

GEOMETRY

Wednesday, August 20, 2025 — 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 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

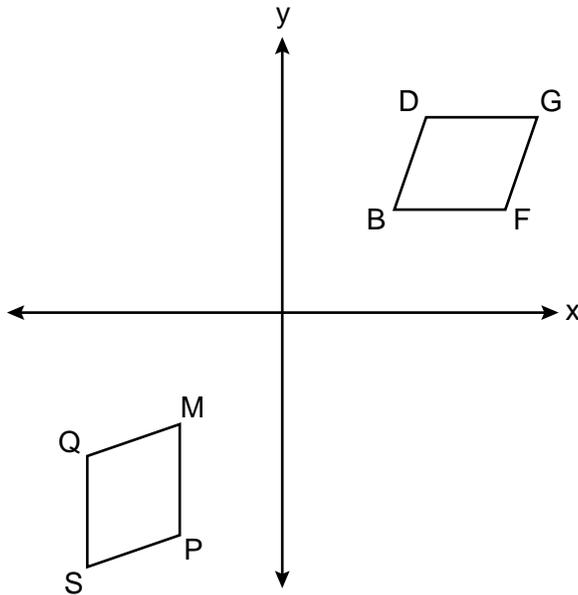
Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression 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 An equilateral triangle is continuously rotated around one of its altitudes. The three-dimensional object formed is a

- (1) cone
- (2) sphere
- (3) cylinder
- (4) pyramid

2 On the set of axes below, quadrilateral $BDGF$ is rotated 90 degrees clockwise about the origin and then reflected over the y -axis. The image of quadrilateral $BDGF$ is quadrilateral $MQSP$.

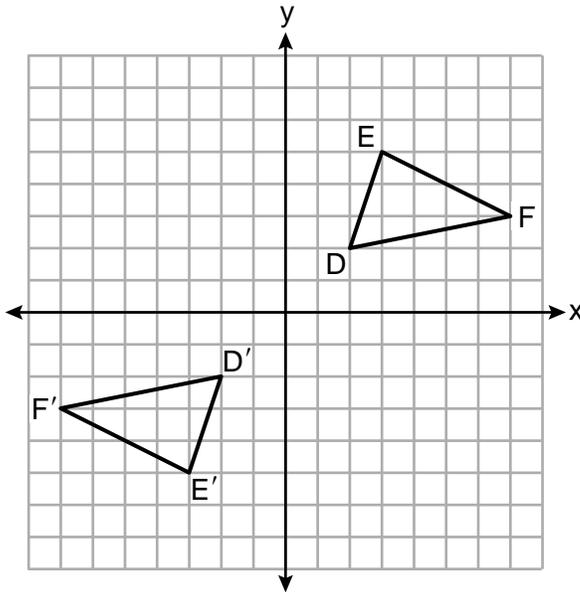


Side \overline{BD} will always map onto

- (1) \overline{MP}
- (2) \overline{PS}
- (3) \overline{MQ}
- (4) \overline{SQ}

Use this space for
computations.

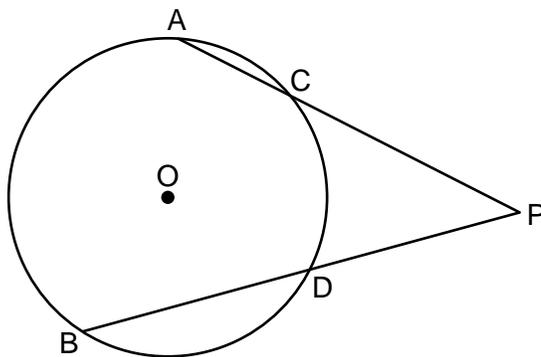
9 On the set of axes below, $\triangle D'E'F'$ is the image of $\triangle DEF$.



A transformation that maps $\triangle DEF$ onto $\triangle D'E'F'$ is a

- (1) reflection over the line $y = x$
- (2) reflection over the line $y = -x$
- (3) point reflection through the origin
- (4) translation 4 units left and 4 units down

10 In circle O below, secants \overline{PCA} and \overline{PDB} are drawn from external point P .

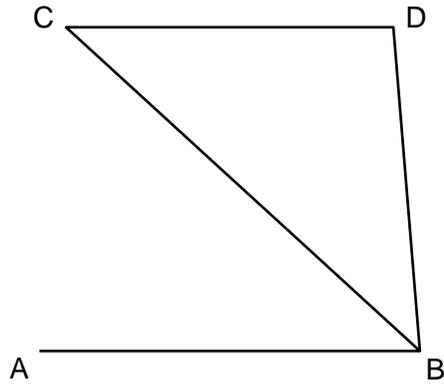


If $PA = 17$, $PD = 10$, and $BD = 12$, what is the length of \overline{PC} , to the nearest tenth?

- (1) 7.1
- (2) 7.7
- (3) 12.9
- (4) 14.2

Use this space for
computations.

11 In the diagram below, $\overline{CD} \parallel \overline{AB}$, and \overline{CB} bisects $\angle ABD$.



Which statement must be true?

- (1) $\overline{CD} \cong \overline{AB}$ (3) $\triangle CDB$ is a right triangle
(2) $\overline{AB} \cong \overline{BD}$ (4) $\triangle CDB$ is an isosceles triangle

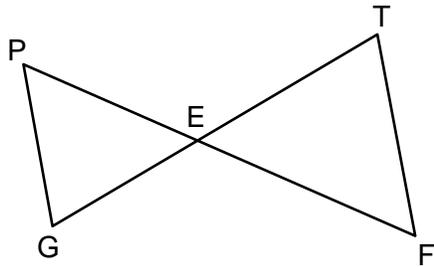
12 Line h is represented by the equation $y = \frac{2}{3}x - 4$.

Which equation represents the line that is perpendicular to line h and passes through the point $(6,1)$?

- (1) $y - 1 = \frac{2}{3}(x - 6)$ (3) $y - 1 = -\frac{3}{2}(x - 6)$
(2) $y + 1 = \frac{2}{3}(x + 6)$ (4) $y + 1 = -\frac{3}{2}(x + 6)$

Use this space for
computations.

- 19 In the diagram below, \overline{GT} and \overline{PF} intersect at E , and $\angle P \cong \angle F$.

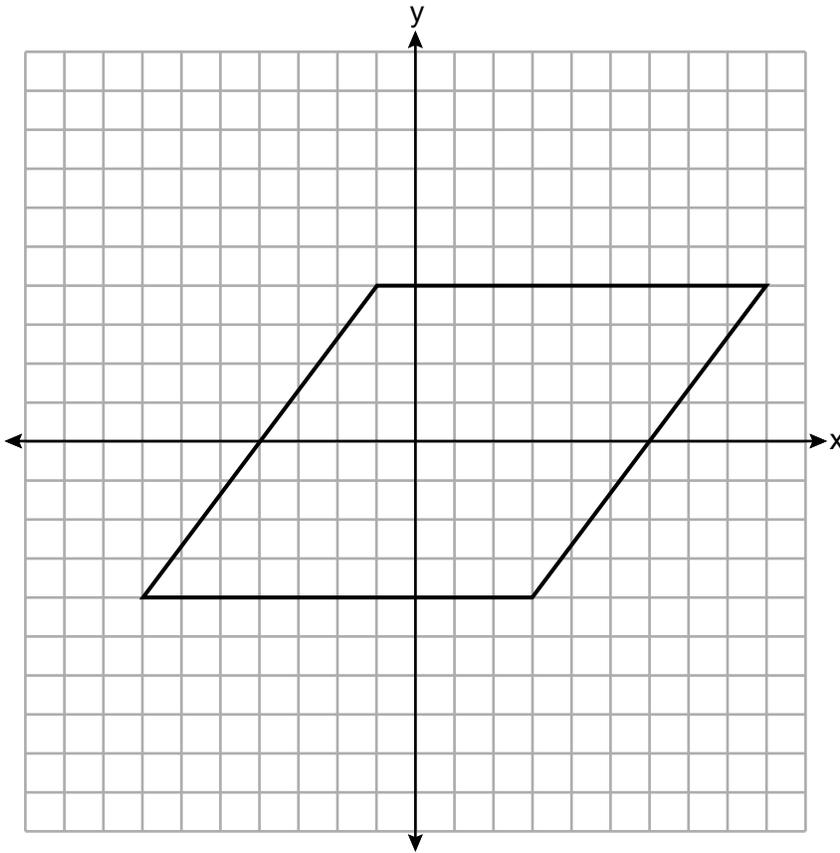


Which equation is always true?

- (1) $\frac{PE}{FE} = \frac{FT}{PG}$ (3) $\frac{PE}{GE} = \frac{TE}{FE}$
(2) $\frac{GE}{TE} = \frac{FT}{PG}$ (4) $\frac{PE}{FE} = \frac{PG}{FT}$
- 20 A section of sidewalk in the shape of a rectangular prism is being replaced. The sidewalk is 10 feet long, 4 feet wide, and 4 inches deep. A brand of concrete mix yields 0.6 cubic foot of concrete per bag. What is the minimum number of bags of concrete mix that must be purchased to completely replace this sidewalk?
- (1) 22 (3) 26
(2) 23 (4) 27
- 21 The line $4x - 6y = 24$ is transformed by a dilation of scale factor 3 centered at the origin. Which equation represents the image of the line after this dilation?
- (1) $y = \frac{2}{3}x - 12$ (3) $y = 2x - 12$
(2) $y = \frac{2}{3}x - 4$ (4) $y = 2x - 4$

Use this space for
computations.

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



Which transformation does *not* carry the rhombus onto itself?

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

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 Triangle $D'A'N'$ is the image of $\triangle DAN$ after a translation.

Explain why $\triangle D'A'N'$ must be congruent to $\triangle DAN$.

26 The table below lists five metals and their densities.

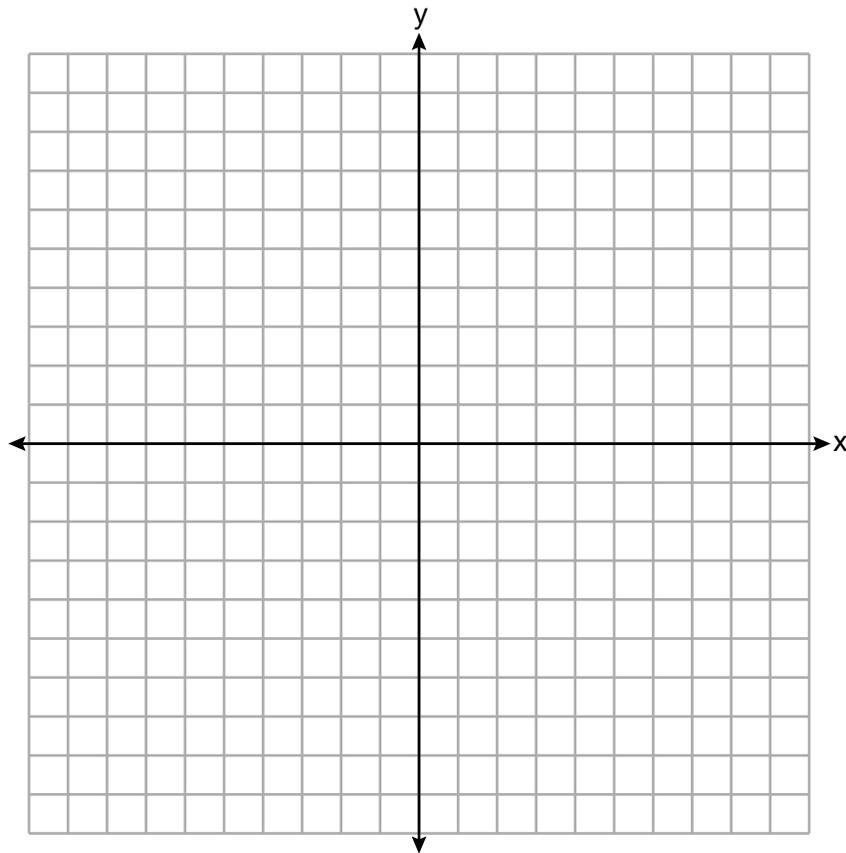
Metal	Density (g/cm³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.

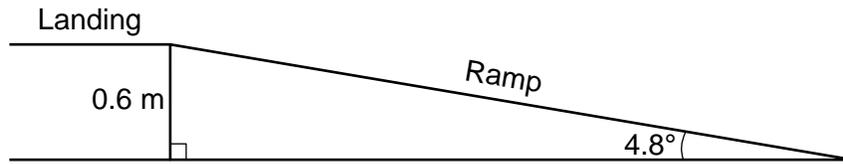
Using the table above, determine and state the type of metal from which this cube is made.

27 The endpoints of \overline{CS} are $C(-3,1)$ and $S(7,6)$. Determine and state the coordinates of point A such that the ratio of $CA:AS$ is $3:2$.

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

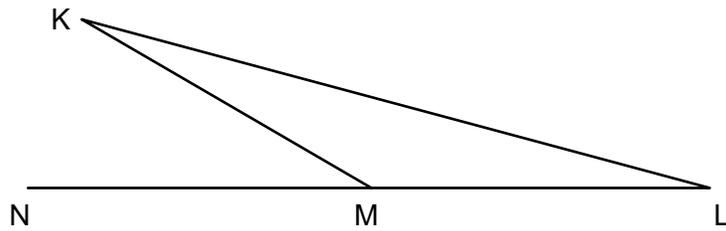


28 The ramp shown in the diagram below has an angle of elevation of 4.8° . The ramp is built to a landing 0.6 m above the ground.



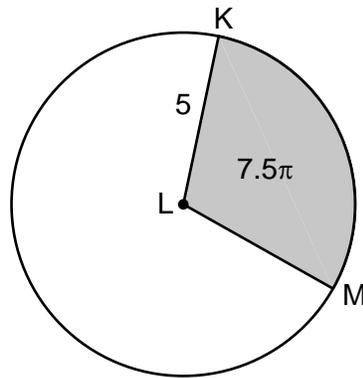
Determine and state the length of the ramp, to the *nearest tenth of a meter*.

29 Angle KML is the vertex angle of isosceles triangle KLM below. Side \overline{LM} is extended through vertex M to point N .



If $m\angle K = 15^\circ$, determine and state $m\angle KMN$.

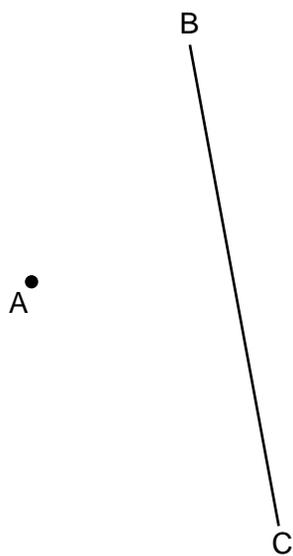
30 In the diagram below of circle L , the area of the shaded sector KLM is 7.5π and $LK = 5$.



Determine and state the degree measure of angle KLM , the central angle of the shaded sector.

31 Using a compass and straightedge, construct the image of point A after a reflection over \overline{BC} .

[Leave all construction marks.]



Part III

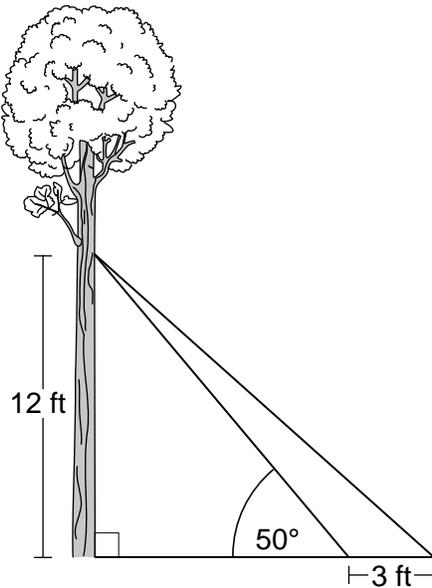
Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily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

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

$$[1000 \text{ cm}^3 = 1 \text{ liter}]$$

- 33** As modeled in the diagram below, two cables are attached from a point on a tree 12 feet above the ground. The longer cable is anchored on the ground 3 feet farther from the tree than the shorter cable is anchored. The angle of elevation between the shorter cable and the ground is 50° .

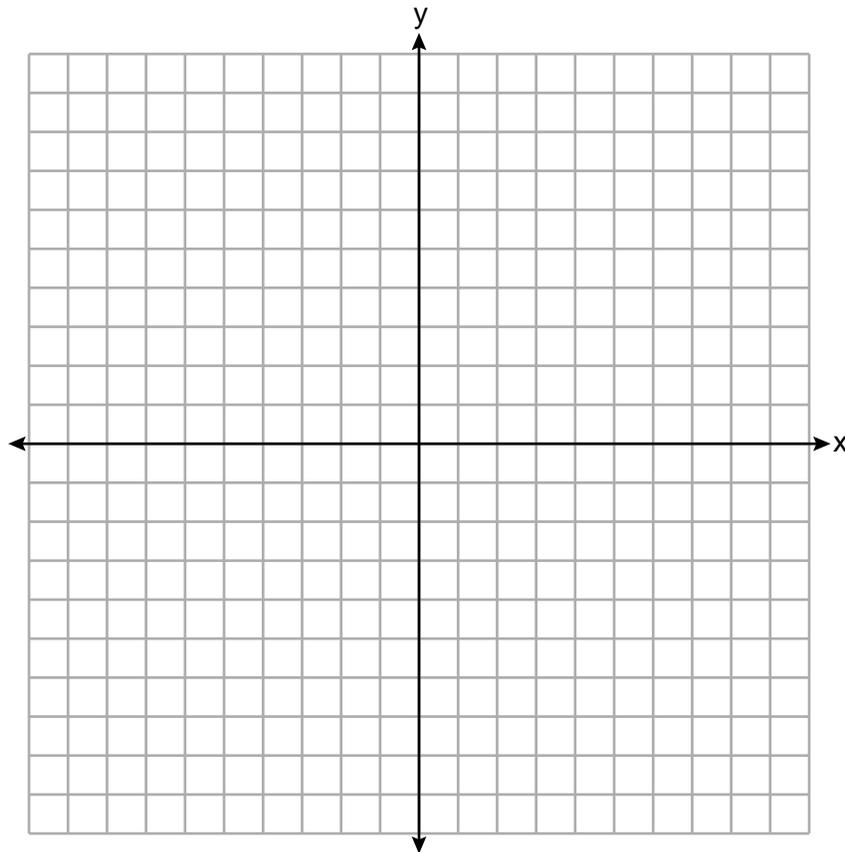


Determine and state, to the *nearest foot*, the distance from the base of the tree to the point where the longer cable is attached to the ground.

Determine and state, to the *nearest degree*, the angle of elevation between the longer cable and the ground.

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

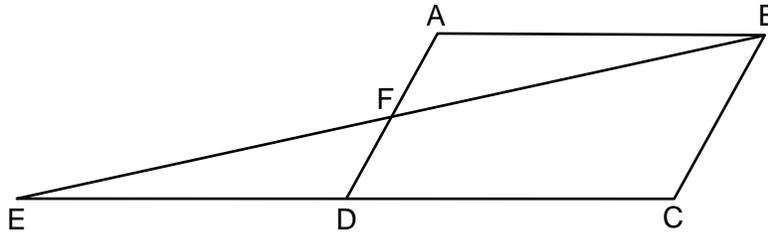
Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]



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 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.

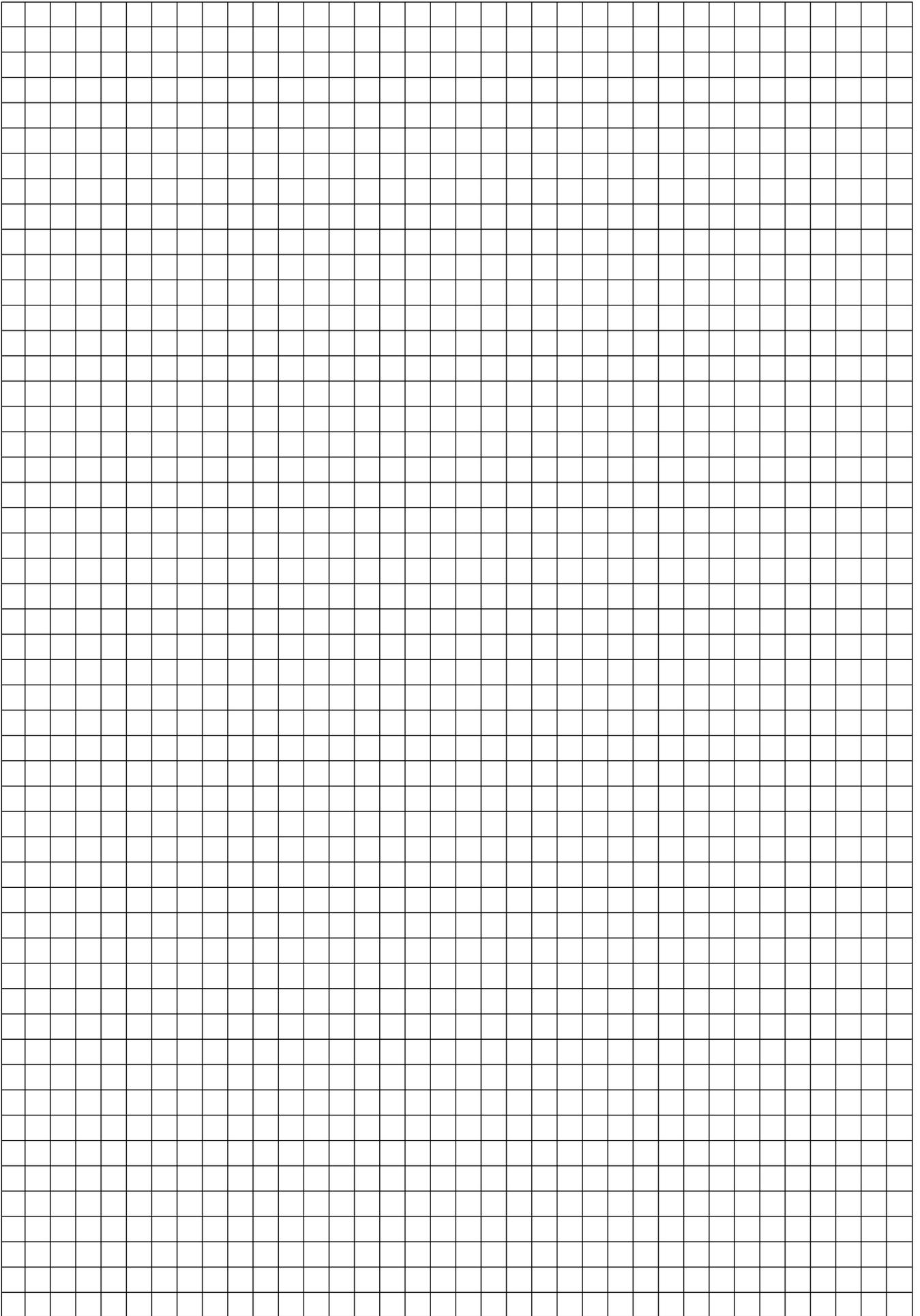


Prove $ABCD$ is a parallelogram.

