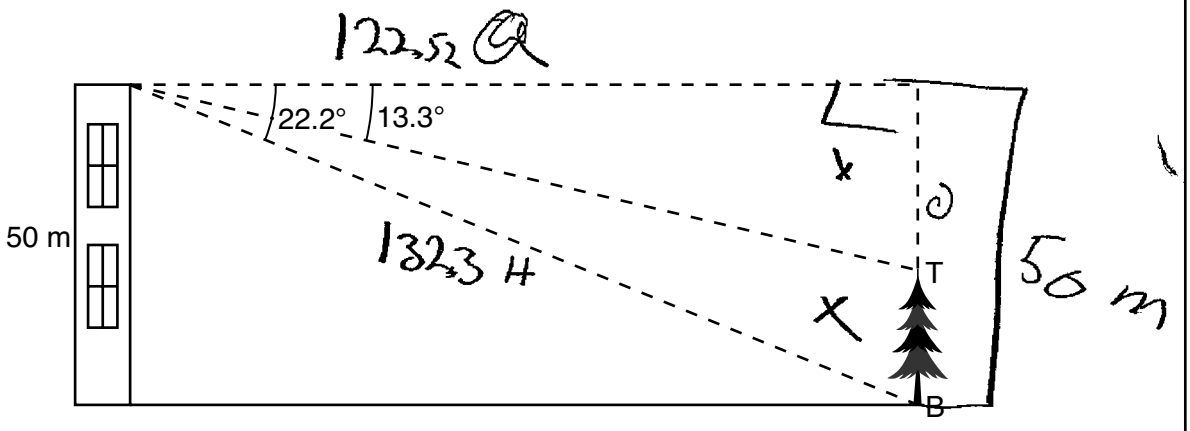
$122.5212599 - 32.59065513 = 89.93060477$

90m

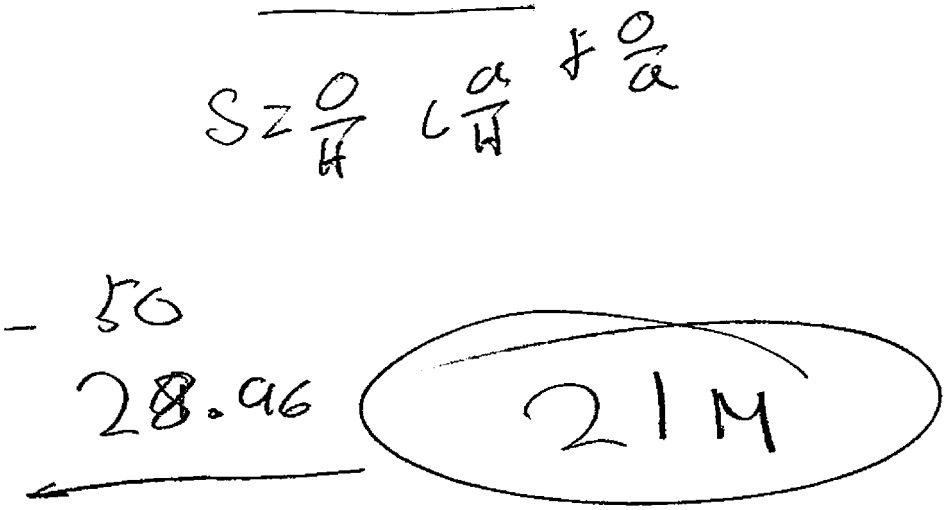
Score 2: The student correctly found the horizontal distance between the building and the tree, but no further correct work was shown.

Question 32

32 As modeled in the diagram below, a building has a height of 50 meters. The angle of depression from the top of the building to the top of the tree, T, is 13.3°. The angle of depression from the top of the building to the bottom of the tree, B, is 22.2°.



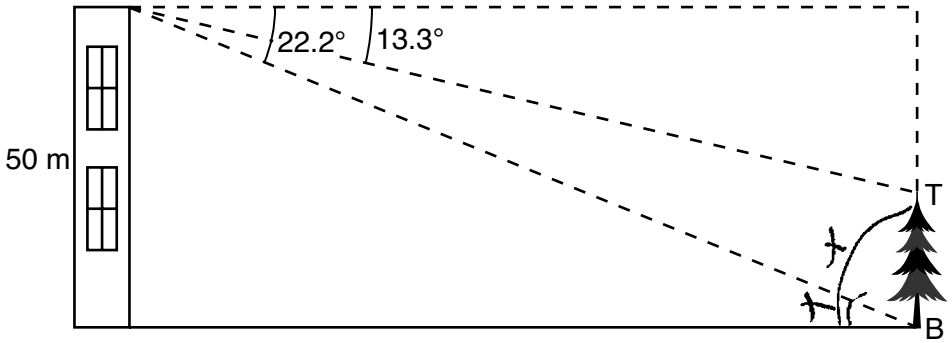
Determine and state, to the *nearest meter*, the height of the tree.



Score 1: The student found the correct height of the tree, but did not show enough work to receive additional credit.

Question 32

32 As modeled in the diagram below, a building has a height of 50 meters. The angle of depression from the top of the building to the top of the tree, T, is 13.3°. The angle of depression from the top of the building to the bottom of the tree, B, is 22.2°.



SOH CAH TOA

Determine and state, to the *nearest meter*, the height of the tree.

$\sin x = \frac{22.2}{50}$

$x = 26.3593\ldots$

$x = 26$ ft

$\sin x = \frac{13.3}{50}$

$x = 15.4263\ldots$

$x = 15$ ft

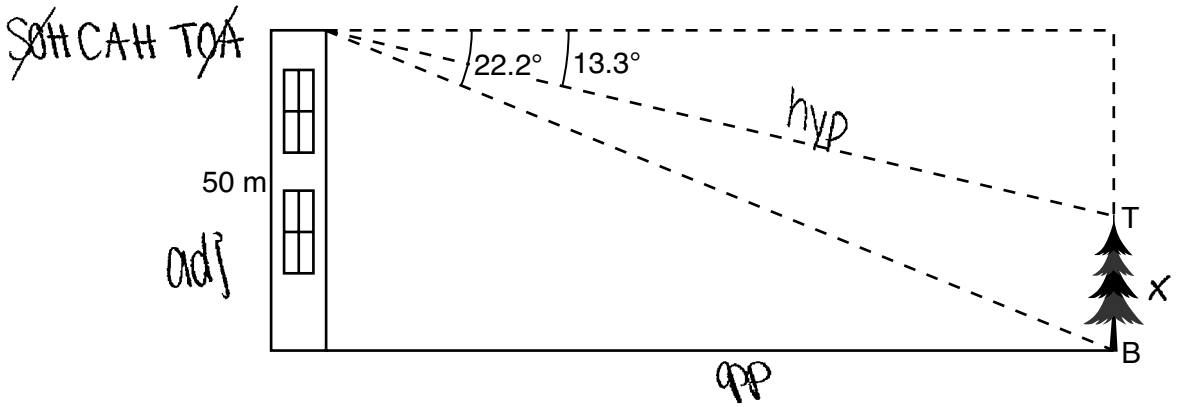
$26 - 15 = 11$

The tree is about 11 feet tall

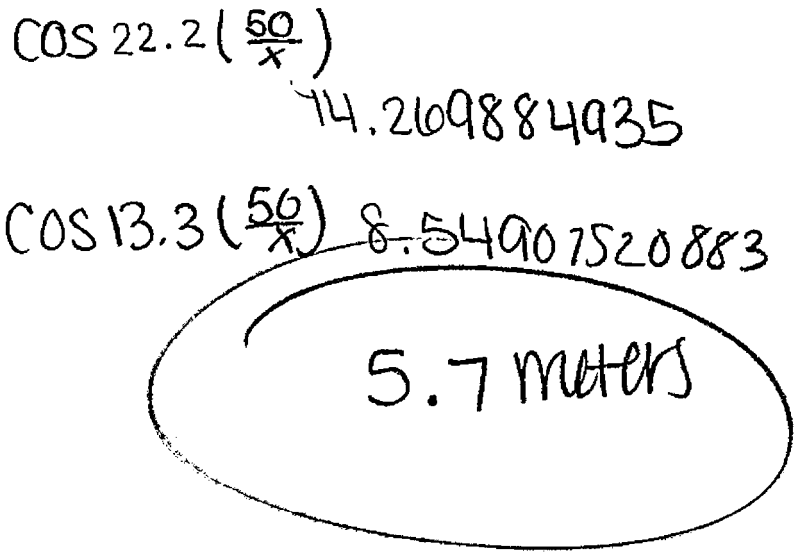
Score 0: The student did not show enough correct relevant work to receive any credit.

Question 32

32 As modeled in the diagram below, a building has a height of 50 meters. The angle of depression from the top of the building to the top of the tree, T, is 13.3°. The angle of depression from the top of the building to the bottom of the tree, B, is 22.2°.



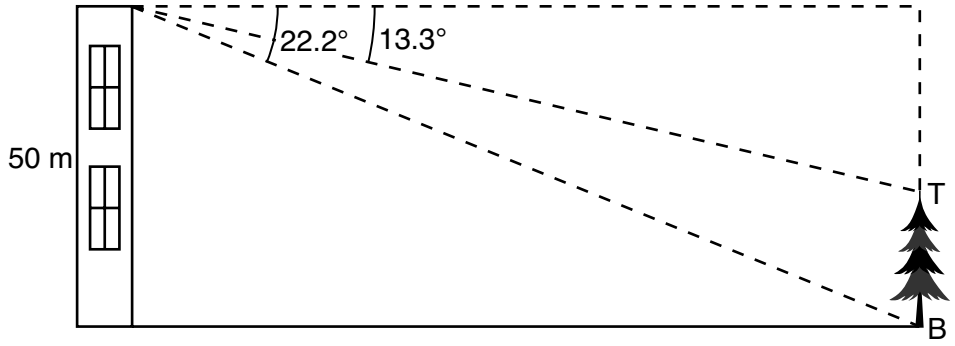
Determine and state, to the *nearest meter*, the height of the tree.



