GEOMETRY – Midterm Review Topics – Chapters 1-6

Chapter 1 Topics

1.1
Undefined Terms—point, line, plane
Collinear, Coplanar
Segment
Endpoint
Ray
Opposite Rays
Postulates—Points, Lines, and Planes

1.2
Coordinate
Ruler Postulate
Distance
Congruent Segments
Segment Addition Postulate (Problems using Algebra)
Midpoint (Problems using Algebra)
Segment Bisector (Problems using Algebra)

1.3
Angle
Interior of an Angle/Exterior of an Angle
Measure of an angle/Degree
Protractor Postulate
Measure of an Angle
Types of Angles
Congruent Angles
Angle Addition Postulate (Problems using Algebra)
Angle Bisector (Problems using Algebra)

1.4
Adjacent Angles
Linear Pair (Problems using Algebra)
Complementary Angles (Problems using Algebra)
Supplementary Angles (Problems using Algebra)
Vertical Angles (Problems using Algebra)

1.5
Perimeter (P)
Area (A)
Rectangle: P=2w+2l, A=lw
Square: P=4s, $A=s^2$
Triangle: P=a+b+c, $A=\frac{1}{2}bh$
Base (b) and Height (h)
Diameter
Radius
Circumference: $C = 2\pi r$ and $C = \pi d$
Area: $A = \pi r^2$

1.6
Midpoint Formula (Problems using Algebra)
Distance Formula (Problems using Algebra)
Pythagorean Theorem
Parts of a right triangle
Finding distance using both distance formula and Pythagorean theorem

Chapter 2 Topics

2.1
Inductive Reasoning
Finding and describing a pattern
Conjecture
Counterexample

2.2
Conditional Statement
Hypothesis
Conclusion
Writing Conditional Statements
Truth Value
Negation
Related Condtionals
--Converse
--Inverse
--Contrapositive
Logically Equivalent Statements

2.3
Deductive Reasoning
Law of Detachment
Law of Syllogism
Making Conclusions

2.4
Biconditional Statement
Truth Value of a Biconditional Statement
Definition
Polygon
Triangle
Quadrilaterals
Definition—Biconditional

2.5
Proof
Properties of Equality
Distributive Property
Justify each step in an Equation
D=rt
Solve an Equation Using Geometry
Properties of Congruence
Difference between Congruence and Equivalencies

2.6
Writing Justifications
Theorem
Linear Pair Theorem
Congruent Supplements Theorem
2-Column proof
Right angle Congruence Theorem (All right angles are congruent)
Congruent Complements Theorem
If no diagram, draw one!
Vertical Angle Theorem

2.7
Common Segments Theorem
If 2 congruent angles are supplementary, then each angle is a right angle.

Chapter 3 Topics

3.1
Parallel Lines
Perpendicular Lines
Skew Lines
Parallel Planes
Transversal
Corresponding Angles
Alternate Interior Angles
Same-Side Interior Angles
Alternate Exterior Angles

Solving Systems of Equations

3.2 Postulates and Theorems for Parallel Lines
Corresponding Angles Postulate
Alternate Interior Angles Theorem
Alternate Exterior Angles Theorem
Same-Side Interior Angles Theorem
If transversal is perpendicular to parallel lines, then all angles are right angles.
**Problems using Algebra

3.3 Postulates and Theorems Proving Lines Parallel
Converse of the Corresponding Angles Postulate
Parallel Postulate
Converse of the Alternate Interior Angles Theorem
Converse of the Alternate Exterior Angles Theorem
Converse of the Same-Side Interior Angles Theorem

3.4
Perpendicular Bisector
Distance from a point to a line
If 2 intersecting lines form a linear pair of congruent angles, then the lines are perpendicular.
Perpendicular Transversal Theorem
If 2 coplanar lines are perpendicular to the same line, then the 2 lines are parallel to each other.
**Algebra Problems

3.5
Rise, Run
Slope
Positive/Negative/Zero/Undefined Slopes
Parallel Lines Theorem
Perpendicular Lines Theorem

3.6
Point Slope Form
Slope Intercept Form
Vertical Lines
Horizontal Line
Transform between both equations
Graphing Lines
Pairs of Lines—
-Parallel Lines
-Intersecting Lines/Perpendicular Lines
-Coinciding Lines
(Algebra Problems)

Chapter 4 Topics

4.1
Classifying Triangles by Angles and Sides
Using Triangle Classification

4.2
Triangle Sum Theorem
Auxiliary Line
Corollary
The acute angles of a right triangle are complementary.
The measure of each equiangular triangle is 180 degrees.
$m\angle A = m\angle B = m\angle C$
Interior/Exterior
Interior Angles/Exterior Angles
Remote Interior Angles
Exterior Angle Theorem
3rd Angles Theorem
(Algebra Problems)

4.3
Congruent
Corresponding Angles and Corresponding Sides
2 polygons are congruent iff their corresponding sides and angles are congruent
CPCT-Corresponding Parts of Congruent Triangles
Proving Triangles Congruent
**Algebra Problems