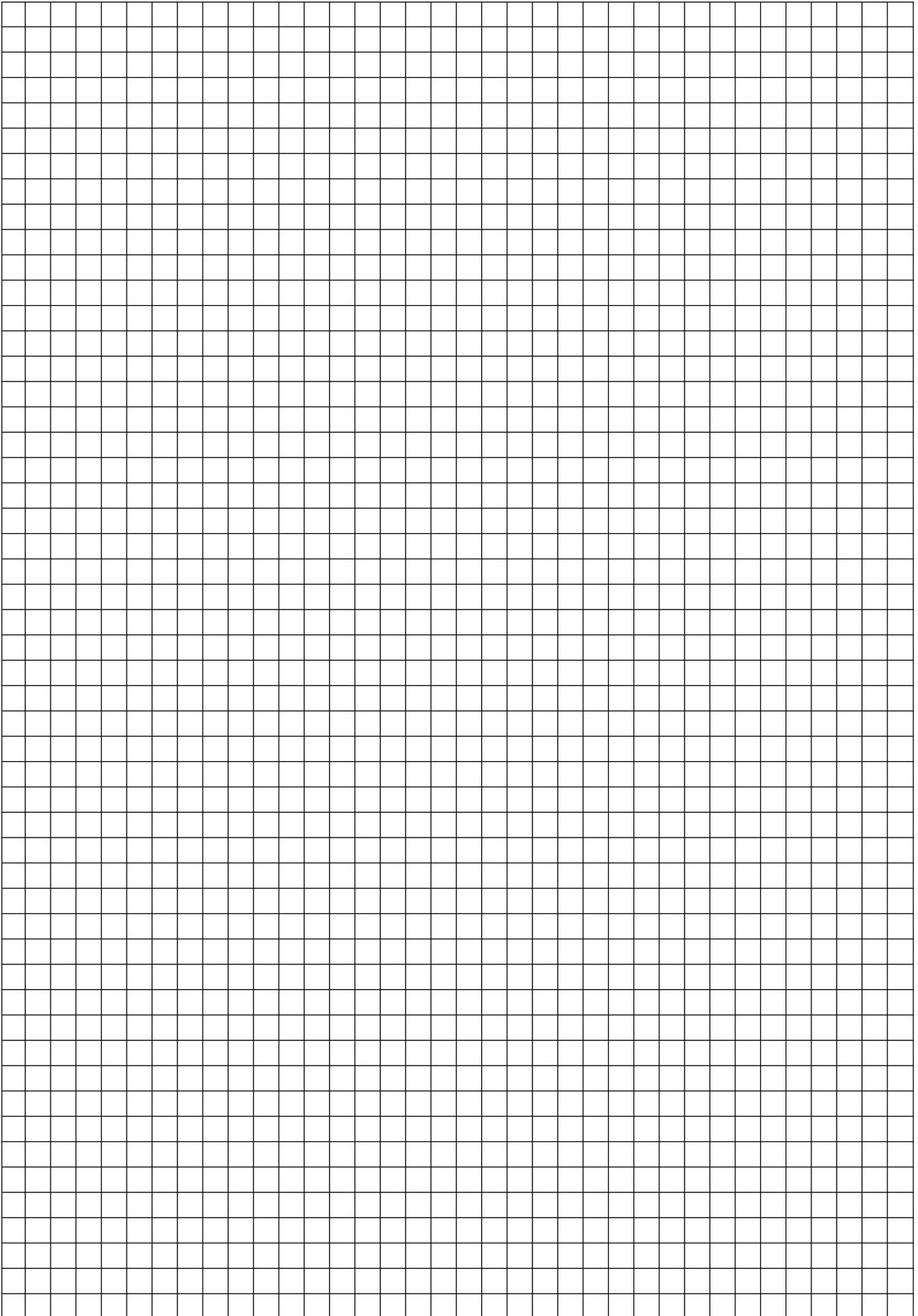
Scrap Graph Paper — this sheet will *not* be scored.

Tear Here

Tear Here



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



Tear Here

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Reference Sheet for Geometry

Volume	Cylinder	$V = Bh$ where B is the area of the base
	General Prism	$V = Bh$ where B is the area of the base
	Sphere	$V = \frac{4}{3}\pi r^3$
	Cone	$V = \frac{1}{3}Bh$ where B is the area of the base
	Pyramid	$V = \frac{1}{3}Bh$ where B is the area of the base

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Regents Examination in Geometry – August 2025

Scoring Key: Part I (Multiple-Choice Questions)

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

Regents Examination in Geometry – August 2025

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

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

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

The chart for determining students' final examination scores for the **August 2025 Regents Examination in Geometry** will be posted on the Department's web site at: <https://www.nysedregents.org/geometryre/> no later than August 20, 2025. Conversion charts provided for the previous administrations of the Regents Examination in Geometry must NOT be used to determine students' final scores for this administration.

FOR TEACHERS ONLY

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

GEOMETRY

Wednesday, August 20, 2025 — 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: <https://www.nysed.gov/state-assessment/high-school-regents-examinations> and select the link "Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

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

Mechanics of Rating

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

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

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

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

Raters should record the student's scores for all questions and the total raw score on the student's separate answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: <https://www.nysed.gov/state-assessment/high-school-regents-examinations> by Wednesday, August 20, 2025. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

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

II. Full-Credit Responses

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

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

III. Appropriate Work

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

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

IV. Multiple Errors

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

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

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

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

Part II

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

- (25) [2] A complete and correct explanation is written.
- [1] An appropriate explanation is written, but one conceptual error is made.
- or*
- [1] An appropriate explanation is written, but it is incomplete or partially correct.
- [0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.
- (26) [2] Iron is indicated, and correct work is shown.
- [1] Appropriate work is shown, but one computational error is made.
- or*
- [1] Appropriate work is shown, but one conceptual error is made.
- or*
- [1] Correct work is shown to find the density of the metal cube, but the choice of metal is missing or incorrect.
- or*
- [1] Iron, but no work is shown.
- [0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

- (27) [2] (3,4), and correct work is shown.
- [1] Appropriate work is shown, but one computational or graphing error is made. Appropriate coordinates are stated.
- or*
- [1] Appropriate work is shown, but one conceptual error is made. Appropriate coordinates are stated.
- or*
- [1] Correct work is shown, and point A is indicated on the set of axes, but the coordinates are not stated or are stated incorrectly.
- or*
- [1] (3,4), but no work is shown.
- [0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.
- (28) [2] 7.2, 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] 7.2, but no work is shown.
- [0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(29) [2] 30, and correct work is shown, such as an appropriately 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] 30, but no work is shown.

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

(30) [2] 108, 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] 108, but no work is shown.

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

- (31) [2] A correct construction is drawn showing all appropriate arcs.
- [1] An appropriate construction is drawn, but one construction error is made.
- [0] A drawing that is not an appropriate construction is shown.

or

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

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] 9, and correct work is shown.

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

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

or

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

or

[2] Correct work is shown to find the number of liters of water in the cylindrical bucket at a height of 26 cm, but no further correct work is shown.

or

[2] Correct work is shown to find the volume of water in the cylindrical bucket at a height of 26 cm and the volume of the tank in cubic centimeters, but no further correct work is shown.

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

or

[1] Correct work is shown to find the volume of water in the cylindrical bucket at a height of 26 cm, but no further correct work is shown.

or

[1] Correct work is shown to find the volume of the tank in cubic centimeters, but no further correct work is shown.

or

[1] 9, but no work is shown.

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

- (33) [4] 13 and 43, and correct work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- [2] Appropriate work is shown, but two or more computational or rounding errors are made.
- or***
- [2] Correct work is shown to find the horizontal distance from the base of the tree to the longer cable, but no further correct work is shown.
- [1] A correct relevant trigonometric equation is written, but no further correct work is shown.
- or***
- [1] 13 and 43, but no work is shown.
- [0] 13 or 43, but no work is shown.
- or***
- [0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

- (34) [4] Correct work is shown to prove *READ* is a rectangle, and correct concluding statements are written.
- [3] Appropriate work is shown, but one computational or graphing error is made. Appropriate concluding statements are written.
- or**
- [3] Appropriate work is shown, but one concluding statement is missing or incorrect.
- [2] Appropriate work is shown, but two or more computational or graphing errors are made. Appropriate concluding statements are written.
- or**
- [2] Appropriate work is shown, but one conceptual error is made.
- or**
- [2] Correct work is shown to prove *READ* is a parallelogram and a correct concluding statement is written, but no further correct work is shown.
- [1] Correct work is shown to prove *READ* is a parallelogram, but the concluding statement is missing or incorrect.
- [0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.
-

Part IV

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

- (35) [6] 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.
- [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.
- or*
- [3] $\triangle ABF \cong \triangle DEF$ is proven, but no further correct work is shown.
- [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 or more statements and/or reasons are missing or incorrect.
- [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 does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.
-

**Map to the Learning Standards
Geometry
August 2025**

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

The *Chart for Determining the Final Examination Score for the August 2025 Regents Examination in Geometry* will be posted on the Department's web site at: <https://www.nysed.gov/state-assessment/high-school-regents-examinations>. Conversion charts provided for previous administrations of the Regents Examination in Geometry must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

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

1. Go to <https://www.nysed.gov/state-assessment/teacher-feedback-state-assessments>.
2. Click Regents Examinations.
3. Complete the required demographic fields.
4. Select the test title from the Regents Examination dropdown list.
5. Complete each evaluation question and provide comments in the space provided.
6. Click the SUBMIT button at the bottom of the page to submit the completed form.

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

GEOMETRY

Wednesday, August 20, 2025 — 12:30 to 3:30 p.m., only

MODEL RESPONSE SET

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Question 25

25 Triangle $D'A'N'$ is the image of $\triangle DAN$ after a translation.

Explain why $\triangle D'A'N'$ must be congruent to $\triangle DAN$.

Translations, or slides, are rigid motions, so they preserve all corresponding congruencies.

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

Question 25

25 Triangle $D'A'N'$ is the image of $\triangle DAN$ after a translation.

Explain why $\triangle D'A'N'$ must be congruent to $\triangle DAN$.

Translation is one of the rigid motions and the corresponding side lengths and angle ~~measures~~ measures of the triangle are preserved.

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

Question 25

25 Triangle $D'A'N'$ is the image of $\triangle DAN$ after a translation.

Explain why $\triangle D'A'N'$ must be congruent to $\triangle DAN$.

A translation preserves corresponding distances,
so $\triangle D'A'N' \cong \triangle DAN$ by $SSS \cong SSS$.

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

Question 25

25 Triangle $D'A'N'$ is the image of $\triangle DAN$ after a translation.

Explain why $\triangle D'A'N'$ must be congruent to $\triangle DAN$.

Translations preserve angle
measure and distance

Score 1: The student wrote an incomplete explanation.

Question 25

25 Triangle $D'A'N'$ is the image of $\triangle DAN$ after a translation.

Explain why $\triangle D'A'N'$ must be congruent to $\triangle DAN$.



A translation preserves
shape and size. only a dilation
changes size.

Score 1: The student wrote an incomplete explanation.

Question 25

25 Triangle $D'A'N'$ is the image of $\triangle DAN$ after a translation.

Explain why $\triangle D'A'N'$ must be congruent to $\triangle DAN$.

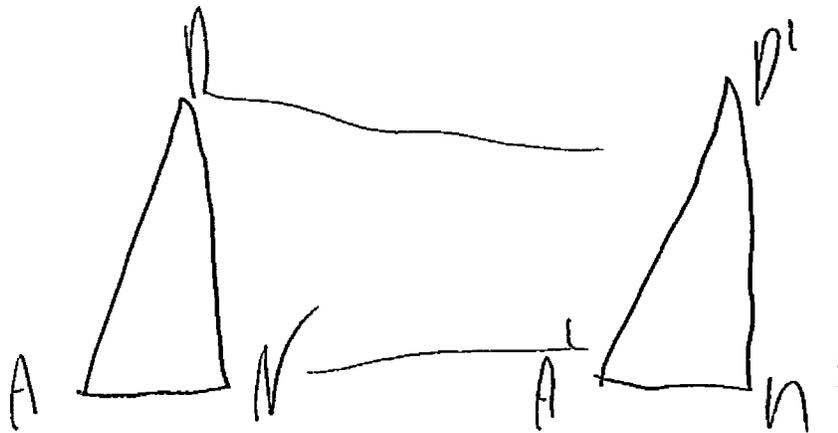
A translation is a rigid motion and rigid motions preserve angle measure so $\triangle DAN \cong \triangle D'A'N'$

Score 1: The student wrote an incomplete explanation.

Question 25

25 Triangle $D'A'N'$ is the image of $\triangle DAN$ after a translation.

Explain why $\triangle D'A'N'$ must be congruent to $\triangle DAN$.



must be \cong because
It is a translation

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

Question 25

25 Triangle $D'A'N'$ is the image of $\triangle DAN$ after a translation.

Explain why $\triangle D'A'N'$ must be congruent to $\triangle DAN$.

$D'A'N'$ is congruent to
 DAN because they are
~~the~~ are the same shape

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

Question 26

26 The table below lists five metals and their densities.

Metal	Density (g/cm ³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.

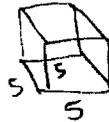
Using the table above, determine and state the type of metal from which this cube is made.

$$D = \frac{982.5}{5^3}$$

$$D = \frac{982.5}{125}$$

$$D = 7.86$$

ANS: THE CUBE
IS MADE OF IRON



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

Question 26

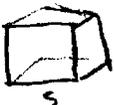
26 The table below lists five metals and their densities.

Metal	Density (g/cm ³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.

Using the table above, determine and state the type of metal from which this cube is made.

982.5 g



$V = Bh$
 $V = 25 \cdot 5$
 $V = 125 \text{ cm}^3$

$$\frac{982.5 \text{ g}}{125 \text{ cm}^3} = 7.86$$

Area of base = l · w
 $5 \cdot 5 = 25$

The solid metal cube is made of Iron. Iron weighs 7.86 g per cm³.

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

Question 26

26 The table below lists five metals and their densities.

Metal	Density (g/cm ³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.

Using the table above, determine and state the type of metal from which this cube is made.

$$D = \frac{M}{V} \quad V = b \cdot h$$

zinc tin iron copper silver

$$7.14 = \frac{x}{5^3} \quad 7.31 = \frac{x}{5^3} \quad 7.86 = \frac{x}{5^3} \quad 8.96 = \frac{x}{5^3} \quad 10.5 = \frac{x}{5^3}$$

892.5 913.75 982.5 1120 1312.5

The solid metal cube is made out of
Iron

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

Question 26

26 The table below lists five metals and their densities.

Metal	Density (g/cm³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.

Using the table above, determine and state the type of metal from which this cube is made.

$$\frac{982.5}{5^3} = 7.86$$

Iron

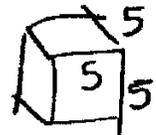
Score 2: The student gave a complete and correct response.

Question 26

26 The table below lists five metals and their densities.

Metal	Density (g/cm ³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.



Using the table above, determine and state the type of metal from which this cube is made.

$$5 \times 5 \times 5 = 125$$

$$982.5 / 125 = 7.31$$

tin

Score 1: The student made a computational error.

Question 26

26 The table below lists five metals and their densities.

Metal	Density (g/cm³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.

Using the table above, determine and state the type of metal from which this cube is made.

The cube is made with iron. $982.5 = 982.5 \text{ grams}$.

Score 1: The student determined the correct metal but did not show work.

Question 26

26 The table below lists five metals and their densities.

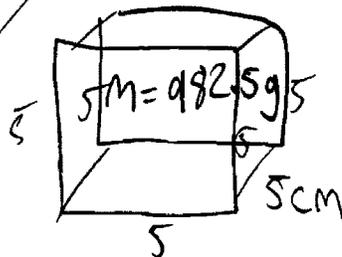
Metal	Density (g/cm ³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

Cube is
Take a
saw

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.

Using the table above, determine and state the type of metal from which this cube is made.

Answer is
Iron



$$D = \frac{982.5}{125} = 7.86$$

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

$$V = l \cdot w \cdot h$$

$$V = 5 \cdot 5 \cdot 5$$

$$V = 125$$

Score 1: The student made a transcription error when finding the density of the cube, but found an appropriate metal.

Question 26

26 The table below lists five metals and their densities.

Metal	Density (g/cm ³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.

Using the table above, determine and state the type of metal from which this cube is made.

982.5 grams

$$7.14 = \frac{982.5}{5 \text{ cm}} = 7.14 \text{ density}$$

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

Question 26

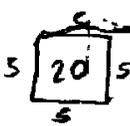
26 The table below lists five metals and their densities.

Metal	Density (g/cm ³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.

Using the table above, determine and state the type of metal from which this cube is made.

982.5



20.6 = 120

$$982.5 / 120 = 8.18$$

The type of metal that the cube is made out of is Cooper

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

Question 26

26 The table below lists five metals and their densities.

Metal	Density (g/cm ³)
Zinc	7.14
Tin	7.31
Iron	7.86
Copper	8.96
Silver	10.5

A solid metal cube has an edge length of 5 cm and a mass of 982.5 grams.

Using the table above, determine and state the type of metal from which this cube is made.

$$\begin{array}{r} 7.14 \\ \times 5 \\ \hline 35.7 \end{array}$$
$$\begin{array}{r} 982.5 \\ \div 5.0 \\ \hline 196.5 \text{ g/cm} \end{array}$$

Copper

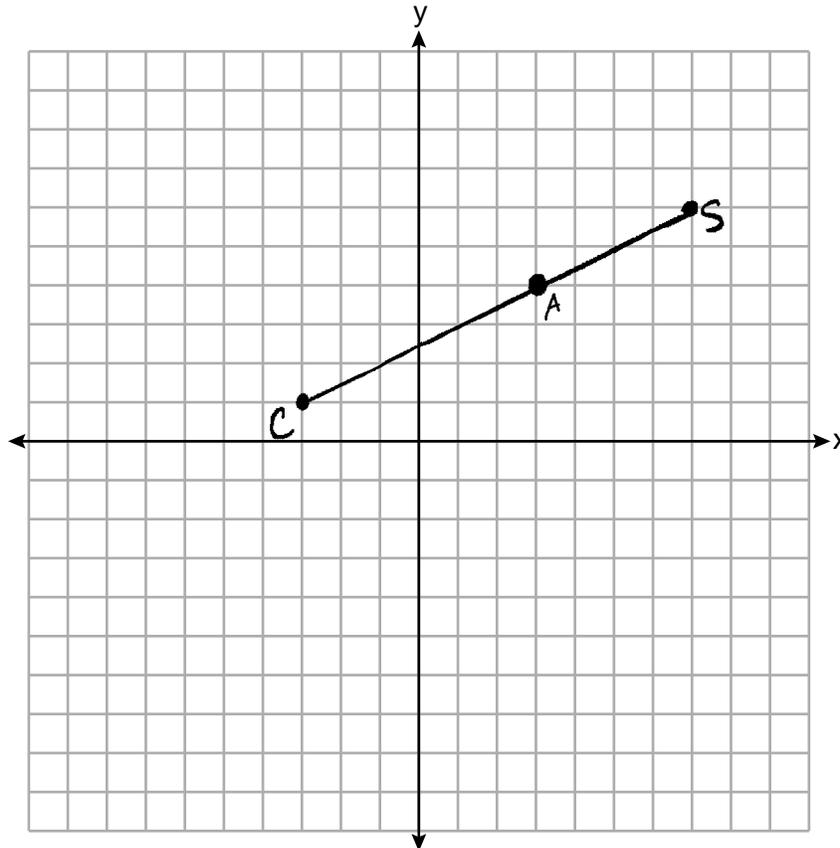
Score 0: The student did not show enough correct work to receive any credit.

Question 27

27 The endpoints of \overline{CS} are $C(-3,1)$ and $S(7,6)$. Determine and state the coordinates of point A such that the ratio of $CA:AS$ is 3:2. **5 parts**

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

$$\begin{aligned} & \left(x, +\frac{3}{5}(\Delta x), y, +\frac{3}{5}(\Delta y)\right) \\ & \left(-3+\frac{3}{5}(10), 1+\frac{3}{5}(5)\right) \\ & (-3+6, 1+3) \\ & \text{A } (3, 4) \end{aligned}$$



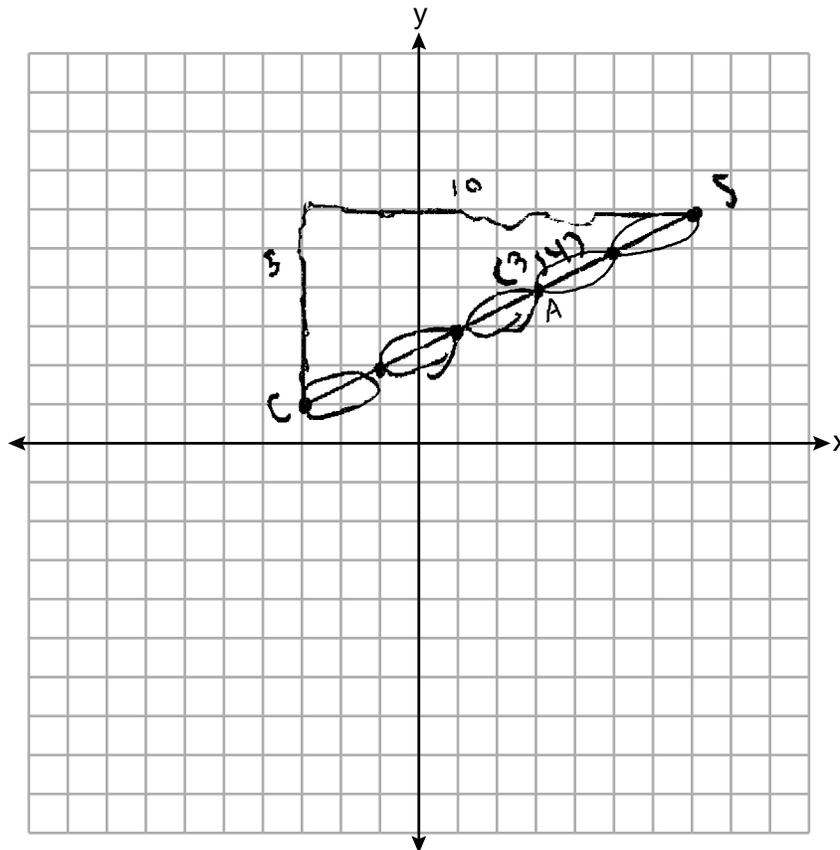
Score 2: The student gave a complete and correct response.

Question 27

27 The endpoints of \overline{CS} are $C(-3,1)$ and $S(7,6)$. Determine and state the coordinates of point A such that the ratio of $CA:AS$ is $3:2$.