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

Question 32

32 As modeled in the diagram below, a building has a height of 50 meters. The angle of depression from the top of the building to the top of the tree, T, is 13.3°. The angle of depression from the top of the building to the bottom of the tree, B, is 22.2°.



Determine and state, to the *nearest meter*, the height of the tree.

$\frac{\tan 22.2}{1} = \frac{x}{50}$

$x = 20.404\,62204$

$\frac{\tan 13.3}{1} = \frac{x}{50}$

$x = 11.\,8194\,9975$

$20.404\,62204$
$- 11.\,8194\,9975$
$8.\,5891\,2284 \approx 9$

9 meters.

Score 0: The student gave a completely incorrect response.

Question 33

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$. Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

$m_{\overline{HY}} = \frac{\Delta y}{\Delta x} = \frac{9-6}{2-(-3)} = \frac{3}{5}$

$m_{\overline{EP}} = \frac{\Delta y}{\Delta x} = \frac{-4+(+1)}{3-8} = \frac{-3}{-5} = \frac{3}{5}$

$m_{\overline{HE}} = \frac{\Delta y}{\Delta x} = \frac{6+(+4)}{-3-3} = \frac{10}{-6} = -\frac{5}{3}$

$m_{\overline{YP}} = \frac{\Delta y}{\Delta x} = \frac{9+(+1)}{2-8} = \frac{10}{-6} = -\frac{5}{3}$

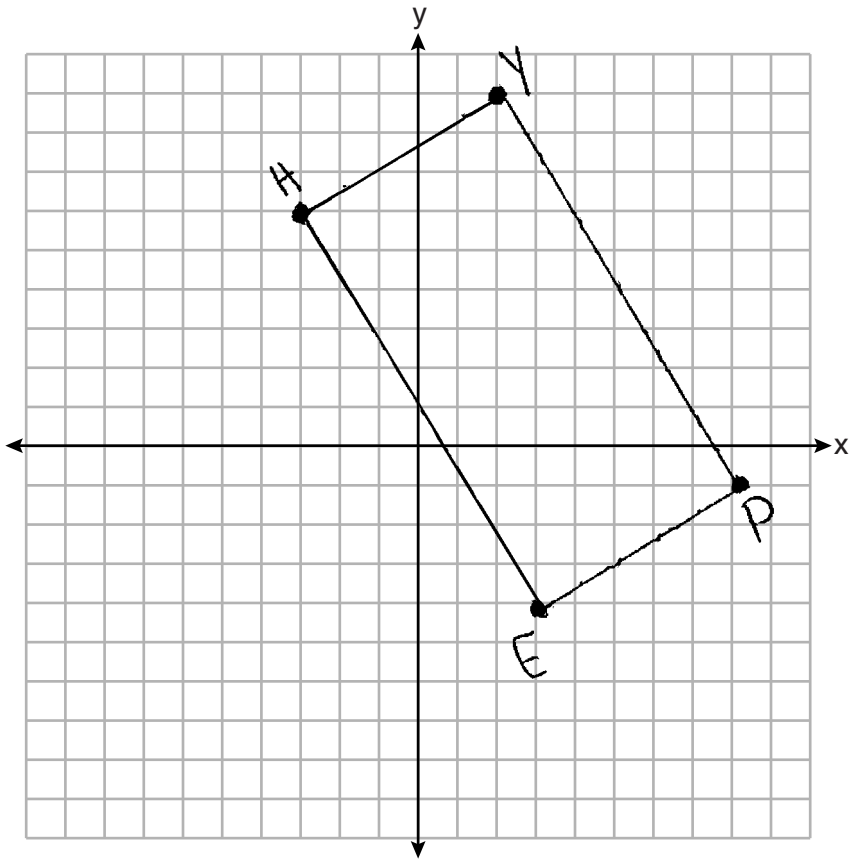
$\overline{HY} \parallel \overline{EP}$ } since they have the same slope.
$\overline{HE} \parallel \overline{YP}$ }

Quadrilateral HYPE is a parallelogram since both pairs of opposite sides are parallel

$\overline{HY} \perp \overline{YP}$ since their slopes are opposite reciprocals

$\measuredangle Y$ is a rt. $\measuredangle$ since $\perp$ lines form rt $\measuredangle$'s

Quadrilateral HYPE is a rectangle since it is a parallelogram w/ a rt. $\measuredangle$



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

Question 33

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$. Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

$HY = \sqrt{(2-3)^2+(9-6)^2}$

$HY = \sqrt{25+9}$

$HY = \sqrt{34}$

$YP = \sqrt{(8-2)^2+(-1-9)^2}$

$YP = \sqrt{36+100}$

$YP = \sqrt{136}$

$EP = \sqrt{(8-3)^2+(-1-4)^2}$

$EP = \sqrt{25+9}$

$EP = \sqrt{34}$

$HE = \sqrt{(3-3)^2+(-4-6)^2}$

$HE = \sqrt{36+100}$

$HE = \sqrt{136}$

Both pairs of opposite sides are equal so HYPE is a parallelogram.

$HP = \sqrt{(8-3)^2+(-1-6)^2}$

$HP = \sqrt{121+49}$

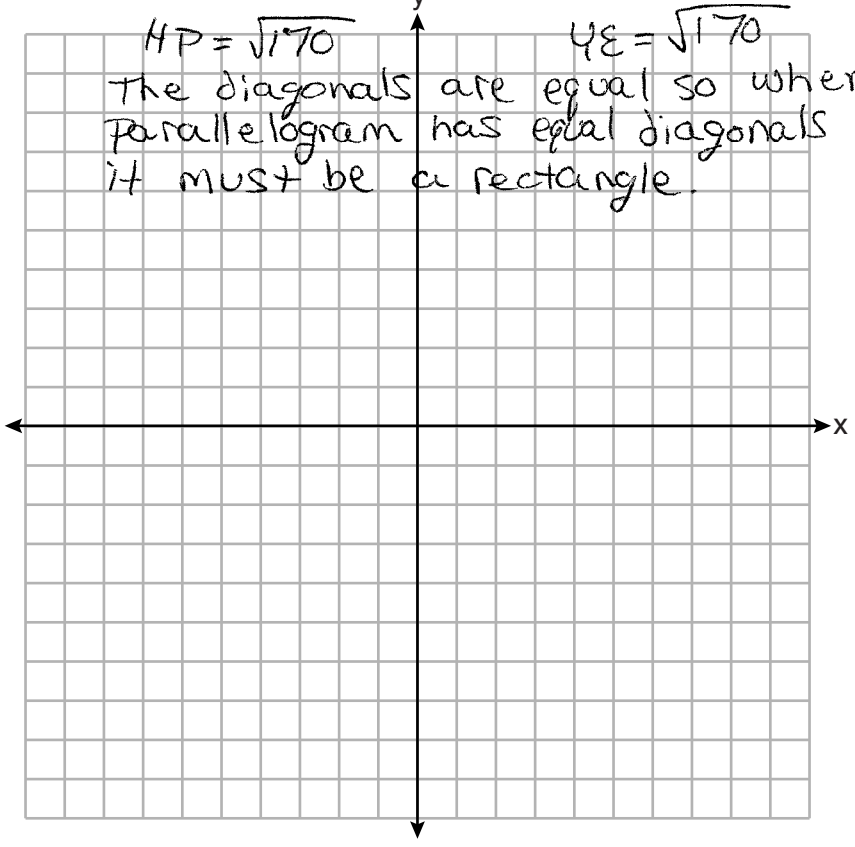
$HP = \sqrt{170}$

$YE = \sqrt{(3-2)^2+(-4-9)^2}$

$YE = \sqrt{1+169}$

$YE = \sqrt{170}$

The diagonals are equal so when a parallelogram has equal diagonals then it must be a rectangle.



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

Question 33

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$. Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

