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

GEOMETRY

Thursday, August 17, 2023 — 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 A plane intersects a sphere. Which two-dimensional shape is formed by this cross section?

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

2 The endpoints of $\overline{AB}$ are $A(-5,3)$ and $B(7,-5)$. Point P is on $\overline{AB}$ such that $AP:PB = 3:1$. What are the coordinates of point P?

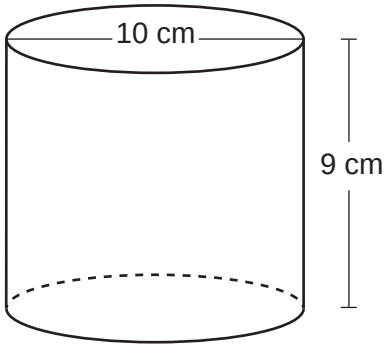
(1) $(-2,-3)$
(2) $(1,-1)$
(3) $(-2,1)$
(4) $(4,-3)$

3 Zach placed the foot of an extension ladder 8 feet from the base of the house and extended the ladder 25 feet to reach the house. To the *nearest degree*, what is the measure of the angle the ladder makes with the ground?

(1) 18
(2) 19
(3) 71
(4) 72

Use this space for computations.

4 Darnell models a cup with the cylinder below. He measured the diameter of the cup to be 10 cm and the height to be 9 cm.



If Darnell fills the cup with water to a height of 8 cm, what is the volume of the water in the cup, to the *nearest cubic centimeter*?

(1) 628
(2) 707
(3) 2513
(4) 2827

5 Which quadrilateral has diagonals that are always perpendicular?

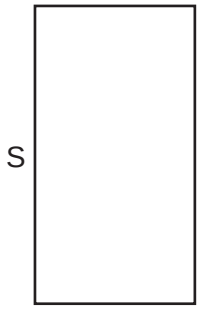
(1) rectangle
(2) rhombus
(3) trapezoid
(4) parallelogram

6 Which regular polygon would carry onto itself after a rotation of 300° about its center?

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

Use this space for computations.

7 The rectangle drawn below is continuously rotated about side S.



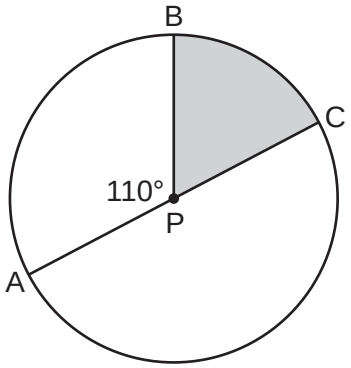
Which three-dimensional figure is formed by this rotation?

(1) rectangular prism
(2) square pyramid
(3) cylinder
(4) cone

8 An equation of the line perpendicular to the line whose equation is $4x - 5y = 6$ and passes through the point $(-2,3)$ is

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

9 In circle P below, diameter $\overline{AC}$ and radius $\overline{BP}$ are drawn such that $m\angle APB = 110°$.



If $AC = 12$, what is the area of shaded sector BPC?

(1) $\frac{7}{6}\pi$
(2) 7π
(3) 11π
(4) 28π

Use this space for computations.

10 In $\triangle ABC$, side $\overline{BC}$ is extended through C to D. If $m\angle A = 30°$ and $m\angle ACD = 110°$, what is the longest side of $\triangle ABC$?

(1) $\overline{AC}$
(2) $\overline{BC}$
(3) $\overline{AB}$
(4) $\overline{CD}$

11 Right triangle ACT has $m\angle A = 90°$. Which expression is always equivalent to $\cos T$?

(1) $\cos C$
(2) $\sin C$
(3) $\tan T$
(4) $\sin T$

12 A regular pyramid with a square base is made of solid glass. It has a base area of 36 cm^2 and a height of 10 cm. If the density of glass is 2.7 grams per cubic centimeter, the mass of the pyramid, in grams, is

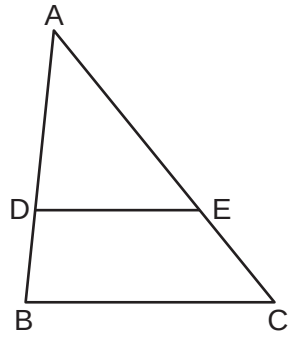
(1) 120
(2) 324
(3) 360
(4) 972

13 The equation of a circle is $x^2 + y^2 + 12x = -27$. What are the coordinates of the center and the length of the radius of the circle?

(1) center (6,0) and radius 3
(2) center (6,0) and radius 9
(3) center (−6,0) and radius 3
(4) center (−6,0) and radius 9

Use this space for computations.

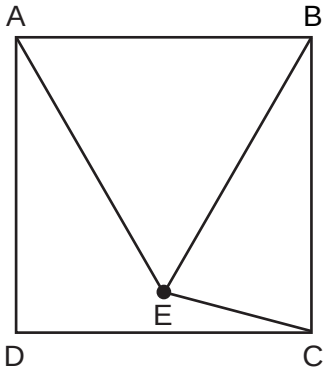
14 In triangle ABC below, D is a point on $\overline{AB}$ and E is a point on $\overline{AC}$, such that $\overline{DE} \parallel \overline{BC}$.



If $AD = 12$, $DB = 8$, and $EC = 10$, what is the length of $\overline{AC}$?

(1) 15
(2) 22
(3) 24
(4) 25

15 In the diagram below, point E is located inside square $ABCD$ such that $\triangle ABE$ is equilateral, and $\overline{CE}$ is drawn.

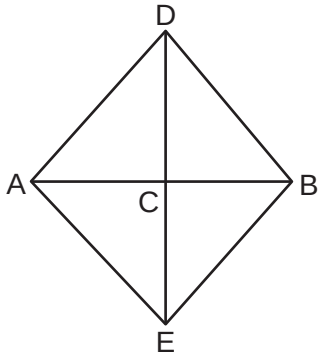


What is $m\angle BEC$?

(1) 30°
(2) 60°
(3) 75°
(4) 90°

Use this space for computations.

16 In the diagram below of quadrilateral $ADBE$, $\overline{DE}$ is the perpendicular bisector of $\overline{AB}$.



Which statement is always true?

(1) $\angle ADC \cong \angle BDC$

(2) $\angle EAC \cong \angle DAC$

(3) $\overline{AD} \cong \overline{BE}$

(4) $\overline{AE} \cong \overline{AD}$

17 What is the image of (4,3) after a reflection over the line $y = 1$?

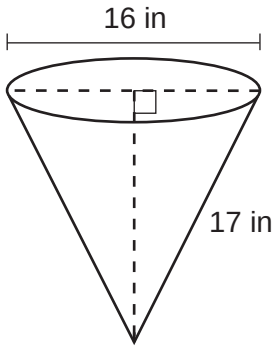
(1) $(-2,3)$

(2) $(-4,3)$

(3) $(4,-1)$

(4) $(4,-3)$

18 In the diagram below, a cone has a diameter of 16 inches and a slant height of 17 inches.



What is the volume of the cone, in cubic inches?

(1) 320π

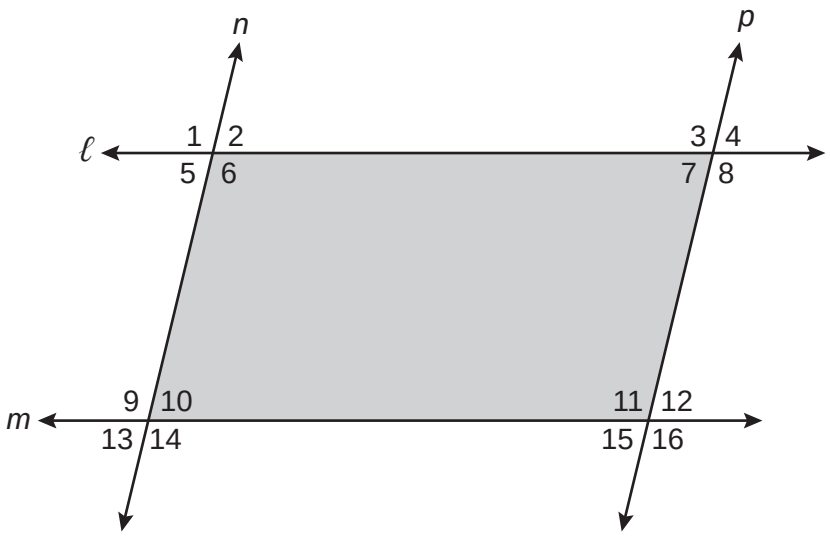
(2) 363π

(3) 960π

(4) 1280π

Use this space for computations.

19 In the diagram below, lines ℓ and m intersect lines n and p to create the shaded quadrilateral as shown.



Which congruence statement would be sufficient to prove the quadrilateral is a parallelogram?

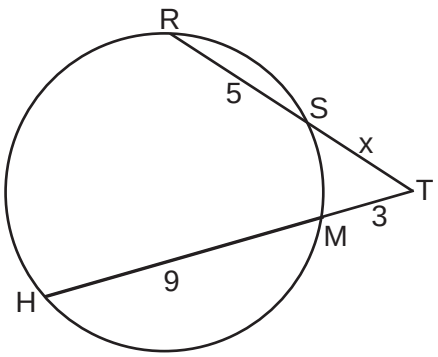
(1) $\angle 1 \cong \angle 6$ and $\angle 9 \cong \angle 14$

(2) $\angle 5 \cong \angle 10$ and $\angle 6 \cong \angle 9$

(3) $\angle 5 \cong \angle 7$ and $\angle 10 \cong \angle 15$

(4) $\angle 6 \cong \angle 9$ and $\angle 9 \cong \angle 11$

20 In the circle below, secants $\overline{TSR}$ and $\overline{TMH}$ intersect at T, $SR = 5$, $HM = 9$, $TM = 3$, and $TS = x$.



Which equation could be used to find the value of x?

(1) $x(x + 5) = 36$

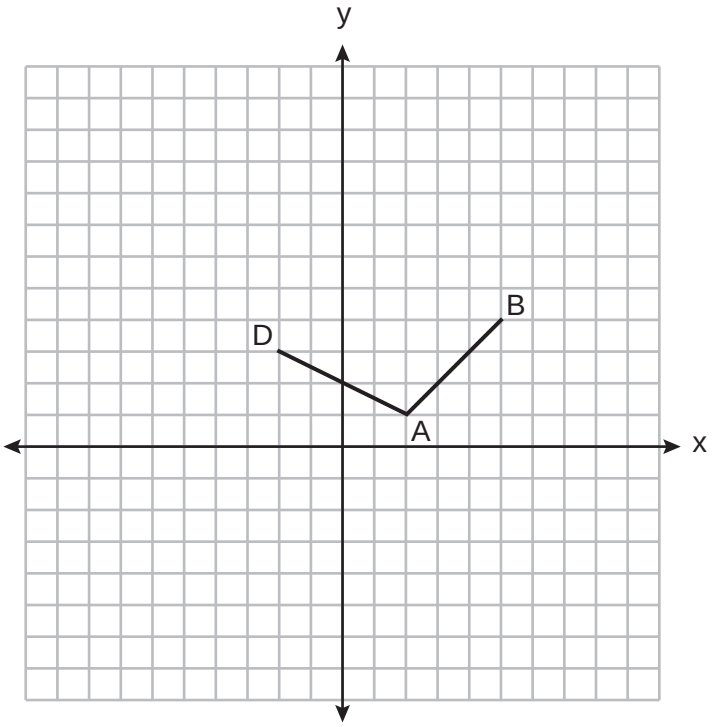
(2) $x(x + 5) = 27$

(3) $3x = 45$

(4) $5x = 27$

Use this space for computations.

21 On the set of axes below, the coordinates of three vertices of trapezoid $ABCD$ are $A(2,1)$, $B(5,4)$, and $D(-2,3)$.



Which point could be vertex C?

(1) $(1,5)$

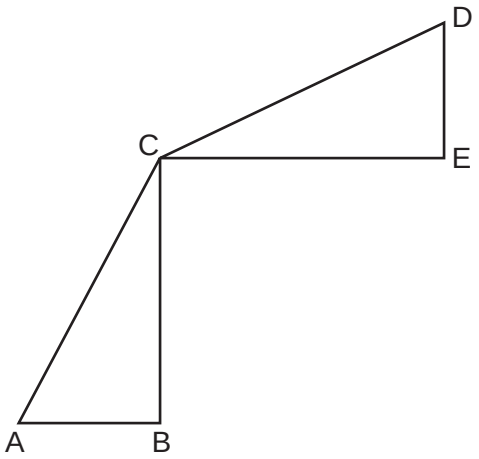
(2) $(4,10)$

(3) $(-1,6)$

(4) $(-3,8)$

Use this space for computations.

22 In the diagram below, $\triangle ABC \cong \triangle DEC$.



Which transformation will map $\triangle ABC$ onto $\triangle DEC$?

(1) a rotation

(2) a line reflection

(3) a translation followed by a dilation

(4) a line reflection followed by a second line reflection

23 If $\triangle TAP$ is dilated by a scale factor of 0.5, which statement about the image, $\triangle T'A'P'$, is true?

(1) $m\angle T'A'P' = \frac{1}{2}(m\angle TAP)$

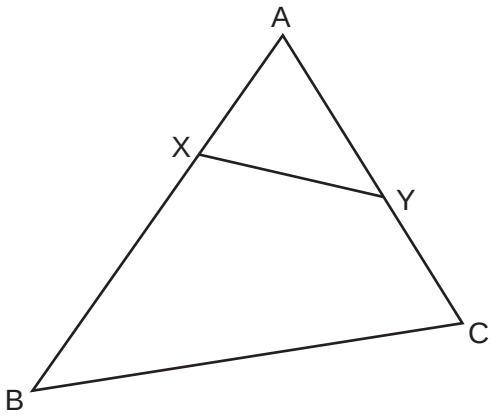
(2) $m\angle T'A'P' = 2(m\angle TAP)$

(3) $TA = 2(T'A')$

(4) $TA = \frac{1}{2}(T'A')$

Use this space for computations.

24 In the diagram below of $\triangle ABC$, X and Y are points on $\overline{AB}$ and $\overline{AC}$, respectively, such that $m\angle AYX = m\angle B$.



Which statement is *not* always true?

(1) $\frac{AX}{AC} = \frac{XY}{CB}$

(2) $\frac{AY}{AB} = \frac{AX}{AC}$

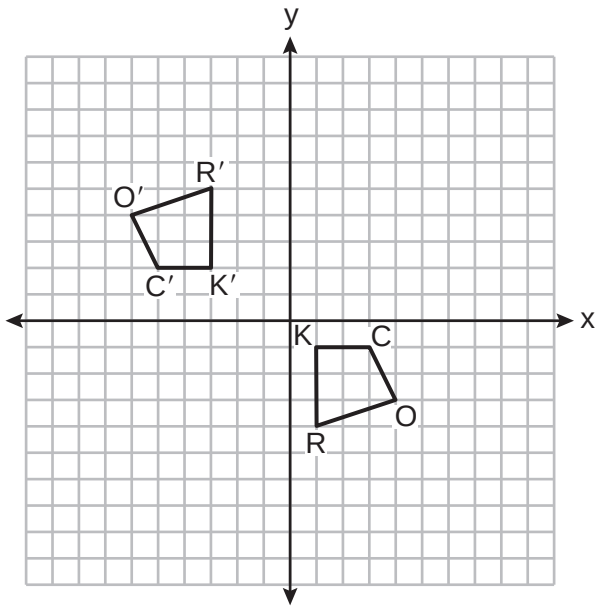
(3) $(AY)(CB) = (XY)(AB)$

(4) $(AY)(AB) = (AC)(AX)$

Part II

Answer all 7 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [14]

25 On the set of axes below, congruent quadrilaterals *ROCK* and $R'O'C'K'$ are graphed.



Describe a sequence of transformations that would map quadrilateral *ROCK* onto quadrilateral $R'O'C'K'$.

26 In triangle CEM, $CE = 3x + 10$, $ME = 5x - 14$, and $CM = 2x - 6$.

Determine and state the value of x that would make $\triangle CEM$ an isosceles triangle with the vertex angle at E.

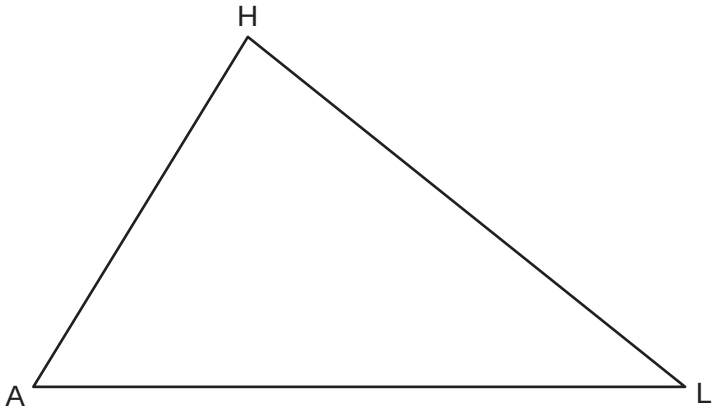
27 A flagpole casts a shadow on the ground 91 feet long, with a 53° angle of elevation from the end of the shadow to the top of the flagpole.

Determine and state, to the *nearest tenth of a foot*, the height of the flagpole.

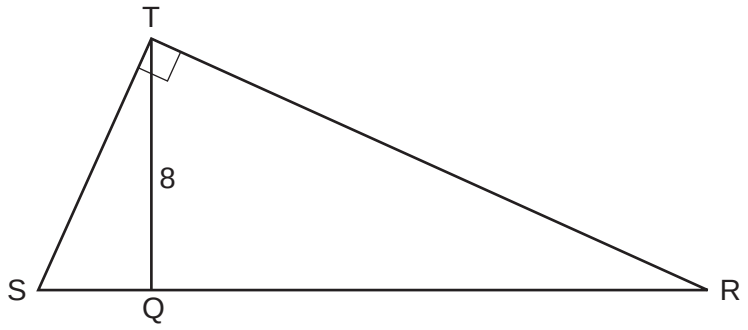
28 A man is spray-painting the tops of 10 patio tables. Five tables have round tops, with diameters of 4 feet, and five tables have rectangular tops, with dimensions of 4 feet by 6 feet. A can of spray paint covers 25 square feet. How many cans of spray paint must be purchased to paint all of the tabletops?

29 Using a compass and straightedge, construct a midsegment of $\triangle AHL$ below.

[Leave all construction marks.]



30 Right triangle STR is shown below, with $m\angle T = 90°$. Altitude $\overline{TQ}$ is drawn to $\overline{SQR}$, and $TQ = 8$.



If the ratio SQ:QR is 1:4, determine and state the length of $\overline{SR}$.

31 Line AB is dilated by a scale factor of 2 centered at point A.

Evan thinks that the dilation of $\overleftrightarrow{AB}$ will result in a line parallel to $\overleftrightarrow{AB}$, not passing through points A or B.

Nathan thinks that the dilation of $\overleftrightarrow{AB}$ will result in the same line, $\overleftrightarrow{AB}$.

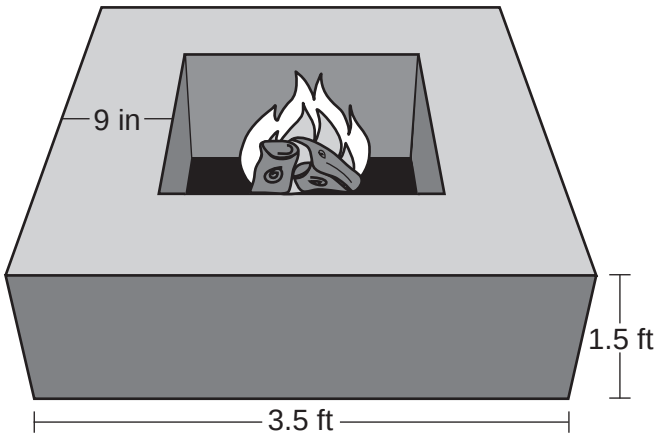
Who is correct?

Explain why.

Part III

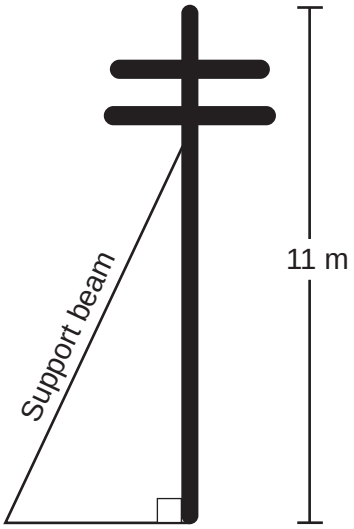
Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



Two conditions for proper support are:

- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

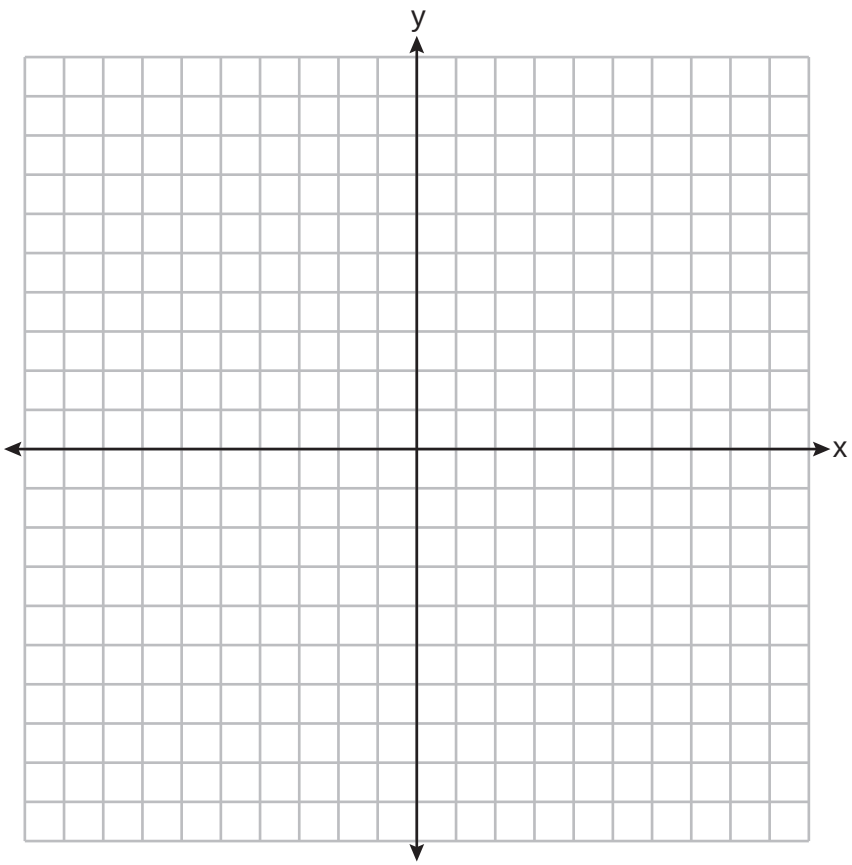
Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.

Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions.

34 The coordinates of the vertices of quadrilateral $ABCD$ are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

Prove that $ABCD$ is a parallelogram, but *not* a rectangle.

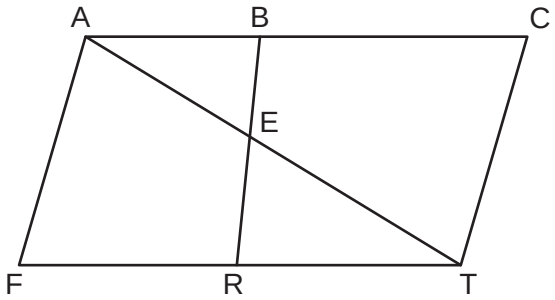
[The use of the set of axes below is optional.]



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 the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

Work space for question 35 is continued on the next page.

Question 35 continued

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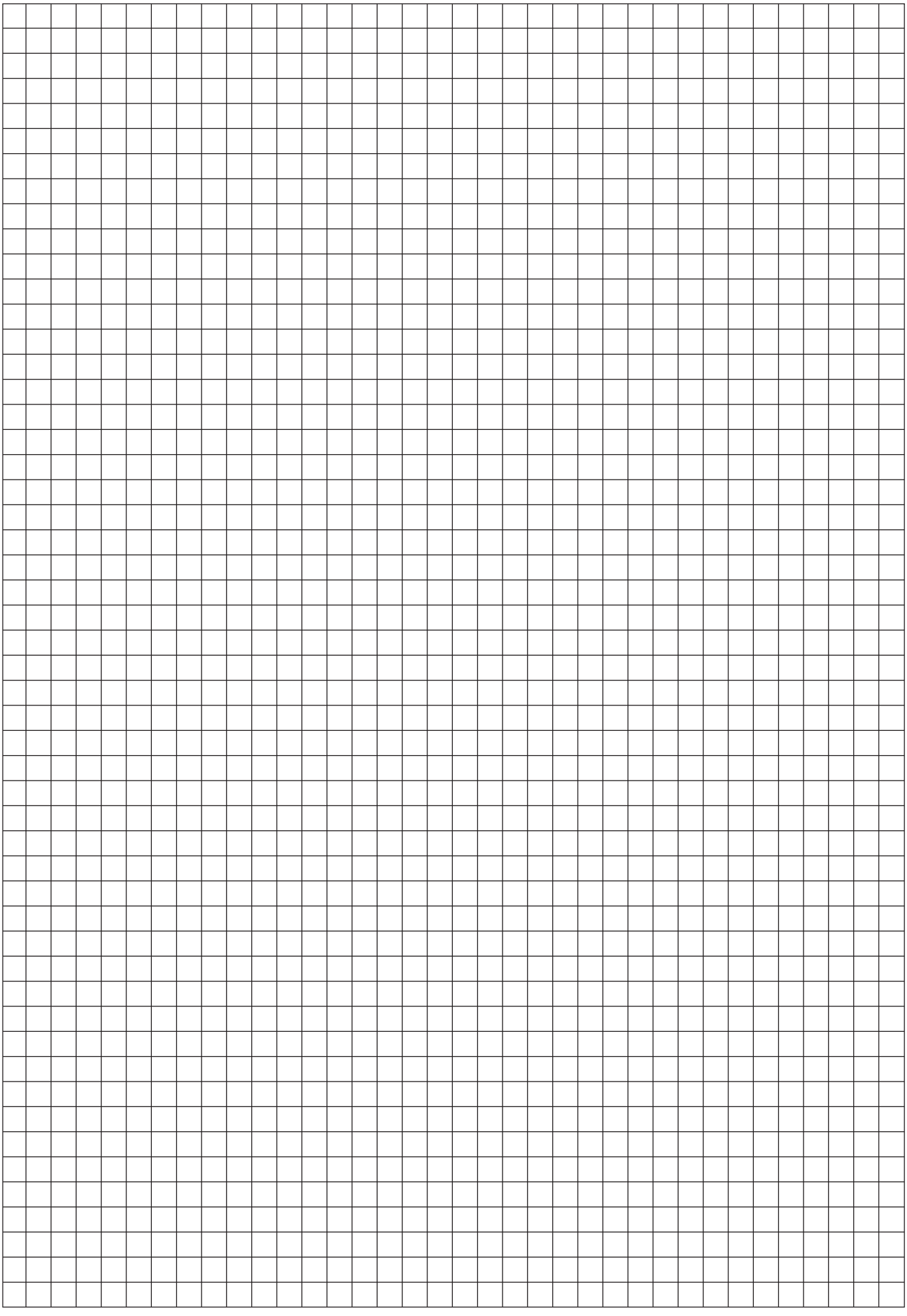

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High School Math Reference Sheet

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

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

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon = 3.785 liters
1 liter = 0.264 gallon
1 liter = 1000 cubic centimeters

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$

Pythagorean Theorem	$a^2 + b^2 = c^2$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - \mathrm{r}}$ where $r \neq 1$
Radians	1 radian $= \frac{180}{\pi}$ degrees
Degrees	1 degree $= \frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$

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GEOMETRY

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GEOMETRY

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

Regents Examination in Geometry – August 2023

Scoring Key: Part I (Multiple-Choice Questions)

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

Regents Examination in Geometry – August 2023

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

Examination	Date	Question Number	Scoring Key	Question Type	Credit	Weight
Geometry	August '23	**25**	-	CR	2	1
Geometry	August '23	**26**	-	CR	2	1
Geometry	August '23	**27**	-	CR	2	1
Geometry	August '23	**28**	-	CR	2	1
Geometry	August '23	**29**	-	CR	2	1
Geometry	August '23	**30**	-	CR	2	1
Geometry	August '23	**31**	-	CR	2	1
Geometry	August '23	**32**	-	CR	4	1
Geometry	August '23	**33**	-	CR	4	1
Geometry	August '23	**34**	-	CR	4	1
Geometry	August '23	**35**	-	CR	6	1

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

The chart for determining students' final examination scores for the **August 2023 Regents Examination in Geometry** will be posted on the Department's web site at: https://www.nysedregents.org/geometryre/ on the day of the examination. Conversion charts provided for the previous administrations of the Regents Examination in Geometry must NOT be used to determine students' final scores for this administration.

FOR TEACHERS ONLY

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

GEOMETRY

Thursday, August 17, 2023 — 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 Scoring Key and Rating Guide to help guide scoring of student work. While not reflective of all scenarios, the Model Response Set illustrates how less common student responses to constructed response questions may be scored. The Model Response Set will be available on the Department's website at: https://www.nysedregents.org/geometryre/.

Note: The rubric definition for a 0-credit response has been updated based on feedback from New York State mathematics educators.

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 Thursday, August 17, 2023. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

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

II. Full-Credit Responses

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

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

III. Appropriate Work

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

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

IV. Multiple Errors

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

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

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

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

Part II

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

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

[1] An appropriate sequence of transformations is described, but one conceptual error is made.

or

[1] An appropriate sequence of transformations is described, 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]** 12, 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] $3x + 10 = 5x - 14$ or equivalent is written, but no further correct work is shown.

or

[1] 12, 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]** 120.8, 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] 120.8, 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]** 8, 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 total areas of the 10 tables, but no further correct work is shown.

or

[1] 8, but no work is shown.

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

(29) **[2]** A correct construction is drawn showing all appropriate arcs.

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

or

[1] A correct construction is drawn showing all appropriate arcs, but the midsegment is not drawn.

[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.

(30) **[2]** 20, 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 length of $\overline{SQ}$, but no further correct work is shown.

or

[1] 20, 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]** Nathan is indicated, and a complete and correct explanation is written.

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

or

[1] Nathan, and an incomplete or partially correct explanation is written.

[0] Nathan, and the explanation is missing or incorrect.

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]** 21, and correct work is shown.

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

or

[3] Correct work is shown to find the volume of the concrete needed to complete the fire pit, but no further correct work is shown.

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

or

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

or

[2] Correct work is shown to find 18.375 and 6, or equivalent volumes, 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 18.375 or 6, or equivalent volumes, but no further correct work is shown.

or

[1] 21, but no work is shown.

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

(33) **[4]** 8.5 and 3.6, 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 8.5 or 3.6, but no further correct work is shown.

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

or

[1] 8.5 or 3.6, 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.

(34) **[4]** Correct work is shown to prove *ABCD* is a parallelogram, and not 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] Correct work is shown to prove *ABCD* is a parallelogram, and not a rectangle, 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] Correct work is shown to prove *ABCD* is a parallelogram, and a concluding statement is written, but no further correct work is shown.

or

[2] Correct work is shown to prove *ABCD* is not a rectangle, and a concluding statement is written, but no further correct work is shown.

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

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

Part IV

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

(35) **[6]** A complete and correct proof that includes a concluding statement is written.

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

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

or

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

or

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

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

or

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

[2] A proof is written that demonstrates a 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 2023

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

Regents Examination in Geometry

August 2023

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

The *Chart for Determining the Final Examination Score for the August 2023 Regents Examination in Geometry* will be posted on the Department's web site at: https://www.nysed.gov/state-assessment/high-school-regents-examinations on Thursday, August 17, 2023. 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. Select the test title.

3. Complete the required demographic fields.

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

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

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

GEOMETRY

Thursday, August 17, 2023 — 12:30 to 3:30 p.m., only

MODEL RESPONSE SET

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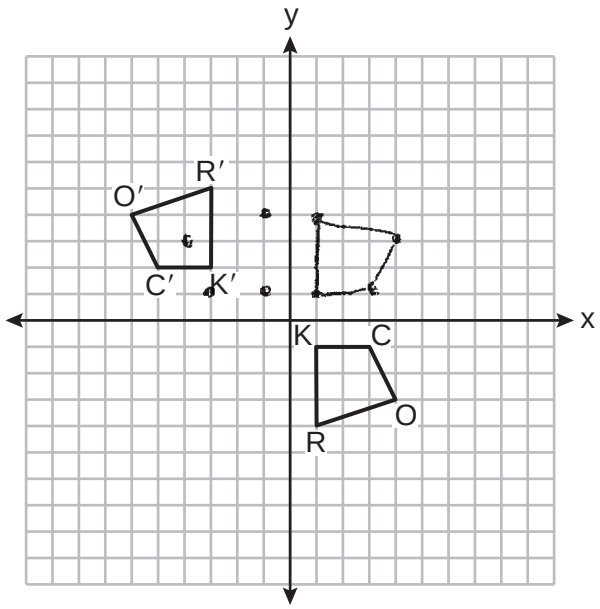
Question 25

25 On the set of axes below, congruent quadrilaterals *ROCK* and *R′O′C′K′* are graphed.



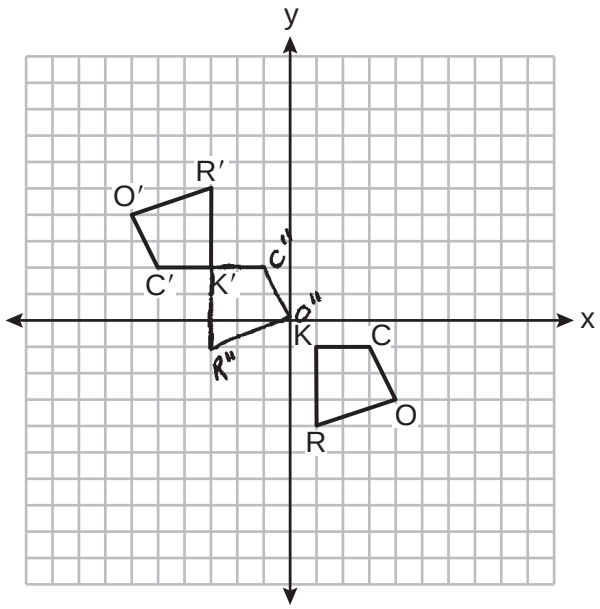
Describe a sequence of transformations that would map quadrilateral *ROCK* onto quadrilateral *R′O′C′K′*.

reflection over X axis, reflection over y axis and translation up 1, left 2

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

Question 25

25 On the set of axes below, congruent quadrilaterals *ROCK* and *R′O′C′K′* are graphed.



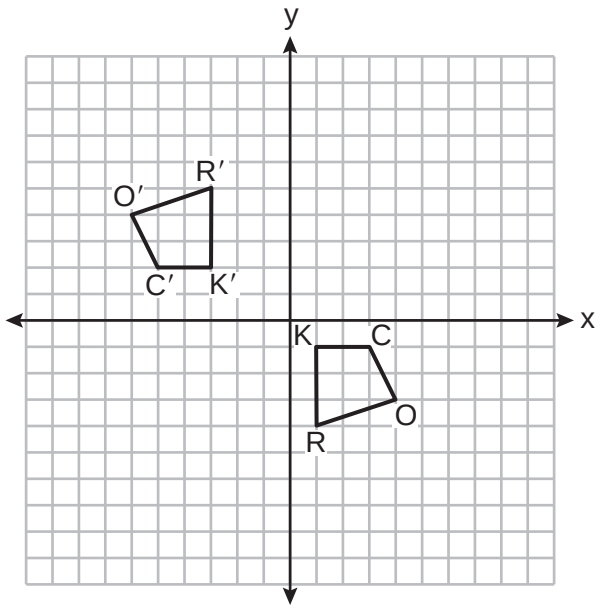
Describe a sequence of transformations that would map quadrilateral *ROCK* onto quadrilateral *R′O′C′K′*.

-translate up 3 left 4 pt K onto pt K'
- Rotate R"O"C"K' about pt. K' 180° mapping R"→R' O"→O' and C"→C'

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

Question 25

25 On the set of axes below, congruent quadrilaterals *ROCK* and *R′O′C′K′* are graphed.



Describe a sequence of transformations that would map quadrilateral *ROCK* onto quadrilateral *R′O′C′K′*.

1 a reflection across the y axis.

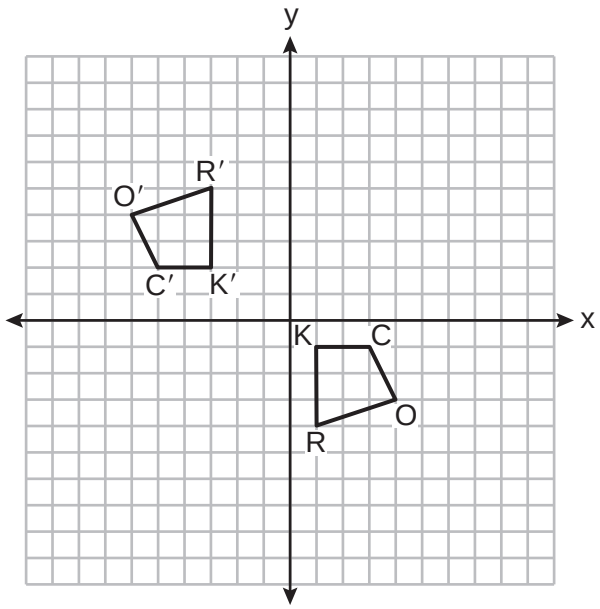
2 a translation up 1 unit. and left 2 units

3 a reflection across line y = 1

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

Question 25

25 On the set of axes below, congruent quadrilaterals *ROCK* and *R′O′C′K′* are graphed.



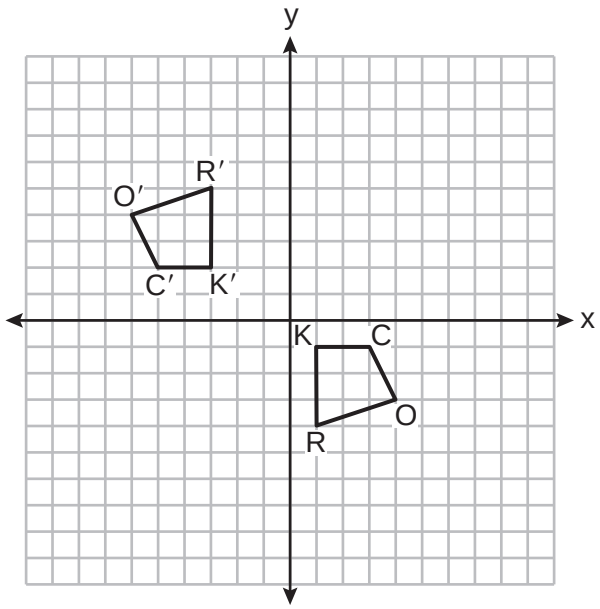
Describe a sequence of transformations that would map quadrilateral *ROCK* onto quadrilateral *R′O′C′K′*.

Rotate 180° about point $(-1, \frac{1}{2})$

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

Question 25

25 On the set of axes below, congruent quadrilaterals *ROCK* and *R′O′C′K′* are graphed.



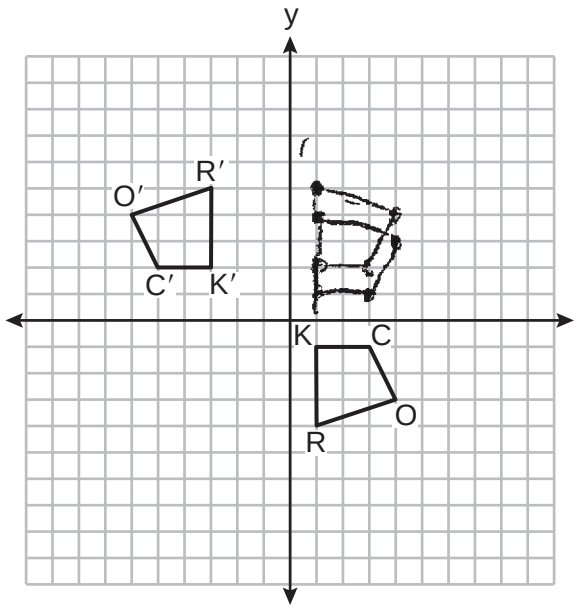
Describe a sequence of transformations that would map quadrilateral *ROCK* onto quadrilateral *R′O′C′K′*.

Rotation of 180° counterclockwise about origin.

Score 1: The student stated an incorrect coordinate as the center of rotation.

Question 25

25 On the set of axes below, congruent quadrilaterals *ROCK* and *R′O′C′K′* are graphed.



R(1,-4) → R′(1,4)
O(4,-3) → O′(4,3)
C(3,-1) → C′(3,1)
K(1,-1) → K′(1,1)

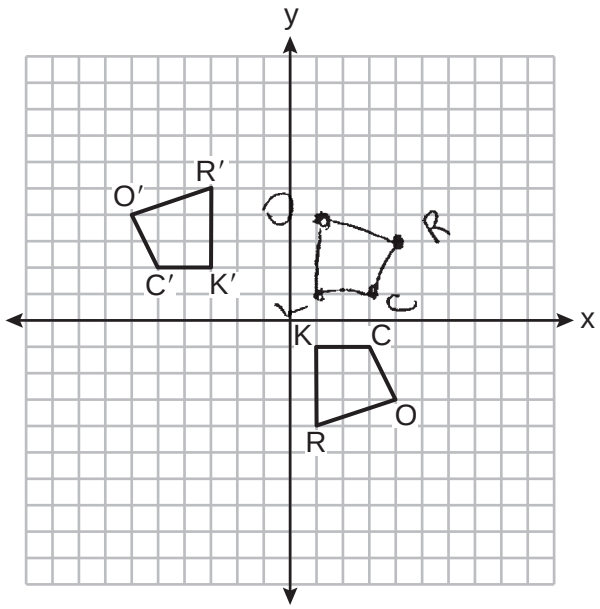
Describe a sequence of transformations that would map quadrilateral *ROCK* onto quadrilateral *R′O′C′K′*.

A reflection over the x axis, a translation of $T_{1,0}$, a translation of $T_{0,-2}$, a reflection over x = -2.

Score 1: The student determined the sequence of transformations correctly, but stated the translations incorrectly as $T_{1,0}$ and $T_{0,-2}$, rather than $T_{0,1}$ and $T_{-2,0}$.

Question 25

25 On the set of axes below, congruent quadrilaterals *ROCK* and *R′O′C′K′* are graphed.



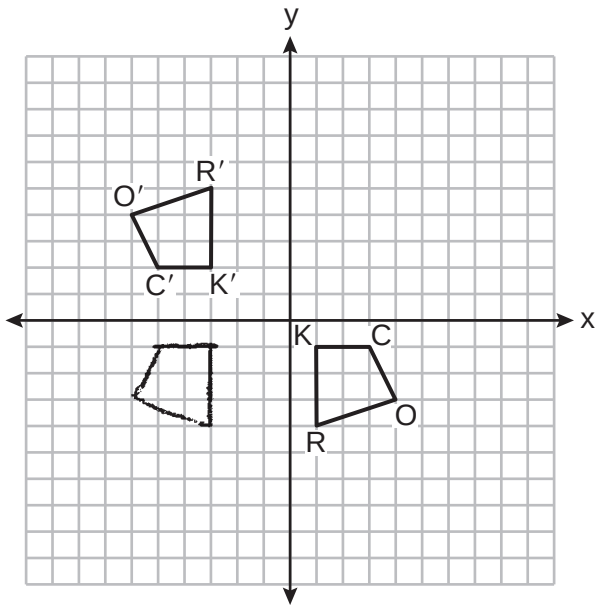
Describe a sequence of transformations that would map quadrilateral *ROCK* onto quadrilateral *R′O′C′K′*.

A reflection over the X-axis and a rotation and translation of (−4, 0) till it maps on to R'O'C'K'

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

Question 25

25 On the set of axes below, congruent quadrilaterals *ROCK* and *R′O′C′K′* are graphed.



Describe a sequence of transformations that would map quadrilateral *ROCK* onto quadrilateral *R′O′C′K′*.

TAPS

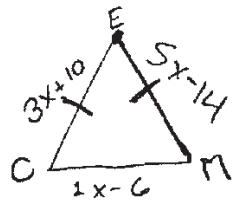
Translate over to the left four units followed by a reflection on the x-axis. from pt K. Rock maps onto ROCK because translations and reflections are rigid motions. Side lengths and angle measures are preserved.

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

Question 26

26 In triangle CEM, $CE = 3x + 10$, $ME = 5x - 14$, and $CM = 2x - 6$.

Determine and state the value of x that would make $\triangle CEM$ an isosceles triangle with the vertex angle at E.



2 sides congruent, vertex at E

$3x+10 = 5x-14$
$-3x \quad -3x$
$10 = 2x-14$
$+14 \quad +14$
$24 = 2x$
$\frac{24}{2} = \frac{2x}{2}$
$12 = x$

$X=12$

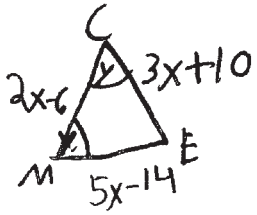
Score 2: The student gave a complete and correct response.

