

Large-Type Edition

**REGENTS EXAMINATION IN
GEOMETRY
TEST SAMPLER
FALL 2008**



The University of the State of New York
THE STATE EDUCATION DEPARTMENT
Office of Standards, Assessments and Reporting
Albany, New York 12234
www.emsc.nysed.gov/osa/

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

GEOMETRY
TEST SAMPLER
FALL 2008

GENERAL DIRECTIONS TO THE STUDENT

Answer all 38 questions in this examination. Write your answers to the Part I multiple-choice questions on the separate answer sheet. No partial credit will be allowed on the multiple-choice section.

For Parts II, III, and IV, clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in these parts, a correct numerical answer with no work shown will receive only 1 credit.

A reference sheet that you may need to answer some questions in this examination is included.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this examination as scrap paper. Scrap graph paper is provided at the end of this examination for any question for which graphing may be helpful but is not required. Any work done on this sheet of scrap graph paper will *not* be scored. Write all your work in pen, except graphs and drawings, which should be done in pencil.

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

Part I

Answer all 28 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [56]

1 Isosceles trapezoid $ABCD$ has diagonals \overline{AC} and \overline{BD} . If $AC = 5x + 13$ and $BD = 11x - 5$, what is the value of x ?

(1) 28

(3) 3

(2) $10\frac{3}{4}$

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

Use this space for
computations.

**Use this space for
computations.**

2 What is the negation of the statement “The Sun is shining”?

- (1) It is cloudy.
- (2) It is daytime.
- (3) It is not raining.
- (4) The Sun is not shining.

**Use this space for
computations.**

3 Triangle ABC has vertices $A(1,3)$, $B(0,1)$, and $C(4,0)$. Under a translation, A' , the image point of A , is located at $(4,4)$. Under this same translation, point C' is located at

(1) $(7,1)$

(3) $(3,2)$

(2) $(5,3)$

(4) $(1,-1)$

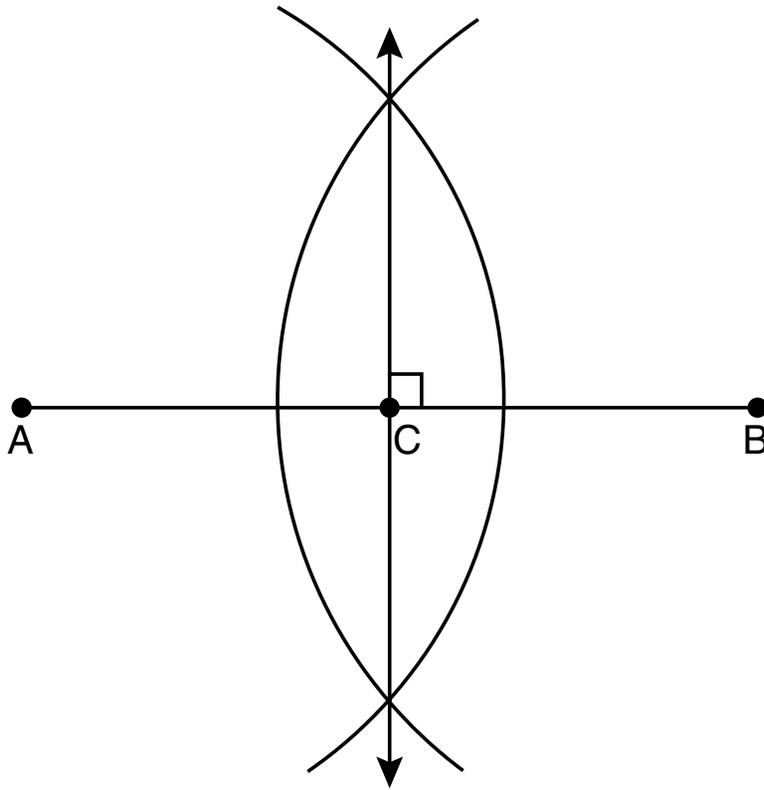
4 The diagram on the next page shows the construction of the perpendicular bisector of \overline{AB} .

**Use this space for
computations.**

Question 4 is continued on the next page.

Question 4 continued

Use this space for
computations.



Which statement is *not* true?

(1) $AC = CB$

(2) $CB = \frac{1}{2}AB$

(3) $AC = 2AB$

(4) $AC + CB = AB$

5 Which graph could be used to find the solution to the system of equations on the next page?

Use this space for computations.

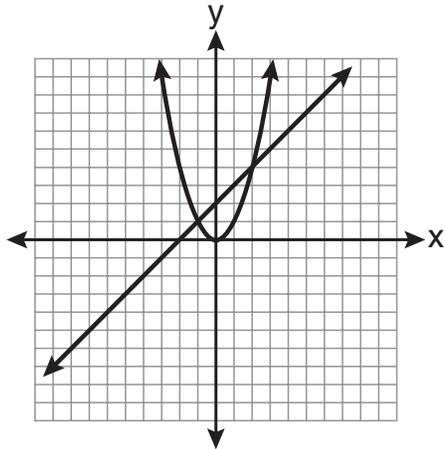
Question 5 is continued on the next page.

Question 5 continued

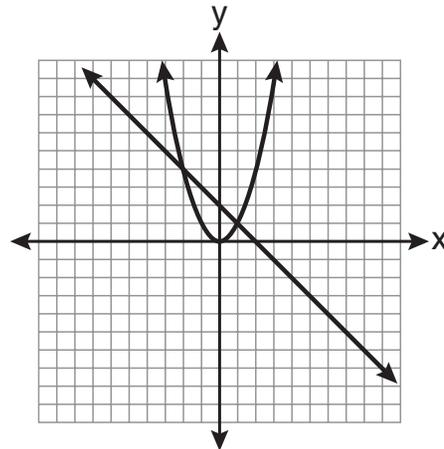
$$y = -x + 2$$

$$y = x^2$$

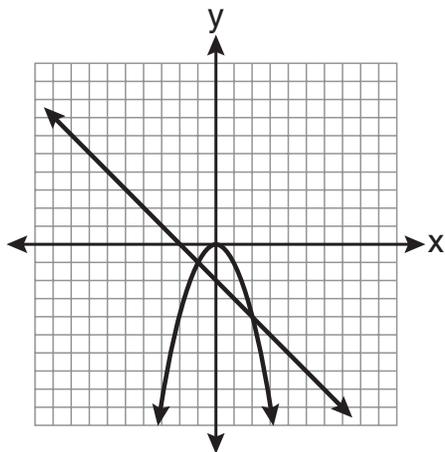
Use this space for computations.



