Large-Type Edition

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

GEOMETRY

Wednesday, June 11, 2025 — 9:15 a.m. to 12:15 p.m., only

Student Name: _____

School Name: _____

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

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

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

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

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

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

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

Notice …

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

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

Part I

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

Use this space for computations.

1 The perimeter of a triangle is 18. What is the perimeter of a similar triangle after a dilation with a scale factor of 3?

(1) 6

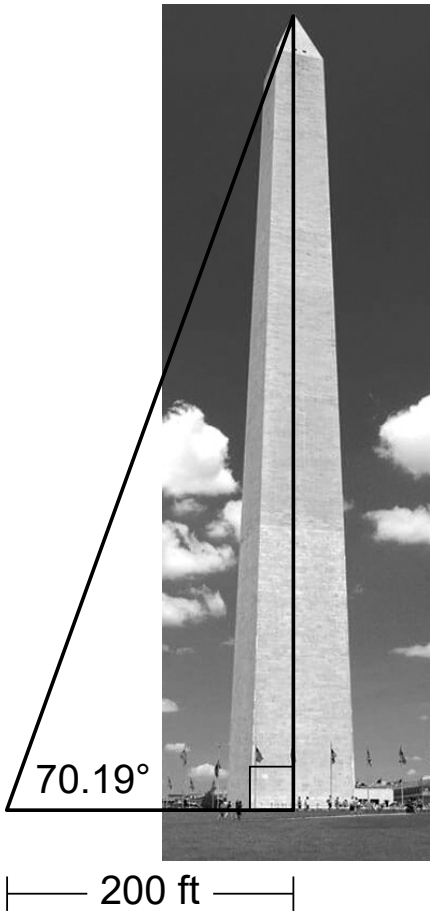
(2) 18

(3) 54

(4) 162

2 The Washington Monument, shown below, is in Washington, D.C. At a point on the ground 200 feet from the center of the base of the monument, the angle of elevation to the top of the monument is 70.19°.

Use this space for computations.



What is the height of the monument, to the *nearest foot*?

(1) 188

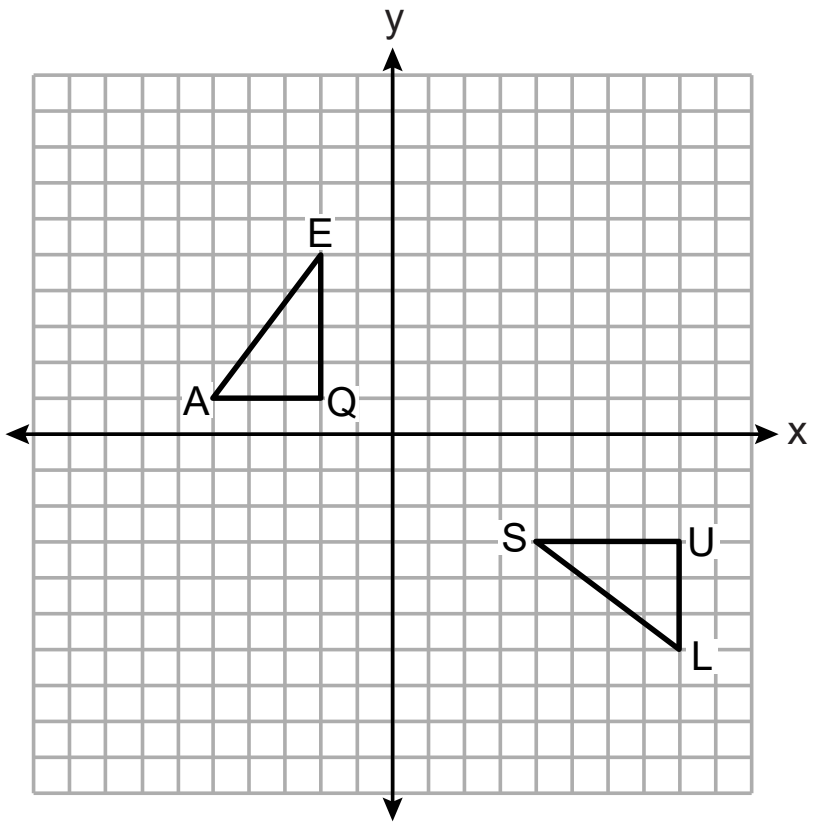
(2) 213

(3) 555

(4) 590

3 On the set of axes below, $\triangle EQA$ and $\triangle SUL$ are graphed.

Use this space for computations.



Which sequence of transformations shows that $\triangle EQA \cong \triangle SUL$?

(1) Rotate $\triangle EQA$ 90° counterclockwise about the origin and then translate 9 units right and 1 unit down.

(2) Rotate $\triangle EQA$ 90° counterclockwise about the origin and then reflect over the line $x = 4$.

(3) Reflect $\triangle EQA$ over the x-axis and then rotate 90° clockwise about the origin.

(4) Translate $\triangle EQA$ 10 units right and then reflect over the line $x = -1$.

Use this space for computations.

4 If two sides of a triangle have lengths of 2 and 8, the length of the third side could be

(1) 10
(2) 7
(3) 6
(4) 4

5 A regular octagon is rotated about its center. Which angle measure will carry the octagon onto itself?

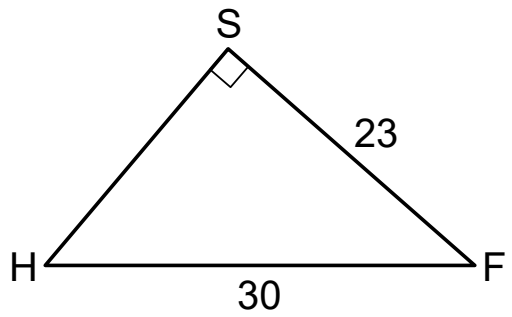
(1) 36°
(2) 90°
(3) 144°
(4) 160°

6 An equation of a circle is $x^2 + y^2 - 6x + 2y = 14$. What are the coordinates of the center and the length of the radius of this circle?