$HP = \sqrt{(2-8)^2+(9-6)^2}$

$= \sqrt{5^2+3^2}$

$= \sqrt{25+9}$

$= \sqrt{34}$

$YE = \sqrt{(3-2)^2+(9-4)^2}$

$YE = \sqrt{1^2+13^2}$

$= \sqrt{1+169}$

$= \sqrt{170}$

$\overline{HP}$ midpoint $\left(\frac{8-3}{2}, \frac{6-1}{2}\right)$

$\left(\frac{5}{2}, \frac{5}{2}\right)$

$\overline{YE}$ midpoint $\left(\frac{3+2}{2}, \frac{9-4}{2}\right)$

$\left(\frac{5}{2}, \frac{5}{2}\right)$

same midpoint so diagonals bisect each other so HYPE is a parallelogram

$HP = \sqrt{(8-3)^2+(6-1)^2}$

$= \sqrt{11^2+7^2}$

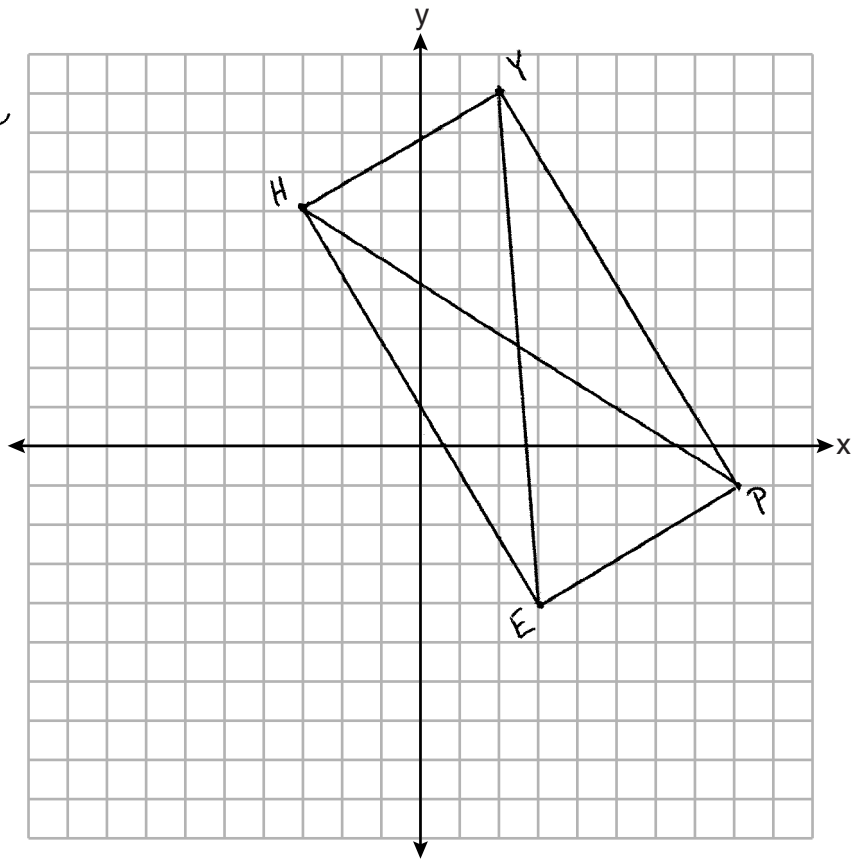
$= \sqrt{121+49}$

$= \sqrt{170}$

$\overline{HP} \cong \overline{YE}$

Diagonals are $\cong$

parallelogram with $\cong$ diagonals.. is a rectangle



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

Question 33

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$. Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

HY $\frac{3}{5}$ FP $\frac{3}{5}$ YP $-\frac{10}{6}$ HE $\frac{10}{6}$

Same Slope Parallel Same Slope Parallel

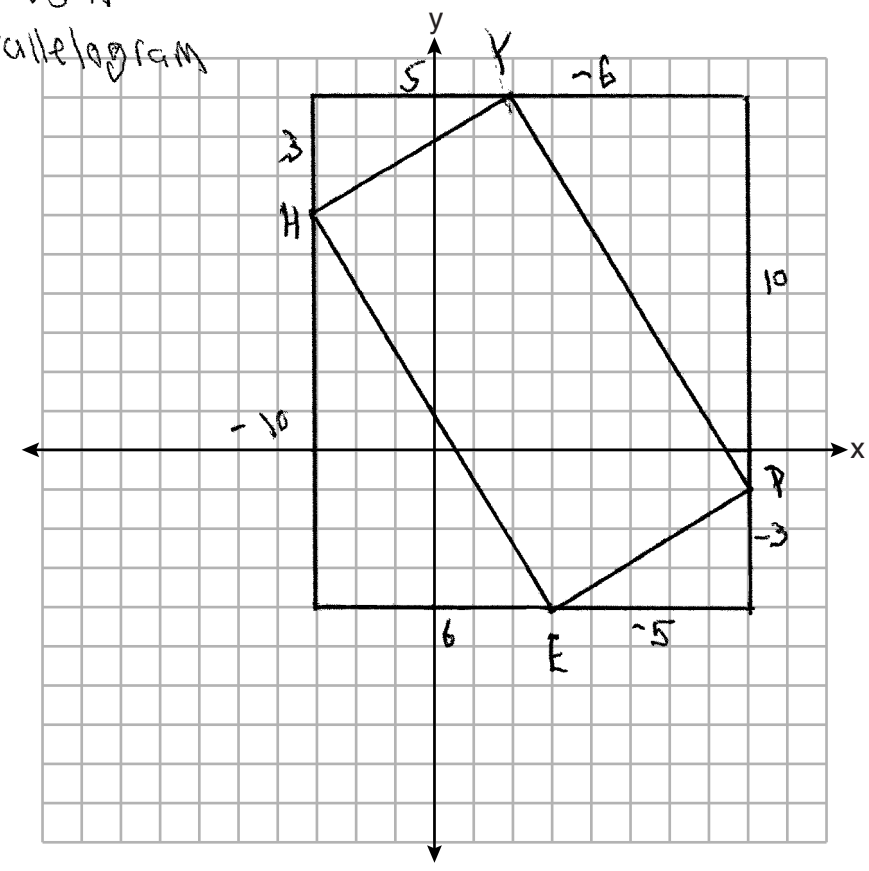
opp sides ∥ parallelogram

HY ⊥ YP

$\frac{3}{5} \perp -\frac{5}{3}$

neg rec Slopes

rt ∠



Score 3: The student did not write a concluding statement in proving a rectangle.

Question 33

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$. Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

$H(-3,6)$ $Y(2,9)$

$d=\sqrt{(2+3)^2+(9-6)^2}$

$=\sqrt{5^2+3^2}$

$=\sqrt{25+9}$

$=\sqrt{34}$

$E(3,-4)$ $P(8,-1)$

$d=\sqrt{(8-3)^2+(-1+4)^2}$

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

$=\sqrt{25+9}$

$=\sqrt{34}$

$H(-3,6)$ $E(3,-4)$

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

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

$=\sqrt{36+100}$

$=\sqrt{136}$

$P(8,-1)$ $Y(2,9)$

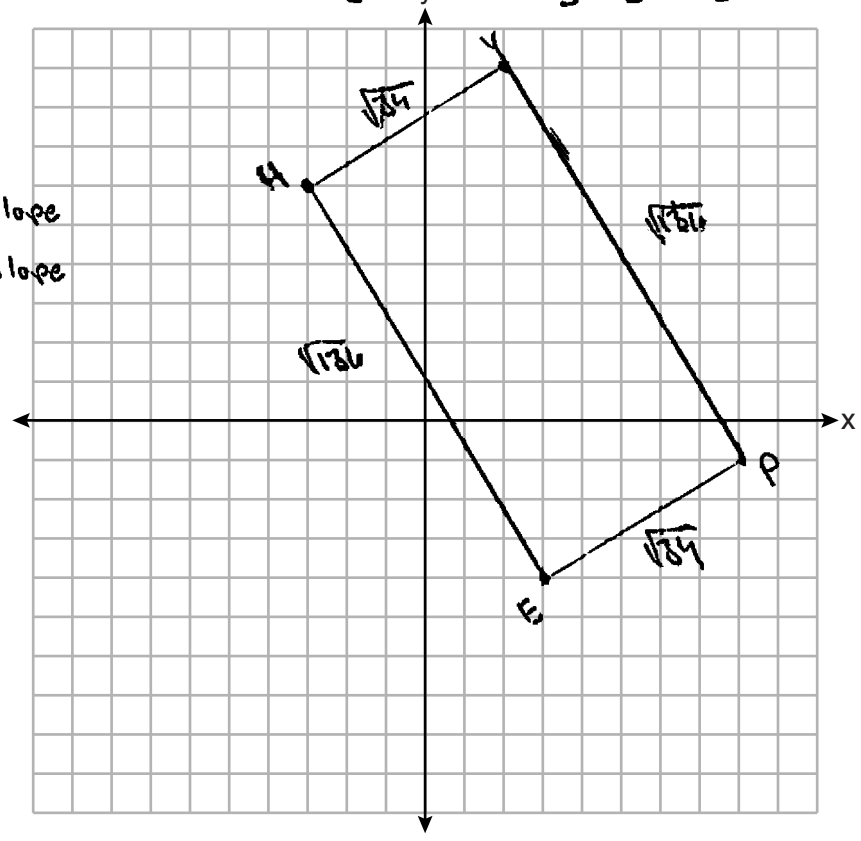
$d=\sqrt{(2-8)^2+(9+1)^2}$

$=\sqrt{-6^2+10^2}$

$=\sqrt{36+100}$

$=\sqrt{136}$

$\frac{\Delta y}{\Delta x}=\frac{9-6}{2--3}=\frac{3}{5}$ $\frac{\Delta y}{\Delta x}=\frac{-1+4}{8-3}=\frac{3}{5}$ $\frac{\Delta y}{\Delta x}=\frac{-4-6}{3--3}=\frac{-10}{6}$ $\frac{\Delta y}{\Delta x}=\frac{9--1}{2-8}=\frac{10}{-6}$



$\overline{HY}$ slope = $\overline{EP}$ slope

$\overline{HE}$ slope = $\overline{YP}$ slope

$\overline{HY} \parallel \overline{EP}$

$\overline{HE} \parallel \overline{YP}$

$\overline{HY} \cong \overline{EP}$

$\overline{HE} \cong \overline{YP}$

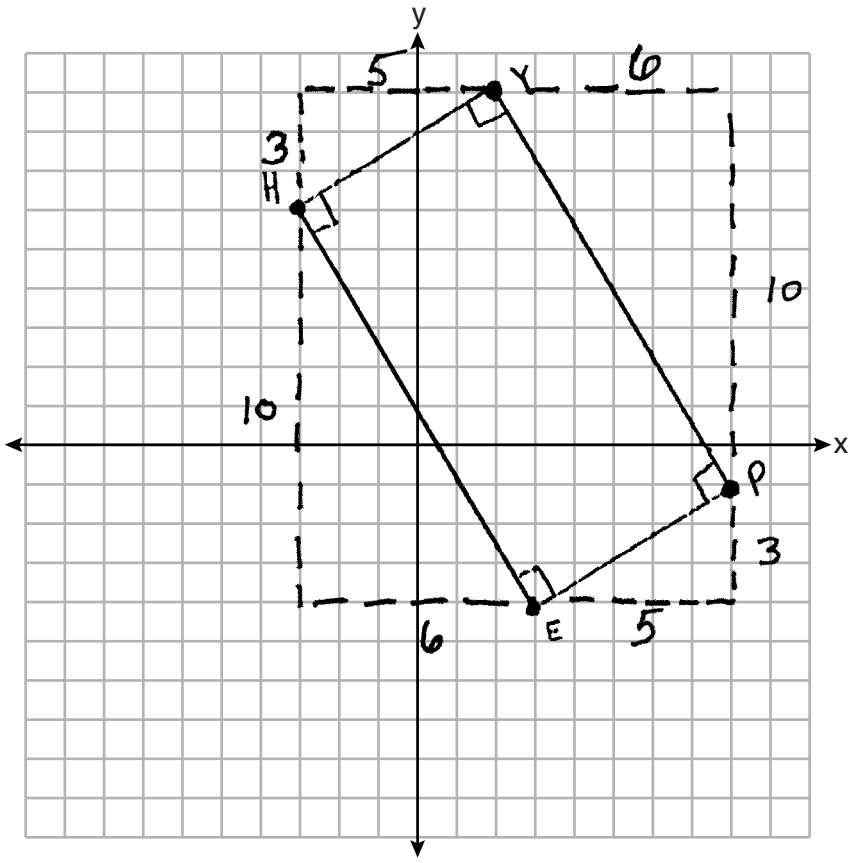
P

Score 2: The student proved *HYPE* is a parallelogram, but did not prove *HYPE* is a rectangle.

