Mr. Jonathan Frank
Mercy High School
Geometry
Summer Preparatory Work

Dear Student,

As you prepare for your studies at Mercy High School in this upcoming 2019-2020 school year, this packet provides work to assist you in reviewing and maintaining skills learned in Algebra 1, and to introduce you to definitions and notations which will be used in your Geometry course. A reasonably large number of problems are included in these pages.

Over the summer, carefully complete as many of these problems as you are able to. To do so, it will be advisable to take **some time each week** to work on this task. Your honest effort will assist us in correctly understanding your abilities and background in mathematics. Completing these problems will also demonstrate your abilities to organize your time and reflect on previous lessons as you take ownership of your own approach to learning.

The first two pages provided are from the final review section of the Holt McDougal *Algebra 1: Concepts and Skills* textbook currently used at Mercy High School. **All students** should be able to **complete problems 1-32**. Students enrolled in an **Honors** course ought **also** to be able to **answer a significant number** of the problems in the remaining sections, **problems 33-77**. (Others are also free to answer any of these questions if you are able to, regardless of your course selection!)

The next two pages are an introduction to geometric terminology, taken from resource material for the McDougall Littell *Basic Geometry* textbook, a book I use regularly as a source of additional practice problems or alternative explanations in addition to our main textbook series. **All students should attempt to answer these questions 1-23**.

You will be asked to **turn in your work on the first day of classes** in September. Please write out your work and **answers for all questions on separate paper**, and turn your work in on that day. This will provide your first grade in mathematics for the year, but do not stress too much over that aspect: the major consideration in this grade will be the effort demonstrated rather than total accuracy, and this assignment will not have an undue influence on your grade for the semester. Simply having spent the time to keep the idea of mathematics in your mind over the summer will be a significant boost to your studies.

Thanks for your time,

Jonathan Frank

Chapters 1-12 Cumulative Practice

Write the sentence as an equation or an inequality. Then use mental math to solve the equation or the inequality. (1.4–1.5)

1. The quotient of m and 7 is greater than or equal to 16.

2. The sum of 4 and the second power of b is equal to 104.

3. The distance t you travel by train is 3 times the distance d you live from the train station. You drive 3 miles to get from your house to the train station.

Evaluate the expression for the given value of the variable. (2.2–2.6, 2.8)

4. $3 + x + (-4)$ when $x = 5$

5. $2x + 12 - 5$ when $x = 9$

6. $3.5 - (-x)$ when $x = 1.5$

7. $-(-3)^2(x)$ when $x = 7$

8. $6x(x + 2)$ when $x = 2$

9. $(8x + 1)(-3)$ when $x = 1$

10. $\frac{1}{4}|(x)(x)(-x)|$ when $x = 4$

11. $\frac{x^2 + 4}{6}$ when $x = 8$

12. $(-5)\left(-\frac{3}{4}x\right)$ when $x = 6$

Solve the equation. Round your solution to the nearest hundredth. (3.1–3.4, 3.6)

13. $-\frac{2}{9}(x - 5) = 12$

14. $7x - (3x - 2) = 38$

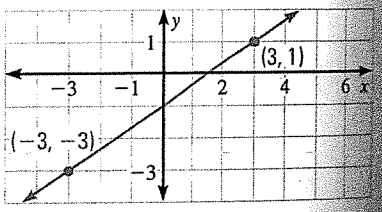
15. $\frac{1}{3}x + 7 = -7x - 5$

16. $8(x + 3) - 2x = 4(x - 8)$

17. $11 + 6.23x = 7 + 5.51x$

18. $-3(2.9 - 4.1x) = 9.2x + 6$

In Exercises 19 and 20, use the graph. (4.7, 5.3, 5.6)



19. Write an equation of a line passing through the point $(2, -2)$ and parallel to the line shown.

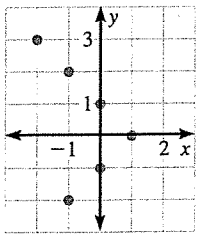
20. Write an equation of a line passing through the point $(-4, 2)$ and perpendicular to the line shown. Graph the equation in the same coordinate plane to check your answer.

Determine whether the relation is a function. If it is a function, give the domain and the range. (4.8)

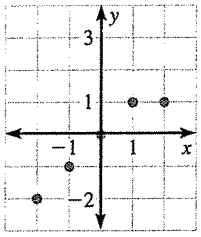
21.

Input	Output
−1	−1
1	−1
3	1
5	3

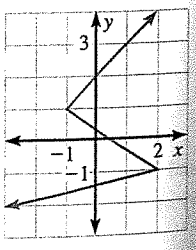
22.



23.



24.