Question 26

26 In triangle CEM, $CE = 3x + 10$, $ME = 5x - 14$, and $CM = 2x - 6$.

Determine and state the value of x that would make $\triangle CEM$ an isosceles triangle with the vertex angle at E.

$x = 12$



$3x + 10 = 5x - 14$

$24 = 2x$

$x = 12$

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

Question 26

26 In triangle CEM, $CE = 3x + 10$, $ME = 5x - 14$, and $CM = 2x - 6$.

Determine and state the value of x that would make $\triangle CEM$ an isosceles triangle with the vertex angle at E.

$5x - 14 = 2x - 6$

$-2x \quad -2x$

$3x - 14 = -6$

$+14 \quad +14$

$\frac{3x}{3} = \frac{8}{3}$

$x = \frac{8}{3}$

Score 1: The student wrote an incorrect equation, but found an appropriate value of x.

Question 26

26 In triangle CEM, $CE = 3x + 10$, $ME = 5x - 14$, and $CM = 2x - 6$.

Determine and state the value of x that would make $\triangle CEM$ an isosceles triangle with the vertex angle at E.

$3x+10+5x-14+2x-6=180$

$10x+10-14-6=180$

$10x-10=180$

$+10\ +10$

$\frac{10x}{10}=\frac{190}{10}$

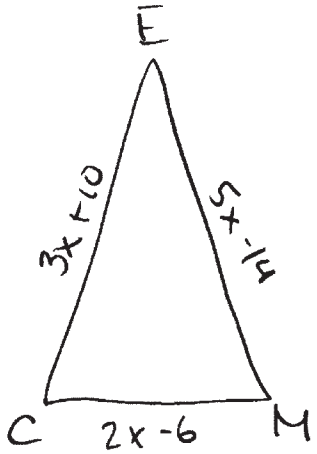
$x=19$

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

Question 26

26 In triangle CEM, $CE = 3x + 10$, $ME = 5x - 14$, and $CM = 2x - 6$.

Determine and state the value of x that would make $\triangle CEM$ an isosceles triangle with the vertex angle at E.



combine like terms

$(3x + 10) = (2x - 6) = (5x - 4)$

$+4 \quad +4$

$3x + 10 = 2x - 2 = 5x$

$-2x \quad -2x$

$1x + 10 = -2 = 3x$

$-1 \quad -1$

$10 = -2 = 4x$

$+2 \quad +2$

$\frac{12}{4} = \frac{4x}{4}$

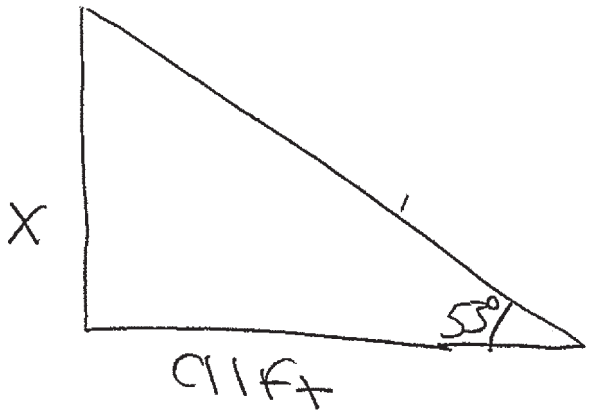
$x = 3$

Score 0: The student gave a completely incorrect response.

Question 27

27 A flagpole casts a shadow on the ground 91 feet long, with a 53° angle of elevation from the end of the shadow to the top of the flagpole.

Determine and state, to the *nearest tenth of a foot*, the height of the flagpole.



$\frac{\tan(53)}{1} = \frac{x}{91}$

$x = 91(\tan 53)$

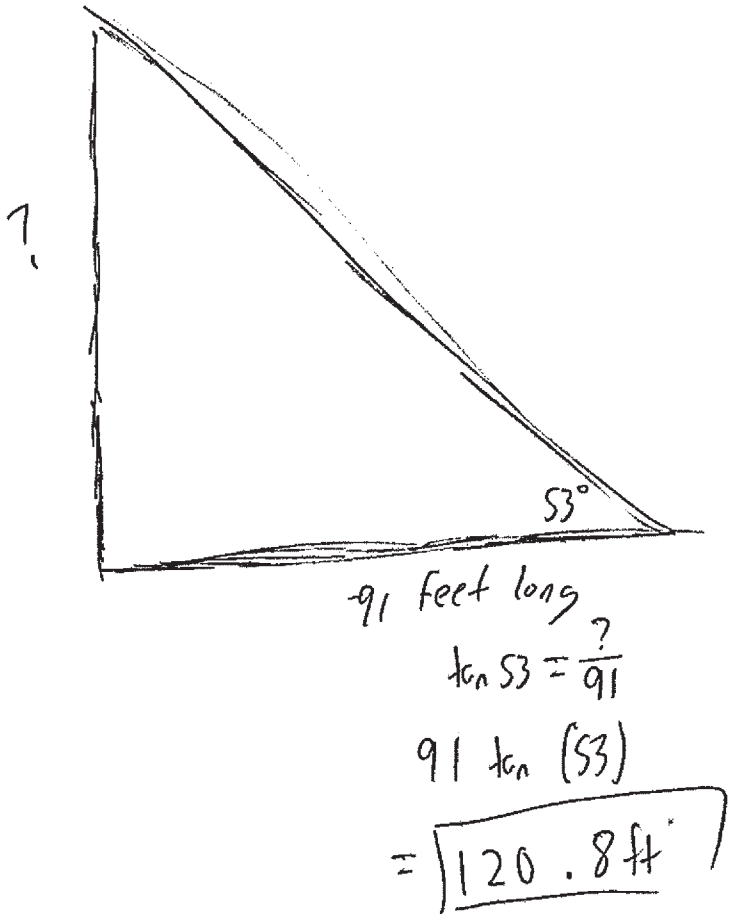
$x = 120.8$ ft

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

Question 27

27 A flagpole casts a shadow on the ground 91 feet long, with a 53° angle of elevation from the end of the shadow to the top of the flagpole.

Determine and state, to the *nearest tenth of a foot*, the height of the flagpole.

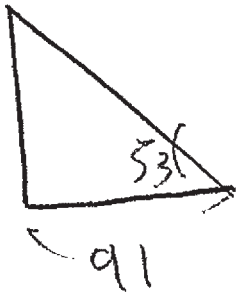


Score 2: The student gave a complete and correct response.

Question 27

27 A flagpole casts a shadow on the ground 91 feet long, with a 53° angle of elevation from the end of the shadow to the top of the flagpole.

Determine and state, to the *nearest tenth of a foot*, the height of the flagpole.



TOA

C SOHCAH TOA $\frac{O}{A}$

$\tan 53 = \frac{x}{91}$

TOA

121

Score 1: The student made a rounding error.

Question 27

27 A flagpole casts a shadow on the ground 91 feet long, with a 53° angle of elevation from the end of the shadow to the top of the flagpole.

Determine and state, to the *nearest tenth of a foot*, the height of the flagpole.

SOH CAH TOA

$\tan 53 = \frac{x}{91}$

$\tan 53x = 91$

$\frac{1.33x}{1.33} = \frac{91}{1.33}$

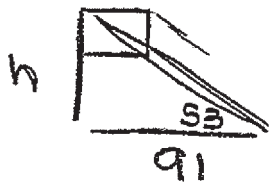
$x = 68.4$

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

Question 27

27 A flagpole casts a shadow on the ground 91 feet long, with a 53° angle of elevation from the end of the shadow to the top of the flagpole.

Determine and state, to the *nearest tenth of a foot*, the height of the flagpole.



$\cos 53 = \frac{h}{91}$

$h = \cos 53(91)$

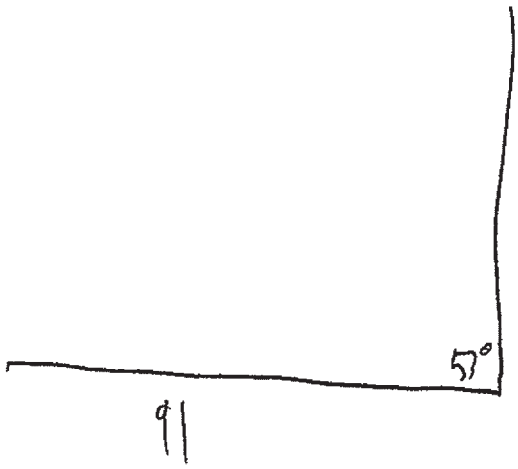
$h = 54.8$ ft

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

Question 27

27 A flagpole casts a shadow on the ground 91 feet long, with a 53° angle of elevation from the end of the shadow to the top of the flagpole.

Determine and state, to the *nearest tenth of a foot*, the height of the flagpole.



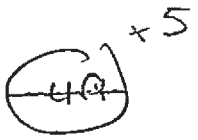
88.91

tan⁻¹(53 − 88.91

Score 0: The student gave a completely incorrect response.

Question 28

28 A man is spray-painting the tops of 10 patio tables. Five tables have round tops, with diameters of 4 feet, and five tables have rectangular tops, with dimensions of 4 feet by 6 feet. A can of spray paint covers 25 square feet. How many cans of spray paint must be purchased to paint all of the tabletops?



$A = \pi r^2$

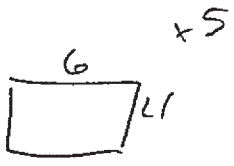
$A = \pi 2^2$

$A = \pi 4$

$A = 12.56$

$A = 12.56 \cdot 5$

$A = 62.83$ sq ft



$A = 6 \cdot 4$

$A = 24$

$A = 24 \cdot 5$

$A = 120$ sq ft

$$\begin{array}{r} 120.00 \\ +\ 62.83 \\ \hline 182.83 \end{array}$$

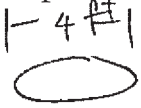
$$\frac{182.83}{25} = 7.313 \text{ cans}$$

8 spray cans

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

Question 28

28 A man is spray-painting the tops of 10 patio tables. Five tables have round tops, with diameters of 4 feet, and five tables have rectangular tops, with dimensions of 4 feet by 6 feet. A can of spray paint covers 25 square feet. How many cans of spray paint must be purchased to paint all of the tabletops?



$A_r = \pi r^2$

$= \pi 4 ft^2$

$5 \times \pi 4 = 20\pi ft^2$

$A_{rectangle} = l \times w$

$= 6 \times 4$

$= 24 ft^2$

$5 \times 24 = 120 ft^2$

$(20\pi + 120) \div 25 \approx 6$ cans

Ans: 6 cans of spray paint must be purchased to paint all of the tabletops.

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

Question 28

28 A man is spray-painting the tops of 10 patio tables. Five tables have round tops, with diameters of 4 feet, and five tables have rectangular tops, with dimensions of 4 feet by 6 feet. A can of spray paint covers 25 square feet. How many cans of spray paint must be purchased to paint all of the tabletops?

$5 \cdot 2^2\pi \approx 63 ft^2$

$5 \cdot 4 \cdot 6 = 120 ft^2$

$+$

$183 ft^2$

7.32

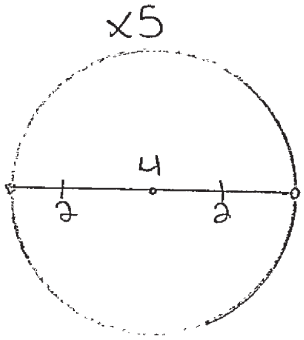
$25\overline{)183}$

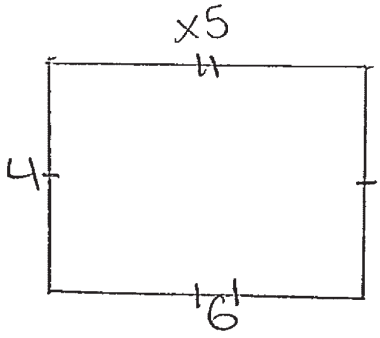
8 cans of spray paint

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

Question 28

28 A man is spray-painting the tops of 10 patio tables. Five tables have round tops, with diameters of 4 feet, and five tables have rectangular tops, with dimensions of 4 feet by 6 feet. A can of spray paint covers 25 square feet. How many cans of spray paint must be purchased to paint all of the tabletops?





= 25 ft²

100
+ 62.83
162.83

25 | 162.83
6.5
≈
7

$A = \pi r^2$
$= \pi(2)^2$
$= 12.566$

$12.566 \times 5 = 62.83 \text{ ft}^2$

$A = bh$
$= (6)(4)$
$= 20$

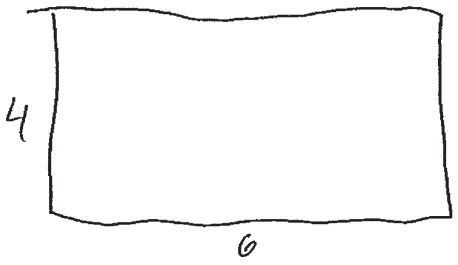
$20 \times 5 = 100 \text{ ft}^2$

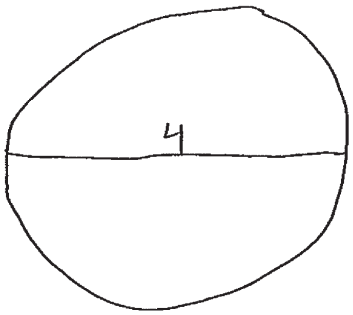
7 cans of spray paint are needed to paint all of the tabletops

Score 1: The student made a computational error.

Question 28

28 A man is spray-painting the tops of 10 patio tables. Five tables have round tops, with diameters of 4 feet, and five tables have rectangular tops, with dimensions of 4 feet by 6 feet. A can of spray paint covers 25 square feet. How many cans of spray paint must be purchased to paint all of the tabletops?





183 cans

rectangle

$A = bh$

$A = 4 \cdot 6$

$A = 24$

$24.5 = 120$

$A = \pi r^2$

$A = \pi 2^2$

$A = 4\pi$

$A = 12.5663$

$12.5663 \cdot 5 = 62.5318$

$120 / 62.8318 = 182.8$

Score 1: The student determined the total area of the ten tables, but no further correct work was shown.

Question 28

28 A man is spray-painting the tops of 10 patio tables. Five tables have round tops, with diameters of 4 feet, and five tables have rectangular tops, with dimensions of 4 feet by 6 feet. A can of spray paint covers 25 square feet. How many cans of spray paint must be purchased to paint all of the tabletops?

Five round top tables

$r = \frac{4}{2} = 2$

one $\rightarrow (2^2)\pi \rightarrow 4\pi$ ft^2

Five round $\rightarrow 4\pi \times 5 = 20\pi$ ft^2

Five rectangle top tables

one $\rightarrow 4 \times 6 = 24$ ft^2

Five rectangle $\rightarrow 24 \times 5 = 120$ ft^2

Total $\rightarrow 4\pi + 120$

$\frac{4\pi + 120}{25} \approx 5.3026 \uparrow$

≈ 6

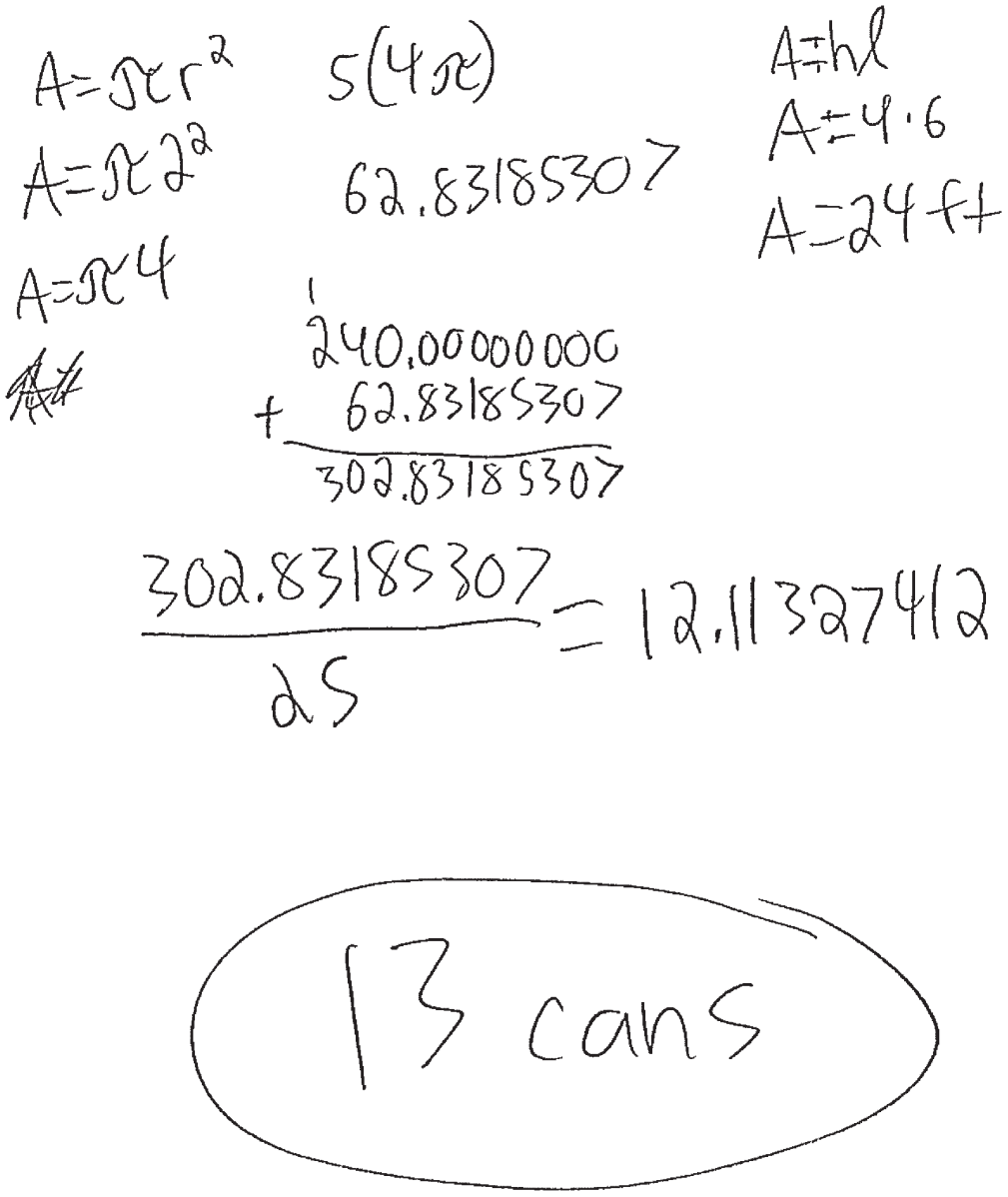
Answer:

It will need 6 cans of spray paint must be purchased to paint all of the table-tops.

Score 1: The student made a transposition error when determining the total area of the ten tables.

Question 28

28 A man is spray-painting the tops of 10 patio tables. Five tables have round tops, with diameters of 4 feet, and five tables have rectangular tops, with dimensions of 4 feet by 6 feet. A can of spray paint covers 25 square feet. How many cans of spray paint must be purchased to paint all of the tabletops?



Score 1: The student made a computational error in determining the area of the five rectangular tables.

Question 28

28 A man is spray-painting the tops of 10 patio tables. Five tables have round tops, with diameters of 4 feet, and five tables have rectangular tops, with dimensions of 4 feet by 6 feet. A can of spray paint covers 25 square feet. How many cans of spray paint must be purchased to paint all of the tabletops?

$\pi 4^2 = 16\pi$

$5(16\pi) = 251.327412287 18$

$6(4) = 24$

$5(24) = 120$

$251.327412287 18 + 120 =$

$\frac{371.32741228718}{25} = 12.69$

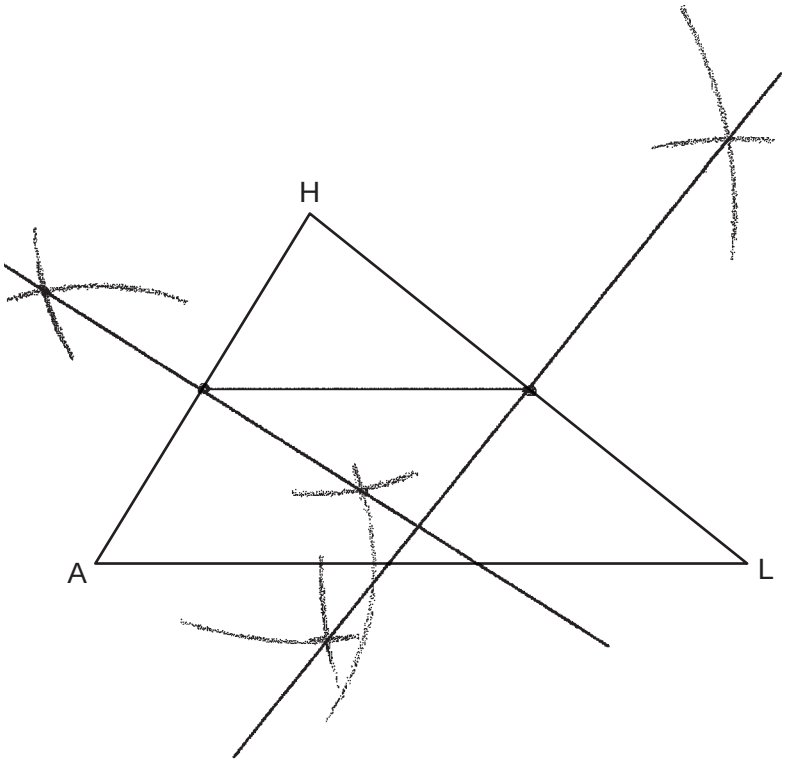
13 cans

Score 0: The student used an incorrect radius when determining the area of the five round tables. The student made a computational error when determining the number of cans.

Question 29

29 Using a compass and straightedge, construct a midsegment of $\triangle AHL$ below.

[Leave all construction marks.]