Question 33

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$. Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

Slope of $\overline{HY} = \frac{3}{5}$ Slope of $\overline{HE} = \frac{10}{6}$
Slope of $\overline{EP} = \frac{3}{5}$ Slope of $\overline{YP} = \frac{10}{6}$
quadrilateral HYPE is a rectangle because opposite sides are parallel, and it has four right angles



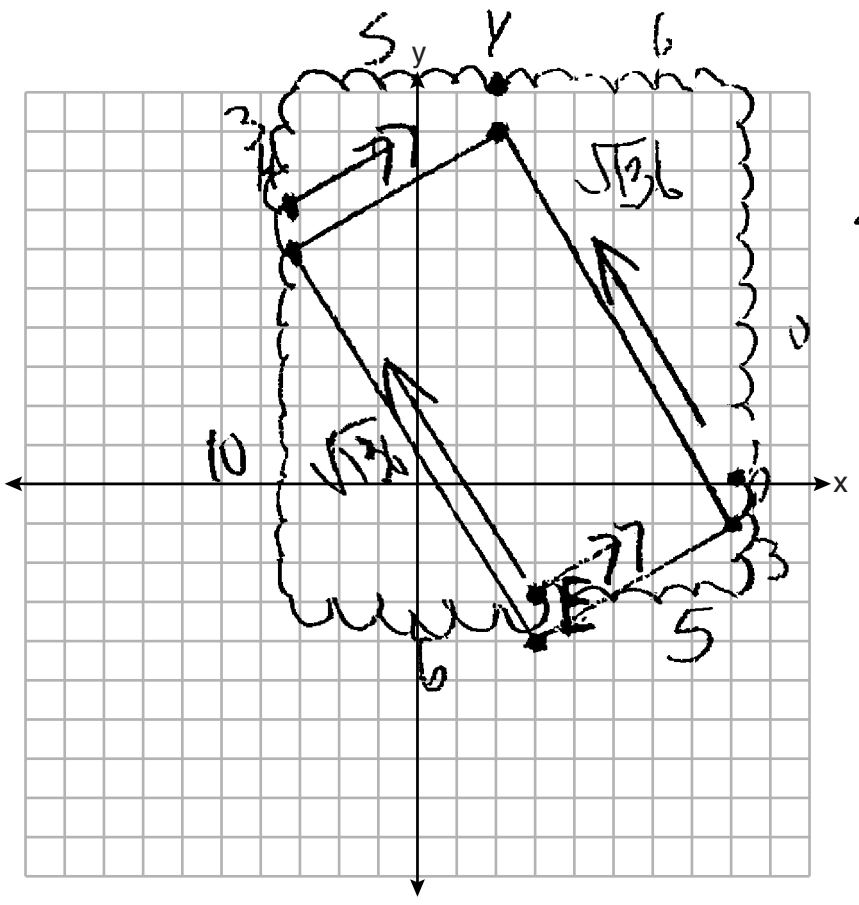
Score 1: The student made a conceptual error in proving a rectangle and a computational error in finding the slopes of $\overline{HE}$ and $\overline{YP}$.

Question 33

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$.

Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

HYPE has opposite sides parallel.
$\overline{HY}$ and $\overline{EP}$ have the same slope of $\frac{3}{5}$.
While $\overline{YP}$ and $\overline{HE}$ have a slope of $\frac{-5}{3}$ or $\frac{-10}{6}$ making them parallel.

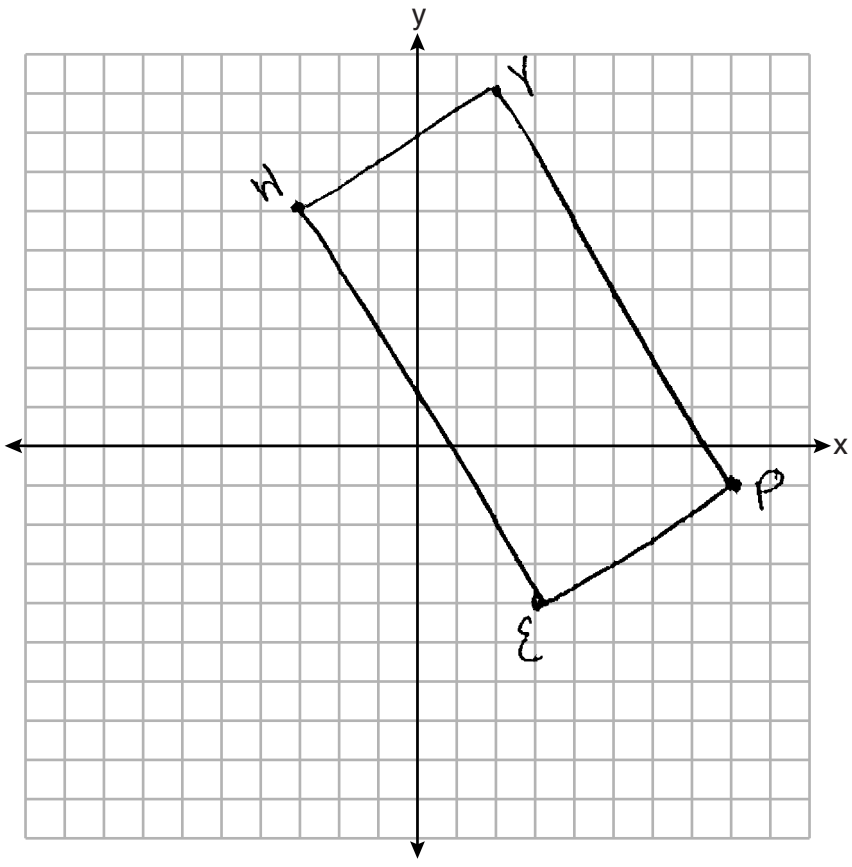


Score 1: The student proved both pairs of opposite sides parallel, but no further correct work was shown.

Question 33

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$. Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

Hype is a rectangle because it has 2 pairs of parallel lines.

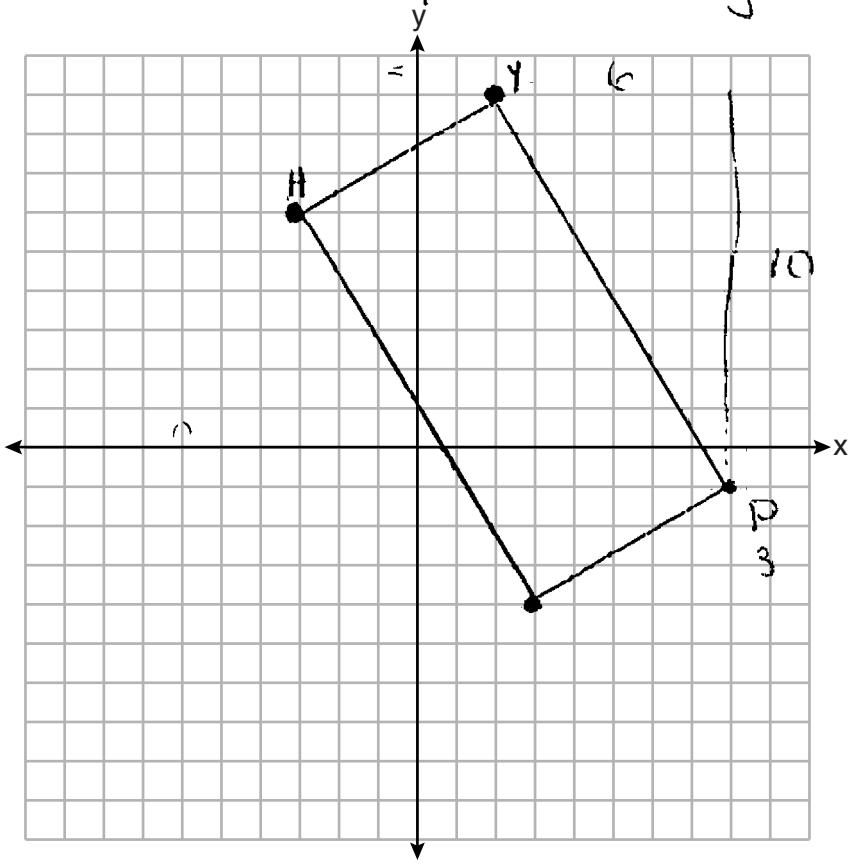


Score 0: The student did not show enough correct relevant work to receive any credit.

