To the Student:

After your registration is complete and your proctor has been approved, you may take the Credit by Examination for Geometry 1A.

WHAT TO BRING

- several sharpened No. 2 pencils
- a protractor
- a ruler
- graph paper
- a scientific calculator
- notebook paper (optional)

ABOUT THE EXAM

The exam consists of 75-82 problems. You will be given three hours to complete the exam. You will need to bring the materials listed above.

The examination is based on the Essential Knowledge and Skills for this subject. Questions are not taken from any one source, so you can prepare for the exam by reviewing any state-adopted geometry textbook. You must review all of the concepts of first-semester geometry. The textbook used with our Geometry 1A course is Geometry: Explorations and Applications by McDougal Littell (1998).

There is also a sample examination included with this letter. The sample exam will give you a model of the types of questions that will be asked on your examination. It is not a duplicate of the actual examination. It is provided to illustrate the format of the exam, not to serve as a review sheet.

Good luck on your examination!
Exam Objectives

Be sure you are able to perform each of the tasks in the following skill areas to prepare yourself for the Geometry 1A CBE. The actual exam will contain the formula chart included with this practice exam. When you take your examination, be sure to show all of your work and do not leave any questions blank.

Patterns, lines, and planes

- use inductive reasoning to make predictions;
- recognize transformations and use them to describe patterns and movement;
- analyze and create conjectures based on information you are given;
- use points, lines, planes, segments, and rays to sketch and identify relationships with tangible objects;
- draw conclusions about diagrams and their geometric relationships;
- sketch, identify, and measure angles in diagrams and real-life examples;
- learn to describe congruency and midpoints;
- identify transformations and reflections;

Triangles and polygons

- identify and classify angles;
- estimate and calculate angle measures;
- name, label, classify, sketch, and find measures of triangles and their angles;
- use triangles to describe real objects;
- describe a geometric figure’s properties;
- identify polygons;
- find the sum of the measures of interior and exterior angles of polygons;
- find specific measures for a given polygon;
- identify types of quadrilaterals;
- find the measures of angles and segments in quadrilaterals;
- name prisms and identify parts of prisms;
- sketch three-dimensional objects and analyze nets;

Reasoning

- use deductive reasoning to reach conclusions;
- make a convincing argument and recognize valid and invalid arguments;
- recognize and use postulates, definitions, and properties;
- justify statements about geometric figures;
- write and understand mathematical proofs;
- use mathematical reasoning to prove that a statement is always true;
- write a proof in two-column format;
- write the converse of a conditional statement;
- recognize and use converses in logical arguments;
- find the lengths of the sides of a right triangle;
• decide if a triangle is a right triangle;
• find lengths of parts of figures and real-life objects;
• determine whether a triangle is acute or obtuse from the lengths of its sides;
• write inverses and contrapositives of statements;
• recognize inverses and contrapositives in logical arguments;

Coordinates
• find the distance between two points and the coordinates of the midpoint of a segment;
• determine distances;
• classify polygons by the lengths of their sides;
• find the slope of a segment or a line and write equations of lines in slope-intercept form;
• graph and compare equations of lines;
• investigate geometric relationships using lines;
• find the slopes of parallel lines and perpendicular lines;
• identify circles and parts of circles;
• write equations for circles;
• describe circular shapes in the real world;
• place figures on coordinate axes and label their vertices;
• use algebraic methods to verify conjectures about triangles and quadrilaterals;
• find coordinates in three dimensions;
• use the distance formula and midpoint formula in three dimensions;
• identify and describe relationships between geometric figures in three dimensions;

Parallel Lines
• identify pairs of angles formed by transversals and lines
• find the measures of angles formed by transversals and lines;
• analyze real-world examples of intersecting lines;
• find the measures and identify types of angles formed by parallel lines and an intersecting transversal;
• identify trapezoids and solve problems involving their angle measure;
• prove lines are parallel;
• apply the converses of theorems, parallel lines, and transversals;
• use facts about angles to prove that two lines are parallel;
• recognize relationships among parallel and intersecting planes;
• identify parallel lines and planes in space;
• analyze real-world examples of parallel and perpendicular lines.
Geometry 1A
Practice Exam

Use inductive reasoning to find the next two numbers in each pattern.

