

**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 STATE EDUCATION DEPARTMENT/THE UNIVERSITY OF THE STATE OF NEW YORK/ALBANY, NY 12234

David Abrams, Assistant Commissioner
Office of Standards, Assessment and Reporting

October 2008

Dear Colleagues:

Thank you for your support as we begin the second year of the transition to the new Regents Examinations in mathematics. We are continuing to develop the new Regents Examination in Geometry, which will be administered for the first time in June 2009. That administration will be the second step in the transition from Mathematics A and Mathematics B to Integrated Algebra, Geometry, and Algebra 2/Trigonometry that will take place over the next two years.

The Regents Examination in Geometry is being developed to evaluate student achievement of the Mathematics Learning Standard 3 and the core curriculum, revised 2005. This Regents Examination in Geometry Test Sampler consists of the types of questions, the formatting, and the scoring guides that are being developed for the examination. It also includes examples of student work from field tests. This Test Sampler may be printed and duplicated for use in classroom instruction.

The Department is proud of its tradition of involving New York State teachers in a variety of curriculum guidance initiatives. Over the years, thousands of teachers have worked with us, and the expertise of diverse educators representing New York's diverse student population is essential in guiding this important work.

Through our Call for Expertise on the Department's web site, **we encourage teachers to become involved in test development and standard-setting activities.** Please download and complete the Call for Expertise application found at:

<http://www.emsc.nysed.gov/ciai/call.htm>

Thank you for all the work that you do on behalf of the students in New York State.

Sincerely,

David Abrams

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Introduction

In March 2005, the Board of Regents adopted a new Learning Standard for Mathematics and issued a revised Mathematics Core Curriculum, resulting in the need for the development and phasing in of three new Regents Examinations in mathematics: Integrated Algebra, Geometry, and Algebra 2/Trigonometry. These new Regents Examinations in mathematics will replace the current Regents Examinations in Mathematics A and Mathematics B. Students must pass any one of these new commencement-level Regents Examinations in order to fulfill the mathematics Regents Examination requirement for graduation. The first administration of the Regents Examination in Integrated Algebra took place in June 2008. The first administration will take place in June 2009 for the Regents Examination in Geometry and in June 2010 for the Regents Examination in Algebra 2/Trigonometry. The Regents Examination in Geometry will be based on the content of the Mathematics Core Curriculum (Revised 2005).

The Regents Examination in Geometry Test Sampler provides examples of the format and types of questions that will comprise the operational examination. The scoring guide in the sampler includes examples of student responses from field testing and the credit allowed for each response.

The reference sheet included in the test sampler will also be provided as part of the operational examination booklet. A straightedge (ruler), a compass, and a graphing calculator must be available for the exclusive use of each student taking the examination. For the operational examination, the memory of any calculator with programming capability must be cleared, reset, or disabled when students enter the testing room. If the memory of a student's calculator is password-protected and cannot be cleared, the calculator must not be used. Students may not use calculators that are capable of symbol manipulation or that can communicate with other calculators through infrared sensors, nor may students use operating manuals, instruction or formula cards, or other information concerning the operation of calculators during the examination.

The sampler may be duplicated for use in your classroom.

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.

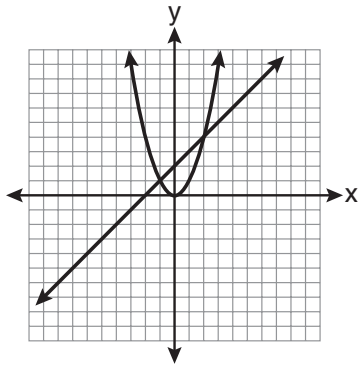
Note: A graphing calculator, a straightedge (ruler), and a compass must be available for you to use while taking this examination.

Use this space for computations.