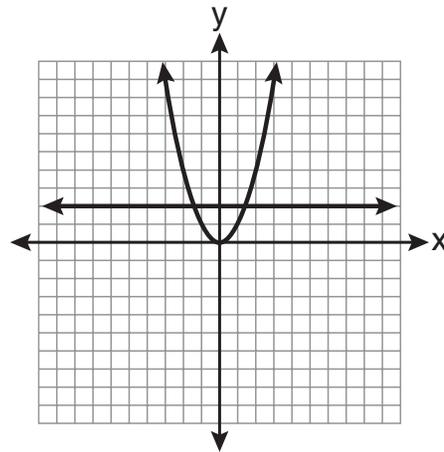
(1)



(3)



(2)



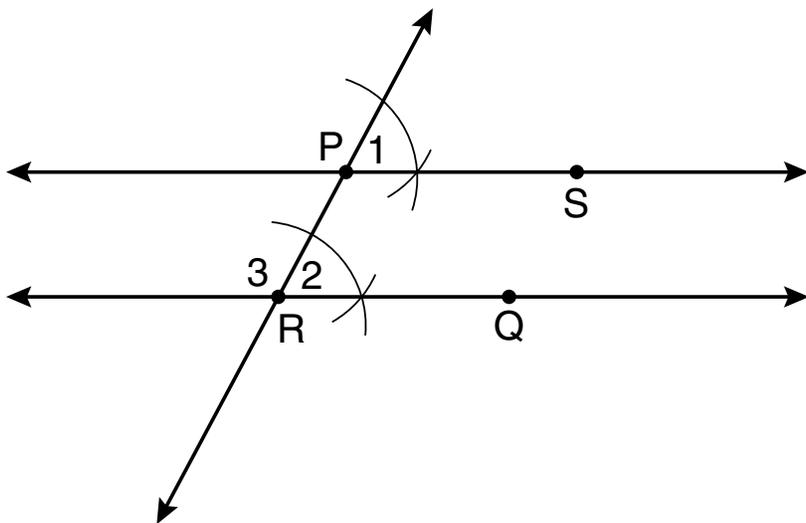
(4)

**Use this space for
computations.**

- 6** Line k is drawn so that it is perpendicular to two distinct planes, P and R . What must be true about planes P and R ?
- (1) Planes P and R are skew.
 - (2) Planes P and R are parallel.
 - (3) Planes P and R are perpendicular.
 - (4) Plane P intersects plane R but is not perpendicular to plane R .

Use this space for
computations.

- 7 The diagram below illustrates the construction of \overleftrightarrow{PS} parallel to \overleftrightarrow{RQ} through point P .

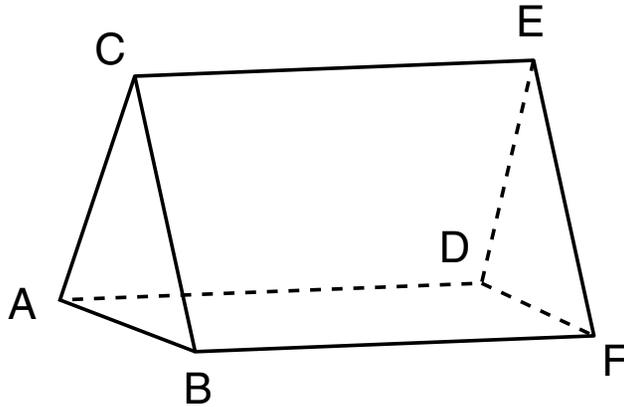


Which statement justifies this construction?

- (1) $m\angle 1 = m\angle 2$ (3) $\overline{PR} \cong \overline{RQ}$
(2) $m\angle 1 = m\angle 3$ (4) $\overline{PS} \cong \overline{RQ}$

8 The figure in the diagram below is a triangular prism.

Use this space for
computations.



Which statement must be true?

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

(3) $\overline{AD} \parallel \overline{CE}$

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

(4) $\overline{DE} \parallel \overline{BC}$

**Use this space for
computations.**

9 The vertices of $\triangle ABC$ are $A(-1,-2)$, $B(-1,2)$, and $C(6,0)$. Which conclusion can be made about the angles of $\triangle ABC$?

(1) $m\angle A = m\angle B$

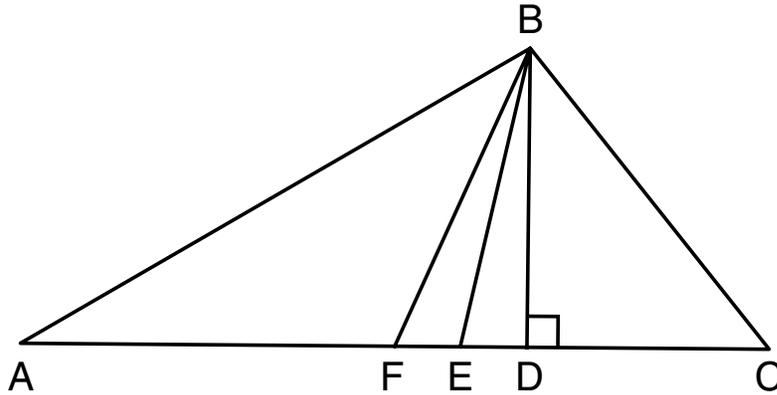
(3) $m\angle ACB = 90$

(2) $m\angle A = m\angle C$

(4) $m\angle ABC = 60$

Use this space for
computations.

- 10 Given $\triangle ABC$ with base \overline{AFEDC} , median \overline{BF} , altitude \overline{BD} , and \overline{BE} bisects $\angle ABC$, which conclusion is valid?

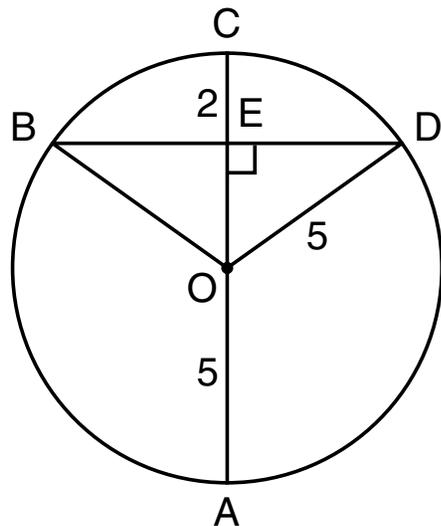


- (1) $\angle FAB \cong \angle ABF$
(2) $\angle ABF \cong \angle CBD$

- (3) $\overline{CE} \cong \overline{EA}$
(4) $\overline{CF} \cong \overline{FA}$

Use this space for computations.

