Geometry 1st Semester

The exam will contain Multiple Choice questions. You may use your scientific calculator for the entire exam. There will also be patty paper, rulers, and scratch paper available.

It is strongly recommended that you spend quality time reviewing all tests and quizzes as well as looking through the notes you took during class. Don't procrastinate!!

Test Dates:

Wednesday, January 22nd	Thursday, January 23rd	Friday, January 24th
5th: 10:10 – 11:40 am	3rd: 8:00am – 9:30am	1st: 8:00am – 9:30am
6th: 12:35 – 2:05 pm	4th: 9:40am – 11:10am	2nd: 9:40am – 11:10am
7th: 2:15 – 3:45pm		

Chapter 1: Foundations of Geometry

| Vocabulary | Measuring angles and segments | Constructions | Midpoint |
| Distance Formula | Inductive Reasoning | Deductive Reasoning | Proofs |

Chapter 2: Parallel and Perpendicular Lines

Properties of parallel lines   Proving that lines are parallel
Solving problems with parallel lines   Slopes of parallel and perpendicular lines

Chapter 3: Transformations

Reflections   Rotations   Translations   Symmetry

Chapter 4: Triangles

Triangle Interior Angle Sum   Properties of Isosceles Triangles
Properties of Equilateral Triangles   Triangle Exterior Angle Conjecture   Proofs
Overlapping triangles   Triangle Congruency Conjectures: *SSS, SAS, ASA, SAA*
                                          Non Congruencies: *SSA, AAA*

Chapter 5: Relationships in Triangles

Perpendicular and angle bisectors in triangles   Medians   Altitudes
Circumcenter   Centroid   Orthocenter   Incenter
Finding the range of the 3rd side of a triangle   Triangle inequality theorem

**Chapter 6: Polygons and Quadrilaterals**

Polygon Sum Conjecture   Polygon Exterior Angle Sum   Kite Properties
Trapezoid Properties   Isosceles Trapezoids   Properties of Midsegments
Properties of Parallelograms   Rhombus/Rectangle/Square Properties
Quadrilateral Proofs

Notes

- The grade you have earned after your final exam is done will be the grade you receive for 1st Semester. I do not round final grades (see Course Expectations).

- Check your grades on Skyward <u>tonight</u>. If you think I have made a mistake, please email me immediately

Topic 1 Review – *Foundations of Geometry*

1. If $DM = 35$, what is the value of r?

$$\underset{D}{\bullet} \overset{r+2}{} \underset{G}{\bullet} \overset{2r-13}{} \underset{M}{\bullet}$$

_____
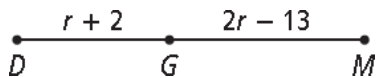
**Items 2–3. Points *P, Q,* and *S* are collinear.**
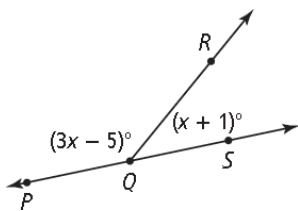
2. What is $m\angle PQR$?

3. If a ray QT bisects $\angle RQS$, what will be the measure of one of the resulting angles?

_____

4. Points *L*, *M*, and *N* are collinear. You are given $LM = 13$ and $LN = 20$. What is a possible value of MN?

_____

5. Ray *BD* bisects $\angle ABC$ so that $m\angle DBC = (x + 6)$ and $m\angle ABD = (2x - 12)$. What is x?

_____

6. What is the distance between points $F(2, 9)$ and $G(4, 14)$? Round to the nearest whole number.

_____

Items 7–8. Use the number line below.
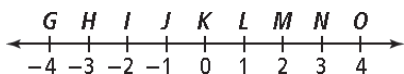
7. What is $KN + IK$?

8. What is the coordinate of the midpoint of $\overline{GO}$?

Items 9–11. Use the following conditional:

If a number is an integer, then it is either positive or negative.