(1) $(-3,1)$ and $r = 5$
(2) $(3,-1)$ and $r = 5$
(3) $(-3,1)$ and $r = \sqrt{24}$
(4) $(3,-1)$ and $r = \sqrt{24}$

Use this space for computations.

7 In $\triangle HSF$ below, $m\angle S = 90°$, $HF = 30$, and $FS = 23$.



What is $m\angle F$, to the *nearest degree*?

(1) 53°

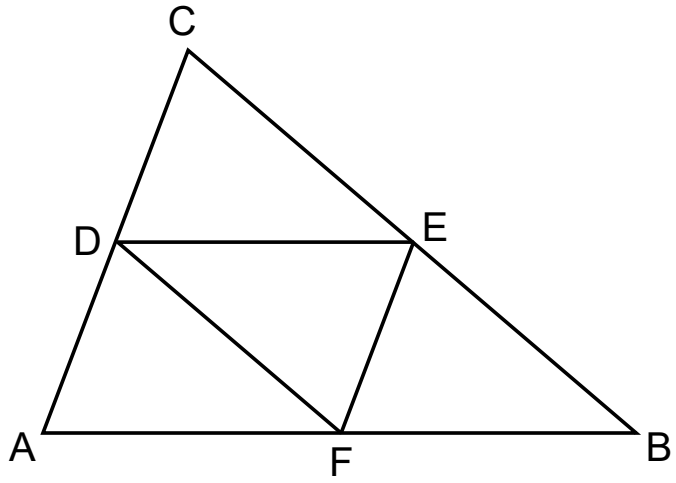
(2) 50°

(3) 40°

(4) 37°

Use this space for computations.

8 In $\triangle CAB$ below, midsegments $\overline{DE}$, $\overline{EF}$, and $\overline{FD}$ are drawn.



If $CA = 14$, $CB = 20$, and $FB = 9$, what is the perimeter of quadrilateral $DEFA$?

(1) 26

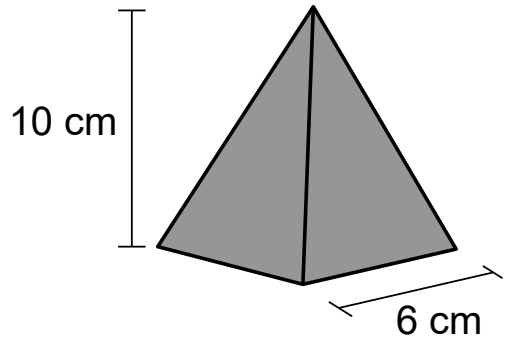
(2) 32

(3) 44

(4) 52

Use this space for computations.

9 A candle can be modeled by a pyramid with a square base, as shown below. The height of the candle is 10 cm, and each side of the base measures 6 cm.



If the candle wax burns at a rate of 3.5 cubic centimeters per hour, what is the approximate number of hours this candle could burn?

(1) 103

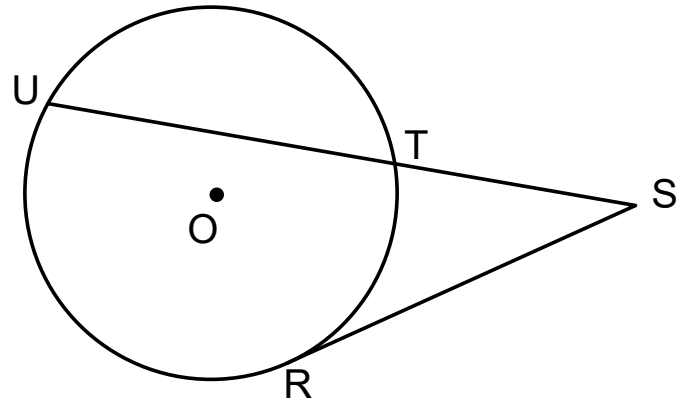
(2) 51

(3) 34

(4) 11

Use this space for computations.

10 In the diagram below, tangent $\overline{SR}$ and secant $\overline{STU}$ are drawn to circle O from external point S.



If $\overset{\frown}{TU} \cong \overset{\frown}{RU}$ and $m\overset{\frown}{TR} = 68°$, what is $m\angle S$?

(1) 22°

(2) 34°

(3) 39°

(4) 78°

11 Triangle RST has $m\angle S = 33°$, $RS = 7$, and $ST = 12$. What is the area of $\triangle RST$, to the *nearest tenth*?

