# 6th Grade Assignment – Week #7

<u>Individual Homework:</u> See how much you can do on Sheet #7 in the workbook.

<u>Group Assignment for Tuesday</u>:
- Note that with problems #1 and #2, you must find a solution that only uses a compass and a straightedge.
1. If you are given a line and a point (not on that line), how can you draw a new line that passes through the given point and is exactly parallel to the given line?
2. If you are given a circle (without its center), how can you locate the exact center?
3. *Puzzle!* Give two numbers that add to 23 and subtract to 10½.

<u>Group Assignment for Thursday</u>:
4. Discuss how you can construct the drawing show at the right (using only a compass and a straightedge), then do it!
5. *Puzzle!* Determine the next seven numbers in this sequence: 2, 3, 4, 8, 11, 20, 30…
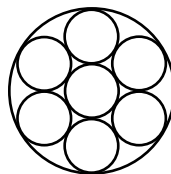
<u>Main Lesson Work (geometry)</u> – **Pages coming out of Lecture #1**

(For those who are doing the Geometric Drawing main lesson.)

What is listed below are suggestions for drawings. You should feel free to vary things, and make up your own drawings entirely. Be sure that it doesn't become overwhelming. As always, the goal should be quality rather than quantity.
- Main Lesson Book Page (Geometric Construction)
  Title: **Copying an Angle**
  Instructions: Draw any angle, and then draw a separate line. By following the instructions I gave in the lecture, copy the angle onto the end of the (separate) line.
- Main Lesson Book Page (Geometric Construction) <Can be done on the same page as the above construction.>
  Title: **Constructing a Perpendicular Line through a Point on the Line**
  Instructions: Draw a line and show a (random) point on that line. By following the instructions I gave in the lecture, draw a perpendicular line through the given point.
- Main Lesson Book Page (Geometric Drawing)
  Title: **The King's Crown**
  Instructions:
  - Lightly in pencil, and very accurately, draw a large circle and then (using a compass and straightedge) mark 24 (very small) points on the circle that are equally spread out (as explained in the lecture). This is referred to as the "24-Division". Erase all construction lines, but keep the circle.
  - Lightly in pencil, label the point as "A" that is two points to the left of the bottom-most point, and label "B" the point that is two points to the right of the bottom-most point.
  - Very carefully, draw 19 lines that connect point A to all of the points that are above A and B. Then draw 19 lines connect point B to the points that are above A and B.
  - Color in the diamond shapes beautifully!

(Continued on the next page →)

- Main Lesson Book Page (Geometric Drawing)
  Title: **Rotation of Circles**
  Instructions:
  - Setting your compass to about one-quarter the width of the page (in landscape orientation), lightly in pencil draw a large circle and then locate the points (in ink) of the 24-division (as you did with the King's Crown drawing). Erase all construction lines, and erase the circle. The only thing remaining should be the 24 points.
  - Now set your compass to about half of what it was for the (above) original circle, and then starting from the left-most of the 24 points, place your compass needle on that point and draw a circle. Be sure that this circle doesn't run off the page! Then draw 23 more circles – each one with the compass needle placed on another point of the original 24-division.
  - Look for the thin crescent moon shapes, and color them in beautifully!

  Extra Drawing: Redo the above drawing, but start with a slightly smaller circle (with a compass setting at about one-fifth the width of the page) for the 24-division, and then use the same compass setting for each of the 24 circles.

  Extra Drawing: Redo the above drawing, but start with an even smaller circle (with a compass setting at about one-tenth the width of the page) for the 24-division, and then make the compass (around) three times larger than that for each of the 24 circles.