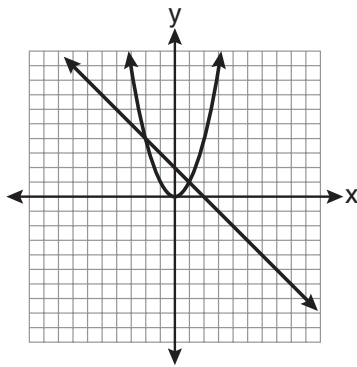
5 Which graph could be used to find the solution to the following system of equations?

$$y = -x + 2$$

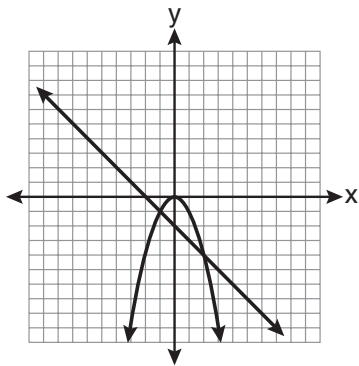
$$y = x^2$$



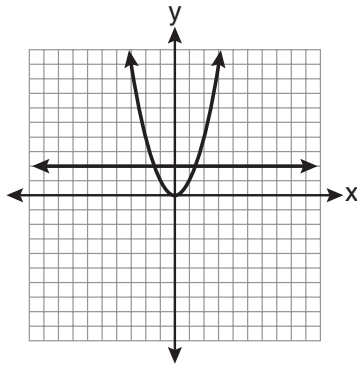
(1)



(3)



(2)



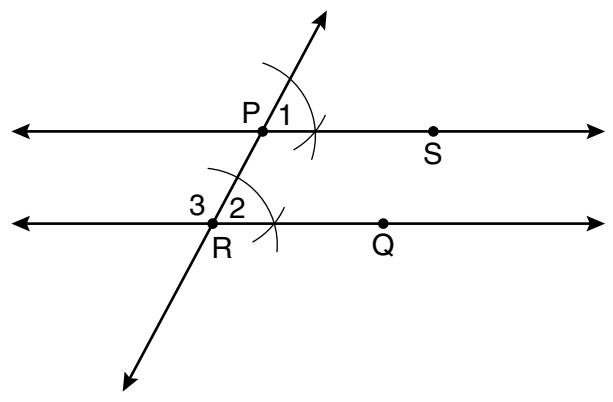
(4)

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.

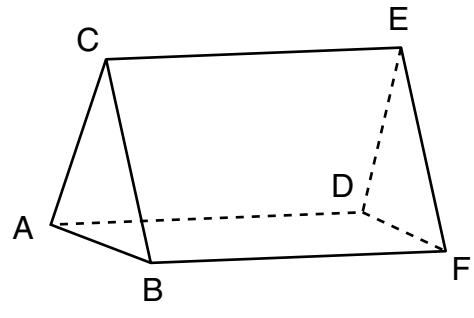
7 The diagram below illustrates the construction of \overleftrightarrow{PS} parallel to \overleftrightarrow{RQ} through point P .



Which statement justifies this construction?

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

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



Which statement must be true?

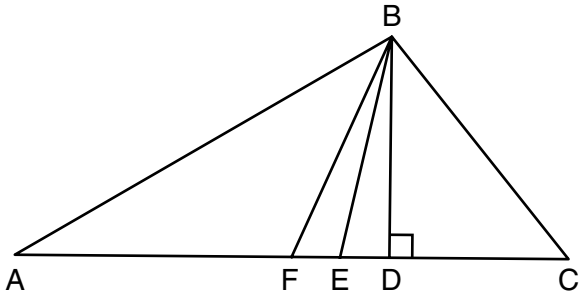
- (1) $\overline{DE} \cong \overline{AB}$
- (2) $\overline{AD} \cong \overline{BC}$
- (3) $\overline{AD} \parallel \overline{CE}$
- (4) $\overline{DE} \parallel \overline{BC}$

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) $m\angle A = m\angle B$
- (2) $m\angle A = m\angle C$
- (3) $m\angle ACB = 90$
- (4) $m\angle ABC = 60$

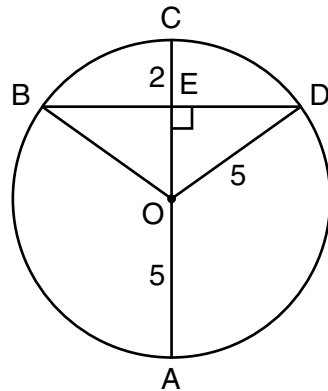
10 Given $\triangle ABC$ with base \overline{AFEDC} , median \overline{BF} , altitude \overline{BD} , and \overline{BE} bisects $\angle ABC$, which conclusion is valid?