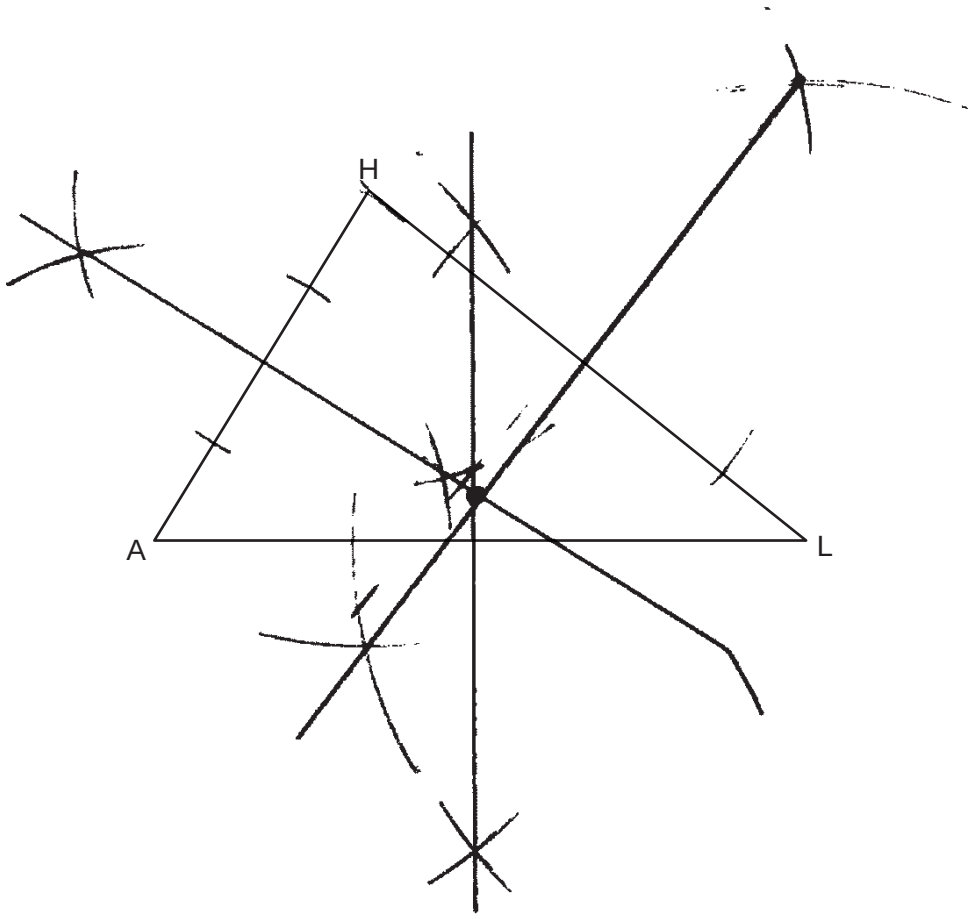


Score 2: The student gave a complete and correct response.

Question 29

29 Using a compass and straightedge, construct a midsegment of $\triangle AHL$ below.

[Leave all construction marks.]

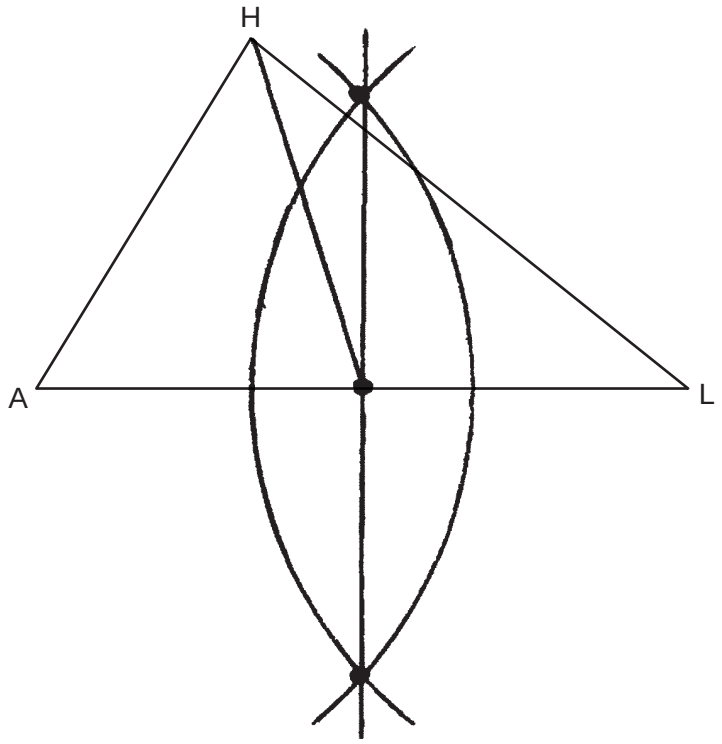


Score 1: The student constructed the perpendicular bisectors of the sides of $\triangle AHL$, but did not draw the midsegment.

Question 29

29 Using a compass and straightedge, construct a midsegment of $\triangle AHL$ below.

[Leave all construction marks.]

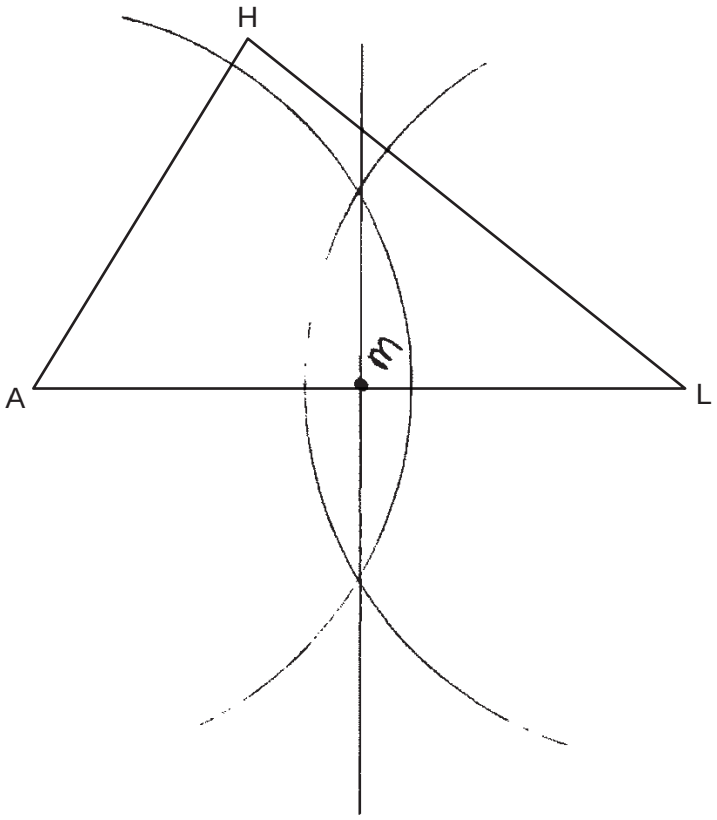


Score 0: The student did not show enough correct work to receive any credit.

Question 29

29 Using a compass and straightedge, construct a midsegment of $\triangle AHL$ below.

[Leave all construction marks.]



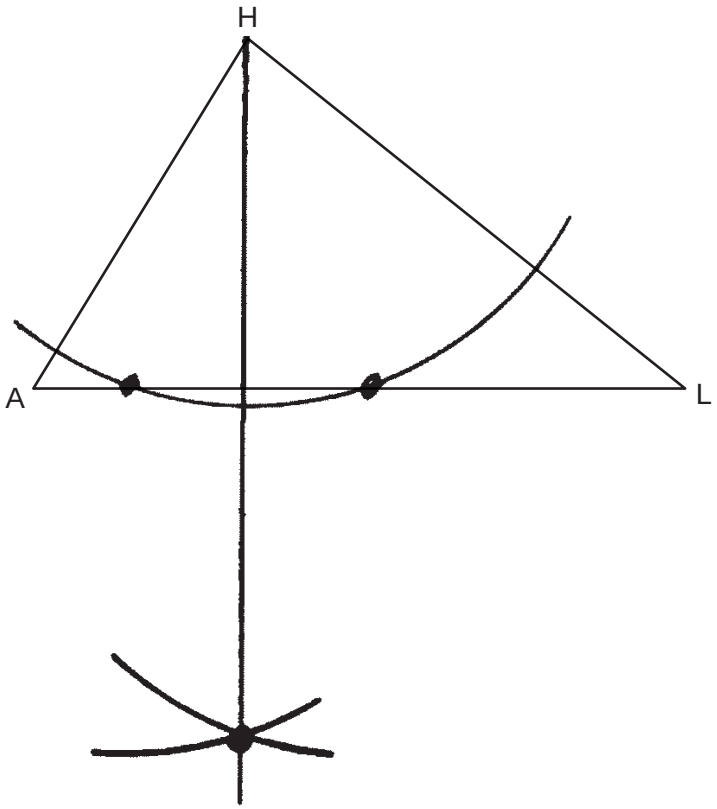
Score 0: The student did not show enough correct work to receive any credit.

Question 29

29 Using a compass and straightedge, construct a midsegment of $\triangle AHL$ below.

[Leave all construction marks.]

Bottom 9

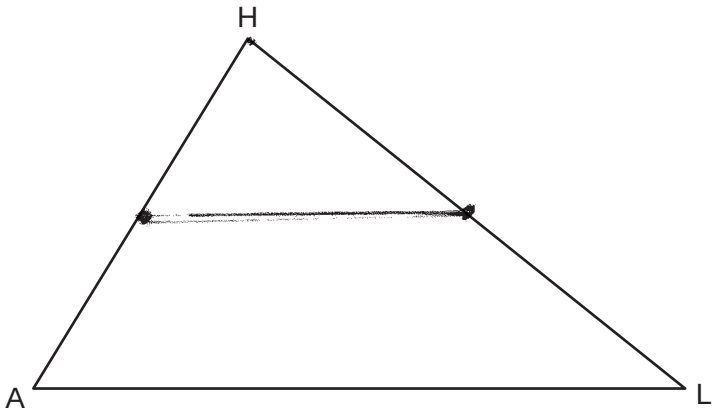


Score 0: The student gave a completely incorrect response.

Question 29

29 Using a compass and straightedge, construct a midsegment of $\triangle AHL$ below.

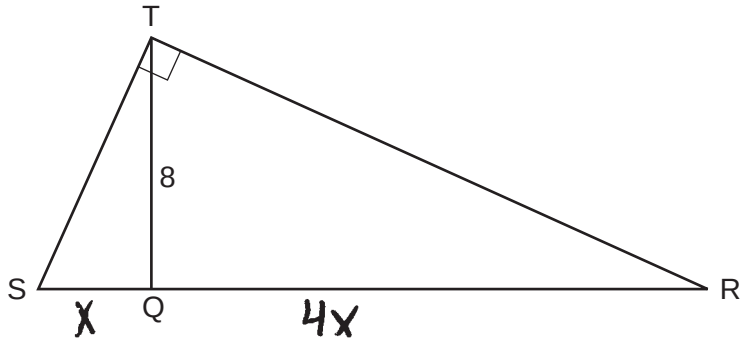
[Leave all construction marks.]



Score 0: The student gave a completely incorrect response.

Question 30

30 Right triangle STR is shown below, with $m\angle T = 90°$. Altitude $\overline{TQ}$ is drawn to $\overline{SQR}$, and $TQ = 8$.



If the ratio $SQ{:}QR$ is 1:4, determine and state the length of $\overline{SR}$.

$\frac{x}{8} = \frac{8}{4x}$

$4x \cdot x = 8 \cdot 8$

$4x^2 = 64$

$x^2 = 16$

$x = 4$

$SQ = 4$

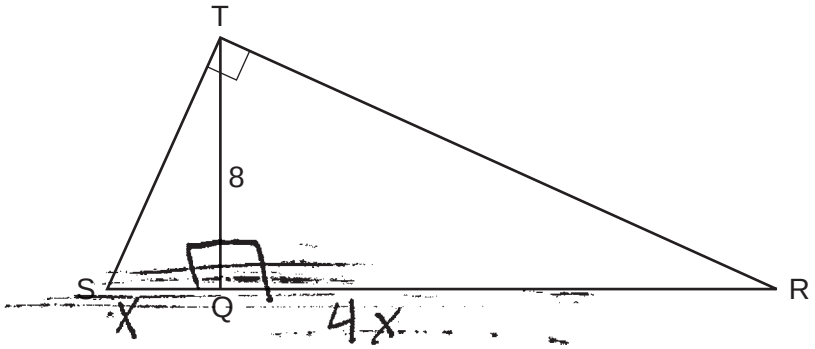
$QR = 16$

$SR = 20$

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

Question 30

30 Right triangle STR is shown below, with $m\angle T = 90°$. Altitude $\overline{TQ}$ is drawn to $\overline{SQR}$, and $TQ = 8$.



If the ratio $SQ{:}QR$ is 1:4, determine and state the length of $\overline{SR}$.

$8^2 = (X)(4X)$

$64 = 4X^2$

$\frac{64}{4} = \frac{4X^2}{4}$

$\sqrt{16} = \sqrt{X^2}$

$X = 4$

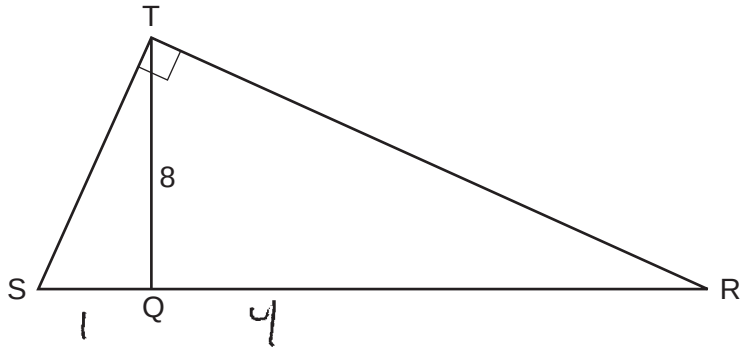
$4 + 4(4) = 20$

length of $\overline{SR}$ = 20 units

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

Question 30

30 Right triangle STR is shown below, with $m\angle T = 90°$. Altitude $\overline{TQ}$ is drawn to $\overline{SQR}$, and $TQ = 8$.



If the ratio $SQ{:}QR$ is 1:4, determine and state the length of $\overline{SR}$.

$\frac{x}{8} = \frac{8}{4x}$

$\sqrt{64} = \sqrt{4x^2}$

$\frac{8}{4} = \frac{4x}{4}$

$2 = x$

$5x = \overline{SR}$

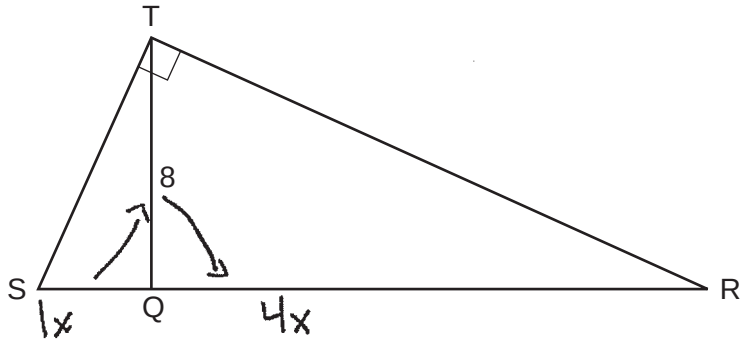
$5(2) = 10$

$\overline{SR} = 10$

Score 1: The student made a computational error.

Question 30

30 Right triangle STR is shown below, with $m\angle T = 90°$. Altitude $\overline{TQ}$ is drawn to $\overline{SQR}$, and $TQ = 8$.



If the ratio $SQ{:}QR$ is 1:4, determine and state the length of $\overline{SR}$.

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

$\frac{4x}{4} = \frac{64}{4}$

$x = 16$

$16 + 4(16)$

$16 + 64$

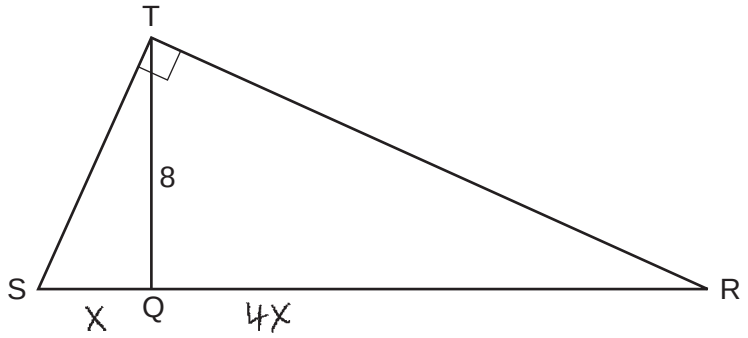
80

$\overline{SR} = 80$

Score 1: The student made a computational error.

Question 30

30 Right triangle STR is shown below, with $m\angle T = 90°$. Altitude $\overline{TQ}$ is drawn to $\overline{SQR}$, and $TQ = 8$.



If the ratio $SQ:QR$ is 1:4, determine and state the length of $\overline{SR}$.

$\frac{x}{8} = \frac{8}{4x}$

$\frac{4x^2}{4} = \frac{64}{4}$

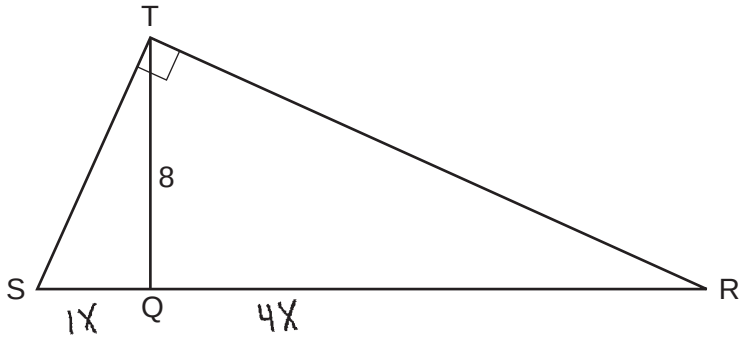
$x^2 = 16$

$x = 4$

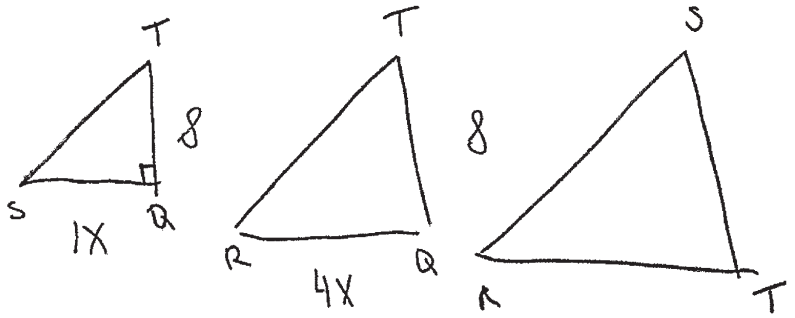
Score 1: The student correctly determined the length of $\overline{SQ}$, but no further correct work was shown.

Question 30

30 Right triangle STR is shown below, with $m\angle T = 90°$. Altitude $\overline{TQ}$ is drawn to $\overline{SQR}$, and $TQ = 8$.



If the ratio $SQ{:}QR$ is 1:4, determine and state the length of $\overline{SR}$.



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

$\frac{32x}{8} = \frac{8x}{8}$

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

$4 = x$

$4(1) + 4(4)$

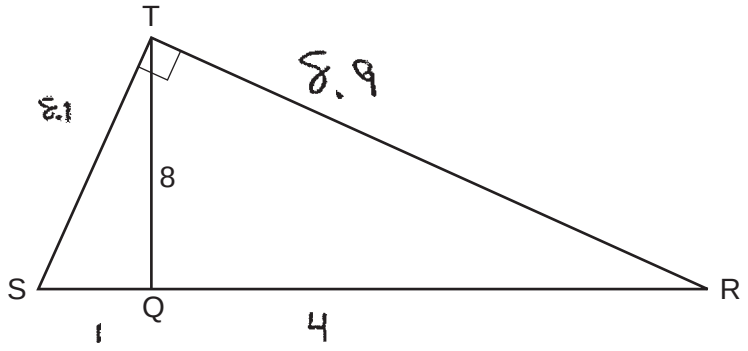
$4 + 16$

$\overline{SR} = 20$

Score 0: The student wrote an incorrect proportion and solved the proportion incorrectly, thus obtaining a correct answer by an incorrect procedure.

Question 30

30 Right triangle STR is shown below, with $m\angle T = 90°$. Altitude $\overline{TQ}$ is drawn to $\overline{SQR}$, and $TQ = 8$.



If the ratio SQ:QR is 1:4, determine and state the length of $\overline{SR}$.

$8^2 + 1^2 = x^2$

$64 + 1 = x^2$

$\sqrt{65} = \sqrt{x^2}$

8.1

$8^2 + 4^2 = x^2$

$64 + 16 = x^2$

$80 = x^2$

8.9

$8.1^2 + 8.9^2 = x^2$

$65.61 + 79.21 = x^2$

$\sqrt{144.82} = \sqrt{x^2}$

6.7

SR = 6.7

Score 0: The student gave a completely incorrect response.

Question 31

31 Line AB is dilated by a scale factor of 2 centered at point A.

Evan thinks that the dilation of $\overleftrightarrow{AB}$ will result in a line parallel to $\overleftrightarrow{AB}$, not passing through points A or B.

Nathan thinks that the dilation of $\overleftrightarrow{AB}$ will result in the same line, $\overleftrightarrow{AB}$.

Who is correct?

Explain why. Nathan is right because a line dialated through a point on the line won't change it at all. the dilation wouldn't move the line because the center of dilation is on the line.

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

Question 31

31 Line AB is dilated by a scale factor of 2 centered at point A.

Evan thinks that the dilation of $\overleftrightarrow{AB}$ will result in a line parallel to $\overleftrightarrow{AB}$, not passing through points A or B.

Nathan thinks that the dilation of $\overleftrightarrow{AB}$ will result in the same line, $\overleftrightarrow{AB}$.

Who is correct?

Explain why.

Nathan because when a line is dilated it still has the same slope as before and it continues on the same line starting at the center point on line AB.

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

Question 31

31 Line AB is dilated by a scale factor of 2 centered at point A.

Evan thinks that the dilation of $\overleftrightarrow{AB}$ will result in a line parallel to $\overleftrightarrow{AB}$, not passing through points A or B.

Nathan thinks that the dilation of $\overleftrightarrow{AB}$ will result in the same line, $\overleftrightarrow{AB}$.

Who is correct?

Explain why. Nathan is correct because if line $\overleftrightarrow{AB}$ is dialated when it is centered at paint A, it will just be another form of $\overleftrightarrow{AB}$ since its image will be on that line. Basically, the dialated line will just be the same as line $\overleftrightarrow{AB}$ since it has the same slope and is centered at A.

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

Question 31

31 Line AB is dilated by a scale factor of 2 centered at point A.

Evan thinks that the dilation of $\overleftrightarrow{AB}$ will result in a line parallel to $\overleftrightarrow{AB}$, not passing through points A or B.

Nathan thinks that the dilation of $\overleftrightarrow{AB}$ will result in the same line, $\overleftrightarrow{AB}$.

Who is correct?

Explain why.

Nathan.

The slopes are the same.

Score 1: The student wrote a partially correct explanation.

Question 31

31 Line AB is dilated by a scale factor of 2 centered at point A.

Evan thinks that the dilation of $\overleftrightarrow{AB}$ will result in a line parallel to $\overleftrightarrow{AB}$, not passing through points A or B.