- 11 In the diagram below, circle O has a radius of 5, and $CE = 2$. Diameter \overline{AC} is perpendicular to chord \overline{BD} at E .



What is the length of \overline{BD} ?

- (1) 12
- (2) 10
- (3) 8
- (4) 4

**Use this space for
computations.**

12 What is the equation of a line that passes through the point $(-3,-11)$ and is parallel to the line whose equation is $2x - y = 4$?

(1) $y = 2x + 5$

(3) $y = \frac{1}{2}x + \frac{25}{2}$

(2) $y = 2x - 5$

(4) $y = -\frac{1}{2}x - \frac{25}{2}$

13 Line segment AB has endpoints $A(2,-3)$ and $B(-4,6)$. What are the coordinates of the midpoint of \overline{AB} ?

(1) $(-2,3)$

(3) $(-1,3)$

(2) $(-1,1\frac{1}{2})$

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

**Use this space for
computations.**

14 What are the center and radius of a circle whose equation is

$$(x - A)^2 + (y - B)^2 = C?$$

(1) center = (A, B) ; radius = C

(2) center = $(-A, -B)$; radius = C

(3) center = (A, B) ; radius = \sqrt{C}

(4) center = $(-A, -B)$; radius = \sqrt{C}

15 A rectangular prism has a volume of $3x^2 + 18x + 24$. Its base has a length of $x + 2$ and a width of 3. Which expression represents the height of the prism?

(1) $x + 4$

(3) 3

(2) $x + 2$

(4) $x^2 + 6x + 8$

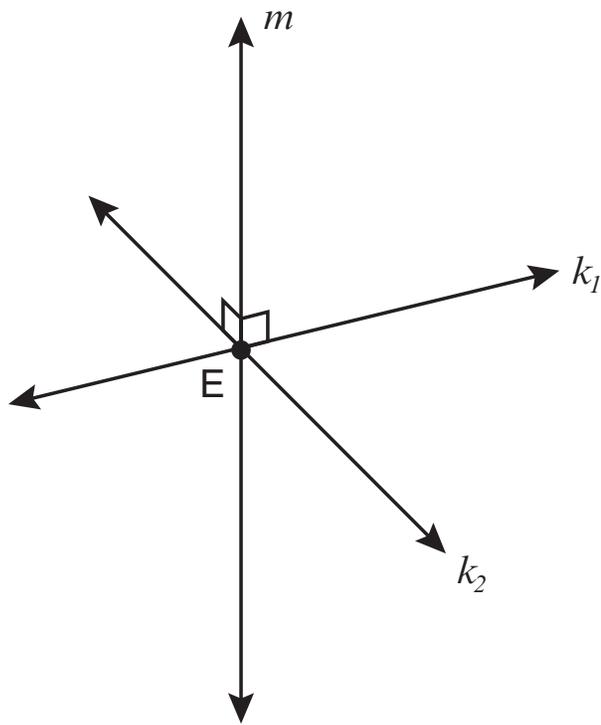
16 Lines k_1 and k_2 intersect at point E. Line m is perpendicular to lines k_1 and k_2 at point E.

**Use this space for
computations.**

Question 16 is continued on the next page.

Question 16 continued

Use this space for
computations.

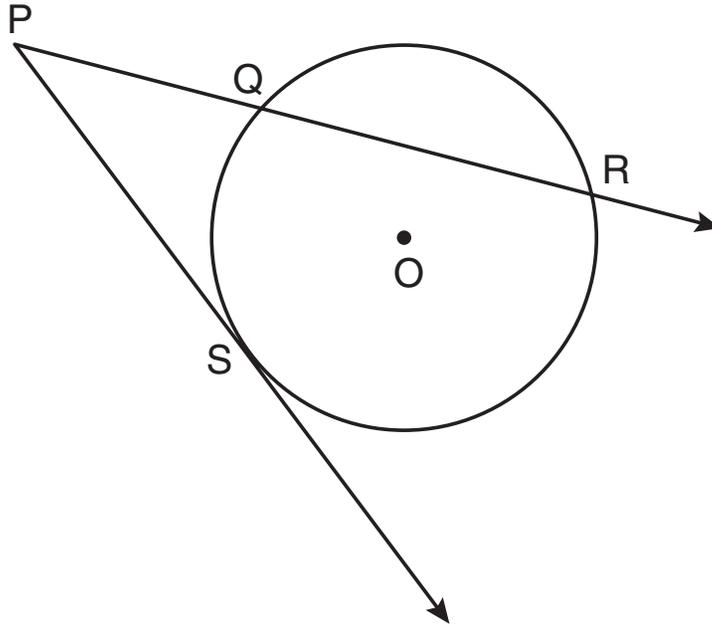


Which statement is always true?

- (1) Lines k_1 and k_2 are perpendicular.
- (2) Line m is parallel to the plane determined by lines k_1 and k_2 .
- (3) Line m is perpendicular to the plane determined by lines k_1 and k_2 .
- (4) Line m is coplanar with lines k_1 and k_2 .

**Use this space for
computations.**

- 17 In the diagram below, \overline{PS} is a tangent to circle O at point S , \overline{PQR} is a secant, $PS = x$, $PQ = 3$, and $PR = x + 18$.



(Not drawn to scale)

What is the length of \overline{PS} ?

- (1) 6
(2) 9
(3) 3
(4) 27

**Use this space for
computations.**

18 A polygon is transformed according to the rule: $(x, y) \rightarrow (x + 2, y)$.
Every point of the polygon moves two units in which direction?

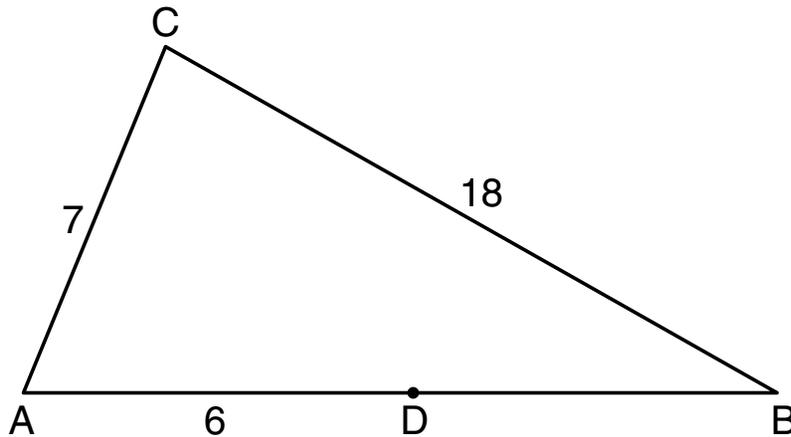
(1) up

(3) left

(2) down

(4) right

- 19 In the diagram below of $\triangle ABC$, D is a point on \overline{AB} , $AC = 7$, $AD = 6$, and $BC = 18$.



