The Philosophy and Geometry of René Descartes

Worksheet #1

1 (unity) ————

a ————————————

b ————————————————

Do each the following constructions (with just a straight edge and a compass), using Descartes' geometric method, given the above line segments.

Make sure your answer is a line segment that has been colored in so that it stands out.

(You may use the backside if you need more room.)

1) $a + b$
2) $b - a$
3) $a \cdot b$
4) $a \div b$
5) $b \div a$
6) a^2
7) $\sqrt{a}$
8) $\sqrt{b-1}$
9) $\frac{a^3}{3b}$

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Worksheet #2

k ———————————————————————

j ——————————

h ——————————————————

Do each the following constructions (with just a straight edge and a compass), using Descartes' geometric method, given the above line segments.

Make sure your answer is a line segment that has been colored in so that it stands out.

(You may use the backside if you need more room.)

1) $x^2 = -jx + k^2$

2) $x^2 = -kx + j^2$

3) $x^2 = jx + k^2$

4) $x^2 = hx + k^2$

5) $x^2 = kx - j^2$

6) $x^2 = kx - h^2$

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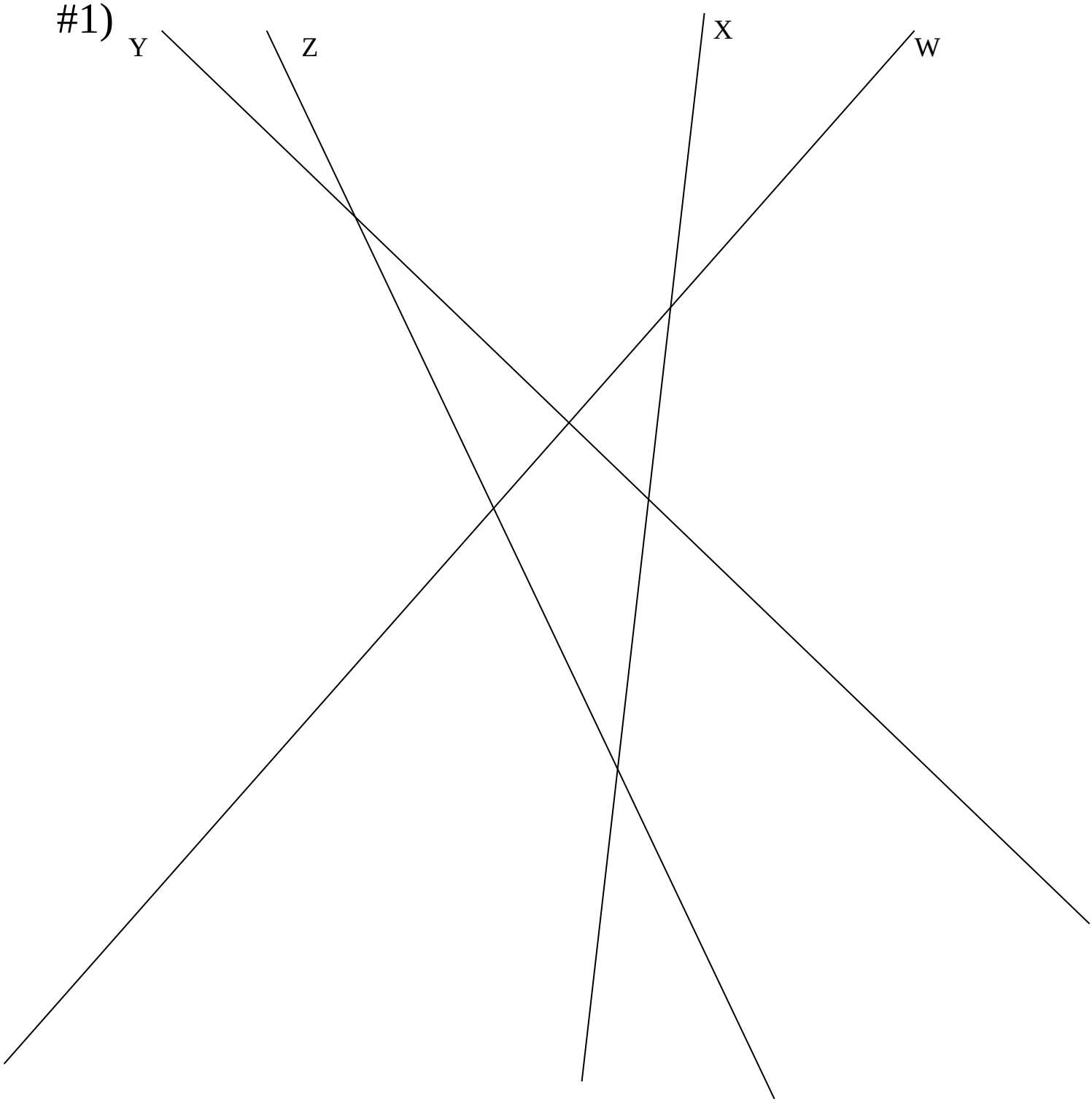
Worksheet #3

The Pappus Problem!