Main Lesson Work (geometry) – **Pages coming out of Lecture #2**

- Main Lesson Book Page (Geometric Construction)
  Title: **Construction of a Square**
  Instructions: (These are two separate drawings, which can be done on the same page.)
  - Draw a circle, and then do the 4-division (locate four equally spread out points). Connect these points to form a square. Leave construction lines. Only color the perimeter of the square and circle.
  - Start with a horizontal line, drawn in color. You will add a square to this line as instructed in today's lecture. Start by extending the line lightly in pencil. Draw two perpendicular lines up from the ends of the original line. Finish constructing the square. Leave construction lines. Only color the remaining three sides of the square – in a different color from the original line.
- Main Lesson Book Page (Geometric Drawing)
  Title: **Nested Hexagons** (As explained in the lecture.)
  Instructions: Draw a large circle in black ink, and then do the 12-division. Draw all six diameters lightly in pencil. In ink, draw a hexagon by connecting every other point on the circle. Draw another hexagon connecting the midpoints of the previously drawn hexagon (which are indicated by the diagonal lines). Keep drawing more hexagons, which get progressively smaller. Color in the thin triangles which form a spiral toward the center of the circle. Be sure that neighboring spirals are in different colors. Make it beautiful!
- (Optional) Main Lesson Book Page (Geometric Drawing)
  Title: **Nested Octagons**
  Instructions: Same as above, but start with a 16-division, and then create nested octagons.
  This is actually how the spirals were inside the beautiful sunflower on the cover of my books!

6th Grade Math − **Sheet #7**

Do it in your head.

1) $30 \cdot 7000$

2) $36,000 \div 40$

3) $8.03 \cdot 10000$

4) $8.03 \div 100$

5) $11 \cdot 62$

6) $320 \cdot 4$

7) $0.3 \cdot 0.007$

8) $140 \div 4$

9) $105 \cdot 103$

10) $10.9 \cdot 1.11$

11) 90^2

12) $(0.01)^3$

13) $\frac{2}{9} + \frac{4}{9}$

14) $\frac{3}{20} \cdot \frac{5}{6}$

15) $\frac{2}{9} + \frac{1}{3}$

16) $\frac{3}{4} \div \frac{3}{8}$

17) $\dfrac{\frac{3}{4}}{\frac{3}{8}}$

18) $17 - 2.3$

19) $304 - 298$

20) $703 - 697$

21) $4005 - 3996$

Fractions.

22) $\frac{3}{4} - \frac{11}{18}$

23) $\frac{42}{49} \cdot \frac{33}{44}$

24) $\left(2\frac{1}{2}\right)^2$

25) $\left(10\frac{2}{5}\right)^2$

26) $2\frac{2}{5} + 1\frac{7}{8}$

27) $2\frac{2}{5} - 1\frac{7}{8}$

28) $2\frac{2}{5} \cdot 1\frac{7}{8}$

29) $2\frac{2}{5} \div 1\frac{7}{8}$

30) $2\frac{2}{3} \cdot 6\frac{3}{4}$

31) *Short Division.*
Fix the divisor and
then leave the answer
as an exact decimal
(perhaps repeating).
$748.4 \div 0.09$

32) *Cast out nines* to check your answer.

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    67.39
x  0.00874
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Estimate. Without doing any exact calculation, circle the closest answer. Try to come up with your answer as fast as possible.

33) $6{,}953 + 5{,}197$
 a) 10,000
 b) 11,000
 c) 12,000
 d) 13,000

34) $805{,}946 - 597{,}265$
 a) 200,000
 b) 300,000
 c) 400,000
 d) 500,000

35) $802 \cdot 489$
 a) 30,000
 b) 40,000
 c) 50,000
 d) 300,000
 e) 400,000
 f) 500,000

36) $58{,}374 \div 29$
 a) 200
 b) 300
 c) 2000
 d) 3000
 e) 20000

Long Division.
Fix the divisor and then divide. Leave your answers as exact decimals (perhaps repeating).

37) $7 \div 22000$

38) $6.52 \div 0.0074$

39) Leave the answer as a mixed number.
  $3285 \div 37$

40) Beth bought 3½ pounds of bananas for 64¢ per pound, a burrito for $2.35, and had to pay 26¢ in tax. How much change did she get if she gave the cashier a $20 bill?

Square Roots.
Calculate.
Example:
  $\sqrt{4900} = 70$

41) $\sqrt{16}$

42) $\sqrt{144}$

43) $\sqrt{900}$

44) $\sqrt{3600}$

45) $\sqrt{10000}$

46) $\sqrt{4000000}$

47) *New Flashcards!* Review all the decimal to fraction conversions given in the last problem of the previous worksheet. Make a new flashcard for each of these conversion facts.