Question 33

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$. Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

Statement	Reason
① HYPE is a ▭	① Given
② $\overline{HY} \parallel \overline{EP}$	Same Slope
③ $\overline{HE} \parallel \overline{YP}$	Same Slope
④ $\overline{YP} \perp \overline{PE}$ & $\overline{HE} \perp \overline{HY}$	Definition of ⊥
⑤ HYPE is a ▭	⑤ Definition of Rectangle



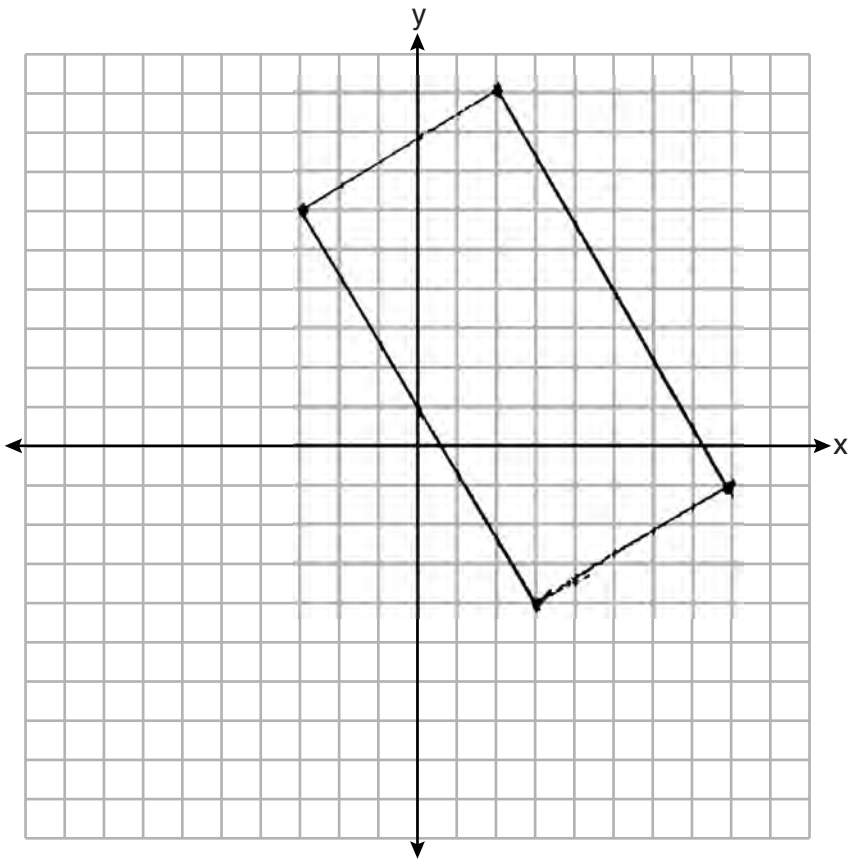
Score 0: The student did not show enough correct relevant work to receive any credit.

Question 33

33 The coordinates of the vertices of quadrilateral *HYPE* are $H(-3,6)$, $Y(2,9)$, $P(8,-1)$, and $E(3,-4)$.

Prove *HYPE* is a rectangle. [The use of the set of axes below is optional.]

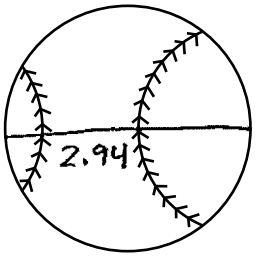
$\overline{HY}$ and $\overline{PE}$ both have the same slope while $\overline{YP}$ and $\overline{HE}$ have the same slope If two lines have the same slope then they are parallel Therefore HYPE has to pairs of parallel sides If all sides of a quadrilateral are congruent, then opposite side are congruent HYPE has 2 pairs of congruent and parallel sides. Therefore HYPE is a rectangle



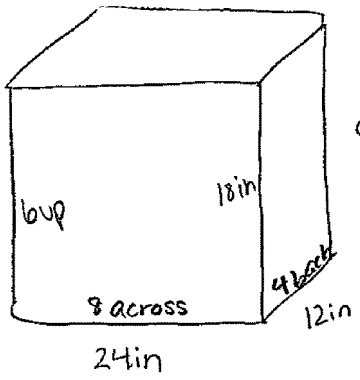
Score 0: The student did not show enough correct relevant work to receive any credit.

Question 34

34 A packing box for baseballs is the shape of a rectangular prism with dimensions of 2 ft × 1 ft × 18 in. Each baseball has a diameter of 2.94 inches.



Determine and state the maximum number of baseballs that can be packed in the box if they are stacked in layers and each layer contains an equal number of baseballs.



$8 \cdot 4 \cdot 6 = 192$ 192 baseballs

$\frac{24}{2.94} = 8.16$

$\frac{18}{2.94} = 6.1$

$\frac{12}{2.94} = 4.08$

The weight of a baseball is approximately 0.025 pound per cubic inch. Determine and state, to the *nearest pound*, the total weight of all the baseballs in the fully packed box.

$V_{circle} = \frac{4}{3}\pi r^3$

$= \frac{4}{3}\pi(1.47)^3$

$= 13.30578843 in^3$

$13.30578843 in^3$

$\times 192$

$2,554.711379 in^3$

$\times \quad 0.025$

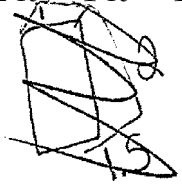
63.86778446 lbs

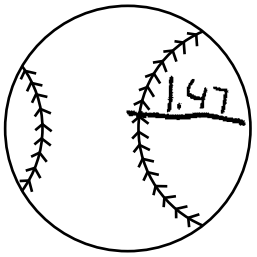
64 pounds

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

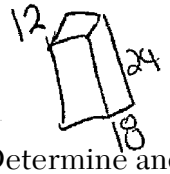
Question 34

34 A packing box for baseballs is the shape of a rectangular prism with dimensions of 2 ft × 1 ft × 18 in. Each baseball has a diameter of 2.94 inches.





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



Determine and state the maximum number of baseballs that can be packed in the box if they are stacked in layers and each layer contains an equal number of baseballs.

~~12·18·24=5184 in³~~

$12 \cdot 18 \cdot 24 = 1584 \text{ in}^3$

$5184 \div 13.3058$

$V = \frac{4\pi(1.47)^3}{3}$

$V = 13.30578842$

389 baseballs

The weight of a baseball is approximately 0.025 pound per cubic inch. Determine and state, to the *nearest pound*, the total weight of all the baseballs in the fully packed box.

$0.025 \cdot 13.30578842 = 0.3326447108$

$0.3326447108 \cdot 389 = 129.3987925$

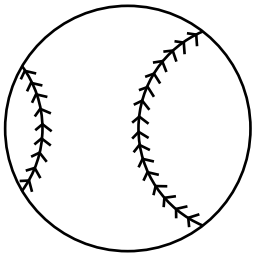
129 lbs

Score 3: The student made an error in finding the number of baseballs.

Question 34

34 A packing box for baseballs is the shape of a rectangular prism with dimensions of 2 ft × 1 ft × 18 in. Each baseball has a diameter of 2.94 inches.

24in 12in 18in



Determine and state the maximum number of baseballs that can be packed in the box if they are stacked in layers and each layer contains an equal number of baseballs.

24/2.94 12/2.94 18/2.94

8.2 4.1 6.1

8.2 × 4.1 × 6.1 = 205.1

205 baseballs can fit in the box

The weight of a baseball is approximately 0.025 pound per cubic inch. Determine and state, to the *nearest pound*, the total weight of all the baseballs in the fully packed box.

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

$V = \frac{4}{3}\pi 1.47^3$

$V = 13.3$

13.3 × .025 = .3325

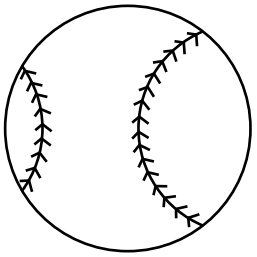
.3325 × 205

68 Pounds

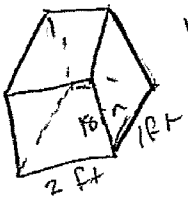
Score 3: The student made an error in finding the number of baseballs.

Question 34

34 A packing box for baseballs is the shape of a rectangular prism with dimensions of 2 ft × 1 ft × 18 in. Each baseball has a diameter of 2.94 inches.



Determine and state the maximum number of baseballs that can be packed in the box if they are stacked in layers and each layer contains an equal number of baseballs.



$V_{prism} = Bh$
$= 2\text{ft}^2 \cdot 18\text{in}$
$= 24\text{in}^2 \cdot 18\text{in}$
$= 432\text{in}^3$

$V_{ball} = \frac{4}{3}\pi r^3$
$= \frac{4}{3}\pi 1.47^3$
$= 13.30578843$

$\text{number} = \frac{V_{prism}}{V_{ball}} = 32.46707268 =$ 32 baseballs per box

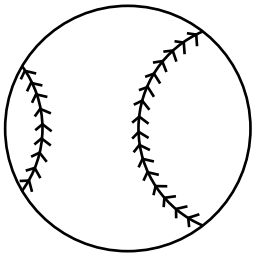
The weight of a baseball is approximately 0.025 pound per cubic inch. Determine and state, to the *nearest pound*, the total weight of all the baseballs in the fully packed box.

$\text{Weight} = .025 \cdot 13.30578843$
$= .3326447108 \text{ pound/ball}$
$\text{total weight} = .3326447108 \cdot 32$
$= 10.64463074$
$\approx 11 \text{ pounds per box}$

Score 2: The student found an appropriate weight of baseballs in a box, but no further correct work was shown.