- (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
- 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) $y = 2x + 5$
(2) $y = 2x - 5$
(3) $y = \frac{1}{2}x + \frac{25}{2}$
(4) $y = -\frac{1}{2}x - \frac{25}{2}$

**Use this space for
computations.**

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

14 What are the center and radius of a circle whose equation is $(x-A)^2 + (y-B)^2 = C$?

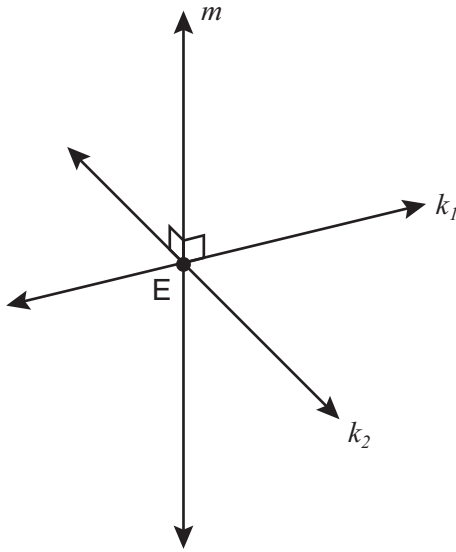
- (1) center = (A,B) ; radius = C
(2) center = $(-A,-B)$; radius = C
(3) center = (A,B) ; radius = \sqrt{C}
(4) center = $(-A,-B)$; radius = \sqrt{C}

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) $x^2 + 6x + 8$

Use this space for computations.

- 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.

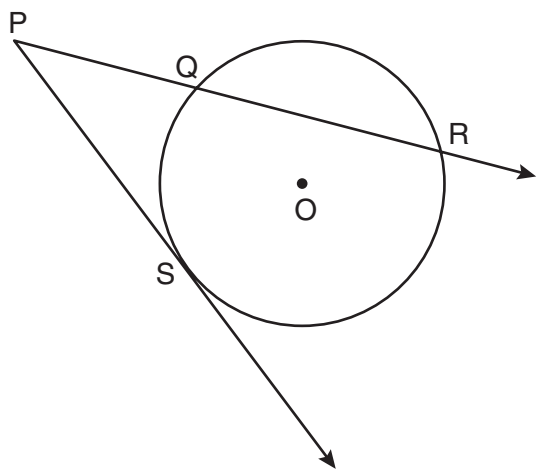


Which statement is always true?

- (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 $PR = x + 18$.



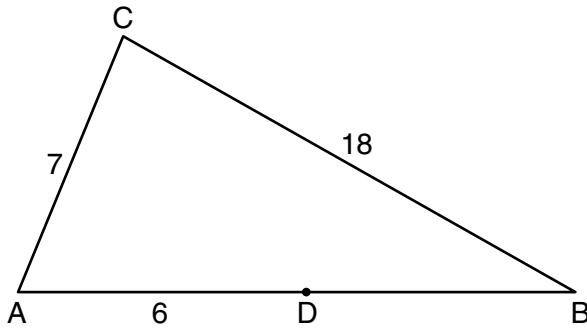
(Not drawn to scale)

What is the length of \overline{PS} ?

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

Use this space for
computations.

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

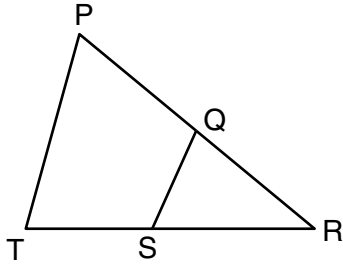


(Not drawn to scale)

The length of \overline{DB} could be

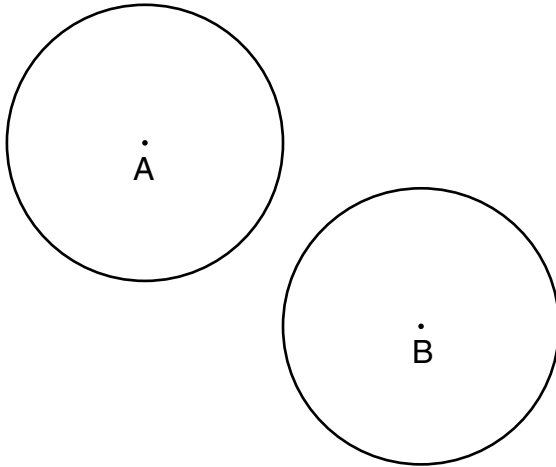
- (1) 5
(2) 12
(3) 19
(4) 25
- 20 The diameter of a circle has endpoints at $(-2,3)$ and $(6,3)$. What is an equation of the circle?
- (1) $(x - 2)^2 + (y - 3)^2 = 16$
(2) $(x - 2)^2 + (y - 3)^2 = 4$
(3) $(x + 2)^2 + (y + 3)^2 = 16$
(4) $(x + 2)^2 + (y + 3)^2 = 4$