(Not drawn to scale)

The length of \overline{DB} could be

- | | |
|--------|--------|
| (1) 5 | (3) 19 |
| (2) 12 | (4) 25 |

**Use this space for
computations.**

**Use this space for
computations.**

20 The diameter of a circle has endpoints at $(-2,3)$ and $(6,3)$. What is an equation of the circle?

(1) $(x - 2)^2 + (y - 3)^2 = 16$

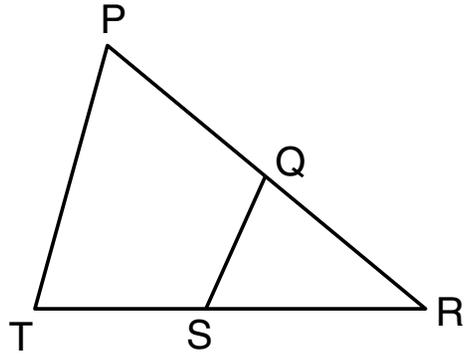
(2) $(x - 2)^2 + (y - 3)^2 = 4$

(3) $(x + 2)^2 + (y + 3)^2 = 16$

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

Use this space for
computations.

- 21 In the diagram below of $\triangle PRT$, Q is a point on \overline{PR} , S is a point on \overline{TR} , \overline{QS} is drawn, and $\angle RPT \cong \angle RSQ$.



Which reason justifies the conclusion that $\triangle PRT \sim \triangle SRQ$?

- | | |
|---------|---------|
| (1) AA | (3) SAS |
| (2) ASA | (4) SSS |

**Use this space for
computations.**

22 The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are

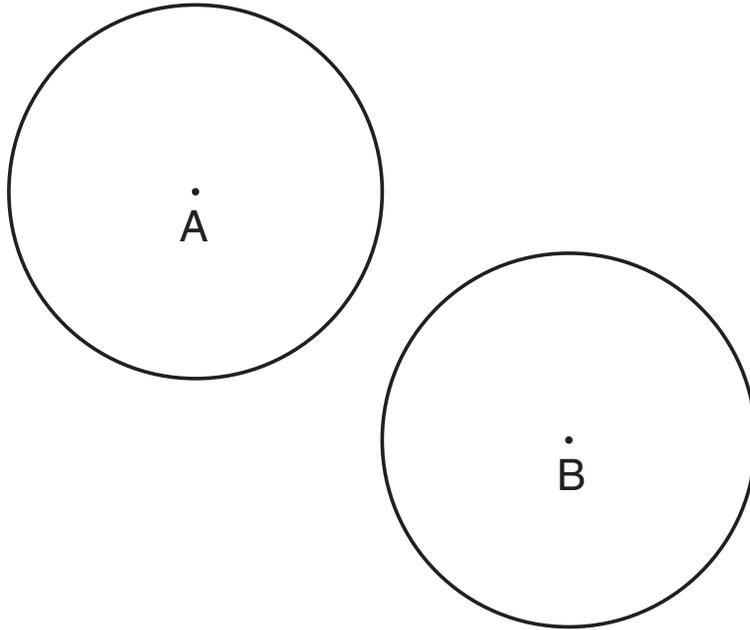
- (1) parallel
- (2) perpendicular
- (3) the same line
- (4) neither parallel nor perpendicular

23 The endpoints of \overline{AB} are $A(3,2)$ and $B(7,1)$. If $\overline{A''B''}$ is the result of the transformation of \overline{AB} under $D_2 \circ T_{-4,3}$ what are the coordinates of A'' and B'' ?

- (1) $A''(-2,10)$ and $B''(6,8)$
- (2) $A''(-1,5)$ and $B''(3,4)$
- (3) $A''(2,7)$ and $B''(10,5)$
- (4) $A''(14,-2)$ and $B''(22,-4)$

**Use this space for
computations.**

24 In the diagram below, circle A and circle B are shown.



What is the total number of lines of tangency that are common to circle A and circle B ?

(1) 1

(3) 3

(2) 2

(4) 4

**Use this space for
computations.**

25 In which triangle do the three altitudes intersect outside the triangle?

- (1) a right triangle
- (2) an acute triangle
- (3) an obtuse triangle
- (4) an equilateral triangle

**Use this space for
computations.**

26 Two triangles are similar, and the ratio of each pair of corresponding sides is $2 : 1$. Which statement regarding the two triangles is *not* true?

- (1) Their areas have a ratio of $4 : 1$.
- (2) Their altitudes have a ratio of $2 : 1$.
- (3) Their perimeters have a ratio of $2 : 1$.
- (4) Their corresponding angles have a ratio of $2 : 1$.

**Use this space for
computations.**

27 What is the measure of an interior angle of a regular octagon?

(1) 45°

(3) 120°

(2) 60°

(4) 135°

28 What is the slope of a line perpendicular to the line whose equation is $5x + 3y = 8$?

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

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

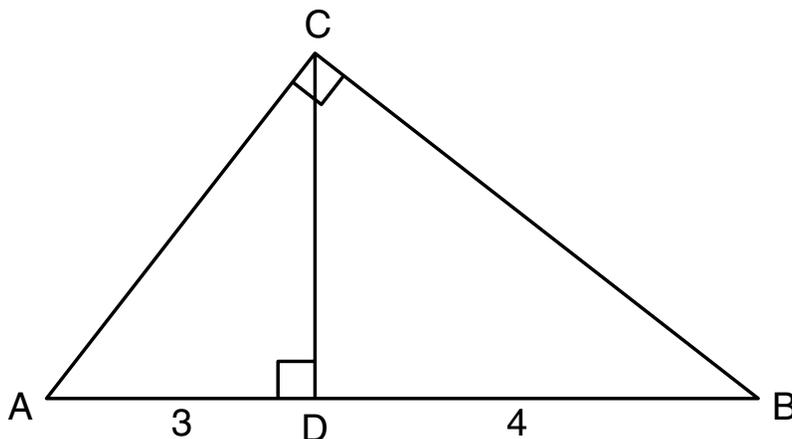
(2) $\frac{3}{5}$

(4) $-\frac{5}{3}$

Part II

Answer all 6 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [12]

- 29 In the diagram below of right triangle ACB , altitude \overline{CD} intersects \overline{AB} at D . If $AD = 3$ and $DB = 4$, find the length of \overline{CD} in simplest radical form.