Write in standard form the equation of the line described below. (5.1–5.2)

25. Slope $= \frac{4}{5}$, y-intercept $= -3$

26. $(-1, 2)$, $m = \frac{1}{3}$

Solve the inequality. Then graph the solution. (6.3–6.5)

27. $-3 < -4x + 9 \leq 14$

28. $|3x + 16| + 2 < 10$

29. $3x - 4 > 5$ or $5x + 1 < 11$

Solve the linear system. (7.2–7.3)

30. $4y = 8x + 16$
$2y = 11x - 7$

31. $-2x + 3y = 15$
$10x - 11y = 9$

32. $y = 5x - 2$
$3x + 7y = 5$

Simplify. Then evaluate the expression when $a = 1$ and $b = 2$. (8.1–8.2, 8.4)

33. $\frac{b^8}{b^2}$

34. $3a^4 \cdot a^{-3}$

35. $(-a^3)(2b^2)^3$

36. $4b^3 \cdot (2 + b)^2$

37. $\frac{4a^{-3}b^3}{ab^{-2}}$

38. $\frac{(5ab^2)^{-2}}{a^{-3}b}$

Determine whether the equation has *two solutions*, *one solution*, or *no real solution*. Then solve the equation. (9.2, 9.6–9.7, 10.5)

39. $6x^2 + 8 = 34$

40. $4x^2 - 9x + 5 = 0$

41. $3x^2 + 6x + 3 = 0$

Completely factor the expression. (10.5–10.7)

42. $x^2 + 6x + 8$

43. $x^2 - 24x - 112$

44. $3x^2 + 17x - 6$

45. $4x^2 + 12x + 9$

46. $x^2 + 10x + 25$

47. $x^2 - 14x + 49$

Solve the equation. (10.4–10.8)

48. $(3x + 1)(2x + 7) = 0$

49. $6x^2 - x - 7 = 8$

50. $x^2 - 4x + 4 = 0$

51. $4x^2 + 16x + 16 = 0$

52. $x^3 + 5x^2 - 4x - 20 = 0$

53. $x^4 + 9x^3 + 18x^2 = 0$

Simplify the expression. (11.3–11.7)

54. $\frac{4x}{12x^2}$

55. $\frac{2x + 6}{x^2 - 9}$

56. $\frac{3x}{x^2 - 2x - 24} \cdot \frac{x - 6}{6x^2 + 9x}$

57. $\frac{x^2 - 6x + 8}{x^2 - 2x} \div (3x - 12)$

58. $\frac{4}{x + 2} + \frac{15x}{3x + 6}$

59. $\frac{3x}{x + 4} - \frac{x}{x - 1}$

Simplify the expression. (12.2)

60. $4\sqrt{7} + 3\sqrt{7}$

61. $9\sqrt{2} - 12\sqrt{8}$

62. $\sqrt{6}(5\sqrt{3} + 6)$

63. $\frac{11}{7 - \sqrt{3}}$

Solve the equation by completing the square. (12.5)

64. $x^2 + 24x = -3$

65. $x^2 - 12x = 19$

66. $x^2 + 20x = -7$

67. $x^2 - 6x - 13 = 0$

68. $x^2 + 16x - 1 = 0$

69. $x^2 + 22x + 5 = 0$

Find the distance between the two points. Round your solution to the nearest hundredth if necessary. Then find the midpoint of the line segment connecting the two points. (12.7–12.8)

70. $(3, 0), (-5, 4)$

71. $(2, 7), (4, 3)$

72. $(5, 1), (1, -5)$

73. $(6, 2), (-2, -3)$

74. $(-1, 2), (6, 9)$

75. $(0, 4), (10, 11)$

76. $(-5, -7), (5, 7)$

77. $(1, -1), (3, 10)$

NAME _____ DATE _____

1–2 Points, Lines, and Planes

Objectives: Use the terms *point*, *line*, *plane*, *collinear*, *coplanar*, and *intersection*. Draw representations of points, lines, and planes.

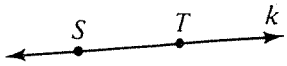
In any mathematical system there are some intuitive ideas that are accepted without definition. In geometry, the terms *point*, *line*, and *plane* are not defined. These terms, which are described below, are then used in the definitions of other terms.

A **point** is a location. A point has no length, no width, and no thickness.

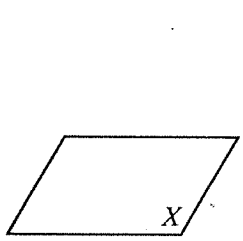
point R R

A **line** is an infinite set of points that extends in two directions. A line has length, but no width and no thickness.