Question 34

34 A packing box for baseballs is the shape of a rectangular prism with dimensions of 2 ft × 1 ft × 18 in. Each baseball has a diameter of 2.94 inches.



Determine and state the maximum number of baseballs that can be packed in the box if they are stacked in layers and each layer contains an equal number of baseballs.

$V = (2)(1)(1.5)$

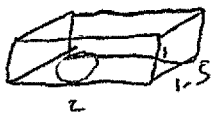
$V = 3 \text{ ft}$

$= 36 \text{ in}^3$

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

$V = \frac{4}{3}\pi (1.47)^3$

$V = 13.3058 \text{ in}^3$

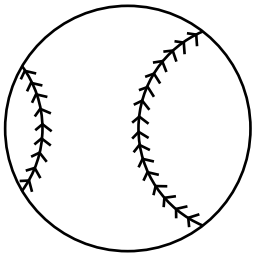


The weight of a baseball is approximately 0.025 pound per cubic inch. Determine and state, to the *nearest pound*, the total weight of all the baseballs in the fully packed box.

Score 1: The student found the volume of one baseball, but no further correct relevant work was shown.

Question 34

34 A packing box for baseballs is the shape of a rectangular prism with dimensions of 2 ft × 1 ft × 18 in. Each baseball has a diameter of 2.94 inches.



Determine and state the maximum number of baseballs that can be packed in the box if they are stacked in layers and each layer contains an equal number of baseballs.

$V = L \cdot W \cdot H$

$V = (24\text{ in})(12\text{ in})(18\text{ in})$

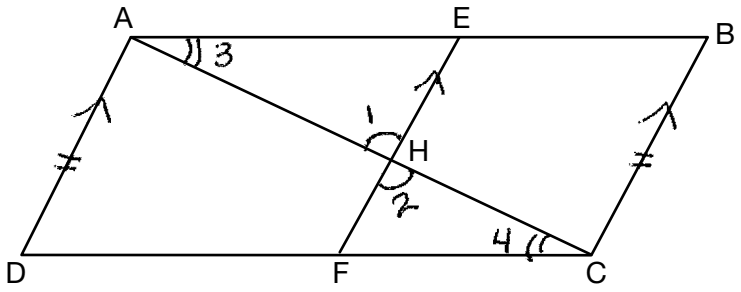
$V = 5184\text{ in}^3$

The weight of a baseball is approximately 0.025 pound per cubic inch. Determine and state, to the *nearest pound*, the total weight of all the baseballs in the fully packed box.

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

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



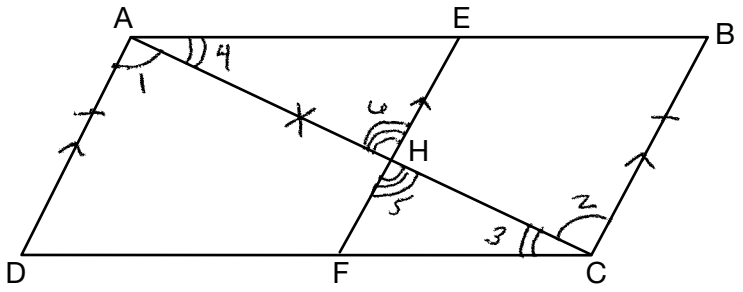
Prove: $(EH)(CH) = (FH)(AH)$

Statement	Reason
1. Quad $ABCD$, $\overline{AC}$ & $\overline{EF}$ intersect at H. $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, $\overline{AD} \cong \overline{BC}$	1. Given
2. $\overline{AD} \parallel \overline{BC}$	2. Transitive Postulate of parallel lines.
3. ABCD is a parallelogram	3. If 1 pair of opposite sides are $\cong$ and $\parallel$, then Quad ABCD is a parallelogram.
4. $\angle 1$ and $\angle 2$ are vertical $\angle$s.	4. Definition of vertical $\angle$s.
5. $\angle 1 \cong \angle 2$	5. vertical $\angle$s are $\cong$
6. $\overline{AB} \parallel \overline{CD}$	6. In a parallelogram, opposite sides are $\parallel$.
7. $\angle 3 \cong \angle 4$	7. If 2 $\parallel$ lines are cut by a transversal, then the alternate interior $\angle$s are $\cong$.
8. $\triangle AHE \sim \triangle CHF$	8. AA $\cong$ AA
9. $\frac{EH}{FH} = \frac{AH}{CH}$	9. If 2 $\triangle$'s are similar, their corresponding sides are in proportion.
10. $(EH)(CH) = (FH)(AH)$	10. In a proportion, the product of the means equals the product of the extremes.

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

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



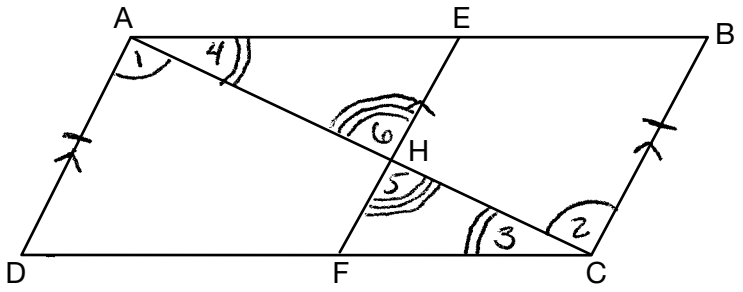
Prove: $(EH)(CH) = (FH)(AH)$

1. Quad $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$ — 1. Given
2. $\overline{AD} \parallel \overline{BC}$ — 2. Transitive property
3. $\overline{AC} \cong \overline{AC}$ — 3. Reflexive property
4. $\angle 1 \cong \angle 2$ — 4. When $\parallel$ lines are cut by a transversal, alternate interior angles are $\cong$
5. $\triangle ADC \cong \triangle CBA$ — 5. SAS
6. $\angle 3 \cong \angle 4$ — 6. CPCTC
7. $\angle 5 \cong \angle 6$ — 7. Vertical angles are $\cong$
8. $\triangle HFC \sim \triangle HEA$ — 8. AA
9. $\frac{EH}{FH} = \frac{AH}{CH}$ — 9. Corresponding sides of similar triangles are in proportion
10. $(EH)(CH) = (FH)(AH)$ — 10. The product of the means equals the product of the extremes.

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

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



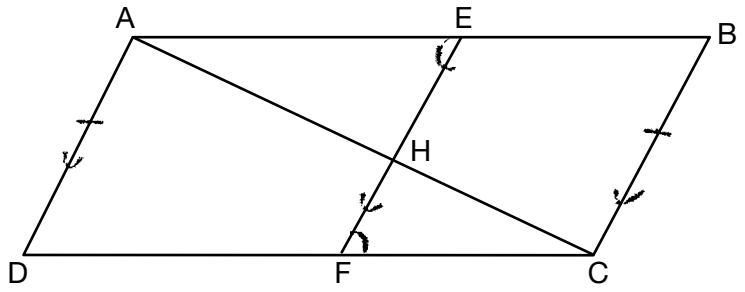
Prove: $(EH)(CH) = (FH)(AH)$

- Given quadrilateral ABCD, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$.
- Since $\overline{EF} \parallel \overline{BC}$ and $\overline{EF} \parallel \overline{AD}$ then $\overline{AD} \parallel \overline{BC}$ by the transitive property.
- So $\angle 1 \cong \angle 2$ because when two $\parallel$ lines are cut by a transversal, the alternate interior angles are congruent.
- Diagonal $\overline{AC} \cong \overline{AC}$ by reflexive $\therefore \triangle ADC \cong \triangle CBA$ by SAS.
- $\angle 3 \cong \angle 4$ because corresponding angles of $\cong$ triangles are $\cong$.
- $\angle 5 \cong \angle 6$ because vertical angles are $\cong$
- So $\triangle FHC \sim \triangle EHA$ by AA and then $\frac{EH}{FH} = \frac{AH}{CH}$ because corresponding sides of similar triangles are proportional.
- Therefore $(EH)(CH) = (FH)(AH)$ because the product of the means equals the product of the extremes.

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

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



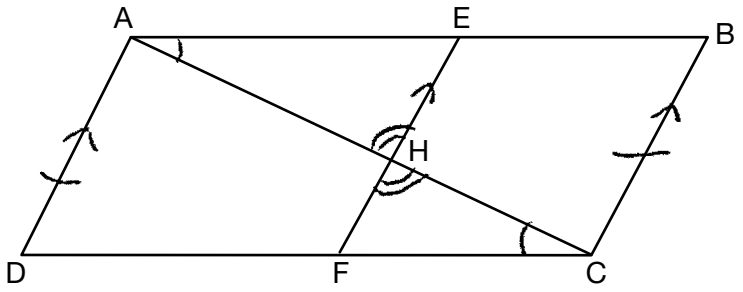
Prove: $(EH)(CH) = (FH)(AH)$

1. Quad ABCD. $\overline{AC}$ intersects $\overline{EF}$ at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, $\overline{AD} \cong \overline{BC}$	1. Given
2. $\overline{AD} \parallel \overline{BC}$	2. Transitive Property
3. ABCD is a $\square$	3. A quadrilateral with 2 opposite sides $\cong$ and $\parallel$ is a $\square$
4. $\overline{AB} \parallel \overline{DC}$	4. Def. of $\square$
5. $\angle AEH \cong \angle CFH$	5. If $\parallel$ lines are cut by a transversal, alternate interior $\angle$s are $\cong$
6. $\angle AHE \cong \angle CHF$	6. Vertical $\angle$s are $\cong$
7. $\triangle AHE \sim \triangle CHF$	7. AA~
8. $\frac{EH}{AH} = \frac{FH}{CH}$	8. Corresponding sides of similar $\triangle$s are proportional
9. $(EH)(CH) = (FH)(AH)$	9. Substitution

Score 5: The student wrote an incorrect reason in step 9.