- 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
 - (2) ASA
 - (3) SAS
 - (4) SSS
- 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 $B''(22,-4)$

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

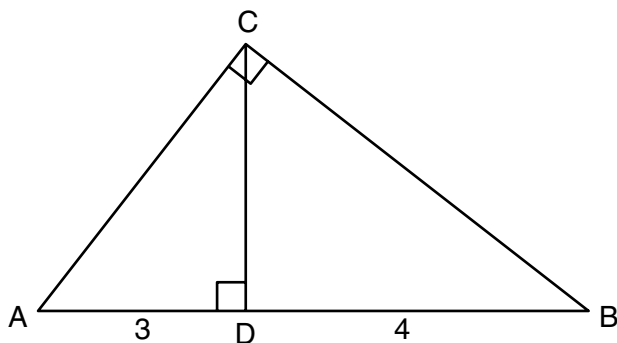
(2) $\frac{3}{5}$

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

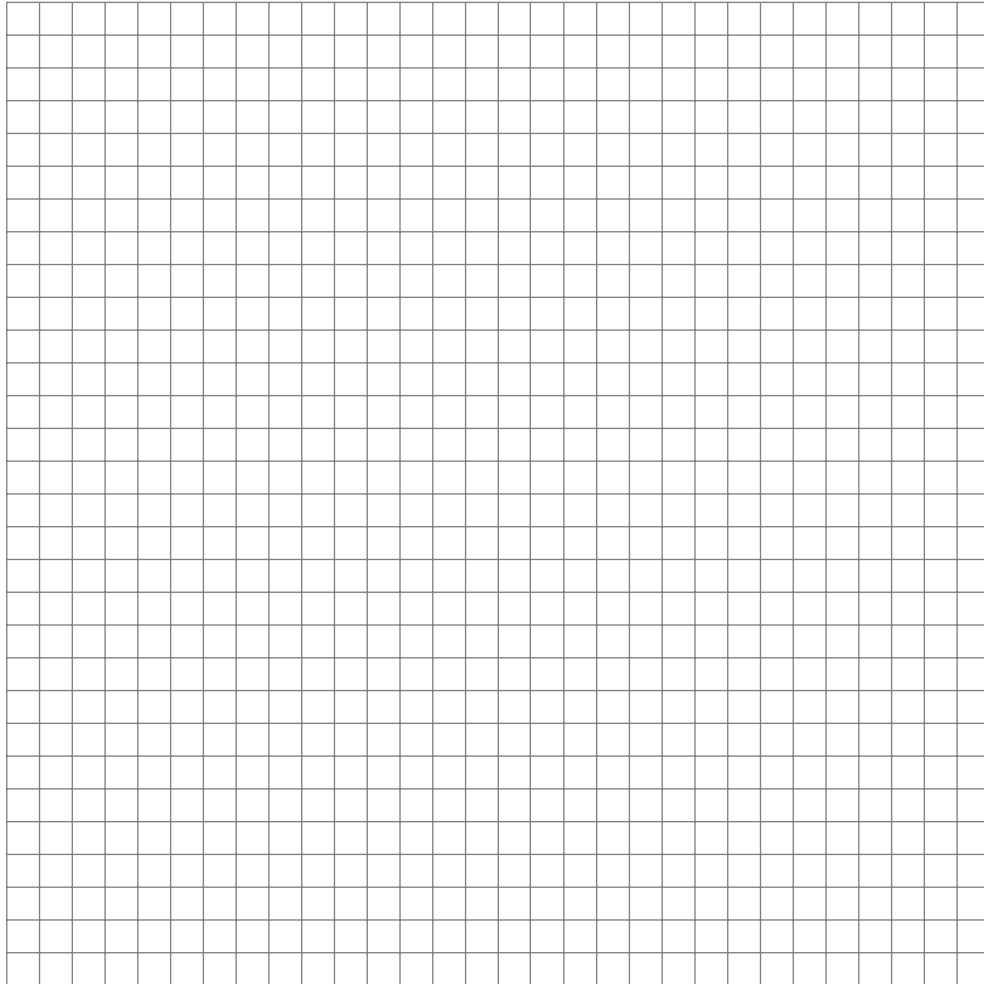
Part II

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.