9. What is the hypothesis of the conditional?

10. What is the conclusion of the conditional?

11. What is a counterexample for the conditional?

_____

12. What is the length of a segment with endpoints at $(-3, 4)$ and $(4, 4)$?
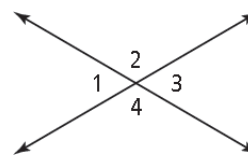
_____

13. Is the converse of the conditional below true?

If a polygon is a triangle, then it has exactly three sides.

_____

15. Use the Law of Detachment to make a conclusion.

If a person wants to get a car, that person must buy car insurance. Jayla wants to get a car.

_____

Items 16–18. Use the diagram shown.

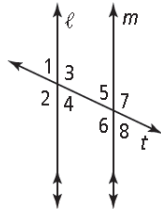**16.** The statement "Angle 2 is congruent to angle 4" is justified by the
_____.

17. If $m\angle 1$ equals $(4x + 2)$ and $m\angle 2$ equals 110, what is the value of x?

# Topic 2 Review – *Parallel and Perpendicular Lines*

1. What type of lines are coplanar and do not intersect?

_____

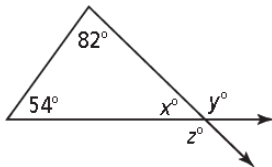**Items 2–5. Lines ℓ and m are intersected by transversal t.**

ℓ ∥ m

2. Which angles are supplementary to Ð1?

3. Which angles are congruent to Ð5?

4. By which postulate or theorem is Ð3 ≅ Ð6?

5. If mÐ2 = 112, what is mÐ7?

6. Write two equations relating the measure of Ð4 to the measures of Ð1, Ð2, and Ð3.

_____
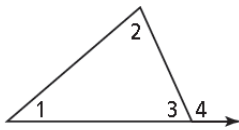
Items 7–9. A triangle is shown.

7. What is x?

8. What is y?

9. Which of the following statements are true? Select all that apply.

   A $x = y$

   B $x + y = 180$

   C $y = z$

   D $x + z = 180$

10. In DABC, $m\angle A$ = 75 and mÐC = 20. What is $m\measuredangle B$?

Items 11–15. Lines a, b, c, and d intersect as shown.
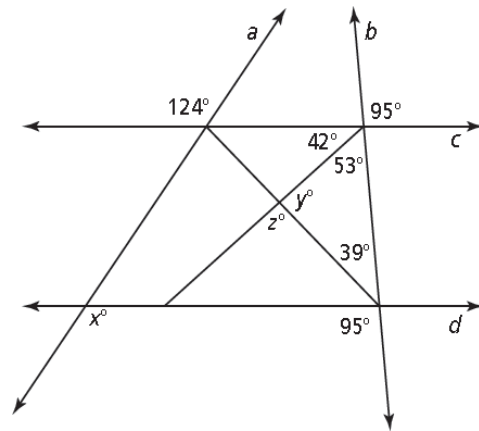
11. Which pair of lines are parallel?

12. What is x?   **13.** What is y?

14. What is z?

15. If the slope of line c is given, the slope of which other line is known?

_____

16. What is the equation of a line that is parallel to the line $y = 2x + 7$ and passes through the point $(-2, 4)$?

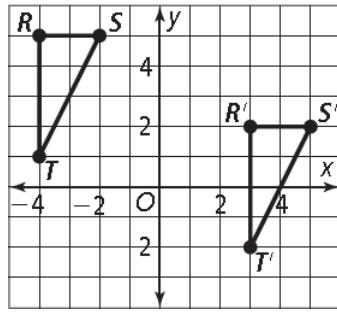**17.** What is the slope of a line perpendicular to the line $y = -\frac{1}{4}x - 1$?
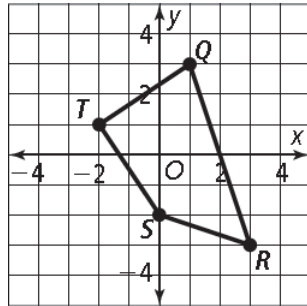
Items 18–20. Part of a city map is shown.
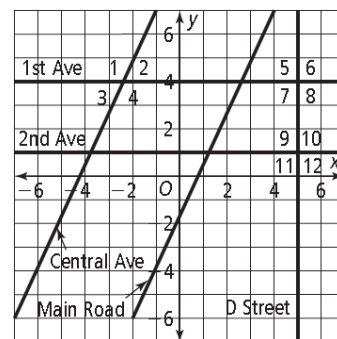
18. Which street is parallel to 1st Ave?