(1) 22.9

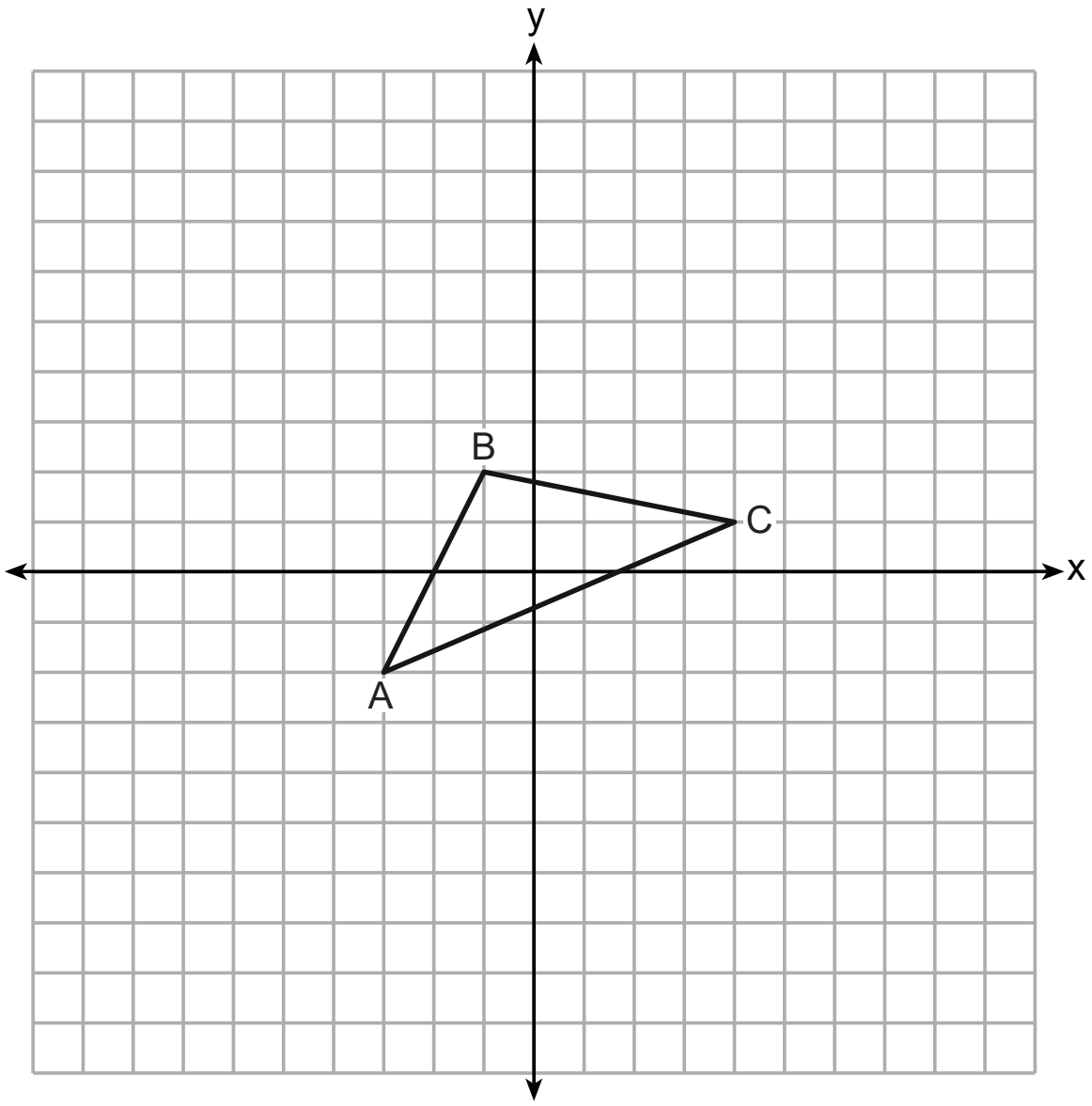
(2) 27.3

(3) 35.2

(4) 45.7

Use this space for computations.

12 Triangle ABC, with vertices whose coordinates are $A(-3,-2)$, $B(-1,2)$, and $C(4,1)$, is graphed on the set of axes below.



Question 12 is continued on the page below.

Use this space for computations.

Triangle $A'B'C'$, whose vertices have coordinates $A'(-6,-2)$, $B'(-2,2)$, and $C'(8,1)$, is the image of $\triangle ABC$. The transformation that maps $\triangle ABC$ onto $\triangle A'B'C'$ is a

(1) dilation

(2) translation

(3) vertical stretch

(4) horizontal stretch

13 Which equation represents a line parallel to the line represented by $y = 4x + 6$ and passing through the point $(-3,2)$?

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

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

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

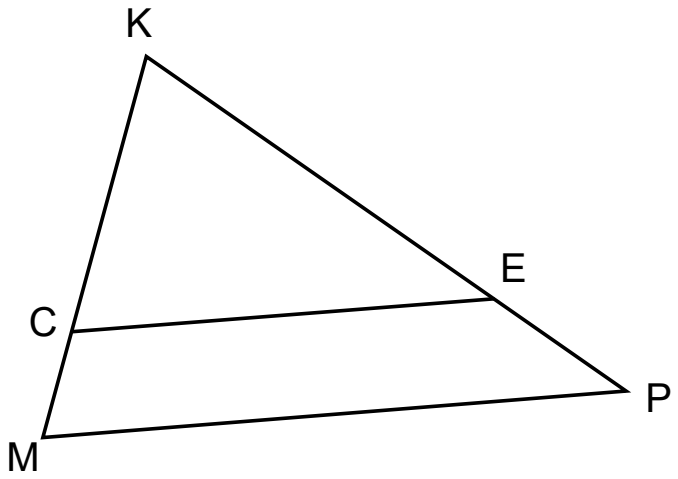
(4) $y + 3 = -\frac{1}{4}(x - 2)$

Use this space for computations.

14 Which two-dimensional figure is always formed when a plane intersects a right cylinder perpendicular to its base?

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

15 In $\triangle KMP$ below, $\overline{CE}$ is drawn parallel to $\overline{MP}$.



If $KC = 8$, $CM = 3$, and $CE = 12$, what is the length of $\overline{MP}$?

(1) 24
(2) 16.5
(3) 15
(4) 4.5

Use this space for computations.