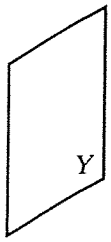
line k $\overleftrightarrow{ST}$



A **plane** is an infinite set of points that creates a flat surface that extends without ending. A plane has length and width, but no thickness.



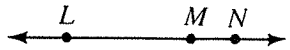
Plane X
Horizontal plane



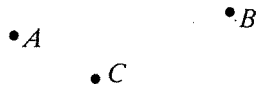
Plane Y
Vertical plane

space the set of all points

collinear points on the same line
Points L, M, and N are collinear.

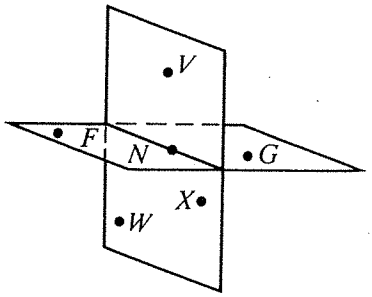


noncollinear points not on the same line
Points A, B, and C are noncollinear.



coplanar points in the same plane
Points W, X, V, and N are coplanar.

noncoplanar points not in the same plane
Points W, X, F, and G are noncoplanar.

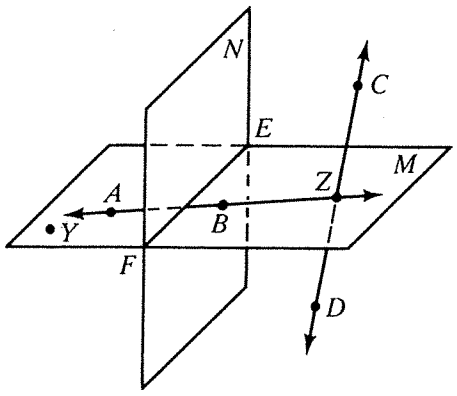


NAME _____ DATE _____

1–2 Points, Lines, and Planes *(continued)*

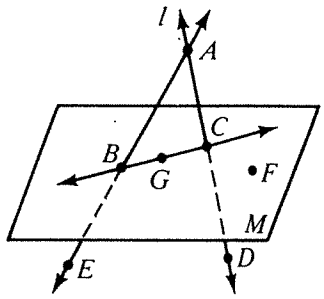
intersection the set of points in both figures
(Dashes in the diagrams indicate parts hidden from view.)

Z is **on** $\overleftrightarrow{AB}$.
$\overleftrightarrow{AB}$ **contains** Z.
$\overleftrightarrow{AB}$ **passes through** Z.
$\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ **intersect at** Z.
Plane M contains $\overleftrightarrow{AB}$ and Y.
$\overleftrightarrow{CD}$ intersects M at Z.
M and N intersect in $\overleftrightarrow{EF}$.
$\overleftrightarrow{EF}$ is the **intersection of** M and N.
M and N contain $\overleftrightarrow{EF}$.



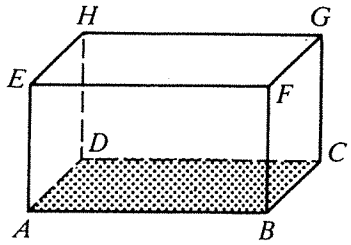
Classify each statement as true or false.

1. $\overleftrightarrow{BC}$ is in plane M.
2. Plane M contains $\overleftrightarrow{AB}$.
3. Line l intersects $\overleftrightarrow{AB}$ at point B.
4. $\overleftrightarrow{AB}$ and $\overleftrightarrow{DA}$ intersect at A.
5. $\overleftrightarrow{AD}$ is in plane M.
6. Plane M intersects $\overleftrightarrow{AE}$ at point B.
7. $\overleftrightarrow{AE}$ intersects plane M at point B.
8. A, B, and E are collinear.
9. B, F, and D are collinear.
10. A, B, and C are coplanar.
11. B, C, F, and G are coplanar.
12. A, B, C, and G are coplanar.
13. A, B, C, and F are coplanar.



The plane that contains the shaded region can be called plane *ABCD*.

14. Name three lines that intersect at point G.
15. Name two planes whose intersection is $\overleftrightarrow{FB}$.
16. Name the intersection of plane $EHGF$ and plane $EFBA$.
17. Name two planes that do not intersect.
18. Are points D, H, G, and C coplanar?
19. Are points D, H, G, and F coplanar?
20. Are points A, B, G, and H coplanar?



Sketch and label the figures described. Use dashes for parts hidden from view.

21. Line $\overleftrightarrow{AB}$ intersects plane X at point C.
22. Two planes M and N intersect in line l.
23. Horizontal plane P contains two lines $\overleftrightarrow{RS}$ and $\overleftrightarrow{TU}$ that intersect at point O.