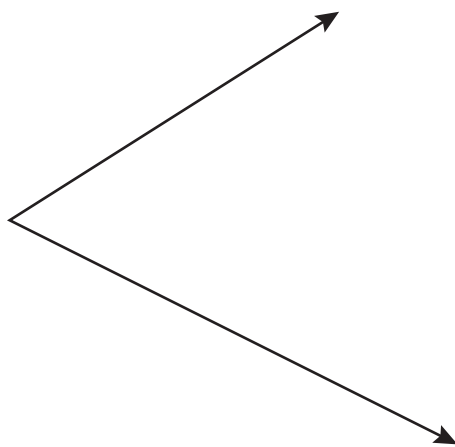


- 30 The vertices of $\triangle ABC$ are $A(3,2)$, $B(6,1)$, and $C(4,6)$. Identify and graph a transformation of $\triangle ABC$ such that its image, $\triangle A'B'C'$, results in $\overline{AB} \parallel \overline{A'B'}$.



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

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



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.

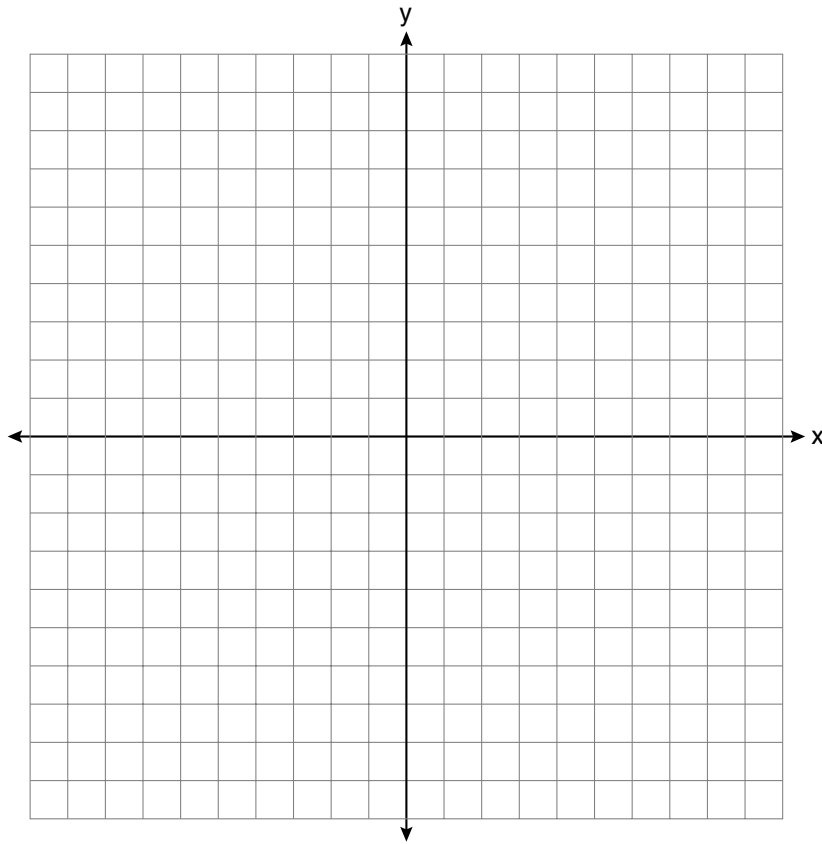
Part III

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]

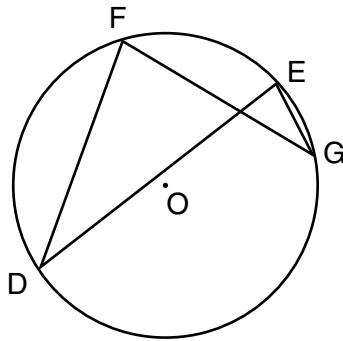
35 On the set of axes below, graph and label $\triangle DEF$ with vertices at $D(-4,-4)$, $E(-2,2)$, and $F(8,-2)$.

