

GEOMETRY (Common Core)

Wednesday, August 12, 2015 — 8:30 to 11:30 a.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 36 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in Parts II, III, and IV directly in this booklet. All work should be written in pen, except for graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale.

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

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

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

Notice...

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

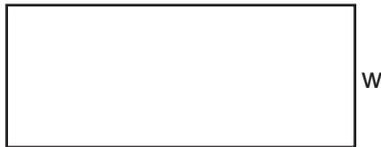
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. 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. [48]

Use this space for
computations.

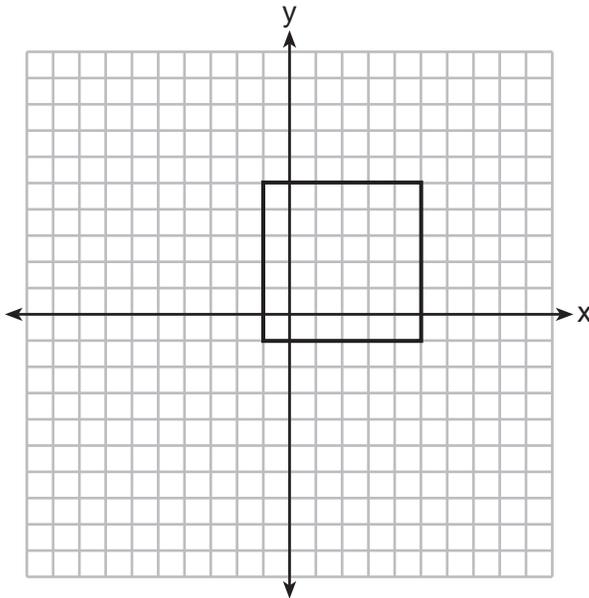
- 1 A parallelogram must be a rectangle when its
- (1) diagonals are perpendicular
 - (2) diagonals are congruent
 - (3) opposite sides are parallel
 - (4) opposite sides are congruent
- 2 If $\triangle A'B'C'$ is the image of $\triangle ABC$, under which transformation will the triangles *not* be congruent?
- (1) reflection over the x -axis
 - (2) translation to the left 5 and down 4
 - (3) dilation centered at the origin with scale factor 2
 - (4) rotation of 270° counterclockwise about the origin
- 3 If the rectangle below is continuously rotated about side w , which solid figure is formed?



- (1) pyramid
 - (2) rectangular prism
 - (3) cone
 - (4) cylinder
- 4 Which expression is always equivalent to $\sin x$ when $0^\circ < x < 90^\circ$?
- (1) $\cos(90^\circ - x)$
 - (2) $\cos(45^\circ - x)$
 - (3) $\cos(2x)$
 - (4) $\cos x$

Use this space for
computations.

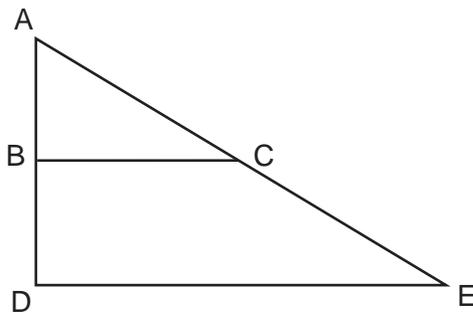
5 In the diagram below, a square is graphed in the coordinate plane.



A reflection over which line does *not* carry the square onto itself?

- (1) $x = 5$
- (2) $y = 2$
- (3) $y = x$
- (4) $x + y = 4$

6 The image of $\triangle ABC$ after a dilation of scale factor k centered at point A is $\triangle ADE$, as shown in the diagram below.

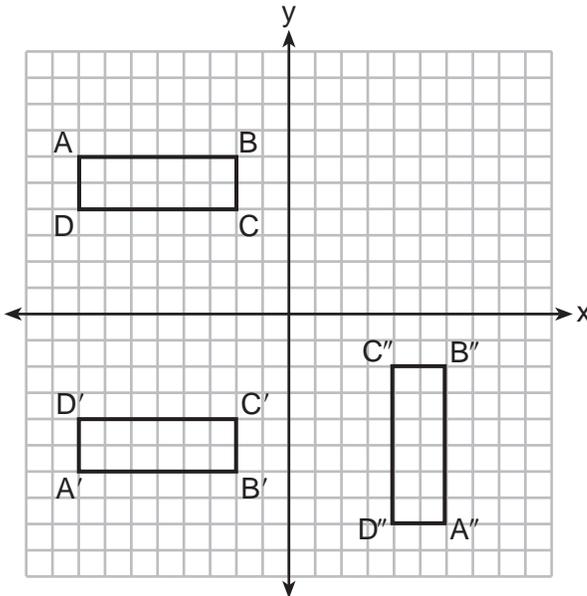


Which statement is always true?

- (1) $2AB = AD$
- (2) $\overline{AD} \perp \overline{DE}$
- (3) $AC = CE$
- (4) $\overline{BC} \parallel \overline{DE}$

Use this space for computations.

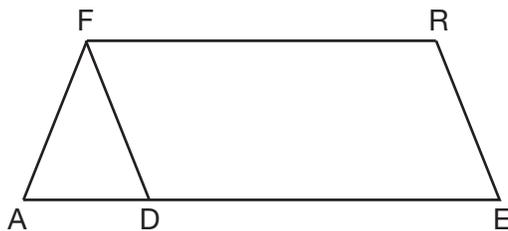
7 A sequence of transformations maps rectangle $ABCD$ onto rectangle $A''B''C''D''$, as shown in the diagram below.



Which sequence of transformations maps $ABCD$ onto $A'B'C'D'$ and then maps $A'B'C'D'$ onto $A''B''C''D''$?

- (1) a reflection followed by a rotation
- (2) a reflection followed by a translation
- (3) a translation followed by a rotation
- (4) a translation followed by a reflection

8 In the diagram of parallelogram $FRED$ shown below, \overline{ED} is extended to A , and \overline{AF} is drawn such that $\overline{AF} \cong \overline{DF}$.



If $m\angle R = 124^\circ$, what is $m\angle AFD$?

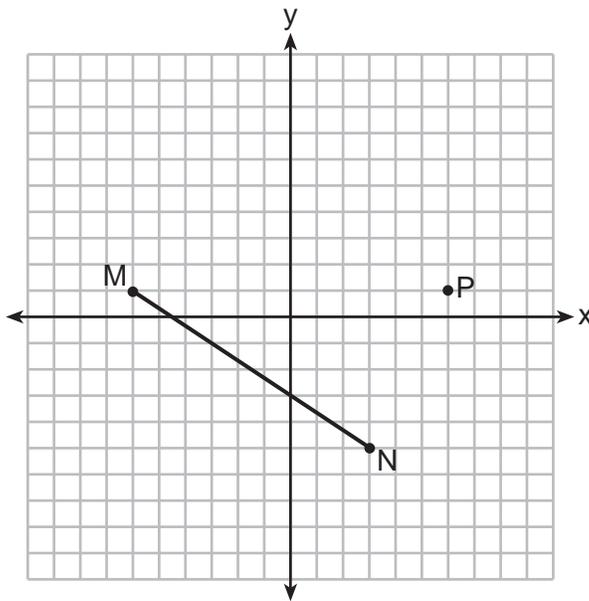
- (1) 124°
- (2) 112°
- (3) 68°
- (4) 56°

Use this space for computations.

9 If $x^2 + 4x + y^2 - 6y - 12 = 0$ is the equation of a circle, the length of the radius is

- (1) 25
- (2) 16
- (3) 5
- (4) 4

10 Given \overline{MN} shown below, with $M(-6,1)$ and $N(3,-5)$, what is an equation of the line that passes through point $P(6,1)$ and is parallel to \overline{MN} ?



- (1) $y = -\frac{2}{3}x + 5$
- (2) $y = -\frac{2}{3}x - 3$
- (3) $y = \frac{3}{2}x + 7$
- (4) $y = \frac{3}{2}x - 8$

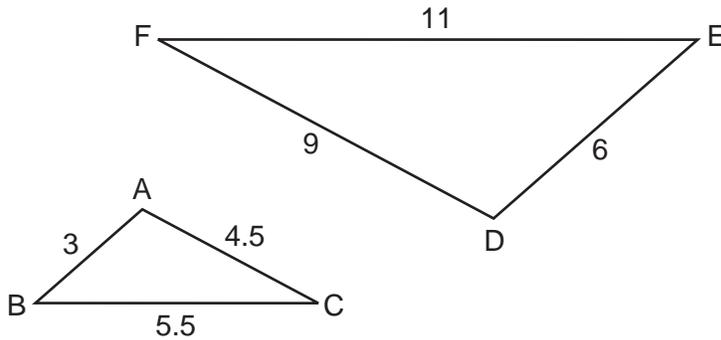
11 Linda is designing a circular piece of stained glass with a diameter of 7 inches. She is going to sketch a square inside the circular region.

To the *nearest tenth of an inch*, the largest possible length of a side of the square is

- (1) 3.5
- (2) 4.9
- (3) 5.0
- (4) 6.9

Use this space for computations.

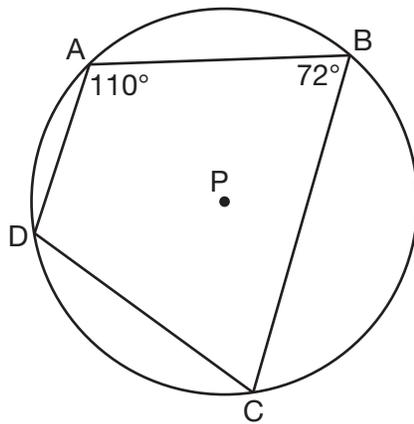
- 14 In the diagram below, $\triangle DEF$ is the image of $\triangle ABC$ after a clockwise rotation of 180° and a dilation where $AB = 3$, $BC = 5.5$, $AC = 4.5$, $DE = 6$, $FD = 9$, and $EF = 11$.



Which relationship must always be true?

- (1) $\frac{m\angle A}{m\angle D} = \frac{1}{2}$ (3) $\frac{m\angle A}{m\angle C} = \frac{m\angle F}{m\angle D}$
(2) $\frac{m\angle C}{m\angle F} = \frac{2}{1}$ (4) $\frac{m\angle B}{m\angle E} = \frac{m\angle C}{m\angle F}$

- 15 In the diagram below, quadrilateral $ABCD$ is inscribed in circle P .



What is $m\angle ADC$?

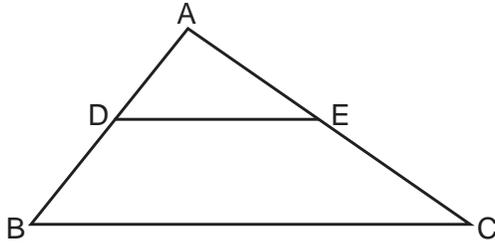
- (1) 70° (3) 108°
(2) 72° (4) 110°

Use this space for computations.

16 A hemispherical tank is filled with water and has a diameter of 10 feet. If water weighs 62.4 pounds per cubic foot, what is the total weight of the water in a full tank, to the *nearest pound*?

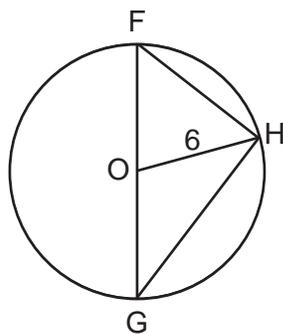
- (1) 16,336 (3) 130,690
(2) 32,673 (4) 261,381

17 In the diagram below, $\triangle ABC \sim \triangle ADE$.



Which measurements are justified by this similarity?

- (1) $AD = 3$, $AB = 6$, $AE = 4$, and $AC = 12$
(2) $AD = 5$, $AB = 8$, $AE = 7$, and $AC = 10$
(3) $AD = 3$, $AB = 9$, $AE = 5$, and $AC = 10$
(4) $AD = 2$, $AB = 6$, $AE = 5$, and $AC = 15$
- 18 Triangle FGH is inscribed in circle O , the length of radius \overline{OH} is 6, and $\overline{FH} \cong \overline{OG}$.

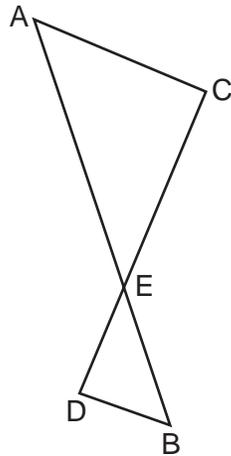


What is the area of the sector formed by angle FOH ?

- (1) 2π (3) 6π
(2) $\frac{3}{2}\pi$ (4) 24π

Use this space for
computations.

- 19 As shown in the diagram below, \overline{AB} and \overline{CD} intersect at E , and $\overline{AC} \parallel \overline{BD}$.



Given $\triangle AEC \sim \triangle BED$, which equation is true?

- (1) $\frac{CE}{DE} = \frac{EB}{EA}$ (3) $\frac{EC}{AE} = \frac{BE}{ED}$
- (2) $\frac{AE}{BE} = \frac{AC}{BD}$ (4) $\frac{ED}{EC} = \frac{AC}{BD}$
- 20 A triangle is dilated by a scale factor of 3 with the center of dilation at the origin. Which statement is true?
- (1) The area of the image is nine times the area of the original triangle.
- (2) The perimeter of the image is nine times the perimeter of the original triangle.
- (3) The slope of any side of the image is three times the slope of the corresponding side of the original triangle.
- (4) The measure of each angle in the image is three times the measure of the corresponding angle of the original triangle.

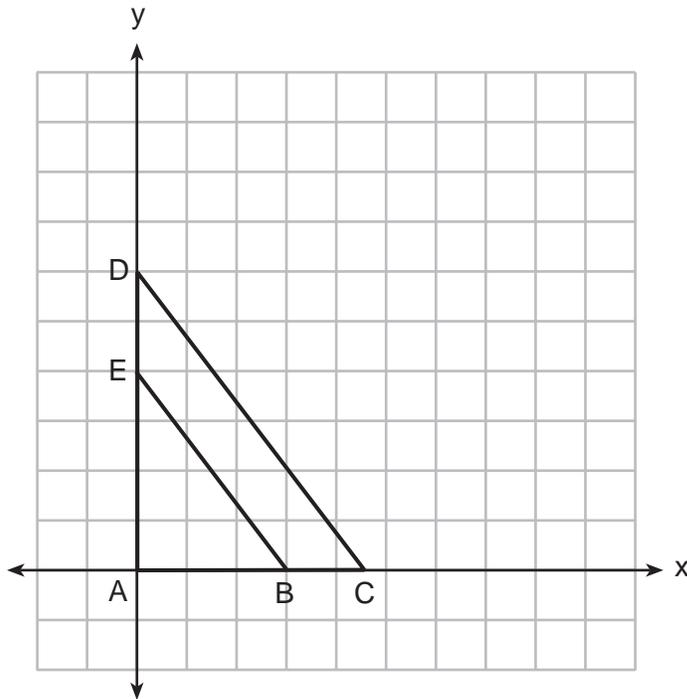
- 21 The Great Pyramid of Giza was constructed as a regular pyramid with a square base. It was built with an approximate volume of 2,592,276 cubic meters and a height of 146.5 meters. What was the length of one side of its base, to the nearest meter?
- (1) 73 (3) 133
- (2) 77 (4) 230

Use this space for computations.

22 A quadrilateral has vertices with coordinates $(-3,1)$, $(0,3)$, $(5,2)$, and $(-1,-2)$. Which type of quadrilateral is this?

- (1) rhombus
- (2) rectangle
- (3) square
- (4) trapezoid

23 In the diagram below, $\triangle ABE$ is the image of $\triangle ACD$ after a dilation centered at the origin. The coordinates of the vertices are $A(0,0)$, $B(3,0)$, $C(4.5,0)$, $D(0,6)$, and $E(0,4)$.



The ratio of the lengths of \overline{BE} to \overline{CD} is

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

24 Line $y = 3x - 1$ is transformed by a dilation with a scale factor of 2 and centered at $(3,8)$. The line's image is

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

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]

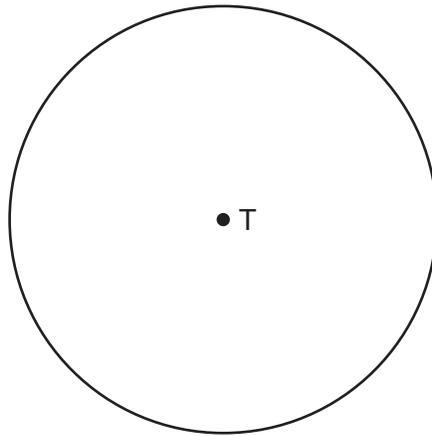
25 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*.

State which type of wood the cube is made of, using the density table below.

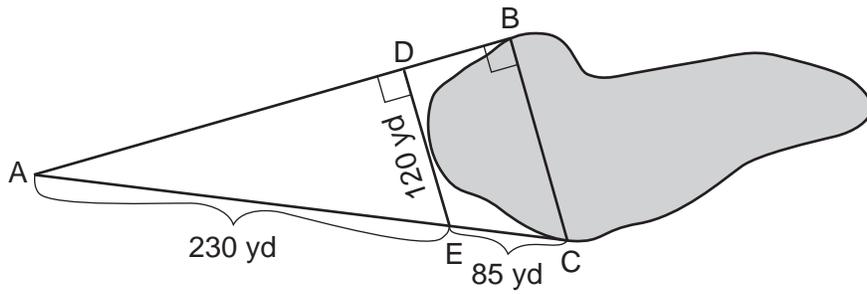
Type of Wood	Density (g/cm ³)
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

26 Construct an equilateral triangle inscribed in circle T shown below.

[Leave all construction marks.]

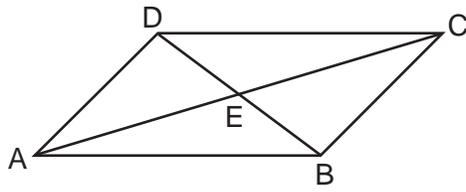


27 To find the distance across a pond from point B to point C , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



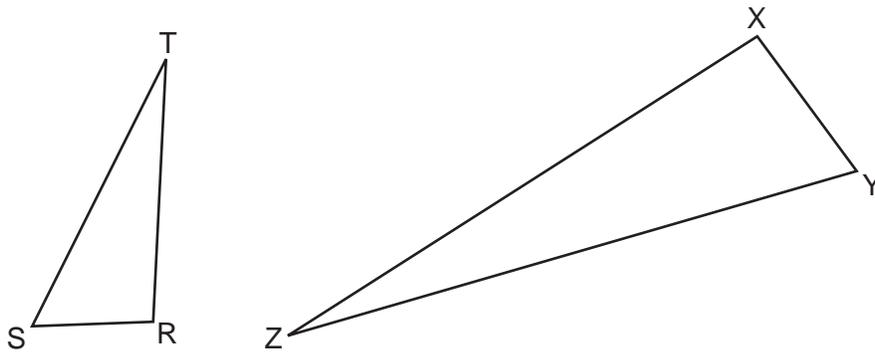
Use the surveyor's information to determine and state the distance from point B to point C , to the nearest yard.