For each problem, find the locus of points such that $W \cdot X = Y \cdot Z$, where W is the distance from a given point on the curve to line w; X is the distance from the same point to line x; Y is the distance from the same point to line y; and Z is the distance from the same point to line z. (There are infinite such points that satisfy the given conditions. These points combine to form a curve.)

#1)



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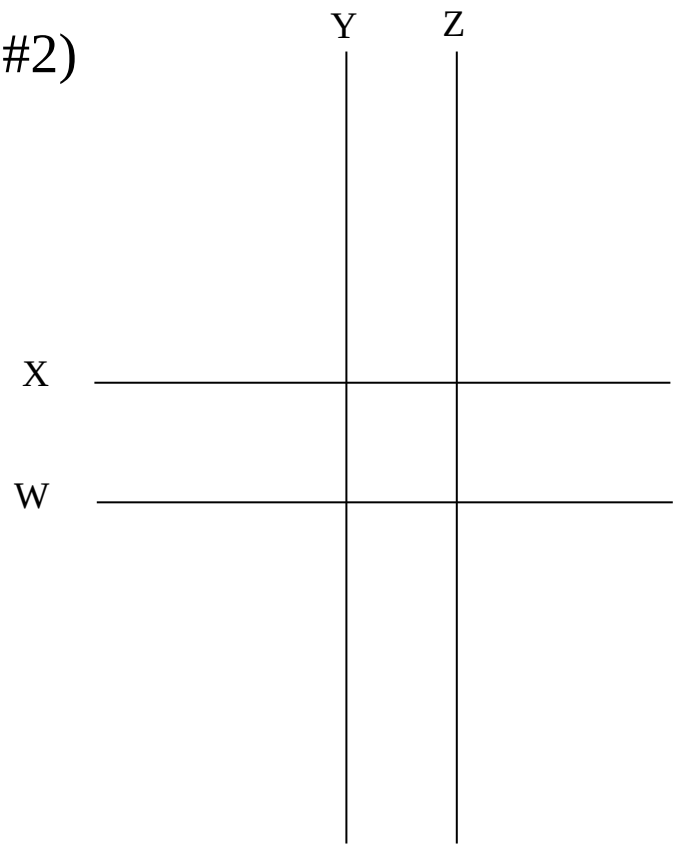

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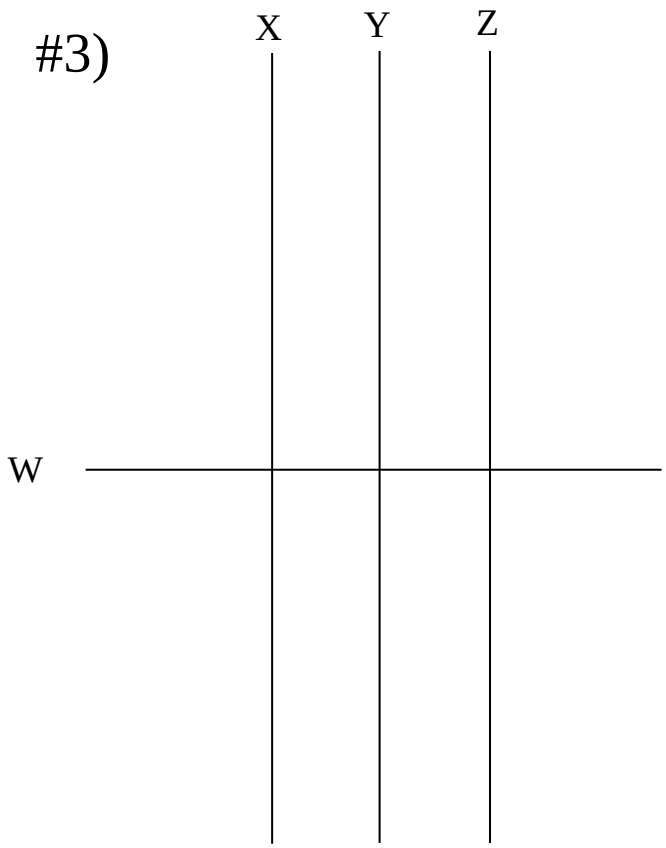