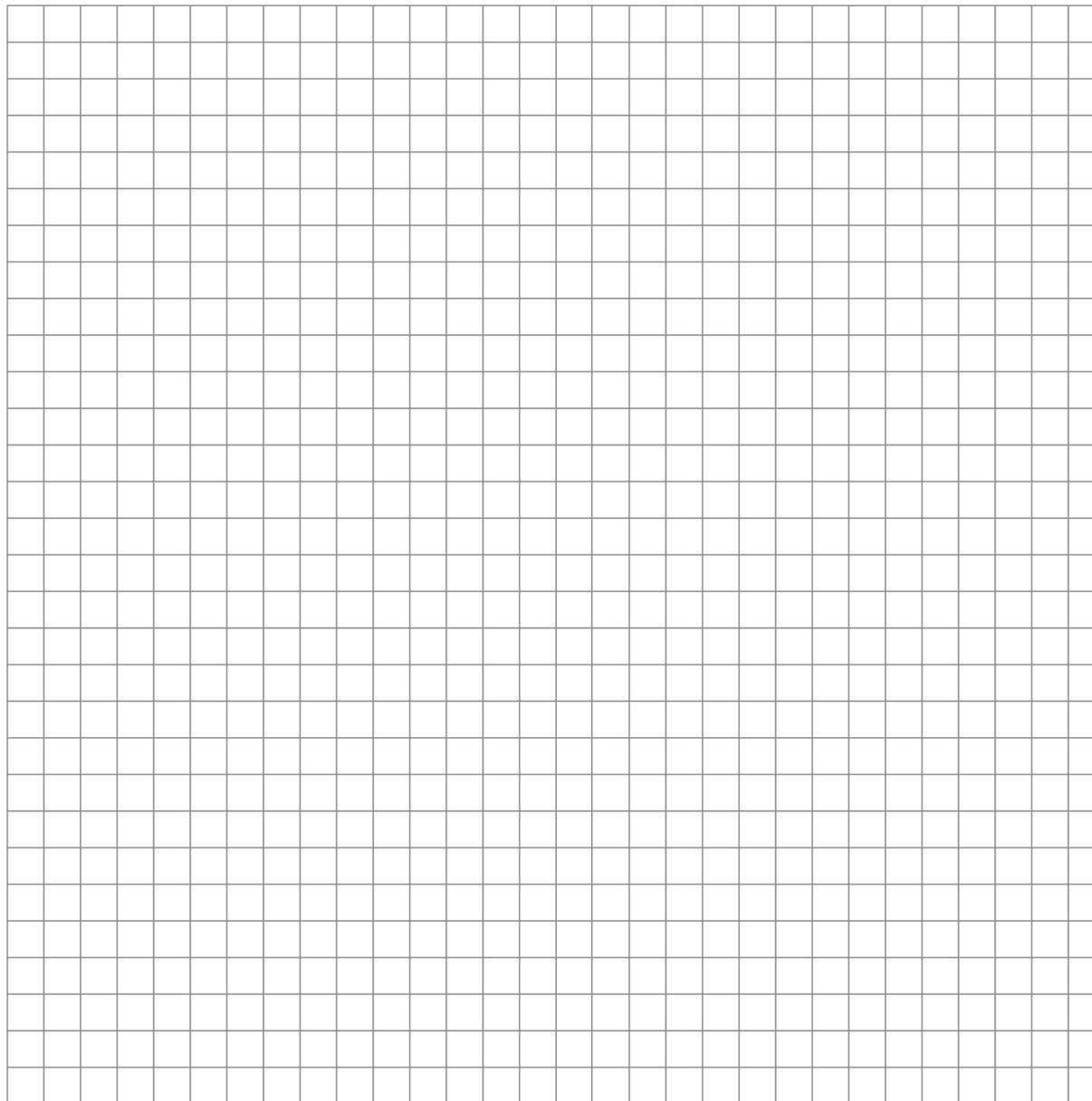
Computation space for question 29 is continued on the next page.

Question 29 continued

30 The vertices of $\triangle ABC$ are $A(3,2)$, $B(6,1)$, and $C(4,6)$. Identify and graph a transformation of $\triangle ABC$ such that its image, $\triangle A'B'C'$, results in $\overline{AB} \parallel A'B'$.

The blank grid for question 30 is on the next page.

Question 30 continued



31 The endpoints of \overline{PQ} are $P(-3,1)$ and $Q(4,25)$. Find the length of \overline{PQ} .

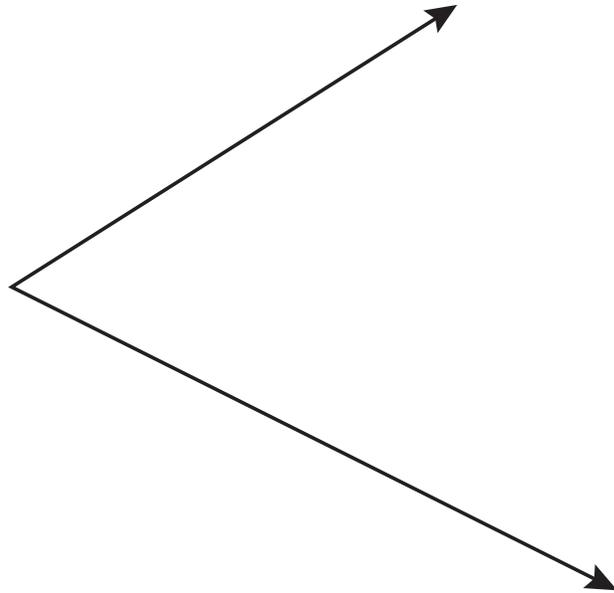
Computation space for question 31 is continued on the next page.

Question 31 continued

32 Using a compass and straightedge, construct the bisector of the angle shown on the next page.
[*Leave all construction marks.*]

Question 32 is continued on the next page.

Question 32 continued



33 The volume of a cylinder is $12,566.4 \text{ cm}^3$. The height of the cylinder is 8 cm. Find the radius of the cylinder to the *nearest tenth of a centimeter*.

34 Write a statement that is logically equivalent to the statement “If two sides of a triangle are congruent, the angles opposite those sides are congruent.”

Identify the new statement as the converse, inverse, or contrapositive of the original statement.