16 A parallelogram must be a rectangle if its diagonals

(1) are perpendicular
(2) bisect each other
(3) bisect its angles
(4) are congruent

17 Point O divides $\overline{COA}$ such that $CO:OA = 1:4$.
If C has coordinates $(-2, -9)$ and A has coordinates $(3,6)$, the coordinates of O are

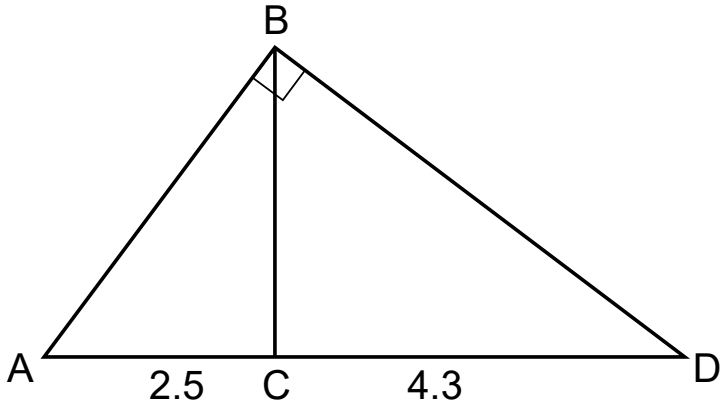
(1) $(2,3)$
(2) $(1,0)$
(3) $(0,-3)$
(4) $(-1,-6)$

18 A spherical balloon is fully inflated with helium to a diameter of 1.7 feet. If helium costs \$0.80 per cubic foot, what is the cost to completely fill the balloon with helium?

(1) \$2.06
(2) \$2.42
(3) \$3.22
(4) \$16.46

Use this space for computations.

19 In right triangle ABD below, altitude $\overline{BC}$ is drawn to hypotenuse $\overline{AD}$, $AC = 2.5$, and $CD = 4.3$.



What is the length of $\overline{BA}$, to the *nearest tenth*?

(1) 3.3

(2) 3.4

(3) 4.1

(4) 5.4

Use this space for computations.

20 Trapezoid $ZOYD$ has parallel sides $\overline{ZO}$ and $\overline{DY}$. If $m\angle Z = 141°$ and $m\angle Y = 73°$, what is $m\angle D$?

(1) $39°$

(2) $73°$

(3) $107°$

(4) $141°$

21 Triangle ABC is translated 5 units to the left and 2 units up to map onto $\triangle PQR$. Which statement is *not* always true?

(1) $\triangle PQR \cong \triangle ABC$

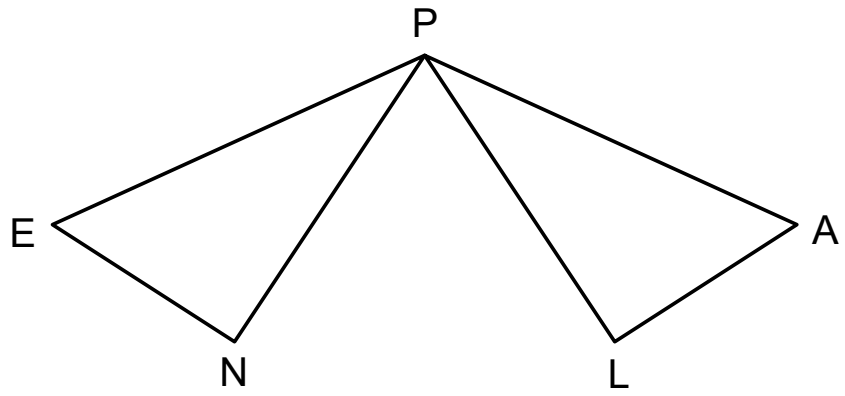
(2) $\angle A \cong \angle Q$

(3) $BQ = \sqrt{29}$

(4) $RQ = CB$

Use this space for computations.

22 In the diagram below, congruent triangles *PEN* and *PAL* are drawn.



Which rigid motion maps $\triangle PEN$ onto $\triangle PAL$?

(1) a point reflection of $\triangle PEN$ through P

(2) a reflection of $\triangle PEN$ over the angle bisector of $\angle EPA$

(3) a rotation of $\triangle PEN$ about point P, mapping $\overline{PE}$ onto $\overline{PA}$

(4) a translation of $\triangle PEN$ along $\overrightarrow{EA}$, mapping point E onto A

23 A cone has a height of 8 inches and volume of 75.4 cubic inches. What is the diameter of the cone, to the *nearest inch*?

(1) 9

(2) 2

(3) 3

(4) 6

Use this space for computations.

24 The line represented by the equation $5x - 2y = 10$ is transformed by a dilation centered at (2,0) with a scale factor of 2. The image of the line

(1) is the original line

(2) passes through the point (4,0)

(3) passes through the point (0,–10)

(4) is perpendicular to the original line

Part II

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

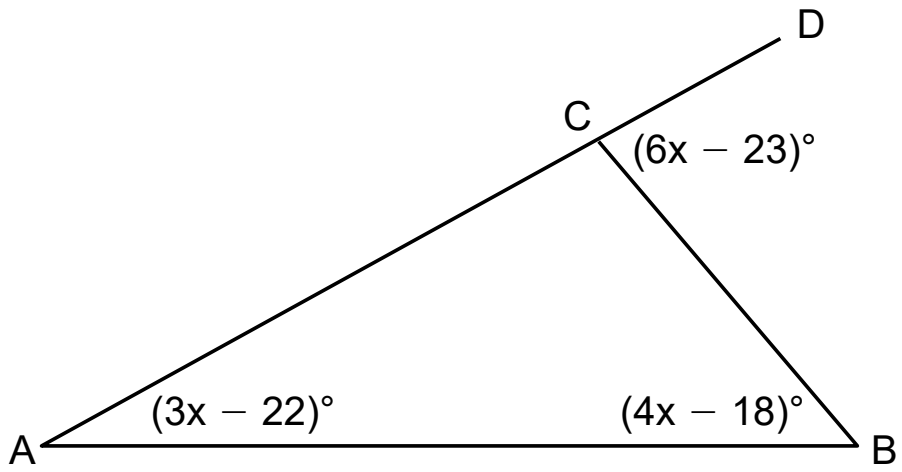
25 In the year 2020, the village of Depew, New York had an area of 5.1 square miles and a population of 15,069. In the same year, the village of Lancaster, New York had an area of 2.7 square miles and a population of 10,087.

