Test 2 practice solutions

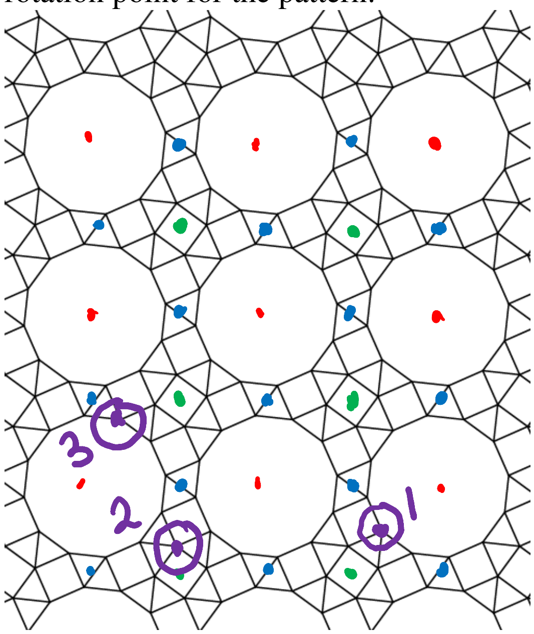
1. Show how to find the measure of an interior angle in a regular 12-gon.

12-2=10 triangles to make a 12-gon.

10x180=1800 degrees total for all of the interior angles

1800/12=150 degrees for each interior angle.

2. A. Draw in all of the symmetry lines and rotation points, and tell the rotation angles for each rotation point for the pattern:



Hmm…I didn't plan it this way, but this one doesn't have any symmetry lines.

It has plenty of rotation points though;

(red) =90º

(green) =90º

(blue) =180º

I think it's easier to find the rotation points if there are symmetry lines, so I'll try to find a better example for the test.

B. Identify the 3 different kinds of vertices in the tessellation, name them, and prove, using angle measurements, that the tessellation works at each vertex.

#1: 3.3.4.12: 60º+ 60º+90º+150º=360º

#2: 3.3.4.3.4: 60º+60º+90º+60º+90º=360º

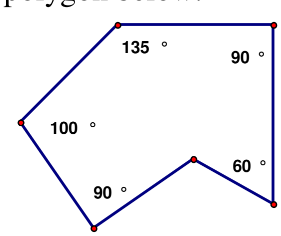
#3: 3.4.3.12: 60º+90º+60º+120º=360º

3. Explain, using angle measurements, how you know that you can't make a tessellation using only regular heptagons (7-sided)

A heptagon has 7-2=5 triangles. Its angle sum is 5×180º=900º. A single interior angle is 900º÷7=128.57º

Two heptagons put together would have an angle sum around a vertex of 128.57º×2=257.14º (which is less than 360º). Three heptagons put together would have an angle sum of 128.57º×3=385.71º (which is more than 360º) so there is no number of heptagons that would give you exactly 360º, so you can't have a tessellation with only regular heptagons.

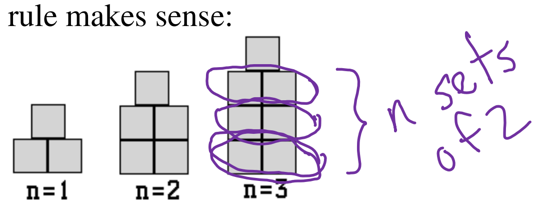
4. Find the missing angle measure in the polygon below:



Irregular hexagon. Made of 6-2=4 triangles, so total angle sum is 180º×4=720º. The missing angle must have measure:

720º-135º-90º-100º-90º-60º=245º

5. Find a function rule for the number of tiles in this pattern, and explain why your function rule makes sense:



The function rule is 2n+1. Each tower has n sets of 2 tiles, so 2n tiles, and then there is 1 more tile on the top.

6. What CGI type are each of these? Which ones are easier and harder?
a. Mary had 6 apples. Her friend gave her 2 more apples. How many apples does Mary have now?