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. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [12]

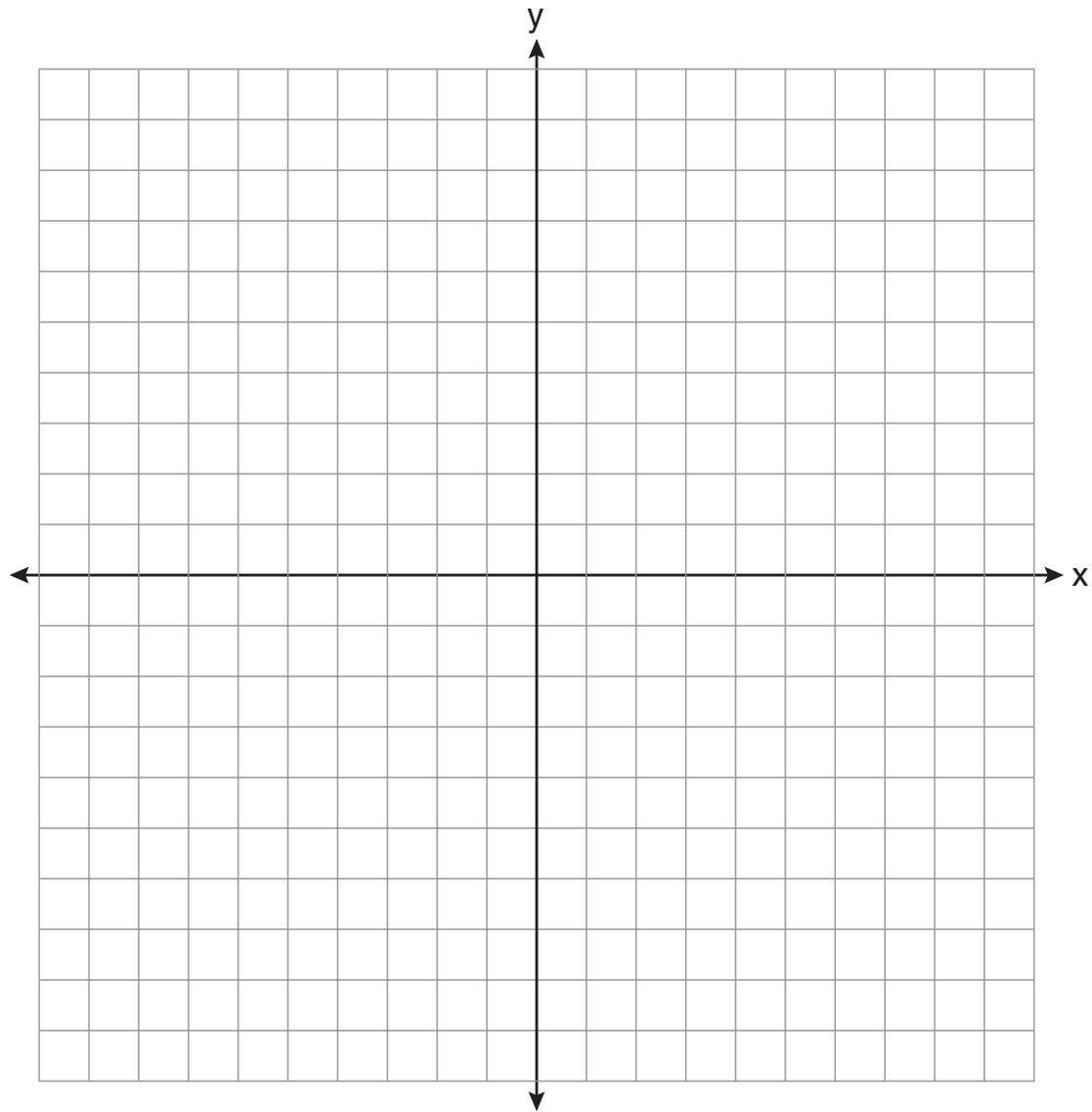
35 On the set of axes on the next page, graph and label $\triangle DEF$ with vertices at $D(-4,-4)$, $E(-2,2)$, and $F(8,-2)$.

If G is the midpoint of \overline{EF} and H is the midpoint of \overline{DF} , state the coordinates of G and H and label each point on your graph.

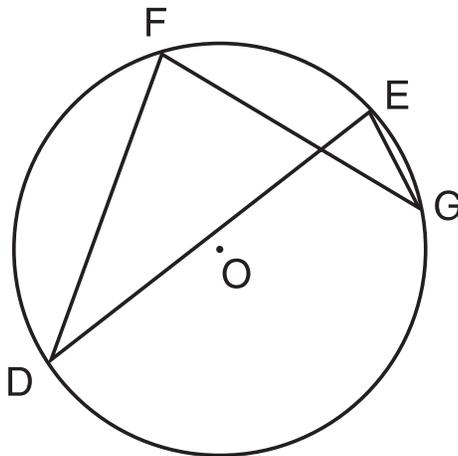
Explain why $\overline{GH} \parallel \overline{DE}$.

The set of axes for question 35 is on the next page.

Question 35 continued



- 36** In the diagram below of circle O , chords \overline{DF} , \overline{DE} , \overline{FG} , and \overline{EG} are drawn such that $m\widehat{DF} : m\widehat{FE} : m\widehat{EG} : m\widehat{GD} = 5 : 2 : 1 : 7$. Identify one pair of inscribed angles that are congruent to each other and give their measure.



Computation space for question 36 is continued on the next page.