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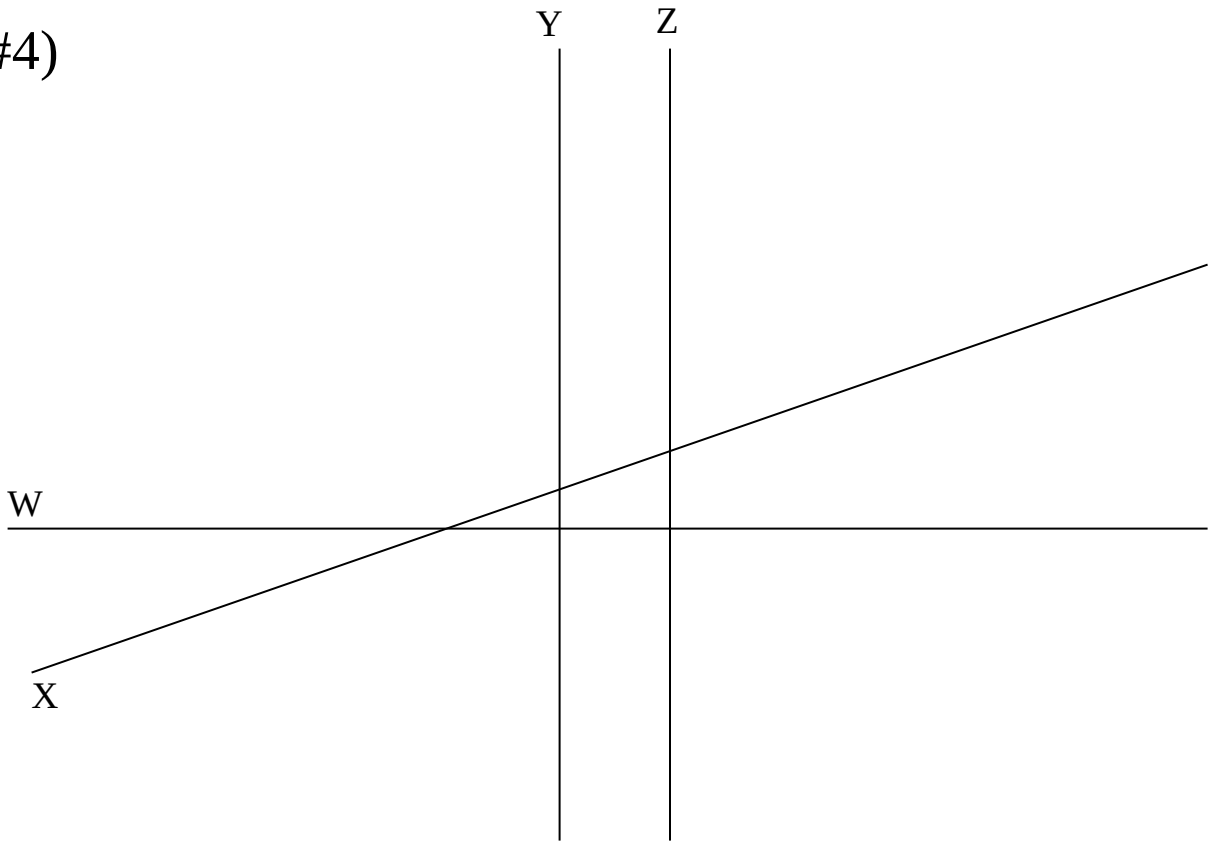