Which village had the larger population density in 2020? Justify your answer.

Work space for question 25 is continued on the page below.

Question 25 continued

26 In $\triangle ABC$ below, $\overline{AC}$ is extended through C to D, $m\angle A = (3x - 22)°$, $m\angle B = (4x - 18)°$, and $m\angle BCD = (6x - 23)°$.



Determine and state $m\angle ACB$.

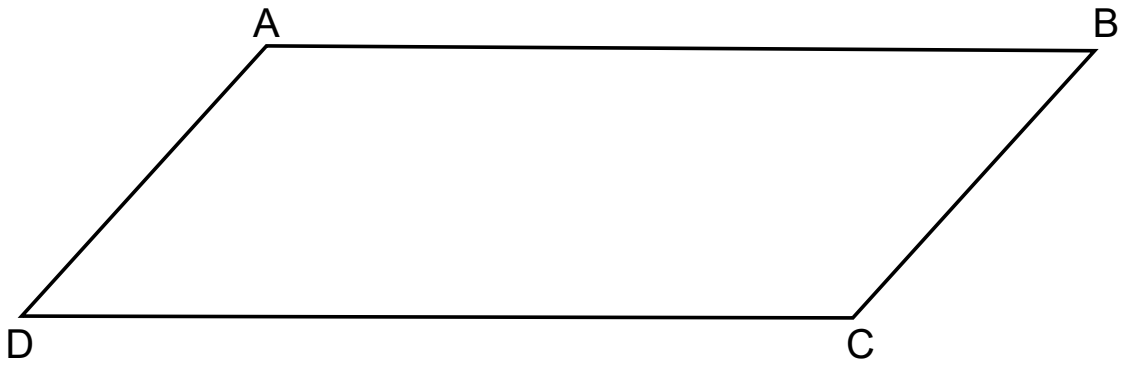
Work space for question 26 is continued on the page below.

Question 26 continued

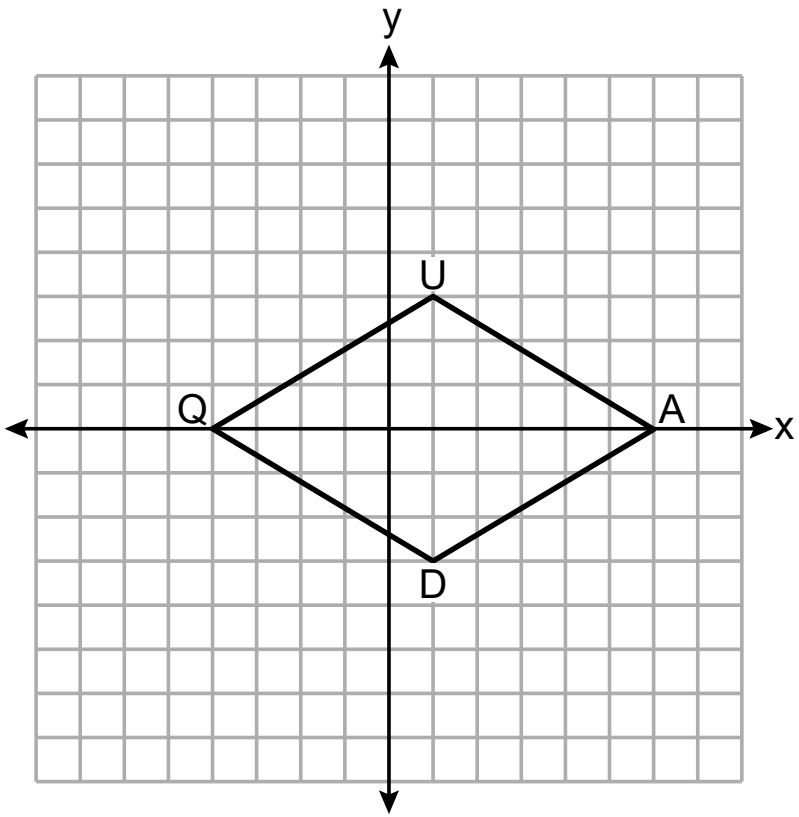
27 Parallelogram $ABCD$ is shown below. Using a compass and straightedge, construct the altitude from point A to side $\overline{DC}$. [Leave all construction marks.]

Question 27 is continued on the page below.

Question 27 continued



28 Quadrilateral *QUAD* is graphed on the set of axes below.



Determine and state the area of quadrilateral *QUAD*.

Work space for question 28 is continued on the page below.

Question 28 continued

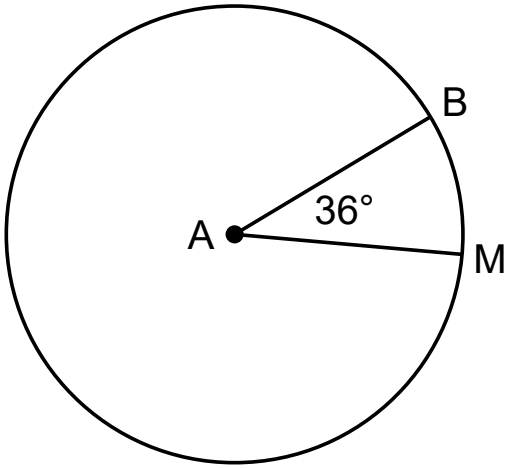
29 In a right triangle, the acute angles have the relationship $\sin(3x - 7)° = \cos(x + 1)°$.

Determine and state the value of x.

Work space for question 29 is continued on the page below.