1. 2, -2, 4, -4, ______, ______
2. 7, 12, 17, 22, ______, ______

Write a formula for the value of the $n$th term in each pattern.

3. 

<table>
<thead>
<tr>
<th>Term</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4…</th>
<th>$n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>6</td>
<td>11</td>
<td>16</td>
<td>21</td>
<td>…</td>
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4. 

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<td>Value</td>
<td>-4</td>
<td>-8</td>
<td>-12</td>
<td>-16</td>
<td>…</td>
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</table>

5. Reflect the figure over the line $EF$.

![Reflection Figure]

6. Translate the heart-shaped figure one inch to the right.

![Translated Figure]
7. Rotate the figure 90° counterclockwise around point $M$.

\[ \text{Diagram: } \begin{array}{c}
\text{\textarrow{left}}
\end{array} M \]

Circle the hypothesis and underline the conclusion of each conditional statement. Also, state whether the conditional is valid or invalid. If it is invalid, give a counterexample.

8. If a figure is a square, then it has four congruent sides.

9. If equilateral triangles are isosceles, then isosceles triangles are equilateral.

Sketch each situation.

10. $\angle EQF$ bisected by ray $QH$

11. plane $R$ intersecting line $A$ at point $Q$

Find the measure of each angle.

12. $\angle LES$

\[ \text{Diagram: } \begin{array}{c}
\text{\textangle{27\degree}}
\text{\textangle{57\degree}}
\text{\textangle{48\degree}}
\text{\textangle{S}}
\text{\textangle{E}}
\text{\textangle{D}}
\text{\textangle{L}}
\text{\textangle{K}}
\end{array} \]

13. $\angle CFM$

\[ \text{Diagram: } \begin{array}{c}
\text{\textangle{100\degree}}
\text{\textangle{60\degree}}
\text{\textangle{100\degree}}
\text{\textangle{Q}}
\end{array} \]
14. $M$ is the midpoint of the long segment. Find the value of $x$.

15. Using the following diagram, identify…
   A. a pair of corresponding angles.
   B. a pair of alternate exterior angles.
   C. the type of angles illustrated by $\angle 2$ and $\angle 5$.

16. Solve for $w$ and $z$.

17. Solve for $x$. 
18. How many lines of symmetry does the following polygon have? Classify the polygon, and be as specific as you can.

[Diagram of a square]

Sketch an example of each figure described in #19-21 below.

19. A quadrilateral with only one pair of parallel sides.

20. A concave heptagon with three pair of congruent sides.

21. A rectangular prism and then a net for the prism.

22. What polygon, if any, has angle measures that add up to $5400^\circ$?

23. Find $n$ if each exterior angle of a regular $n$-gon has a measure of $40^\circ$.

24. Find the sum of the measures of the exterior angles in a 20-gon.

25. Find the sum of the measures of the interior angles in an octagon.

26. Complete the two-step proof using the figure below.

[Diagram of two intersecting lines $m$ and $n$ with angles 3 and 4]

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<td>1. $\angle 3 \cong \angle 4$</td>
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</tr>
<tr>
<td>2. $m \parallel n$</td>
<td>2.</td>
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</table>
27. Use the graphic below to complete the two-column proof.

Given: line \( l \parallel \) line \( m \), \( \angle 4 \cong \angle 7 \)
Prove: \( \angle 1 \cong \angle 4 \)

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28. In the following sentence, identify the hypothesis and conclusion for the conditional statement, then write the converse, inverse, and contrapositive for the statement:

\textit{If you are happy, then you smile.}

29. Solve for \( x \) and \( y \).

30. Find the length and midpoint of the segment whose endpoints are \( A(-4,1) \) and \( B(4,3) \).
In #31-32 below, tell whether each triangle with the given side lengths is acute, right, or obtuse.

31. 36, 21, 51
32. 25, 60, 65
33. Can the lengths 9, 12, and 15 make a right triangle? Why or why not?

Use the diagram below for #34-36.

34. Name a segment that is skew to $CD$.
35. Name a segment parallel to $EF$.
36. Name a plane parallel to plane $ABC$.
37. Using your protractor, construct a $127^\circ$ angle.