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

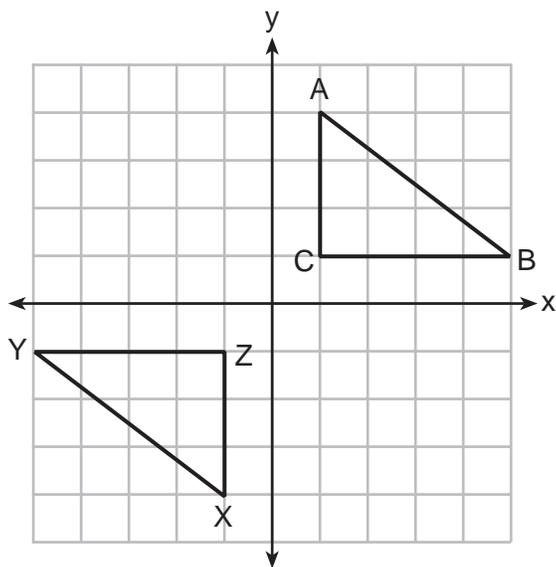


Prove: $\angle ACD \cong \angle CAB$

29 Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.



30 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.



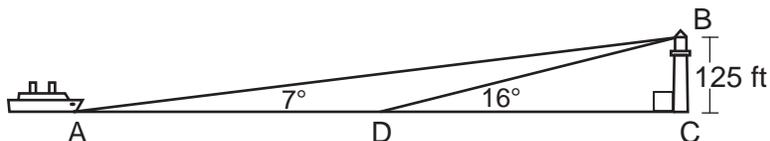
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

31 The endpoints of \overline{DF} are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E , if $DE:EF = 2:3$.

Part III

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

- 32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A , the angle of elevation from the ship to the light was 7° . A short time later, at point D , the angle of elevation was 16° .

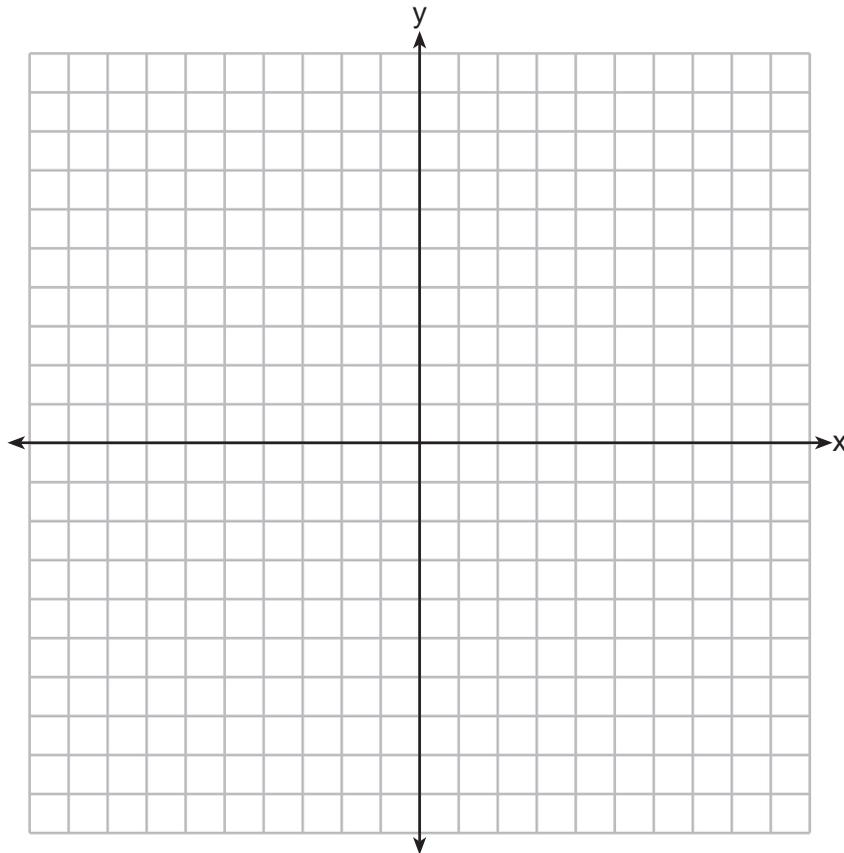


To the *nearest foot*, determine and state how far the ship traveled from point A to point D .

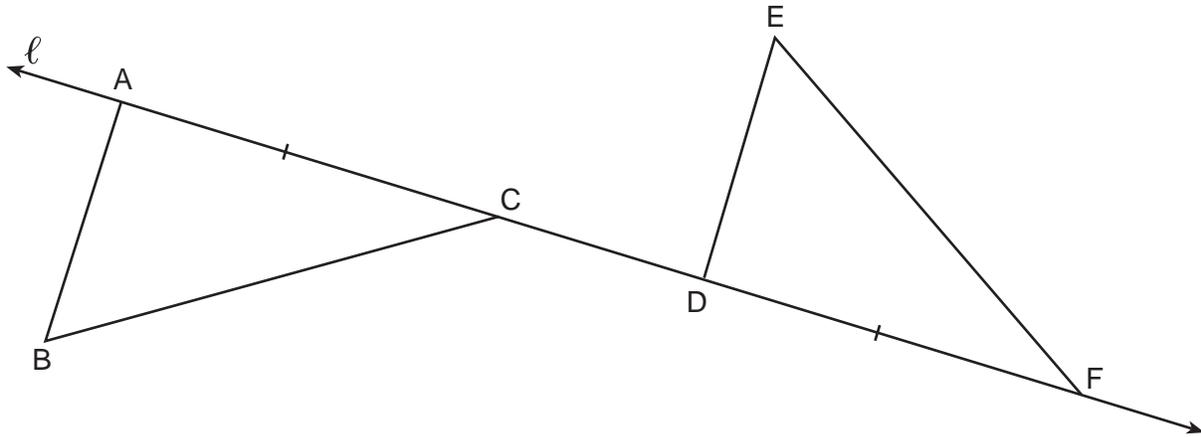
33 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$.

Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle.

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



34 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A , C , D , and F are collinear on line ℓ .



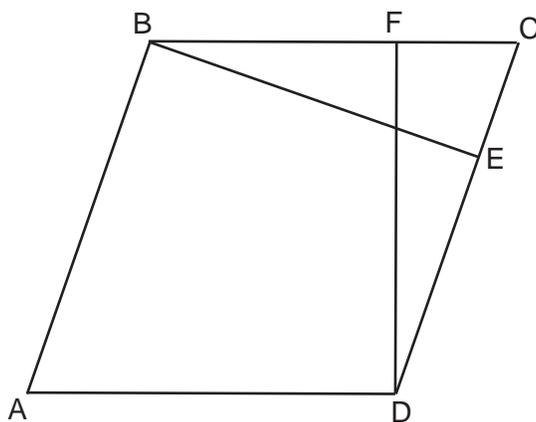
Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ , such that point D is mapped onto point A . Determine and state the location of F' . Explain your answer.

Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ . Suppose that E'' is located at B . Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

Part IV

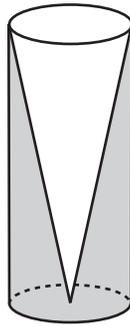
Answer the 2 questions in this part. Each correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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]

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, and $\overline{CE} \cong \overline{CF}$.



Prove $ABCD$ is a rhombus.

- 36** Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?



Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

High School Math Reference Sheet

1 inch = 2.54 centimeters	1 kilometer = 0.62 mile	1 cup = 8 fluid ounces
1 meter = 39.37 inches	1 pound = 16 ounces	1 pint = 2 cups
1 mile = 5280 feet	1 pound = 0.454 kilogram	1 quart = 2 pints
1 mile = 1760 yards	1 kilogram = 2.2 pounds	1 gallon = 4 quarts
1 mile = 1.609 kilometers	1 ton = 2000 pounds	1 gallon = 3.785 liters
		1 liter = 0.264 gallon
		1 liter = 1000 cubic centimeters

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

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

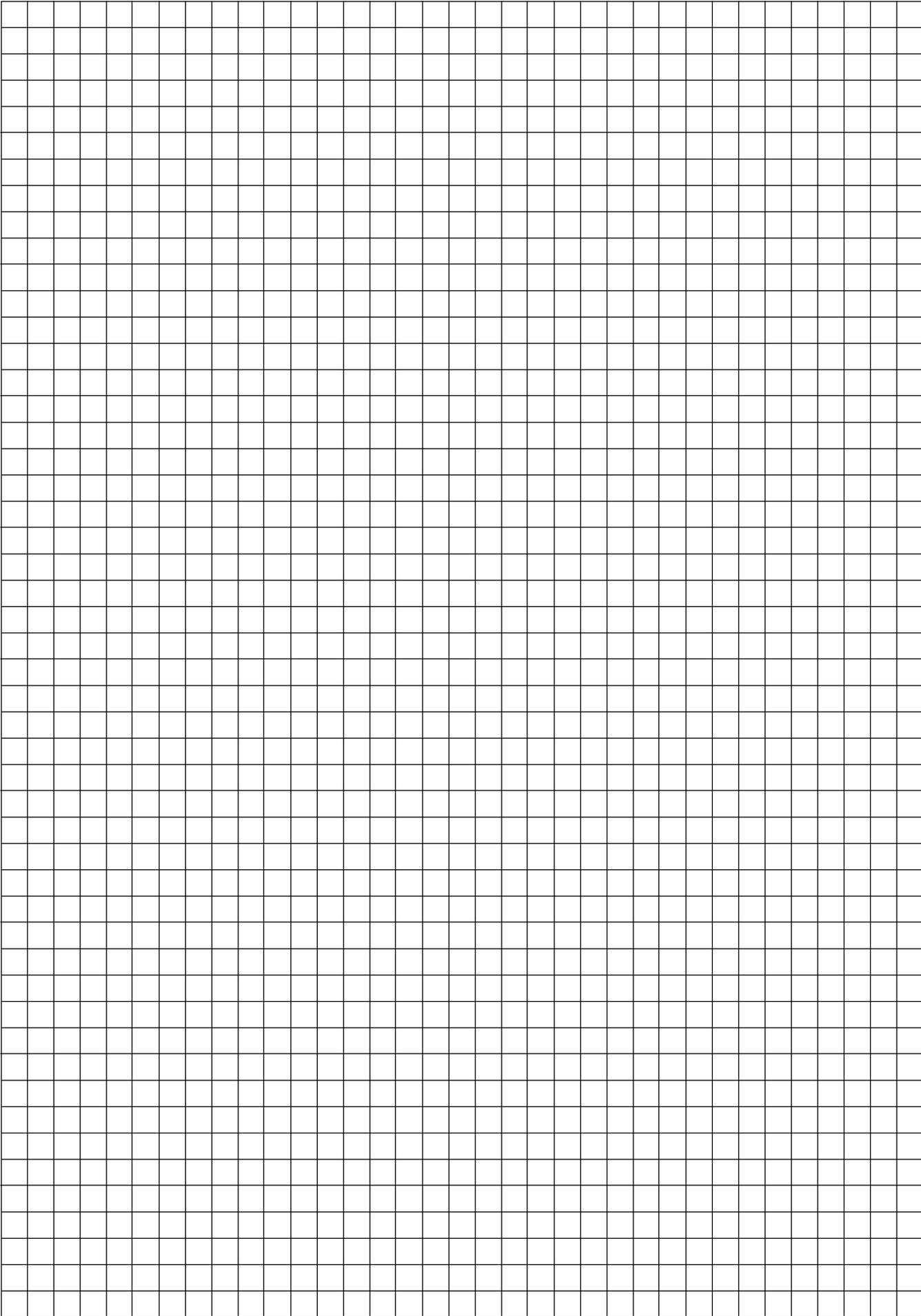
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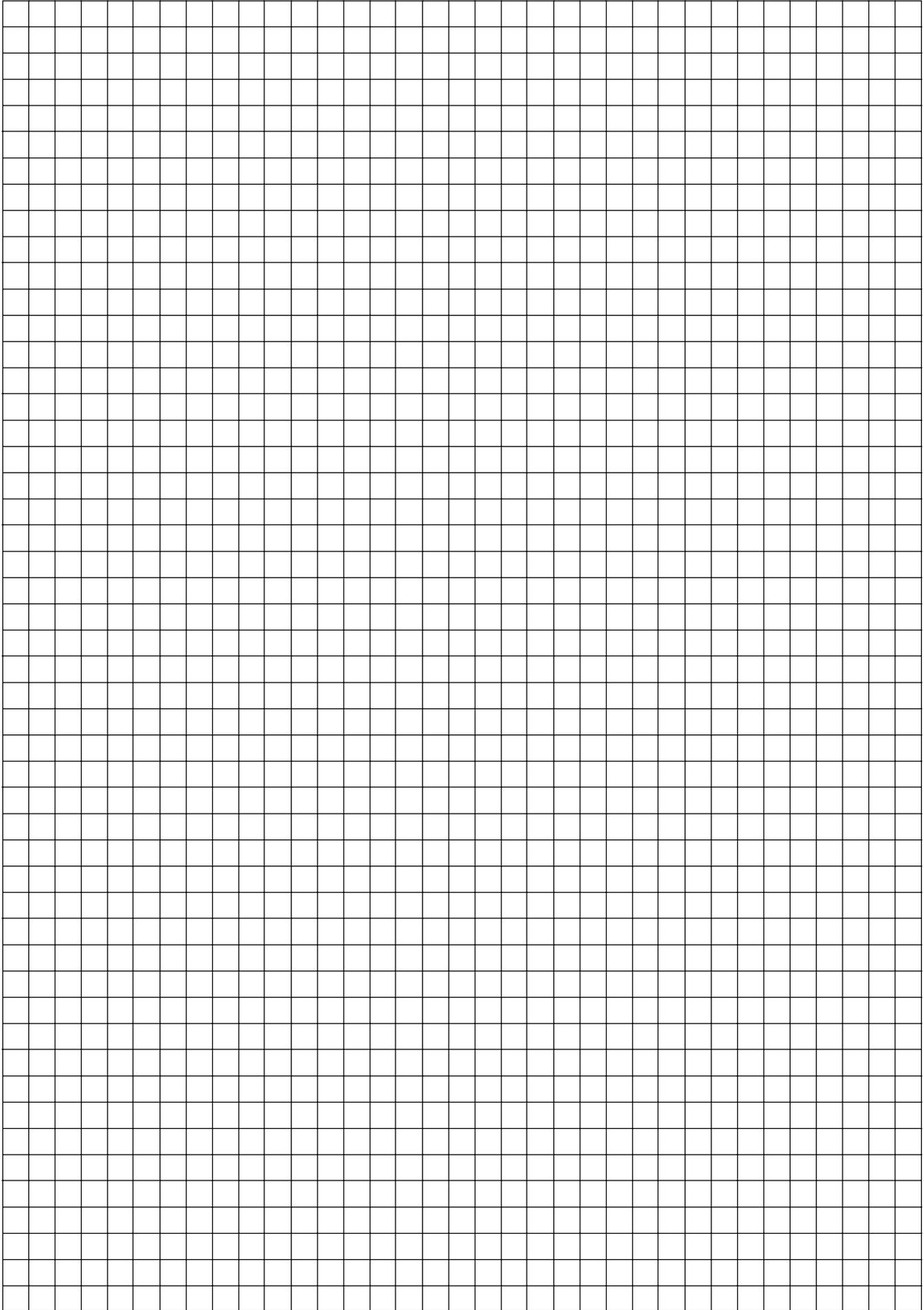
Scrap Graph Paper — This sheet will *not* be scored.



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



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GEOMETRY (COMMON CORE)

Printed on Recycled Paper

GEOMETRY (COMMON CORE)

FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

GEOMETRY (COMMON CORE)

Wednesday, August 12, 2015 — 8:30 to 11:30 a.m., only

SCORING KEY AND RATING GUIDE

Mechanics of Rating

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

Do *not* attempt to correct the student's work by making insertions or changes of any kind. In scoring the open-ended 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 open-ended 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 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.

Raters should record the student's scores for all questions and the total raw score on the student's separate answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Wednesday, August 12, 2015. 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.

If the student’s responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.

Part I

Allow a total of 48 credits, 2 credits for each of the following. Allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 2	(9) 3	(17) 4
(2) 3	(10) 1	(18) 3
(3) 4	(11) 2	(19) 2
(4) 1	(12) 3	(20) 1
(5) 1	(13) 2	(21) 4
(6) 4	(14) 4	(22) 4
(7) 1	(15) 3	(23) 1
(8) 3	(16) 1	(24) 4

Updated information regarding the rating of this examination may be posted on the New York State Education Department’s web site during the rating period. Check this web site at: <http://www.p12.nysed.gov/assessment/> and select the link “Scoring Information” for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

Beginning in June 2015, the Department is providing supplemental scoring guidance, the “Model Response Set,” for the Regents Examination in Geometry (Common Core). This guidance is intended to be part of the scorer training. Schools should use the Model Response Set along with the rubrics in the Scoring Key and Rating Guide to help guide scoring of student work. While not reflective of all scenarios, the Model Response Set illustrates how less common student responses to constructed-response questions may be scored. The Model Response Set will be available on the Department’s web site at: <http://www.nysedregents.org/Geometrycc/>.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examination in Geometry (Common Core) 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 (Common Core)*, 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] Ash is stated, 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] Appropriate work is shown to find the density, but the wood choice is missing or is incorrect.
- or*
- [1] 0.638 or Ash, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (26) [2] A correct construction is drawn showing all appropriate arcs.
- [1] Appropriate arcs are marked on the circle, but the triangle is not drawn.
- [0] A drawing that is not an appropriate construction is shown.
- or*
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

- (27) [2] 164, 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 proportion to find BC is written, but no further correct work is shown.
- or*
- [1] 164, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (28) [2] A complete and correct proof that includes a concluding statement is written.
- [1] Only one relevant correct statement and reason are written.
- or*
- [1] One conceptual error is made.
- [0] The “given” and/or the “prove” statements are written, but no further correct relevant statements are written.
- or*
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (29) [2] The triangles are similar, and a correct justification is stated.
- [1] Appropriate work is shown, but one computational error is made. An appropriate justification is stated.
- or*
- [1] Appropriate work is shown, but one conceptual error is made.
- [0] The triangles are similar, but no justification is stated.
- or*
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

- (30) [2] A correct explanation is written to explain why $\triangle ABC \cong \triangle XYZ$.
- [1] An appropriate explanation is written, but one conceptual error is made.
- or***
- [1] An appropriate explanation is written, but is incomplete.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (31) [2] (7,8), 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] Appropriate work is shown to find 7 and 8, but the answer is not written as coordinates.
- or***
- [1] (7,8), but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

Part III

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

- (32) [4] 582, and correct work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or*
- [3] Correct work is shown to find the lengths of both \overline{AC} and \overline{DC} , but they are not subtracted.
- [2] Appropriate work is shown, but two or more computational or rounding errors are made.
- or*
- [2] Appropriate work is shown, but one conceptual error is made.
- or*
- [2] Correct work is shown to find the length of either \overline{AC} or \overline{DC} , but no further correct work is shown.
- or*
- [2] $\frac{125}{\tan 7} - \frac{125}{\tan 16}$, or an equivalent to find AD is written, 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] $\tan 7 = \frac{125}{AC}$ and $\tan 16 = \frac{125}{DC}$ are written, but no further correct work is shown.
- or*
- [1] 582, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