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



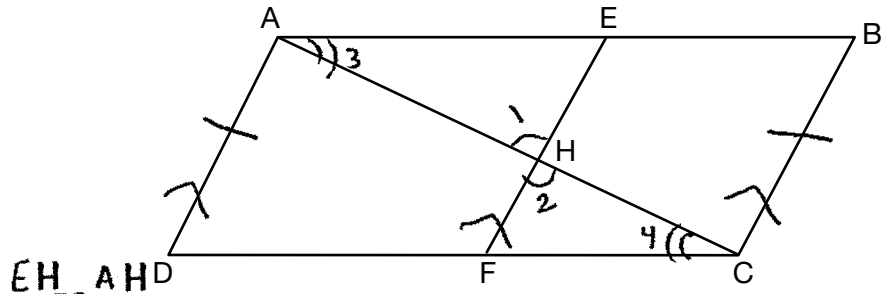
Prove: $(EH)(CH) = (FH)(AH)$ $\frac{EH}{FH} = \frac{AH}{CH}$ $\triangle AHE \sim \triangle CHF$

S	R
(1) Quadrilateral ABCD, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, $\overline{AD} \cong \overline{BC}$	(1) Given
(2) Quad ABCD is a parallelogram	(2) If a quad has an opposite pair of sides $\cong$ and parallel, it is a parallelogram
(3) $\angle AHE$ and $\angle CHF$ are vertical $\angle$s	(3) Intersecting lines form vertical angles
(4) $\angle AHE \cong \angle CHF$	(4) Vertical angles are $\cong$
(5) $\overline{BA} \parallel \overline{DC}$	(5) In a parallelogram, opposite sides are $\parallel$
(6) $\angle EAH \cong \angle HCF$	(6) If 2 $\parallel$ lines are cut by a transversal, alternate interior angles are $\cong$
(7) $\triangle AHE \sim \triangle CHF$	(7) AA Similarity
(8) $\frac{EH}{FH} = \frac{AH}{CH}$	(8) Corresponding sides of similar $\triangle$s are in proportion
(9) $(EH)(CH) = (FH)(AH)$	(9) In a proportion, the product of the means is equal to the product of the extremes

Score 5: The student did not state $\overline{AD} \parallel \overline{BC}$ to prove $ABCD$ is a parallelogram.

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



$\frac{EH}{FH} = \frac{AH}{CH}$

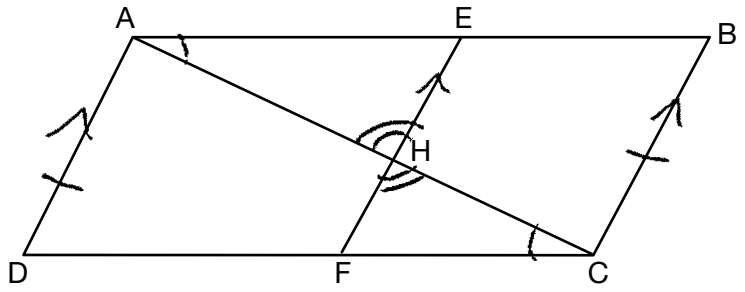
Prove: $(EH)(CH) = (FH)(AH)$ ✓

statements	reasons
(1) quad ABCD, $\overline{AC}$ & $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, $\overline{AD} \cong \overline{BC}$	(1) given
(2) $\overline{AB} \parallel \overline{CD}$	(2) opp sides of para are $\parallel$
A (3) $\angle 3 \cong \angle 4$	(3) if 2 lines $\parallel$ alt int $\angle$'s $\cong$
A (4) $\angle 1 \cong \angle 2$	(4) vertical $\angle$'s $\cong$
(5) $\triangle AHE \sim \triangle CHF$	(5) AA
(6) $\frac{EH}{FH} = \frac{AH}{CH}$	(6) corr sides of $\sim \triangle$'s are in proportion
✓ (7) $(EH)(CH) = (FH)(AH)$	(7) prod of means = prod of extremes

Score 4: The student made a conceptual error by not proving $ABCD$ is a parallelogram.

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



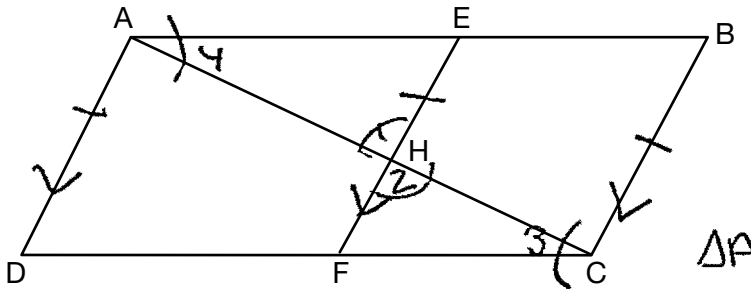
Prove: $(EH)(CH) = (FH)(AH)$

Statements	Reasons
1. Quad $ABCD$ $\overline{AC}$ and $\overline{EF}$ intersect at H	1. Given
2. $\overline{EF} \parallel \overline{AD}$ $\overline{EF} \parallel \overline{BC}$	2. Given
3. $\overline{AD} \parallel \overline{BC}$	3. If two lines are $\parallel$ to the same line, then they are parallel
4. $\overline{AD} \cong \overline{BC}$	4. Given
5. Quad $ABCD$ is a $\square$	5. A quad with one pair of opposite sides that are $\cong$ and $\parallel$, then it is a $\square$
6. $\overline{AB} \parallel \overline{DC}$	6. def of parallelogram
7. $\angle HAE \cong \angle HCF$	7. Alternate interior $\angle$s
8. $\angle EHA$ and $\angle EHC$ are vertical $\angle$s	8. def of vertical $\angle$s
9. $\angle EHA \cong \angle FHA$	9. vertical $\angle$s are $\cong$
10. $\triangle AHE \sim \triangle CHF$	10. AA~
11. $\frac{EH}{FH} = \frac{AH}{CH}$	11. If two $\triangle$s are similar, corresponding sides are in proportion
12. $(EH)(CH) = (FH)(AH)$	12. Cross products are equal

Score 4: The student gave an incorrect reason in step 7, and stated an incorrect angle in step 9.

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



$\frac{EH}{FH} = \frac{AH}{CH}$

$\triangle AEH \sim \triangle FCH$

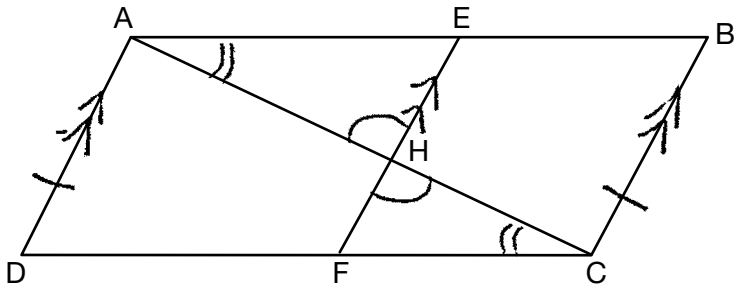
Prove: $(EH)(CH) = (FH)(AH)$

Statement	reason
1. Quad ABCD, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, $\overline{AD} \cong \overline{BC}$	1. Given
2. Quad ABCD is a parallelogram	2. A parallelogram has one pair of opposite sides congruent and parallel, then ABCD is a parallelogram.
3. $\angle 1 \cong \angle 2$	3. Vertical angles are congruent
4. $\angle 3 \cong \angle 4$	4. If $\parallel$ lines are cut by a transversal, the alternate int. angles are congruent
5. $\triangle AEH \sim \triangle CFH$	5. AA~Thm
6. $\frac{EH}{FH} = \frac{AH}{CH}$	6. corresponding sides of a congruent $\triangle$ are proportion
7. $EH \cdot CH = FH \cdot AH$	7. the product of the means is equal to the product of the extremes

Score 3: The student did not state $\overline{AD} \parallel \overline{BC}$ to prove $ABCD$ is a parallelogram, did not state $\overline{AB} \parallel \overline{CD}$ to prove $\angle 3 \cong \angle 4$, and incorrectly stated congruent triangles in reason 6.

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



Prove: $(EH)(CH) = (FH)(AH)$

$\frac{EH}{CH} = \frac{FH}{AH}$ $EH \cong AH$ $FH \cong CH$

Statements

1.) $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$
2.) $\overline{AD} \cong \overline{BC}$
3.) ABCD is PARA
4.) $\angle AHE \cong \angle FHC$
5.) $\overline{AB} \parallel \overline{CD}$
6.) $\angle BAC \cong \angle HCF$
7.) $\triangle AEH \sim \triangle CFH$
8.) $(EH)(CH) = (FH)(AH)$

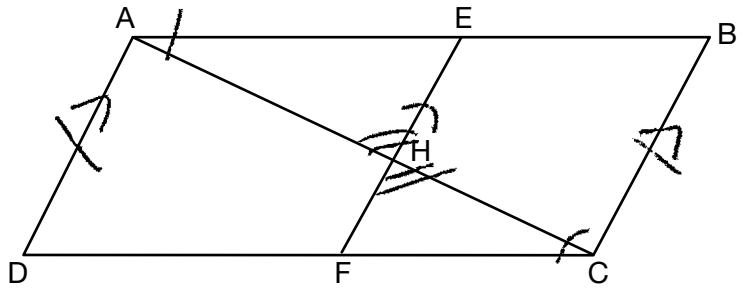
Reasons

1.) Given
2.) Given
3.) if opp sides $\cong$ & $\parallel$, PARA
4.) vert $\angle$'s are $\cong$
5.) if PARA, opp sides $\parallel$
6.) if lines $\parallel$, alt int $\angle$'s $\cong$
7.) AA
8.) if $\triangle$'s $\sim$, a proportion with sides of $\sim$ $\triangle$'s is correct

Score 3: The student did not state $\overline{AD} \parallel \overline{BC}$ to prove $ABCD$ is a parallelogram and gave no correct statements and reasons after step 7.