19. A city planner wants to build a road perpendicular to D Street. What is the slope of the new road?

20. If mÐ5 = x, which angles also have a measure of x?

Topic 3 Review - *Transformations*

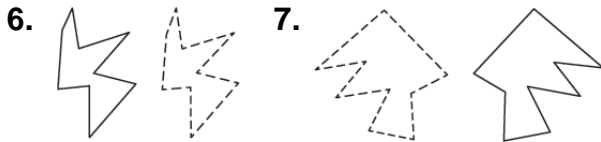**1.** What is a rule for the translation of △*RST*?

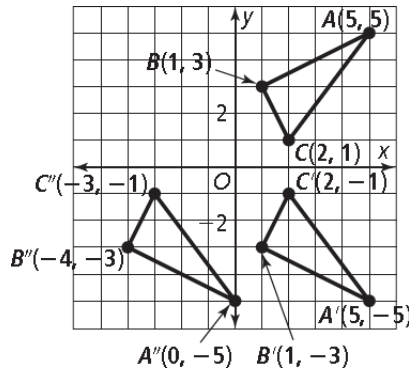**Items 2–5. Find the coordinates of the vertices of each image.**

2. $R_{x\text{-axis}}(QRST)$

3. $r_{(90°, O)}(QRST)$

4. $T_{(3, -2)}(QRST)$

5. $(R_y \circ T_{(2, 0)})(QRST)$

Items 6–7. What rigid motion maps the solid-line figure onto the dotted-line figure?

6.   **7.**

8. Which of the descriptions is true for the graph?

   A △*A'B'C'* is $T_{(0, -2)}(\triangle ABC)$

   B △*A'B'C'* is $(T_{(0, -2)} \circ R_{x\text{-axis}})(\triangle ABC)$

   C △*A'B'C'* is $R_{x\text{-axis}}(\triangle ABC)$

   **D** △*A'B'C'* is $r_{90°}(\triangle ABC)$

9. Point *P'*(5, −4) is the image of point *P*(2, 3) under a translation. What is the image of (6, −2) under the same translation?

10. Which capital letters have one or more lines of symmetry? Select all that apply.

   A X   **B** Z   **C** H   **D** C

11. Point *T* is at (−2, 5). What are the coordinates of point *T'* after $R_{y\text{-axis}} \circ R_{x\text{-axis}}$?

**12.** The rule $T_{(5, -3)}$ is used for point (5, −1). What quadrant is the translated point located in?
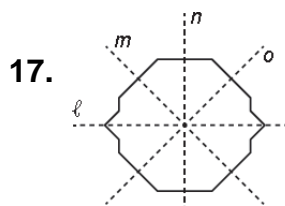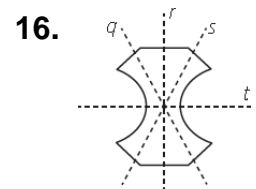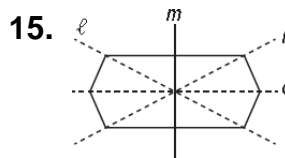
13. Which of the following descriptions apply to the transformation on the right?
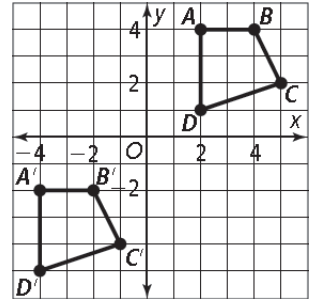
14. If a figure is translated with the rule $T_{(-3, 3)}$, which translation moves the image back to the original position?