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

point $A = (3, 4)$



$\frac{3}{5} = \frac{2}{10}$

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

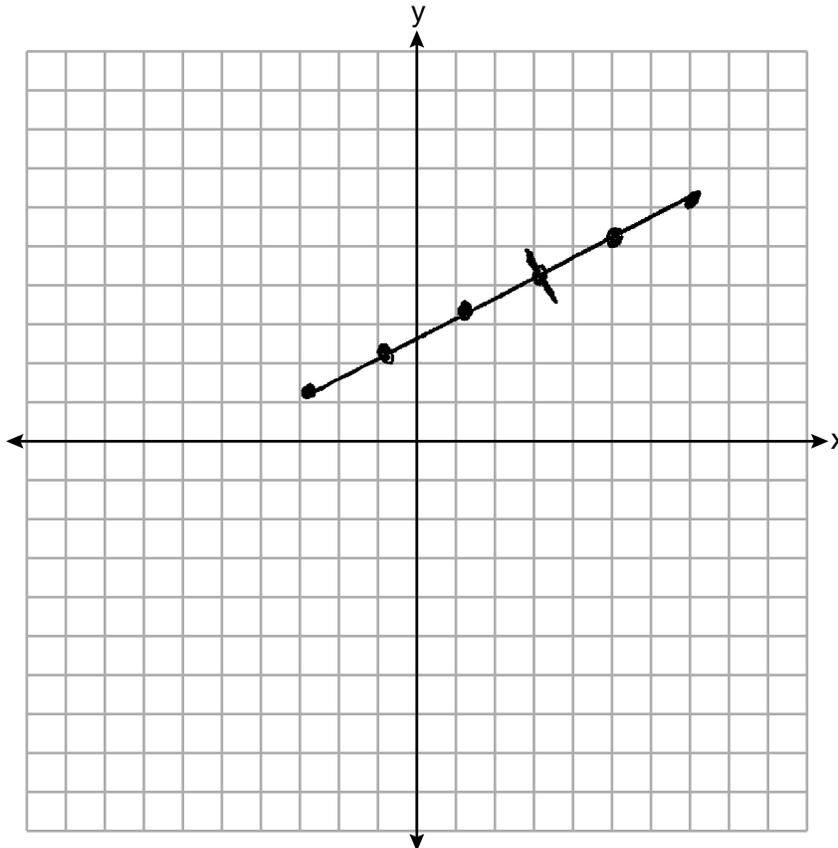
Question 27

27 The endpoints of \overline{CS} are $C(-3,1)$ and $S(7,6)$. Determine and state the coordinates of point A such that the ratio of $CA:AS$ is $3:2$.

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

$$A = (3, 4)$$

$$m = \frac{5}{10} = \frac{1}{2}$$



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

Question 27

27 The endpoints of \overline{CS} are $C(-3,1)$ and $S(7,6)$. Determine and state the coordinates of point A such that the ratio of $CA:AS$ is $3:2$.

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

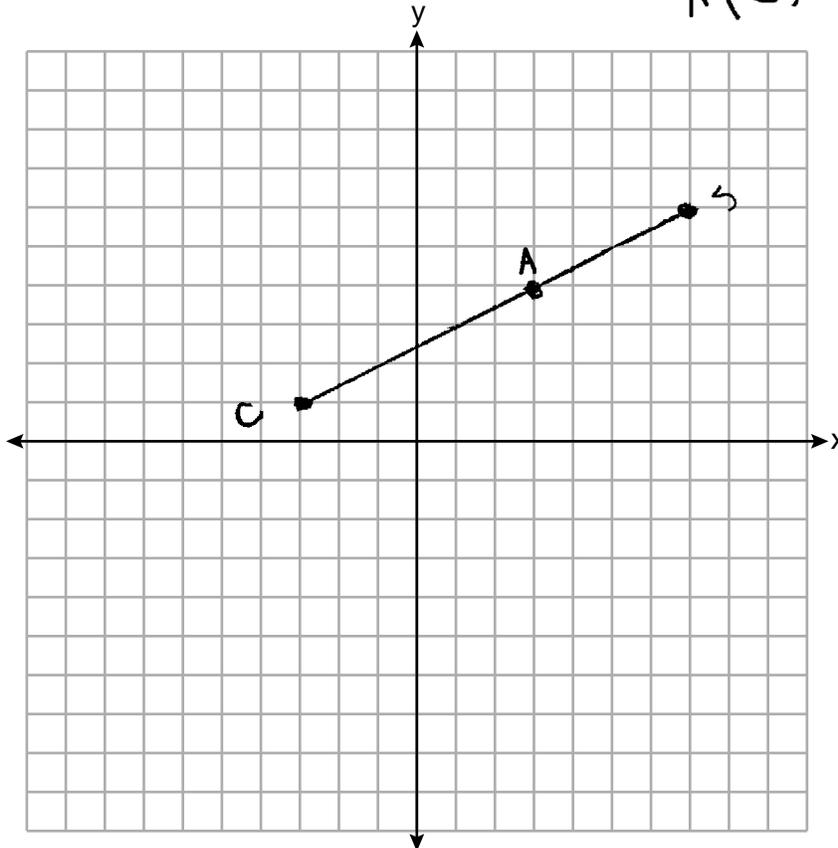
$$\text{horiz} = \left| \frac{3}{5} \cdot \frac{10}{1} \right| = 6$$

$$\text{vert} = \left| \frac{3}{5} \cdot \frac{5}{1} \right| = 3$$

$$C(-3, 1)$$

$$+6 \quad +3$$

$$A(3, 4)$$

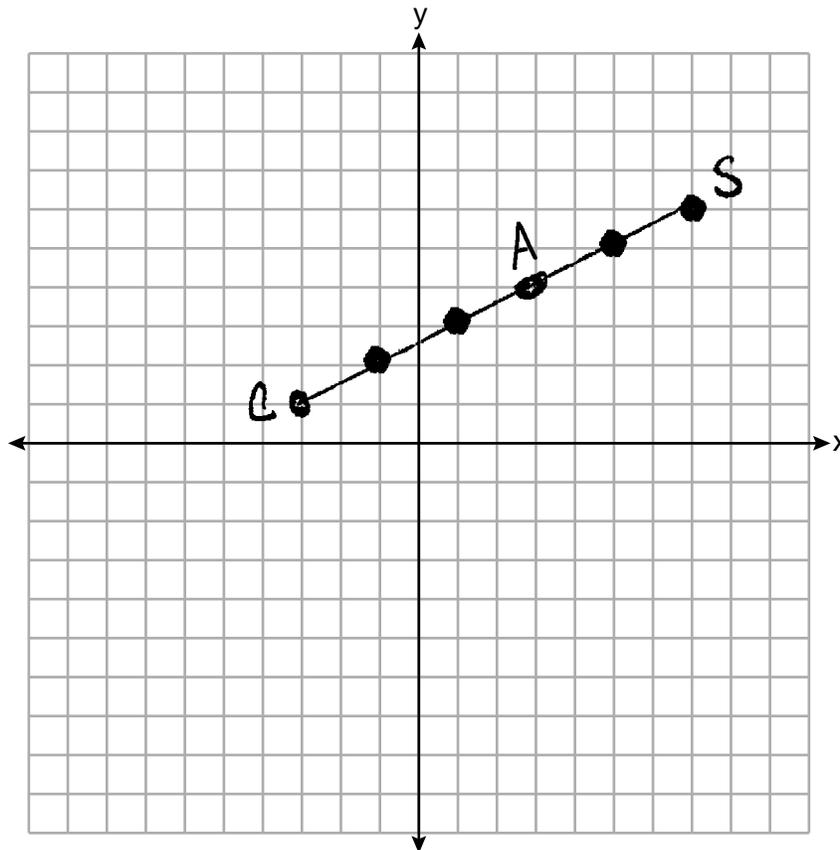


Score 2: The student gave a complete and correct response.

Question 27

27 The endpoints of \overline{CS} are $C(-3,1)$ and $S(7,6)$. Determine and state the coordinates of point A such that the ratio of $CA:AS$ is $3:2$.

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



Score 1: The student correctly indicated point A , but the coordinates of A were not stated as a point.

Question 27

27 The endpoints of \overline{CS} are $C(-3,1)$ and $S(7,6)$. Determine and state the coordinates of point A such that the ratio of $CA:AS$ is $3:2$.

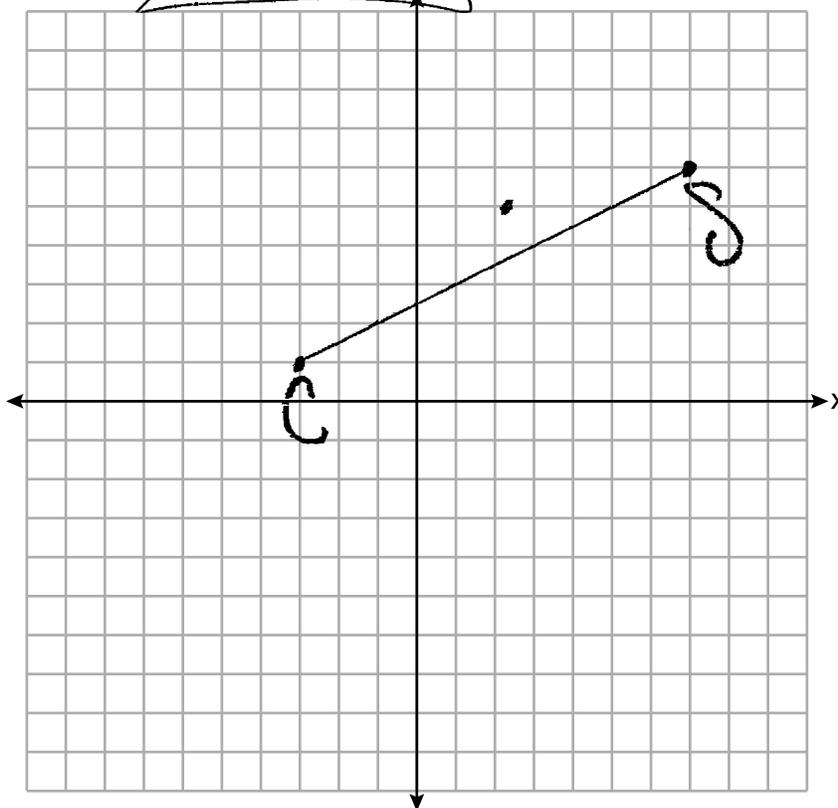
[The use of the set of axes below is optional.]

$$P = \left(\frac{ax_1 + by_2}{a+b}, \frac{ay_1 + by_2}{a+b} \right)$$

$$P = \left(\frac{3(-1) + 2(7)}{3+2}, \frac{3(1) + 2(6)}{3+2} \right)$$

$$P = \left(\frac{-3+14}{5}, \frac{3+12}{5} \right)$$

$$P = \left(\frac{11}{5}, 3 \right)$$



Score 0: The student used an incorrect formula and made an incorrect substitution into their formula.

Question 27

27 The endpoints of \overline{CS} are $C(-3,1)$ and $S(7,6)$. Determine and state the coordinates of point A such that the ratio of $CA:AS$ is $3:2$.

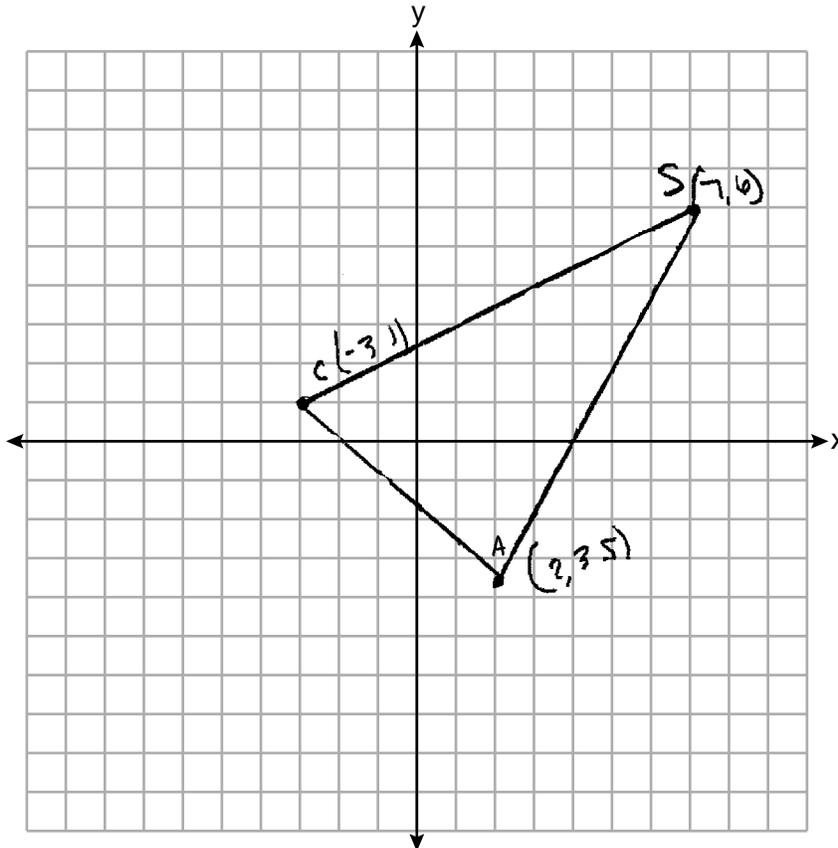
[The use of the set of axes below is optional.]

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

$$\frac{1-6}{-3-7} = \frac{-5}{-10}$$

$$\frac{-3+7}{2} = \frac{1+6}{2}$$

$$(2, 3.5)$$



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

Question 27

27 The endpoints of \overline{CS} are $C(-3,1)$ and $S(7,6)$. Determine and state the coordinates of point A such that the ratio of $CA:AS$ is 3:2.

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

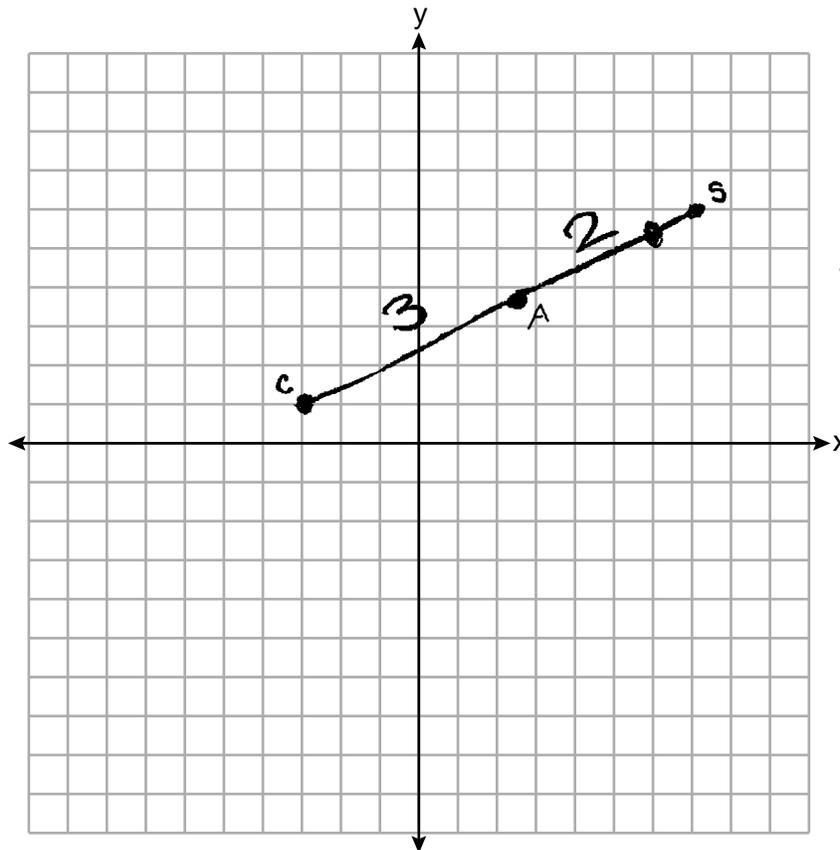
$$-3 + \frac{3}{5}(-3+7)$$

$$-1.6$$

$$1 + \frac{3}{5}(1+6)$$

$$-5.6$$

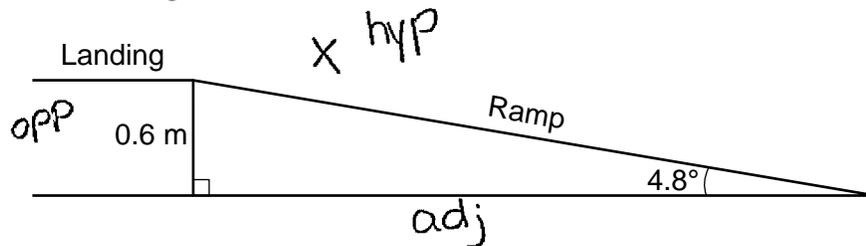
$$(-6, 5.6)$$



Score 0: The student used an incorrect formula, and made a computational error.

Question 28

28 The ramp shown in the diagram below has an angle of elevation of 4.8° . The ramp is built to a landing 0.6 m above the ground.



Determine and state the length of the ramp, to the *nearest tenth of a meter*.

$$\frac{O}{H} \quad \frac{A}{H} \quad \frac{T}{A}$$

$$\frac{\sin(4.8)}{1} = \frac{0.6}{x}$$

$$\frac{\sin(4.8) \times}{\sin(4.8)} = \frac{0.6}{\sin(4.8)}$$

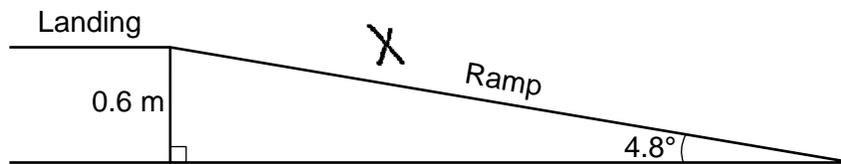
$$x = 7.17$$

$$x = 7.2$$

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

Question 28

28 The ramp shown in the diagram below has an angle of elevation of 4.8° . The ramp is built to a landing 0.6 m above the ground.



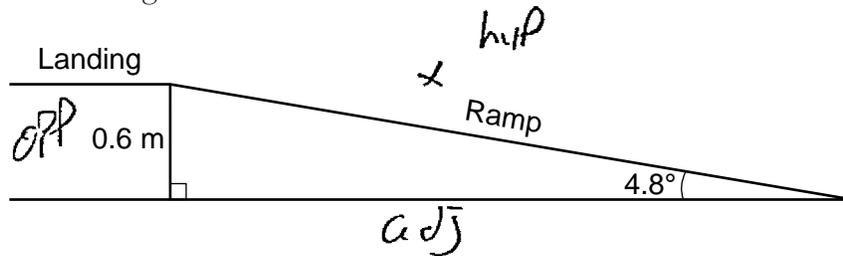
Determine and state the length of the ramp, to the *nearest tenth of a meter*.

$$\begin{aligned} \text{SDH} \\ \sin(4.8) &= \frac{0.6}{X} \\ \frac{\sin(4.8) \cdot X}{\sin(4.8)} &= \frac{0.6}{\sin(4.8)} \\ X &= 7.2 \text{ m} \end{aligned}$$

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

Question 28

28 The ramp shown in the diagram below has an angle of elevation of 4.8° . The ramp is built to a landing 0.6 m above the ground.



Determine and state the length of the ramp, to the nearest tenth of a meter.

Soh-Cah-Toa

$$\sin\left(\frac{4.8}{1}\right) = \frac{.6}{x}$$

$$\begin{aligned} \sin(4.8) \\ &= .0836778433 \\ &\times 6 = .50206706 \end{aligned}$$

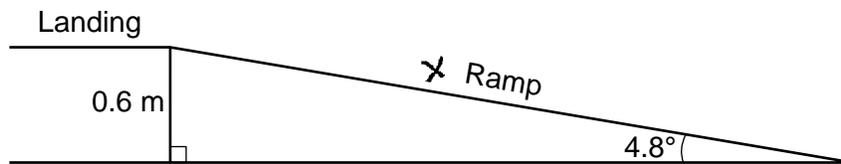
$$r_{amp} = \frac{1}{2} \text{ meter}$$

$$r_{amp} = .5 \text{ meters}$$

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

Question 28

28 The ramp shown in the diagram below has an angle of elevation of 4.8° . The ramp is built to a landing 0.6 m above the ground.



Determine and state the length of the ramp, to the *nearest tenth of a meter*.

$$x \cdot \sin(4.8) = \frac{0.6}{x} \cdot x$$

$$\sin(4.8)(x) = 0.6$$

$$\frac{0.1x}{0.1} = \frac{0.6}{0.1}$$

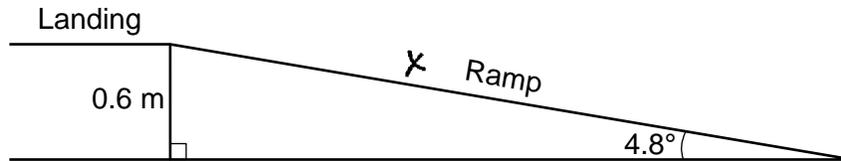
$$x = 6$$

The length of the ramp is 6 m.

Score 1: The student made a rounding error when determining $\sin 4.8^\circ$.

Question 28

28 The ramp shown in the diagram below has an angle of elevation of 4.8° . The ramp is built to a landing 0.6 m above the ground.



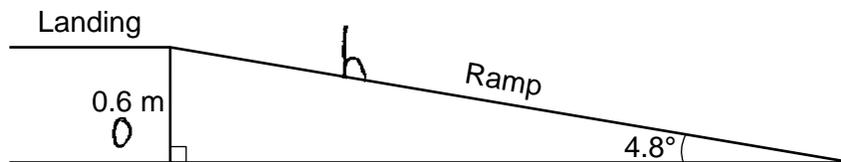
Determine and state the length of the ramp, to the *nearest tenth of a meter*.

$$\tan 4.8 = \frac{0.6}{x} \quad \boxed{X=7.1}$$

Score 1: The student wrote an incorrect trigonometric equation, but solved it appropriately.

Question 28

28 The ramp shown in the diagram below has an angle of elevation of 4.8° . The ramp is built to a landing 0.6 m above the ground.



Determine and state the length of the ramp, to the nearest tenth of a meter.

$$\begin{aligned} 4.8^2 + 0.6^2 &= c^2 \\ 23.04 + 0.36 &= c^2 \\ \sqrt{23.4} &= c \\ 4.8 &= c \end{aligned}$$

Soh
Cab
Tdh

$$\frac{\sin X}{4.8} = \frac{0.6}{0.6}$$

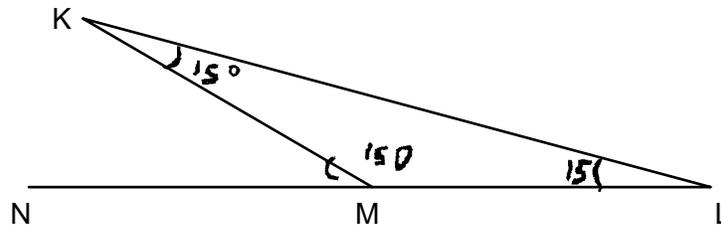
$$\sin(0.6) = 4.8$$

$$X = 8.5$$

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

Question 29

29 Angle KML is the vertex angle of isosceles triangle KLM below. Side \overline{LM} is extended through vertex M to point N .