- (33) [4] 3 or 9.5, and correct work is shown.
- [3] Appropriate work is shown, but one computational or graphing error is made.
- [2] Appropriate work is shown, but two or more computational or graphing errors are made.
- or***
- [2] Appropriate work is shown, but one conceptual error is made.
- [1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
- or***
- [1] Appropriate work is shown to find $\frac{2}{3}$, the slope of a line perpendicular to \overline{BC} .
No further correct work is shown.
- or***
- [1] 3 or 9.5, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (34) [4] Point C , and a correct explanation is written. Yes, and a correct explanation is written.
- [3] Point C , but the explanation is incorrect or missing. Yes, and a correct explanation is written.
- or***
- [3] Point C , and a correct explanation is written. Yes, but the explanation is incorrect.
- [2] One conceptual error is made.
- or***
- [2] Point C , and a correct explanation is written. No further correct work is shown.
- or***
- [2] Yes, and a correct explanation is written. No further correct work is shown.
- [1] Point C is written, with no further correct work.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

Part IV

For each 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 conclusion 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 or reason is missing or is incorrect.
- [4] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements or reasons are missing or are incorrect.
- or***
- [4] $\triangle BEC \cong \triangle DFC$ is proven, but no further correct work is shown.
- [3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
- or***
- [3] $\angle BEC \cong \angle DFC$ and $\angle C \cong \angle C$ are proven, but no further correct work is shown.
- [2] A proof is written that demonstrates a method of proof, but one conceptual error is made, and one statement or reason is missing or is incorrect.
- or***
- [2] Some correct relevant statements about the proof are made, but three or four statements or reasons are missing or are incorrect.
- or***
- [2] $\angle BEC \cong \angle DFC$ is proven, but no further correct work is shown.
- [1] Only one correct relevant statement and reason are written.
- [0] The “given” and/or the “prove” statements are written, but no further correct relevant statements are written.
- or***
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

- (36) [6] 1885, \$98.02, and \$59.15, and correct work is shown.
- [5] Appropriate work is shown, but one computational or rounding error is made.
- [4] Appropriate work is shown, but two computational or rounding errors are made.
- or*
- [4] Appropriate work is shown, but one conceptual error is made.
- or*
- [4] Correct work is shown to find 1885 and \$98.02, but no further correct work is shown.
- [3] Appropriate work is shown, but three or more computational or rounding errors are made.
- or*
- [3] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- [2] Appropriate work is shown, but one conceptual error and two or more computational or rounding errors are made.
- or*
- [2] Appropriate work is shown, but two conceptual errors are made.
- or*
- [2] Correct work is shown to find 1885, but no further correct work is shown.
- [1] Appropriate work is shown, but two conceptual errors and one computational or rounding error are made.
- or*
- [1] Correct work is shown to find the volume of one candle. No further correct work is shown.
- or*
- [1] 1885, \$98.02, and \$59.15, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

**Map to the Common Core Learning Standards
Geometry (Common Core)
August 2015**

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

27	Constructed Response	2	G-SRT.B
28	Constructed Response	2	G-CO.C
29	Constructed Response	2	G-SRT.A
30	Constructed Response	2	G-CO.B
31	Constructed Response	2	G-GPE.B
32	Constructed Response	4	G-SRT.C
33	Constructed Response	4	G-GPE.B
34	Constructed Response	4	G-CO.B
35	Constructed Response	6	G-CO.C
36	Constructed Response	6	G-MG.A

Regents Examination in Geometry (Common Core)

August 2015

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

The *Chart for Determining the Final Examination Score for the August 2015 Regents Examination in Geometry (Common Core)* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Wednesday, August 12, 2015. Conversion charts provided for previous administrations of the Regents Examination in Geometry (Common Core) must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

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

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

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

GEOMETRY (COMMON CORE)

Wednesday, August 12, 2015 — 8:30 to 11:30 a.m.

MODEL RESPONSE SET

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Question 25

25 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*.

State which type of wood the cube is made of, using the density table below.

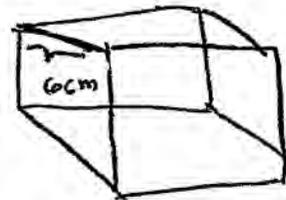
Type of Wood	Density (g/cm ³)
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
<u>Ash</u>	0.638
Maple	0.676
Oak	0.711

~~density =~~

$$d = \frac{\text{mass}}{\text{Volume}}$$
~~density =~~

$$6 \cdot 6 \cdot 6 = 216$$

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



mass = 137.8

$$0.637962963 \text{ round up} = \frac{137.8g}{216 \text{ cm}^3}$$

~~0.638~~
 0.638

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

Question 25

25 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*.

State which type of wood the cube is made of, using the density table below.

Type of Wood	Density (g/cm ³)
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

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

$$D = \frac{137.8}{6^3}$$

$$D = 0.637962963$$

Score 1: The student found the density of the wood, but did not state which type of wood the cube is made of.

Question 25

25 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*.

State which type of wood the cube is made of, using the density table below.

Type of Wood	Density (g/cm ³)
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

$$V = s^3$$

$$V = 6^3$$

$$V = 216$$

$$\frac{137.8}{216} = 3.89 \text{ g/cm}^3$$

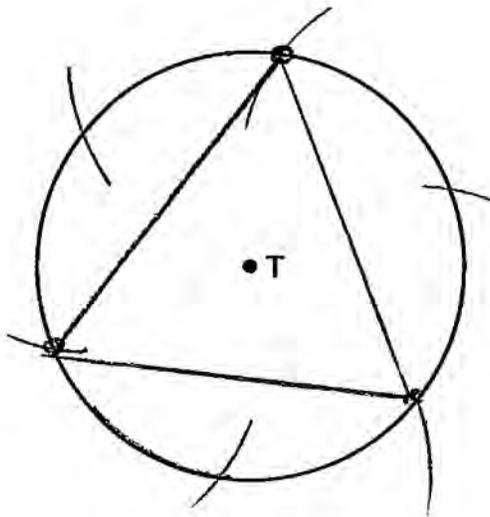
Pine

Score 0: The student's response was completely incorrect.

Question 26

26 Construct an equilateral triangle inscribed in circle T shown below.

[Leave all construction marks.]

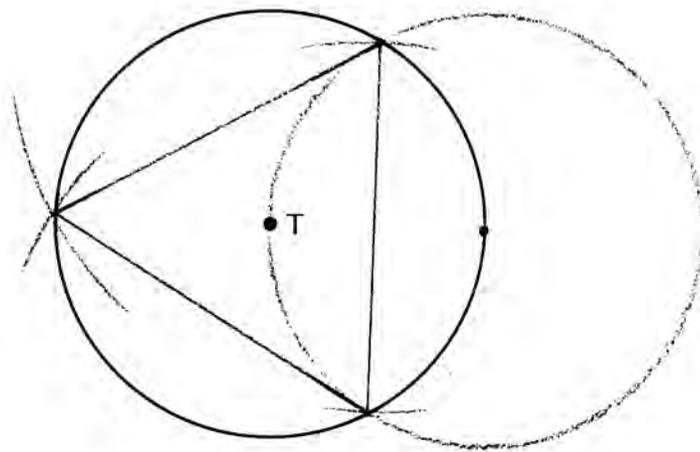


Score 2: The student drew a correct construction showing all appropriate construction marks.

Question 26

26 Construct an equilateral triangle inscribed in circle T shown below.

[Leave all construction marks.]

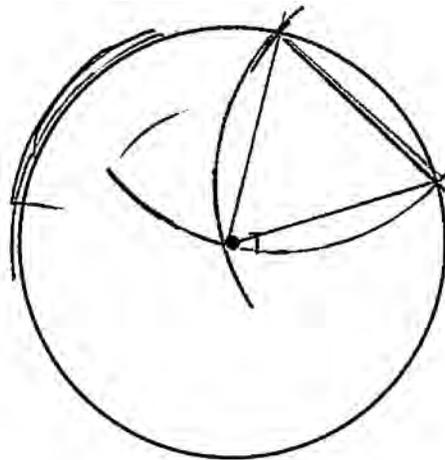


Score 2: The student drew a correct construction showing all appropriate arcs.

Question 26

26 Construct an equilateral triangle inscribed in circle T shown below.

[Leave all construction marks.]

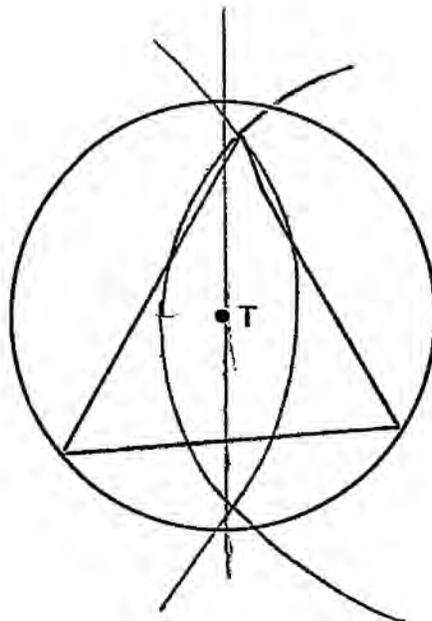


Score 1: The student constructed an equilateral triangle, but did not have it inscribed in circle T .

Question 26

26 Construct an equilateral triangle inscribed in circle T shown below.

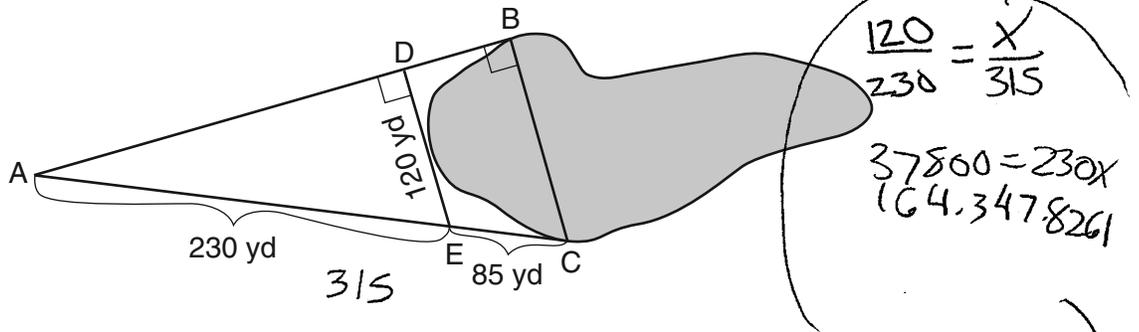
[Leave all construction marks.]



Score 0: The student made an incorrect construction.

Question 27

27 To find the distance across a pond from point B to point C , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



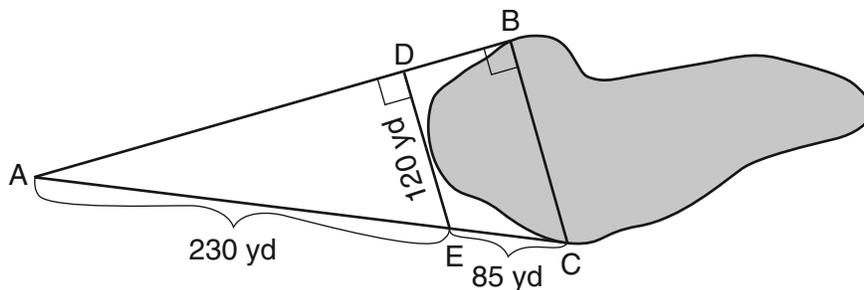
Use the surveyor's information to determine and state the distance from point B to point C , to the nearest yard.

B to $C \sim 164$ yards

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

Question 27

27 To find the distance across a pond from point B to point C , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



Use the surveyor's information to determine and state the distance from point B to point C , to the nearest yard.

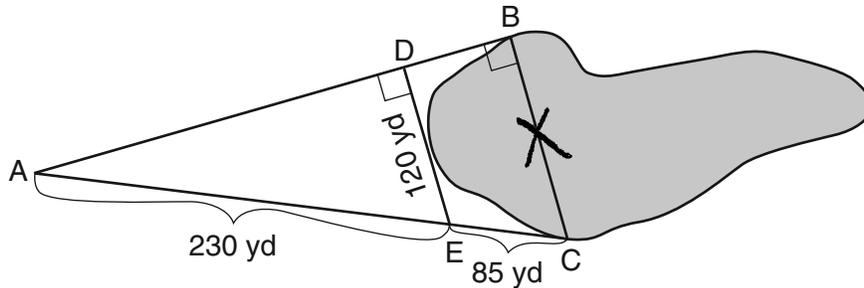
$$120/46 \quad AC/AE = 63/46$$

$$\begin{array}{r} \times 63 \\ \hline 164.3 \end{array} \quad BC = 164 \text{ yds}$$

Score 2: The student used a simplified ratio for $\frac{AC}{AE}$ and solved arithmetically.

Question 27

27 To find the distance across a pond from point B to point C , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



Use the surveyor's information to determine and state the distance from point B to point C , to the nearest yard.

1641 yards

$$\begin{array}{r} 230 \\ + 85 \\ \hline 315 \end{array}$$

$$\frac{230}{120} = \frac{315}{X}$$

$$\frac{377400}{230} = \frac{230X}{230}$$

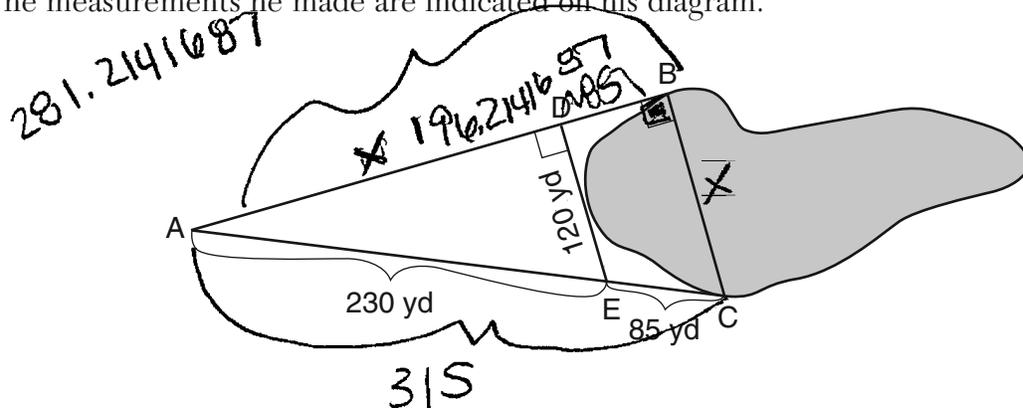
$$X \approx 1640.8$$

$$X = 1641$$

Score 1: The student made one computational error when multiplying 120 and 315.

Question 27

27 To find the distance across a pond from point B to point C , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



Use the surveyor's information to determine and state the distance from point B to point C , to the nearest yard.

$$\begin{aligned}
 120^2 + x^2 &= 230^2 \\
 -14400 + x^2 &= 52900 \\
 -14400 & \quad -14400 \\
 \hline
 \sqrt{x^2} &= \sqrt{38500} \\
 x &= 196.2141687
 \end{aligned}$$

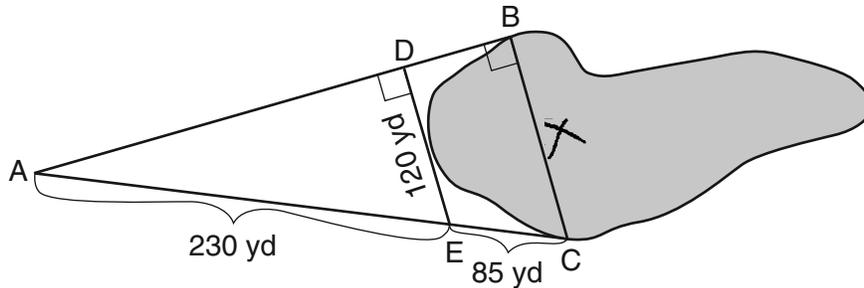
$$\begin{aligned}
 x^2 + 281.2141687^2 &= 315^2 \\
 x^2 + 79081.40868 &= 99225 \\
 x^2 &= 20143.59132 \\
 x &= \boxed{141.9281203}
 \end{aligned}$$

$$\boxed{BC = 142 \text{ yds.}}$$

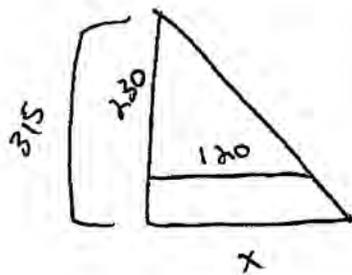
Score 1: The student made an error by assuming $BD = EC$, but found an appropriate length for \overline{BC} .

Question 27

27 To find the distance across a pond from point B to point C , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



Use the surveyor's information to determine and state the distance from point B to point C , to the nearest yard.



$$\frac{315}{230} = \frac{120}{x}$$

$$230 \cdot 120 = 315x$$

$$\frac{27600}{315} = \frac{315x}{315}$$

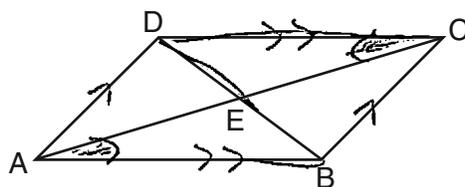
$$87.6 \approx$$

88 yards

Score 1: The student set up the proportion incorrectly, but found an appropriate length for \overline{BC} .

Question 28

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



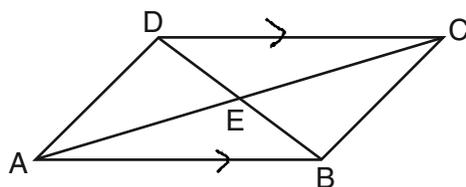
Prove: $\angle ACD \cong \angle CAB$

statements	reasons
1) $ABCD$ is a parallelogram, diag. \overline{AC} and \overline{BD} intersect @ E	1) Given
2) $\overline{DC} \parallel \overline{AB}$, $\overline{DA} \parallel \overline{CB}$	2) opp. sides of a parallelogram are \parallel .
3) $\angle ACD \cong \angle CAB$	3) If 2 \parallel lines are cut by a transversal, then alt. int. \angle 's are \cong .

Score 2: The student has written a complete and correct proof.

Question 28

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



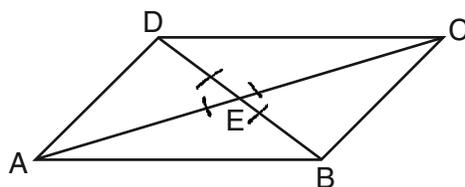
Prove: $\angle ACD \cong \angle CAB$

Statement	Reason
1) \overline{AC} and \overline{BD} intersect at E	1) Given
2) $\overline{AB} \parallel \overline{DC}$	2) Opposite sides of a parallelogram are parallel
3) $\angle ACD \cong \angle CAB$	3) Parallel lines cut by a transversal form alternate interior angles

Score 1: The student wrote one correct statement and reason.