38. Classify the following triangle.

39. Given $\angle A$ and $\angle B$ are complementary, and $m\angle A = 55^\circ$, find the $m\angle B$.

40. Find the slope of the line passing through the given points (5,-3) and (6,8).
Given rectangle $ABCD$, complete #41-43 below.

![Diagram of rectangle ABCD with angles and measurements]

41. $m \angle B = \underline{\phantom{000}}$

42. $AB = \underline{\phantom{000}}$

43. $m \angle ABE = \underline{\phantom{000}}$

44. Tell whether each pair of lines is parallel, perpendicular, or neither, and explain why.
   
   A. $y = 3x - 7$ and $y = 3x + 2$
   
   B. $y = 3x - 3$ and $y = -\frac{1}{4}x - 3$

45. Write the equation for the line that has slope 5 and y-intercept 7.

46. Write the equation for the line that has slope $\frac{3}{2}$ and contains the point (-2,7).

47. Write the equation for the horizontal line that contains (3,-5).

48. Write the equation for the circle with center (3,-2) and radius 3.

49. Given the following graph of the circle, write the equation.

![Diagram of a circle with center at (3,-2) and radius 3]
50. Find the exact length for $x$.

51. Find the values for $x, y$, and $z$.

52. Find the measure of $\angle 1$ and $\angle 2$, that would prove line $a$ and line $b$ are parallel.

\[
m\angle 1 = (5x - 10)^\circ \\
m\angle 2 = (3x + 30)^\circ
\]

53. Using the conditional statement, complete all the parts of the following proof.

If $M$ is the midpoint of $CD$, then $CM \cong MD$.

Given: ____________________
Prove: ____________________

Diagram:

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54. Complete the two-column proofs, write one statement per blank.

Given: $5x + 8 = 40 – 3x$

Prove: $x = 4$

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55. Given: $\angle 1 \cong \angle 4, \angle 2 \cong \angle 3$

Prove: $AB \parallel CD$

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</table>

56. Given the following vertices, determine the lengths of the sides $AB$, $BC$, and $AC$ to classify the triangle as isosceles, scalene, or equilateral. You must show your work.

$A(-3,5)$ and $B(-1,7)$ and $C(7,0)$
57. On your own paper, graph the lines \(x + y = 10\) and \(y = -x - 4\).

58. What do you notice about the two lines you graphed in #57 above?

59. Find the midpoint and the distance between the two points \(E(5,6,-3)\) and \(F(-2,5,-7)\) in the three-dimensional coordinate system.

60. On your own paper, graph points \(E\) and \(F\) along with the midpoint you found in #59 above on the 3-D coordinate system.

61. Given the following prism graphed in the 3-D coordinate system. Which plane is the face \(RSTU\) parallel to: the \(xy\), \(yz\), or \(xz\) plane?

For #62-65, answer always true, sometimes true, or never true.

62. A rhombus is a rectangle.

63. A parallelogram is a square.

64. A trapezoid is a parallelogram.

65. A quadrilateral is a polygon.

For #66-68, identify the property being used in each of the conditional statements.

66. If \(m\angle A = m\angle B\) and \(m\angle B = m\angle C\), then \(m\angle A = m\angle C\).

67. If \(x + 6 = 42\) and \(x = y\), then \(y + 6 = 42\).

68. If \(2x - 10 = 20\), then \(2x = 30\).
Using the given property in #69-70 below, complete the conditional statement.

69. Distributive property  
   If $3(y - 10) = -4$, then __________.

70. Multiplication property  
   If $\frac{x}{60} = 50$, then __________.

71. Given trapezoid $ABCD$, find the measures of $x$ and $y$.

![Trapezoid ABCD](image)

72. Classify the following quadrilateral as specifically as possible, using the given markings and measurements.

![Quadrilateral](image)

73. Classify the following quadrilateral as specifically as possible, using the given markings and measurements.

![Quadrilateral](image)

74. Name all of the bases for the prism.

![Prism](image)
75. Sketch a right pentagonal prism.

76. Sketch a net sufficient for a rectangular prism.

77. Name the prism formed from the following corresponding net.
Practice Exam Answer Key

1. 6, -6 or 8, -8
2. 27, 32
3. $5n + 1$
4. $-4n$
5. 