4.4
Triangle Rigidity
SSS
Included Angle
SAS
AAS
Verifying Triangle Congruence

4.5
Included Side
ASA
HL

4.6
CPCTC—Corresponding Parts of Congruent Triangles are Congruent
Remember: SSS, SAS, ASA, AAS, HL use corresponding parts to prove triangles congruent
CPCTC uses congruent triangles to prove corresponding parts are congruent

4.8
Isosceles Triangle
Legs, Vertex Angle, Base, Base Angles
Isosceles Triangle Theorem (ITT)

Converse of Isosceles Triangle Theorem
If a triangle is equilateral, then it is equiangular.
(equilateral triangle→equiangular triangle)
(Algebra Problems)

Chapter 5 Topics

5.1
Equidistant
Perpendicular Bisector Theorem
Converse of Perpendicular Bisector Theorem
Angle Bisector Theorem
Converse of Angle Bisector Theorem
Applying Angle Bisector Theorem

5.2
Concurrent
Circumcenter Theorem
Incenter
Incenter Theorem
Inscribed

5.3
Median of a Triangle
Centroid of a Triangle
Centroid Theorem
Altitude of a Triangle
Orthocenter of a triangle
Slope
Point-slope form
Vertical line
Horizontal Line

5.4
Midsegment of a Triangle
Triangle Midsegment Theorem
**Algebra Problems

5.5
Indirect Proof
Angle-Side Relationships in Triangles Theorem
Conv. of Angle-Side Relationships in Triangles Theorem
Inequality Properties:
-Addition Property of Inequality
-Subtraction Property of Inequality
-Multiplication Property of Inequality
-Division Property of Inequality
-Transitive Property of Inequality
-Comparison Property of Inequality—If a+b=c and b>0, then a<c
Triangle Inequality Theorem

5.6
Hinge Theorem
Converse of Hinge Theorem
Simplify Radicals

5.7
Pythagorean Theorem
Pythagorean Triples
**Algebra Problems

5.8
45-45-90 Triangle Theorem
30-60-90 Triangle Theorem

Chapter 6 Topics

6.1
Side of a Polygon, Vertex of a Polygon, Diagonal of a Polygon
Names of Polygons
Definition of Polygon
Regular Polygon
Concave
Convex
Polygon Angle-Sum Theorem
Polygon Exterior Angle Sum Theorem
**Algebra Problems

6.2
Parallelogram
If quad is a parallelogram, then its opp. Sides are congruent
If a quad is a parallelogram, then its opp. Angles are congruent
If a quad is a parallelogram, then its consec. Angles are supplementary.
If a quad is a parallelogram, then its diagonals bisect each other.

6.3
Conditions for Parallelograms
Quad with 1 pair of opp sides parallel and congruent is a parallelogram.
Quad with opp sides congruent is a parallelogram
Quad with opp angles congruent is a parallelogram
Quad with angles supp. To consecuative angles is a parallelogram
Quad with diagonals bisecting each other is a parallelogram

GEOMETRY – Algebra Review

Simplify:

1) $\sqrt{180}$

2) $\sqrt{8} \cdot \sqrt{10}$

3) $\sqrt{\frac{54}{24}}$

4) $\sqrt{12} \cdot \sqrt{75}$

5) $\frac{17}{\sqrt{7}}$

6) $\sqrt{24} \cdot \sqrt{2x} \cdot \sqrt{3x}$

7) $\frac{6}{\sqrt{3}+2}$

8) $(2\sqrt{11}+5)(\sqrt{11}-2)$

9) $\frac{8x^5+16x^3-8x}{4x}$

10) $\frac{16\sqrt{2}\cdot 64}{8}$

11) $-8x^3(-3x^2+5x)$

12) $-8x^3(-3x^2 \cdot 5x)$

13) $(x^2-3)^2$

14) $(4x-9)^2$

Solve:

15) $7^2 + x^2 = (x + 3)^2$

16) $4x^2 = 16$

17) $x^2 - 3x = 28$

18) $2x^2 - 7x = -5$

19) $3y^2 + 4y = 2y^2 - 2y - 9$

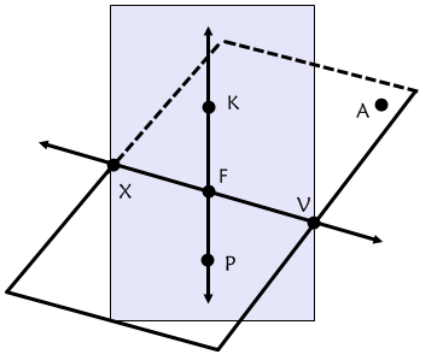
20) Write an equation for the line that goes through the points (-8, 9) and (-6, 5).

21) What is the equation of the perpendicular bisector of $\overline{MN}$ if M has coordinates (-3, 5) and N has coordinates (6, 8)?

22) What is the equation for a line parallel to $y = -\frac{1}{2}x - 8$ through point (8, -5)?

GEOMETRY – Chapter 1 Review

Use the following diagram for problems 1-4.



1) Name two opposite rays.

2) Name a point on $\overrightarrow{XF}$.

3) Name the intersection of the two planes.

