The Bronx High School of Science
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Course: M3(H) – (Honors) Geometry
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Review for Exam #3:

Orange Book p. 111 Chapter Review #1–19, p. 113 #13, Review Book p. 178 #12

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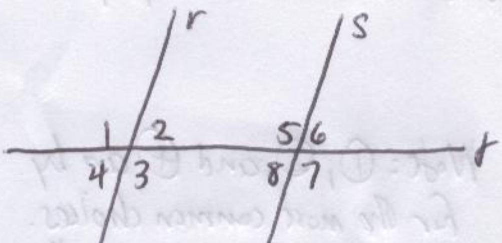
(REAL Disclaimer: These solutions are to be used only as a guideline. These solutions represent how I would attack the problems. Your methods may or may not vary.)



1) The same side interior angles are ∠5 and $\boxed{\angle 2.}$

2) ∠5 and ∠1 are $\boxed{\text{corresponding angles.}}$ Note that both angles are to the left of the parallel lines r and s, and above the transversal t.

3) ∠5 and ∠3 are $\boxed{\text{alternate interior angles.}}$ Note both angles are on opposite sides of the transversal t and inside the area between the lines r and s.

4) Not necessarily, especially if we go to three dimensions. j can be skew – Imagine it going vertically through your paper where s and t intersect. This doesn't intersect r, but isn't parallel.

5) ∠1 ≅ ∠5 since they are alternate interior angles (with the knowledge that r ∥ s). Thus, m∠5 = m∠1 so $\boxed{m\angle 5 = 105°.}$ ∠1 ≅ ∠7 since they are alternate exterior angles, so m∠7 = m∠1 = $\boxed{105°.}$

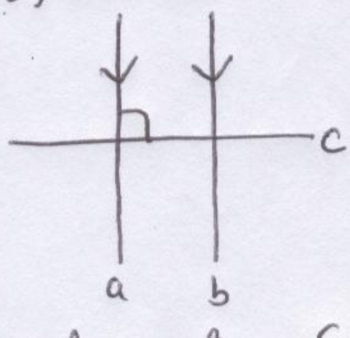
6) ∠2 and ∠8 are alternate interior angles, so m∠2 = m∠8. Thus:

$$70 = 6x - 2$$
$$+2 \quad +2$$
$$72 = 6x \rightarrow \boxed{x = 12.}$$

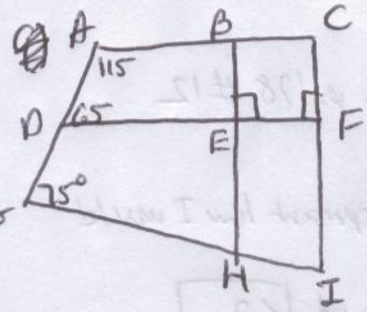
7) ∠3 and ∠8 are same-side interior angles. Thus, they are supplementary. So:

$$8y - 40 + 2y + 20 = 180$$
$$10y - 20 = 180$$
$$+20 \quad +20$$
$$10y = 200 \rightarrow \boxed{y = 20.}$$

8) Draw this:



Clearly, $\boxed{b \perp c}$. The reason for this is a theorem we discussed – that "If a line is perpendicular to one of two parallel lines, then it is perpendicular to the other."



9) $\overleftrightarrow{DF}$ must be parallel to $\overleftrightarrow{AB}$. This is because $\angle A$ and $\angle ADE$ are supplementary angles, and they are same-side interior angles. Thus, $\overleftrightarrow{DF} \parallel \overleftrightarrow{AB}$.

10) $\boxed{\overline{BH} \parallel \overline{CI}}$, since it is true that both of these lines are perpendicular to the same line, $\overline{DF}$.

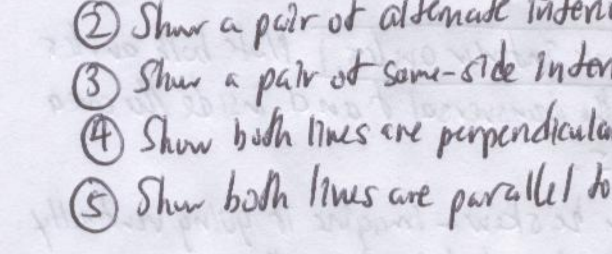
11) These are outlined on p. 85 in the text:

1. Show a pair of corresponding angles are $\cong$.
2. Show a pair of alternate interior angles are $\cong$.
3. Show a pair of same-side interior angles are supplementary.
4. Show both lines are perpendicular to the same line.
5. Show both lines are parallel to the same line.

Note: 1, 2, and 4 are by far the most common choices. The others are rarer, but they work. As an added challenge, try to show 5 works.

12) The angles in a right triangle sum to 180°. As the right angle is 90°, the other two must sum to the balance, 90°. So:

$$x + 2x - 15 = 90.$$
$$3x - 15 = 90$$
$$+15 \quad +15$$
$$3x = 105 \longrightarrow \boxed{x = 35.}$$



13) $m\angle 6 + m\angle 7 + m\angle 8 = \boxed{180^\circ}$ since they are the angles of the triangle on the right.