Nathan thinks that the dilation of $\overleftrightarrow{AB}$ will result in the same line, $\overleftrightarrow{AB}$.

Who is correct?

Explain why.

Evan because when a line is dilated the slopes are equal, but the y-intercept is multiplied by the scale factor. So the lines will be parallel with different y-intercepts.

Score 1: The student wrote a partially correct explanation.

Question 31

31 Line AB is dilated by a scale factor of 2 centered at point A.

Evan thinks that the dilation of $\overleftrightarrow{AB}$ will result in a line parallel to $\overleftrightarrow{AB}$, not passing through points A or B.

Nathan thinks that the dilation of $\overleftrightarrow{AB}$ will result in the same line, $\overleftrightarrow{AB}$.

Who is correct?

Explain why.

Nathan, if you dialate the segment, you are just making it longer.

Score 0: The student wrote an incorrect explanation.

Question 31

31 Line AB is dilated by a scale factor of 2 centered at point A.

Evan thinks that the dilation of $\overleftrightarrow{AB}$ will result in a line parallel to $\overleftrightarrow{AB}$, not passing through points A or B.

Nathan thinks that the dilation of $\overleftrightarrow{AB}$ will result in the same line, $\overleftrightarrow{AB}$.

Who is correct?

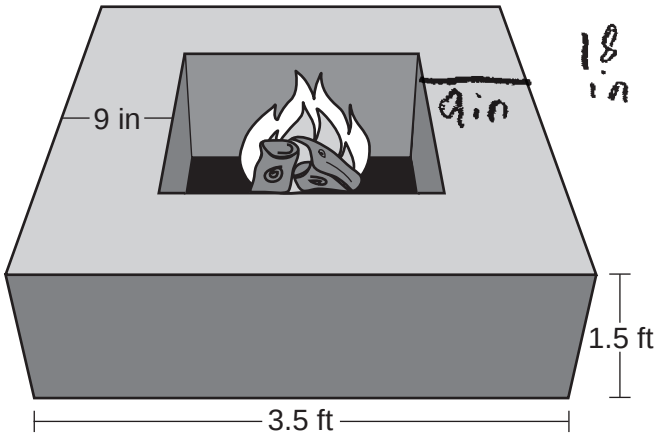
Explain why.

Evan is correct because the line created would not be drawn on the same line.

Score 0: The student wrote an incorrect explanation.

Question 32

32 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



18 in or 1.5 ft.

If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

Volume of whole fire

$V = B \cdot h$

$V = 3.5^2 \cdot 1.5$

$V = 18.375\ ft^3$

$3.5 - 1.5 = 2.0$

$18.375 - 6.000 = 12.375\ ft^3$

Volume of inner fire

$V = Bh$

$V = 2^2 \cdot 1.5$

$V = 6\ ft^3$

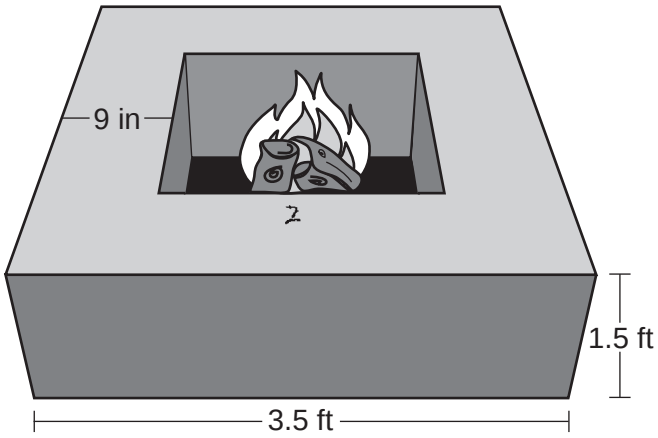
$\frac{12.375}{0.6} = 21$ bags

Josh will need a minimum of 21 bags.

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

Question 32

32 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

$9 \div 12 = 0.75$ ft

$3.5 - 0.75 - 0.75 = 2$ ft.

$3.5^2 \cdot 1.5 = 18.375$ ft^3

$2^2 \cdot 1.5 = 6$ ft^3

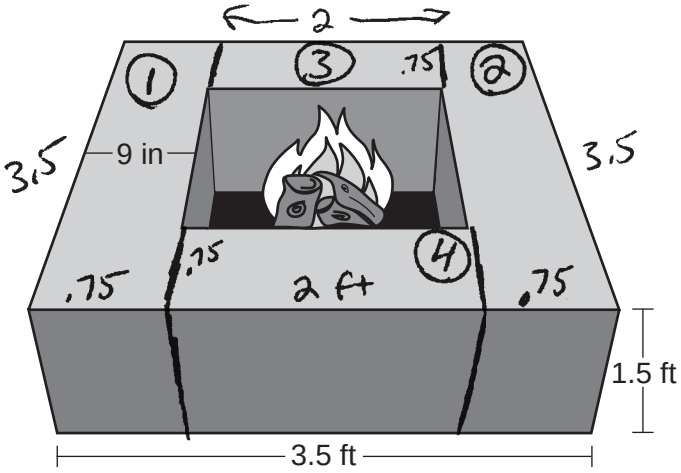
$18.375 - 6 = 12.375$ ft^3

$12.375 \div 0.6 \approx 21$ bags

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

Question 32

32 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

① $V = 3.5 \cdot 1.5 \cdot .75 = 3.9375\ ft^3$

② $V = 3.5 \cdot 1.5 \cdot .75 = 3.9375\ ft^3$

③ $V = 2 \cdot 1.5 \cdot .75 = 2.25\ ft^3$

④ $V = 2 \cdot 1.5 \cdot .75 = 2.25\ ft^3$

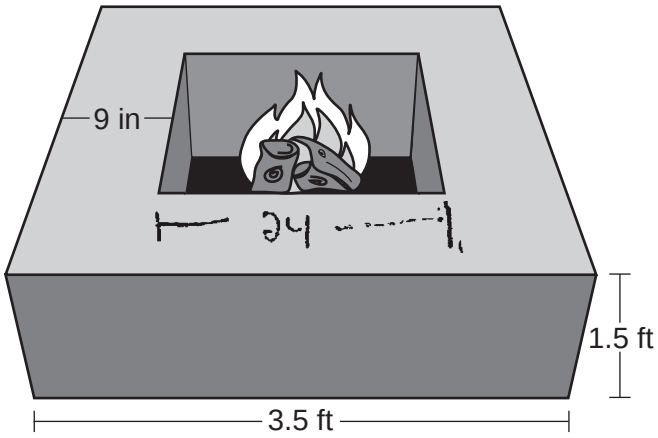
Volume of fire pit $= 12.375\ ft^3$

$\frac{12.375}{0.6} = 20.625 \rightarrow 21$ bags

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

Question 32

32 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

$3.5 \cdot 12 = 42$ $42 - 9 = 33 - 9 = 24$

$24 \cdot 24 \cdot 1.5 = 864$

$2 \cdot 2 \cdot 0.125 = .5$

$3.5 \cdot 3.5 \cdot 1.5 = 18.375 ft$

$18.375 - .5$

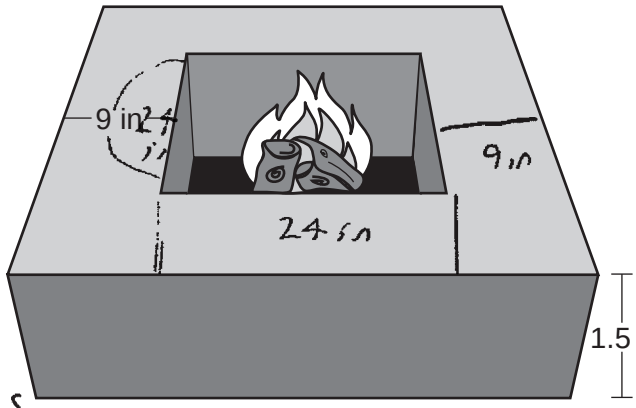
$\frac{17.875}{.6} = 29.79$

30 bags

Score 3: The student made a computational error in determining the volume of the inner region of the fire pit.

Question 32

32 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

42 in × 42 in × 18 in = 31,752 in^3

24 in × 24 in × 1.5 in = 864 in^3

31,752 − 864 = 30,888 in^3

$1\ ft^3 = 1728\ in^3$

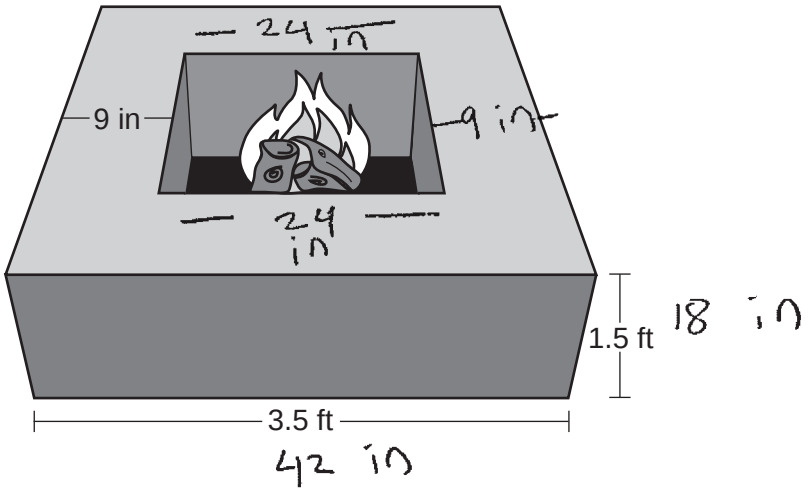
$0.6\ ft^3 = 1036.8\ in^3$

$\frac{30,888\ in^3}{1036.8\ in^3} = 29.79$ ≈ 30 bags

Score 3: The student used an incorrect height when determining the volume of the inner region of the fire pit.

Question 32

32 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

$V = lwh$

$V = 42 \times 42 \times 18$

$V = 31752\ in^3$

$V = 24 \times 24 \times 18$

$V = 10368\ in^3$

$31752 - 10368 = 21384$

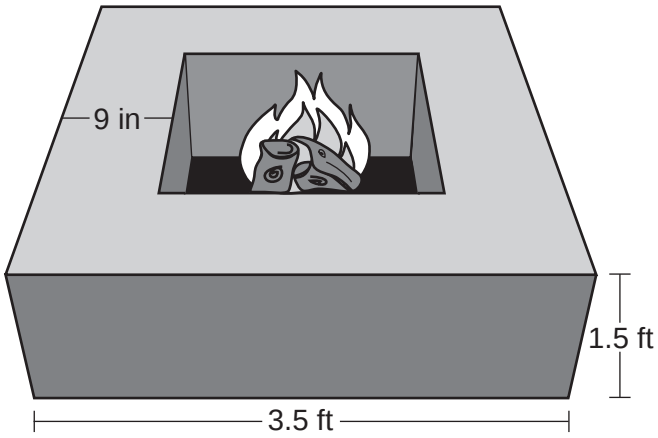
$\frac{21384}{0.6} = 35640$

35640 bags

Score 3: The student did not convert the volume of concrete to cubic feet.

Question 32

32 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

Volume = (3.5)(1.5) - (2)(1.5)

= 2.25

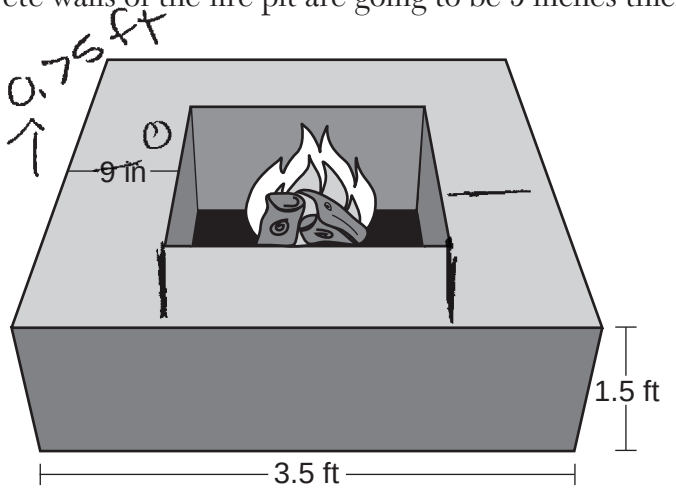
bags = 2.25/0.6 = 3.75

bags = 4 bags

Score 2: The student made a conceptual error when determining the volume of both the outside rectangular prism and the inner region of the fire pit.

Question 32

32 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

vol. large − vol. small

$(3.5)(1.5)(1.5) - (1.5)(1.5)(1.5)$

$7.875 - 3.375 = 4.5\,ft^3$

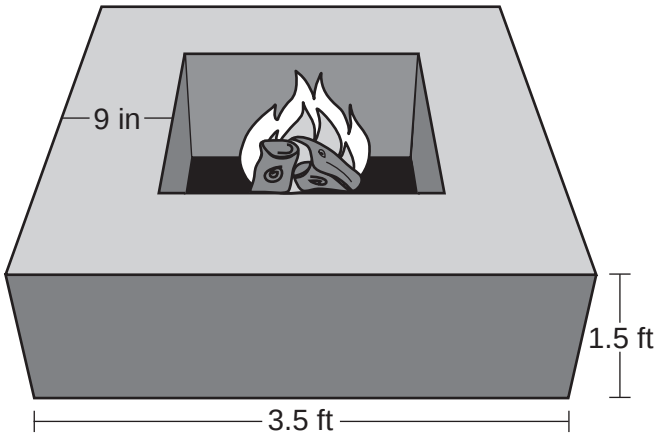
$4.5 \div .6 = 7.5$

minimum # of bags: 7 bags

Score 1: The student made a conceptual error in determining the volume of both the outside rectangular prism and inner region of the fire pit. The student made a rounding error in determining the number of bags of concrete.

Question 32

32 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

$V = l \cdot w \cdot h$

$= 3.5 \times 3.5 \times 1.5$

$V = 18.375$

$V = 2.75 \times 2.75 \times 1.5$

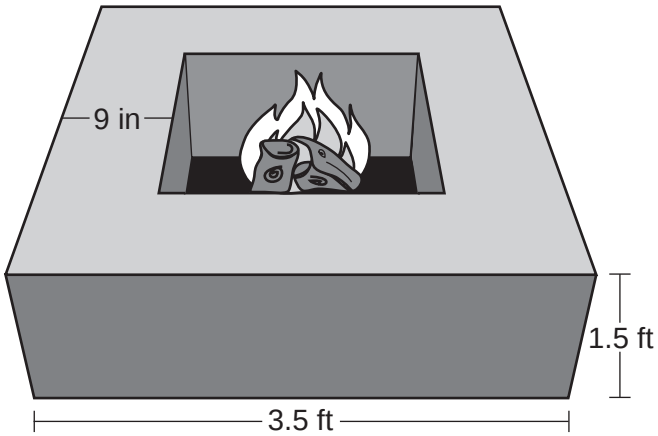
$V = 11.34375$

$\frac{18.375}{11.34375} =$ 1.619 bags

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

Question 32

32 Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3, determine and state the minimum number of bags needed to build the fire pit.

$B = b \cdot h$

$B = 3.5 \cdot 1.5$

$B = 5.25$

$V = Bh$

$V = 5.25(9)$

$V = 47.25\ in^3$

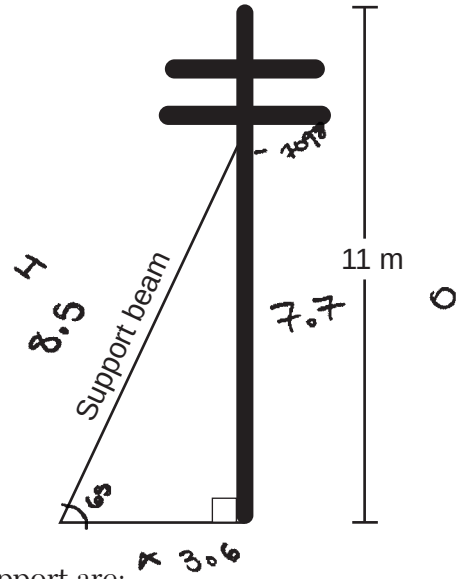
$0.6 \times 47.25 = 28.35$

The minimum number of bags needed to build the fire pit is 28 bag of Concrete.

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

Question 33

33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



Two conditions for proper support are:

- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.

$.70(11) = 7.7$ $\quad \sin\theta = \frac{O}{H} \rightarrow \frac{7.7}{H} = \sin 65$

$\frac{\sin 65 H = 7.7}{\sin 65 \quad \sin 65}$

$H = 8.5$ meters

Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions. $\tan 65 = \frac{7.7}{x}$

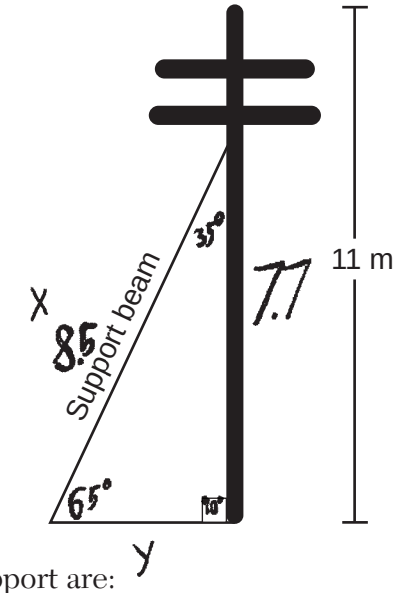
$\frac{\tan 65 x = 7.7}{\tan 65 \quad \tan 65}$

$x = 3.6$ meters

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

Question 33

33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



Two conditions for proper support are:

- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.

$\frac{x}{11} = \frac{70}{100}$ $\frac{770}{100} = 7.7$ m

$\sin(65^\circ) = \frac{7.7}{x}$ $\frac{0.906}{1} = \frac{7.7}{x}$ $\frac{7.7}{0.906} =$ 8.5 meters

Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions.

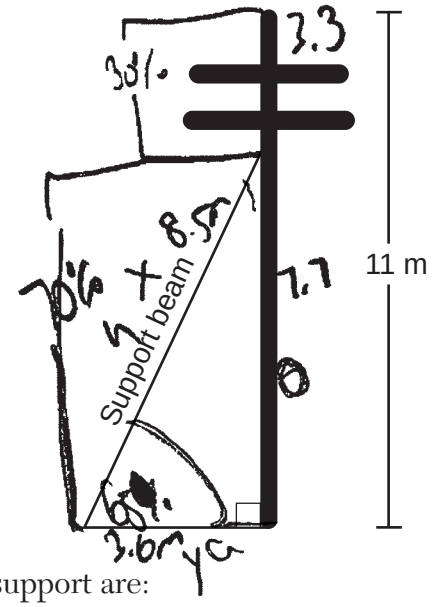
$\cos(65^\circ) = \frac{y}{8.5}$

$\frac{0.423}{1} = \frac{y}{8.5}$ 3.6 meters

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

Question 33

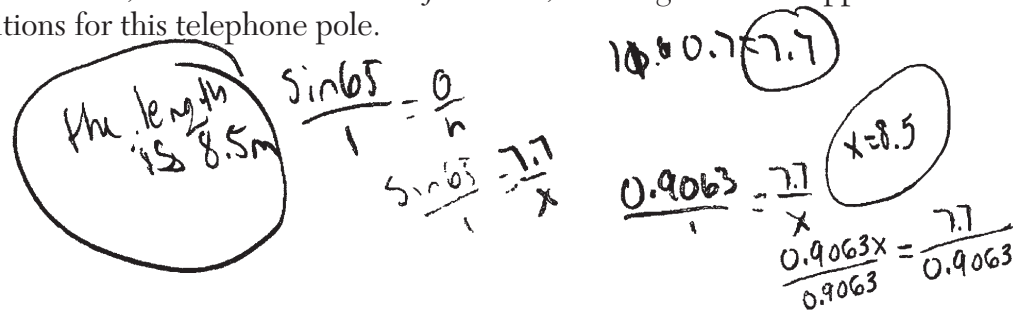
33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



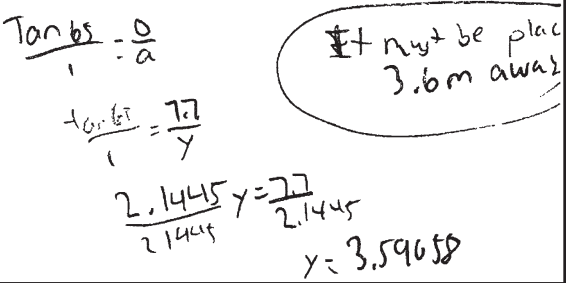
Two conditions for proper support are:

- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.



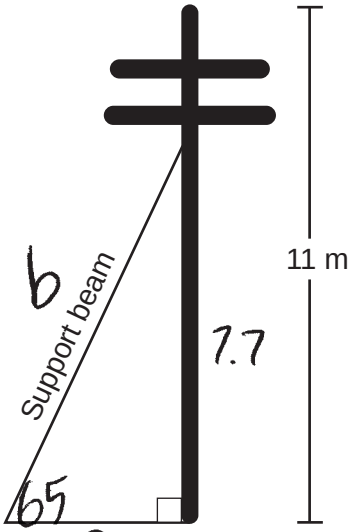
Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions.



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

Question 33

33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



11(.7) = 7.7

Two conditions for proper support are:

- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.

$\sin 65 = \frac{7.7}{b}$ $b = \frac{7.7}{\sin 65}$

$b = 8.5$

Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions.

$7.7^2 + g^2 = 8.5^2$

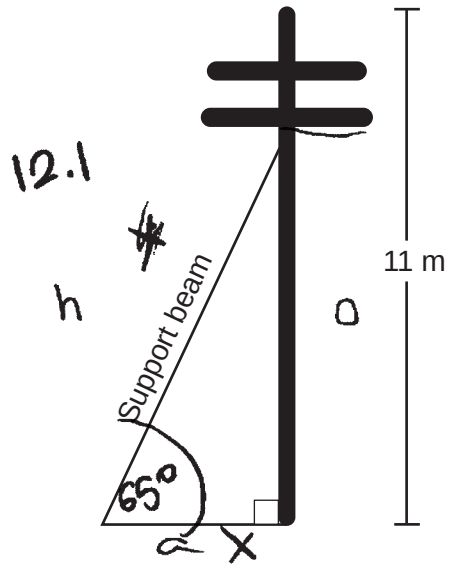
$g^2 = 12.96$

$g = 3.6$

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

Question 33

33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



Two conditions for proper support are:

- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

SOHCAHTOA

Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.

$\sin 65 = \frac{11}{h}$

12.1m

$\frac{h \sin(65)}{\sin 65} = \frac{11}{\sin 65}$

$h = 12.137...$

Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions.