Question 29 continued

30 In circle A below, $m\angle BAM = 36°$.

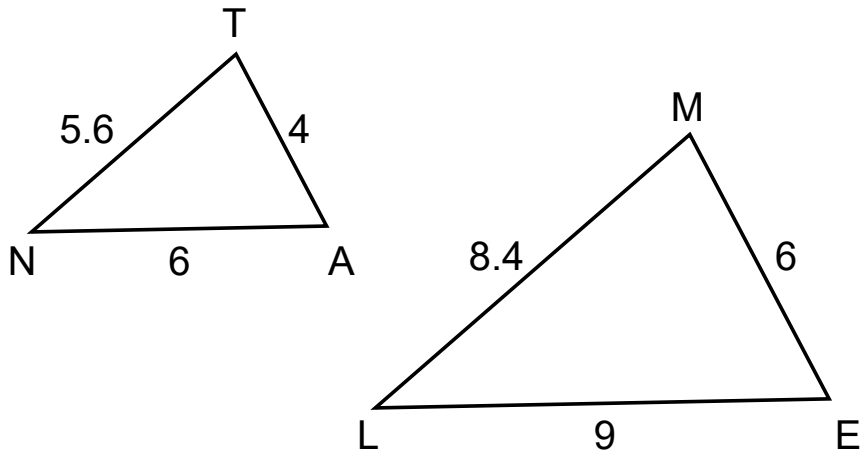


If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]

Work space for question 30 is continued on the page below.

Question 30 continued

31 In triangles ANT and ELM below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

Work space for question 31 is continued on the page below.

Question 31 continued

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 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand?
Justify your answer.

Work space for question 32 is continued on the page below.