   A $T_{(3, -3)}$ **B** $T_{(-3, 3)}$
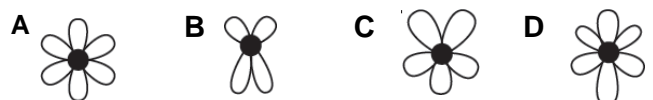
   C $T_{(0, 3)}$ **D** $T_{(-3, 0)}$

Items 15–18. Find the lines of symmetry for each shape. Select all that apply.

15.   **16.**

17.   **18.**
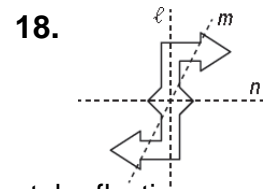
19. Which words have horizontal reflection symmetry?

   A BOO   **C** RADAR

   B PIP   **D** EXCEED

20. Which shape is an example of rotational symmetry?
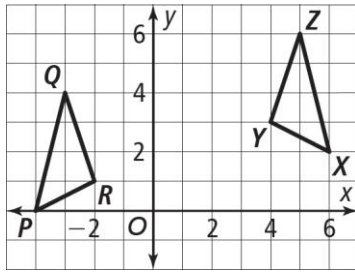
   A   **B**   **C**   **D**

Topic 4 Review – *Triangle Congruence*

1. What theorem shows that $\triangle ACE \cong \triangle BCD$?
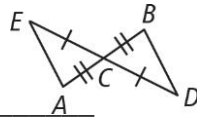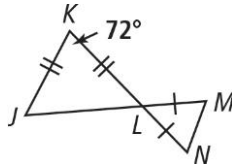
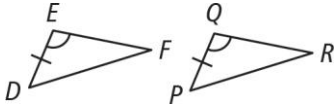**2.** What composition of rigid motions maps $\triangle PQR$ to $\triangle XZY$?

Items 3–4. $\triangle JKL$ and $\triangle LMN$ are shown.

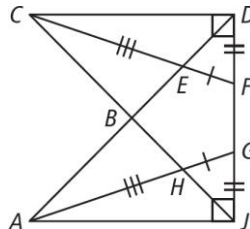**3.** What is $m\angle KJL$?

4. What is $m\angle LNM$?

5. What additional piece of information is needed to show that $\triangle DEF \cong \triangle PQR$ by ASA?
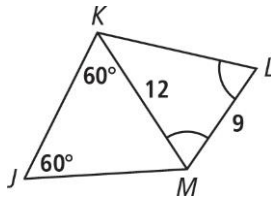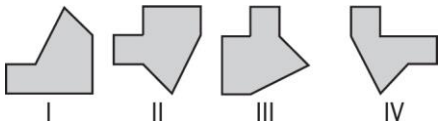
Items 6–7. Refer to the diagram shown.

6. What theorem shows that $\triangle AJG \cong \triangle CDF$?

7. Which can be proven? Select all that apply.

    A $\angle CED \cong \angle AHJ$ **C** $\overline{CB} \cong \overline{DB}$

    B $\overline{AB} \cong \overline{CB}$ **D** $\angle DAG \cong \angle JCF$

8. What is the perimeter of the quadrilateral $JKLM$?

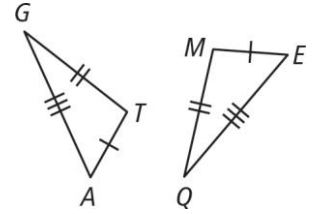**9.** Which of the figures appear to be congruent?

    I   II   III   IV

10. Which of the following cannot be used to prove that two triangles are congruent?

    A AAA   **C** SSS
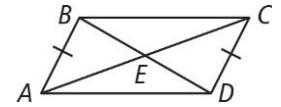
    B ASA   **D** HL

11. Which statement is correct?

    A $\triangle AGT \cong \triangle QME$

    B $\triangle TAG \cong \triangle EMQ$

    C $\triangle GTA \cong \triangle QME$
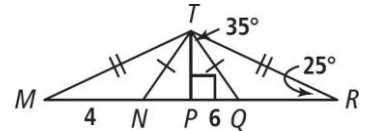
    D $\triangle AGT \cong \triangle MEQ$

Items 12–14. Refer to the diagram shown.