The support beam must be placed 5.1m from the base of the pole

$\frac{\cos 65}{1} = \frac{x}{12.1}$

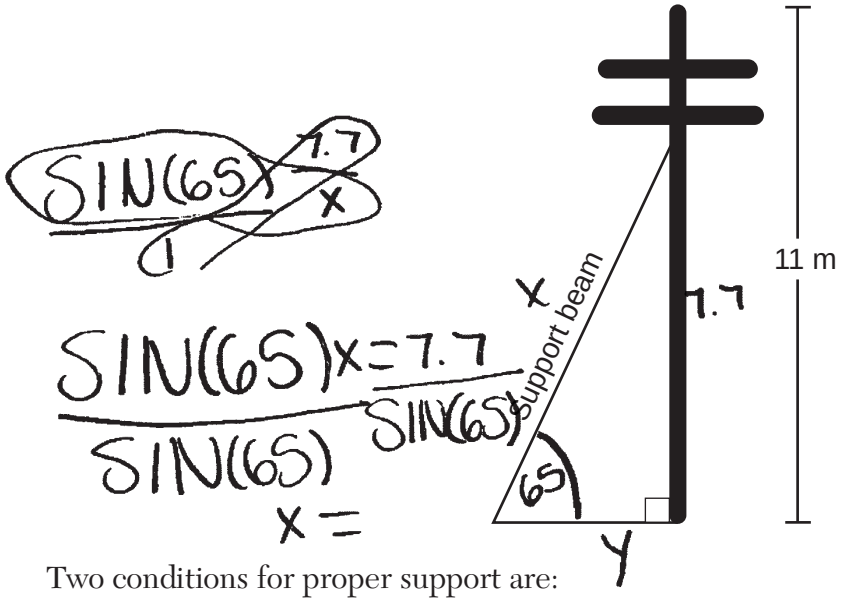
$x = 5.1136$

5.1

Score 3: The student used an incorrect height when determining the length of the support beam.

Question 33

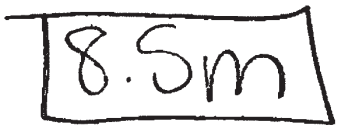
33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



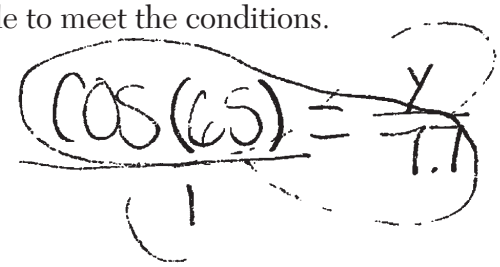
Two conditions for proper support are:

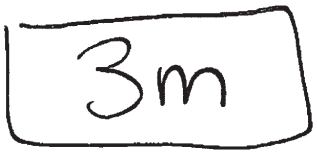
- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.



Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions.

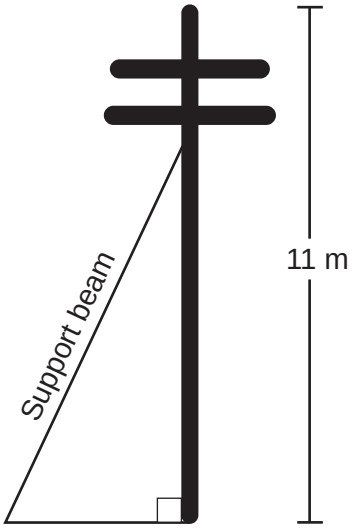




Score 2: The student determined the length of the support beam, but no further correct work was shown.

Question 33

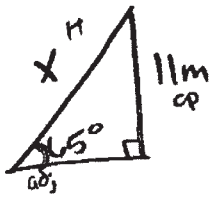
33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



Two conditions for proper support are:

- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.



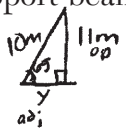
$\sin 65 = \frac{11}{x}$

$= 9.469885657$

$= 10\text{m}$

Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions.

10m



$\cos 65 = \frac{y}{10}$

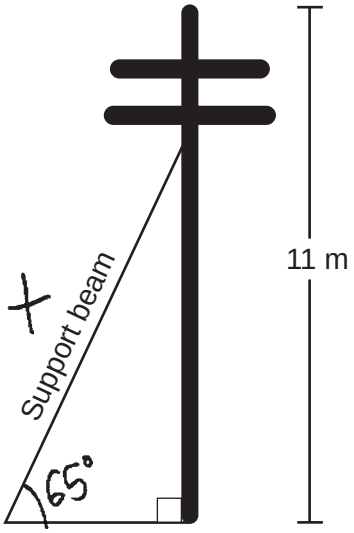
$= 4.226182617$

$= 4.2\text{m}$

Score 2: The student used an incorrect height and made a computational error when determining the length of the support beam. The student found an appropriate distance from the bottom of the support beam to the base of the pole.

Question 33

33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



Two conditions for proper support are:

- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.

$\frac{\sin 65°}{1} = \frac{11}{x}$

$\frac{11}{\sin 65°} = \frac{x(\sin 65°)}{\sin 65°}$

$x = 12.1$

12.1 meters

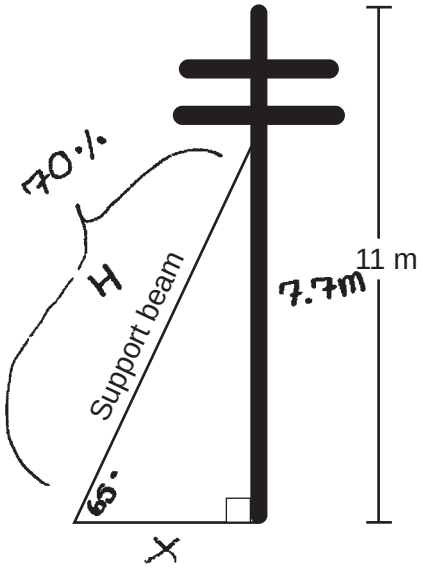
Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions.

$12.1 - 11 = 1.1$ meters

Score 1: The student used an incorrect height when determining the length of the support beam. No further correct work was shown.

Question 33

33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



SOH CAH TOA
Sin Cos Tan

Two conditions for proper support are:

- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.

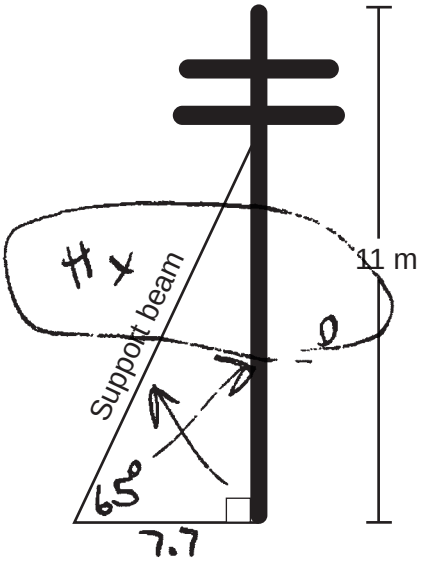
$\sin 65 = \frac{7.7}{H}$

Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions.

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

Question 33

33 A telephone pole 11 meters tall needs to be stabilized with a support beam, as modeled below.



11 × 0.70 = 7.7 m

Two conditions for proper support are:

- The beam reaches the telephone pole at 70% of the telephone pole's height above the ground.
- The beam forms a 65° angle with the ground.

Determine and state, to the *nearest tenth of a meter*, the length of the support beam that meets these conditions for this telephone pole.

x = 11 sin 65

10 m

Determine and state, to the *nearest tenth of a meter*, how far the support beam must be placed from the base of the pole to meet the conditions.

70% of 11 m

0.7

11 × 0.7 = 7.7 m

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

Question 34

34 The coordinates of the vertices of quadrilateral $ABCD$ are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

Prove that $ABCD$ is a parallelogram, but *not* a rectangle.

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

$d_{AB} \sqrt{(0-3)^2+(4-8)^2} = \sqrt{(9)+(16)} = \sqrt{25} = 5$

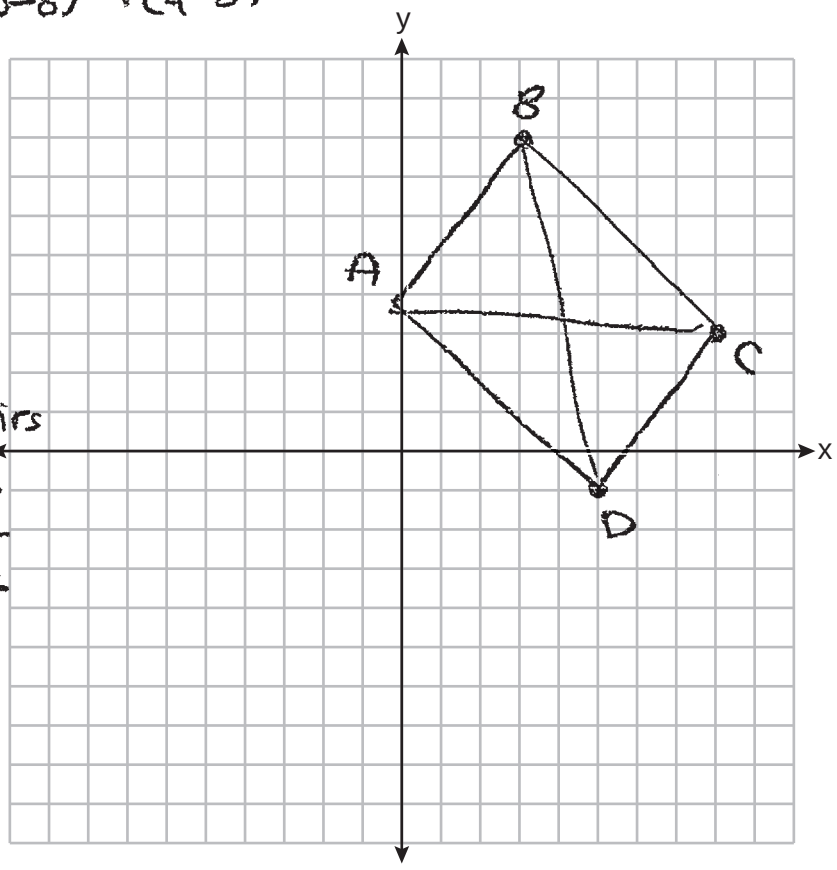
$d_{CD} \sqrt{(8-5)^2+(3+1)^2} = \sqrt{9+16} = \sqrt{25} = 5$

$d_{BC} \sqrt{(3-8)^2+(8-3)^2} = \sqrt{(25)+(25)} = \sqrt{50}$

$d_{AD} = \sqrt{(0-5)^2+(4+1)^2} = \sqrt{25+25} = \sqrt{50}$

$d_{BD} = \sqrt{(3-5)^2+(8+1)^2} = \sqrt{(4)+(81)} = \sqrt{85}$

$d_{AC} = \sqrt{(0-8)^2+(4-3)^2} = \sqrt{(64)+(1)} = \sqrt{65}$



- ABCD is a ▱ bc both pairs opp sides ≅.
- ABCD is not a rectangle bc diagonal are not ≅.

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

Question 34

34 The coordinates of the vertices of quadrilateral *ABCD* are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

Prove that *ABCD* is a parallelogram, but *not* a rectangle.

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

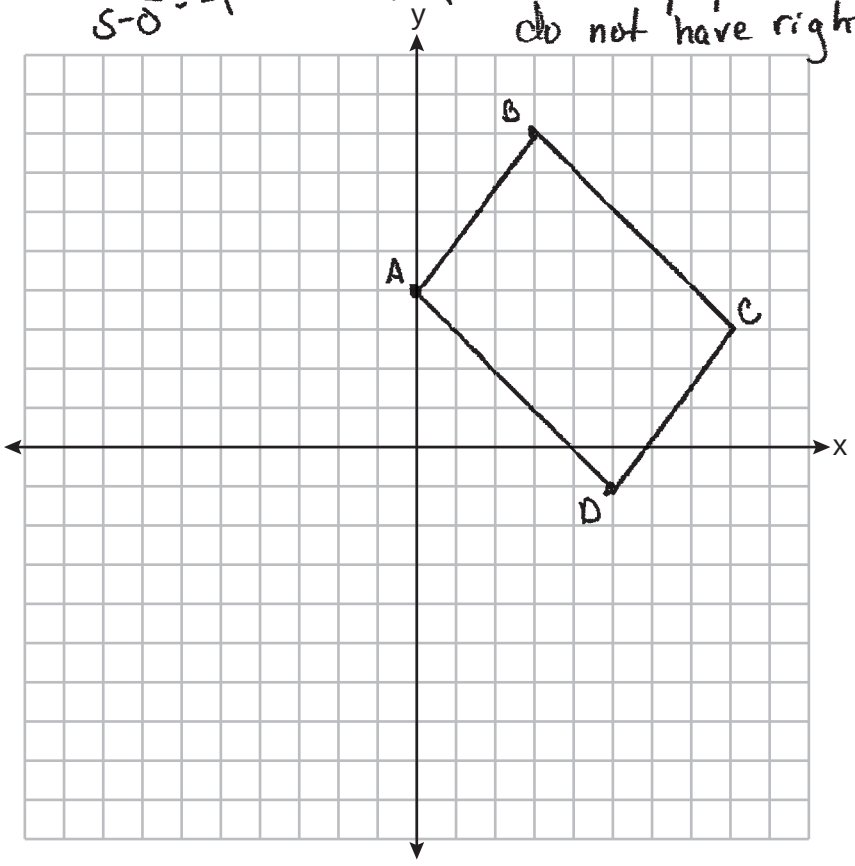
slope $\overline{AB} = \frac{8-4}{3-0} = \frac{4}{3}$ ∥

slope $\overline{CD} = \frac{-1-3}{5-8} = \frac{-4}{-3} = \frac{4}{3}$

slope $\overline{BC} = \frac{3-8}{8-3} = -1$ ∥

slope $\overline{AD} = \frac{-1-4}{5-0} = -1$

ABCD is a parallelogram but not a rectangle because both pairs of opposite sides are parallel but consecutive sides do not have opposite reciprocal slopes so they ~~slopes~~ are not perpendicular and therefore do not have right angles



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

Question 34

34 The coordinates of the vertices of quadrilateral $ABCD$ are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

Prove that $ABCD$ is a parallelogram, but *not* a rectangle.

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

$\overline{AB}$ $d = \sqrt{(0-3)^2+(4-8)^2}$
$d = \sqrt{(-3)^2+(-4)^2}$
$d = \sqrt{9+16}$
$d = \sqrt{25} = 5$

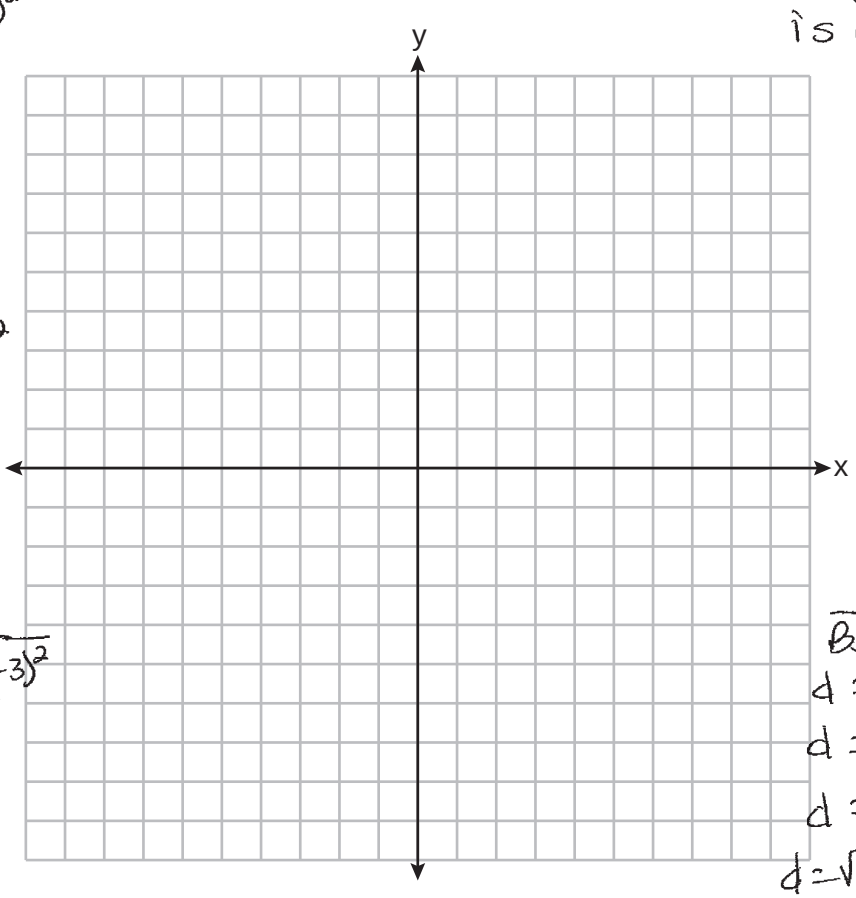
$\overline{BC}$ $d = \sqrt{(3-8)^2+(8-3)^2}$
$d = \sqrt{(-5)^2+(5)^2}$
$d = \sqrt{25+25}$
$d = \sqrt{50}$

since both pairs of opposite sides are congruent, ABCD is a parallelogram

$\overline{CD}$
$d = \sqrt{(8-5)^2+(3-(-1))^2}$
$d = \sqrt{(3)^2+(4)^2}$
$d = \sqrt{9+16}$
$d = \sqrt{25} = 5$

$\overline{AD}$
$d = \sqrt{(0-5)^2+(4-(-1))^2}$
$d = \sqrt{(-5)^2+(5)^2}$
$d = \sqrt{25+25}$
$d = \sqrt{50}$

$\overline{AC}$
$d = \sqrt{(0-8)^2+(4-3)^2}$
$d = \sqrt{(-8)^2+(1)^2}$
$d = \sqrt{64+1}$
$d = \sqrt{65}$



$\overline{BD}$
$d = \sqrt{(3-5)^2+(8-(-1))^2}$
$d = \sqrt{(-2)^2+9^2}$
$d = \sqrt{4+81}$
$d = \sqrt{85}$

Score 3: The student did not write a concluding statement when proving $ABCD$ is not a rectangle.

Question 34

34 The coordinates of the vertices of quadrilateral $ABCD$ are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

Prove that $ABCD$ is a parallelogram, but *not* a rectangle.

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

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

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

$\sqrt{25+25}$

$5\sqrt{50}$

$\sqrt{25}\sqrt{2}$

$BC=5\sqrt{2}$

$AD=\sqrt{(5-0)^2+(-1-4)^2}$

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

$\sqrt{25+25}$

$5\sqrt{50}$

$\sqrt{25}\sqrt{2}$

$AD=5\sqrt{2}$

∴opposite sides are congruent

$BD=\sqrt{(5-3)^2+(-1-8)^2}$

$\sqrt{2^2+-9^2}$

$\sqrt{4+81}$

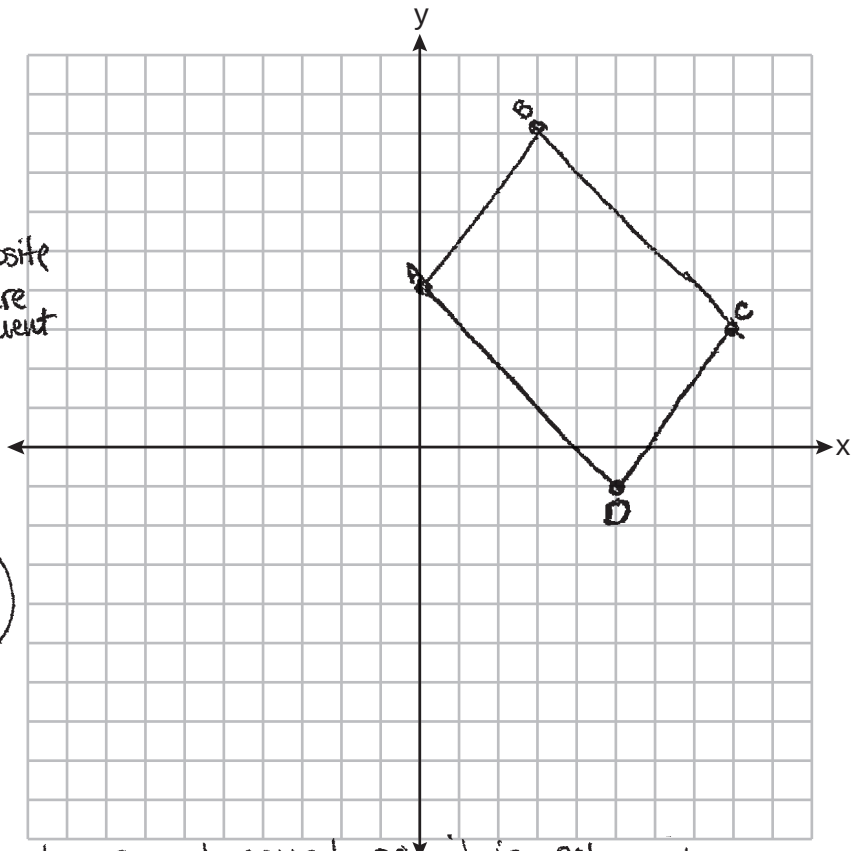
$BD=\sqrt{85}$

$AC=\sqrt{(8-0)^2+(3-4)^2}$

$\sqrt{8^2+-1^2}$

$\sqrt{64+1}$

$AC=\sqrt{65}$



∴The diagonals are not equal so it is not a rectangle

Score 2: The student proved $ABCD$ was not a rectangle, but did not prove $ABCD$ was a parallelogram.

Question 34

34 The coordinates of the vertices of quadrilateral *ABCD* are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

Prove that *ABCD* is a parallelogram, but *not* a rectangle.