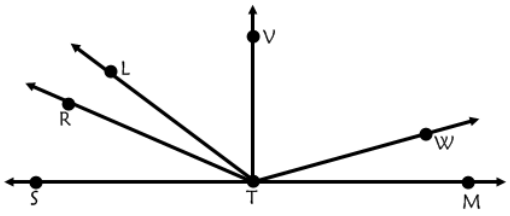
4) Name a plane containing X, V, and P.

5) The intersection of two planes is a(n) _____.

6) M is between N and R. If $MR = 7.6$ and $NR = 15$, what is MN?

7) $\overline{LH}$ bisects $\overline{GK}$ at M. If $GM = 2x + 6$ and $GK = 24$, solve for x.

Use the following diagram for problems 8-11. ∠VTS is a right angle.



8) Name an acute angle.

9) Name an obtuse angle.

10) Name two angles that form a linear pair.

11) Name two angles that are supplementary and congruent.

12) $\overrightarrow{BD}$ bisects ∠ABC, $m\angle ABD = \left(\frac{1}{2}y + 10\right)°$, and $m\angle DBC = (y + 4)°$. What is $m\angle ABC$?

Use the following diagram for problem 13.

13) AB = 6x + 4, BC = x + 8, and AC = x^2 – 18. Solve for x.

If m∠A = (4x – 30)° and m∠B = 54.3°, find the measure of the following:

14) the complement of A

15) the supplement of B

Find the perimeter and area of problems 16 and 17. Draw a diagram.

16) A rectangle with length = x + 4 and width = x

17) A triangle with side a = 3x, side b = 10, side c = x + 6, and height = 2x.

18) Find the circumference of a circle with radius of 4 centimeters. Leave answer in terms of pi.

19) Find the area of a circle with a diameter of 12 feet. Leave answer in terms of pi.

20) Find the coordinates of the midpoint of $\overline{MN}$ with endpoints M(-2, 6) and N(8, 0).

21. K is the midpoint of $\overline{HL}$. H has coordinates (1, -7) and K has coordinates (9, 3). Find the coordinates of L.

GEOMETRY – Chapter 2 Review

1) Find the next two items in the pattern, and then write a conjecture about the pattern.

   0.7, 0.07, 0.007, …

2) Show that the conjecture is false by providing a counterexample: "For every integer n, n^5 is positive."

3) Show that the conjecture is false by providing a counterexample: "Two complementary angles are not congruent."

4) Write the inverse: "All even numbers are divisible by 2."

5) Write the converse: "A triangle with one right angle is a right triangle."

6) Write the contrapositive: "If $n^2 = 144$, then $n = 12$."

Determine if each conjecture in problems 7 and 8 is valid, and by which law of deductive reasoning.

7) If n is a natural number, then n is an integer.

   N is a rational number, if n is an integer.

   If n is 0.875 is a rational number, then n is a natural number.

8) If you do your homework, then your grade will be at least a C.

   You have a C-.

9) For the conditional, "If an angle is a right angle, then its measure is 90 degrees," write the converse and a biconditional statement.

10) Write the definition as a biconditional: "An acute triangle is a triangle with three acute angles."

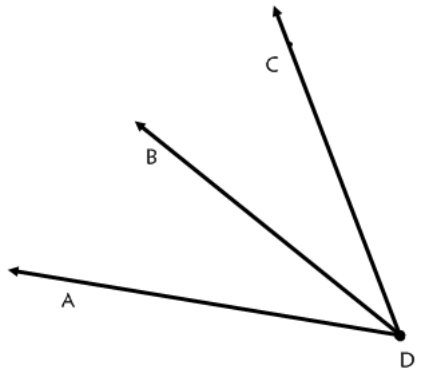
11) Solve the equation and justify each step. J is a point on segment GH. GJ=2x, JH=3x – 9, GH= 4x – 4. Solve for x. Draw a diagram.

12) Write a two-column proof:

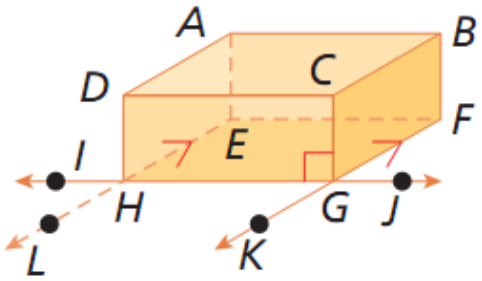
Given: $m\angle ADC = 30°$

$m\angle ADB = 15°$

Prove: $\overrightarrow{DB}$ bisects $\angle ADC$



GEOMETRY - Chapter 3 Review



For problems 1-8, identify the following using the above diagram:

1) One pair of parallel segments

2) One pair of skew segments

3) One pair of perpendicular segments

4) One pair of parallel planes

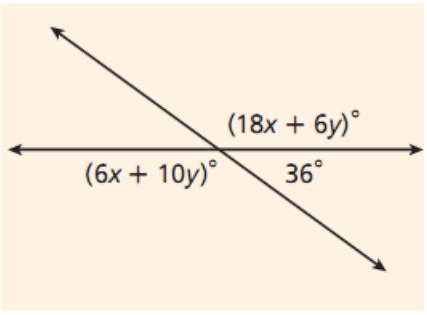
5) One pair of alternate interior angles