12. If $\angle BAC \cong \angle DCA$, what theorem can be used to show that $\triangle ABE \cong \triangle CDE$?

13. If $\overline{BD}$ bisects $\overline{AC}$ and $\overline{AC}$ bisects $\overline{BD}$, what theorem can be used to show that $\triangle ABE \cong \triangle CDE$?

14. If $\overline{AB} \parallel \overline{CD}$ and $\overline{AC} \cong \overline{BD}$, what theorem can be used to show that $\triangle ACD \cong \triangle CAB$?
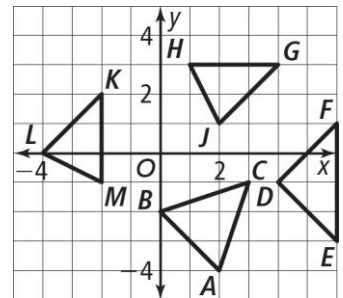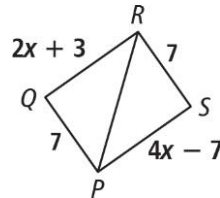
Items 15–16. Refer to the diagram shown.

15. What is $m\angle MNT$?

16. What is MR?

17. Which triangle is congruent to $\triangle KLM$?

118. To show that $\triangle RQP \cong \triangle PSR$ by SSS, what must be the value of x?
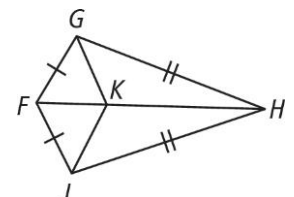
19. Which theorem shows $\triangle QMP \cong \triangle RNP$?
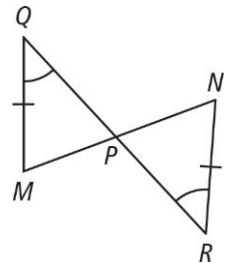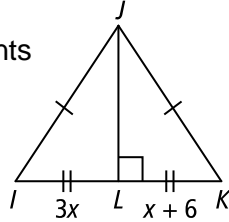
20. Which statements are true? Select all that apply.

    A $\triangle FGK \cong \triangle FJK$

    B $\triangle GKH \cong \triangle JKH$

    C $\overline{FG} \cong \overline{KG}$

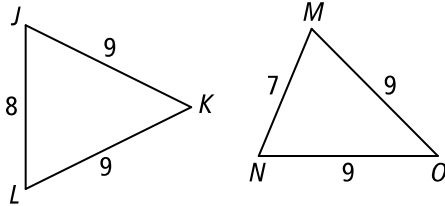   **D** $\angle GFH \cong \triangle JFH$

Topic 5 Review – *Relationships in Triangles*

1. Which of the following statements must be true? Select all that apply.

   A $\overline{JL}$ bisects $\overline{IK}$.

   B $\triangle IJK$ is equilateral.

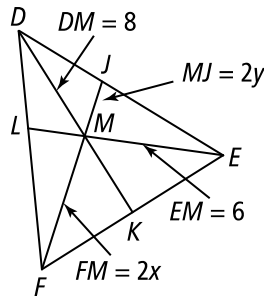   **C** $\overline{JL}$ is the perpendicular bisector of $\overline{IK}$.

   D $KL = 9$

_____

2. Which of the following statements is true?

   A $m\angle K < m\angle O$ **B** $\angle J \cong \angle L$

   C $\angle J \cong \angle M$

3. A triangle has vertices at (1, 1), (1, 4), and (−3, 4). Where is the circumcenter located?

**Items 4–8. ΔDEF is shown at the right. *M* is the centroid.**

$DM = 8$
$MJ = 2y$
$EM = 6$
$FM = 2x$

4. $\overline{DK}, \overline{EL},$ and $\overline{FJ}$ are _____.