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

Slope $\overline{BC} = \frac{\text{Rise}}{\text{Run}}$

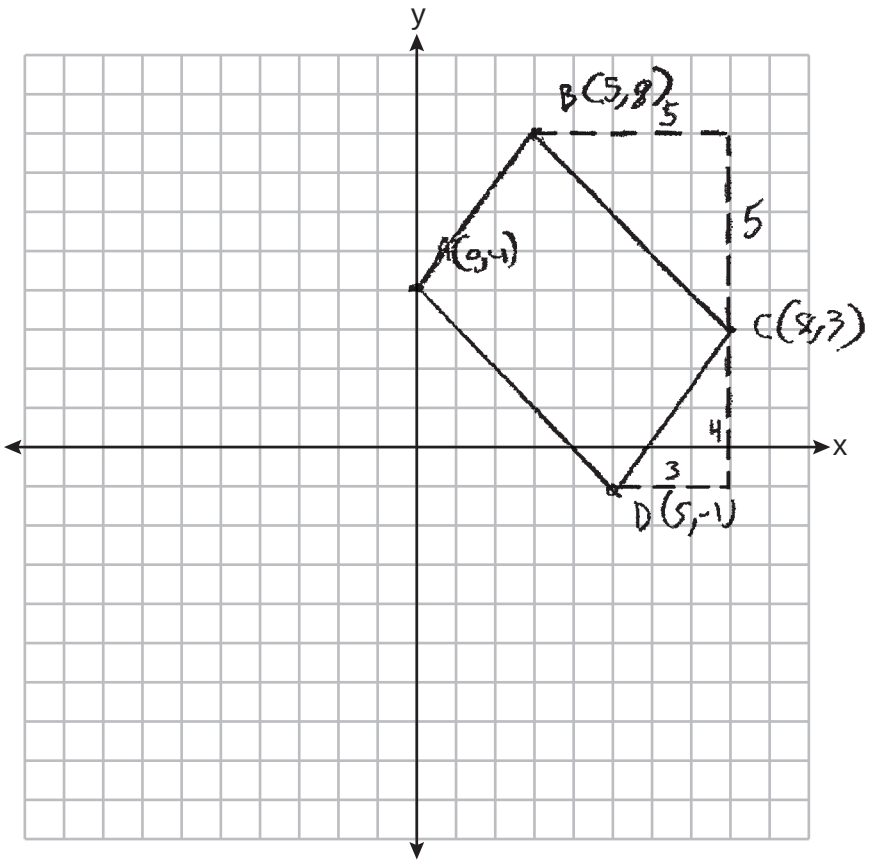
Slope $\overline{BC} = \frac{5}{-5} = \frac{1}{-1} = -1$

Slope $\overline{DC} = \frac{\text{Rise}}{\text{Run}}$

Slope $\overline{DC} = \frac{4}{3}$

-1 and $\frac{4}{3}$ are not opposite reciprocals lines are not perpendicular, In rectangle all adjacent lines are perpendicular

$\square ABCD$ is not a Rectangle



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

Question 34

34 The coordinates of the vertices of quadrilateral *ABCD* are *A*(0,4), *B*(3,8), *C*(8,3), and *D*(5,−1).

Prove that *ABCD* is a parallelogram, but *not* a rectangle.

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

$AB\sqrt{(0-3)^2+(4-8)^2}$

$\sqrt{9+16}$

$\sqrt{25}$

$AB = 5$

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

$\sqrt{25+25}$

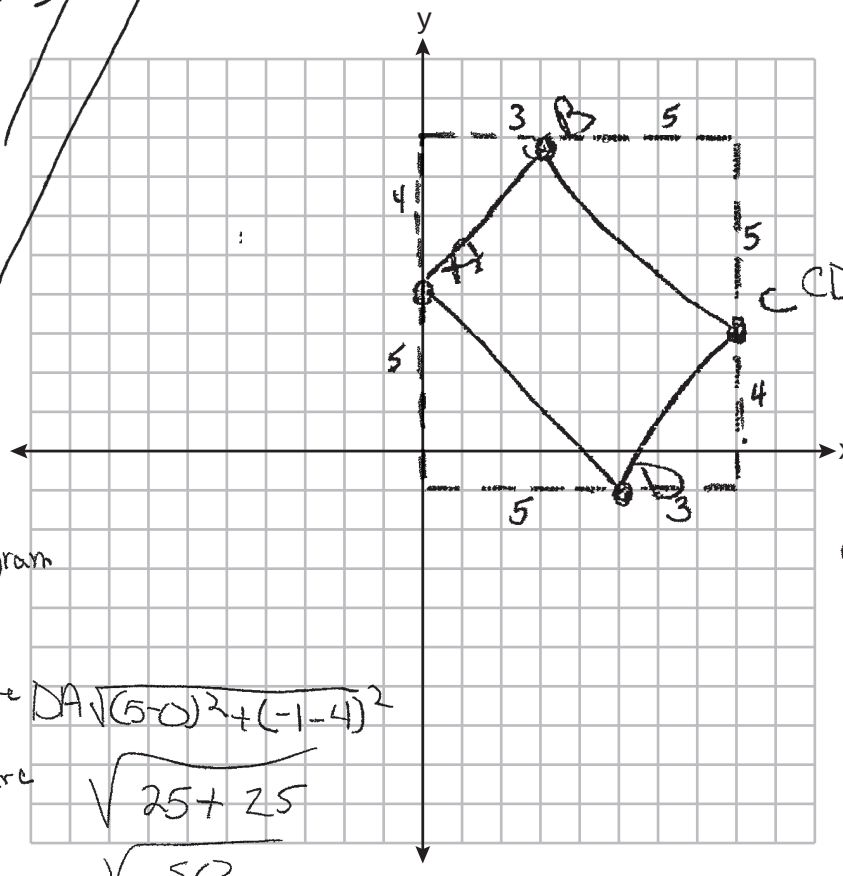
$\sqrt{50}$

$\overline{AB}$ Rise/Run $= \frac{4}{3}$

$\overline{BC}$ Rise/Run $= \frac{-5}{5}$

$\overline{CD}$ Rise/Run $= \frac{4}{3}$

$\overline{AD}$ Rise/Run $= \frac{-5}{5}$



$CD\sqrt{(8-5)^2+(3-(-1))^2}$

$\sqrt{9+16}$

$\sqrt{25}$

$CD = 5$

its a parallelogram

yes because $\overline{AB}$ and $\overline{CD}$ are parallel and $\overline{BC}$ and $\overline{DA}$ are parallel

$DA\sqrt{(5-0)^2+(-1-4)^2}$

$\sqrt{25+25}$

$\sqrt{50}$

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

Question 34

34 The coordinates of the vertices of quadrilateral *ABCD* are *A*(0,4), *B*(3,8), *C*(8,3), and *D*(5,−1).

Prove that *ABCD* is a parallelogram, but *not* a rectangle.

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

AB (0,4) (3,8)

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

$\sqrt{(3-0)^2+(8-4)^2}$

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

$\sqrt{9+16}$

$\sqrt{25}$

5

BC (3,8) (8,3)

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

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

$\sqrt{25+25}$

$\sqrt{50}$

7.07

CD (8,3) (5,-1)

$\sqrt{(5-8)^2+(-1-3)^2}$

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

$\sqrt{9+16}$

$\sqrt{25}$

5

AD (0,4) (5,-1)

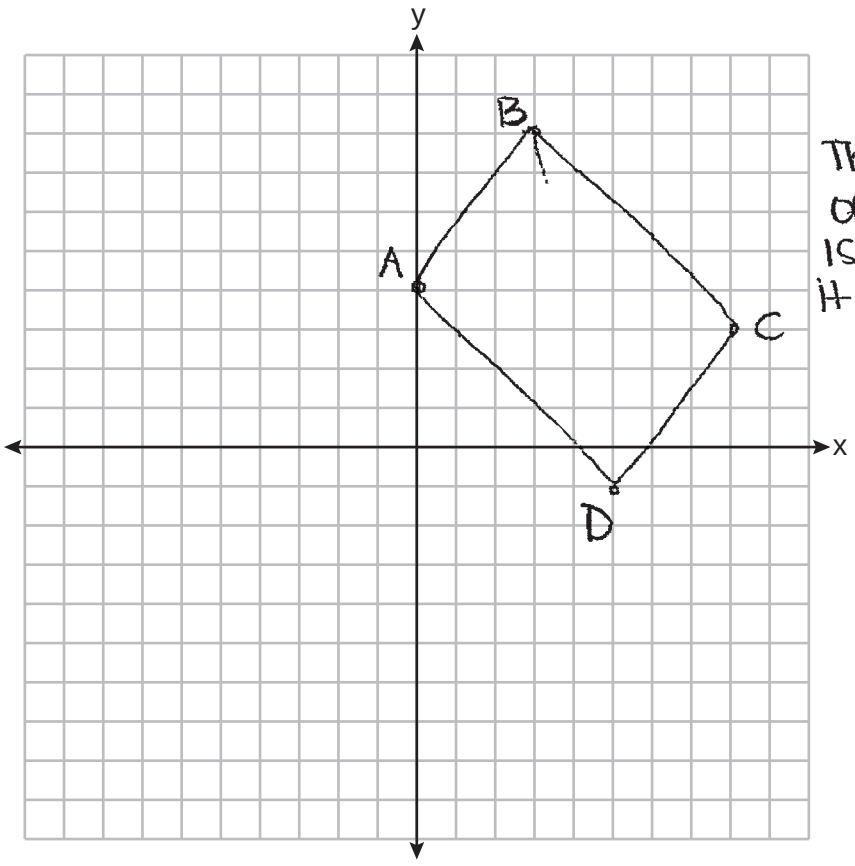
$\sqrt{(5-0)^2+(-1-4)^2}$

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

$\sqrt{25+25}$

$\sqrt{50}$

7.07



The distance of the bisector is different ∴ it is a parallelog

Score 1: The student found the length of all four sides, but no further correct work was shown.

Question 34

34 The coordinates of the vertices of quadrilateral $ABCD$ are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

Prove that $ABCD$ is a parallelogram, but *not* a rectangle.

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

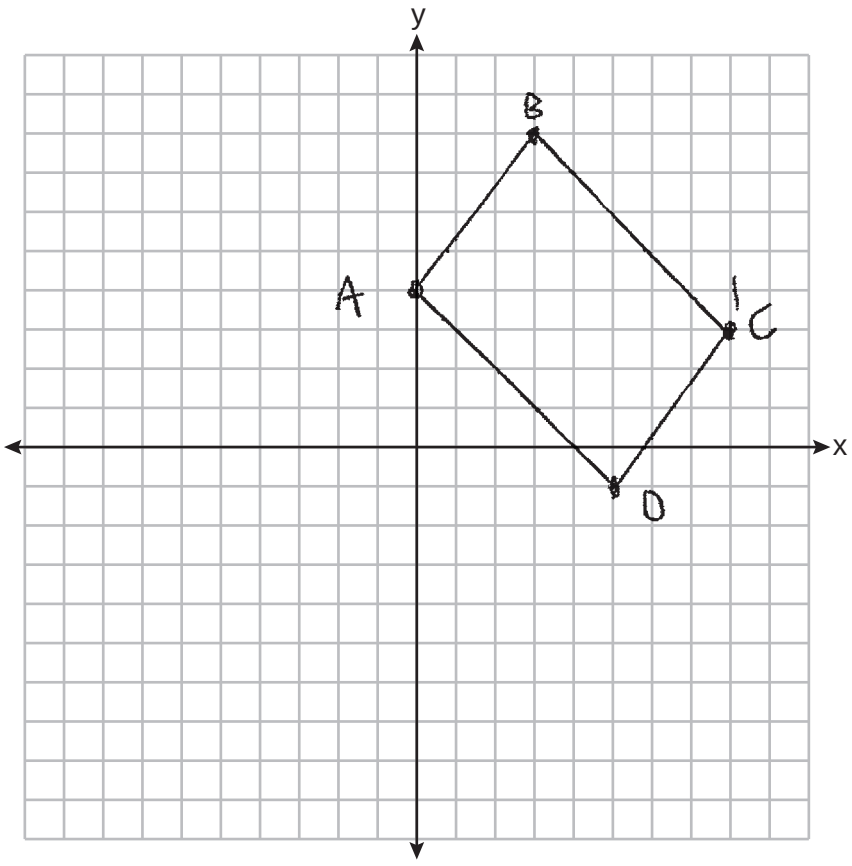
$M_{\overline{AB}} = \frac{8-4}{3-0} = \frac{4}{3}$

$M_{\overline{BC}} = \frac{8-3}{3-8} = \frac{5}{-5} = -1$

$M_{\overline{CD}} = \frac{3-1}{8-5} = \frac{4}{3}$

$M_{\overline{DA}} = \frac{4+1}{0-5} = \frac{5}{-5} = -1$

$\overline{AB}$ is not perpindicular to $\overline{BC}$.



Score 1: The student found the slopes of all four sides, but wrote an incomplete concluding statement when proving $ABCD$ was not a rectangle.

Question 34

34 The coordinates of the vertices of quadrilateral *ABCD* are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

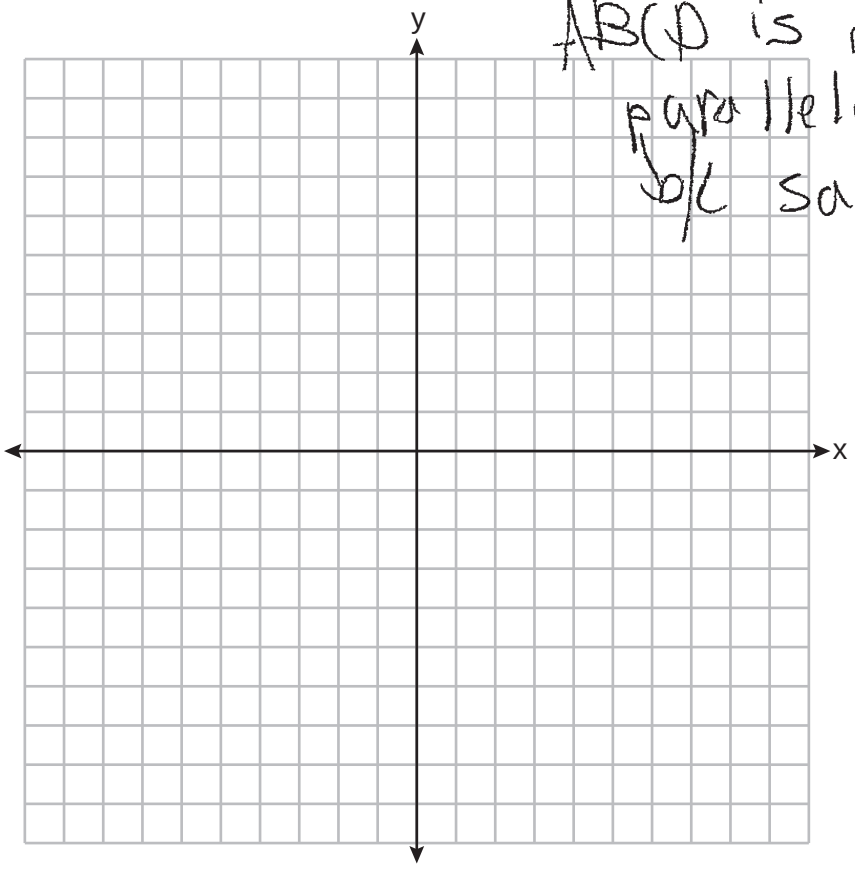
Prove that *ABCD* is a parallelogram, but *not* a rectangle.

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

A(0,4)
C(8,3)
$Mpx = \frac{x_1+x_2}{2}$
$= \frac{0+8}{2}$ $\frac{8}{2}$
$= 4$ (4, 3,5)

B(3,8)
D(5,-1)
$Mpy = \frac{y_1+y_2}{2}$
$\frac{3+5}{2}$ $\frac{8-1}{2}$
$= \frac{8}{2}$ $\frac{7}{2}$
$= 4$ $= 3,5$
(4, 3,5)

$\frac{4+3}{2}$
$= \frac{7}{2}$
$= 3,5$



ABCD is a parallelogram b/c same midpt

Score 1: The student found the midpoints of both diagonals, but wrote an incomplete concluding statement when proving *ABCD* was a parallelogram. No further correct work was shown.

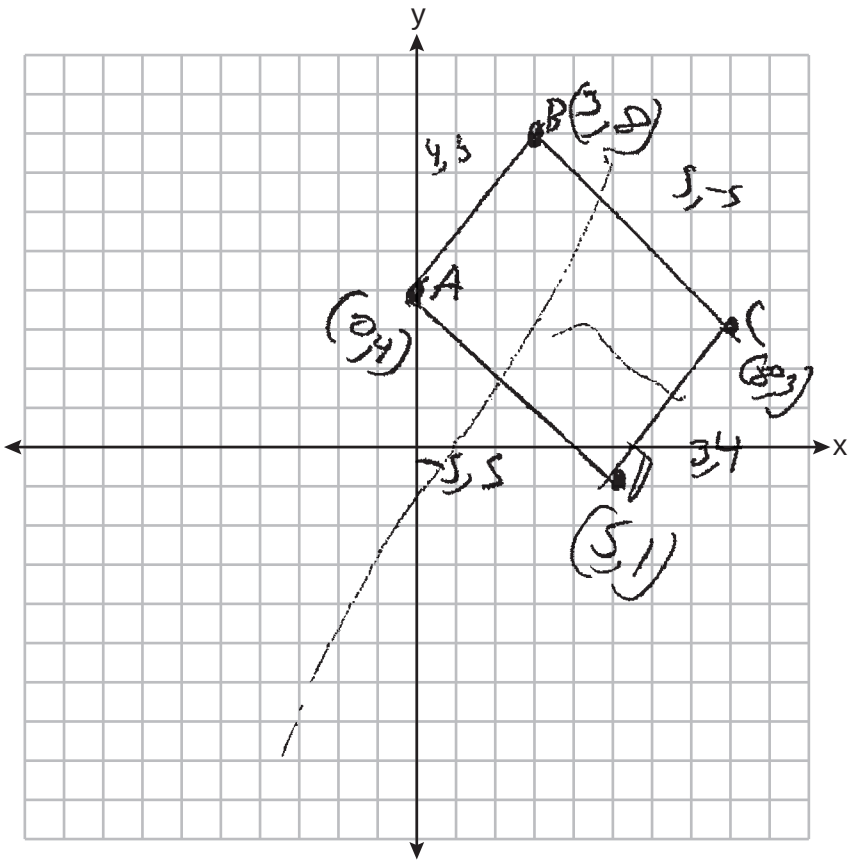
Question 34

34 The coordinates of the vertices of quadrilateral *ABCD* are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

Prove that *ABCD* is a parallelogram, but *not* a rectangle.

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

4, 3 3, 4
−5, 5 5, −5



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

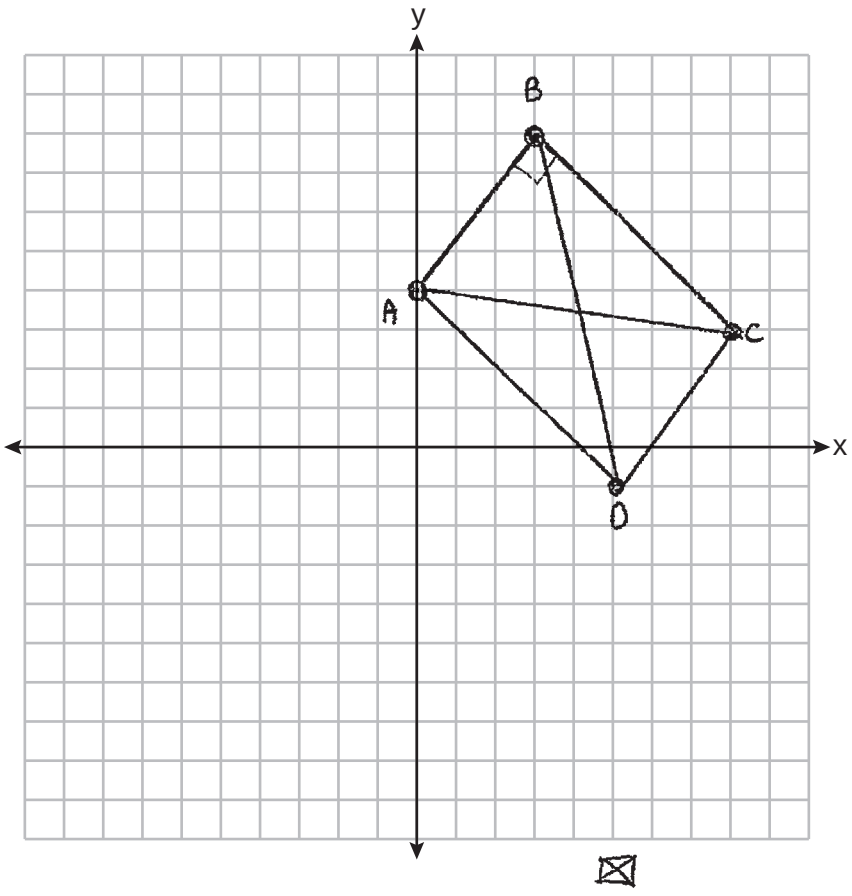
Question 34

34 The coordinates of the vertices of quadrilateral *ABCD* are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

Prove that *ABCD* is a parallelogram, but *not* a rectangle.

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

ABCD is a parrallelogram because 2 sets of parrallel sides are equal in proportion to each other. It is not a rectangle because the diagnols are not ⊥. In a parallelagram diagnals bisect each other like the diagram below.



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

Question 34

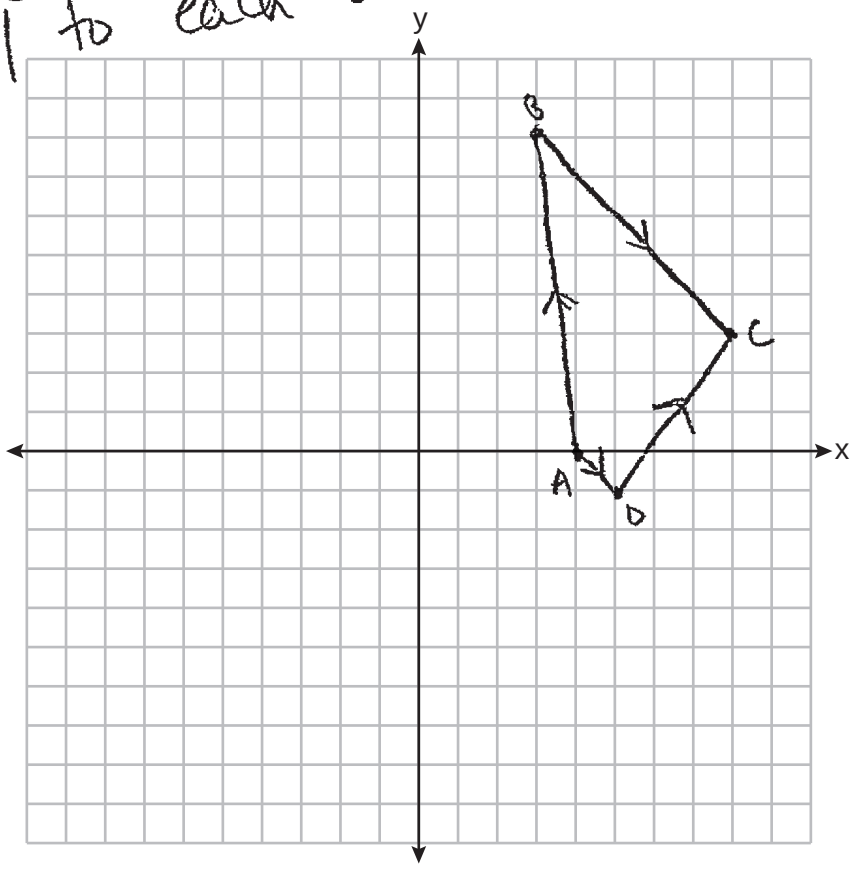
34 The coordinates of the vertices of quadrilateral *ABCD* are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

Prove that *ABCD* is a parallelogram, but *not* a rectangle.