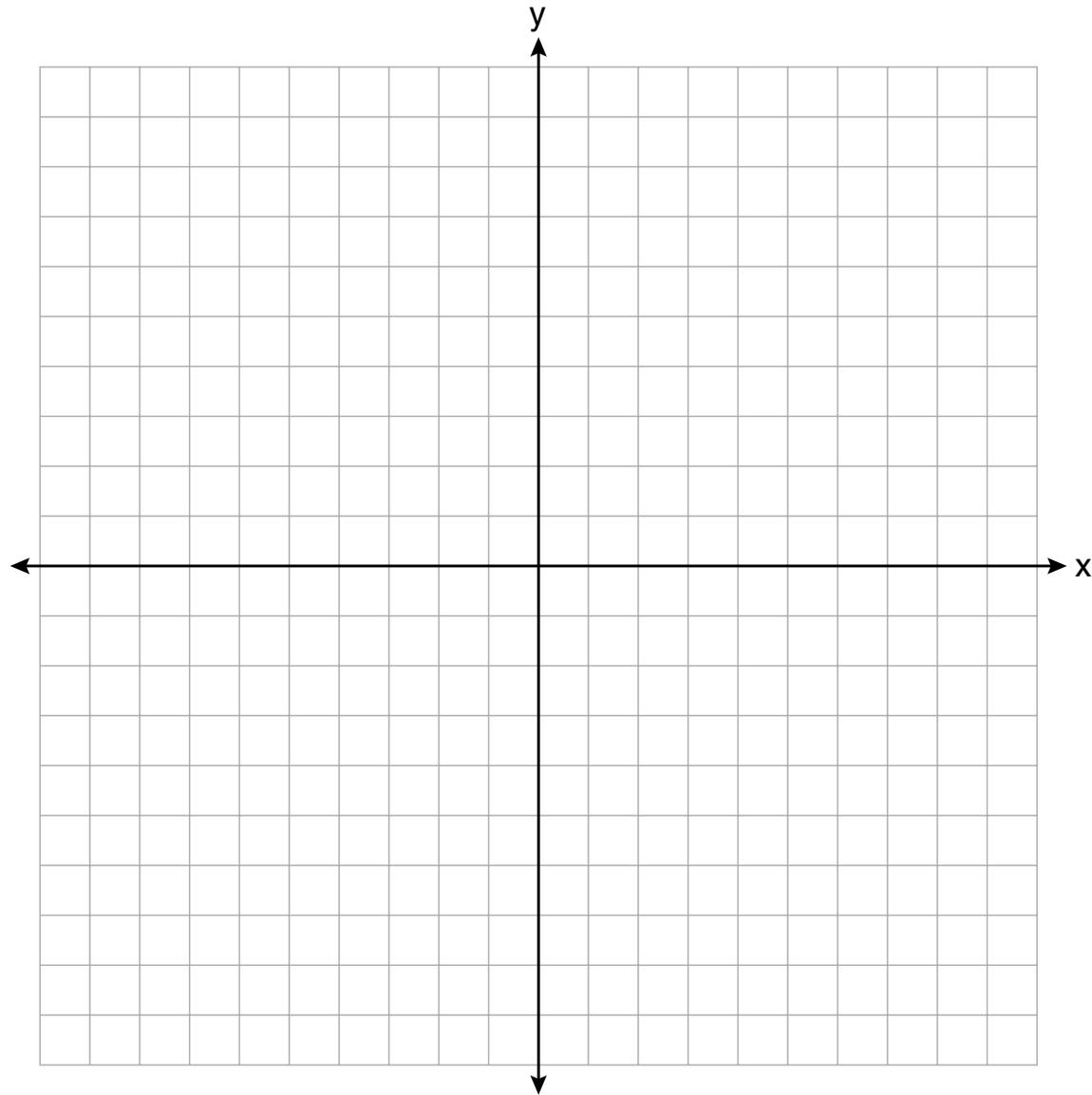
Question 36 continued

37 A city is planning to build a new park. The park must be equidistant from school A at $(3,3)$ and school B at $(3,-5)$. The park also must be exactly 5 miles from the center of town, which is located at the origin on the coordinate graph. Each unit on the graph represents 1 mile.

On the set of axes on the next page, sketch the compound loci and label with an **X** all possible locations for the new park.

The set of axes for question 37 is on the next page.

Question 37 continued

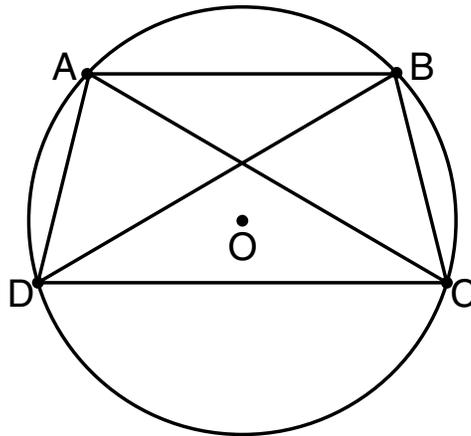


Part IV

Answer the question in this part. The correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For the question in this part, a correct numerical answer with no work shown will receive only 1 credit. [6]

- 38 In the diagram below, quadrilateral $ABCD$ is inscribed in circle O , $\overline{AB} \parallel \overline{DC}$, and diagonals \overline{AC} and \overline{BD} are drawn.

Prove that $\triangle ACD \cong \triangle BDC$.



Computation space for question 38 is on the next page.

Question 38 continued

Geometry Reference Sheet

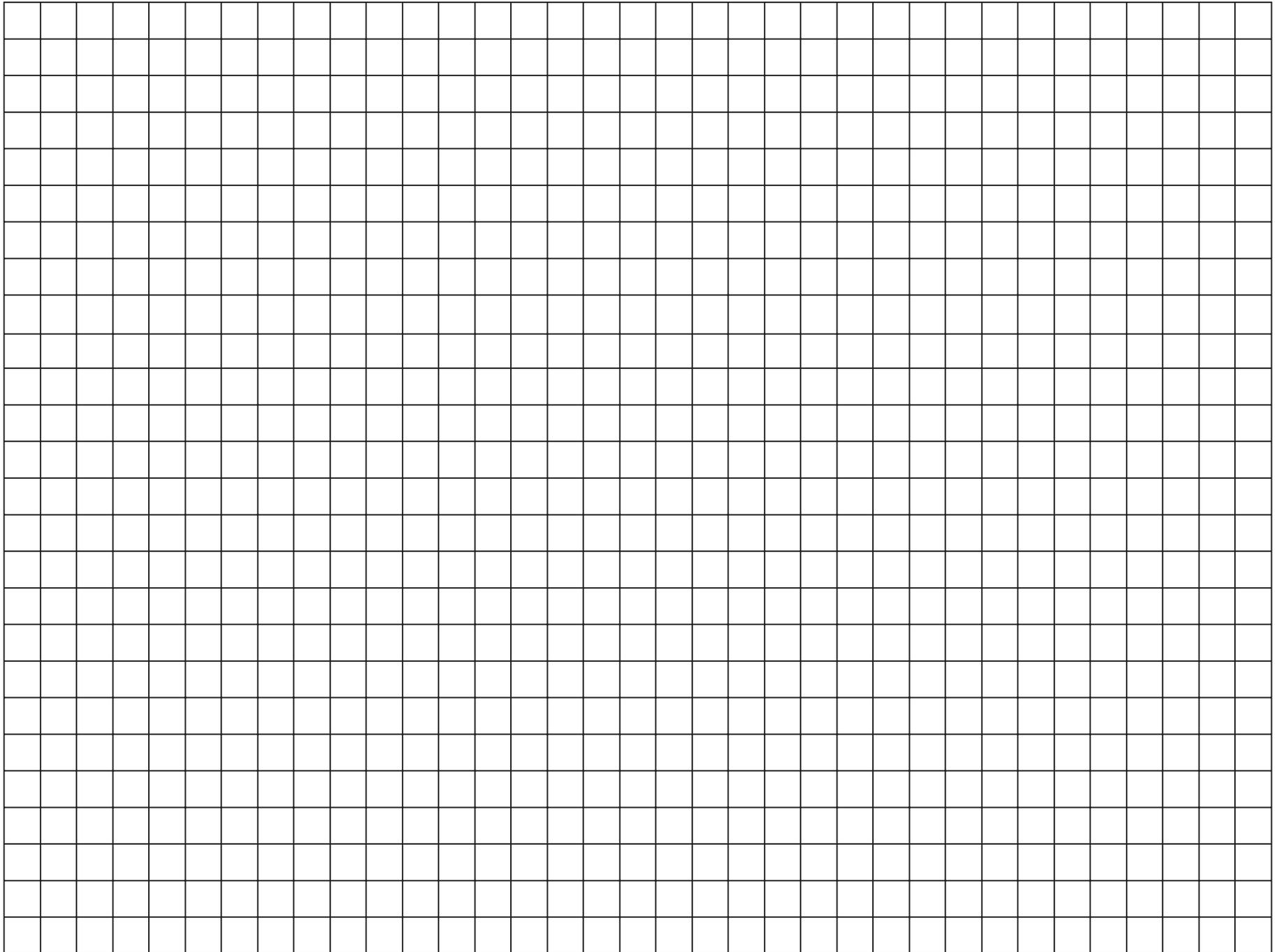
Volume	Cylinder	$V = Bh$ where B is the area of the base
	Pyramid	$V = \frac{1}{3}Bh$ where B is the area of the base
	Right Circular Cone	$V = \frac{1}{3}Bh$ where B is the area of the base
	Sphere	$V = \frac{4}{3}\pi r^3$