6) One pair of corresponding angles

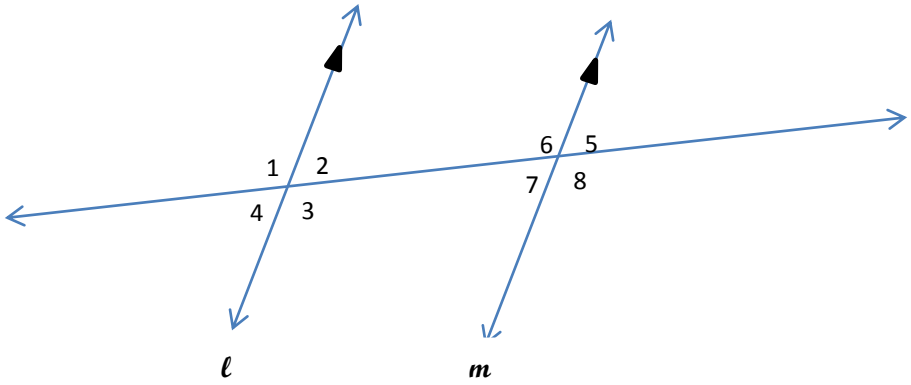
7) One pair of alternate exterior angles

8) One pair of same-side interior angles

9) Use diagram at below right to solve for x and y:



Use the following diagram to answer problems 10-17:



In problems 10-13, state the theorem/postulate that is related to the measures of the angles in each pair. Then, find the unknown angle measure.

10) $m\angle 1 = 120°;\ m\angle 8 = (60x)°$

11) $m\angle 8 = (75x - 30)°;\ m\angle 3 = (30x + 60)°$

12) $m\angle 3 = (50x + 20)°;\ m\angle 6 = (100x - 80)°$

13) $m\angle 3 = (45x + 30)°;\ m\angle 7 = (25x + 10)°$

In problems 14-17, name the theorem/postulate that proves l || m:

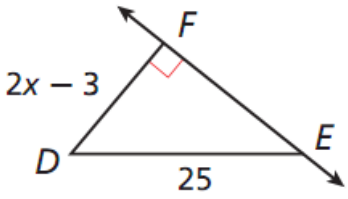
14) $\angle 2 \cong \angle 7$

15) $\angle 5 \cong \angle 4$

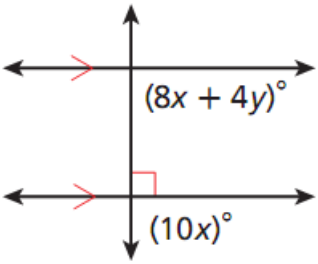
16) $\angle 1 \cong \angle 6$

17) $\angle 2$ and $\angle 6$ are supplementary

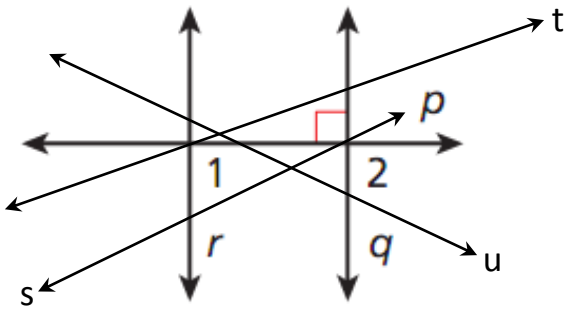
18) Write and solve an inequality for x:



19) Solve to find x and y:



20) Write a two-column proof:



Given: $\angle 1 \cong \angle 2$

$p \perp q$

Prove: $p \perp r$

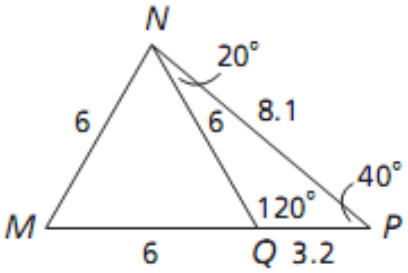
21) Determine if $\overleftrightarrow{XY}$ and $\overleftrightarrow{AB}$ are parallel, perpendicular, or neither.

X(0, -2); Y(1, 2); A(-2, 5); B(-3, 1)

22) Write the equation of the line through (-1, 3) and (3, -5) in slope-intercept form.

GEOMETRY - Chapter 4 Review

Use the following diagram for problems 1-3 and classify each triangle by its angles and sides:

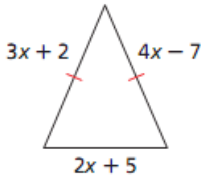


1) ΔMNQ

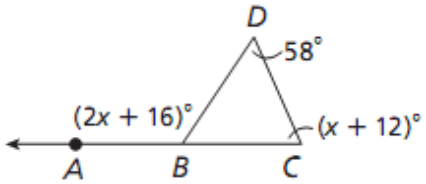
2) ΔNQP

3) ΔMNP

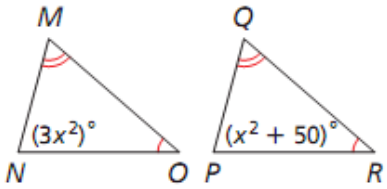
4) Find the side lengths of the following triangle:



5) Find m∠ABD.

