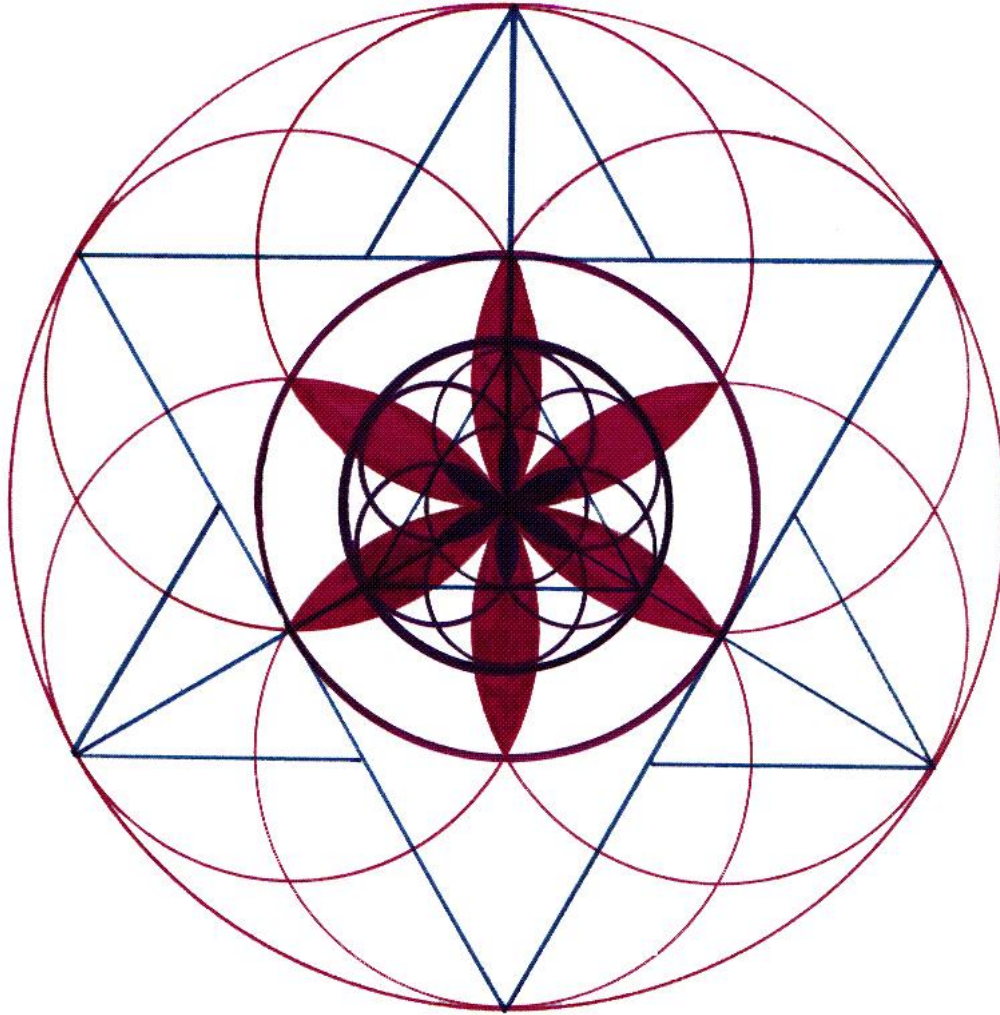# Magnet Geometry Summer Packet

Complete the following problems on **separate paper,** showing all steps necessary to justify your answer; no credit will be given for work done on this paper. Be sure to include units in your answers, where appropriate. Do all work in pencil. Please bring your work and this packet on the first day of class. It will be discussed and corrected, and then collected. It will count as your first graded assignment.

A. Algebra Review

1. Simplify each expression, putting your answer in simplest radical form.

   a. $\sqrt{180} - 4\sqrt{125} + 3\sqrt{75}$

   b. $\left(2\sqrt{5} - 3\right)^2$

   c. $\sqrt{\dfrac{3}{8}}$

   d. $\dfrac{14 - \sqrt{80}}{2}$

2. a. State the quadratic formula; b. Use the quadratic formula to solve the following equation: $2a^2 - 3a = 18$

3. Factor and solve:

   a. $x^2 - x - 72 = 0$

   b. $2x^2 + 9x - 5 = 0$

   c. $x^2 - 64 = 0$

   d. $4x^2 - 36x + 72 = 0$

4. Solve each of the following:

   a. $\dfrac{x}{5} = \dfrac{12}{25}$

   b. $\dfrac{6}{x+3} = \dfrac{4}{2x-7}$

   c. $\dfrac{2}{3}x + 4 = 6$
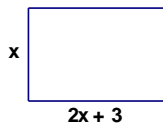
   d. $2(x + 1) - 3 = 4$