If $m\angle K = 15^\circ$, determine and state $m\angle KMN$.

Isosceles triangle has the same base angle and the
Sum of two interior angles = exterior angle

$$\angle K + \angle L = \angle KMN$$

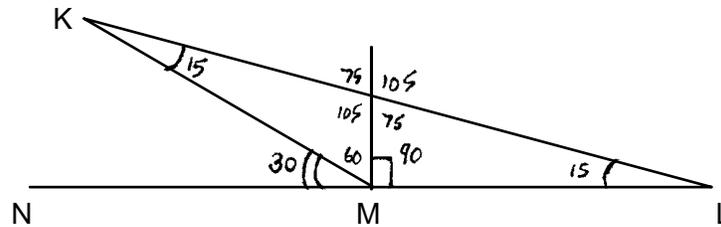
$$m\angle KMN = 15 + 15$$

$$\boxed{30^\circ}$$

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

Question 29

29 Angle KML is the vertex angle of isosceles triangle KLM below. Side \overline{LM} is extended through vertex M to point N .



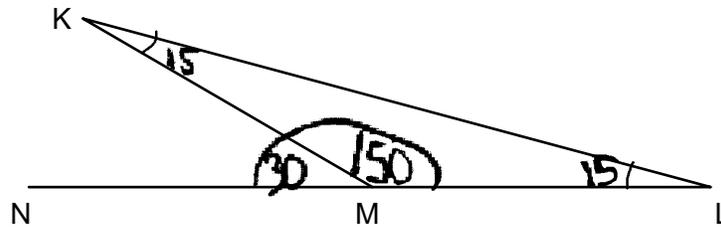
If $m\angle K = 15^\circ$, determine and state $m\angle KMN$.

$$m\angle KMN = 30^\circ$$

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

Question 29

29 Angle KML is the vertex angle of isosceles triangle KLM below. Side \overline{LM} is extended through vertex M to point N .



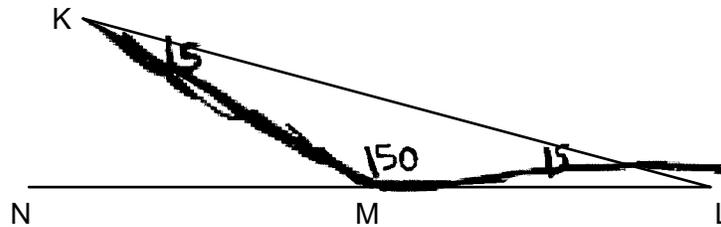
If $m\angle K = 15^\circ$, determine and state $m\angle KMN$.

$$m\angle KMN = 30^\circ$$

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

Question 29

29 Angle KML is the vertex angle of isosceles triangle KLM below. Side \overline{LM} is extended through vertex M to point N .



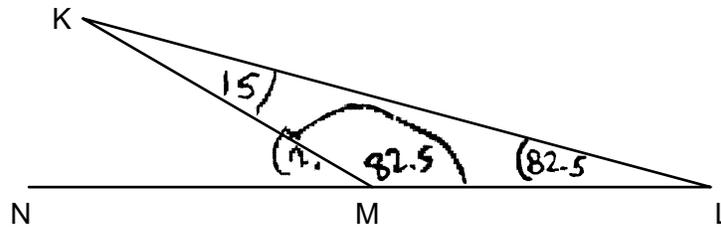
If $m\angle K = 15^\circ$, determine and state $m\angle KMN$.

$$180 - 30 = 150$$

Score 1: The student determined the measure of $\angle LMK$.

Question 29

29 Angle KML is the vertex angle of isosceles triangle KLM below. Side \overline{LM} is extended through vertex M to point N .



If $m\angle K = 15^\circ$, determine and state $m\angle KMN$.
 $180 - 15 = 165$
 $\frac{165}{2} = 82.5$

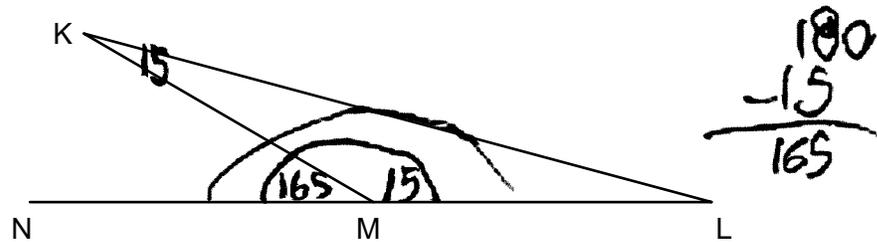
$$180 - 82.5 = 97.5$$

$$m\angle KMN = 97.5$$

Score 1: The student made an error in determining the measure of $\angle KML$.

Question 29

29 Angle KML is the vertex angle of isosceles triangle KLM below. Side \overline{LM} is extended through vertex M to point N .



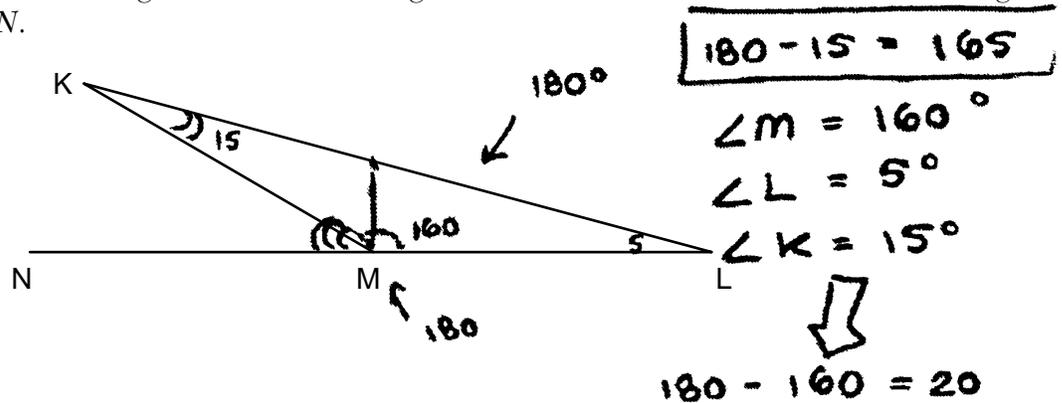
If $m\angle K = 15^\circ$, determine and state $m\angle KMN$.

$m\angle KMN = 165$

Score 1: The student made an error in determining the measure of $\angle KML$.

Question 29

29 Angle KML is the vertex angle of isosceles triangle KLM below. Side \overline{LM} is extended through vertex M to point N .



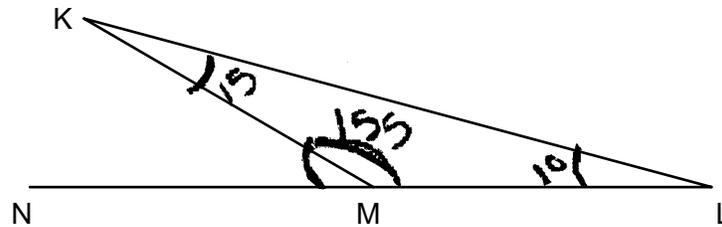
If $m\angle K = 15^\circ$, determine and state $m\angle KMN$.

$$m\angle KMN = 20^\circ$$

Score 0: The student made a conceptual error in not using isosceles triangle KLM and made an error in assuming $m\angle L = 5^\circ$.

Question 29

29 Angle KML is the vertex angle of isosceles triangle KLM below. Side \overline{LM} is extended through vertex M to point N .



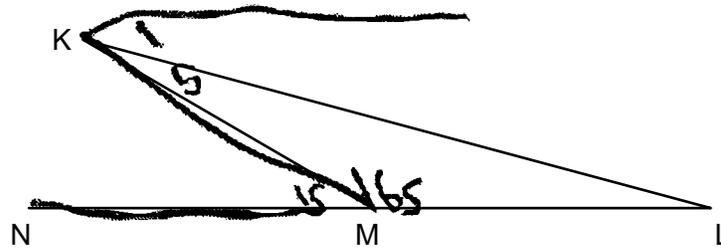
If $m\angle K = 15^\circ$, determine and state $m\angle KMN$.

$\triangle = 180$
 $K = 15^\circ$
 $M = 165$
 $L = 10^\circ$
 $M = 155$

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

Question 29

29 Angle KML is the vertex angle of isosceles triangle KLM below. Side \overline{LM} is extended through vertex M to point N .



If $m\angle K = 15^\circ$, determine and state $m\angle KMN$.

$$\angle K \cong \angle NMK$$

$$\angle KML = 165^\circ$$

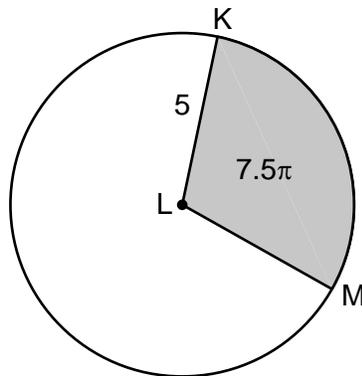
$$\angle NMK = 15$$

$$\begin{array}{r} 140 \\ - 15 \\ \hline 165 \end{array}$$

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

Question 30

30 In the diagram below of circle L , the area of the shaded sector KLM is 7.5π and $LK = 5$.



Determine and state the degree measure of angle KLM , the central angle of the shaded sector.

$$x = m\angle KLM$$

$$A = \pi(5)^2 \\ = 25\pi$$

$$\frac{x}{360} = \frac{7.5\pi}{25\pi}$$

$$\frac{25\pi x}{\pi} = \frac{2700\pi}{\pi}$$

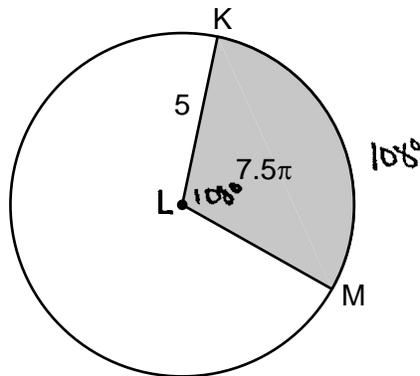
$$\frac{25x}{25} = \frac{2700}{25}$$

$$x = 108$$

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

Question 30

30 In the diagram below of circle L , the area of the shaded sector KLM is 7.5π and $LK = 5$.



Determine and state the degree measure of angle KLM , the central angle of the shaded sector.

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

$$7.5\pi = \pi 5^2 \left(\frac{m}{360} \right)$$

$$7.5\pi = 25\pi \left(\frac{m}{360} \right)$$

$$360 \cdot 7.5\pi = \frac{25\pi m}{360} \cdot 360$$

$$\frac{2700\pi}{25\pi} = \frac{25\pi m}{25\pi}$$

$$108 = m$$

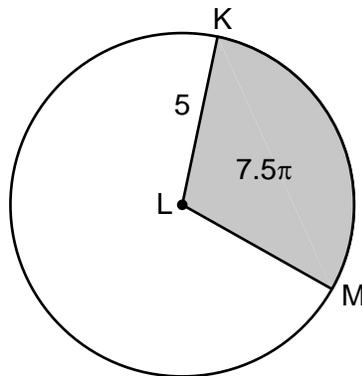
↓

$$\boxed{m \angle KLM = 108^\circ}$$

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

Question 30

30 In the diagram below of circle L , the area of the shaded sector KLM is 7.5π and $LK = 5$.



Determine and state the degree measure of angle KLM , the central angle of the shaded sector.

$$\frac{7.5\pi}{360} = \frac{X}{\pi(5)^2}$$

$$\frac{7.5\pi}{360} = \frac{X}{25\pi}$$

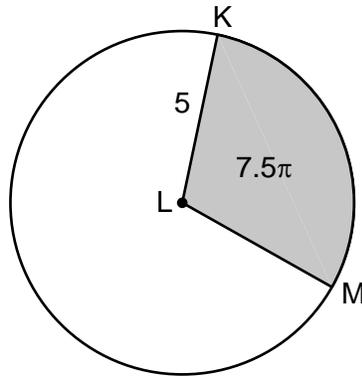
$$\frac{360X}{360} = \frac{1850.5508255}{360}$$

$$X = 5.140418959$$

Score 1: The student wrote an incorrect proportion, but solved it appropriately.

Question 30

30 In the diagram below of circle L , the area of the shaded sector KLM is 7.5π and $LK = 5$.



Determine and state the degree measure of angle KLM , the central angle of the shaded sector.

$$A = \pi r^2$$
$$A = \pi 5^2$$
$$A = 25\pi$$

~~$$\frac{25\pi}{7.5\pi} = 3\frac{1}{3}\pi$$~~

$$\frac{7.5}{25} = \frac{1}{3}$$

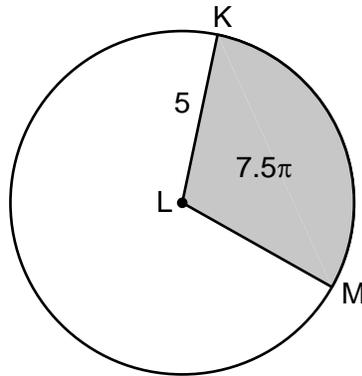
$$\frac{360}{3} = 120$$

$$\angle KLM = 120^\circ$$

Score 1: The student made a computational error.

Question 30

30 In the diagram below of circle L , the area of the shaded sector KLM is 7.5π and $LK = 5$.



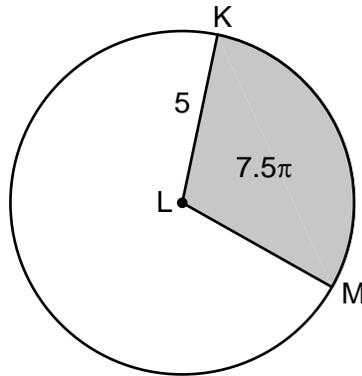
Determine and state the degree measure of angle KLM , the central angle of the shaded sector.

$$\begin{aligned}7.5\pi &= 23.6 \\ 23.6 \times 5 &= 118 \\ \angle KLM &= 118^\circ\end{aligned}$$

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

Question 30

30 In the diagram below of circle L , the area of the shaded sector KLM is 7.5π and $LK = 5$.



Determine and state the degree measure of angle KLM , the central angle of the shaded sector.

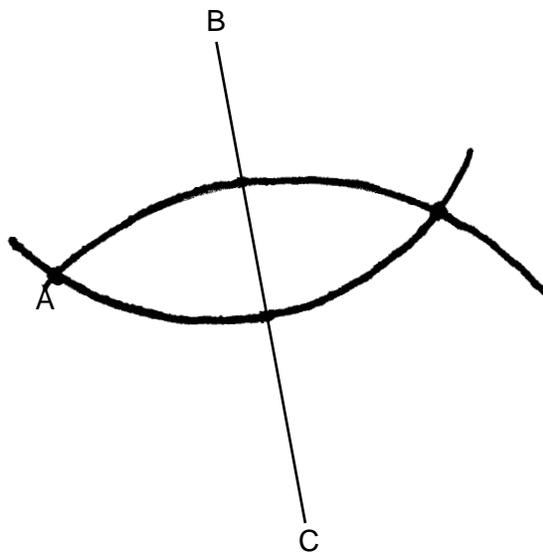
$$\frac{7.5\pi}{360} = \frac{5}{360}$$

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

Question 31

31 Using a compass and straightedge, construct the image of point A after a reflection over \overline{BC} .

[Leave all construction marks.]

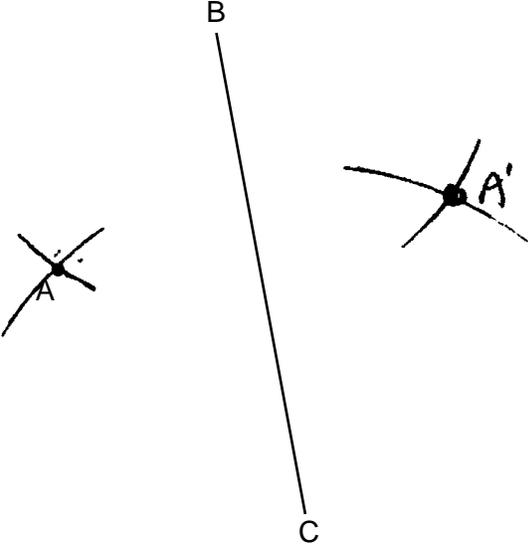


Score 2: The student gave a complete and correct response. One arc has a radius length of \overline{BA} , centered at B , and the other arc has a radius length of \overline{CA} , centered at C . The intersection of the arcs is the image of point A after a reflection over \overline{BC} .

Question 31

31 Using a compass and straightedge, construct the image of point A after a reflection over \overline{BC} .

[Leave all construction marks.]

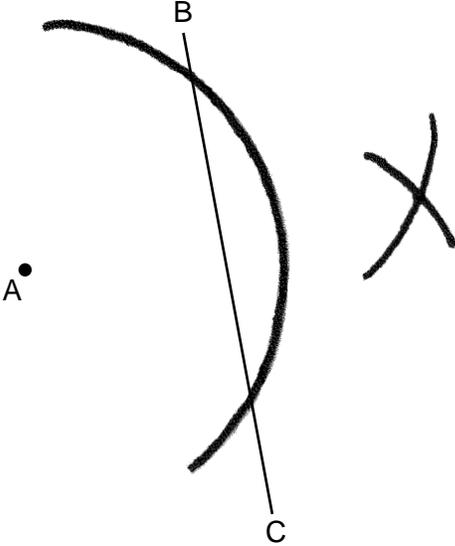


Score 2: The student gave a complete and correct response.

Question 31

31 Using a compass and straightedge, construct the image of point A after a reflection over \overline{BC} .

[Leave all construction marks.]

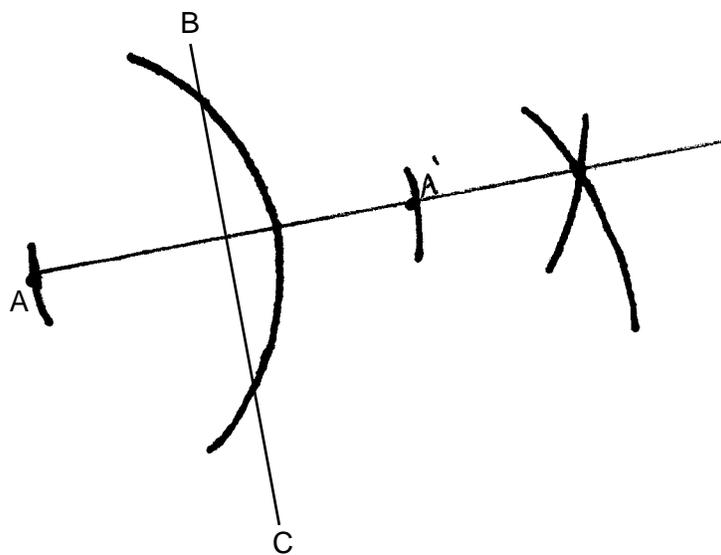


Score 2: The student gave a complete and correct response.

Question 31

31 Using a compass and straightedge, construct the image of point A after a reflection over \overline{BC} .

[Leave all construction marks.]

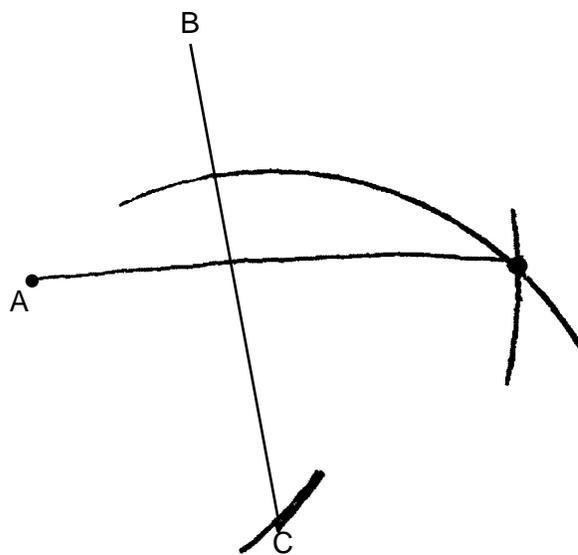


Score 2: The student gave a complete and correct response.

Question 31

31 Using a compass and straightedge, construct the image of point A after a reflection over \overline{BC} .

[Leave all construction marks.]



Score 1: The student made one construction error in using a radius length of \overline{BC} , centered at A rather than using a radius length of \overline{AB} , centered at B.

Question 31

31 Using a compass and straightedge, construct the image of point A after a reflection over \overline{BC} .

[Leave all construction marks.]

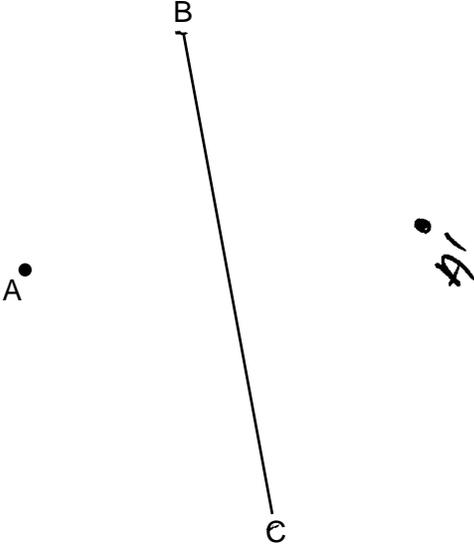


Score 0: The student did not show enough correct relevant course-level work to receive any credit.

Question 31

31 Using a compass and straightedge, construct the image of point A after a reflection over \overline{BC} .

[Leave all construction marks.]



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

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]

$$1 \text{ liter} = 1000 \text{ cm}^3$$

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

$$V = \pi 10^2 \cdot 26$$

$$V = 8168.1408 \rightarrow 1 \text{ bucket}$$

$$75 \text{ liters} \rightarrow 75000 \text{ cm}^3$$

$$75000 / 8168.1408 = 9.1820$$

9 buckets of water

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

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]

$$1 \text{ liter} = 1,000 \text{ cm}^3$$

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

$$= \pi (10)^2 (26)$$

$$= 8,168.140899 \text{ cm}^3$$

$$\frac{8,168 \text{ cm}^3}{1} \cdot \frac{1 \text{ liter}}{1000 \text{ cm}^3} = 8.168 \text{ liters}$$

$$\frac{75}{8.168} = 9.182$$

9

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

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]

$$V = \pi r^2 h \quad 75L = 75000 \text{ cm}^3$$
$$V = \pi 10^2 (26)$$

$$V = 8168.1409 \text{ cm}^3$$

$$75000 \text{ cm}^3 \div 8168.1409$$

9

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

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]

$$r = 10$$
$$V = \pi(10)^2 \cdot 26$$
$$100 \cdot 26 \cdot \pi$$
$$2600 \cdot \pi$$
$$V = 8168.1408$$
$$75 \cdot 1000$$
$$75000$$
$$8168.1408 \overline{)75000}$$
$$\boxed{9.1820}$$

Buckets,

Score 3: The student made a rounding error.