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

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

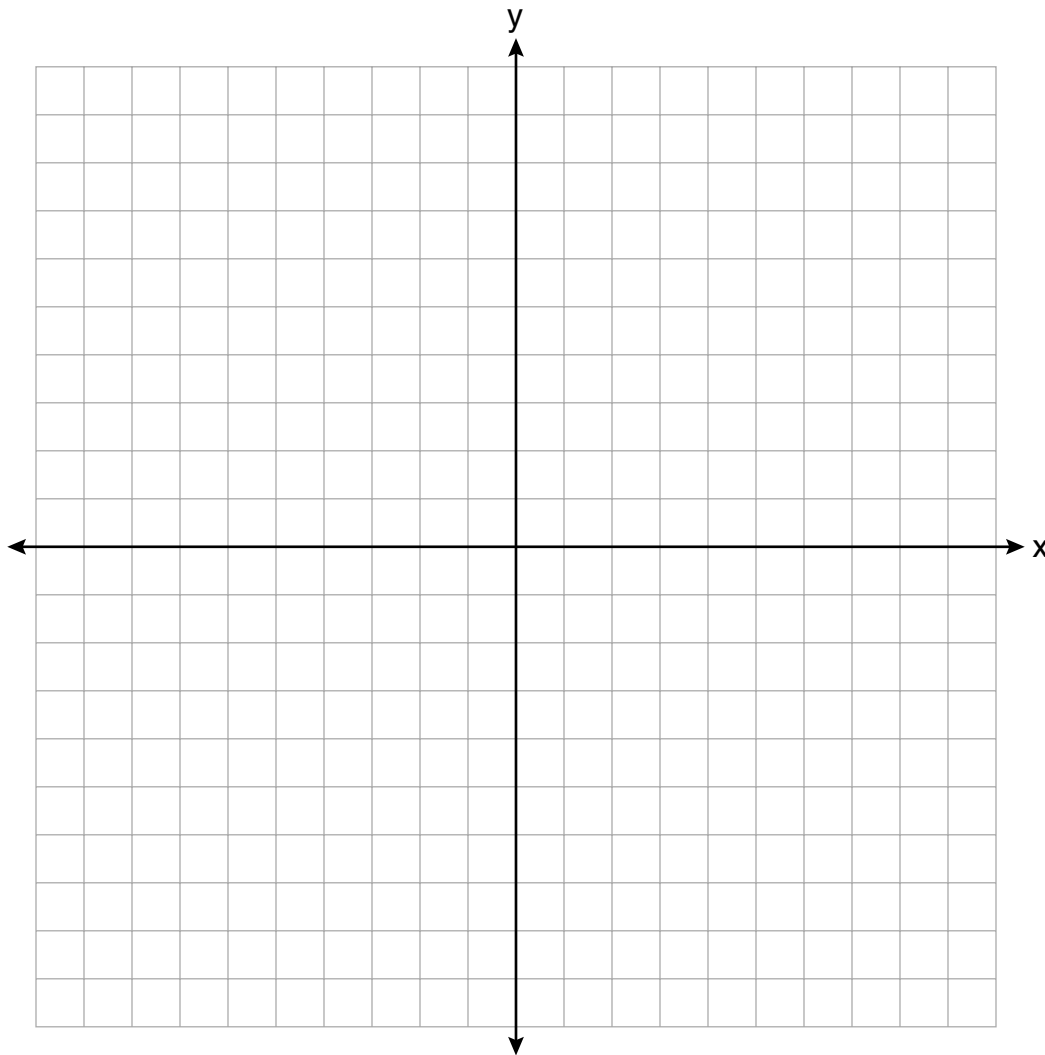


- 36 In the diagram below of circle O , chords \overline{DF} , \overline{DE} , \overline{FG} , and \overline{EG} are drawn such that $m\widehat{DF} : m\widehat{FE} : m\widehat{EG} : m\widehat{GD} = 5 : 2 : 1 : 7$. Identify one pair of inscribed angles that are congruent to each other and give their measure.



- 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 below, sketch the compound loci and label with an **X** all possible locations for the new park.