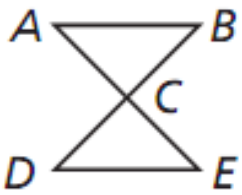


6) Find the m∠N and m∠P.



7) Given ΔABC ≅ ΔJKL. If AB = 2x + 12 and JK = 4x – 50, find x and AB.

8) Write a two-column proof of the following:



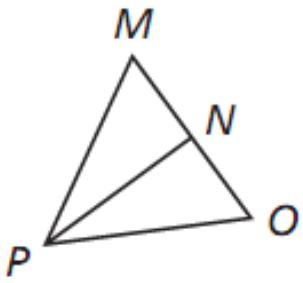
Given: C is the midpoint of $\overline{BD}$ and $\overline{AE}$

$\angle A \cong \angle E$

$\overline{AB} \cong \overline{ED}$

Prove: $\Delta ABC \cong \Delta EDC$

9) Write a two-column proof of the following:

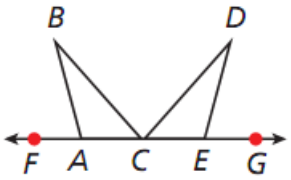


Given: $\overline{PN}$ bisects $\overline{MO}$

$\overline{PN} \perp \overline{MO}$

Prove: $\Delta MNP \cong \Delta ONP$

10) Write a two-column proof of the following:



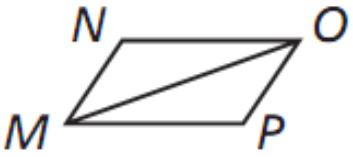
Given: $\angle FAB \cong \angle GED$

$\angle ACB \cong \angle DCE$

$\overline{AC} \cong \overline{EC}$

Prove: $\Delta ABC \cong \Delta EDC$

11) Write a two-column proof of the following:

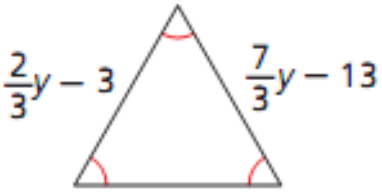


Given: $\overline{NO} \parallel \overline{MP}$

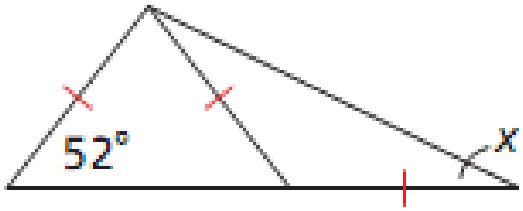
$\angle N \cong \angle P$

Prove: $\overline{MN} \parallel \overline{OP}$

12) Solve for y:

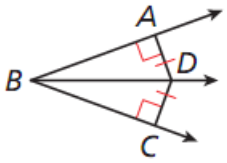


13) Solve for x:



GEOMETRY – Chapter 5 Review

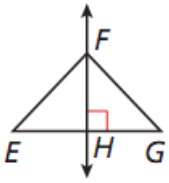
Use the diagram to the right for problems 1 and 2:



1) Given that m∠ABD = 16°, find m∠ABC.

2) Given that m∠ABD = (2x + 12)° and m∠CBD = (6x – 18)°, find m∠ABC.

Use the diagram to the right for problems 3 and 4:

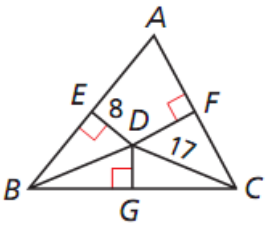


3) Given that $\overline{FH}$ is the perpendicular bisector of $\overline{EG}$, EF = 4y – 3 and FG = 6y – 37, find FG.

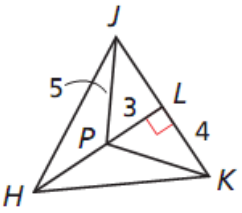
4) Given that EF = 10.6, EH = 4.3, and FG = 10.6, find EG.

5) Write an equation for the perpendicular bisector of the segment with endpoints X(7, 9) and Y(-3, 5).

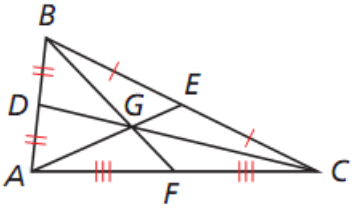
6) $\overline{ED}$, $\overline{FD}$, and $\overline{GD}$ are the perpendicular bisectors of ΔABC, ED = 8, and DC = 17. Find BD.



7) $\overline{JP}$, $\overline{KP}$, and $\overline{HP}$ are angle bisectors of ΔHJK, PL = 3, LK = 4, and JP = 5. Find the distance from P to HK.