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]

$$75 \times 1000 = 75000 \text{ cm}^3$$
$$\pi (10)^2 (26) = 2600\pi \text{ cm}^3$$

$$\frac{75000}{2600\pi} = 90.6$$

90 buckets

Score 3: The student made a computational error.

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]

$$\pi (10)^2 (26)$$

$$\pi 100 (26)$$

$$8168.140899 \text{ cm}^3 / 1000$$

$$8.1681 \text{ liters}$$

$$\begin{array}{r} * \quad 75 \\ \hline 612.6 \end{array}$$

$$\textcircled{612}$$

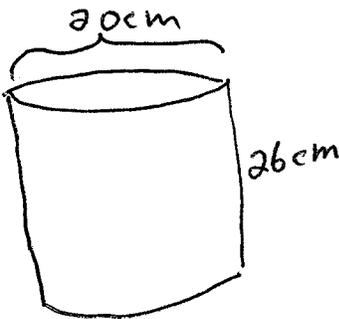
Score 3: The student correctly determined the number of liters of water in one cylindrical bucket. The student made an error in multiplying the number of liters by 75, but an appropriate number of buckets was found.

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]



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

$$V = \pi (10\text{cm})^2 (26\text{cm})$$

$$V = 2600\pi \text{ cm}^3$$

$$V = 8168.140899 \text{ cm}^3$$

$$8168.140899 \text{ cm}^3 \cdot \frac{1 \text{ liter}}{1000 \text{ cm}^3} =$$

$$8.168140899 \text{ liters}$$

$$\frac{8.168140899}{75} = .1089085453$$

1 bucket

Score 2: The student correctly determined the number of liters of water in one cylindrical bucket, but divided by 75. The student made an error when determining the number of buckets.

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm $\div 2$

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]

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

$$= \pi (10)^2 (26)$$

$$= 2600\pi$$

$$\frac{2600\pi}{1000} = 2.6\pi$$

$$\approx 8.168$$

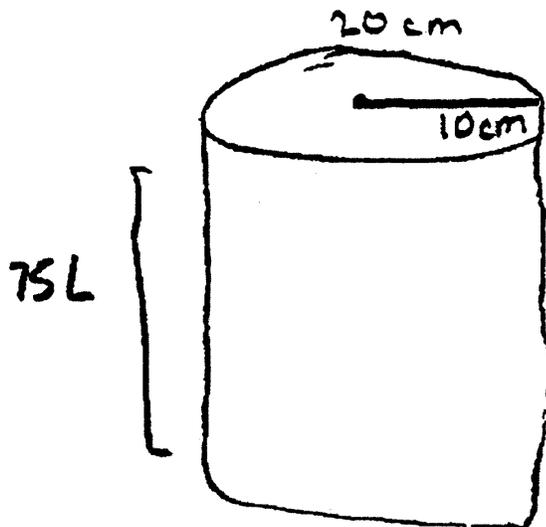
Score 2: The student correctly determined the number of liters of water in the cylindrical bucket.

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]



$$\begin{aligned} V &= \pi r^2 h \\ &= \pi (10)^2 (26) \\ &= \boxed{8,168.14 \text{ cm}^3} \end{aligned}$$

Score 1: The student correctly determined the volume of water in one cylindrical bucket.

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]



$$V = \pi r^2 h$$
$$V = \pi (10)^2 (26)$$
$$V = \frac{\pi 2600}{8}$$
$$108.9$$

109 buckets

Score 1: The student correctly determined the volume of water in one cylindrical bucket.

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]

9

Score 1: The student determined the number of buckets, but showed no work.

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm.

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]



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

$$75 = \pi 10^2 (26)$$

$$V = \pi 10^2$$

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

Question 32

32 Joan wants to fill an empty 75-liter fish tank with water. She uses a cylindrical bucket with a diameter of 20 cm. $\sqrt{20} = 4.47$ radius

Determine and state the maximum number of buckets of water, filled to an exact height of 26 cm, Joan can put into the fish tank before it overflows.

[1000 cm³ = 1 liter]

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

$$75 = \pi 10^2 h$$

~~$$75 = \pi 10^2 h$$~~

$$\frac{75}{10\pi} = \frac{10\pi h}{10\pi}$$

$$h = 2.387324$$

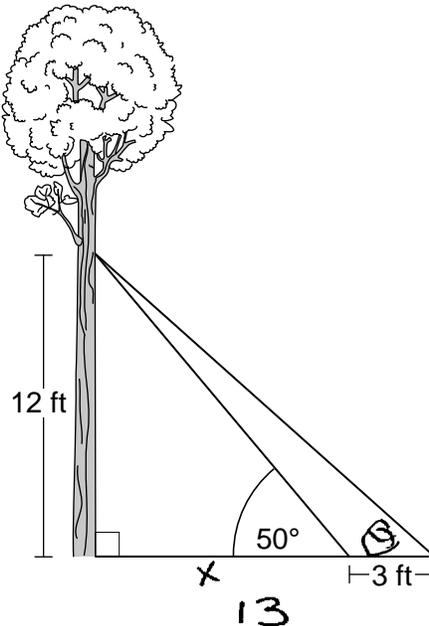
(26)

$$h = 62$$

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

Question 33

- 33 As modeled in the diagram below, two cables are attached from a point on a tree 12 feet above the ground. The longer cable is anchored on the ground 3 feet farther from the tree than the shorter cable is anchored. The angle of elevation between the shorter cable and the ground is 50° .



Determine and state, to the *nearest foot*, the distance from the base of the tree to the point where the longer cable is attached to the ground.

$$\tan 50 = \frac{12}{x}$$

13 ft

$$\frac{\tan 50 x = 12}{\tan 50 \quad \tan 50}$$

$$10.069 + 3 = 13.069$$

Determine and state, to the *nearest degree*, the angle of elevation between the longer cable and the ground.

$$\tan \theta = \frac{12}{13}$$

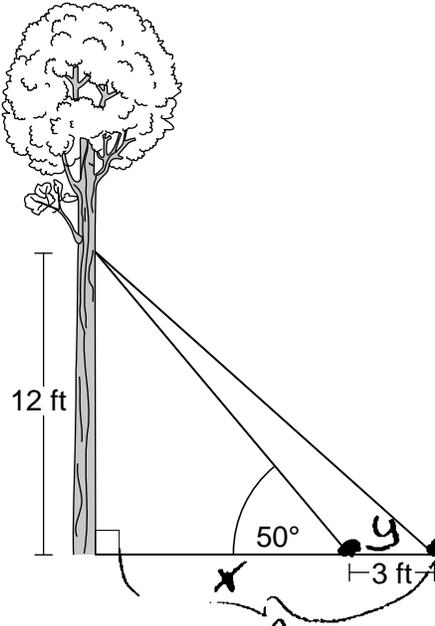
43°

$$\theta = 42.709$$

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

Question 33

- 33 As modeled in the diagram below, two cables are attached from a point on a tree 12 feet above the ground. The longer cable is anchored on the ground 3 feet farther from the tree than the shorter cable is anchored. The angle of elevation between the shorter cable and the ground is 50° .



Determine and state, to the *nearest foot*, the distance from the base of the tree to the point where the longer cable is attached to the ground.

$$\tan 50 = \frac{12}{x} \quad x = 10.069 \dots$$

$$x \tan 50 = 12$$

$$\frac{x \tan 50 + \tan 50}{\tan 50} = \frac{12 + 3}{\tan 50}$$

$$x = \frac{12}{\tan 50} \quad 10.069 + 3 = 13.069$$

13

Determine and state, to the *nearest degree*, the angle of elevation between the longer cable and the ground.

$$\tan y = \frac{12}{13.069} \quad y = 43$$

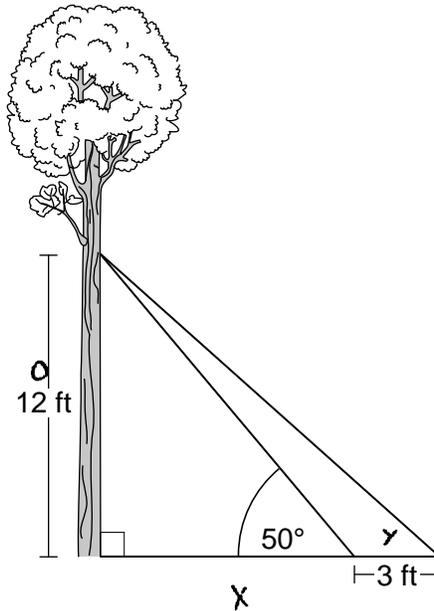
$$\tan^{-1} \tan y = \tan^{-1} \frac{12}{13.069}$$

$$y = 42.558 \dots$$

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

Question 33

- 33** As modeled in the diagram below, two cables are attached from a point on a tree 12 feet above the ground. The longer cable is anchored on the ground 3 feet farther from the tree than the shorter cable is anchored. The angle of elevation between the shorter cable and the ground is 50° .



Determine and state, to the *nearest foot*, the distance from the base of the tree to the point where the longer cable is attached to the ground.

$$\frac{\tan 50 = 12}{x}$$

$$\frac{x(\tan 50) = 12}{\tan 50}$$

$$\frac{y = 10.06919557}{13}$$

$$x = 13.06919557$$

$$x \approx 13 \text{ ft}$$

Determine and state, to the *nearest degree*, the angle of elevation between the longer cable and the ground.

$$\frac{\sin y = 12}{13}$$

$$y = \sin^{-1}\left(\frac{12}{13}\right)$$

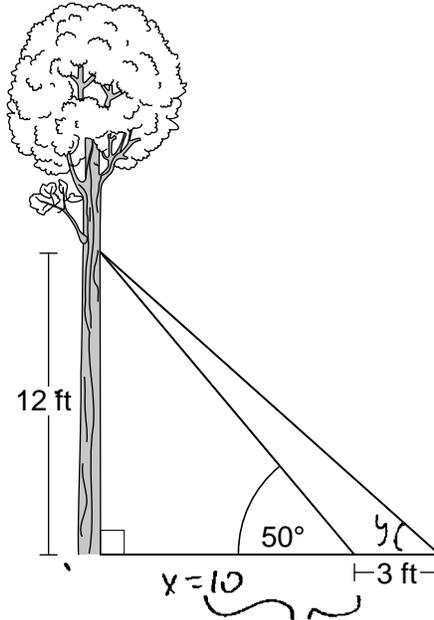
$$y \approx 67^\circ$$

$$\frac{13(\sin y) = 12}{13}$$

Score 3: The student used an incorrect trigonometric function to find the angle of elevation, but found an appropriate answer.

Question 33

33 As modeled in the diagram below, two cables are attached from a point on a tree 12 feet above the ground. The longer cable is anchored on the ground 3 feet farther from the tree than the shorter cable is anchored. The angle of elevation between the shorter cable and the ground is 50° .



$$\frac{S}{H} \quad \frac{A}{H} \quad \frac{T}{A}$$

Determine and state, to the *nearest foot*, the distance from the base of the tree to the point where the longer cable is attached to the ground.

$$(x) \tan(50) = \frac{12}{x} (x)$$

$$\frac{1.19}{1.19} x = \frac{12}{1.19}$$

$$x = 10.08 + 3 = 13$$

Determine and state, to the *nearest degree*, the angle of elevation between the longer cable and the ground.

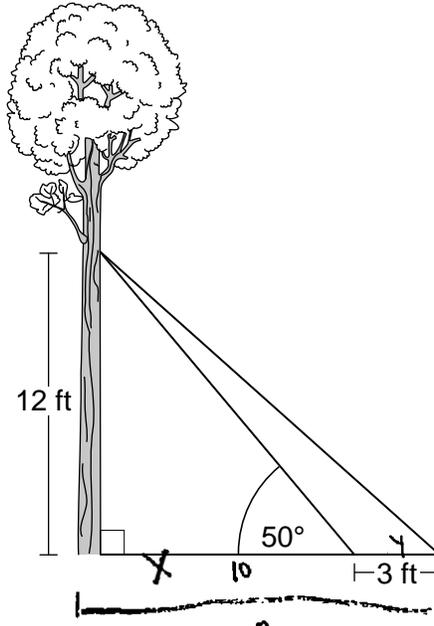
$$\tan y = \frac{12}{13}$$

$$y = 42.7$$

Score 3: The student made a rounding error when determining the angle of elevation.

Question 33

33 As modeled in the diagram below, two cables are attached from a point on a tree 12 feet above the ground. The longer cable is anchored on the ground 3 feet farther from the tree than the shorter cable is anchored. The angle of elevation between the shorter cable and the ground is 50° .



SOH CAH TOA

Determine and state, to the *nearest foot*, the distance from the base of the tree to the point where the longer cable is attached to the ground.

$$\frac{\tan(50)}{1} = \frac{12}{x}$$

$$12 = \frac{\tan(50)x}{\tan(50)}$$

$$x = 10.069 \rightarrow x + 3$$

13 ft

Determine and state, to the *nearest degree*, the angle of elevation between the longer cable and the ground.

45°

$$\frac{\tan y}{1} = \frac{12}{13}$$

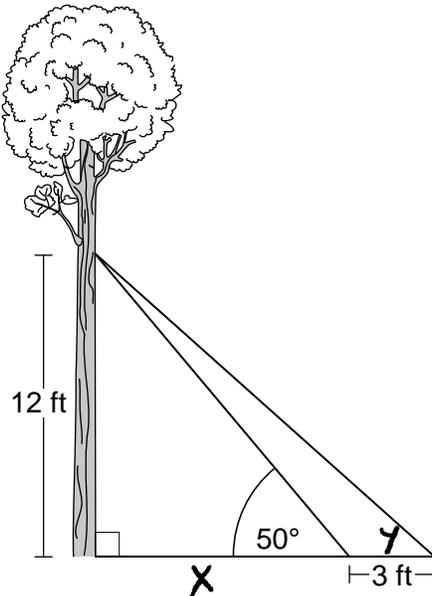
$$12 = \tan 13$$

$$\frac{12}{\tan(45)} = 12$$

Score 3: The student correctly determined the distance from the base of the tree to the longer cable. The student wrote a correct relevant trigonometric equation to determine the angle of elevation.

Question 33

- 33 As modeled in the diagram below, two cables are attached from a point on a tree 12 feet above the ground. The longer cable is anchored on the ground 3 feet farther from the tree than the shorter cable is anchored. The angle of elevation between the shorter cable and the ground is 50° .



Determine and state, to the *nearest foot*, the distance from the base of the tree to the point where the longer cable is attached to the ground.

$$\tan 50 = \frac{12}{x}$$

$$x = \frac{12}{\tan 50}$$

10

$$x = 10.069\dots$$

Determine and state, to the *nearest degree*, the angle of elevation between the longer cable and the ground.

$$\tan \gamma = \frac{12}{10}$$

$$\gamma = \tan^{-1}\left(\frac{12}{10}\right)$$

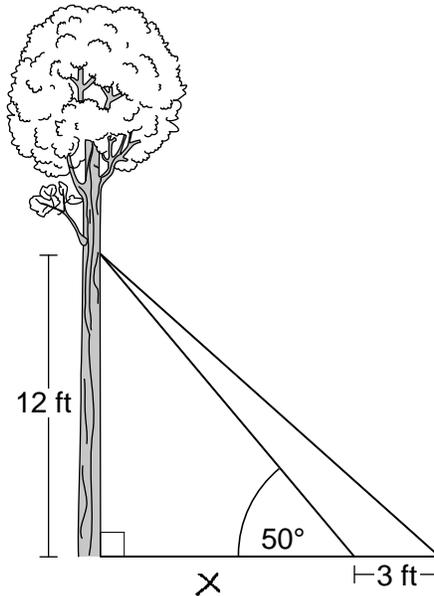
$$\gamma = 50.194\dots$$

50.2

Score 2: The student made a computational error and a rounding error.

Question 33

- 33 As modeled in the diagram below, two cables are attached from a point on a tree 12 feet above the ground. The longer cable is anchored on the ground 3 feet farther from the tree than the shorter cable is anchored. The angle of elevation between the shorter cable and the ground is 50° .



$$\tan 50 = \frac{12}{x}$$
$$\tan 50(x) = 12$$

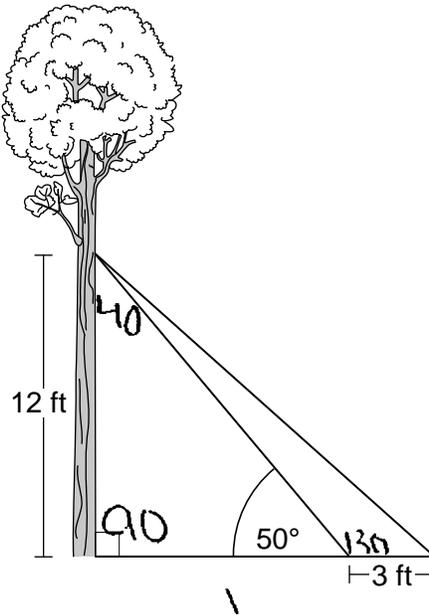
Determine and state, to the *nearest foot*, the distance from the base of the tree to the point where the longer cable is attached to the ground.

Determine and state, to the *nearest degree*, the angle of elevation between the longer cable and the ground.

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

Question 33

33 As modeled in the diagram below, two cables are attached from a point on a tree 12 feet above the ground. The longer cable is anchored on the ground 3 feet farther from the tree than the shorter cable is anchored. The angle of elevation between the shorter cable and the ground is 50° .



Determine and state, to the *nearest foot*, the distance from the base of the tree to the point where the longer cable is attached to the ground.

$$\approx 12 \text{ ft} \quad , \quad a^2 - 4(3)^2 = 12^2$$

$$a^2 + 9 = 144$$

$$-9 \quad -9$$

$$\sqrt{a^2} = \sqrt{135}$$

Determine and state, to the *nearest degree*, the angle of elevation between the longer cable and the ground.

$$12 + 3 =$$

$$15 \text{ ft}$$

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

Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

x_1, y_1 x_2, y_2
 slope = $\frac{y_2 - y_1}{x_2 - x_1}$
 distance = $\sqrt{\Delta x^2 + \Delta y^2}$

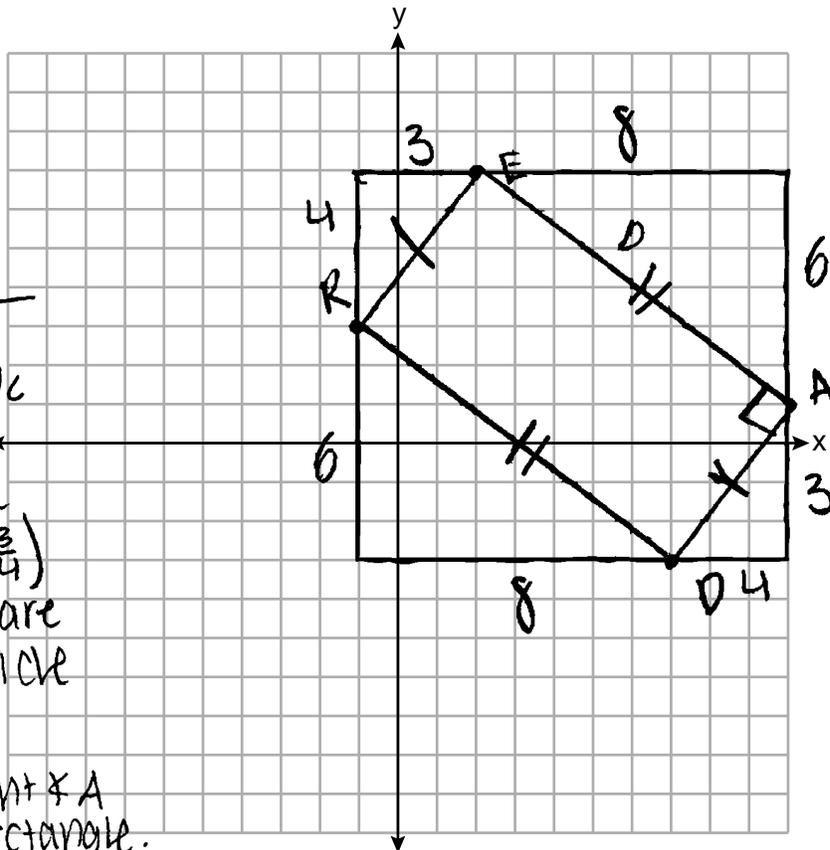
slope of $\overline{EA} = \frac{1-7}{10-2} = \frac{-6}{8} = -\frac{3}{4}$

slope of $\overline{AD} = \frac{-3-1}{7-10} = \frac{-4}{-3} = \frac{4}{3}$

distance of \overline{EA} and $\overline{RD} = \sqrt{8^2 + 6^2} = \sqrt{100} = 10$

distance of \overline{RE} and $\overline{AD} = \sqrt{3^2 + 4^2} = \sqrt{25} = 5$

$\sqrt{100} = 10$
 $\overline{EA} \cong \overline{RD}$ and $\overline{RE} \cong \overline{AD}$. The slope of \overline{EA} ($-\frac{3}{4}$) and \overline{AD} ($\frac{4}{3}$) are negative reciprocals so $\overline{EA} \perp \overline{AD}$ and then right $\angle A$ so $READ$ is a rectangle.