Question 28

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



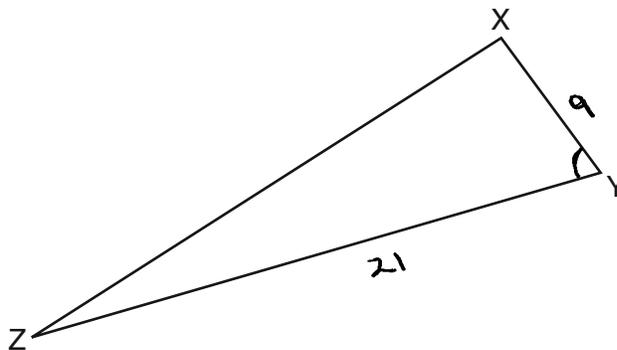
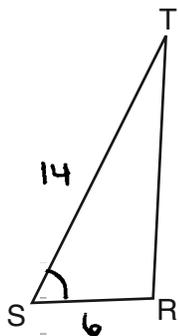
Prove: $\angle ACD \cong \angle CAB$

Statements	Reasons
① Parallelogram $ABCD$ - diagonals \overline{AC} and \overline{BD} intersect at E	① Given
② $\overline{AC} \cong \overline{BD}$	② In a parallelogram, diagonals are congruent
③ $\angle ACD \cong \angle CAB$	③ Alternate interior angles are congruent in a parallelogram

Score 0: The student only wrote the given correctly.

Question 29

29 Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.



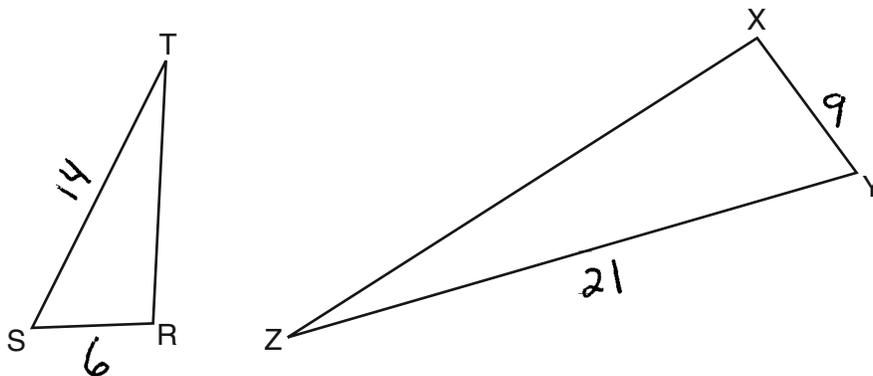
$$\frac{6}{14} = \frac{9}{21}$$
$$126 = 126$$

Yes, because of SAS similarity

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

Question 29

29 Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.



$$\frac{14}{21} = \frac{6}{9}$$

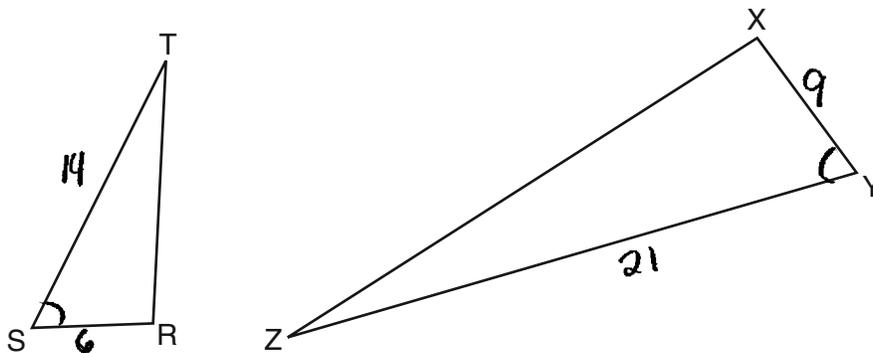
$$126 = 126$$

$\triangle RST$ is similar to $\triangle XYZ$ because the corresponding sides come equal to value in the equation $\frac{14}{21} = \frac{6}{9}$. Also, $m\angle S \cong m\angle Y$. Side $\overline{ST} \sim \overline{YZ}$ in triangles RST and XYZ , $\overline{XY} \sim \overline{RS}$ in those triangles as well.

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

Question 29

29 Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.



$$\frac{14}{6} = \frac{21}{9}$$

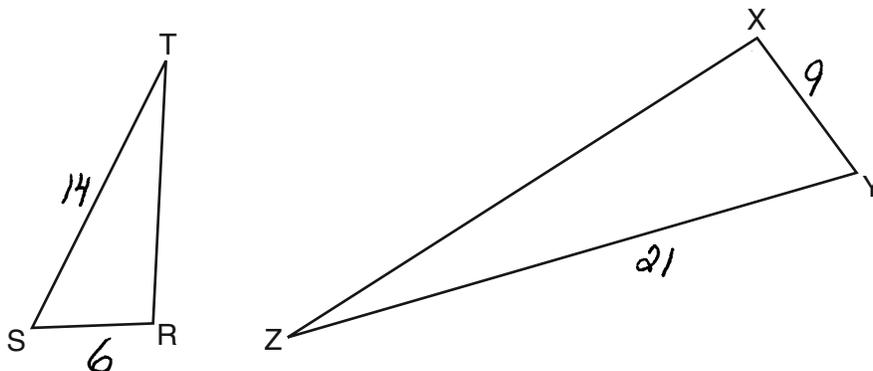
$$126 = 126 \checkmark$$

Yes

Score 1: The student gave an incomplete justification. No relationship between the proportion and the included angle was stated.

Question 29

29 Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.



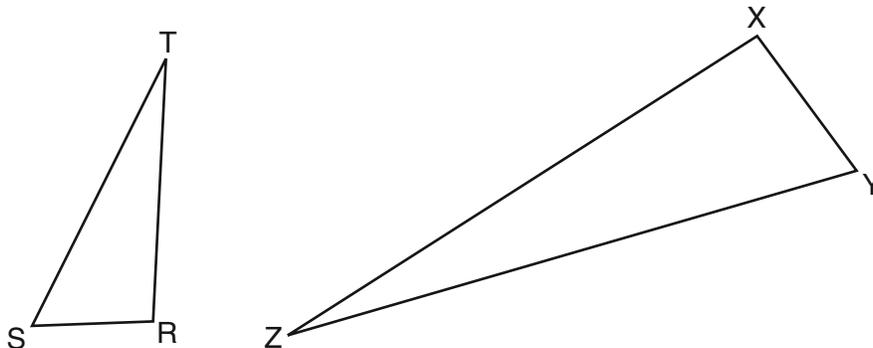
$$\begin{array}{ccc} 126 & \frac{14}{21} = \frac{6}{9} & 120 \end{array}$$

No, $\triangle RST$ is not similar to $\triangle XYZ$ because its cross-products are not equal

Score 1: The student gave an appropriate answer based on a computational error.

Question 29

29 Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.

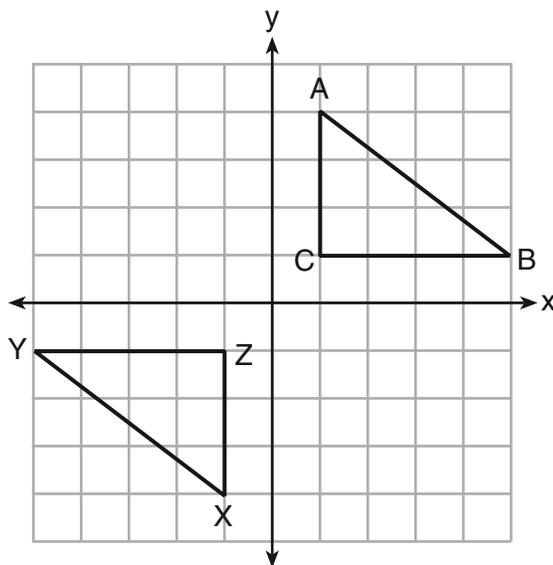


The triangle are similar because $\angle S$ and $\angle Y$ are congruent and similar Δ 's have congruent \angle 's

Score 0: The student's response was completely incorrect.

Question 30

30 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.



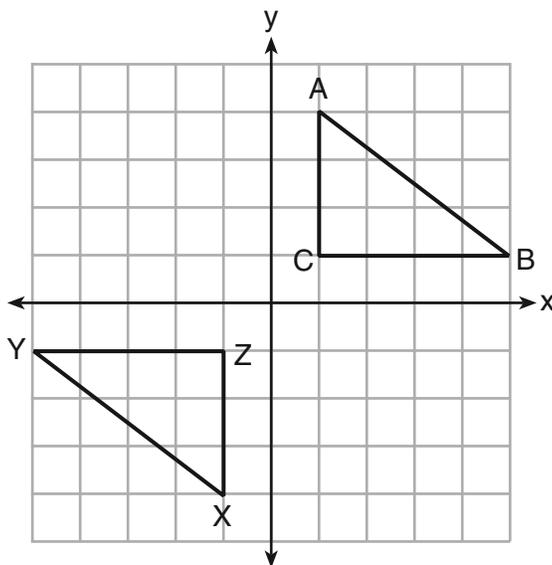
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

$\triangle XYZ$ is the image of $\triangle ABC$ after a rotation of 180° about the origin which means $\triangle ABC$ can be mapped onto $\triangle XYZ$ and distance is preserved in any rotation. Rotations are also rigid motions and then the triangles are congruent.

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

Question 30

30 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.



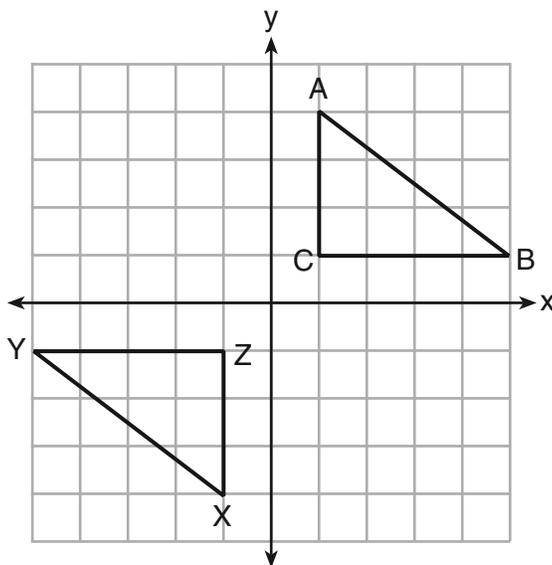
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

Because when rotating
around the origin
distance is preserved
therefore \cong ence is
preserved

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

Question 30

30 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.



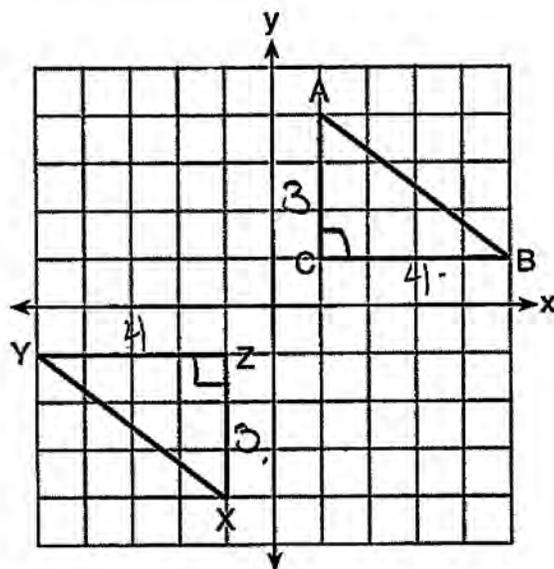
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

$\triangle ABC \cong \triangle XYZ$ because it is
a rotation and a rotation
is a rigid motion.

Score 1: The student had an appropriate explanation but did not explain using the properties of rigid motions.

Question 30

30 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.



Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

State ments	Reasons
① $AC \cong ZX$	① Both sides are 3 units
② $CB \cong YZ$	① Both sides are 4 units.
③ $\angle Z \cong \angle C$	③ right angles are congruent
④ $\triangle ABC \cong \triangle XYZ$	④ SAS congruence Postulate.

Score 0: The student did not use the properties of rigid motions to explain the congruence.

Question 31

31 The endpoints of \overline{DF} are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E , if $DE:EF = 2:3$.

\overline{DF}

$D(1, 4)$ $F(16, 14)$

① List coordinates (x goes from 1-16, y from 4-14)
 ② Chunk your x and y values into 5th

<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16</p>	<p>4 5 6 7 8 9 10 11 12 13 14</p>	<p>← (4,6) would be 1/5 ← (7,8) would be 2/5 ← (10,10) would be 3/5 ← (13,12) would be 4/5 ← (16,14) would be 5/5</p>	<p>← E has to be (7,8) because DE : EF is 2 : 3</p>
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Score 2: The student has a complete and correct response.

Question 31

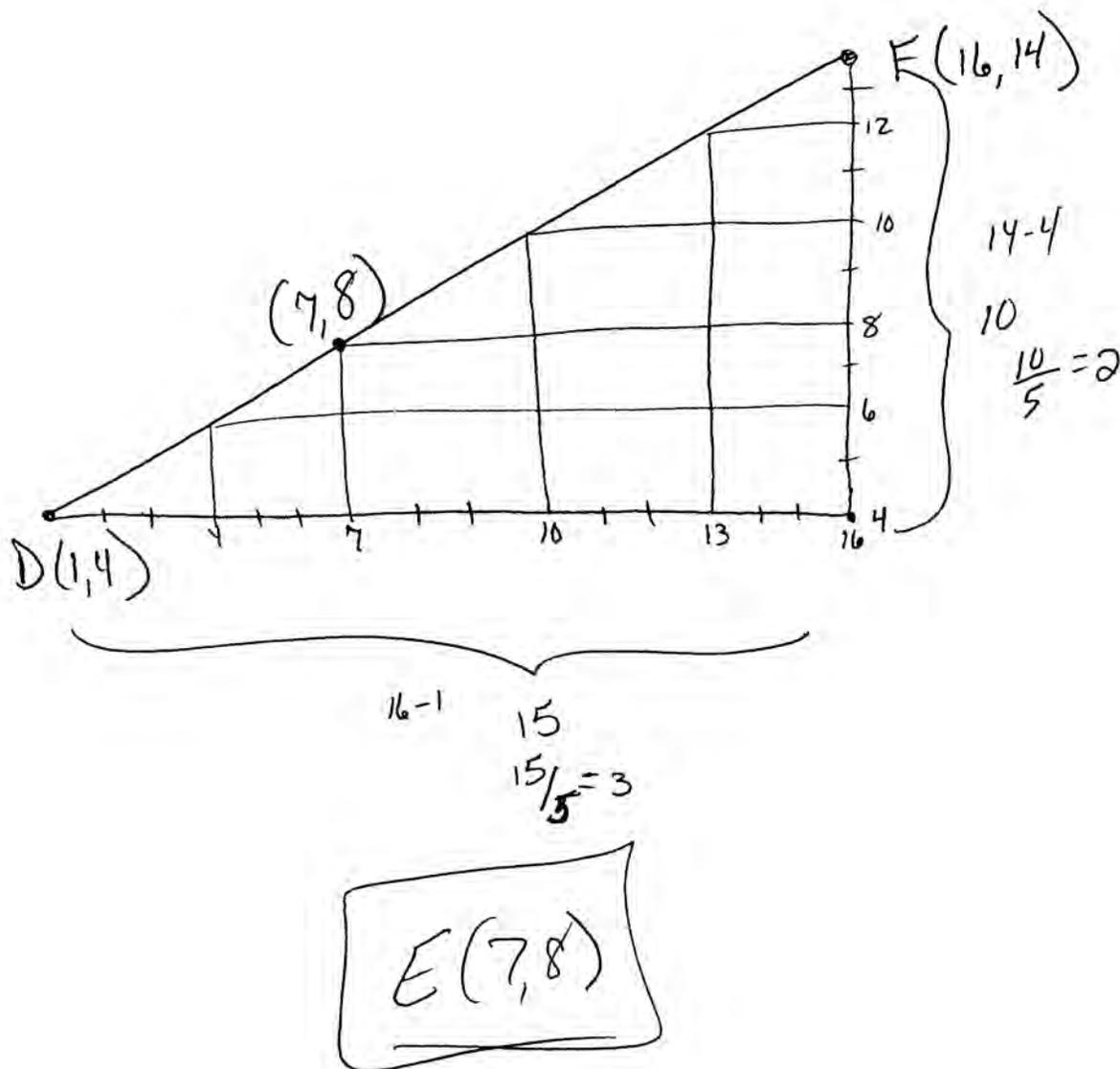
31 The endpoints of \overline{DEF} are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E , if $DE:EF = 2:3$.

$$\begin{array}{r} \frac{DE}{DF} = \frac{2}{5} \\ \frac{16-1}{5} = \frac{14-4}{5} \\ \frac{2}{5} \cdot 15 = \frac{2}{5} \cdot 10 \\ \frac{30}{5} = \frac{20}{5} \\ 6 = 4 \\ 1+6 = 4+4 \\ (7, 8) \end{array}$$

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

Question 31

31 The endpoints of \overline{DF} are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E , if $DE:EF = 2:3$.



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

Question 31

31 The endpoints of \overline{DEF} are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E , if $DE:EF = 2:3$.

$$k = \frac{3}{5}$$

$$P = \left(1 + \frac{3}{5}(15), 4 + \frac{3}{5}(10)\right)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{14 - 4}{16 - 1} = \frac{10}{15}$$

$$P = (1 + 9, 4 + 6)$$

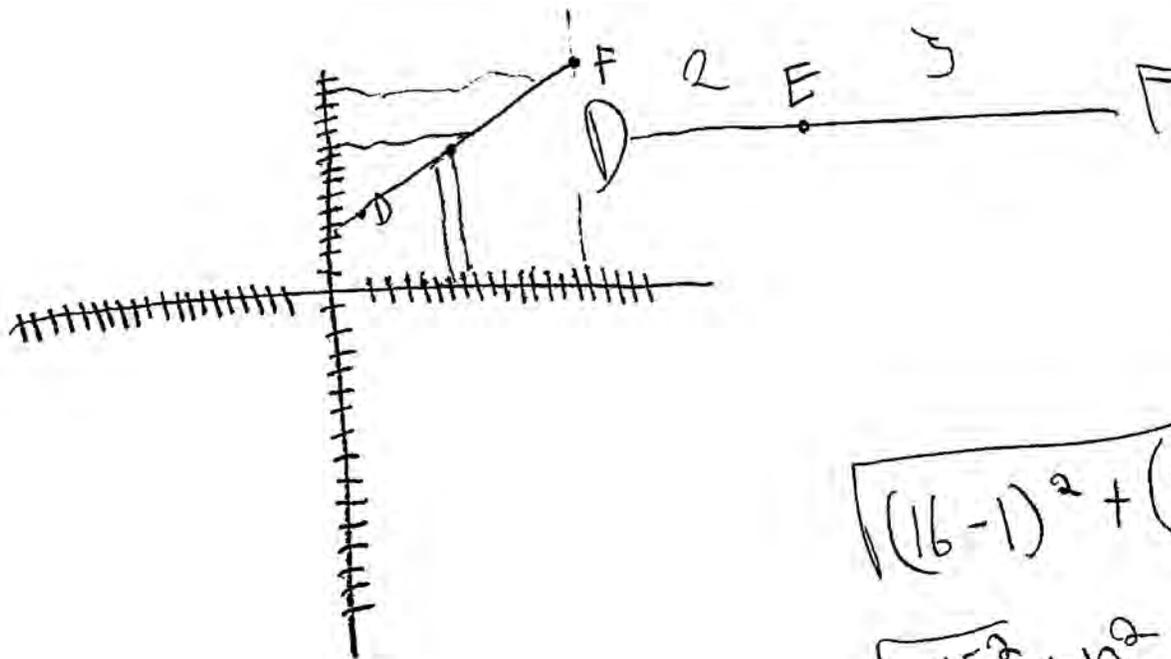
$$P = (10, 10)$$

$$E(10, 10)$$

Score 1: The student made an error in using $\frac{3}{5}$ instead of $\frac{2}{5}$. The answer is appropriate for the mistake made.