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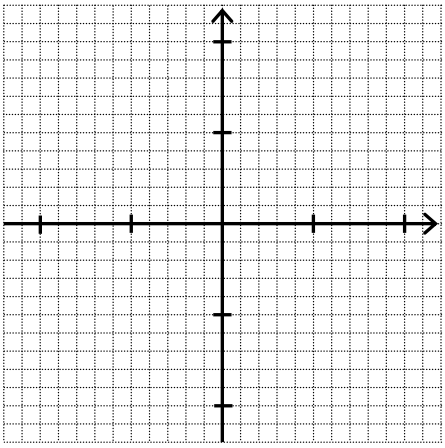
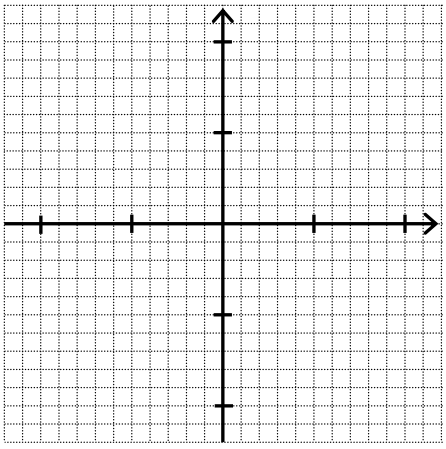
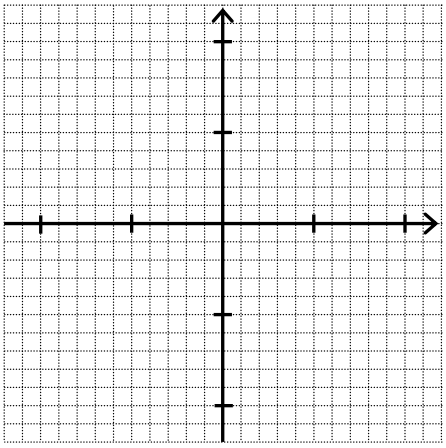
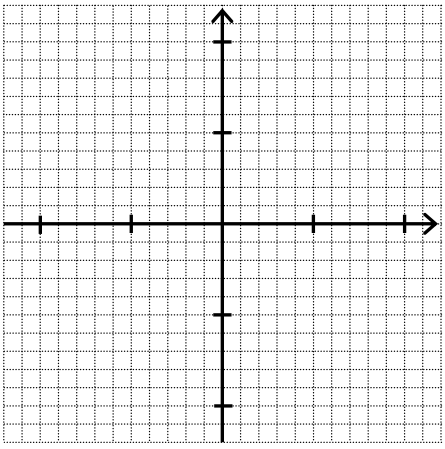
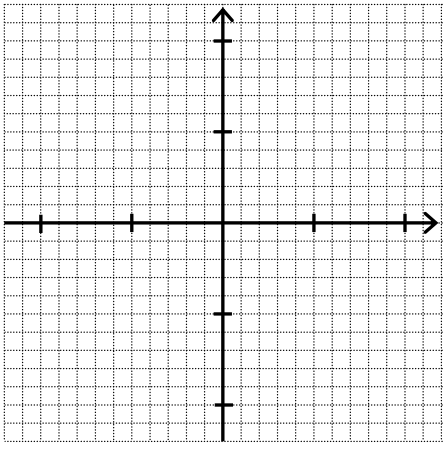
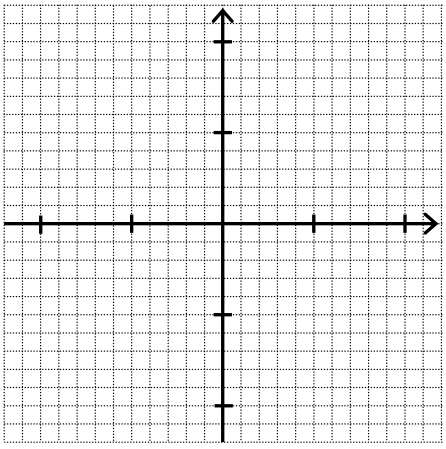
Worksheet #4

Modern Coordinate Geometry!

Graph each of the equations on the below graphs.
(Remember the Golden Rules of Cartesian Geometry!)

1) $y = -3x + 2$
2) $y = x^2 - 6$
3) $(x+2)^2 + (y-3)^2 = 25$
4) $y = x^4 - 9x^2$
5) $y = \frac{8x}{x^2 - 9}$

The Philosophy and Geometry of René Descartes

Review Sheet

f ———————————————————————

e ——————

g ————————————

h ————————————————

1 ——

Do each the following constructions (with just a straight edge and a compass), using Descartes' geometric method, given the above line segments.

Make sure your answer is a line segment that has been colored in so that it stands out.

Also, state the length (in cm) of your final answer.

1) $e \cdot g$
2) $f \div g$
3) $\sqrt{g}$
4) $x^2 = -hx + g^2$
5) $x^2 = fx - e^2$
6) $x^2 = hx + g^2$
7) $x^2 = -fx - e^2$

Essay Questions

Some possible questions for the test include, but are not limited to:

1) Give an outline of the main text of Descartes' book *The Method*.
2) Give an outline of Descartes' appendix *La Géométie*.
3) What was new about Descartes' geometry? What was its impact on the world?
4) What are the key aspects of Descartes' general philosophy? What was its impact?
5) What are the key aspects of the Cartesian-Newtonian scientific method? What was its impact?
6) Describe the Pappus problem and its solution.
7) How was Descartes' ideas about the Pappus problem different from what the Greeks would have done?
8) Describe each of the conic sections.
9) How has this course changed your thinking or changed the way you see the world?