5. What is EL?

6. What is an expression for FJ?

   A 2x   **B** 3x   **C** 2y   **D** 3y

7. What is the order of sides of $\triangle DEF$ from shortest to longest?

   A $\overline{EF}, \overline{DF}, \overline{DE}$ **B** $\overline{DF}, \overline{DE}, \overline{FE}$

   C $\overline{EF}, \overline{DE}, \overline{DF}$ **D** not enough info

8. Which equation relates DM to MK?

   A $MK = \dfrac{1}{4}DM$ **C** $MK = \dfrac{1}{2}DM$

   B $MK = \dfrac{1}{3}DM$ **D** $MK = \dfrac{2}{3}DM$

Items 9–11. ΔDEF is shown below.

$(3y + 4)°$ $(5y − 10)°$
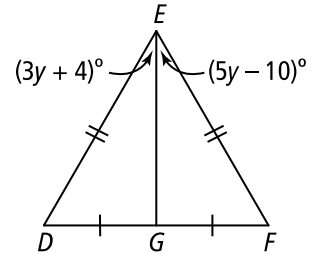
9. What is $m\angle DEF$?

10. Which of the following describes $\overline{GE}$? Select all that apply.

   A angle bisector   **C** perpendicular bisector

   B median   **D** altitude

11. Which of the following does $\overline{GE}$ contain? Select all that apply.

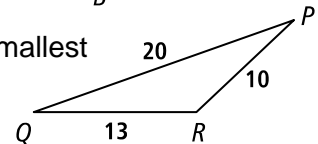   **A** circumcenter   **C** orthocenter

   B incenter   **D** centroid

12. What is the range of possible values for x?

23   75° $(x − 13)°$ 22
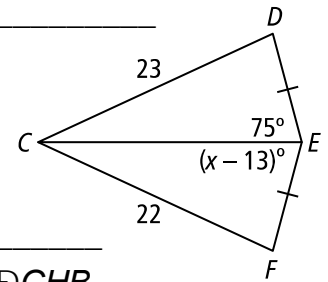
13. Suppose $m\angle ABH > m\angle GHB$ in the figure below. What is an inequality that relates AH and GB?
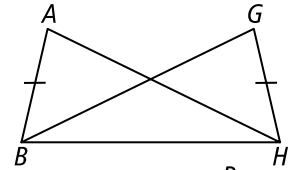
14. What is the order of the angles for $\triangle PQR$ from smallest to largest?

20   10   13

15. Which point of concurrency in NOT always inside a triangle?

Items 16–17. ΔLMN is shown below.
$PQ = −2y + 15$ and $PS = 3y + 5$.
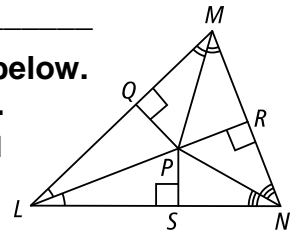
16. Find the radius of the inscribed circle of ΔLMN.

17. Point *P* represents which point of concurrency?

18. An ice cream vendor wants to be located equidistant from the entrances of a zoo and an amusement park. Should he locate his stand on a perpendicular bisector, an angle bisector, a median, or an altitude?

Topic 6 Review – *Quadrilaterals and Other Polygons*

1. What is the value of *x*?

(Figure: heptagon with angles 125°, 148°, 107°, 122°, 126°, 131°, x°)

Items 2–3. Quadrilateral *PQRS* is shown.

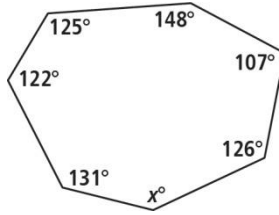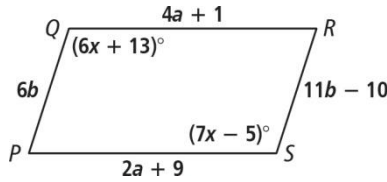**2.** What must $m\angle QPS$ be for *PQRS* to be a parallelogram?