Question 31

31 The endpoints of \overline{DF} are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E , if $DE:EF = 2:3$.



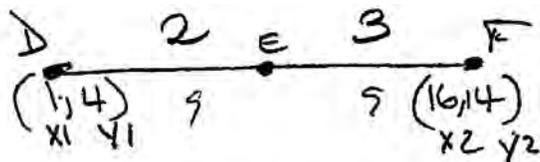
$$\begin{aligned} &\sqrt{(16-1)^2 + (14-4)^2} \\ &\sqrt{15^2 + 10^2} \\ &\sqrt{225 + 100} \\ &\sqrt{325} \end{aligned}$$

$$E = (7, 6)$$

Score 0: The student expressed an incorrect response without appropriate justification.

Question 31

31 The endpoints of \overline{DF} are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E , if $DE:EF = 2:3$.



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

$$(16 - 1)^2 + (14 - 4)^2$$

$$(15)^2 + (10)^2$$

$$225 + 100$$

$$\sqrt{325}$$

$$18.0$$

$$\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$$

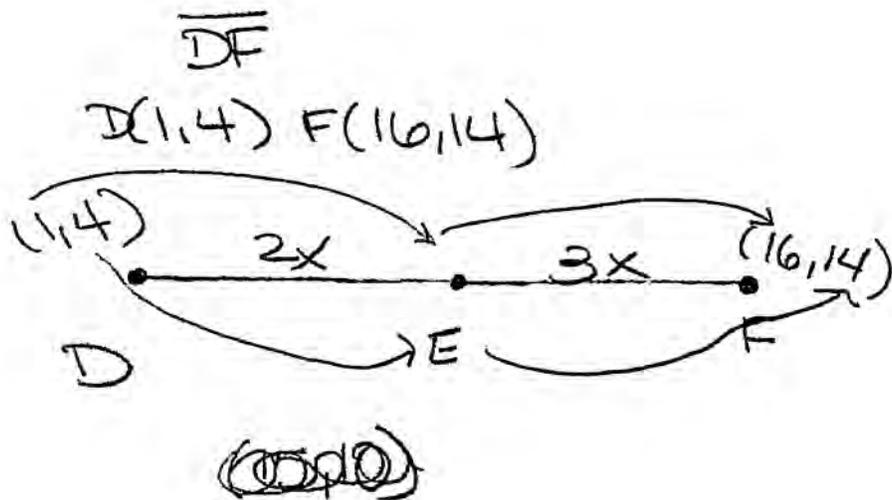
$$\frac{1 + 16}{2}, \frac{4 + 14}{2} \mid \frac{17}{2}, \frac{18}{2} \mid 8.5, 9$$

point $E = (8.5, 9)$

Score 0: The student's use of the midpoint formula was irrelevant to the question.

Question 31

31 The endpoints of \overline{DF} are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E , if $DE:EF = 2:3$

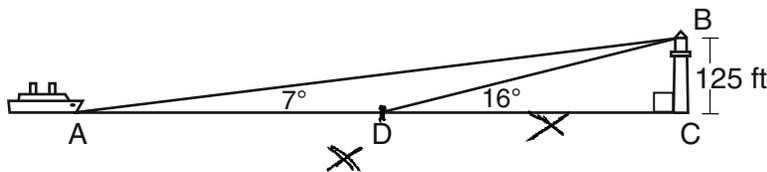


2x	3x
15, 10	15, 10
7, 5, 5	2.5,

Score 0: The student gave an incomplete and incoherent response.

Question 32

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7° . A short time later, at point D, the angle of elevation was 16° .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

$$1) \quad \tan 7^\circ = \frac{125}{X}$$

$$X \tan 7^\circ = 125$$

$$\frac{X \tan 7^\circ}{\tan 7^\circ} = \frac{125}{\tan 7^\circ}$$

$$X = 1018.043303$$

$$2) \quad \tan 16^\circ = \frac{125}{X}$$

$$X \tan 16^\circ = 125$$

$$\frac{X \tan 16^\circ}{\tan 16^\circ} = \frac{125}{\tan 16^\circ}$$

$$X = 435.9268055$$

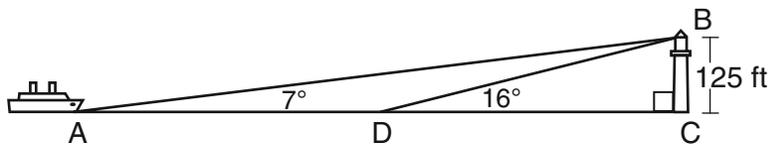
$$3) \quad \begin{array}{r} 1018.043303 \\ - 435.9268055 \\ \hline \end{array}$$

Distance $A \rightarrow D = 582 \text{ ft}$

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

Question 32

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7° . A short time later, at point D, the angle of elevation was 16° .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

$$\tan 7^\circ = \frac{125}{x}$$

$$x = 1018$$

$$\tan 16^\circ = \frac{125}{x}$$

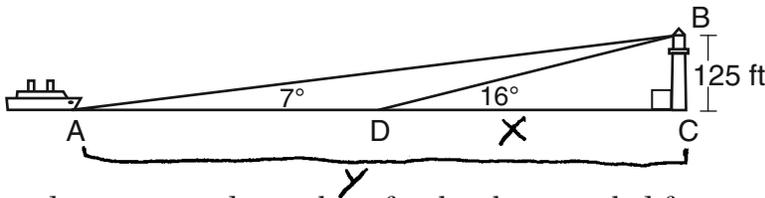
$$x = 435.9$$

$$AD = 582 \text{ ft.}$$

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

Question 32

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7° . A short time later, at point D, the angle of elevation was 16° .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

$$\tan 74 = \frac{x}{125}$$

$$x = 435.9268055$$

$$\tan 83 = \frac{y}{125}$$

$$y = 1018.043303$$

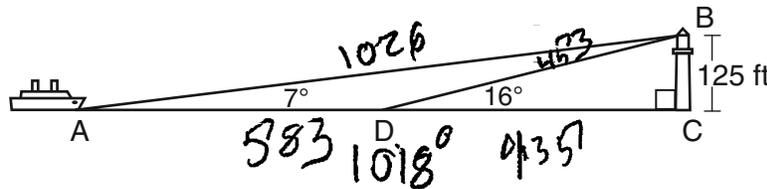
$$y - x = 582.116498$$

$$y - x = 582$$

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

Question 32

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7° . A short time later, at point D, the angle of elevation was 16° .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

$$\sin(7) = \frac{125}{h}$$

$$h = 1026$$

$$125^2 + b^2 = 1026^2$$

$$125^2 + b^2 = 433^2$$

$$1018 - 433 = 583$$

$$\overline{AD} = 583$$

$$\frac{\sin(16)}{1} = \frac{125}{x}$$

$$\frac{125}{\sin(16)} = \frac{\sin(16) \times x}{\sin(16)}$$

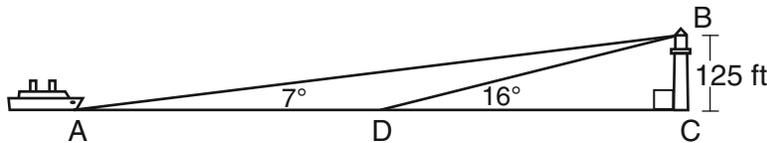
$$433 = x$$

$$1026 - 433 = 593$$

Score 3: The student inappropriately rounded the values early when finding the hypotenuses. The student then correctly used the Pythagorean Theorem to get an appropriate answer.

Question 32

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7° . A short time later, at point D, the angle of elevation was 16° .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

$$\sin 7 = \frac{125}{AC}$$

$$AC = \frac{125}{\sin 7}$$

$$AC = \frac{125}{0.12187} \\ 1025.689$$

$$\sin 16 = \frac{125}{DC}$$

$$DC = \frac{125}{\sin 16}$$

$$DC = 453.494$$

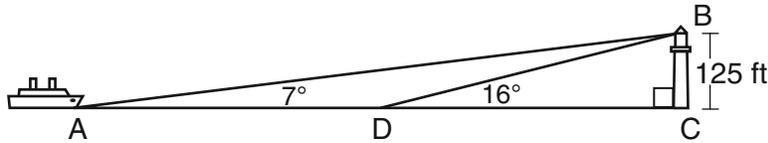
$$1025.689 - 453.494$$

$$AD = 572.195 \approx 572$$

Score 2: The student made one conceptual error using the wrong trigonometric function, but found an appropriate distance from point A to point D.

Question 32

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7° . A short time later, at point D, the angle of elevation was 16° .



To the nearest foot, determine and state how far the ship traveled from point A to point D.

$$\frac{\tan 16}{1} = \frac{125}{x}$$

$$\tan 16 x = 125$$

$$\tan x = 16(125)$$

$$\tan x = 2780$$

$$\frac{\tan 7}{1} = \frac{125}{x}$$

$$\tan 7 x = 125$$

$$\tan x = 7(125)$$

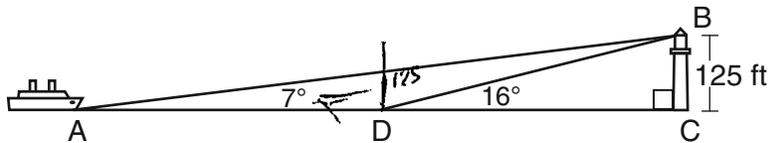
$$\tan x = 8060$$

$$x = 5284 \text{ ft}$$

Score 1: The student had both trigonometric functions written correctly, but showed no further correct work.

Question 32

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A , the angle of elevation from the ship to the light was 7° . A short time later, at point D , the angle of elevation was 16° .



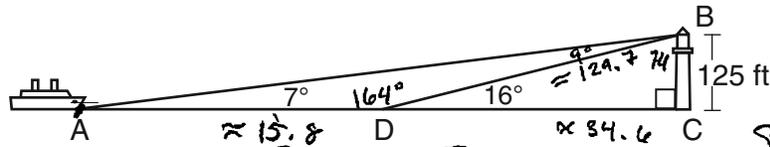
To the *nearest foot*, determine and state how far the ship traveled from point A to point D .

$$\begin{aligned} \tan 7 &= \frac{125}{x} \\ \frac{\tan 7}{\tan 7} (x) &= \frac{125}{\tan 7} \\ x &= 143 \text{ feet} \end{aligned}$$

Score 1: The student had a correct trigonometric function for finding AC , but used radians.

Question 32

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7° . A short time later, at point D, the angle of elevation was 16° .



$$\frac{\sin 16}{1} = \frac{x}{125}$$

To the nearest foot, determine and state how far the ship traveled from point A to point D.

$$16 - 7 = 9^\circ$$

$$\overline{AC} = 50.25644059$$

$$x = (\sin 16) 125$$

$$x = 34.45466948$$

$$\frac{\sin 7}{1} = \frac{x}{129.6615758}$$

$$x = (\sin 7) \times 129.6615758$$

$$x = 15.80177111$$

$$\frac{125^2 + 34.45466948^2}{\sqrt{16812.12425}} = \sqrt{c^2}$$

$$c = 129.6615758$$

$$\overline{AD} \approx 15.8 \text{ ft} \\ = 15.80177111 \text{ ft}$$

$$\overline{BD} \approx 129.7 \text{ ft}$$

$$\overline{CD} \approx 34.6 \text{ ft}$$

Score 0: The student gave a completely incorrect response.

Question 33

33 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$.

Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle.

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

$$\text{Distance } \overline{BC} = \sqrt{(-4+1)^2 + (-1+3)^2} = \sqrt{(-3)^2 + (2)^2} = \sqrt{9+4} = \sqrt{13}$$

$$\text{Distance } \overline{AB} = \sqrt{(-3-x)^2 + (-1-3)^2}$$

$$\text{Distance } \overline{AC} = \sqrt{(-1-x)^2 + (-4-3)^2} = \sqrt{(-1-x)^2 + (-7)^2} = \sqrt{(-1-x)^2 + 49}$$

$$\sqrt{13}^2 + \sqrt{(-3-x)^2 + 16}^2 = \sqrt{(-1-x)^2 + 49}^2$$

$$\sqrt{1169 + (-3-x)^2 + 16} = (-1-x)^2 + 49$$

$$13 - 1x^2 + 6x + 9 + 16 = x^2 + 2x + 50$$

$$-x^2 - 6x$$

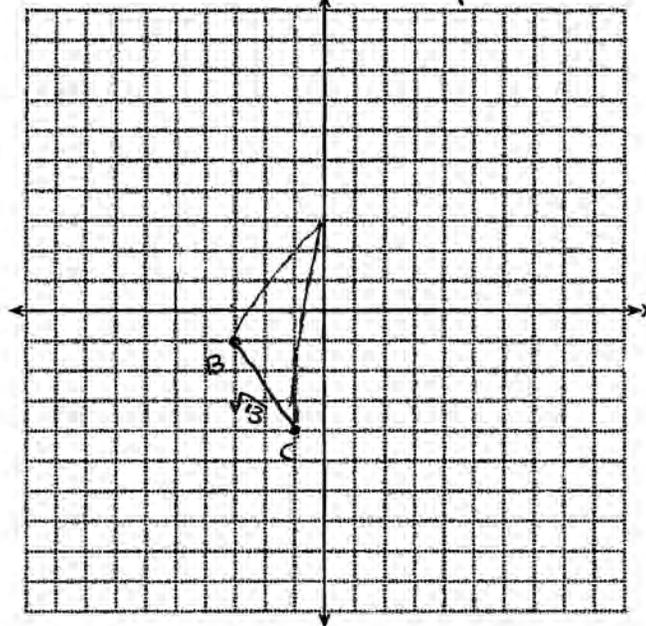
$$38 = -4x + 50$$

$$-12 = -4x$$

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

$$3 = x$$

$(-3-x)(-3-x)$
 $9 - 3x + 3x + x^2$
 $9 + 6x + x^2$
 $(-1-x)(-1-x)$
 $1 + x + x + x^2$
 $1 + 2x + x^2$



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

Question 33

33 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$.

Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle.

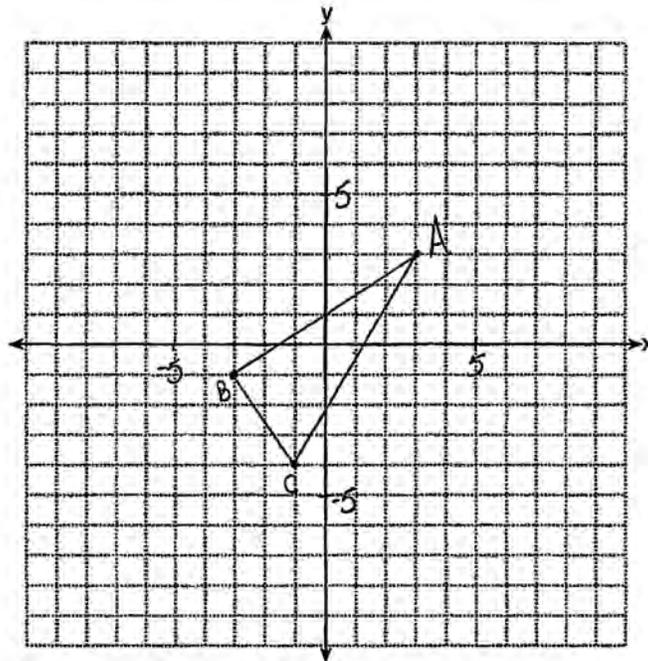
[The use of the set of axes below is optional.]

$$\text{slope of } BC = \frac{\Delta y}{\Delta x}$$

$$BC = \frac{-3}{2}$$

$$y = \frac{2}{3}x + b$$

$$x = 3$$



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

Question 33

33 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$.

Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle.

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

$$C(-1,-4) \quad (5,0)$$

$$m = \frac{2}{3}$$

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

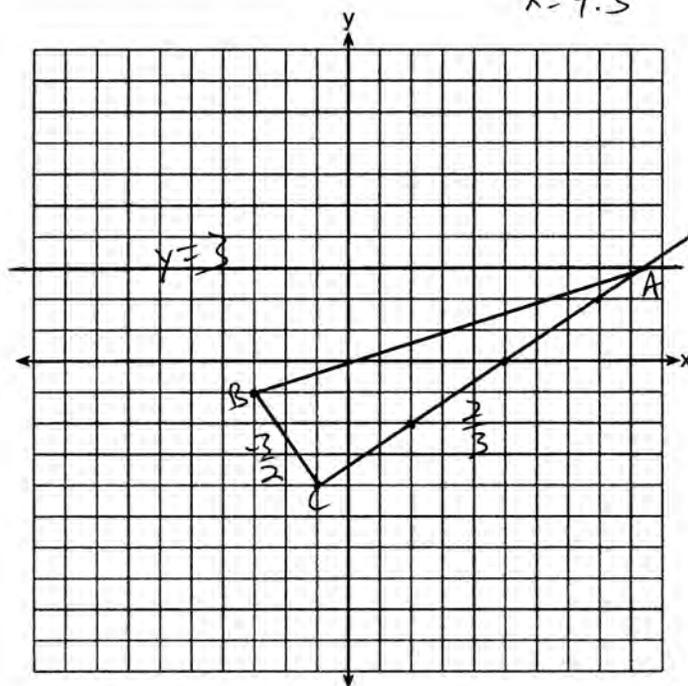
$$3+4 = \frac{2}{3}(x+1)$$

$$3(7 = \frac{2}{3}(x+1))$$

$$21 = 2x + 2$$

$$19 = 2x$$

$$x = 9.5$$



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

Question 33

33 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$.

Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle.