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

ABCD is a ▱ and not a rectangle because the opposite sides are ∥ to each other.

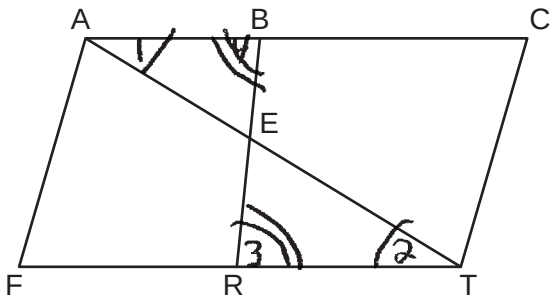
$\frac{3}{4}$ $\frac{3}{4}$ $D=\sqrt{\Delta x+\Delta y}$ $\frac{3}{4}$ $\frac{3}{4}$ $\frac{\Delta y}{\Delta x}$ $S=\frac{\Delta y}{\Delta x}$ $\frac{5}{5}$ $\frac{5}{5}$ (1, 1)



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

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

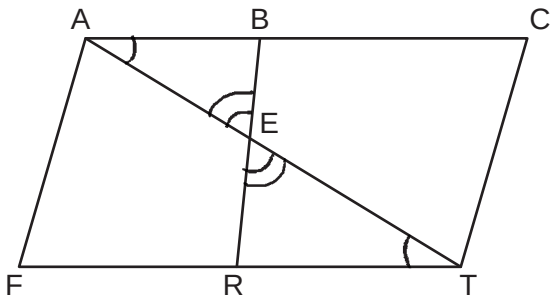
Statements	Reasons
Quad FACT, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E	1. Given
1. $\overline{AF} \parallel \overline{CT}$, $\overline{AF} \cong \overline{CT}$	2. A quad w/ one set of opp sides $\parallel$ and $\cong$ → parallelogram
2. ACTF is a parallelogram	3. parallelogram → opp. sides $\parallel$
3. $\overline{AC} \parallel \overline{FT}$	4. parallel lines cut by a transversal → alt. int. $\angle$'s $\cong$
4. $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$	5. AA Similarity
5. $\triangle ABE \sim \triangle TRE$	6. $\sim\triangle$'s → corr. sides proportional
6. $\frac{AB}{AE} = \frac{TR}{TE}$	7. product of means = product of extremes
7. $AB \cdot TE = AE \cdot TR$	

Work space for question 35 is continued on the next page.

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

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

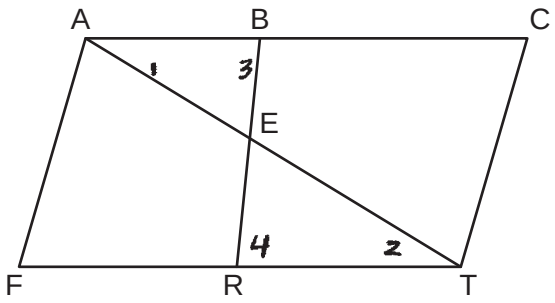
$\angle BEA \cong \angle RET$ b/c intersecting lines form $\cong$ vertical angles.
$\overline{AF} \parallel \overline{CT}$ and $\overline{AF} \cong \overline{CT}$ so quad FACT is a parallelogram, b/c one pair of opp sides are $\cong$ and $\parallel$.
$\overline{AC} \parallel \overline{FT}$ b/c parallelogram have opposite $\parallel$ sides. $\angle EAB \cong \angle ETR$ b/c $\parallel$ lines cut by transversal have $\cong$ alternate interior angles
$\triangle BEA \sim \triangle RET$ b/c AA. $\frac{AB}{TR} = \frac{AE}{TE}$ b/c similar $\triangle$s have proportional corresponding sides. $(AB)(TE) = (AE)(TR)$ b/c product of means = product of extremes.

Work space for question 35 is continued on the next page.

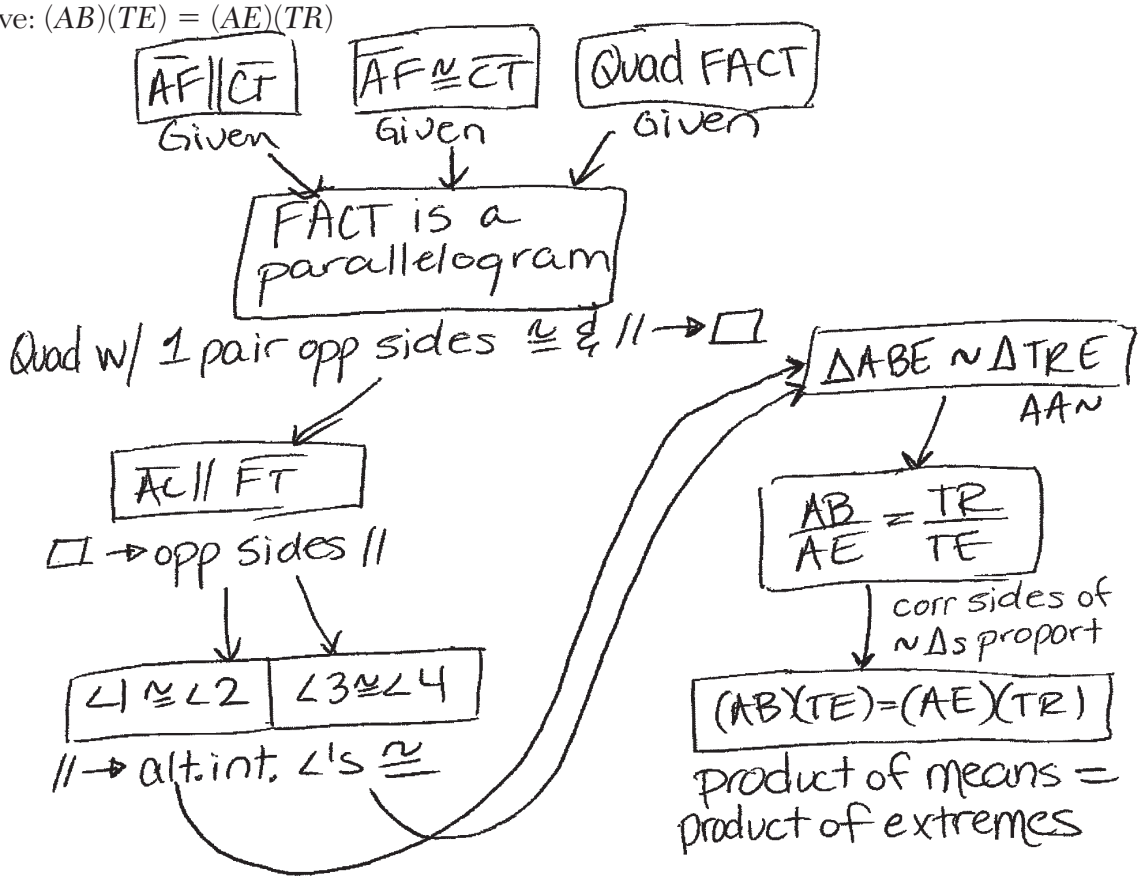
Score 6: The student gave a complete and correct response.

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

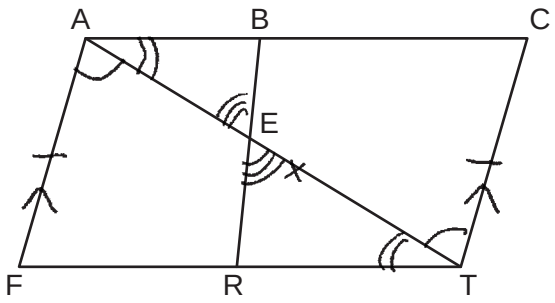


Work space for question 35 is continued on the next page.

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

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

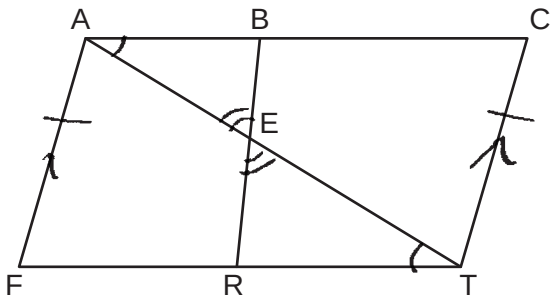
1. Quadrilateral FACT, $\overline{BR}$ + $\overline{AT}$ intersect at E $\overline{AF} \parallel \overline{CT}$ $\overline{AF} \cong \overline{CT}$	1. Given
2. $\angle FAT \cong \angle CTA$	2. If 2 parallel lines are cut by a transversal, the alternate interior angles are $\cong$.
3. $\overline{AT} \cong \overline{AT}$	3. Reflexive
4. $\triangle AFT \cong \triangle TCA$	4. SAS $\cong$ SAS
5. $\angle FTA \cong \angle CAT$	5. CPCTC
6. $\angle BEA \cong \angle RET$	6. Vertical angles are $\cong$.
7. $\triangle AEB \sim \triangle TER$	7. AA $\cong$ AA
8. $\frac{AE}{AB} = \frac{TE}{TR}$	8. Corresponding sides of similar triangles are in proportion
9. $AB \cdot TE = AE \cdot TR$	9. Cross multiply.

Work space for question 35 is continued on the next page.

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

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

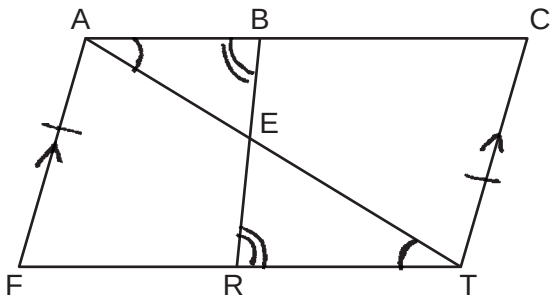
Statements	Reasons
1) Quad FACT $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, $\overline{AF} \cong \overline{CT}$	1) Given
1.5) $\overline{AC} \parallel \overline{FT}$	1.5) opposite sides of a parallelogram are parallel. (1)
2) $\angle CAT \cong \angle RTA$	2) If parallel lines are cut by a transversal, then alternate interior angles are congruent (1.5).
3) $\angle AEB \cong \angle TER$	3) Intersecting lines meet to form vertical angles that are congruent (PIC)
4) $\triangle ABE \sim \triangle TRE$	4) AA $\cong$ AA (2, 3).
5) $\frac{AB}{AE} = \frac{TR}{TE}$	5) If triangles are similar, then corresponding sides are proportional (4)
6) $(AB)(TE) = (AE)(TR)$	6) In a proportion, the product of the means is equal to the product of the extremes (5).

Work space for question 35 is continued on the next page.

Score 4: The student made one conceptual error by not proving *FACT* was a parallelogram.

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



△ABE ~ △TRE

Prove: $(AB)(TE) = (AE)(TR)$

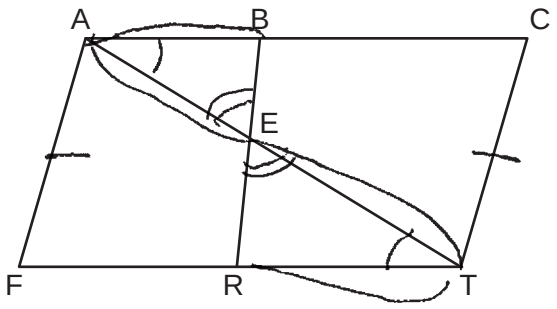
Statements	Reasons
Quad FACT	
1) $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, $\overline{AF} \cong \overline{CT}$	1) Given
2) quadrilateral FACT is a $\square$	2) a quad with one pair of opp sides $\parallel$ and $\cong$ is a $\square$
3) $\overline{AC} \parallel \overline{FT}$	3) $\square \rightarrow$ opp sides are $\parallel$
4) $\angle CAT \cong \angle ATF$, $\angle BRT \cong \angle RBA$	4) when lines are $\parallel$, alt int $\angle$s are $\cong$
5) $\triangle ABE \sim \triangle TRE$	5) AA~
6) $\frac{AB}{AE} = \frac{TR}{TE}$	6) def ~
7) $(AB)(TE) = (AE)(TR)$	7) cross product

Work space for question 35 is continued on the next page.

Score 4: The student had incorrect reasons for steps 6 and 7.

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

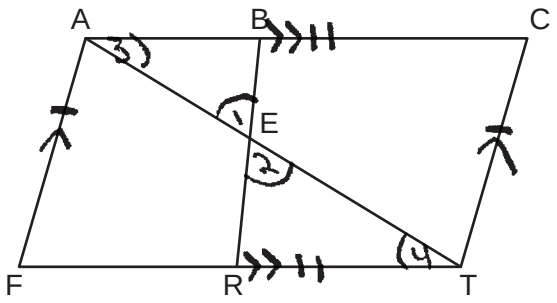
S	R
1) Quad FACT $\overline{AF} \parallel \overline{CT}$ $\overline{AF} \cong \overline{CT}$	1) given
2) Quadrilateral FACT is a parallelogram	2) definition of Parallelogram
3) $\overline{AC} \parallel \overline{FT}$	3) in a parallelogram opposite sides are parallel
4) $\angle BAE \cong \angle ETR$ (A)	4) Alternate interior angles are congruent
5) $\angle BEA \cong \angle TER$ (A)	5) vertical angles congruent
6) $\triangle BAE \sim \triangle RTE$	6) A.A postulate for similar triangle
7) $\frac{AB}{AE} = \frac{TR}{TE}$	7) in similar triangles the corresponding sides are in proportion
8) $(AB)(TE) = (AE)(TR)$	8) In a proportion the Product of means equals the product of extremes,

Work space for question 35 is continued on the next page.

Score 4: The student had an incorrect reason in step 2 and an incomplete reason in step 4.

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

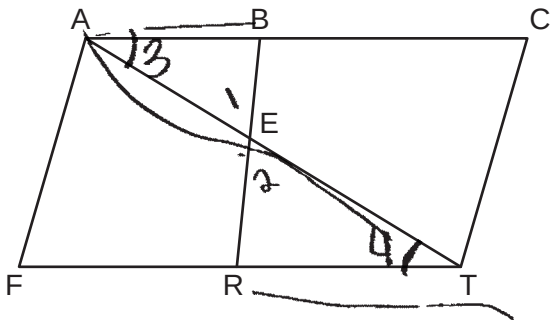
Statements	Reasons
1) quad FACT, $\overline{BR}$ intersects diag $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, $\overline{AF} \cong \overline{CT}$	1) given
2) $\angle 1 \cong \angle 2$	2) vertical $\angle$'s $\cong$
3) quad FACT is a parallelogram	3) one pair of opposite sides are $\parallel$ and $\cong$ then a quad is a parallelogram
4) $\overline{AC} \parallel \overline{FT}$	4) def of parallelogram
5) $\angle 3 \cong \angle 4$	5) two $\parallel$ lines cut by a transv result in a $\cong$ alt int $\angle$'s
6) $\triangle ABE \cong \triangle TRE$	6) AA
7) $\overline{AB} \cong \overline{AE}$, $\overline{TE} \cong \overline{TR}$	7) CPCTC
8) $(AB)(TE) = (AE)(TR)$	8) cross multiply

Work space for question 35 is continued on the next page.

Score 3: The student had three incorrect statements and/or reasons after step 5.

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

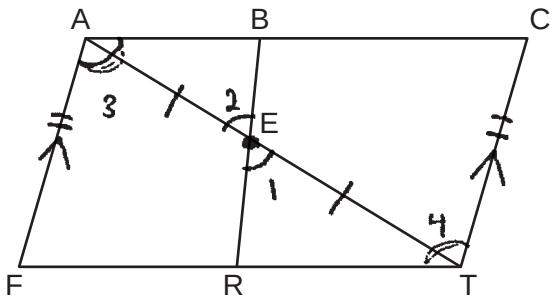
1. $\overline{AF} \parallel \overline{CT}$, $\overline{AF} \cong \overline{CT}$ — 1. Given
2. $FACT$ is a $\parallel$gram — 2. $\parallel$gram if opp sides $\parallel$ + $\cong$
3. $\angle 1$ & $\angle 2$ $\cong$ — 3. Vertical $\angle$s $\cong$ thm
4. $\angle 3$ & $\angle 4$ $\cong$ — 4. Def bisected angle
5. $\triangle ABE \sim \triangle RET$ — 5. AAS
6. $(AB)(TE) = (AE)(TR)$ — 6. CPCTC

Work space for question 35 is continued on the next page.

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

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

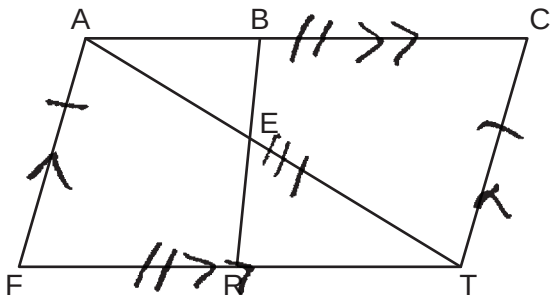
Statements	Reasons
1) $\overline{BR}$ intersects diagonal $\overline{AT}$	1) Given
2) $\overline{AE} \cong \overline{ET}$	2) Def of segment bisector
3) $\overline{AF} \parallel \overline{CT}$	3) Given
4) $\overline{AF} \cong \overline{CT}$	4) Given
5) $\angle 1 \cong \angle 2$	5) Vertical angles congruent
6) $\angle 3 \cong \angle 4$	6) Because $\overline{BR}$ bisects the diagonal $\overline{AT}$ the opp angles are bisected and also equal to eachother
7) FACT is a parallelogram	7) Because diagonals $\cong$ & $\parallel$ line segments
8) $(AB)(TE) = (AE)(TR)$	8) Equals multiplied with equals results in equals

Work space for question 35 is continued on the next page.

Score 1: The student had only one correct relevant statement and reason in step 5.

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

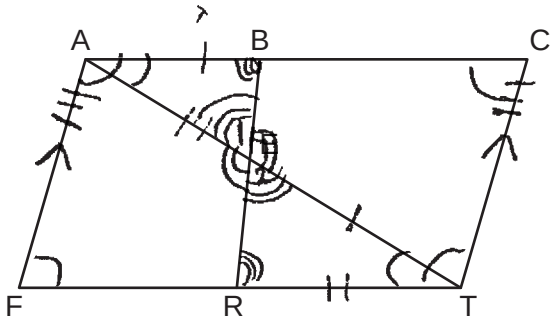
Statement	reason
1. Br intersects $\overline{AT}$ @ E, $\overline{AF} \parallel \overline{CT}$ $\overline{AF} \cong \overline{CT}$	1 Given
2. FACT is a pramciogram	2.. A quad is a parallelogram iff one pair of opposite sides are Pralle and congruent
3. $\overline{FT} \cong \overline{AC}$	3. parallelograms have opposite Sides ?
4. $\overline{AT} \cong \overline{AT}$	4. Reflexive
5 $\triangle AFT \cong \triangle ACT$	5. SSS $\triangle \cong$
6.	6.

Work space for question 35 is continued on the next page.

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

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

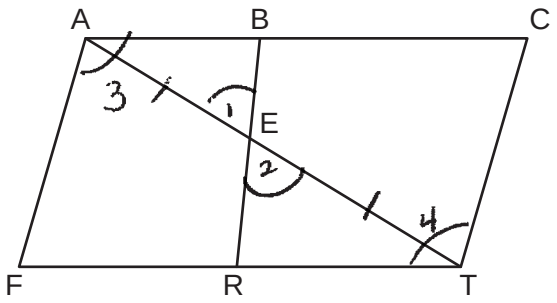
S	R
1) $\overline{BR}$ intersects diagonal $\overline{AT}$ at E; $\overline{AF} \parallel \overline{CT}$; $\overline{AF} \cong \overline{CT}$	1) Given
2) $\angle 1 \cong \angle 2$	2) vertical $\angle$'s are $\cong$
3) $\angle A \cong \angle T$	3) Alternate interior $\angle$'s are $\cong$ if lines are $\parallel$
4) $\angle C \cong \angle F$; $\angle A \cong \angle F$	4) Definition of a parallelogram
5) $\triangle AFT \cong \triangle TCA$	5) ASA
6) $(AB)(TE) = (AE)(TR)$	6) CPCTC

Work space for question 35 is continued on the next page.

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

Question 35

35 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



Prove: $(AB)(TE) = (AE)(TR)$

Statements	Reasons
(1) $\overline{BR}$ intersects diag. $\overline{AT}$	(1) Given
(2) $\overline{AE} \cong \overline{ET}$	(2) Def. of seg. bisector
(3) $\overline{AF} \parallel \overline{CT}$, $\overline{AF} \cong \overline{CT}$	(3) Given
(4) $\angle 1 \cong \angle 2$	(4) Vertical angles
(5) $\angle 3 \cong \angle 4$	(5) Because $\overline{BR}$ bisects diag. $\overline{AT}$ the opp. $\angle$'s are bisected and equal to each other
(6) FACT is a parallelogram	(6) Because diagonals $\cong$ & $\parallel$ line segments
(7) $(AB)(TE) = (AE)(TR)$	(7) Equals multiplied with equals results in equals.

Work space for question 35 is continued on the next page.

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

Regents Examination in Geometry – August 2023

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

(Use for the August 2023 exam only.)

Raw Score	Scale Score	Performance Level
80	**100**	5
79	**99**	5
78	**97**	5
77	**96**	5
76	**95**	5
75	**94**	5
74	**93**	5
73	**92**	5
72	**91**	5
71	**90**	5
70	**90**	5
69	**89**	5
68	**88**	5
67	**87**	5
66	**86**	5
65	**86**	5
64	**85**	5
63	**84**	4
62	**84**	4
61	**83**	4
60	**83**	4
59	**82**	4
58	**81**	4
57	**81**	4
56	**80**	4
55	**80**	4
54	**79**	3

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

Raw Score	Scale Score	Performance Level
26	**60**	2
25	**58**	2
24	**57**	2
23	**56**	2
22	**55**	2
21	**53**	1
20	**51**	1
19	**50**	1
18	**48**	1
17	**46**	1
16	**45**	1
15	**43**	1
14	**41**	1
13	**39**	1
12	**36**	1
11	**34**	1
10	**32**	1
9	**29**	1
8	**27**	1
7	**24**	1
6	**21**	1
5	**18**	1
4	**15**	1
3	**11**	1
2	**8**	1
1	**4**	1
0	**0**	1

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

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

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