Use the figure to the right for problems 8-10. In ΔABC, AE = 12, DG = 7, and BG = 9.
Find each length:



8) AG

9) GC

10) BF

For items 11 and 12, use ΔMNP with vertices M(-4, -2), N(6, -2), and P(-2, 10). Find the coordinates of the following points:

11) the centroid

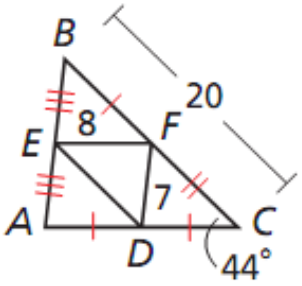
12) the orthocenter

Use the diagram at right for problems 13-15. Find each measure:

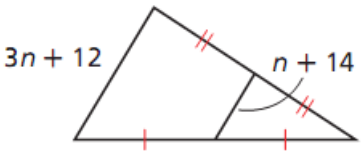
13) ED

14) AB

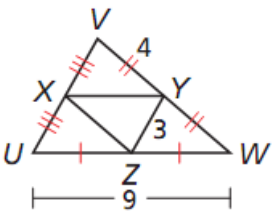
15) m∠BFE



16) Find the value of n using the diagram below.



17) In the diagram below, ΔXYZ is the midsegment triangle of ΔWUV. What is the perimeter of ΔXYZ?



18) Draw ΔABC, then write the angles in order from smallest to largest if AB = 7, BC = 9, and AC = 8.

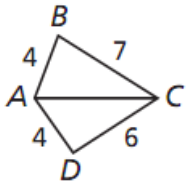
19) Draw ΔDEF, then write the sides in order from shortest to longest if m∠E = 61° and m∠F = 59°.

20) The lengths of two sides of a triangle are 17 cm and 12 cm. Find the range of possible lengths for the third side.

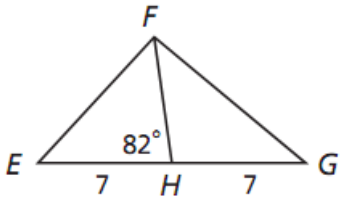
21) Tell whether a triangle can have sides with lengths 2.7, 3.5, and 9.8.

22) Ray wants to place a chair so it is 10 feet from his television set. Can the distance from the chair to his fireplace be 6 feet and the distance between the fireplace and the television be 8 feet?

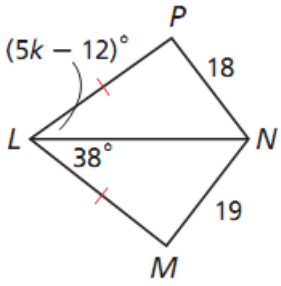
23) Compare m∠BAC and m∠DAC below.



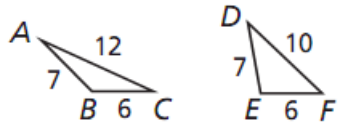
24) Compare EF and FG below.



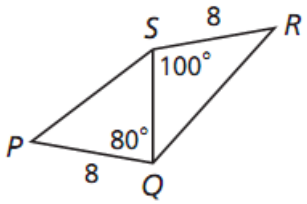
25) Find the range of values for k in the diagram below.



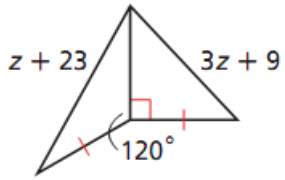
26) Compare m∠ABC and m∠DEF below:



27) Compare PS and QR below:



28) Find the range of values for z below:

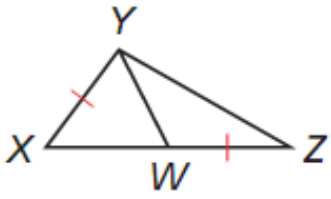


30) Write a two-column proof:

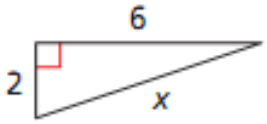
Given: $\overline{XY} \cong \overline{WZ}$

$XW < YZ$

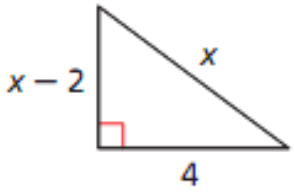
Prove: $m\angle XYW < m\angle ZXY$



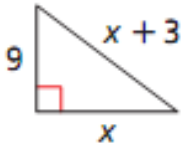
31) Find the value of x. Give answer in simplest radical form.



32) Find the value of x. Give answer in simplest radical form.

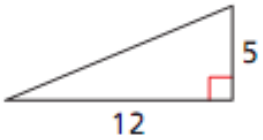


33) Find the value of x.



34) An entertainment center is 52 inches wide and 40 inches high. Will a TV with a 60 inch diagonal fit in it?

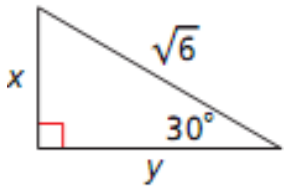
35) Find the missing side length. Tell if the side lengths form a Pythagorean triple.



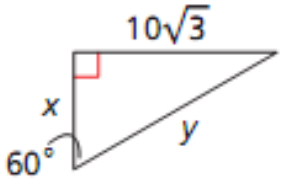
36) Tell if the measures 7, 11, and 15 can be the side lengths of a triangle. If so, classify the triangle as acute, obtuse, or right.