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



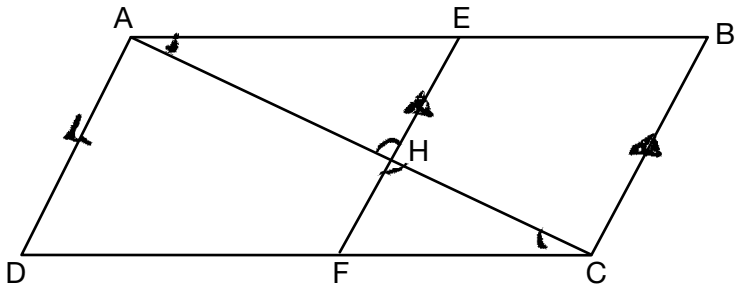
Prove: $(EH)(CH) = (FH)(AH)$

S	R
1) $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, $\overline{AD} \cong \overline{BC}$	1) given
2) $\angle EAH \cong \angle HCF$	2) $\parallel$ lines form $\cong$ alt. int. $\angle$'s
3) $\angle AHE \cong \angle FHC$	3) Vertical $\angle$'s are $\cong$
4) $\triangle AHE \sim \triangle CHF$	4) AA thm for similarity
5) $\frac{EH}{FH} = \frac{AH}{CH}$	5) Corresponding sides in $\sim \triangle$'s are proportional
6) $(EH)(CH) = (FH)(AH)$	6) Cross multiplying

Score 2: The student made a conceptual error by not proving $ABCD$ is a parallelogram, did not state $\overline{AB} \parallel \overline{CD}$ to prove $\angle EAH \cong \angle FCH$, and wrote an incorrect reason in step 6.

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



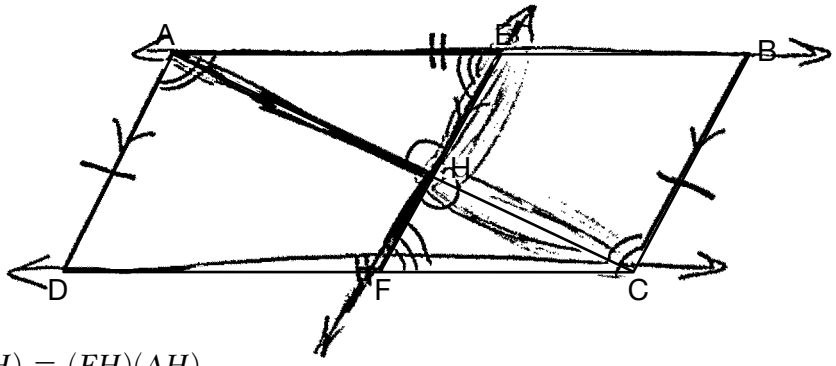
Prove: $(EH)(CH) = (FH)(AH)$

1. $\overline{AD} \parallel \overline{EF}$, $\overline{EF} \parallel \overline{BC}$ — 1. Given
2. $\overline{AD} \parallel \overline{BC}$ — 2. If two lines are parallel to the same line, then they are parallel to each other.
3. $\angle BAC \cong \angle ADC$ — 3. Alternate interior angles are congruent to each other.
4. $\angle EHA \cong \angle CHF$ — 4. Vertical angles are congruent to each other.
5. $\triangle AHE$ is similar to $\triangle CHF$ — 5. AA Similarity
6. $(EH)(CH) = (FH)(AH)$ — 6. Similar triangles are in proportion.

Score 2: The student wrote some correct relevant statements and reasons.

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



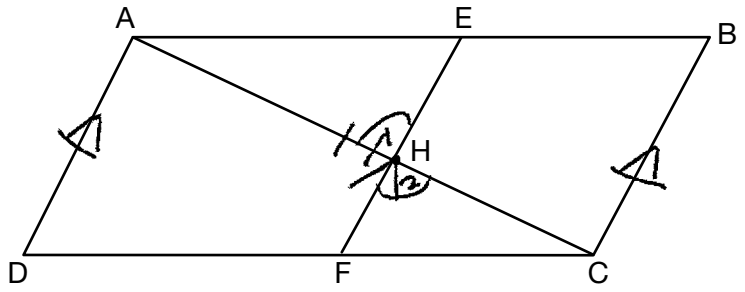
Prove: $(EH)(CH) = (FH)(AH)$

Statement	reason
① quadrilateral ABCD, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$	① given
A ② $\angle AHE \cong \angle CHF$	② vertical angles are $\cong$
③ $\overline{AB} \parallel \overline{DC}$	③ opposite sides of a quadrilateral are parallel
A ④ $\angle AEH \cong \angle CFH$	④ two parallel lines cut by a transversal create congruent alternate interior angles
⑤ $\triangle AEH \sim \triangle CFH$	⑤ AA
⑥ $(EH)(CH) = (FH)(AH)$	⑥ corresponding parts of similiar triangles are similiar

Score 2: The student made a conceptual error in step 3 and gave no correct statements and reasons after step 5.

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



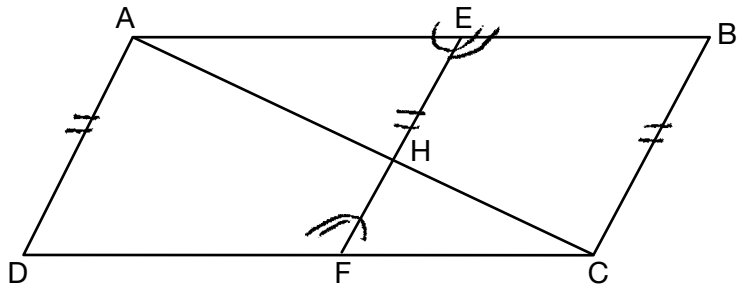
Prove: $(EH)(CH) = (FH)(AH)$

Statements	Reasons
1) Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$	1) Given
2) $\angle 1, \angle 2$ are vert $\angle$'s	2) $\angle$'s that form at intersection are vert
3) $\angle 1 \cong \angle 2$	3) vert $\angle$'s are $\cong$
4) $\overline{AC} \cong \overline{AC}$	4) Reflexive Prop
5) $\frac{EH}{FH} = \frac{CH}{AH}$	5) CSSTP
6) $(EH)(CH) = (FH)(AH)$	6) cross products

Score 1: The student only proved $\angle 1 \cong \angle 2$ correctly, and no further correct relevant work was shown.

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



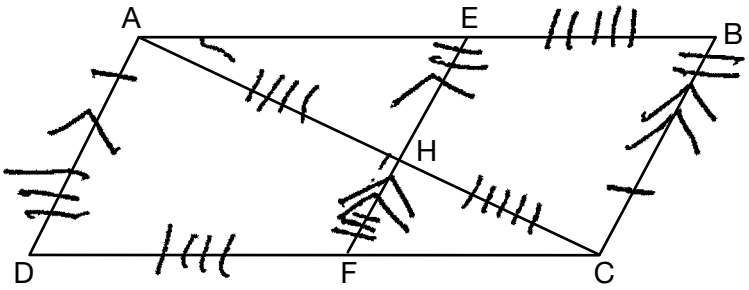
Prove: $(EH)(CH) = (FH)(AH)$

Statement	Reasoning
1. Quadrilateral ABCD, $\overline{AC}$ & $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$ and $\overline{AD} \cong \overline{BC}$	1. Given
2. $\angle HEA \cong \angle HFC$	2. $\parallel$ lines create $\cong$ alternate exterior angles
3. $\angle HEB \cong \angle HFD$	3. $\parallel$ lines create $\cong$ alternate exterior angles.
4. $\overline{EH} \cong \overline{HF}$, $\overline{AH} \cong \overline{HC}$	4. They are proportional
5. $\frac{EH}{FH} = \frac{AH}{CH}$	5. proportional
6. $(EH)(CH) = (FH)(AH)$	6. cross multiplication

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

Question 35

35 Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, and $\overline{AD} \cong \overline{BC}$



Prove: $(EH)(CH) = (FH)(AH)$

Statements	Reasons
1. Quadrilateral ABCD, $\overline{EF} \parallel \overline{AD}$, $\overline{EF} \parallel \overline{BC}$, $\overline{AD} \cong \overline{BC}$	1. given
2. AHFD and EHCB are parallelograms	2. They have opposite parallel sides
3. $\square$AHFD and $\square$EHCB have opposite congruent sides.	3. Parallelograms have opposite parallel sides.
4. $(EH)(EH) = (FH)(AH)$	4. Corresponding parts of Corresponding figures are equal

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

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

Regents Examination in Geometry – August 2022

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

(Use for the August 2022 exam only.)

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

Raw Score	Scale Score	Performance Level
53	**79**	3
52	**79**	3
51	**78**	3
50	**78**	3
49	**77**	3
48	**77**	3
47	**76**	3
46	**76**	3
45	**75**	3
44	**75**	3
43	**74**	3
42	**73**	3
41	**73**	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	**63**	2
28	**61**	2
27	**60**	2

Raw Score	Scale Score	Performance Level
26	**59**	2
25	**58**	2
24	**56**	2
23	**55**	2
22	**53**	1
21	**52**	1
20	**50**	1
19	**49**	1
18	**47**	1
17	**45**	1
16	**43**	1
15	**41**	1
14	**39**	1
13	**37**	1
12	**35**	1
11	**32**	1
10	**30**	1
9	**27**	1
8	**25**	1
7	**22**	1
6	**19**	1
5	**16**	1
4	**13**	1
3	**10**	1
2	**7**	1
1	**4**	1
0	**0**	1

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

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

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