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

Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

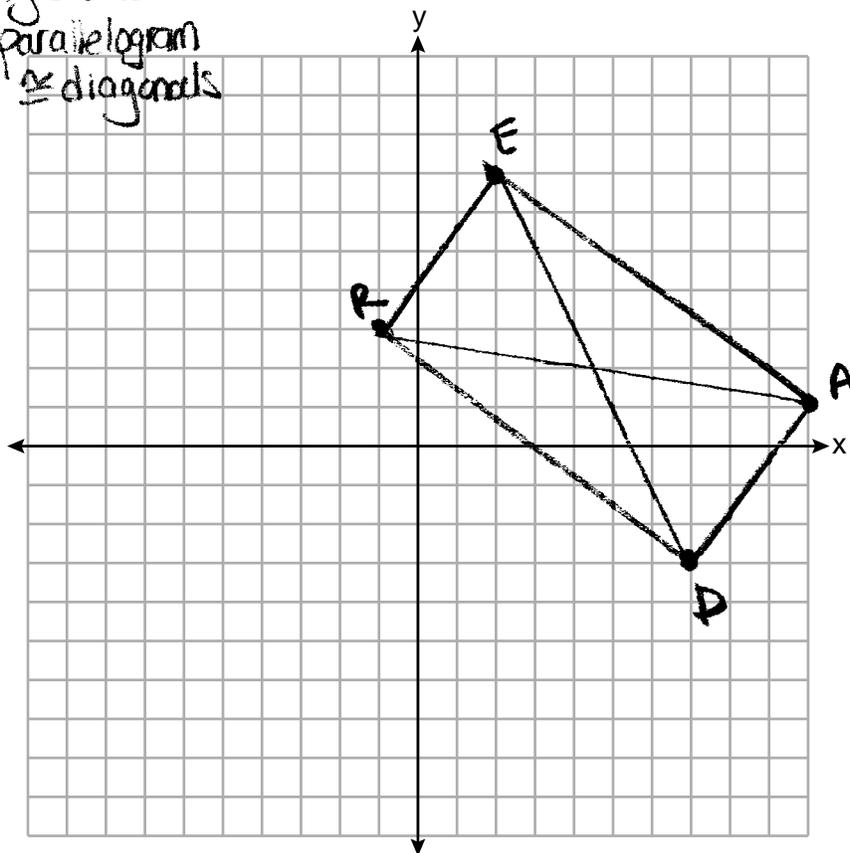
Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

$$\begin{aligned} \text{Midpt } \overline{RA} &= \left(\frac{-1+10}{2}, \frac{3+1}{2} \right) = \left(\frac{9}{2}, \frac{4}{2} \right) = \left(\frac{9}{2}, 2 \right) \\ \text{Midpt } \overline{ED} &= \left(\frac{2+7}{2}, \frac{7+(-3)}{2} \right) = \left(\frac{9}{2}, \frac{4}{2} \right) = \left(\frac{9}{2}, 2 \right) \end{aligned} \left. \begin{array}{l} \text{same midpt} \\ \overline{RA} \text{ and } \overline{ED} \text{ bisect} \\ \text{each other} \end{array} \right\}$$

$READ$ is a parallelogram because the diagonals bisect each other

$$\begin{aligned} d \overline{RA} &= \sqrt{(-1-10)^2 + (3-1)^2} = \sqrt{121+4} = \sqrt{125} \\ d \overline{ED} &= \sqrt{(2-7)^2 + (7-(-3))^2} = \sqrt{25+100} = \sqrt{125} \end{aligned} \left. \right\} \overline{RA} \cong \overline{ED}$$

$READ$ is a rectangle because it's a parallelogram with \cong diagonals



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

Question 34

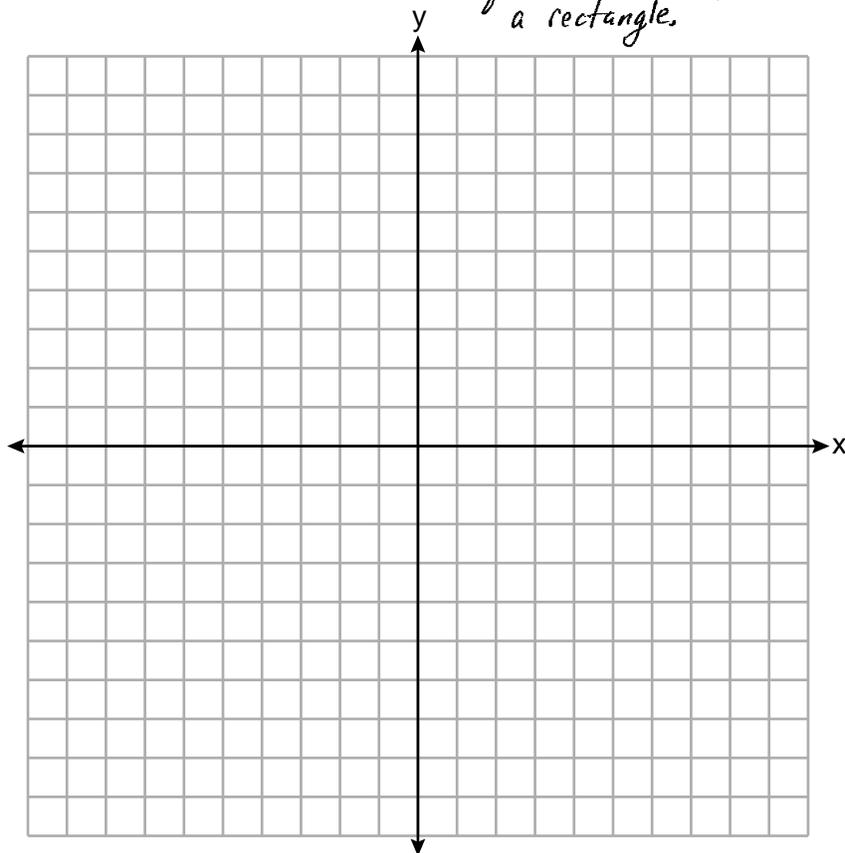
34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

$$\begin{array}{l}
 m_{\overline{RE}} = \frac{7-3}{2-(-1)} = \frac{4}{3} \\
 m_{\overline{EA}} = \frac{1-7}{10-2} = \frac{-6}{8} = -\frac{3}{4} \\
 m_{\overline{AD}} = \frac{-3-1}{7-10} = \frac{-4}{-3} = \frac{4}{3} \\
 m_{\overline{DR}} = \frac{3-(-3)}{-1-7} = \frac{6}{-8} = -\frac{3}{4} \\
 m_{\overline{RE}} = \frac{4}{3}
 \end{array}
 \begin{array}{l}
 \left. \begin{array}{l} \\ \\ \\ \\ \\ \end{array} \right\} \text{neg. reciprocals} \rightarrow \overline{RE} \perp \overline{EA} \rightarrow \angle E \text{ is a rt } \angle \\
 \left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} \text{neg. reciprocals} \rightarrow \overline{EA} \perp \overline{AD} \rightarrow \angle A \text{ is a rt } \angle \\
 \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \text{neg. reciprocals} \rightarrow \overline{AD} \perp \overline{DR} \rightarrow \angle D \text{ is a rt } \angle \\
 \left. \begin{array}{l} \\ \end{array} \right\} \text{neg. reciprocal} \rightarrow \overline{DR} \perp \overline{RE} \rightarrow \angle R \text{ is a rt } \angle
 \end{array}$$

and all rt \angle 's are \cong

so $READ$ is an equiangular quadrilateral + all equiangular quads are rectangles. $\therefore READ$ is a rectangle.



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

Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

$$RE = \sqrt{3^2 + 4^2} = \sqrt{25} = 5 \quad \text{so } \overline{RE} \cong \overline{AD}$$

$$AD = \sqrt{3^2 + 4^2} = \sqrt{25} = 5$$

$$EA = \sqrt{4^2 + 6^2} = \sqrt{100} = 10$$

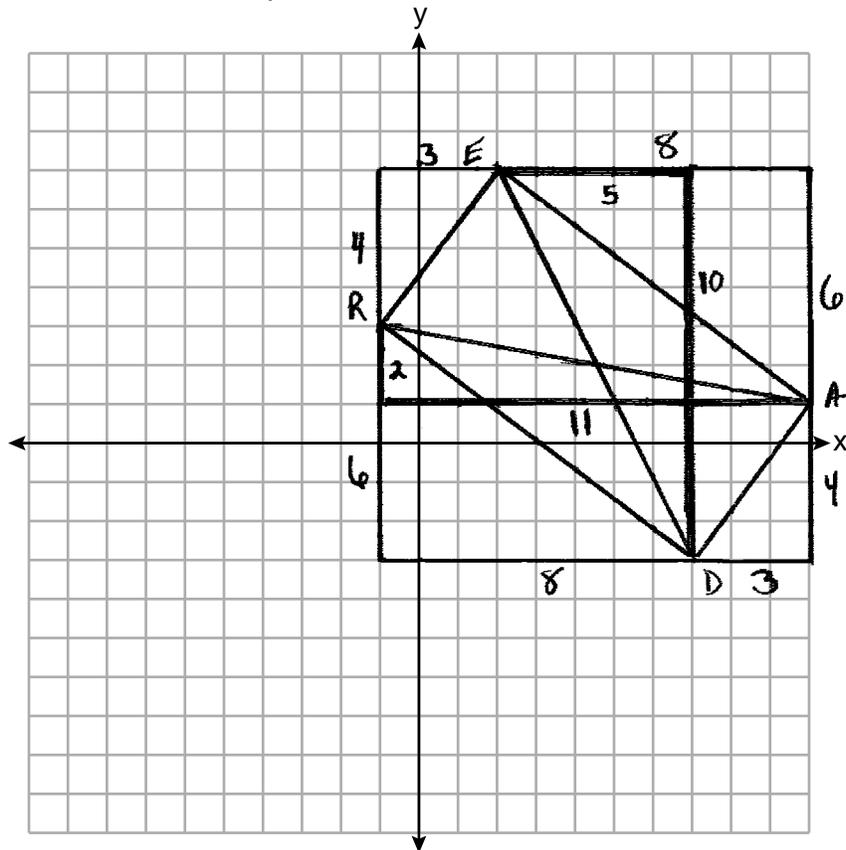
$$RD = \sqrt{8^2 + 6^2} = \sqrt{100} = 10 \quad \text{so } \overline{EA} \cong \overline{RD}$$

A quad w/ both pr of opp sides \cong is a parallelogram
 so $READ$ is a parallelogram.

$$ED = \sqrt{5^2 + 10^2} = \sqrt{125}$$

$$RA = \sqrt{11^2 + 2^2} = \sqrt{125} \quad \text{so } \overline{ED} \cong \overline{RA}$$

A parallelogram w/ \cong diagonals is a rectangle so
 $READ$ is a rectangle.



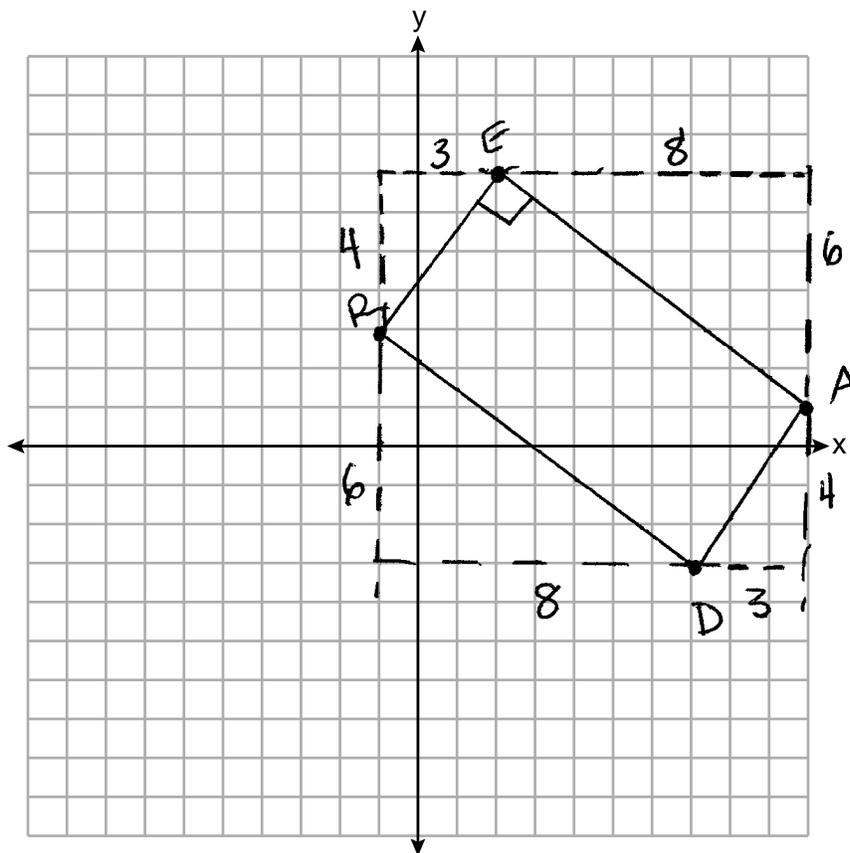
Score 4: The student gave a complete and correct response.

Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

$m_{\overline{RE}} = \frac{4}{3}$ $m_{\overline{EA}} = -\frac{6}{8} = -\frac{3}{4}$ $m_{\overline{RE}} = \frac{4}{3}$ } opp. reciprocal slopes
 $m_{\overline{DA}} = \frac{4}{3}$ $m_{\overline{RD}} = -\frac{6}{8} = -\frac{3}{4}$ $m_{\overline{EA}} = -\frac{3}{4}$ } $\overline{RE} \perp \overline{EA}$
 \overline{EA} is a \perp \overline{RE} .
 same slope $\rightarrow \parallel$ same slope $\rightarrow \parallel$
 $READ$ is a parallelogram because
 both pairs of opposite sides are
 parallel



Score 3: The student wrote an incomplete concluding statement when proving the rectangle.

Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

$$m_{\overline{RE}} = \frac{7-3}{2-(-1)} = \frac{4}{3}$$

$$m_{\overline{EA}} = \frac{1-7}{10-2} = \frac{-6}{8} = -\frac{3}{4}$$

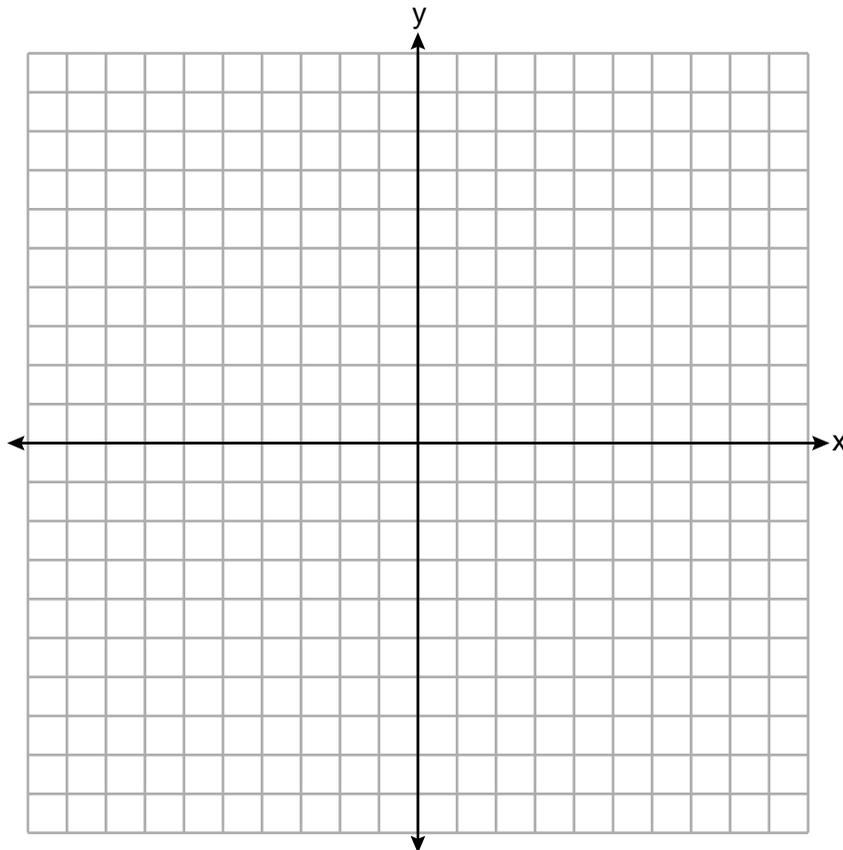
$$m_{\overline{AD}} = \frac{-3-1}{7-10} = \frac{-4}{-3} = \frac{4}{3}$$

$$m_{\overline{DR}} = \frac{-3-3}{7-(-1)} = \frac{-6}{8} = -\frac{3}{4}$$

* Since the slopes of \overline{RE} and \overline{AD} are the same, $\overline{RE} \parallel \overline{AD}$. Since slopes of \overline{EA} and \overline{DR} are the same, $\overline{EA} \parallel \overline{DR}$. $READ$ is a parallelogram because both pairs opposite sides are \parallel .

* Since slopes of \overline{RE} and \overline{EA} are neg. reciprocals, $\angle E$ a right \angle .

* A parallelogram w/ a right \angle is a Rectangle.
 $\Rightarrow READ$ is a Rectangle



Score 3: The student wrote an incomplete conclusion in not stating $\overline{RE} \perp \overline{EA}$.

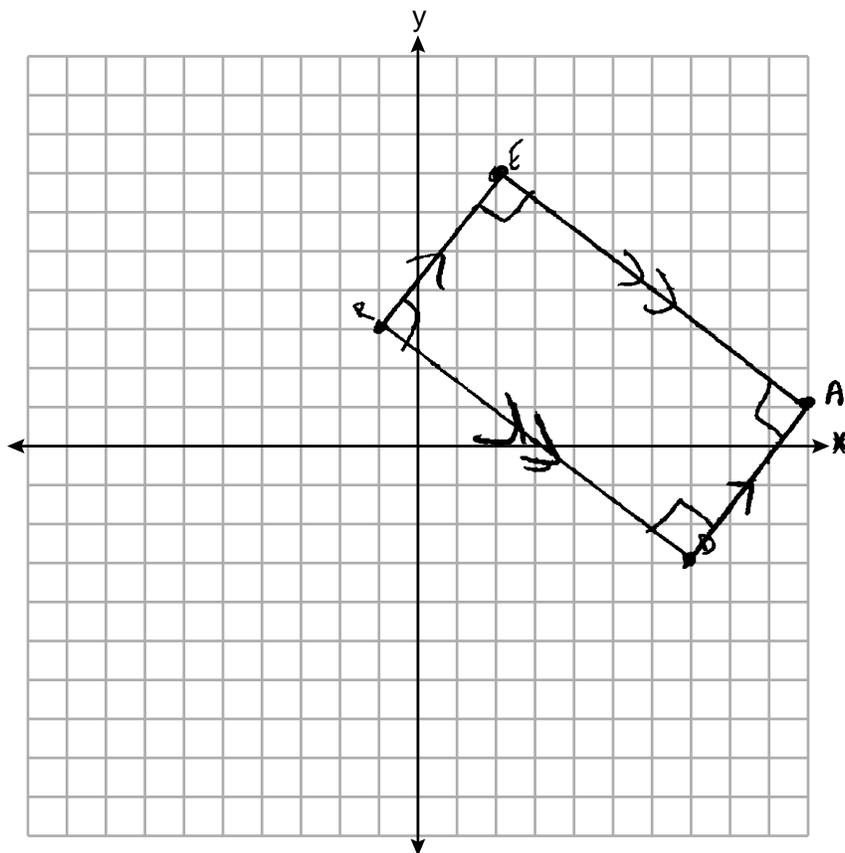
Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

// b/c \angle 's

$$\begin{array}{l}
 RE = \sqrt{(2-(-1))^2 + (7-3)^2} = 5 \\
 DA = \sqrt{(7-10)^2 + (-3-1)^2} = 5 \\
 EA = \sqrt{(10-2)^2 + (1-7)^2} = 10 \\
 RD = \sqrt{(7-(-1))^2 + (-3-3)^2} = 10
 \end{array}
 \left\{
 \begin{array}{l}
 m_{\overline{RE}} = \frac{2-(-1)}{7-3} = \frac{3}{4} \\
 m_{\overline{DA}} = \frac{7-10}{-3-1} = \frac{3}{4} \\
 m_{\overline{EA}} = \frac{10-2}{1-7} = -\frac{4}{3} \\
 m_{\overline{RD}} = \frac{7-(-1)}{-3-3} = -\frac{4}{3}
 \end{array}
 \right.
 \begin{array}{l}
 \text{Quadrilateral } READ \\
 \text{is a parallelogram} \\
 \text{b/c } \overline{RE} \parallel \overline{DA} \text{ b/c} \\
 \text{equal slopes and} \\
 \overline{EA} \parallel \overline{RD} \text{ b/c equal} \\
 \text{slopes. } \overline{RE} \perp \overline{EA} \perp \overline{DA} \perp \overline{RD} \\
 \text{b/c negative} \\
 \text{reciprocal slopes.}
 \end{array}$$



Score 2: The student made the same error when determining the slopes of all four sides. The student wrote an incomplete concluding statement.

Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

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

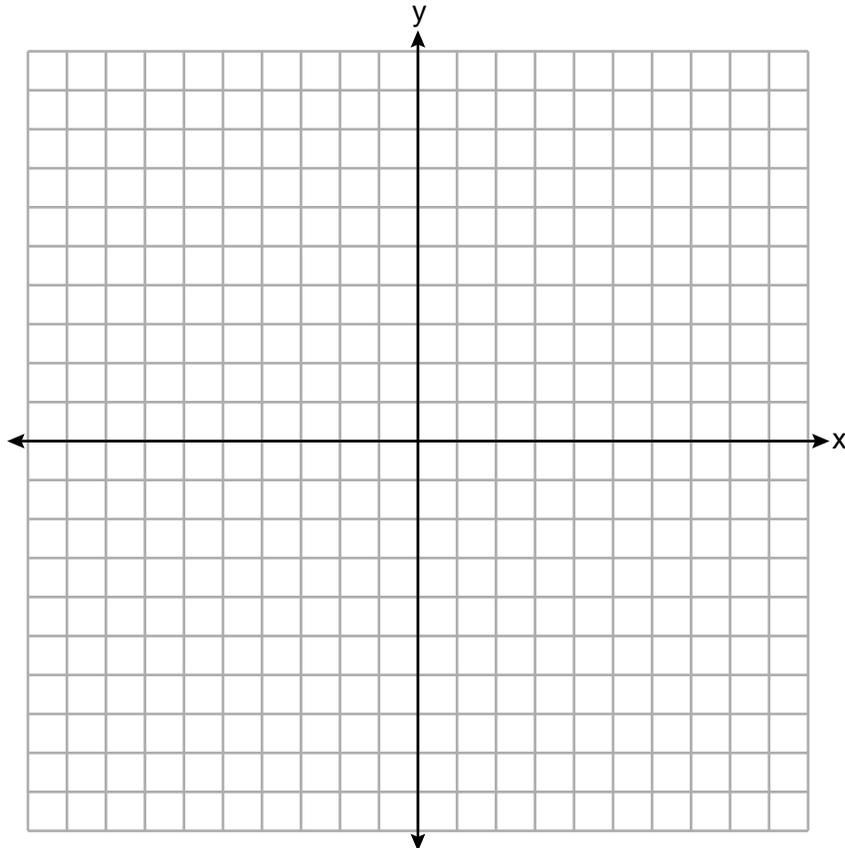
$$RE = \sqrt{(-1 - 2)^2 + (3 - 7)^2} = \sqrt{(-3)^2 + (-4)^2} = \boxed{5}$$

$$EA = \sqrt{(2 - 10)^2 + (7 - 1)^2} = \sqrt{(-8)^2 + (6)^2} = \boxed{10}$$

$$AD = \sqrt{(10 - 7)^2 + (1 + 3)^2} = \sqrt{(3)^2 + (4)^2} = \boxed{5}$$

$$DR = \sqrt{(7 + 1)^2 + (-3 - 3)^2} = \sqrt{(8)^2 + (-6)^2} = \boxed{10}$$

Using the distance formula I found that quadrilateral $READ$ is a rectangle. I found that opposite sides were congruent therefore quadrilateral $READ$ is a rectangle.



Score 2: The student made a conceptual error when proving the rectangle.

Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

Quadrilateral $READ$ is a rectangle because opposite sides have equal slopes and opposite sides have equal side lengths.

$$m_{\overline{RE}} = \frac{7-3}{2-(-1)} = \frac{4}{3}$$

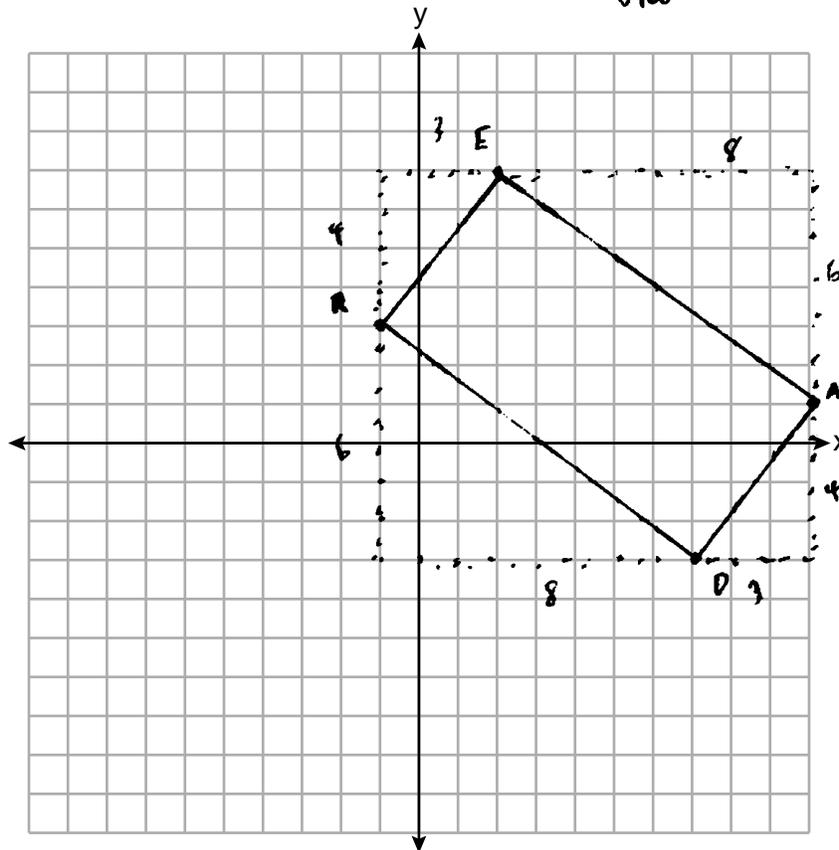
$$m_{\overline{EA}} = \frac{7-1}{2-10} = \frac{6}{-8}$$

$$m_{\overline{AD}} = \frac{1-3}{10-7} = \frac{2}{3}$$

$$m_{\overline{RD}} = \frac{3-(-3)}{-1-7} = \frac{6}{-8}$$

$$EA = \frac{\sqrt{8^2 + 6^2}}{\sqrt{64 + 36}} = \frac{\sqrt{100}}{\sqrt{100}}$$

$$RD = \frac{\sqrt{8^2 + 6^2}}{\sqrt{64 + 36}} = \frac{\sqrt{100}}{\sqrt{100}}$$



$$RE = \frac{\sqrt{4^2 + 4^2}}{\sqrt{16 + 16}}$$

$$\frac{\sqrt{32}}{\sqrt{32}} = 1$$

$$AD = \frac{\sqrt{4^2 + 4^2}}{\sqrt{16 + 16}} = \frac{\sqrt{32}}{\sqrt{32}} = 1$$

Score 2: The student made a conceptual error when proving the rectangle.

Question 34

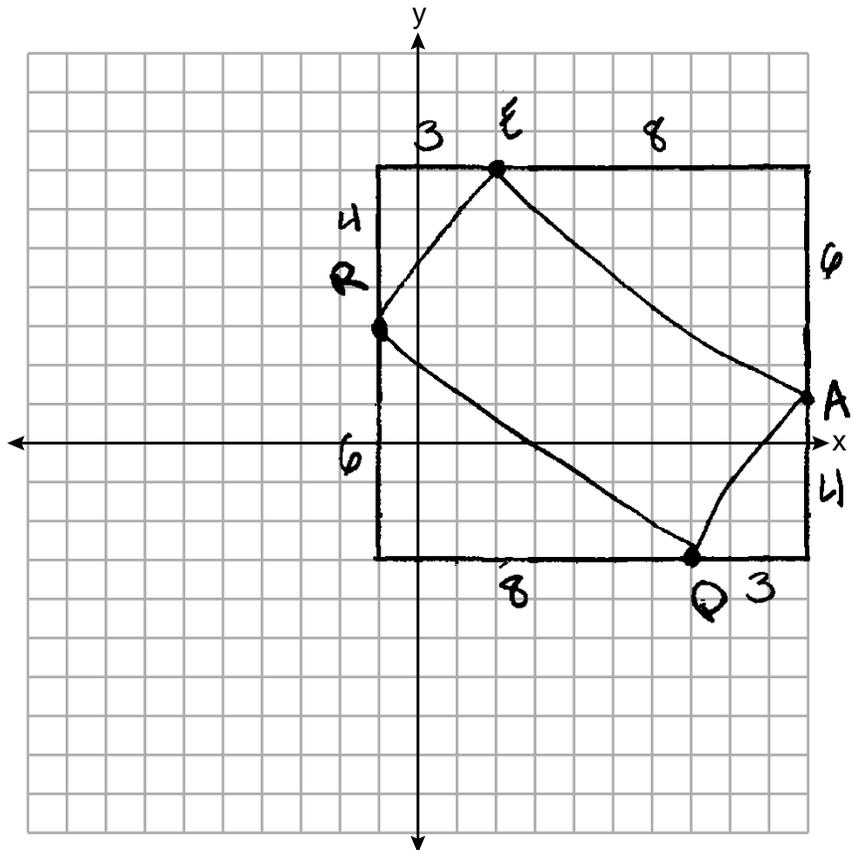
34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

Plan: Use slope formula to show opposite sides are parallel
 Use slope formula to show adjacent sides are perpendicular;
 make 90° angles, so it's a rectangle

Calc: $\overline{RE} \frac{4}{3}$ $\overline{RD} \frac{-6}{8}$ $\overline{DA} \frac{4}{3}$ $\overline{AE} \frac{-6}{8}$

Conc: $\overline{RE} \cong \overline{AD}$, $\overline{EA} \cong \overline{RD}$, so it's a rectangle



Score 1: The student determined the four slopes of the sides of $READ$.

Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

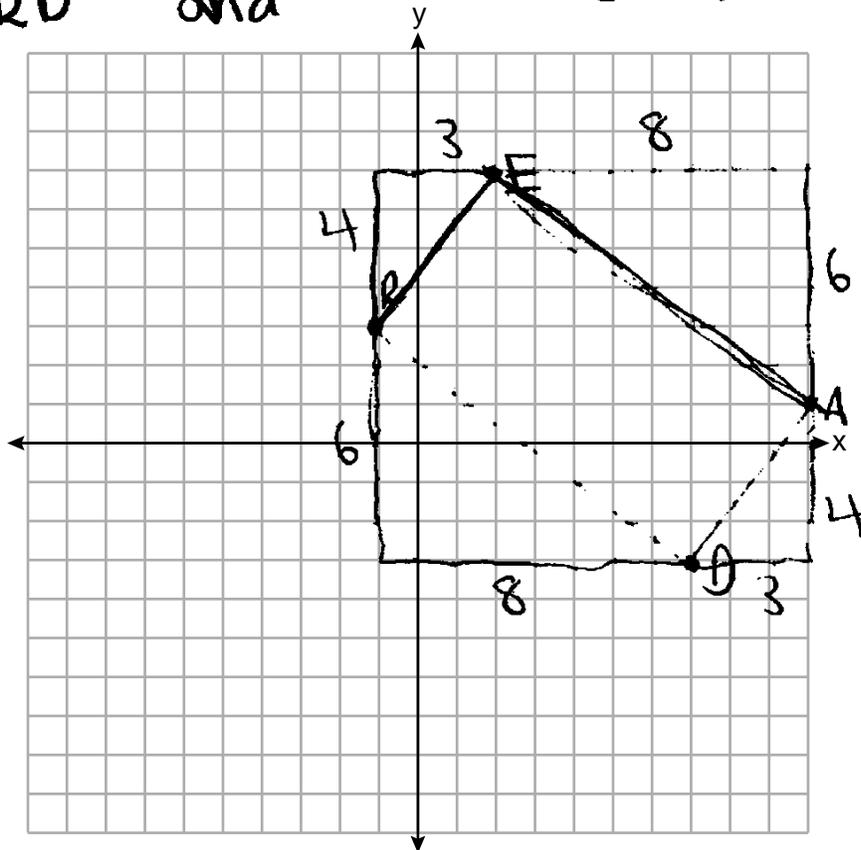
$$EA = \sqrt{6^2 + 8^2} = \sqrt{100} = 10$$

$$RD = \sqrt{8^2 + 6^2} = \sqrt{100} = 10$$

$$RE = \sqrt{4^2 + 3^2} = \sqrt{25} = 5$$

$$DA = \sqrt{3^2 + 4^2} = \sqrt{25} = 5$$

$$\overline{EA} \cong \overline{RD} \quad \text{and} \quad \overline{RE} \cong \overline{DA}$$



Score 1: The student determined the lengths of the four sides of $READ$.

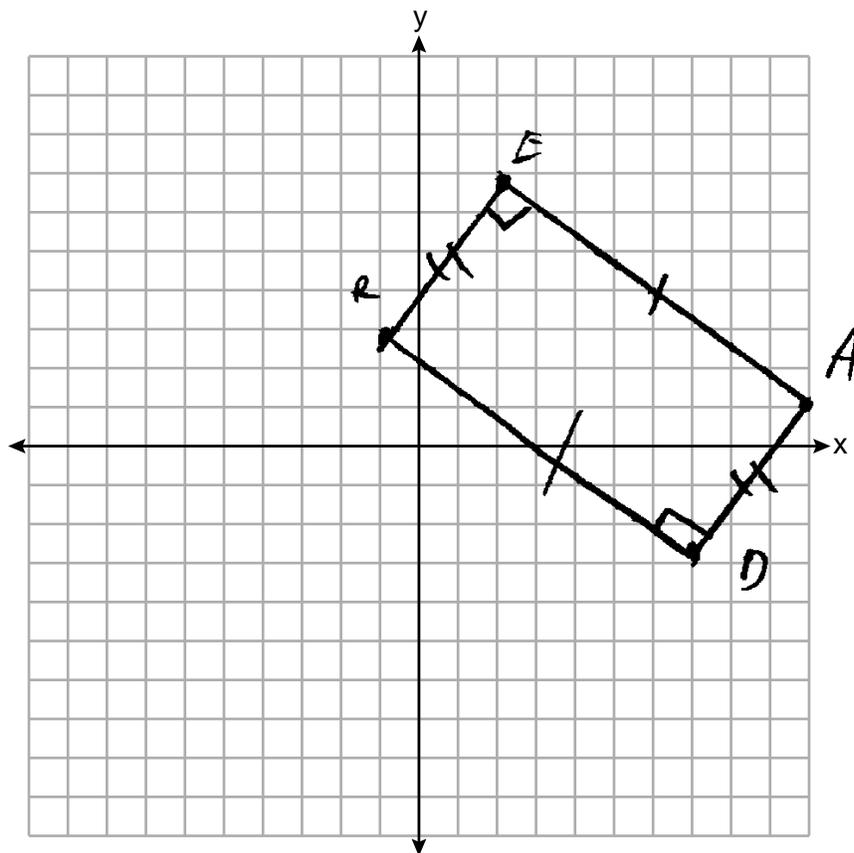
Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

$$\begin{aligned} \overline{RD} \text{ slope} &= \frac{6}{8} \\ \overline{EA} \text{ slope} &= \frac{6}{8} \\ \overline{RE} \text{ slope} &= \frac{4}{3} \\ \overline{AD} \text{ slope} &= \frac{4}{3} \end{aligned}$$

Read is a rectangle
 because it has opposite
 congruent sides, $\overline{RD} \cong \overline{EA}$,
 $\overline{RE} \cong \overline{AD}$,



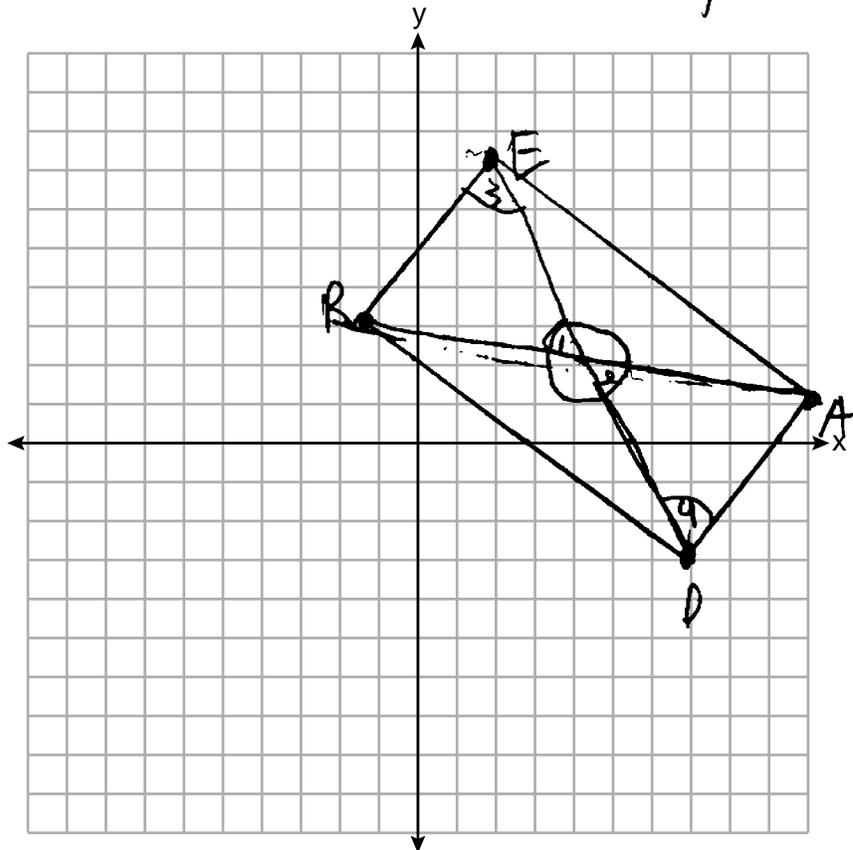
Score 0: The student did not show enough correct relevant course-level work to receive any credit.

Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

G	R
① \overline{ED} bisects \overline{AR}	① forms vertical angles
② $\angle 1 \cong \angle 2$	② vertical angles
③ $\angle 3 \cong \angle 4$	③ alternate int. angles
④ $READ$ is a rectangle	④ AA



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

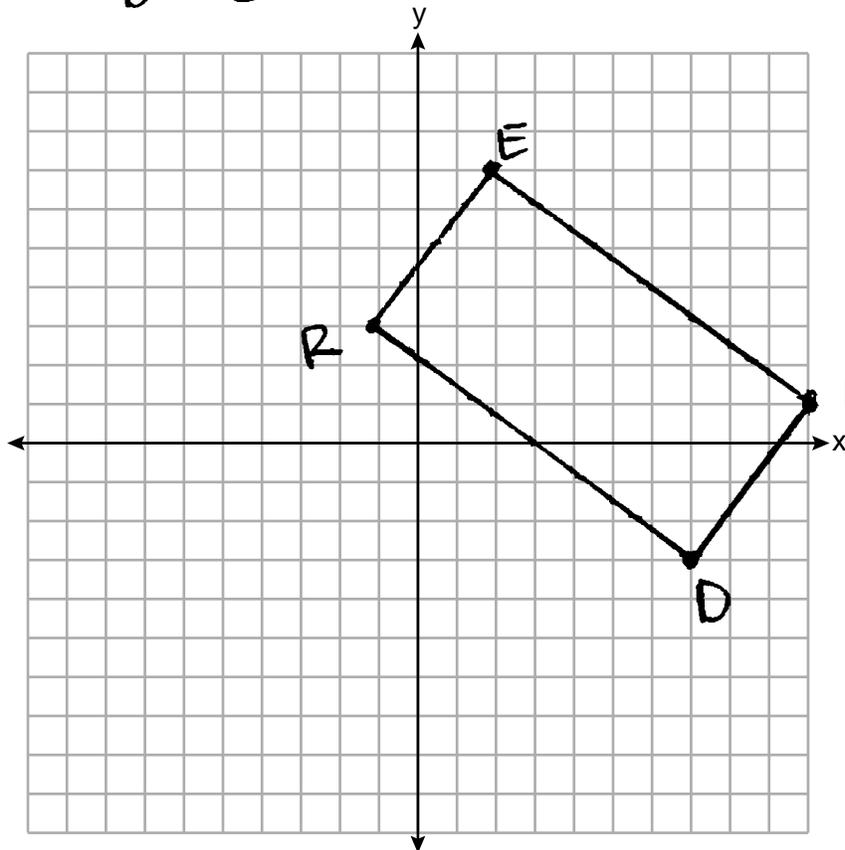
Question 34

34 Quadrilateral $READ$ has vertices with coordinates $R(-1,3)$, $E(2,7)$, $A(10,1)$, and $D(7,-3)$.

Prove $READ$ is a rectangle. [The use of the set of axes below is optional.]

$$\begin{array}{l} x^1 \quad y^1 \quad x^2 \quad y^2 \\ (-1, 3) \quad (2, 7) \\ D: RE \\ \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ \sqrt{(2 - (-1))^2 + (7 - 3)^2} \\ \sqrt{9 + 16} \\ D = 5 \end{array}$$

$$\begin{array}{l} x \quad y \quad x \quad y \\ (10, 1) \quad (7, -3) \\ D: AD \\ \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ \sqrt{(7 - 10)^2 + (-3 - 1)^2} \\ \sqrt{9 + 16} \\ D = 5 \end{array}$$

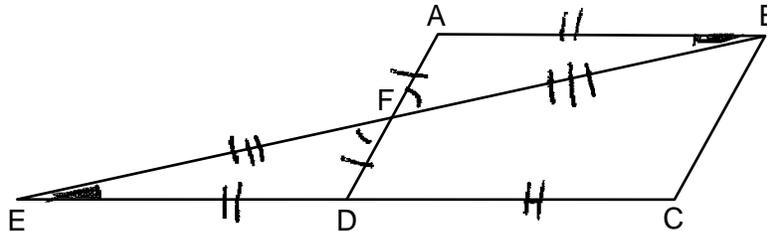


It has a pair of opp sides that are \cong because \overline{RE} and \overline{AD} have the same distance

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

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



Prove $ABCD$ is a parallelogram.

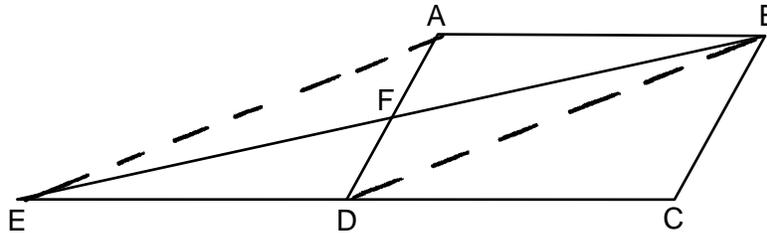
1. Quadrilateral $ABCD$, \overline{CD} is extended to E
 \overline{AFD} + \overline{BFE} bisect each other
 $\overline{DE} \cong \overline{DC}$
2. $\overline{AF} \cong \overline{FD}$ (S.S.)
 $\overline{BF} \cong \overline{FE}$ (S.S.)
3. $\angle AFB \cong \angle DFE$ (v.a.)
4. $\triangle ABF \cong \triangle DEF$
5. $\overline{AB} \cong \overline{DE}$
6. $\overline{AB} \cong \overline{DC}$
7. $\angle ABF \cong \angle DEF$
8. $\overline{AB} \parallel \overline{EDC}$
9. $ABCD$ is a \square

1. Given
2. Defn of a bisector
3. Vertical \angle 's are \cong
4. SAS \cong SAS
5. CPCTC
6. Substitution
7. CPCTC
8. If 2 lines are cut by a transversal forming \cong alternate interior angles, the lines are parallel
9. If ~~one~~ pair of opposite sides of a quadrilateral are both \cong and parallel, it is a parallelogram.

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

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



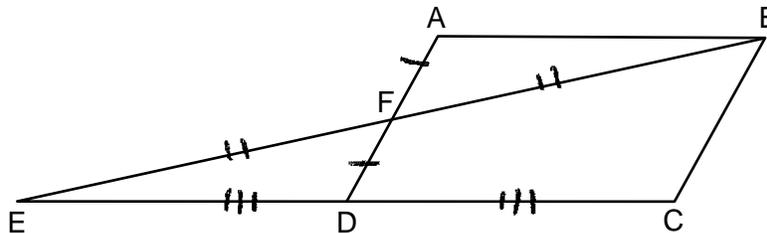
Prove $ABCD$ is a parallelogram.

S	R
<ol style="list-style-type: none"> 1. quad $ABCD$, \overline{CD} extended thru D to E so \overline{AFD}, \overline{BFE} bisect each other, $\overline{DE} \cong \overline{DC}$ 2. Draw auxiliary lines \overline{EA} and \overline{DB}. 3. $EABD$ is a parallelogram 4. $\overline{AB} \parallel \overline{DE}$, so $\overline{AB} \parallel \overline{DC}$ 5. $\overline{AB} \cong \overline{DE}$ 6. $\overline{AB} \cong \overline{DC}$ 7. $ABCD$ is a parallelogram 	<ol style="list-style-type: none"> 1. given 2. Between any 2 points there exists exactly one line segment. 3. If the diagonals of a quad bisect each other, it is a parallelogram. 4. Oppo. sides of a p-gram are \parallel. 5. Oppo. sides of a p-gram are \cong. 6. Substitution 7. If a quad. has one set of opposite sides \cong and \parallel, then it is a parallelogram.

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

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



Prove $ABCD$ is a parallelogram.

Given quad. $ABCD$, \overline{CD} extended through D to E so \overline{AFD} & \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.

A bisector divides a segment at its midpoint, so F is the midpoint of \overline{EB} .

As $\overline{DE} \cong \overline{DC}$, D is the midpoint of \overline{EC} .

So \overline{DF} is the midsegment of $\triangle ECB$.

A midsegment is parallel to the third side of a \triangle , so $\overline{DF} \parallel \overline{BC}$, and so $\overline{DA} \parallel \overline{BC}$.

Since \overline{EFB} bisects \overline{AFD} , $\overline{DF} \cong \overline{AF}$, so $2DF = DA$.

A midsegment is half the length of the third side of a \triangle , so $2 \cdot DF = BC$. As $2 \cdot DF = DA$, then $\overline{DA} \cong \overline{BC}$ by substitution.

Quad. $ABCD$ has one pair of sides (\overline{DA} and \overline{BC})

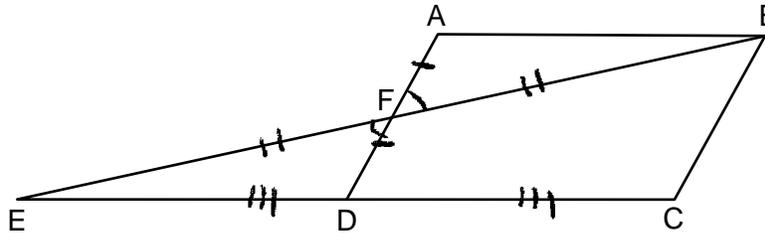
that are both parallel

and congruent, so $ABCD$ is a parallelogram.