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

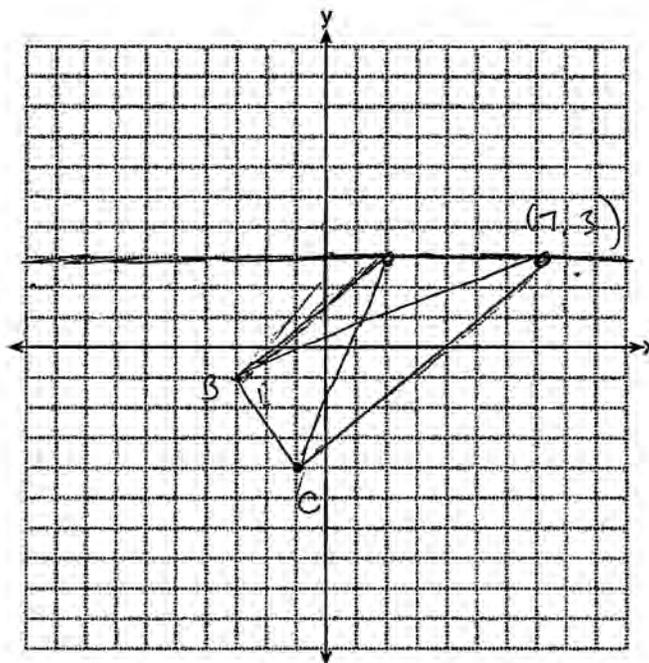
Slopes $\frac{\Delta y}{\Delta x} = 7$ \uparrow

slope of $\overline{BC} = \frac{-1-(-4)}{-3-(-1)} = \frac{3}{-2}$

slope of $\overline{BA} = \frac{-3-3}{-3-x} = \frac{-6}{-6} = 1$

$x=2$ because \overline{BC} and \overline{BA}

would have slopes that were negative reciprocals of each other, making them perpendicular, and perpendicular lines form right \angle 's making it a right \triangle



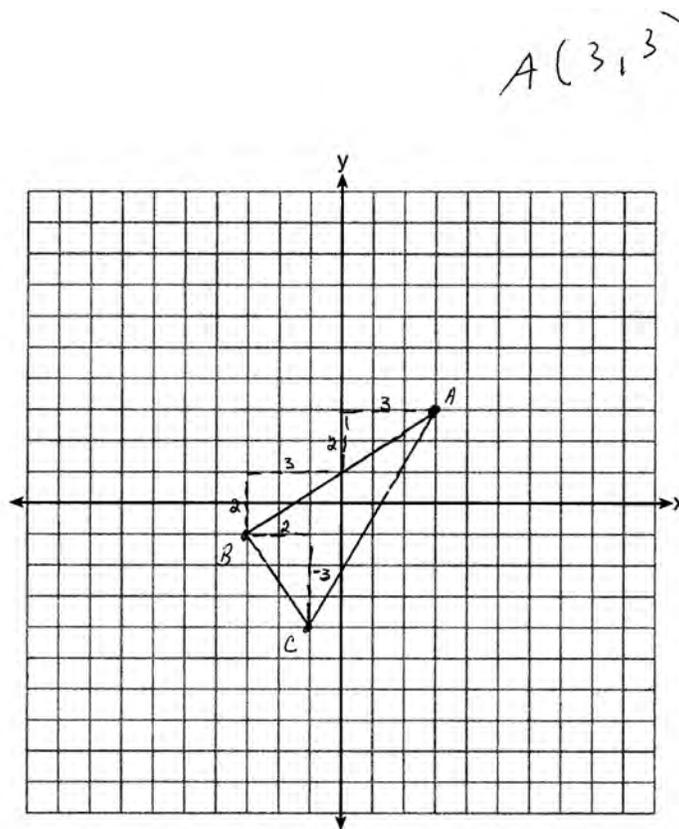
Score 3: The student made one graphing error when counting the slope of \overline{BA} .

Question 33

33 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$.

Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle.

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



Score 2: The student gave a correct response for the value of x . The work for slope was shown graphically but the justification for a right triangle was incomplete.

Question 33

33 Triangle ABC has vertices with $A(3,3)$, $B(-3,-1)$, and $C(-1,-4)$.

Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle.

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

d

3,3

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

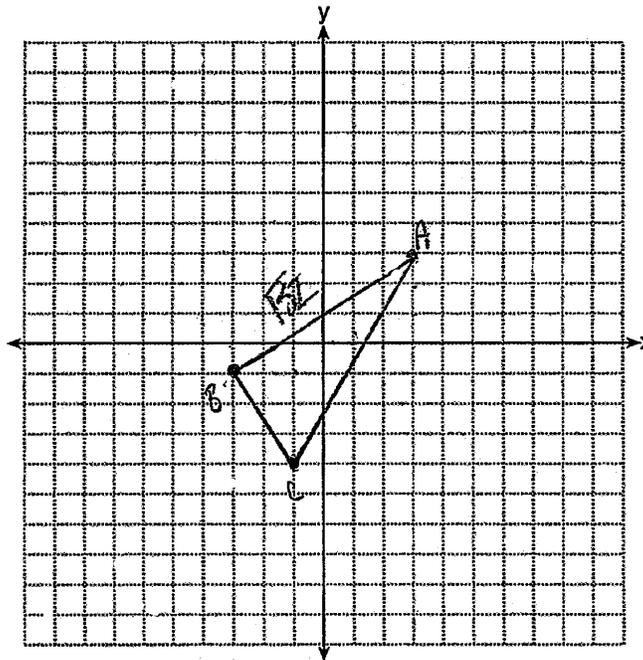
$$d_{BA} = \sqrt{(-3) - (3))^2 + (-1) - (3))^2}$$

$$d_{BA} = \sqrt{(-6)^2 + (-4)^2}$$

$$d_{BA} = \sqrt{36 + 16}$$

$$d_{BA} = \sqrt{52}$$

$x=3$



Score 1: The student gave a correct response with insufficient justification for a right triangle.

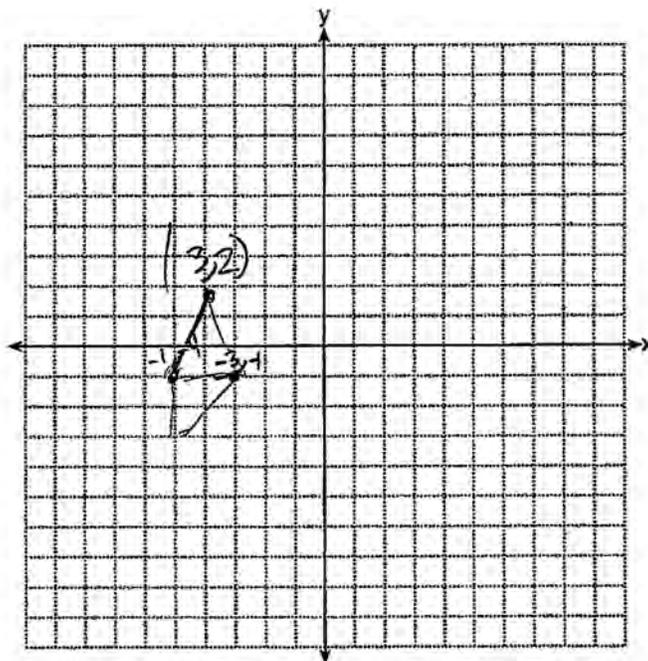
Question 33

33 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$.

Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle.

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

^{reason}
The x to this is because the x would have to
lie in the II due to $(x, \frac{4}{3})$



Score 0: The student gave a completely incorrect response.

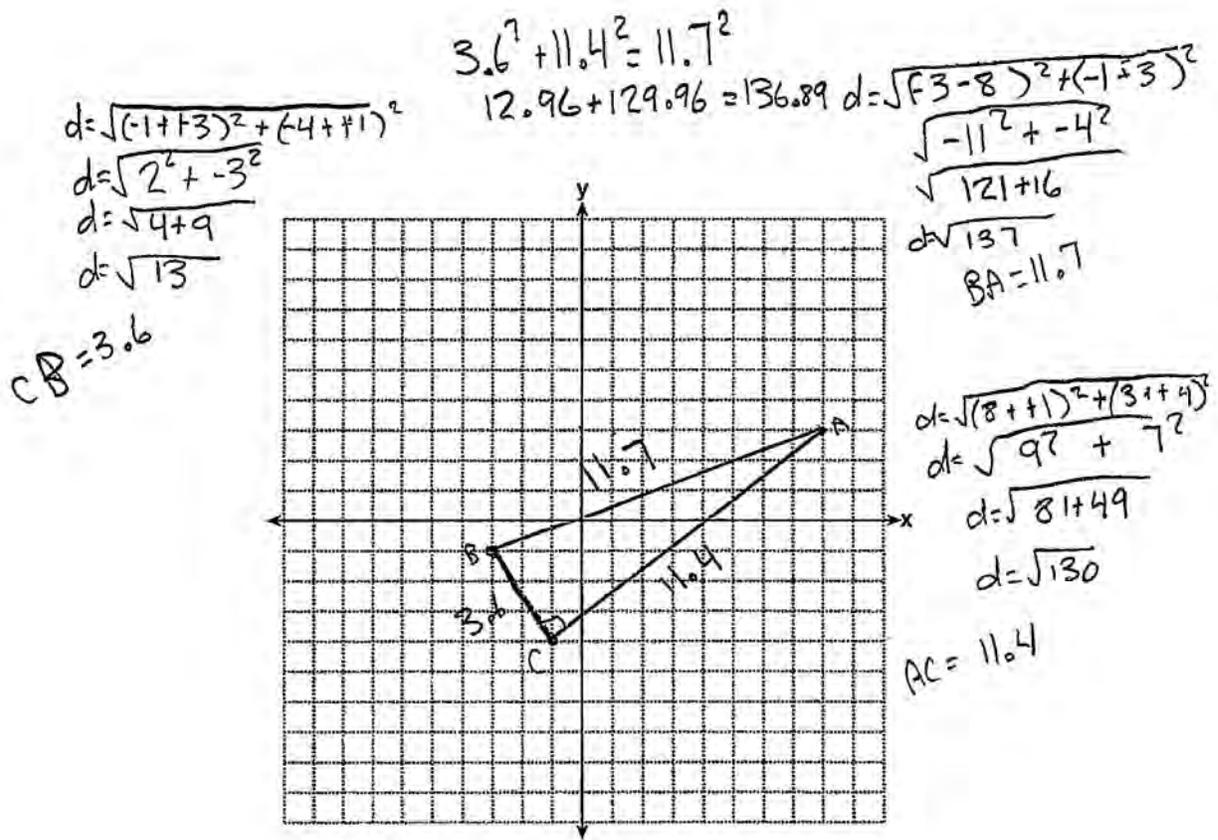
Question 33

33 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$.

Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle.

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

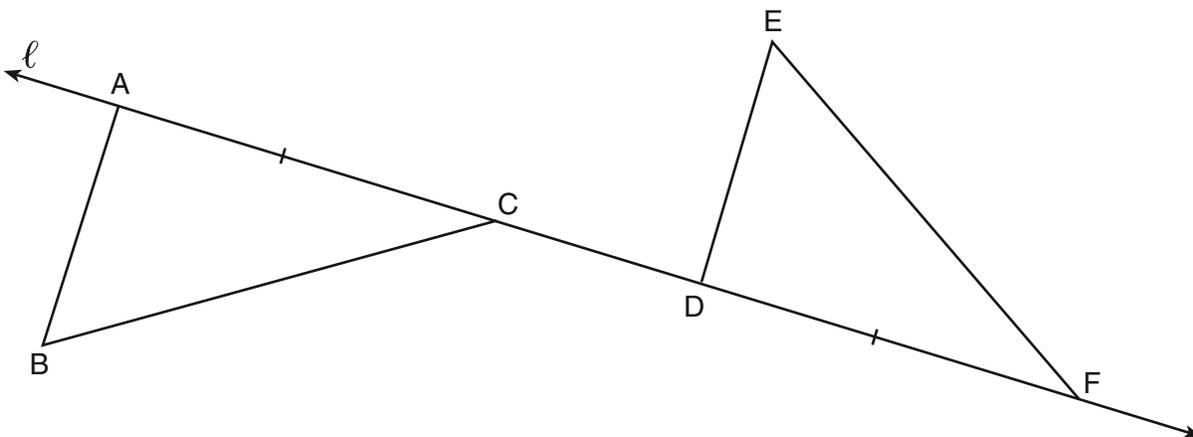
The value of x is 8. I used the graph to find 8. But with using pathagran therom I could check if I am right which I am the side CB is 3.6, BA is 11.7, AC is 11.4. I used the distance formula to find the distances.



Score 0: The student gave an incorrect value of x followed by an incorrect explanation that the point makes the triangle a right triangle using Pythagorean Theorem.

Question 34

34 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A, C, D, and F are collinear on line ℓ .



Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ , such that point D is mapped onto point A. Determine and state the location of F' . Explain your answer.

Point F' would be at point C after translation because $\overline{AC} \cong \overline{DF}$ and if D' meets A then F' will touch C.

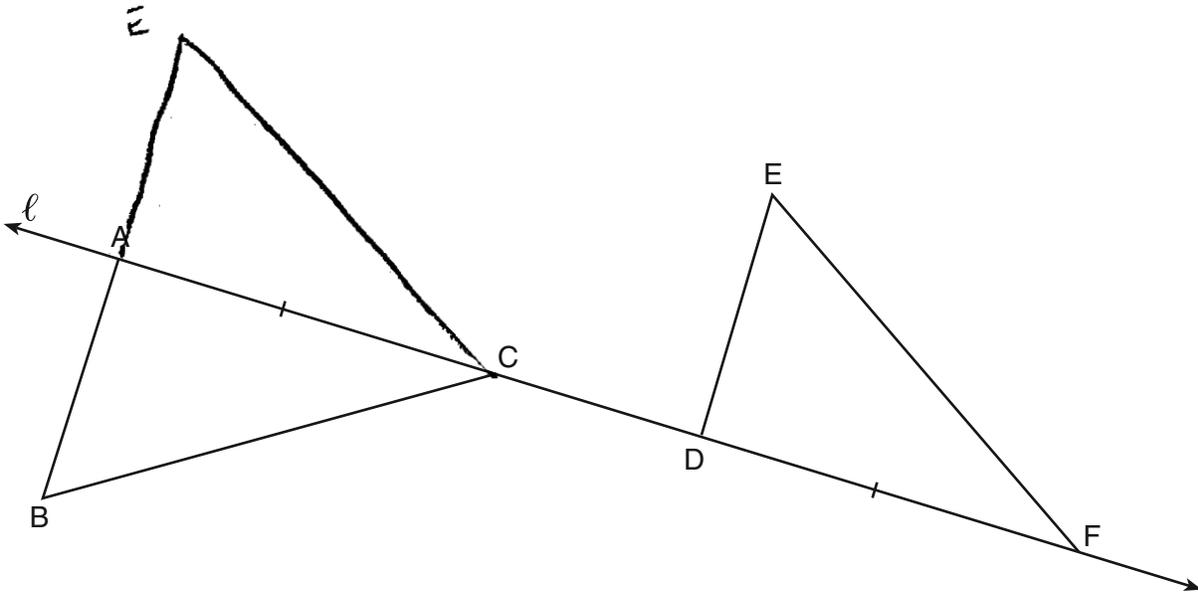
Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ . Suppose that E'' is located at B. Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

$\triangle DEF$ is congruent to $\triangle ABC$ because from the previous answer, $\overline{DF} \cong \overline{AC}$ so if point E'' lays on point B the triangles are congruent. This is proven by $\overline{SSS} \cong \overline{SSS}$

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

Question 34

34 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points $A, C, D,$ and F are collinear on line ℓ .



Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ , such that point D is mapped onto point A . Determine and state the location of F' . Explain your answer.

Point F would be located on point C , because lines \overline{AC} and \overline{DF} are congruent, and therefore, if points A and D were the same point, and the sides were both collinear, C and F would be located on the same point.

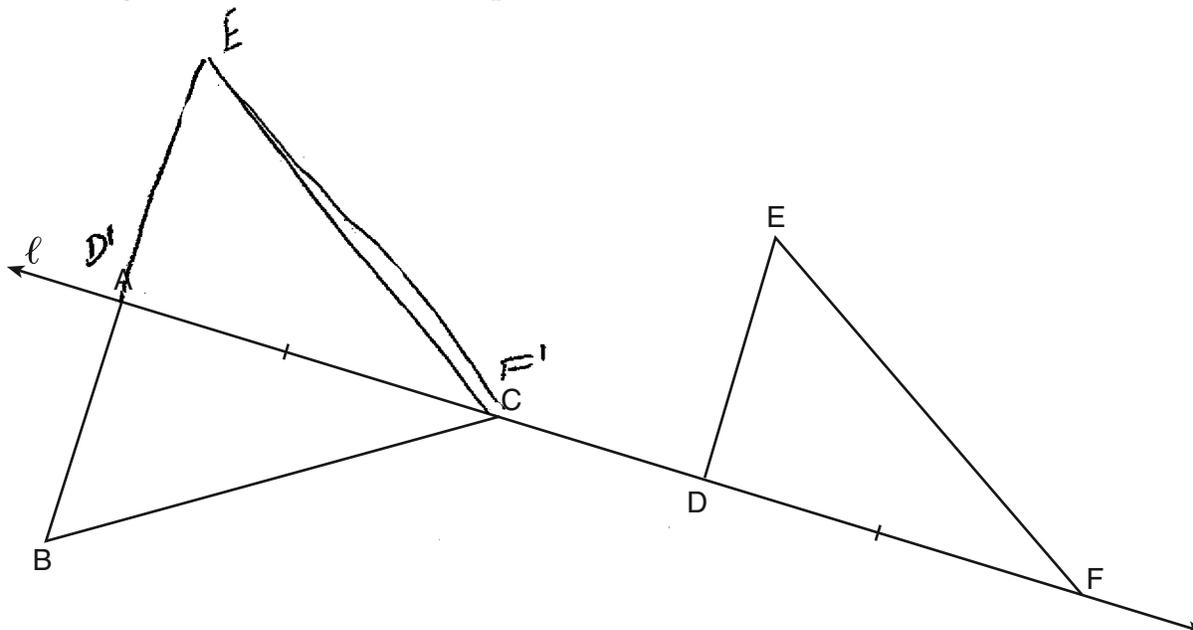
Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ . Suppose that E'' is located at B . Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

Yes $\triangle DEF$ is congruent to $\triangle ABC$, because all of the points of $\triangle D''E''F''$ are located at the same points as $\triangle BAC$, making them congruent. $\triangle D''E''F''$ is also congruent to $\triangle DEF$ because, during the translation, it never underwent dilation. Therefore, through the transitive property, $\triangle DEF \cong \triangle ABC$.

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

Question 34

34 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A, C, D, and F are collinear on line ℓ .



Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ , such that point D is mapped onto point A . Determine and state the location of F' . Explain your answer.