6. 

7. 

8. If a figure is a square, then it has four congruent sides.  valid

9. If equilateral triangles are isosceles, then isosceles triangles are equilateral.  invalid; not all isosceles triangles are equilateral.

10.
11. 

12. $57 + 27 + 48 = 132^\circ$

13. $100 - 60 = \frac{40}{2} = 20^\circ$

14. $4x - 15 = 2x + 25$

   $2x - 15 = 25$
   
   $2x = 25 + 15$
   
   $2x = 40$
   
   $x = 20$

15. A. answers vary but could include (2,7), (3,8), (7,9), (8,12), (4,5)
    B. answers vary but could include (1,8), (2,5), (7,11), (6,12)
    C. alternate exterior angles

16. $146 + w = 180$

   $w = 180 - 146$
   
   $w = 34$

   $34 + 22 + z = 180$

   $56 + z = 180$
   
   $z = 124$

17. $2x + 52 = 180$

   $2x = 128$
   
   $x = 64$

18. Four lines of symmetry: square, quadrilateral, rectangle, rhombus

19. 

20. 

17
21. 

22. \((n - 2)180 = 5400^\circ; 32\text{-gon}\)

23. \[
\frac{360}{n} = 40 \\
\therefore n = 9
\]

24. \(360^\circ\)

25. \((8 - 2)180 = 6 \times 180 = 1080^\circ\)

26.

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<td>2. (m \parallel n)</td>
<td>2. If alternate interior angles are congruent, then the lines are parallel.</td>
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<td>1. line (l \parallel m)</td>
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<tr>
<td>2. (\angle 4 \cong \angle 7)</td>
<td>2. given</td>
</tr>
<tr>
<td>3. (\angle 1 \cong \angle 7)</td>
<td>3. If lines are parallel, then corresponding angles are congruent.</td>
</tr>
<tr>
<td>4. (\angle 1 \cong \angle 4)</td>
<td>4. transitive/substitution</td>
</tr>
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</table>

28. hypothesis: you are happy
conclusion: you smile
converse: If you smile, then you are happy.
inverse: If you are not happy, then you do not smile.
contrapositive: If you do not smile, then you are not happy.
29. \[4^2 + 3^2 = x^2 \quad 3^2 + 6^2 = y^2\]
   \[16 + 9 = x^2 \quad 9 + 36 = y^2\]
   \[25 = x^2 \quad 45 = y^2\]
   \[\sqrt{25} = x \quad \sqrt{45} = y\]
   \[5 = x\]

30. \[M = \left(\frac{-4 + 4}{2}, \frac{1+3}{2}\right) = \left(0, \frac{4}{2}\right) = (0, 2)\]

31. \[21^2 + 36^2 < 51^2; \text{ obtuse}\]

32. \[25^2 + 60^2 = 65^2; \text{ right}\]

33. yes, the lengths can make a right triangle because \[a^2 + b^2 = c^2, \text{ and } 9^2 + 12^2 = 15^2\]

34. \[\overline{FE}, \overline{HG}, \overline{FA}, \overline{GB}\]

35. \[\overline{AD}, \overline{CB}, \overline{GH}\]

36. \[EFGH\]

37. \[127^\circ\]

38. scalene acute

39. \[55^\circ + \angle B = 90^\circ\]
   \[\angle B = 90^\circ - 55^\circ\]
   \[\angle B = 35^\circ\]

40. \[m = \frac{-3-8}{5-6} = \frac{-11}{-1} = 11\]

41. \[m\angle B = 90^\circ\]

42. \[AB = 10 \text{ m}\]

43. \[m\angle ABE = 54^\circ (90 - 36 = 54^\circ)\]

44. A. parallel because they have the same slope
   B. slopes are neither parallel nor perpendicular
45. \( y = 5x + 7 \)

46. \( y = \frac{3}{2}x + b \)
   
   \[
   7 = \frac{3}{2}(-2) + b
   \]
   
   \[
   7 = -3 + b
   \]
   
   \[10 = b\]
   
   \[
   y = \frac{3}{2}x + 10
   \]

47. \( y = -5 \)