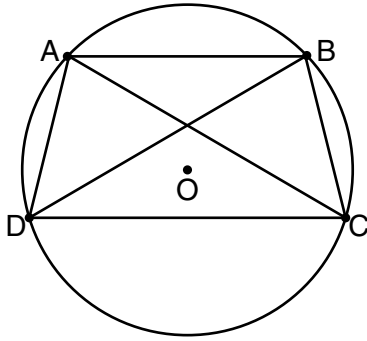


Part IV

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 $\triangle ACD \cong \triangle BDC$.



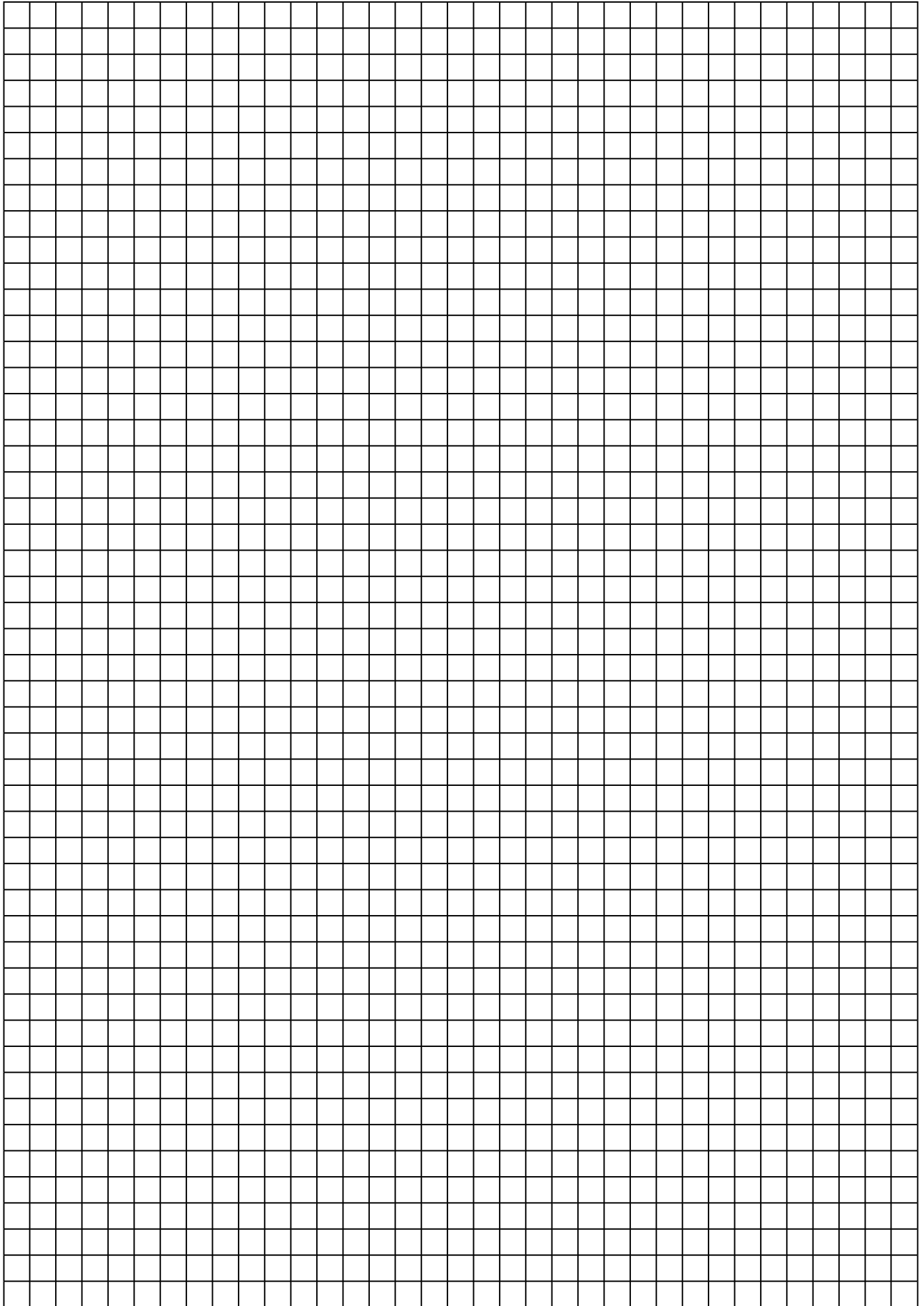
Geometry Reference Sheet

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	$V = \frac{4}{3}\pi r^3$

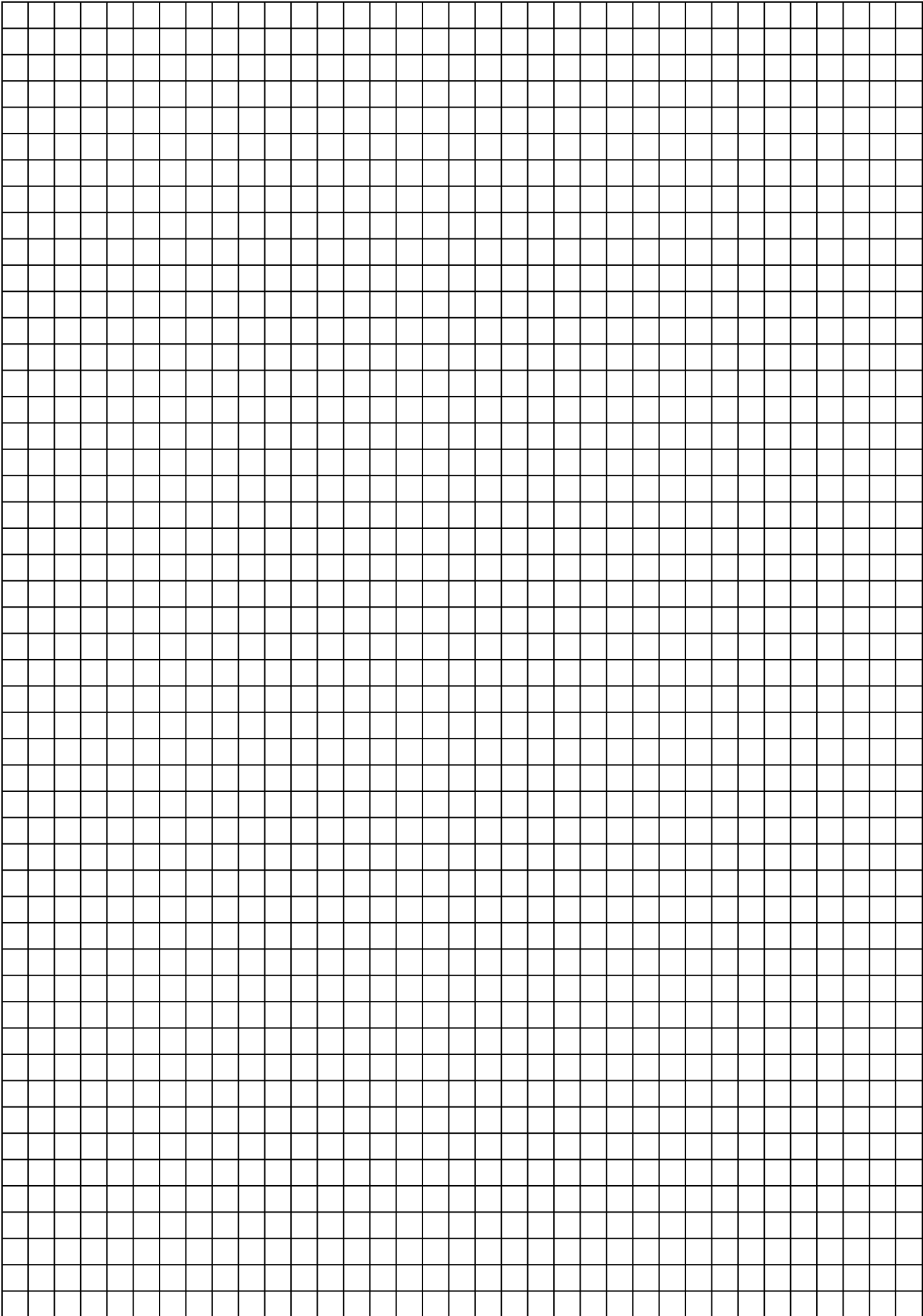
Lateral Area (L)	Right Circular Cylinder	$L = 2\pi rh$
	Right Circular Cone	$L = \pi rl$ where l is the slant height

Surface Area	Sphere	$SA = 4\pi r^2$
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Scrap Graph Paper — This sheet will *not* be scored.



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



GEOMETRY TEST SAMPLER

Fall 2008

ANSWER SHEET

Student Sex: Male Female Grade

Teacher School

Your answers to Part I should be recorded on 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