F' would be located at point C because if point D is on point A, the triangle has to contain the same length which makes F' fall on point C

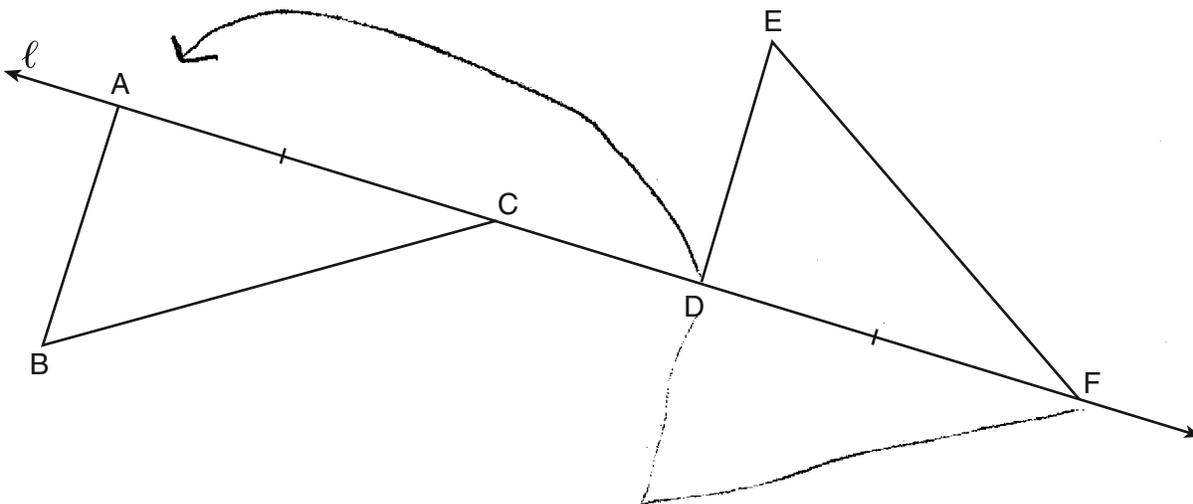
Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ . Suppose that E'' is located at B . Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

Yes they are still congruent triangles with the same length for each side.

Score 3: The student gave an incomplete explanation for the second part of the question.

Question 34

34 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points $A, C, D,$ and F are collinear on line ℓ .



Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ , such that point D is mapped onto point A . Determine and state the location of F' . Explain your answer.

$F \rightarrow F'$ would be at location C because $\overline{AC} \cong \overline{DF}$ they have congruent distances apart.

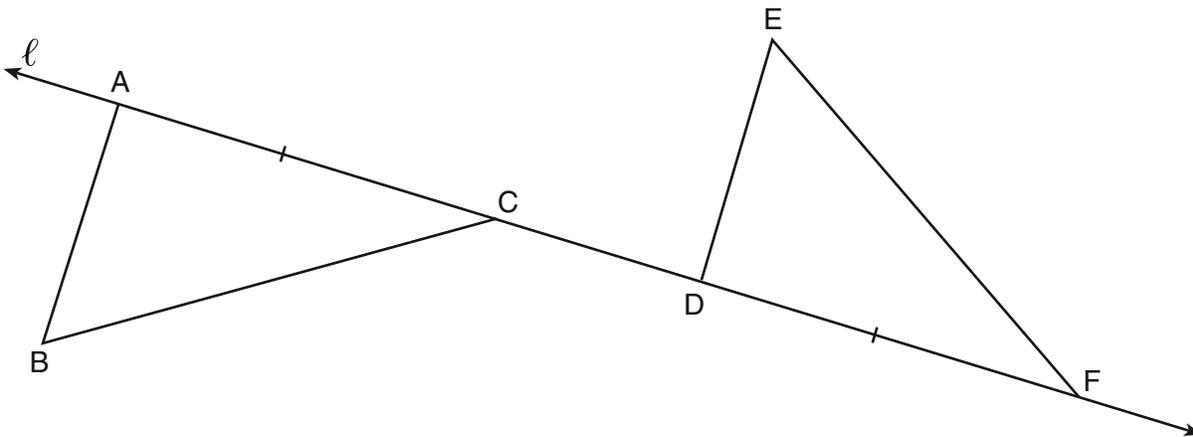
Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ . Suppose that E'' is located at B . Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

Yes because $\overline{AC} \cong \overline{DF}$ and points are collinear on line ℓ . Also a reflection preserves the size of image to be the same.

Score 3: The student gave an incomplete explanation for the first part of the question.

Question 34

34 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A, C, D, and F are collinear on line ℓ .



Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ , such that point D is mapped onto point A. Determine and state the location of F' . Explain your answer.

Point F would then be on point C because point D and F are on the same line and if D is on A, then F must be on C and E on B.

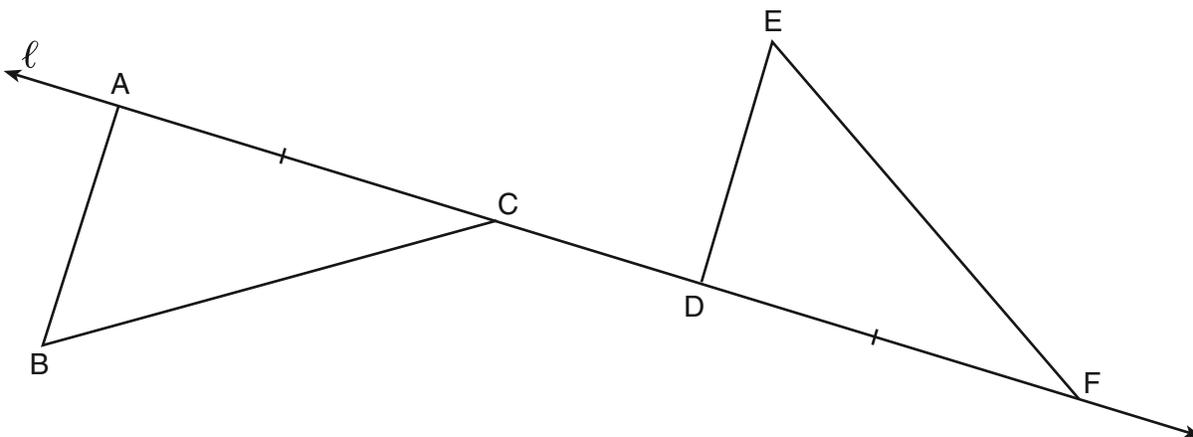
Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ . Suppose that E'' is located at B. Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

$\triangle DEF \cong \triangle ABC$ because all the angles and sides match up and are perfectly fit together. In order to have 2 congruent triangles you need equalsides.

Score 2: The student correctly answered Point C and Yes, but both explanations were incomplete.

Question 34

34 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A , C , D , and F are collinear on line ℓ .



Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ , such that point D is mapped onto point A . Determine and state the location of F' . Explain your answer.

The location of F' will be on point C because after the translation the orientation of the triangle must stay the same.

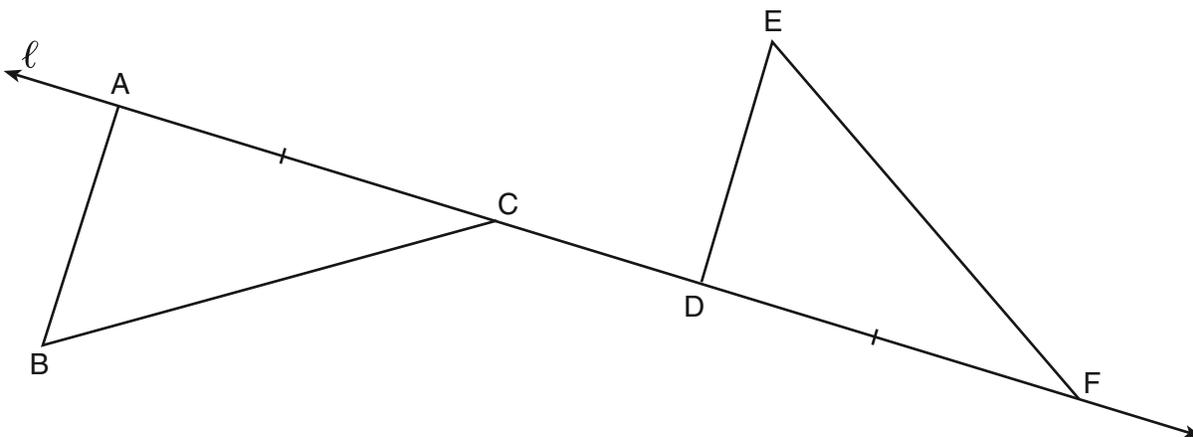
Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ . Suppose that E'' is located at B . Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

$\triangle DEF$ is congruent to $\triangle ABC$ because they both share line ℓ and have a congruent side.

Score 1: The student correctly answered Point C , but showed no further correct work.

Question 34

34 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A , C , D , and F are collinear on line ℓ .



Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ , such that point D is mapped onto point A . Determine and state the location of F' . Explain your answer.

F would be on ℓ after
you slide it over.

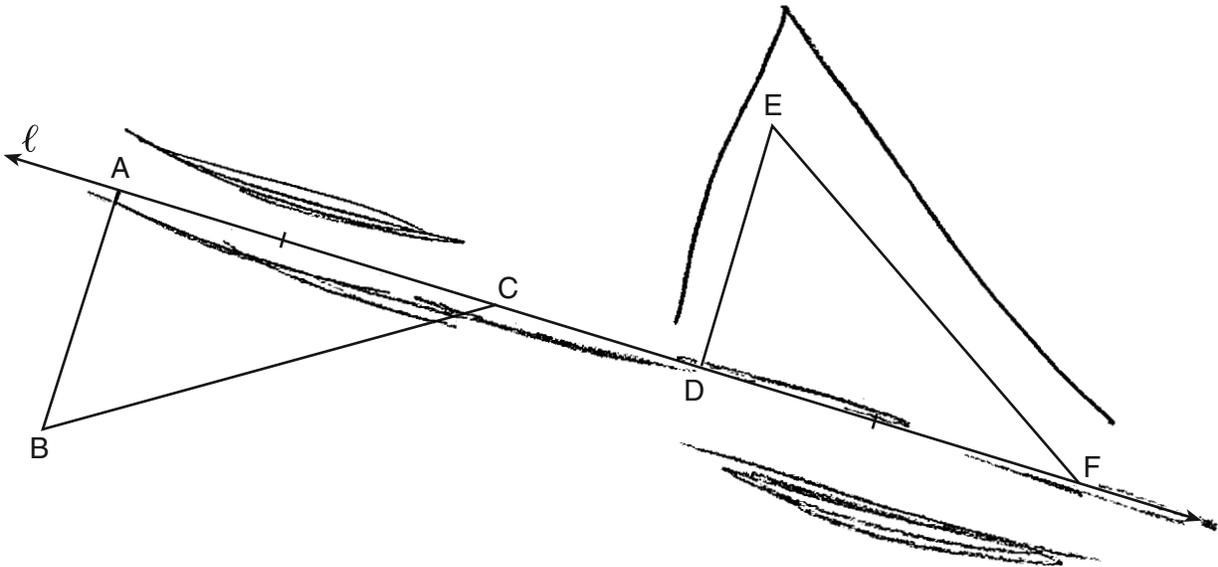
Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ . Suppose that E'' is located at B . Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

Yes because their's Isometry.

Score 1: The student correctly answered Point C , but showed no further correct work.

Question 34

34 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points $A, C, D,$ and F are collinear on line ℓ .



Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ , such that point D is mapped onto point A . Determine and state the location of F' . Explain your answer.

F' would be C' because D and F are close to each other and A and C are close to each other. They are the same distance.

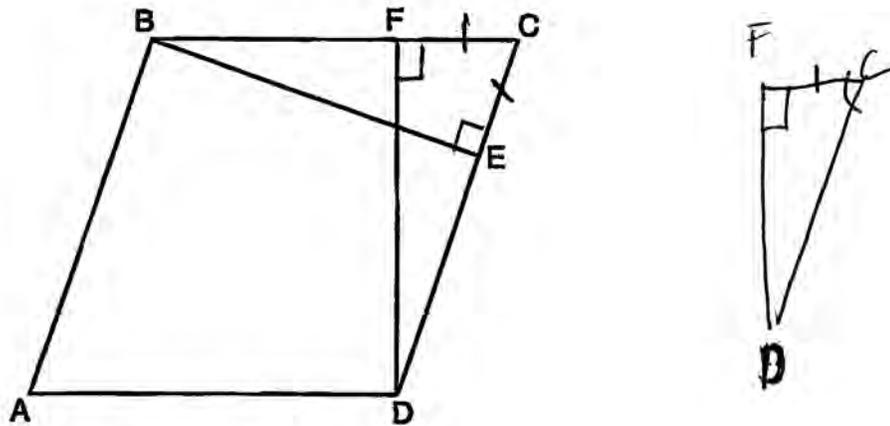
Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ . Suppose that E'' is located at B . Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

yes because its on the same side and B and E are the same.

Score 0: The student's response was completely incorrect.

Question 35

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CD}$, $\overline{DF} \perp \overline{BC}$, and $\overline{CE} \cong \overline{CF}$.



Prove $ABCD$ is a rhombus.

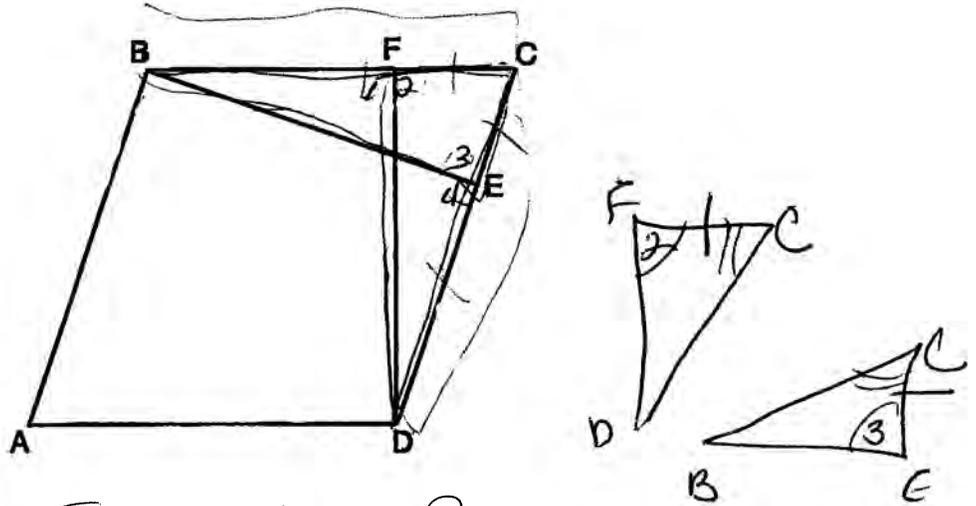
Given $\overline{BE} \perp \overline{CD}$ & $\overline{DF} \perp \overline{BC}$, the \perp segments form right angles $\angle BEC$ & $\angle DFC$, which are congruent. $\angle BCD = \angle BCE$ by reflexive property. Given $\overline{CE} = \overline{CF}$, this makes $\triangle BEC \cong \triangle DFC$ by ASA.

The corresponding segments \overline{BE} & \overline{DF} are congruent by CPCTC. Given that $ABCD$ is a parallelogram & 2 consecutive sides are \cong $ABCD$ must be a rhombus.

Score 6: The student has a complete and correct proof.

Question 35

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, and $\overline{CE} \cong \overline{CF}$.



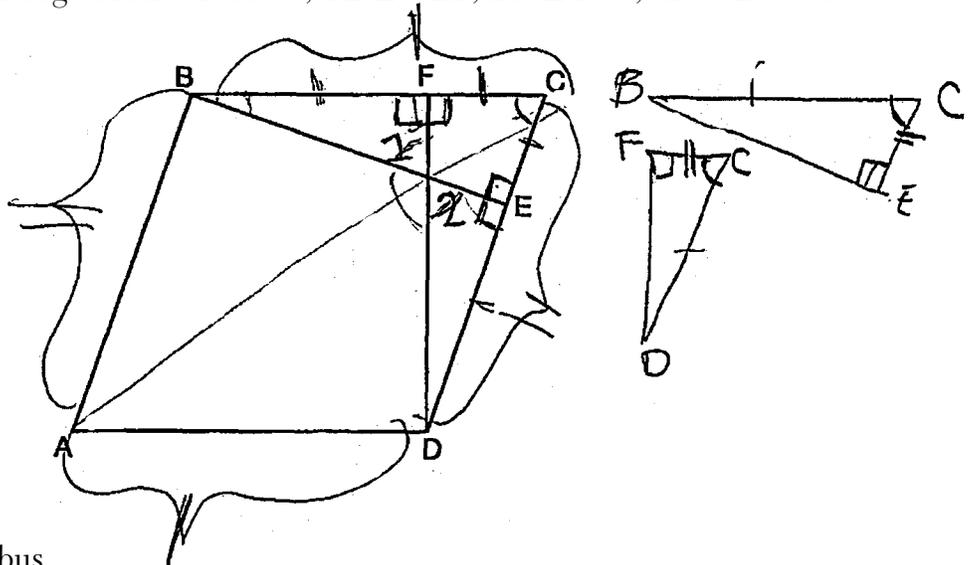
Prove $ABCD$ is a rhombus.

- | | |
|---|---|
| <p style="text-align: center; font-size: 2em; margin: 0;">S</p> <ol style="list-style-type: none"> ① $ABCD$ is a \square, $\overline{BE} \perp \overline{CD}$,
$\overline{DF} \perp \overline{BC}$, $\overline{CE} \cong \overline{CF}$ ② $\angle 1, \angle 2, \angle 3, \angle 4$ are
right angles ③ $\angle 2 \cong \angle 3$ ④ $\angle C \cong \angle C$ ⑤ $\triangle DFC \cong \triangle BEC$ ⑥ $\overline{DC} \cong \overline{BC}$ ⑦ $ABCD$ is a
rhombus | <p style="text-align: center; font-size: 2em; margin: 0;">R</p> <ol style="list-style-type: none"> ① given ② \perp lines intersect to (i)
form right angles ③ if 2 angles are right, then
they are \cong (2) ④ reflexive ⑤ ASA \cong ASA (1, 3, 4) ⑥ if 2 \triangle's are \cong corresp
parts are \cong (5) ⑦ a rhombus is a \square
w/ 2 consec. sides \cong
(1, 7) |
|---|---|

Score 6: The student has a complete and correct proof.

Question 35

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, and $\overline{CE} \cong \overline{CF}$.



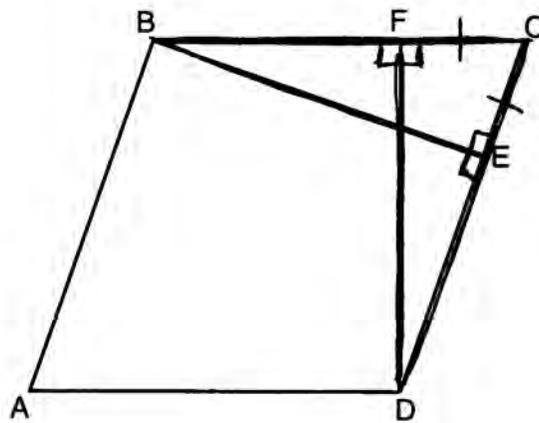
Prove $ABCD$ is a rhombus.

Statements	Reasons
① $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$	① given
② $\angle DFC \cong \angle BFD \cong \angle FEC$, $\angle B \cong \angle D$	② perpendicular lines form congruent right angles
③ $\angle 1 \cong \angle 2$	③ vertical angles are congruent
④ $\angle C = \angle C$	④ reflexive property
⑤ $\triangle BCE \cong \triangle DCF$	⑤ ASA
⑥ $\overline{BC} \cong \overline{CD}$	⑥ CPCTC
⑦ $ABCD$ is a rhombus	⑦ in a parallelogram, if two consecutive sides are congruent, said parallelogram is a rhombus

Score 5: The student had an incomplete given.

Question 35

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CD}$, $\overline{DF} \perp \overline{BC}$, and $\overline{CE} \cong \overline{CF}$.