Find the values of the variables. Give your answers in simplest radical form:

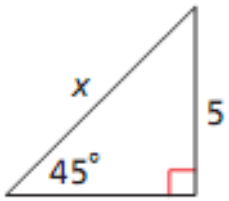
37)



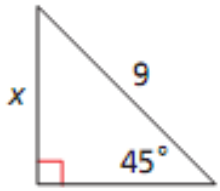
38)



39)



40)



Find the perimeter and area of each figure. Give your answers in simplest radical form:

41) A square with a diagonal length of 20 centimeters

42) An equilateral triangle with height 24 inches

43) Name the point of concurrency for

a) angle bisectors;

b) perpendicular bisectors;

c) medians; and

d) altitudes.

44) In a right triangle, the hypotenuse has length 18 – 3z and one leg has length z + 4. Draw a diagram and write an inequality to show all possible values for z.

GEOMETRY – Midterm Proof Review

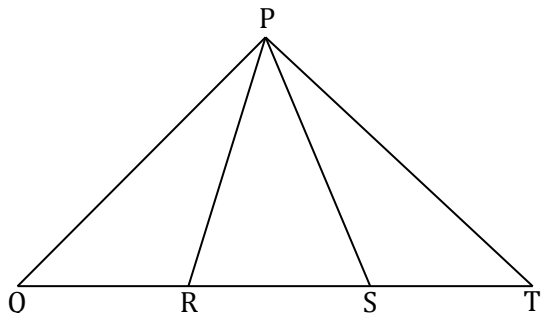
1) Write a two-column proof:

Given: $\angle QPS \cong \angle TPR$

$\overline{PQ} \cong \overline{PT}$

$\overline{PR} \cong \overline{PS}$

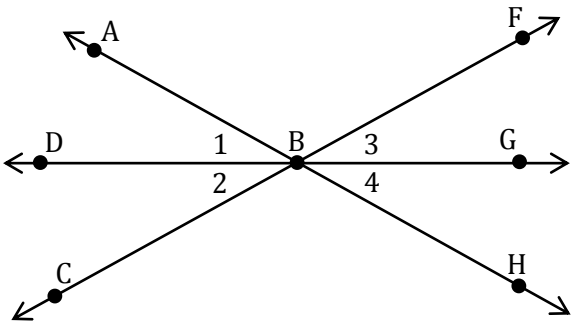
Prove: $\Delta PQR \cong \Delta PTS$



2) Write a two-column proof:

Given: $\overrightarrow{BD}$ bisects $\angle ABC$

Prove: $\overrightarrow{BG}$ bisects $\angle FBH$

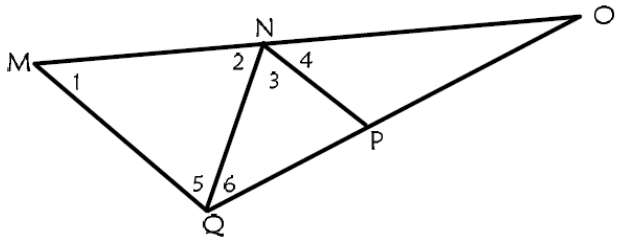


3) Write a two-column proof:

Given: $\overline{MQ} \parallel \overline{NP}$

$\angle 4 \cong \angle 3$

Prove: $\angle 1 \cong \angle 5$

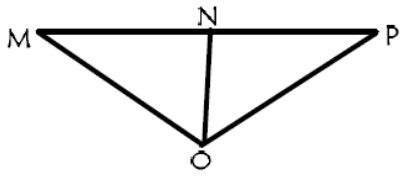


4) Write a two-column proof:

Given: $\overline{NO}$ bisects $\angle POM$

$\overline{NO} \perp \overline{MP}$

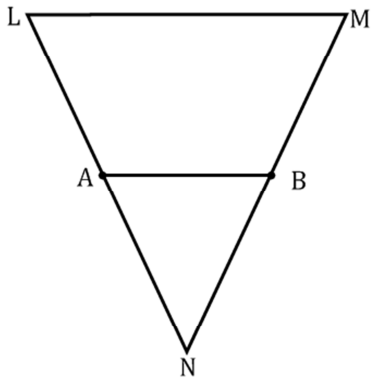
Prove: $\Delta MNO \cong \Delta PNO$



Proof Review

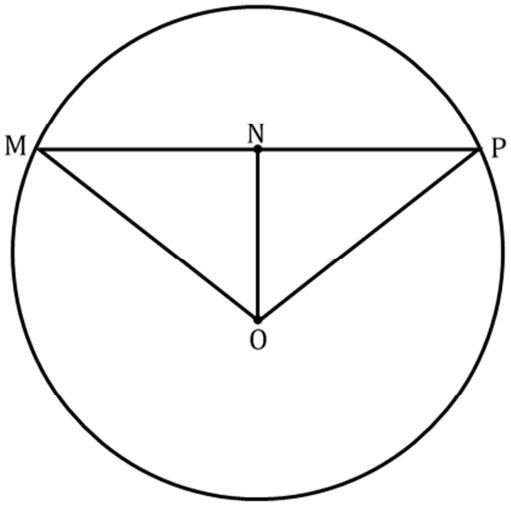
1.) Given: $NL = NM;\ AL = BM$

Prove: $NA = NB$



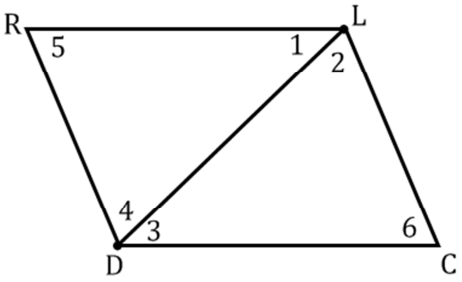
2.) Given: $\overline{NO}$ bisects $\angle POM$; $\overline{NO} \perp \overline{MP}$

Prove: $\overline{NO}$ is $\perp$ bisector



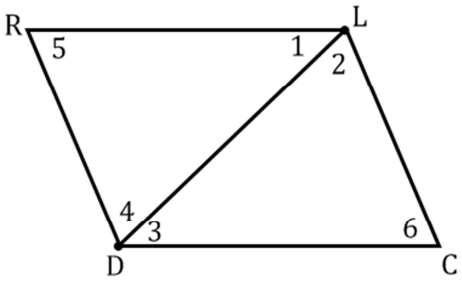
3.) Given: $\overline{RL} \parallel \overline{CD};\ \overline{LC} \parallel \overline{DR}$

Prove: $\angle 5 \cong \angle 6$



4.) Given: $\angle 4 \cong \angle 2;\ \overline{DR} \cong \overline{LC}$

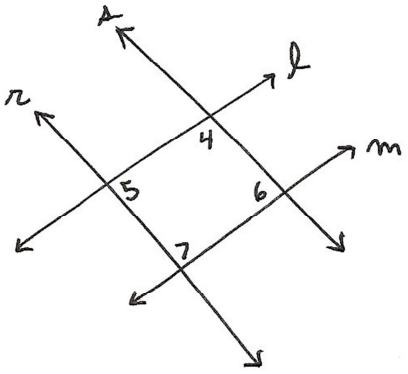
Prove: $\overline{RL} \cong \overline{CD}$



Proof Review

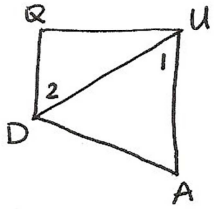
① Given: $r \parallel s$; $\angle 5 \cong \angle 6$

Prove: $\ell \parallel m$



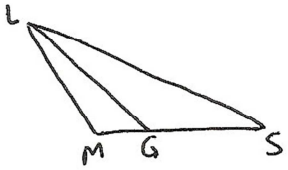
② Given: $\overline{AU} \perp \overline{QU}$; $\angle 1 \cong \angle 2$

Prove: $\overline{DQ} \perp \overline{QU}$



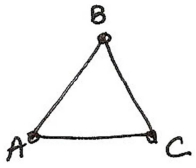
③ Given: $m\angle LGM = 25°$

Prove: $\triangle LGS$ is an obtuse $\triangle$



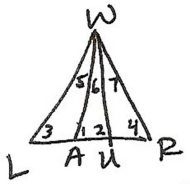
④ Given: $\triangle ABC$ is equiangular

Prove: $m\angle A = m\angle B = m\angle C = 60°$
(prove this thm!)



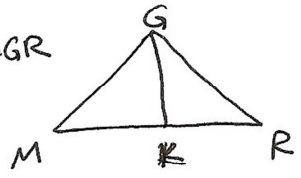
⑤ Given: $\angle 1 \cong \angle 2$; $\angle 3 \cong \angle 4$; $\overline{LA} \cong \overline{RU}$

Prove: $\triangle WLU \cong \triangle WRA$



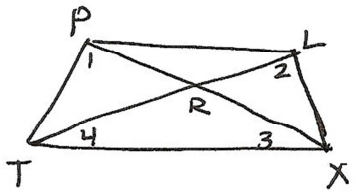
⑥ Given: K is midpt of $\overline{MR}$
$\triangle MGR$ is isosceles $\triangle$ with vertex $\angle MGR$

Prove: $\triangle MGK \cong \triangle RGK$



⑦ Given: $\overline{PX} \cong \overline{LT}$; $\triangle PRL$ is an isosceles $\triangle$ with base $\overline{PL}$

Prove: $\triangle TRX$ is isosceles



⑧ (same diag as above) Given: $\measuredangle 1 \cong \measuredangle 2$; $\measuredangle 3 \cong \measuredangle 4$

Prove: $\overline{PT} \cong \overline{LX}$

⑨ Given: $\measuredangle 1 \cong \measuredangle 2$; $\measuredangle 3 \cong \measuredangle 4$; $\measuredangle 1 \cong \measuredangle 4$; $\overline{GV} \cong \overline{TV}$

Prove: $\triangle RVS$ is isosceles