3. What must the values of *a* and *b* be for *PQRS* to be a parallelogram?

(Figure: parallelogram PQRS with Q angle $(6x + 13)°$, side $4a + 1$ at top QR, side $6b$ at left, side $11b - 10$ at right, S angle $(7x - 5)°$, bottom side $2a + 9$)
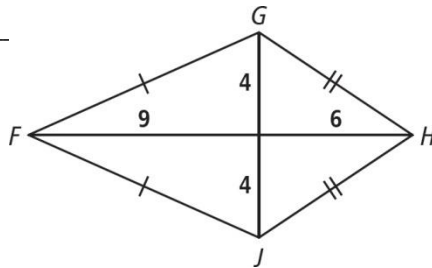
4. The diagonals of parallelogram *ABCD* intersect at *P*. Which statements must be true? Select all that apply.

 A $\overline{AP} \cong \overline{CP}$ **C** $m\angle ABC = 90°$

 B $\overline{BC} \cong \overline{AD}$ **D** $\angle CAD \cong \angle ACB$

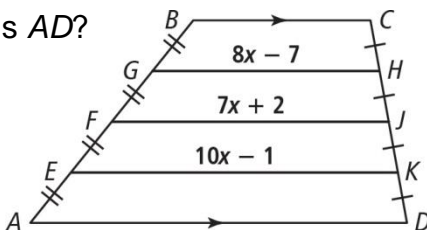**5.** What is the measure of an interior angle of a regular 10-gon?

6. What is the perimeter of *FGHJ*?

(Figure: kite FGHJ with segments labeled 4, 9, 6, 4 and tick marks)

7. The diagonals of quadrilateral *WXYZ* intersect at *R*. If *R* is the midpoint of $\overline{WY}$ and $\overline{XZ}$, which additional statement shows that *WXYZ* is a rectangle?

 A $WX = YZ$ **C** $m\angle WXY = 90$

 B $\overline{WY} \perp \overline{XZ}$ **D** $WR = XR$

8. What is *AD*?

(Figure: trapezoid with segments $8x - 7$, $7x + 2$, $10x - 1$ and vertices B, C, G, H, F, J, E, K, A, D)

9. How many sides does a polygon have if each exterior angle measures 18°?

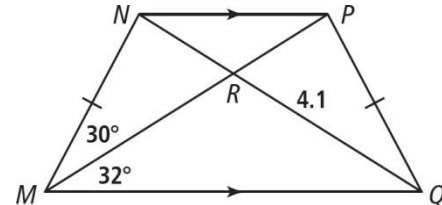**10.** Which statements are true about rhombuses? Select all that apply.

 A Opposite angles are congruent.

 B Diagonals are perpendicular.

 C Diagonals are congruent.

 D Opposite sides are parallel.

Items 11−12. Parallelogram *ABCD* is shown.

(Figure: parallelogram ABCD with diagonals intersecting at E, angles 45°, 71°, 27°)
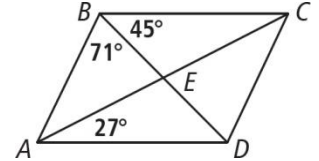
11. What is $m\angle BAC$?

12. If $BE = 2x + 2$, $BD = 5x - 3$, and $AE = 4x - 6$, what is *AC*?

Items 13–14. Quadrilateral *MNPQ* is shown.

(Figure: quadrilateral MNPQ with diagonals intersecting at R, 4.1, 30°, 32°)

13. What is $m\angle NPQ$?

14. If $MP = 5.9$, what is *RN*?

15. Which statements are true about square *EFGH*? Select all that apply.

(Figure: square EFGH with diagonals intersecting at P)

 A $FP = 2(EG)$ **C** $m\angle EFH = 45$

 B $EP = EH$ **D** $\overline{FH} \perp \overline{EG}$
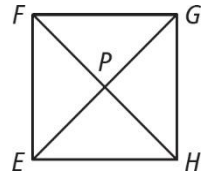
16. The lengths of the diagonals of a rhombus are 2*x* and 8*x*. What expression gives the perimeter of the rhombus?