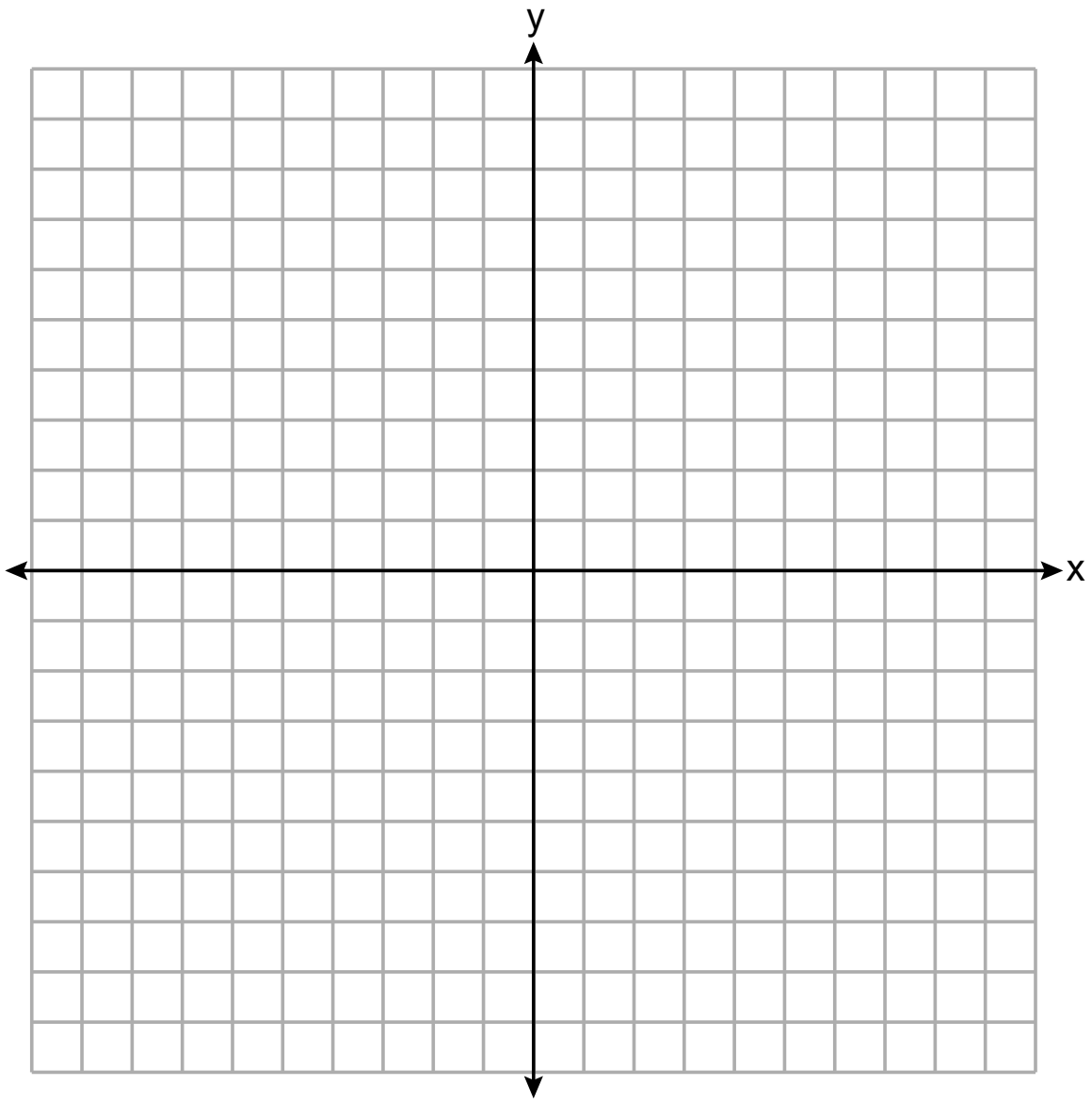
Question 32 continued

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

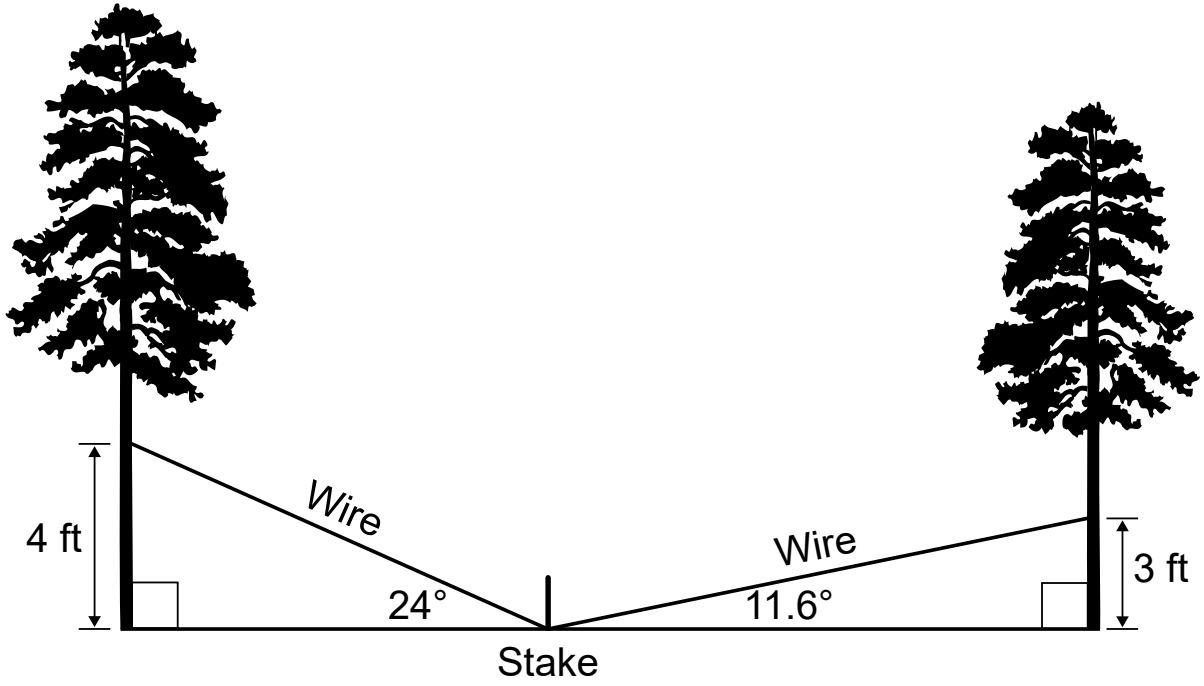
Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

The set of axes for question 33 is on the page below.

Question 33 continued



34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

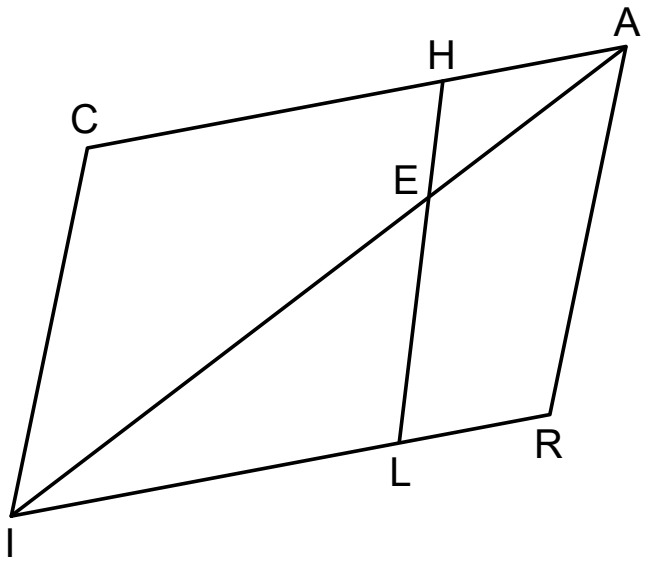
Work space for question 34 is continued on the page below.

Question 34 continued

Part IV

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

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



Prove: $HA \bullet EL = LI \bullet EH$

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

Question 35 continued

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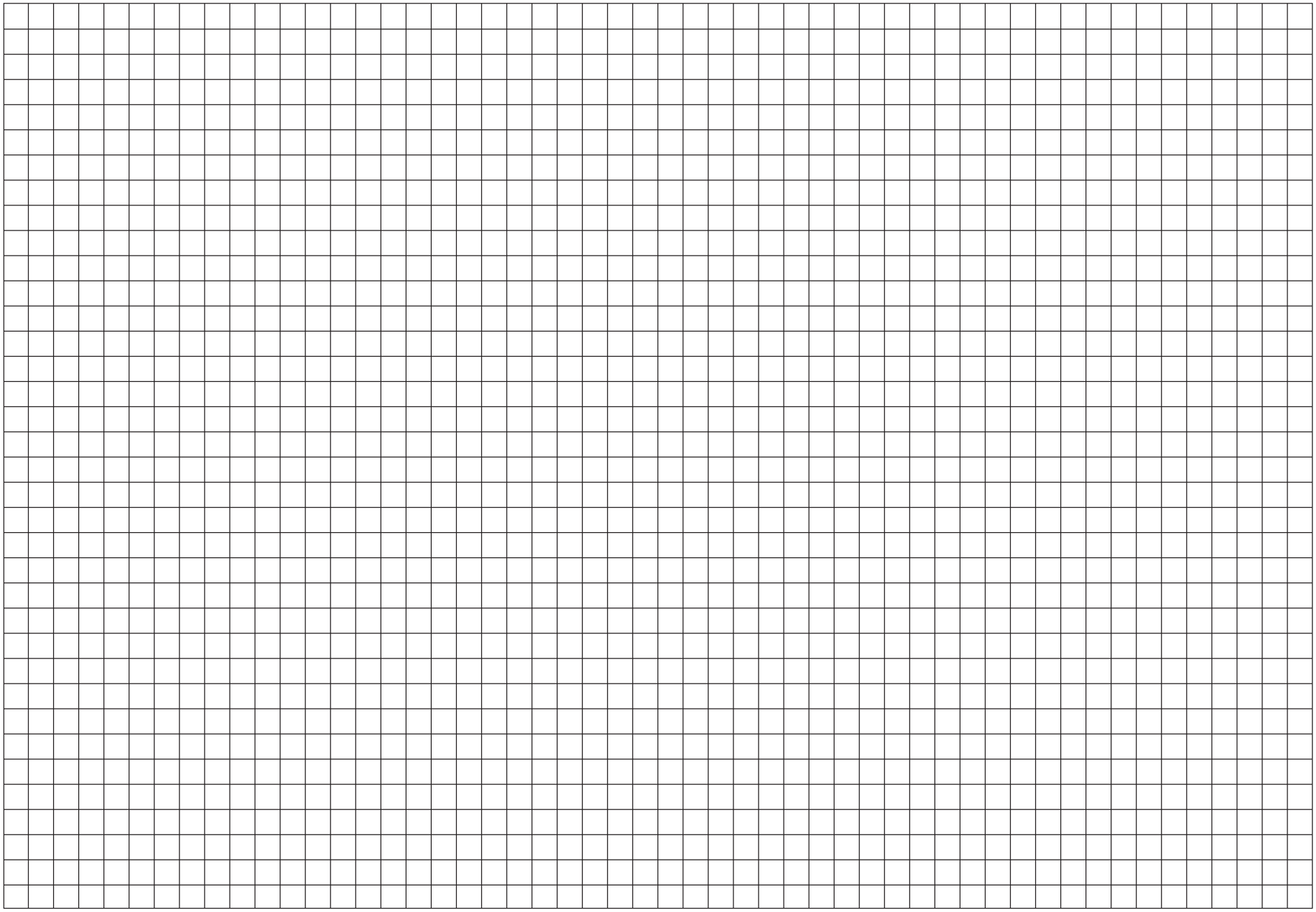