5. Solve each system of equations using the method specified. Express your answer as an ordered pair.

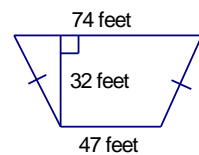   a. $y = 7x - 1$; $y = 2x + 9$
      (substitution)

   b. $3x + 5y = 10$; $7x - 15y = 26$
      (linear combination)

B. Geometry Review

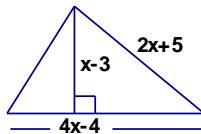1. Find the length of each side when the perimeter of the rectangle below is 72 units.

   x

   2x + 3

2. Find the perimeter and area of the trapezoid below.

   74 feet

   32 feet

   47 feet

   Isosceles Trapezoid

3. The area of the triangle below is $(4x^2 + 10)$ sq. units.   Solve for x. Find the answer to the nearest unit.

   2x+5

   x-3

   4x-4

4. Find the area, the circumference and the diameter of a circle with radius = $(x + 2)$cm. Do not substitute a number for π.)

5. The circumference of a circle is 6π cm. Find the radius and the area of the circle in terms of π.

6. Find the area of a rhombus if its base has a measure of $x - 9$ and its height is $x + 7$.

7. Find the area of a triangle if its base has a measure of $2x + 16$ and its height is $x + 4$.

8. Find the area of a square if its side has a measure of $x - 8$.

9. Find the measure, in terms of x, of the side of a square with area = $x^2 - 16x + 64$.

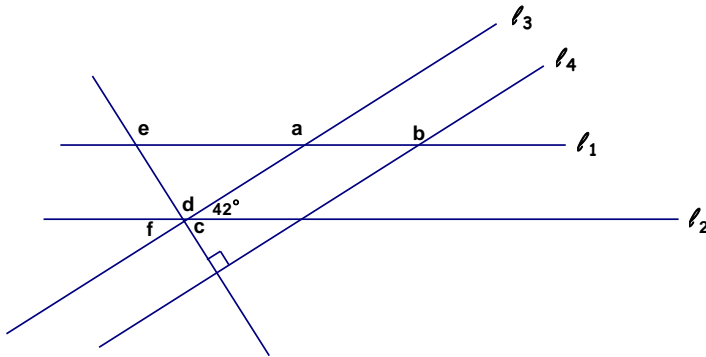10. The coordinates of points P and Q are (6, -8) and (-4, 1).

    a. Calculate the length of $\overline{PQ}$.
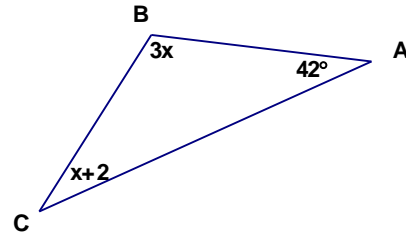
    b. Find the midpoint of $\overline{PQ}$.

11. Find the equation of each line using the given information. Put your answer in the form specified.

a.   perpendicular to y = -3x + 1, has an x-intercept of 7   (general form)

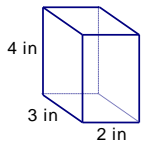b.   contains the point (3, -11), has a y-intercept of 5   (slope-intercept form)

12. a. Write an equation of the line with a slope of 0 and a y-intercept of (0, 12).   b. Sketch the line.

13. a. Write an equation of the line that contains points A (-2, 3) and B (-6, -5).   b. Sketch the line.

14. a. Write an equation of the line with a slope of –3 and a y-intercept of (0, 5).   b. Sketch the line.

15. Find the measures of two supplementary angles if one is five times the measure of the other.

16. Find the measures of two complementary angles when one is 24° less than twice the other.

17. Given $l_1 \parallel l_2$ and $l_3 \parallel l_4$, find the measure of each of the following angles: a; b; c; d; e; and f.
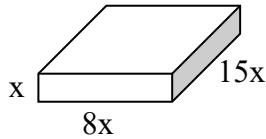

18. Find the measure of ∠B and ∠C.

19. Find the surface area and volume of these rectangular prisms:
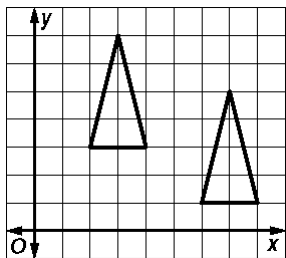

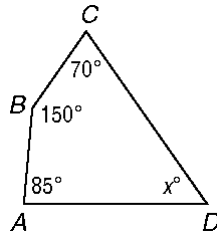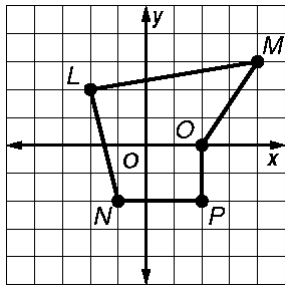a.   b. Answer will be in terms of x.

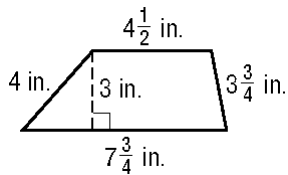20. Identify the transformation below.