17. Quadrilateral *ABCD* is a parallelogram. What is *BC*?

(Figure: parallelogram ABCD with point Q on AD, segment 18)
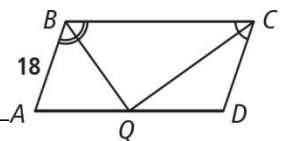
Items 18–20. Give the most precise classification for each figure: quadrilateral, parallelogram, trapezoid, kite, rectangle, square.

18. *(Figure: quadrilateral with diagonals and tick marks)*

19. *(Figure: rectangle)*

20. *(Figure: kite with sides 12, 12, 10, 6, 6, 8)*
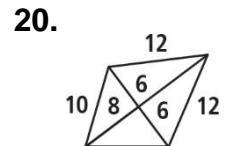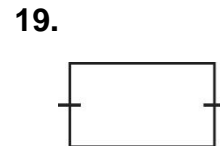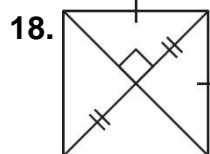
Geometry Final Exam Review Answer Key

Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6
1. $46/3$	1. parallel	1. $T_{<7,-3>}$	1. SAS	1. A, C, D	1. $141°$
2. $133°$	2. $\angle 6, \angle 7$	2. $Q'(1,-3); R'(3,3);$ $S'(0,2); T'(-2,-1)$	2. $T_{<6,2>} \circ R_{x=-2}$	2. B	2. $59°$
3. $23.5°$	3. $\angle 1, \angle 4$	3. $Q'(-3,1); R'(3,3);$ $S'(2,0); T'(-1,-2)$	3. $54°$	3. $(-1, 2.5)$	3. $a=4, b=2$
4. 7	4. Alternate Interior Angles Thm.	4. $Q'(4,1); R'(6,-5);$ $S'(3,-4); T'(1,-1)$	4. $63°$	4. medians	4. A, B, D
5. 18	5. $112°$	5. $Q'(-3,3); R'(-5,-3);$ $S'(-2,-2); T'(0,1)$	5. $\angle D \cong \angle P$	5. 9	5. $144°$
6. 5	6. $m\angle 4 = m\angle 1 + m\angle 2;$ $m\angle 4 = 180 - m\angle 3$	6. translation	6. HL	6. B	6. $4\sqrt{13} + 2\sqrt{97}$
7. 5	7. $44°$	7. reflection	7. A, B, D	7. D	7. D
8. 0	8. $136°$	8. C	8. 45	8. B	8. 35
9. A number is an integer.	9. B, C, D	9. $(9,-9)$	9. II and III	9. $50°$	9. 20
10. A number is either positive or negative.	10. $85°$	10. A, C, D	10. A	10. A, B, C, D	10. A, B, D
11. 0, it's an integer but it's neither positive nor negative.	11. c and d	11. $(2,-5)$	11. C	11. A, B, C, D	11. $37°$
12. 7	12. $124°$	12. Quadrant IV	12. AAS	12. $13° < x < 88°$	12. 44
13. Yes	13. $88°$	13. $T_{<-6,-6>}$	13. SSS	13. $AH > GB$	13. $118°$
	14. $92°$	14. A	14. ASA	14. $\angle Q, \angle P, \angle R$	14. 1.8
15. Jayla must buy car insurance.	15. line d	15. m, o	15. $125°$	15. circumcenter and orthocenter	15. C, D
16. Vertical Angles Thm.	16. $y = 2x + 8$	16. r, t	16. 20	16. 11	16. $4x\sqrt{17}$
17. 17	17. $m_\perp = 4$	17. l, n	17. ΔGJH	17. incenter	17. 36
	18. 2nd Ave.	18. none	18. 5	18. perpendicular bisector	18. square
	19. $m_\perp = 0$	19. A, D	19. AAS		19. quadrilateral
	20. $\angle 6, \angle 7, \angle 8, \angle 9,$ $\angle 10, \angle 11, \angle 12$	20. A	20. A, B, D		20. kite