The reference sheet continues on next page.

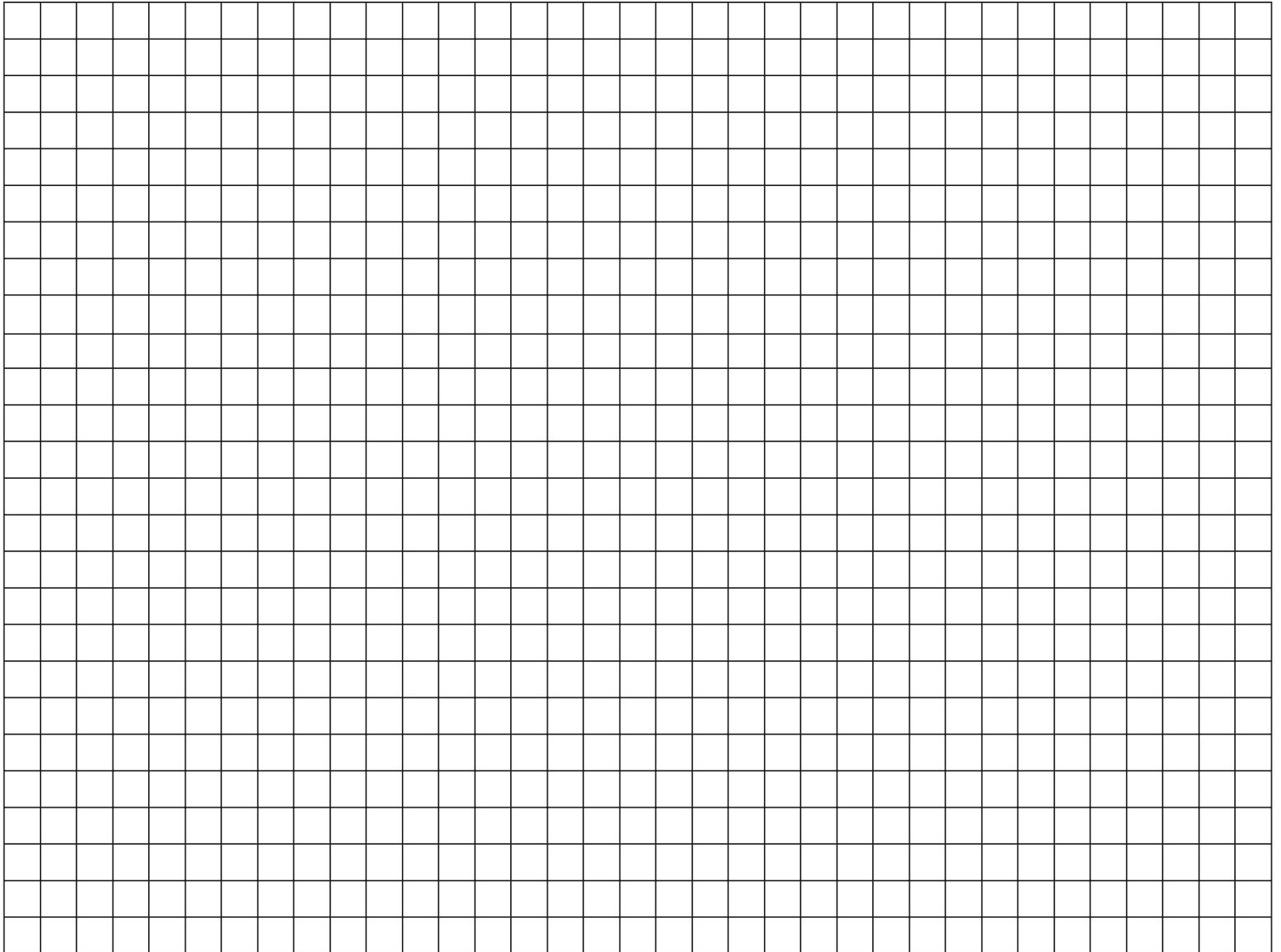
Lateral Area (L)	Right Circular Cylinder	$L = 2\pi rh$
	Right Circular Cone	$L = \pi rl$ where l is the slant height

Surface Area	Sphere	$SA = 4\pi r^2$
--------------	--------	-----------------

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



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



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

GEOMETRY TEST SAMPLER

Fall 2008

ANSWER SHEET

Student Sex: Male Female Grade

Teacher School

Your answers to Part I should be recorded on the back of this answer sheet.

Part I

Answer all 28 questions in this part.

- | | | | |
|---------|----------|----------|----------|
| 1 | 8 | 15 | 22 |
| 2 | 9 | 16 | 23 |
| 3 | 10 | 17 | 24 |
| 4 | 11 | 18 | 25 |
| 5 | 12 | 19 | 26 |
| 6 | 13 | 20 | 27 |
| 7 | 14 | 21 | 28 |

Your answers for Parts II, III, and IV should be written in the test booklet.

The declaration below should be signed when you have completed the examination.

I do hereby affirm, at the close of this examination, that I had no unlawful knowledge of the questions or answers prior to the examination and that I have neither given nor received assistance in answering any of the questions during the examination.

Signature