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

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



Prove $ABCD$ is a parallelogram.

\square Quad $ABCD$, \overline{CD} extended through D to E so \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$

$\triangle AFB \cong \triangle DFE$
 Vertical Angles are \cong

$\overline{AF} \cong \overline{DF}$, $\overline{BF} \cong \overline{FE}$
 when a segment is bisected, 2 \cong segments are formed.

$\triangle AFB \cong \triangle DFE$
 SAS

$\overline{DE} \cong \overline{AB}$
 CPCTC

$\overline{DC} \cong \overline{AB}$
 Substitution

$\angle E \cong \angle ABF$
 CPCTC

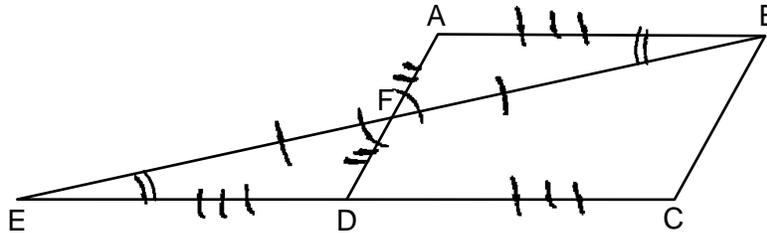
$\overline{AB} \parallel \overline{EDC}$
 Congruent alternate interior angles create parallel lines

$ABCD$ is a parallelogram
 A quadrilateral with one pair of opposite sides parallel and congruent is a parallelogram

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

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



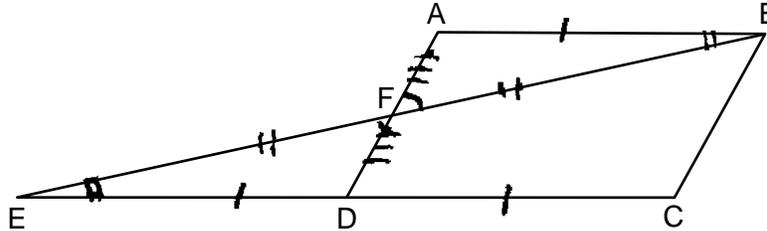
Prove $ABCD$ is a parallelogram.

Statement	Reason
Quad $ABCD$,	1) Given
1) \overline{AFD} & \overline{BFE} bisect each other, $\overline{DE} \cong \overline{DC}$	2) when a segment is bisected, it makes 2 \cong segments
2) $\overline{AF} \cong \overline{DF}$, $\overline{BF} \cong \overline{EF}$	3) vertical \angle s are \cong
3) $\angle AFB \cong \angle DFE$	4) SAS
4) $\triangle DFE \cong \triangle AFB$	5) CPCTC
5) $\overline{AB} \cong \overline{DE}$	6) if alt. int. \angle s are \cong the lines are \parallel
6) $\overline{AB} \parallel \overline{EDC}$	7) one pair opp sides \parallel & $\cong \rightarrow$ parallelogram
7) \parallel ogram $ABCD$	

Score 5: The student had one statement and reason missing to prove step 7.

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



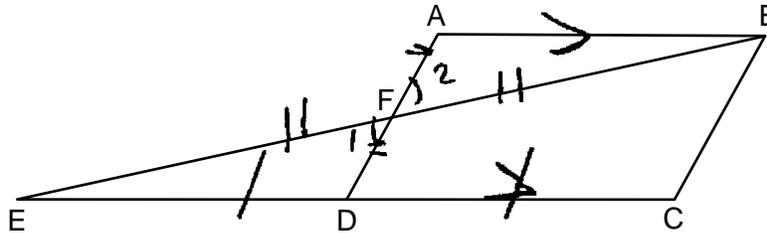
Prove $ABCD$ is a parallelogram.

S	R
① \overline{CD} is extended to point E , \overline{AFD} and \overline{BFE} bisect each other and $\overline{DE} \cong \overline{DC}$ Quad $ABCD$	① Given
② $\overline{AF} \cong \overline{FB}$ $\overline{EF} \cong \overline{FD}$	② Definition of a segment bisector
③ $\angle AFB \cong \angle DFE$	③ Vertical angles are congruent.
④ $\triangle EDF \cong \triangle BAF$	④ SAS
⑤ $\overline{AB} \cong \overline{DE}$ $\angle E \cong \angle FBA$	⑤ CPCTC
⑥ $\overline{AB} \cong \overline{DC}$	⑥ Substitution
⑦ $\overline{AB} \parallel \overline{EC}$	⑦ If 2 alternate interior angle are congruent, then the lines are parallel.
⑧ $ABCD$ is parallelogram	⑧ If one side is congruent and parallel, then it is parallelogram.

Score 5: The student had an incorrect reason in step 8.

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



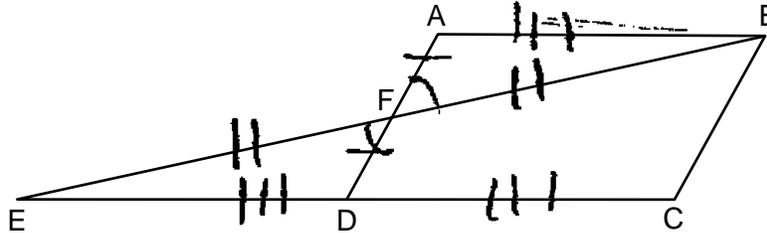
Prove $ABCD$ is a parallelogram.

S	R
1) In quad $ABCD$ below, side \overline{CD} is extended to point E such that \overline{AFD} and \overline{BFE} bisect each other, $\overline{DE} \cong \overline{DC}$	1) Given
2) $\angle 1 \cong \angle 2$	2) Vertical \angle 's are \cong
3) F is the md pt of \overline{AD} F is the md pt of \overline{BE}	3) Segment bisectors intersect a segment at its md pt
4) $\overline{AF} \cong \overline{BF}$ $\overline{EF} \cong \overline{DF}$	4) md pts \div a segment into 2 \cong segments
5) $\triangle EFD \cong \triangle BFA$	5) SAS
6) $\overline{DE} \cong \overline{AB}$	6) Corresponding parts of \cong \triangle 's are \cong
7) $\overline{AB} \cong \overline{DC}$	7) substitution
8) Quad $ABCD$ is a \square	8) In a quad, if one pair of sides is \cong , it is a \square

Score 4: The student made a conceptual error in step 8.

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



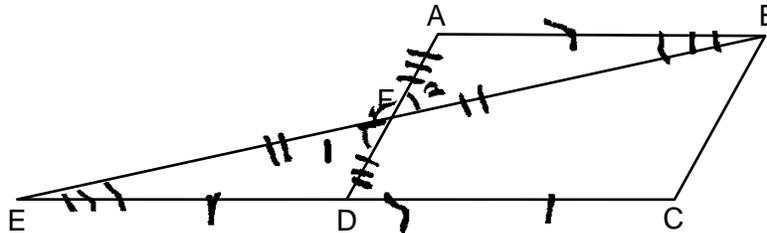
Prove $ABCD$ is a parallelogram.

statement	Reasons
1. \overline{AFD} and \overline{BFE} bisect each other $\overline{DE} \cong \overline{DC}$	1. Givens
2. $\overline{EF} \cong \overline{FB}$ and $\overline{AF} \cong \overline{DF}$	2. Bisectors split a seg into 2 \cong seg.
3. $\angle AFB \cong \angle FED$	3. Vertical Δ 's are \cong
4. $\Delta ABF \cong \Delta DEF$	4. SAS
5. $\overline{AB} \cong \overline{ED}$	5. CPCTC
6. $\overline{AB} \cong \overline{DC}$	6. Substitution
7. $\Delta ABF \cong \Delta FED$	7. CPCTC
8. $ABCD$ is a parallelogram	8. When 2 segments are equal length, and are \parallel then it makes it a parallelogram

Score 4: The student had a missing statement and reason to prove step 8. The student had an incomplete reason in step 8.

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



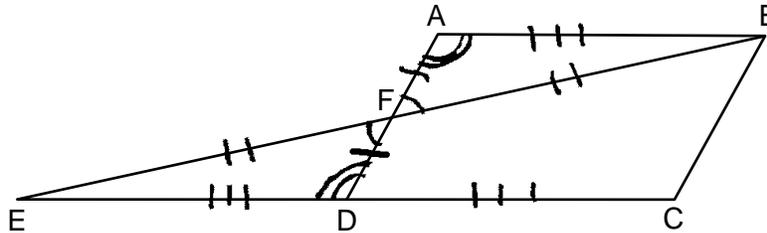
Prove $ABCD$ is a parallelogram.

S	R
① \overline{AFD} & \overline{BFE} bisect each other $\overline{DE} \cong \overline{DC}$, Quad $ABCD$	① Given
② $\sphericalangle 1 \cong \sphericalangle 2$	② Vertical \sphericalangle 's are \cong
③ $EF \cong BF$ $AF \cong DF$	③ Bisect means to split into 2 \cong parts
④ $\triangle FED \cong \triangle FBA$	④ SAS
⑤ $\sphericalangle E \cong \sphericalangle ABF$	⑤ CPCTC
⑥ $\overline{AB} \parallel \overline{EC}$	⑥ Alt int \sphericalangle 's that are \cong exist
⑦ $ABCD$ is a parallelogram	⑦ Opposite sides \parallel opposite \sphericalangle 's $\cong \rightarrow$ parallelogram

Score 3: The student had two missing statements and reasons to prove step 7. The student had incorrect reasons in steps 6 and 7.

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



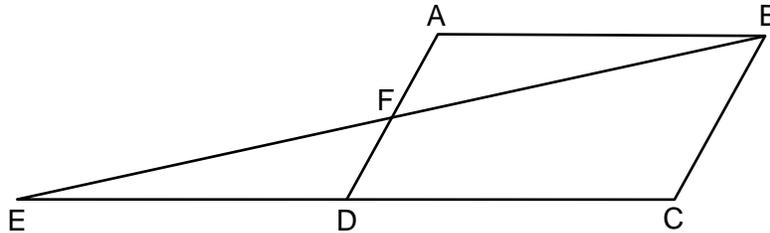
Prove $ABCD$ is a parallelogram.
 - SAS
 - Supplementary

Statement	Reason
① \overline{CD} is extended to point E , such that \overline{AFD} and \overline{BFE} bisect each other, & $\overline{DE} \cong \overline{DC}$	① given
② $\overline{EF} \cong \overline{FB}$ and $\overline{AF} \cong \overline{FD}$	② TO bisect means to divide into 2 \cong parts
③ $\angle EFD \cong \angle AFB$	③ If 2 lines intersect, vertical \angle s are \cong
④ $\triangle EFD \cong \triangle BFA$	④ SAS \cong SAS
⑤ $\angle A \cong \angle FDE$	⑤ CPCTC
⑥ $\angle FDC$ is supplementary to $\angle A$	⑥ If angles are \cong then a supplement to one of those \angle s will be supplementary to the \cong angle
⑦ $ABCD$ is a parallelogram	⑦ If a quado. has supplementary consecutive angles that are supplementary then it is a parallelogram.

Score 3: The student had one missing statement and reason to prove step 6. The student made a conceptual error in step 7.

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



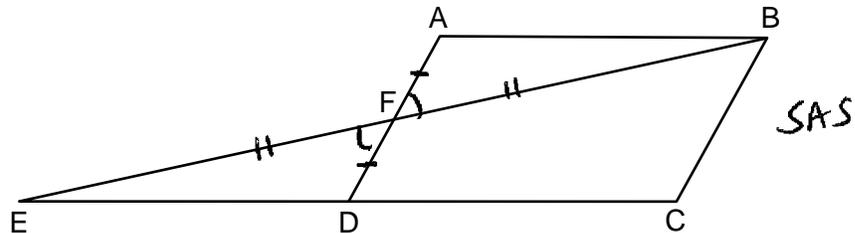
Prove $ABCD$ is a parallelogram.

Statements	Reasons
1) \overline{AFD} and \overline{BFE} bisect each other. $\overline{DE} \cong \overline{DC}$	1) Given
2) $\overline{AF} \cong \overline{BF}$, $\overline{DF} \cong \overline{CF}$	2) Definition of a bisector.
3) $\angle EFD \cong \angle BFA$	3) Vertical angles are \cong
4) $\triangle EFD \cong \triangle BFA$	4) SAS
5) $\overline{AB} \cong \overline{ED} \cong \overline{DC}$	5) Transitive Property
6) $\angle A + \angle D = 180^\circ$ $\angle D + \angle C = 180^\circ$	6) Same side interior angles theorem.
7) $\overline{AB} \parallel \overline{DC}$, $\overline{AD} \parallel \overline{BC}$	7) Definition of parallel lines.
8) $ABCD$ is a parallelogram	8) Definition of a parallelogram

Score 3: The student proved $\triangle EFD \cong \triangle BFA$. The student had no correct work after step 4.

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



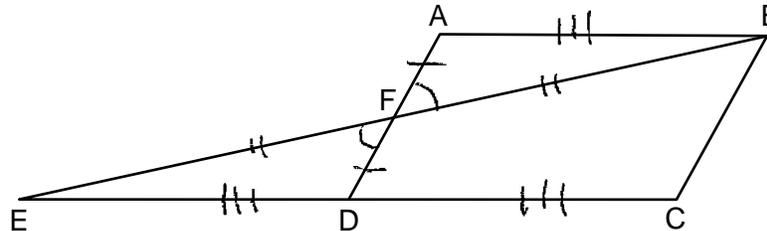
Prove $ABCD$ is a parallelogram.

statements	Reasons
1) QUAD $ABCD$, side \overline{CD} is extended to pt E , \overline{AFD} + \overline{BFE} bisect each other, $\overline{DE} \cong \overline{DC}$	1) Given
2) $\overline{AF} \cong \overline{DF}$, $\overline{EF} \cong \overline{BF}$	2) def bisector
3) $\angle DFE \cong \angle AFB$	3) verticle \angle 's
4) $\triangle EFD \cong \triangle BFA$	4) SAS

Score 2: The student had an incorrect reason in step 3.

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



Prove $ABCD$ is a parallelogram.

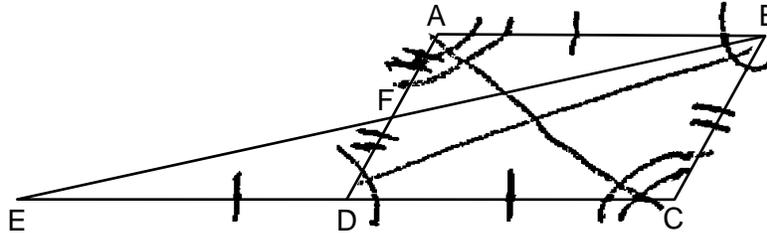
1. Quad $ABCD$, \overline{AFD} + \overline{BFE} bisect each other, $\overline{DE} \cong \overline{DC}$
2. $\angle AFB \cong \angle DFE$
3. $\overline{AF} \cong \overline{FD}$
4. $\overline{BF} \cong \overline{EF}$
 $\triangle DEF \cong \triangle ABF$
5. $\overline{AB} \cong \overline{DC}$
6. $\overline{AB} \parallel \overline{DC}$
7. $ABCD$ is a \square

1. Given
2. Vertical angles are \cong
3. A bisector divides a segment into 2 \cong parts
4. $SSS \cong SSS$
5. opposite sides are \cong .
6. opposite sides are \parallel .
7. Proved in 4 + 5.

Score 2: The student had two correct statements and reasons in steps 2 and 3.

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



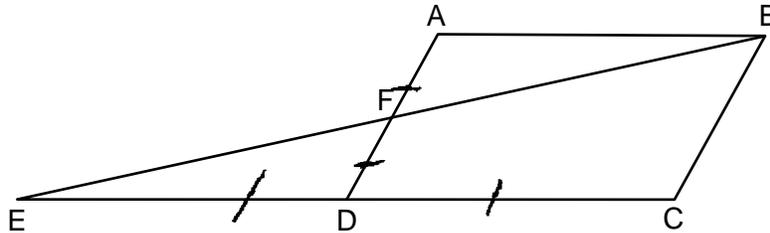
Prove $ABCD$ is a parallelogram.

S	R
<p>1. side \overline{CD} is extended to point E / \overline{AFD} & \overline{BFE} bisect each other / $\overline{DE} \cong \overline{DC}$</p> <p>2. $\overline{AF} \cong \overline{FD}$</p> <p>3. $\overline{AD} \cong \overline{BC}$ $\overline{DC} \cong \overline{AB}$</p> <p>4. $\angle ABC \cong \angle ADC$ $\angle BCD \cong \angle DAB$</p> <p>5. $ABCD$ is a parallelogram</p>	<p>1. Given</p> <p>2. Segment that bisects a segment, creates 2 \cong segments</p> <p>3. Parallel lines are congruent</p> <p>4. Angles made by parallel lines that are alternate interior angles are congruent.</p> <p>5. 2 Pairs of congruent sides & angles.</p>

Score 1: The student correctly proved $\overline{AF} \cong \overline{FD}$.

Question 35

35 In quadrilateral $ABCD$ below, side \overline{CD} is extended through D to point E such that \overline{AFD} and \overline{BFE} bisect each other, and $\overline{DE} \cong \overline{DC}$.



Prove $ABCD$ is a parallelogram.

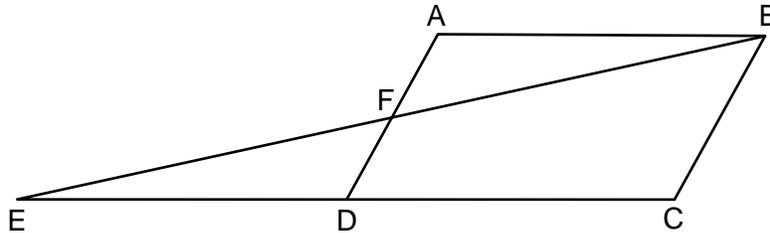
1. $ABCD$, \overline{CD} is extended to point E , \overline{AFD} and \overline{BFE} bisect each other, $\overline{DE} \cong \overline{DC}$
2. F is a midpt of \overline{AD}
~~~~~
3.  $\overline{AF} \cong \overline{DF}$  ~~~~~
4.  $\overline{AB} \cong \overline{DC}$   
 $\overline{AD} \cong \overline{BC}$
5.  $ABCD$  is a  $\square$

1. given
2. a seg bis. intersect a seg at its midpt
3. a midpt  $\div$  a seg into 2  $\cong$  segs
4. opp sides in a  $\square$  are congruent
5. a  $\square$  has at least 1 pair of  $\cong$  sides.

**Score 1:** The student correctly proved  $\overline{AF} \cong \overline{FD}$ .

Question 35

35 In quadrilateral  $ABCD$  below, side  $\overline{CD}$  is extended through  $D$  to point  $E$  such that  $\overline{AFD}$  and  $\overline{BFE}$  bisect each other, and  $\overline{DE} \cong \overline{DC}$ .



Prove  $ABCD$  is a parallelogram.

| Statements                                                                                                        | Reasons                                                             |
|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1. Quad $ABCD$ ,<br>$\overline{AFD}$ & $\overline{BFE}$ bisect<br>each other, $\overline{DE} \cong \overline{DC}$ | 1. Given                                                            |
| 2. $\overline{AD} \cong \overline{BC}$ , $\overline{AB} \cong \overline{DC}$                                      | 2. Opposite sides of<br>a quad are $\cong$ .                        |
| 3. $ABCD$ is a<br>parallelogram                                                                                   | 3. When both pairs<br>of sides are $\cong$<br>it's a parallelogram. |

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

## Regents Examination in Geometry – August 2025

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

(Use for the August 2025 exam only.)

| Raw Score | Scale Score | Performance Level |
|-----------|-------------|-------------------|
| 80        | 100         | 5                 |
| 79        | 99          | 5                 |
| 78        | 97          | 5                 |
| 77        | 96          | 5                 |
| 76        | 94          | 5                 |
| 75        | 93          | 5                 |
| 74        | 92          | 5                 |
| 73        | 91          | 5                 |
| 72        | 90          | 5                 |
| 71        | 89          | 5                 |
| 70        | 88          | 5                 |
| 69        | 87          | 5                 |
| 68        | 86          | 5                 |
| 67        | 85          | 5                 |
| 66        | 84          | 4                 |
| 65        | 84          | 4                 |
| 64        | 83          | 4                 |
| 63        | 82          | 4                 |
| 62        | 82          | 4                 |
| 61        | 81          | 4                 |
| 60        | 80          | 4                 |
| 59        | 80          | 4                 |
| 58        | 79          | 3                 |
| 57        | 79          | 3                 |
| 56        | 78          | 3                 |
| 55        | 77          | 3                 |
| 54        | 77          | 3                 |

| Raw Score | Scale Score | Performance Level |
|-----------|-------------|-------------------|
| 53        | 76          | 3                 |
| 52        | 76          | 3                 |
| 51        | 75          | 3                 |
| 50        | 75          | 3                 |
| 49        | 74          | 3                 |
| 48        | 73          | 3                 |
| 47        | 73          | 3                 |
| 46        | 72          | 3                 |
| 45        | 72          | 3                 |
| 44        | 71          | 3                 |
| 43        | 71          | 3                 |
| 42        | 70          | 3                 |
| 41        | 69          | 3                 |
| 40        | 69          | 3                 |
| 39        | 68          | 3                 |
| 38        | 68          | 3                 |
| 37        | 67          | 3                 |
| 36        | 66          | 3                 |
| 35        | 66          | 3                 |
| 34        | 65          | 3                 |
| 33        | 64          | 2                 |
| 32        | 63          | 2                 |
| 31        | 63          | 2                 |
| 30        | 62          | 2                 |
| 29        | 61          | 2                 |
| 28        | 60          | 2                 |
| 27        | 59          | 2                 |

| Raw Score | Scale Score | Performance Level |
|-----------|-------------|-------------------|
| 26        | 59          | 2                 |
| 25        | 58          | 2                 |
| 24        | 57          | 2                 |
| 23        | 56          | 2                 |
| 22        | 55          | 2                 |
| 21        | 54          | 1                 |
| 20        | 52          | 1                 |
| 19        | 51          | 1                 |
| 18        | 50          | 1                 |
| 17        | 49          | 1                 |
| 16        | 47          | 1                 |
| 15        | 46          | 1                 |
| 14        | 44          | 1                 |
| 13        | 42          | 1                 |
| 12        | 40          | 1                 |
| 11        | 38          | 1                 |
| 10        | 36          | 1                 |
| 9         | 34          | 1                 |
| 8         | 31          | 1                 |
| 7         | 29          | 1                 |
| 6         | 26          | 1                 |
| 5         | 22          | 1                 |
| 4         | 19          | 1                 |
| 3         | 15          | 1                 |
| 2         | 10          | 1                 |
| 1         | 6           | 1                 |
| 0         | 0           | 1                 |

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

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

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