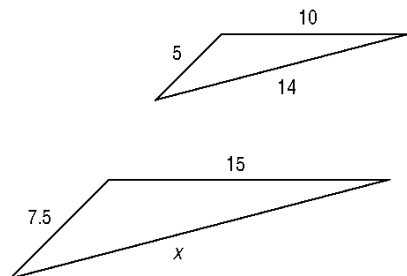21. Quadrilateral *ABCD* is shown below. Find the value of *x*.

22. What is the measure of each interior angle of a regular pentagon?

23. The ratio of the sides of two squares is 3:1. What is the ratio of their areas?

24. Find the coordinates of the vertices of the figure shown after a reflection over the *x*-axis. Then graph the reflection image. Use graph paper.

25. The vertices of a figure are *W*(–1, 4), *X*(–1, 1), *Y*(–5, 1). Graph the image after a reflection over the *y*-axis and a rotation of 90⁰ clockwise. Use graph paper.

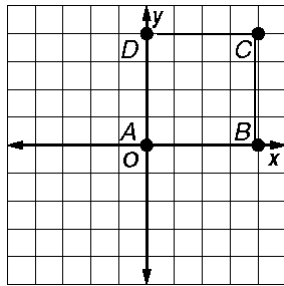26. Find the area of the figure. Round to the nearest tenth if necessary.

27. On a small-scale map of a city, the length of the line from the train station to the arena is 10 centimeters, and from the train station to the hospital it is 15 centimeters. On a larger map, the length of the line from the train station to the arena is 27 centimeters. Find the length of the line from the train station to the hospital on the larger map to the nearest tenth.

28. A 6-foot tall orangutan casts a 2.5-foot shadow, and at the same time of day a wooly mammoth casts a 30-foot shadow. How tall is the mammoth?

29. In the figure below, the triangles are similar. Find the value for *x*.

30. If the ratio of the length to the height of a standard television screen is 4:3, what are the length and height of a television screen with a 25-inch diagonal?

31. In the figure below, a quadrilateral can be formed by connecting the midpoints of the sides of the square *ABCD*. Explain how to find the length of the perimeter of this inner quadrilateral. Then find the perimeter, showing all of your work. Round to the nearest tenth, if necessary. Provide a labeled graph with your solution. Use graph paper.

C. Geometry Applications

1. What is the largest number of regions into which you can divide a circle with one straight line? Two lines? Three lines? Four lines? Make a chart showing the maximum number of regions formed when **n** straight lines intersect a circle, for n = 1…6. Describe a pattern in the chart.

2. Find at least three ways to arrange six identical toothpicks to obtain four congruent triangles**.** Make a sketch of your solutions.

3. Consider the 26 capital letters of the English alphabet written as simply as possible (no serifs, no fancy fonts.) Which of these 26 letters have a vertical line of symmetry? a horizontal line of symmetry? rotational symmetry? List the letters that have each property.

4. At what locations could a man leave his house, then walk three miles north, three miles west, three miles south, and find himself back home, at the same point where he started?

5. Define a Pythagorean triple and list at least three examples.

6. Draw a regular pentagon and its five diagonals. How many triangles are formed? Show or describe how you counted the triangles.

7. Traditional constructions are performed using only a compass and straightedge. What are the three ancient impossible construction problems of Euclidean geometry? In your own words, describe each problem.

8. When a clock shows the time to be 12:15:00, how many degrees are in the acute angle between the minute hand and the hour hand?

9. Sketch the graph of the equation $|x| + |y| = 5$. What type of figure is formed? What are its perimeter and area?

10. Imagine you start saving pennies during summer vacation. On the first day, you drop one penny into the piggy bank, two pennies the second day, three pennies the third day, and so on. How much money do you have at the end of summer vacation? Vacation this year lasts 75 days.

11. Your friend is also saving pennies. She puts one penny into her piggy bank the first day, two pennies the second day, four the third day, and so on, each day doubling the number

of pennies added. How much money would she have at the end of vacation, if she could
keep saving at this rate?

12. The inside of a deep refrigerator has a volume of 4.2 cubic feet and measures 18 inches wide and 16
inches deep. Find the length of the refrigerator in inches to the nearest tenth.

13. A half-filled cylindrical water tank has a water level of 20 feet high. The tank can hold 6000 cubic feet of
water. Find the diameter of the tank in feet to the nearest tenth.

14. The Transamerica Pyramid, a high-rise building in San Francisco, is 853 feet high and has a base area of
about 30,579 square feet. Find the approximate volume of the building.

15. An ice-cream cone has a volume of 112 cubic centimeters and a height of 12 cm. Find the diameter of the
cone to the nearest tenth if it is completely filled up to its height.

16. A cylindrical box of volume 763.4 cubic centimeters and diameter 4.5 cm is being used to package some
table tennis balls as shown in the figure below. How many table tennis balls can be packaged in the
box if each ball has a diameter of 4 cm? (Use $\pi = 3.14$)