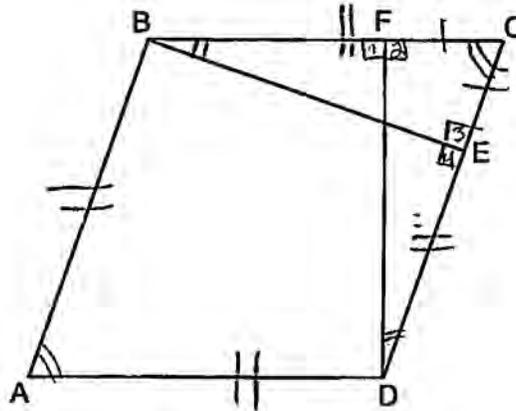
Prove $ABCD$ is a rhombus.

- | | |
|--|--|
| <p>① $\overline{BE} \perp \overline{CD}$, $\overline{DF} \perp \overline{BC}$
 $\overline{CE} \cong \overline{CF}$, $\square ABCD$</p> <p>② $\angle BEC$ is a right angle
 and $\angle DFC$ is a right angle</p> <p>③ $\angle BEC \cong \angle DFC$</p> <p>④ $\overline{BC} \cong \overline{BC}$</p> <p>⑤ $\triangle BCE \cong \triangle DCF$</p> <p>⑥ $\overline{BC} \cong \overline{DC}$</p> <p>⑦ $\square ABCD$ is a rhombus</p> | <p>① Given</p> <p>② Definition of perpendicular</p> <p>③ All right angles are congruent</p> <p>④ Reflexive</p> <p>⑤ ASA \cong ASA</p> <p>⑥ sides are congruent</p> <p>⑦ Two consecutive sides are congruent</p> |
|--|--|

Score 5: The student gave one incorrect reason.

Question 35

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, and $\overline{CE} \cong \overline{CF}$.



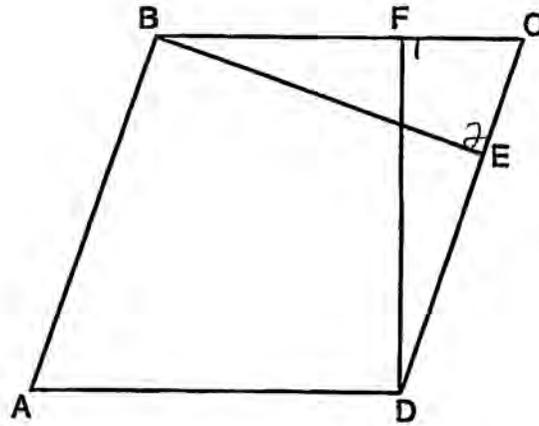
Prove $ABCD$ is a rhombus.

S	R
① $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$	① Given
Parallelogram $ABCD$	
② $\angle 1, \angle 2, \angle 3, \angle 4$ are rt. \angle s	② \perp lines form rt. \angle s
③ $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$	③ All rt. \angle s are \cong
④ $\angle C \cong \angle C$	④ Reflexive
⑤ $\triangle BEC \cong \triangle DFC$	⑤ ASA
⑥ $\overline{CD} \cong \overline{BA}$	⑥ In a parallelogram, opposite sides are \cong
⑦ $\angle B \cong \angle D$	⑦ CPCTC
⑧ $\angle A \cong \angle C$	⑧ In a parallelogram, opposite \angle s are \cong
⑨ $ABCD$ is a rhombus	⑨ All sides are \cong ,

Score 4: The student proved congruent triangles, but showed no further correct work to prove $ABCD$ is a rhombus.

Question 35

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, and $\overline{CE} \cong \overline{CF}$.



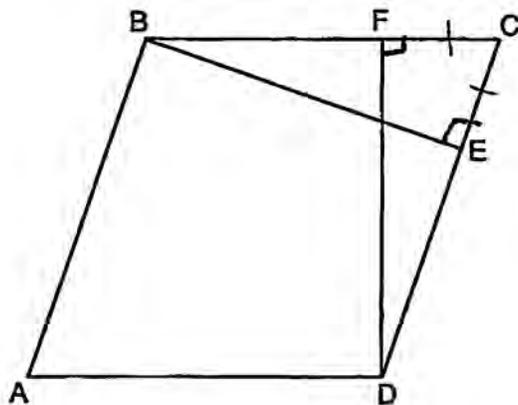
Prove $ABCD$ is a rhombus.

S	R
1) $\square ABCD$, $\overline{BE} \perp \overline{CED}$ $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$	1) given
2) $\angle 1, \angle 2$ are rt $\angle s$	2) \perp lines intersect to form rt $\angle s$
3) $\angle 1 \cong \angle 2$	3) if 2 $\angle s$ are rt, then they are \cong
4) $\angle C \cong \angle C$	4) Reflexive property

Score 3: The student proved $\angle BEC \cong \angle DFC$ and $\angle C \cong \angle C$, but showed no further work.

Question 35

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, and $\overline{CE} \cong \overline{CF}$.



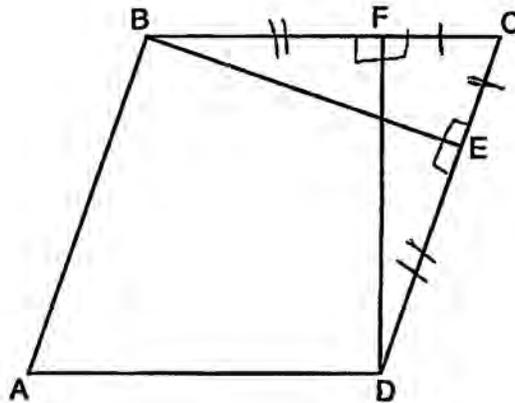
Prove $ABCD$ is a rhombus.

<p>① $\overline{BE} \perp \overline{CED}, \overline{DF} \perp \overline{BFC}$, and $\overline{CE} \cong \overline{CF}$</p> <p>② $\angle DFC$ and $\angle BEC$ are right angles</p> <p>③ $\triangle DFC \cong \triangle BEC$</p>	<p>① Given</p> <p>② perpendicular lines create rt \angle's</p> <p>③ rt \angle's are \cong</p>
--	--

Score 2: The student proved $\angle BEC \cong \angle DFC$, but showed no further work.

Question 35

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, and $\overline{CE} \cong \overline{CF}$.



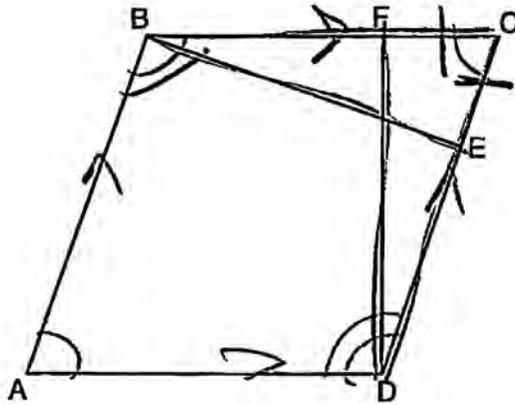
Prove $ABCD$ is a rhombus.

Statement	Reason
① $\overline{BE} \perp \overline{CED}$ $\overline{DF} \perp \overline{BFC}$ $\overline{CE} \cong \overline{CF}$	① Given
② $\angle BED \neq \angle BEC$ $\angle BFD \neq \angle DFC$ are right angles	② perpendicular lines form right angles
③ $\angle BED \cong \angle BEC$ $\angle BFD \cong \angle DFC$	③ right angles are congruent
④ $BC - FC \cong CD - CE$	④ subtraction postulate
⑤ $BF \cong DE$	⑤ substitute postulate
⑥ $ABCD$ is a rhombus	⑥ all sides are congruent

Score 1: The student used perpendicularity to prove right angles, but did not prove $\angle BEC \cong \angle DFC$.

Question 35

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, and $\overline{CE} \cong \overline{CF}$.



$\overline{BE} \perp \overline{CED}, \overline{DF} \perp \overline{BFC} \overline{CE} \cong \overline{CF}$ / Given

Prove $ABCD$ is a rhombus.

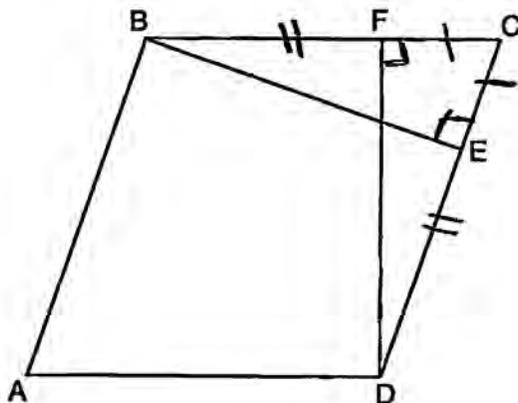
1. $\overline{CD} \parallel \overline{BA}, \overline{BC} \parallel \overline{AD}$
2. $\angle A + \angle D = 180^\circ$
 $\angle B + \angle C = 180^\circ$
3. $\angle B \cong \angle D$
 $\angle A \cong \angle C$
4. $\overline{AD} \cong \overline{BC}$
5. $ABCD$ is a rhombus

1. opposite sides \parallel .
2. properties of suppl.
3. opposite angles congruent.
4. supplementary lines parallel.
5. ASA

Score 0: The student repeated the given but wrote no relevant statements.

Question 35

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CD}$, $\overline{DF} \perp \overline{BC}$, and $\overline{CE} \cong \overline{CF}$.



Prove $ABCD$ is a rhombus.

S	R
<ol style="list-style-type: none"> 1. $\overline{CE} \cong \overline{CF}$ 2. $\overline{CE} + \overline{ED} \cong \overline{CD}$ 3. $\overline{CF} + \overline{BF} = \overline{CB}$ 4. $\overline{CD} \cong \overline{CB}$ 5. Parallelogram $ABCD$ 6. $\overline{CB} \cong \overline{DA}$ 7. $\overline{CD} \cong \overline{BA}$ 8. All sides are \cong 9. $ABCD$ is a rhombus 	<ol style="list-style-type: none"> 1. Given 2. Parts are equal to the total (1) 3. Partition (2) 4. Given 5. Opposite sides of a parallelogram are \cong. 6. Partition (3, 5) 7. All sides are \cong

Score 0: The student wrote no relevant statements.

Question 36

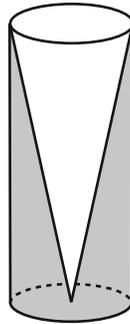
36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

$$V = \frac{1}{3}\pi(1.5)^2 \cdot 8$$

$$V_{100} = \frac{800}{3}\pi(2.25)$$

$$= 1885 \text{ in}^3$$

↑
Volume for 100 candles



Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$(1885 \text{ in}^3)(0.52) \left(\frac{0.9}{\text{in}^3}\right) (0.10) \left(\frac{\$}{0.9}\right) = \$98.02$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\text{Revenue} = \$195$$

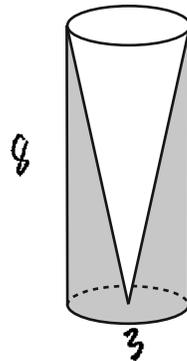
$$\text{Cost} = \cancel{\$}37.83 + \cancel{\$}98.02 = \$135.85$$

$$\text{Profit} = \$195 - \cancel{\$}135.85 = \$59.15$$

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

Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?



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

$$V = \frac{1}{3}\pi (1.5)^2 (8)$$

$$V = 6\pi = 18.84955592$$

$$\times 100$$

$$\boxed{1884.96 \text{ in}^3}$$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$0.52 \times 1884.96 = 980.179202$$

$$\times .10^{\$}$$

$$\boxed{\$98.02}$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\begin{array}{r} \$98.02 \\ + 37.83 \\ \hline \$135.85 \end{array}$$

$$\begin{array}{r} 100 \\ \times 1.95 \\ \hline 195 \end{array}$$

$$\begin{array}{r} 195 \\ - 135.85 \\ \hline \boxed{\$59.15} \end{array}$$

Score 5: The student did not give the total volume to the *nearest cubic inch*.

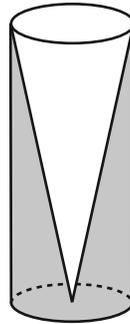
Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

$$V = \frac{1}{3} \pi r^2 h = 18.849$$

$$18.849 \times 100 = 1884.9 \text{ in}^3$$

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



$$h = 8 \text{ inches}$$

$$d = 3 \text{ inches}$$

$$V = 100 \text{ candles}$$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$1884.9 \times 0.52 \text{ oz} = 979.6807 \times \$0.10 = \boxed{\$97.96}$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\begin{array}{r} 97.96 \\ + 37.83 \\ \hline \$135.79 \text{ spent} \end{array}$$

$$1.95 \times 100 = \$195.00$$

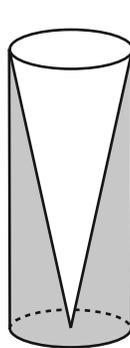
$$\begin{array}{r} 195.00 \\ - 135.79 \\ \hline \end{array}$$

$$\boxed{\$59.21} \text{ profit}$$

Score 5: The student truncated instead of rounding early when finding the volume and the cost of the wax.

Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?



$V = \pi r^2 h$
 $V = \pi \left(\frac{3}{2}\right)^2 (8) = 56.548$
 for 100 candles
 5654.87

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$(.52)(.10)(5654.87) = \$294.053$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\begin{array}{r} 195.00 \\ - 37.83 \\ \hline 157.17 \\ - 294.05 \\ \hline -136.88 \\ \text{Walter lost money} \end{array}$$

Score 4: The student made an error in finding the volume as well as a rounding error.

Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

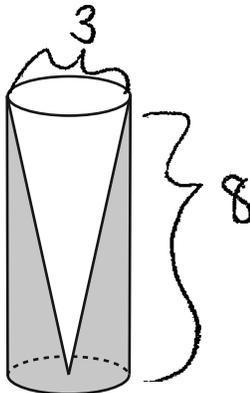
$$V = \pi r^2 h$$

$$V = \pi (1.5)^2 (8)$$

$$\pi (2.25) (8)$$

$$\pi 18$$

$$56.55$$



$$56.55 \times 100 =$$

$$5654.866776$$

$$\boxed{5654.87}$$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$\boxed{294.053}$$

$$d = \frac{W}{V}$$

$$.52 = \frac{x}{5654.87}$$

$$x = 2940.534$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\begin{array}{r} 37.83 \\ + 294.053 \\ \hline 331.883 \end{array}$$

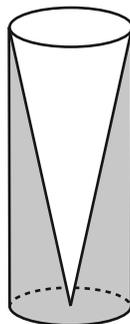
$$\begin{array}{r} 1.95 \\ \times 100 = 195 \\ \hline \text{Walter 10¢ } \$136.883 \end{array}$$

Score 3: The student made an error by finding the volume of a cylinder, and two rounding errors.

Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

$$V = 1884.96$$



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

$$V = \frac{1}{3} \pi 1.5^2 (8)$$

$$V = \frac{1}{3} \pi 2.25 (8)$$

$$V = \frac{1}{3} \pi 2.25 (8) \cdot 100$$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$A = \pi r^2$$

$$A = \pi 1.5^2$$

$$A = 7.07$$

$$\$.10$$

~~$$V = 1884.96$$~~

~~$$V = 1884.96$$~~

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\$ 157.17$$

$$1.95 \cdot 100$$

$$195$$

$$- 37.83$$

$$\$ 157.17$$

Score 2: The student made a rounding error when finding the volume, did not find the cost of the wax, and made an error in finding the profit.

Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

Handwritten work for finding the volume of a cone:

$$\frac{1}{3} \pi \cdot 1.5^2 \cdot 8$$

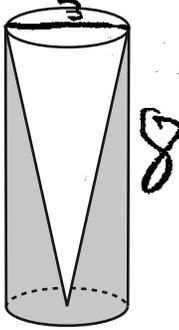
$$2.25 \cdot 8$$

$$18\pi$$

$$56.54866776$$

$$3 \overline{) 56.54866776} \times 160 =$$

8



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

1884.96 in^3

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$1884.96 \times 0.52$$

$$980.1792$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

Score 2: The student made a rounding error in finding the volume, and calculated the ounces of wax, but not the cost.

Question 36

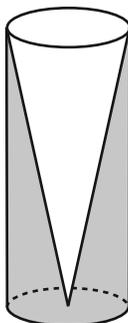
- 36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

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

$$V = \frac{1}{3} \pi (1.5)^2 (8)$$

$$V = 18.849$$

19



Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$\frac{19}{.52} = 36.538 \times 10 = 365$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

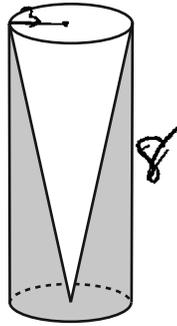
$$365 - 1.95 - 37.83 = 325.22$$

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

Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

$$\boxed{\approx 75.36 \text{ in}^3}$$



$$\begin{array}{r} \frac{1}{3} \pi r^2 h \\ \frac{1}{3} \pi (1.5)^2 (8) \\ 3 \pi (8) \\ 24 \pi \end{array} \qquad \begin{array}{r} 3.14 \\ \underline{24} \\ 1256 \\ \underline{628} \\ 753.6 \end{array}$$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$\boxed{1000.56}$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\begin{array}{r} 100 \\ \times 1.95 \\ \hline 500 \\ 900 \\ 190 \\ \hline 195.00 \end{array} \qquad \begin{array}{r} 37.83 \\ \times 1.95 \\ \hline 179.115 \\ 75.36 \\ \hline 75.36 \end{array}$$

$$\boxed{\$ 195.00}$$

Score 0: The student gave a completely incorrect response.

Regents Examination in Geometry (Common Core) – August 2015

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

(Use for the August 2015 exam only.)

Raw Score	Scale Score	Performance Level	Raw Score	Scale Score	Performance Level	Raw Score	Scale Score	Performance Level
86	100	5	57	80	4	28	59	2
85	99	5	56	80	4	27	58	2
84	98	5	55	79	3	26	56	2
83	97	5	54	79	3	25	55	2
82	96	5	53	79	3	24	53	1
81	95	5	52	78	3	23	52	1
80	94	5	51	78	3	22	50	1
79	93	5	50	77	3	21	49	1
78	93	5	49	77	3	20	47	1
77	92	5	48	76	3	19	45	1
76	91	5	47	75	3	18	44	1
75	90	5	46	75	3	17	42	1
74	90	5	45	74	3	16	40	1
73	89	5	44	74	3	15	38	1
72	88	5	43	73	3	14	36	1
71	88	5	42	72	3	13	34	1
70	87	5	41	72	3	12	32	1
69	86	5	40	71	3	11	30	1
68	86	5	39	70	3	10	27	1
67	86	5	38	69	3	9	25	1
66	85	5	37	69	3	8	23	1
65	84	4	36	68	3	7	20	1
64	84	4	35	67	3	6	18	1
63	83	4	34	66	3	5	15	1
62	83	4	33	65	3	4	12	1
61	82	4	32	64	2	3	10	1
60	82	4	31	63	2	2	7	1
59	81	4	30	61	2	1	3	1
58	81	4	29	60	2	0	0	1

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

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

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