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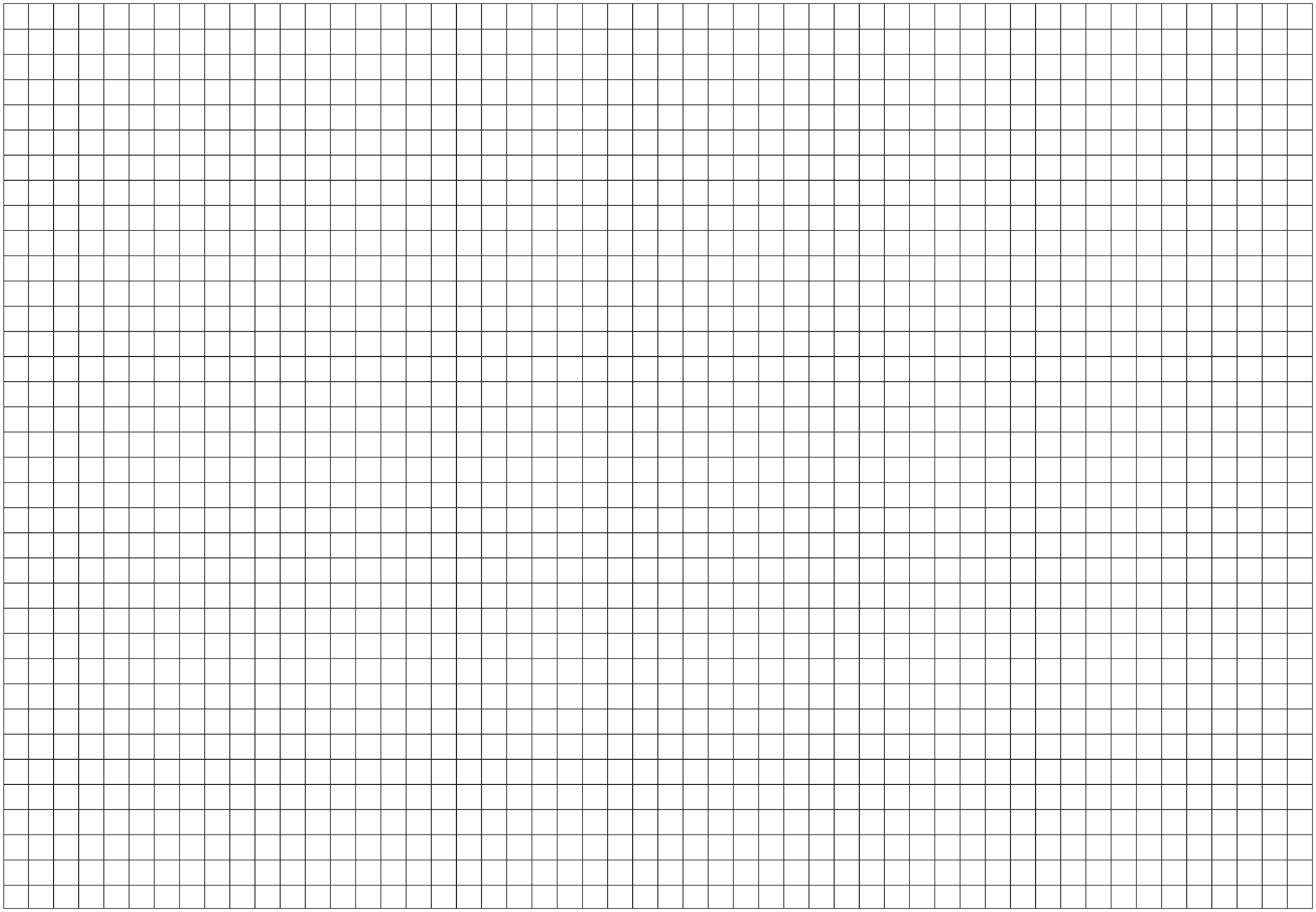

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Reference Sheet for Geometry

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

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