Join, result unknown

b. There are 6 boys and 2 girls in Ms. Triangle's reading group. How many children are in the reading group?

Part-part whole, whole unknown

c. Kyle ate 4 apples. Now he has 3 apples. How many apples did Kyle have to start with?

Separate start unknown

A is easiest, and c is hardest.

7. Write a Separate, result unknown and compare difference unknown problems. Explain how to direct model each

SRU: John had 8 cookies. He ate 2 of them. How many does he have now.

Model by putting out 8 counters, and then moving 2 away, and counting those left.

CDU: John has 8 cookies, and Sam has 6 cookies. How many more cookies does John have than Sam?

Model by putting 8 counters in a row, and 6 counters in another row. Then match up the counters in the 2 rows, and count the number not matched up.

8. Tell what problem type each of these problems is:
a. Janet has 20 cookies. She wants to put the same number of cookies in each of the 5 lunch bags she is filling. How many cookies should she put in each bag?

Partitive division

b. Andrea has 4 sheets of stickers. Each sheet has 8 stickers on it. How many stickers does Andrea have?

Multiplication

c. I have 28 chocolate almonds. If I eat 4 each day, how long will my chocolate almonds last?

Measurement division

d. Each pencil costs 15 cents. How much do 4 pencils cost?

Multiplication

f. Sam has 35 cents. Lemon drops cost 5 cents each. How many lemon drops can Sam buy?

Measurement division

9. Write a measurement division, a partitive division and a multiplication problem. Explain how to direct model each

Measurement division for problem 8f is modeled by counting out 35 counters, and then putting them in groups of 5, and counting out how many groups.

Partitive division (8a) is modeled by counting out 20 counters for the cookies, and then using either different colored counters or something similar to show the 5 bags or groups. Then put 1 counter at a time into each group, and count how many cookie counters are in each group.

10. a. Explain how knowing the commutative* law of multiplication helps children learn the multiplication facts

This approximately halves the number of facts kids have to learn, because if you know 8×5=10 (skip count by 5's), you also know 5×8=40.

b. Draw a diagram that shows why the commutative* law of multiplication makes sense (this problem would probably be phrased in a way similar to the homework assignment.
*distributive could be here instead.

See assignment on communtative and distributive law.

11. a. Explain 2 efficient ways, using different counting or derived facts strategies, that a student could figure out the sum: 8+7

Use doubles: 7+7=14, so 7+8=15

Make 10: give 2 from the 7 to the 8 to make it 10, so 8=7=10+5=15

b. Explain 2 efficient ways, using different counting or derived facts strategies, that a student could use to figure out the difference: 12-9

Counting up: 9…, 10, 11, 12, the difference is 3

Use 10: 12-10=2 and 10-9=1, so 12-9=2+1=3

c. Explain 2 efficient ways, using different counting or derived facts strategies, that a student could use to figure out the product 4×7, assuming the knowledge of the "easy" facts (1's ,2's, 5's and 10's)

$4\times7=4\times(5+2)=4\times5+4\times2=20+8=28$

$4\times7=2\times2\times7$. $2\times7=14$. $2\times14=28$, so $4\times7=28$

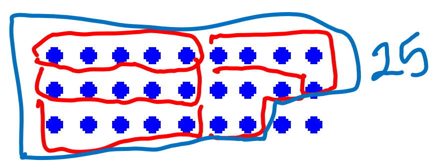
12. Give an example of a problem that it would be efficient to solve using each strategy:

A. Count on 7+2 B. Doubles plus 1 6+7 C. Use 10 to subtract 13-9

D. Count on from a known fact for a multiplication problem. 6×8 (count up from 5×8)

13. Tell how many objects there are in base 5:

102_5



14. Add in base 5: 243_5+124_5

$$243 + 124_5 = 422_5$$

16. $3\,4\,12 - 143 = 214$

15. Convert to base 10: 342_5

$$3\times25+4\times5+2 = 75+20+2 = 97$$

16. Subtract in base 5: $412_5 - 143_5$