48. \((x - 3)^2 + (y + 2)^2 = 9\)

49. center \((0, -4); r = 5\); equation: \(x^2 + (y + 4)^2 = 25\)

50. \(4^2 + x^2 = 10^2\)
   
   \[
   16 - 16 + x^2 = 100 - 16
   \]
   
   \[
   \sqrt{x^2} = \sqrt{84}
   \]
   
   \[x = \sqrt{84} = \sqrt{4 \times 21} = 2\sqrt{21}\]

51. \(x = 20^\circ; y = 160^\circ; z = 80^\circ\)

   \[
   5x - 10 + 3x + 30 = 180
   \]
   
   \[
   8x + 20 - 20 = 180 - 20
   \]
   
   \[
   8x = 160
   \]
   
   \[x = 20\]

52. \(m\angle 1 = 5(20) - 10 = 90\)

   \[
   m\angle 2 = 3(20) + 30 = 90
   \]
53. Given: \( M \) is the midpoint of \( CD \)
Prove: \( CM \cong MD \)

Diagram: \( \begin{array}{ccc} C & M & D \end{array} \)

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<td>2. ( CM \cong MD )</td>
<td>2. definition of midpoint</td>
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54.

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</tr>
<tr>
<td>2. ( 5x = 32 - 3x )</td>
<td>2. subtraction</td>
</tr>
<tr>
<td>3. ( 8x = 32 )</td>
<td>3. addition</td>
</tr>
<tr>
<td>4. ( x = 4 )</td>
<td>4. division</td>
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55.

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<td>2. ( \angle 2 \cong \angle 3 )</td>
<td>2. given</td>
</tr>
<tr>
<td>3. ( \angle 4 \cong \angle 3 )</td>
<td>3. vertical angles are congruent</td>
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<tr>
<td>4. ( \angle 1 \cong \angle 2 )</td>
<td>4. transitive/substitution</td>
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<tr>
<td>5. ( AB \parallel CD )</td>
<td>5. If alternate interior angles are congruent, then lines are parallel.</td>
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56. scalene
57. 

58. parallel; same slope

59. \[ M = \left( \frac{5+2}{2}, \frac{6+5}{2}, \frac{-3+7}{2} \right) \]

\[ = \left( \frac{3}{2}, \frac{1}{2}, \frac{-5}{2} \right) \]

\[ d = \sqrt{(5-2)^2 + (6-5)^2 + (-3+7)^2} \]

\[ = \sqrt{7^2 + 1^2 + 4^2} \]

\[ = \sqrt{49 + 1 + 16} \]

\[ = \sqrt{66} \]

60. 

61. xy plane

62. sometimes true

63. sometimes true

64. never true
65. always true
66. transitive/substitution
67. substitution
68. addition
69. $3y - 30 = -4$
70. $x = 3000$
71. $x = 78^\circ, y = 100^\circ$
72. rectangle
73. rhombus
74. $\triangle EFG, \triangle JIH$
75. 

76. 

77. hexagonal prism
Formula Chart

Angles in a Polygon

- Sum of interior angles in a convex polygon is \((n - 2)(180)\), where \(n\) represents the number of sides.
- Measure of each interior angle in a regular convex polygon is \((n - 2)(180)/n\), where \(n\) represents the number of sides.
- Sum of the exterior angles in a convex polygon is \(360^\circ\).
- Measure of each exterior angle in a regular convex polygon is \(360/n\), where \(n\) represents the number of sides.

Pythagorean Theorem

- If you have a right triangle whose legs are \(a\) and \(b\), with hypotenuse \(c\), then \(a^2 + b^2 = c^2\).

Coordinate Geometry

- Distance formula: \(d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}\)
- Simplify square root answers or round to the nearest hundredth.
- Midpoint formula: \(M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)\)
- Slope formula: \(m = \frac{y_2 - y_1}{x_2 - x_1}\)
- Slope intercept formula for the equation of a line: \(y = mx + b\)
- Equation of a circle with center \((h,k)\) and radius \(r\): \((x - h)^2 + (y - k)^2 = r^2\)

Coordinate geometry in the third dimension

- Distance formula: \(d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}\)
- Midpoint formula: \(M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2}\right)\)