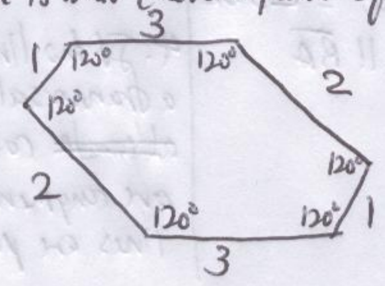
14) $\angle 4$ is an exterior angle of the triangle on the left. Thus, its measure is the sum of the measures of the remote interior angles, or $m\angle 4 = m\angle 1 + m\angle 2$.

So:

$$130 = 30 + m\angle 2$$
$$\boxed{m\angle 2 = 100^\circ.}$$

15) $\boxed{\angle 3 \cong \angle 6}$, since $\angle 4 \cong \angle \cancel{7}^{5}$, and that if two angles are congruent, then their supplements are congruent. Based on this, since $\angle 1 \cong \angle 7$, we know that $m\angle 1 + m\angle 3 = m\angle 6 + m\angle 7$ by Addition Postulate. Since both triangles have angles that sum to 180, $\boxed{\angle 2 \cong \angle 8.}$

16) A All we care is that each angle is equal, but the sides are not all congruent:



B The interior angle sum is:

$$180(n-2) = 180(6-2) = 180\cdot 4 = \boxed{720°.}$$

C The exterior angle sum is $\boxed{360°}$, as it is for any polygon.

17) The sum of the interior angles of an 18-gon is $180(18-2) = 180(16) = 2880°$.
Each angle is equal, so $= \frac{2880}{18} = \frac{\cancel{180}^{10}\cdot 16}{\cancel{18}} = \boxed{160°.}$

18) The sum of the exterior angles of this polygon is 360°. As all are identical, the angle measures: $\frac{360}{24} = \boxed{15°.}$

19) Since each angle measures 150°, each exterior angle measures $180-150=\boxed{30°.}$
Thus, $\frac{360}{n} = 30 \longrightarrow 30n = 360 \longrightarrow \boxed{n=12.}$ The polygon has 12 sides.

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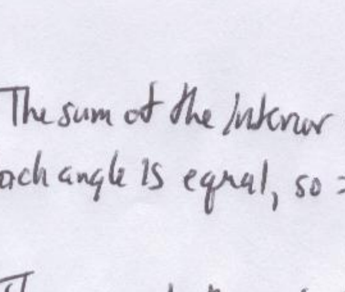
13)



Given: $\overline{AB} \parallel \overline{CD}$
$\overrightarrow{BF}$ bisects $\angle ABE$
$\overrightarrow{DG}$ bisects $\angle CDB$
Prove: $\overrightarrow{BF} \parallel \overrightarrow{DG}$

Statements	Reasons
1. $\overline{AB} \parallel \overline{CD}$	1. Given.
2. $\angle ABE \cong \angle CDB$	2. If two lines are parallel and cut by a transversal, then corresponding angles are congruent.
3. $\overrightarrow{BF}$ bisects $\angle ABE$, $\overrightarrow{DG}$ bisects $\angle CDB$	3. Given
4. $m\angle FBE = \frac{1}{2} m\angle ABE$, $m\angle GDB = \frac{1}{2} m\angle CDB$	4. An angle bisector splits angle into pieces one-half the measure of the original
5. $\angle FBE \cong \angle GDB$	5. Division Postulate.
6. $\overrightarrow{BF} \parallel \overrightarrow{DG}$	6. If two lines are cut by a trans. such that $\cong$ corr. are formed, then the lines are parallel.

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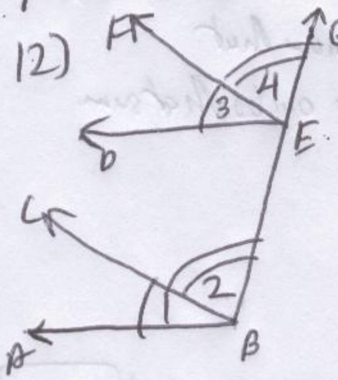
12) 

Given: $\angle 1 \cong \angle 3$

$\angle 2 \cong \angle 4$

Prove: $\overrightarrow{ED} \parallel \overrightarrow{BA}$

Statements	Reasons
1. $\angle 1 \cong \angle 3$	1. Given.
2. $\angle 2 \cong \angle 4$	2. Given.
3. $\angle 1 + \angle 2 \cong \angle 3 + \angle 4$ or $\angle DEG \cong \angle ABE$	3. Addition Postulate.
4. $\overrightarrow{ED} \parallel \overrightarrow{BA}$	4. If two lines are cut by a transversal such that ~~alternate~~ corresponding angles are congruent, then the lines are parallel.