#

Geometry/Trigonometry
Unit 1: Parallel Lines Notes

Name:
Date:
Period:

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(2) Page 33 - 34 #7 -21 odd, 23 – 28 all

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(4) Page 60 – 61 #1 – 8 all #13 – 23 odd

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Geometry Notes 1.5 Coordinate and Noncoordinate Geometry

Noncoordinate geometry (aka Euclidean geometry) – the geometry of _____ mathematicians.

Coordinate geometry (aka analytical geometry) - was developed in the 17th century and has the advantage of using _____ in the exploration of geometric relationships. It uses the _____ to study the_____ of segments, lines, planes and other figures.

Real number line - _____ system where points have a _____ coordinate.

Coordinate plane – _____ system in which points have _____ coordinates.

Slope – used to describe the _____ of a line

(1) Formula: $m =$ _____

(2) Parallel Lines: _____ slope

(3) Perpendicular lines: _____ slope or $m_1 \cdot m_2 = -1$

Coplanar – points, lines, segments and other figures that _____ plane.

Collinear – points, segments, or rays that _____ line.

Midpoint Formula - Let $A(x_1, y_1)$ *and* $B\ (x_2, y_2)$ be points in a coordinate plane.

$$Midpoint\ of\ \overline{AB} = (\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$$

Geometry Notes 2.1 Exploring Patterns

Reasoning in geometry: First 2 steps are _____. The third step is when you are _____ it.

(1) Look for a _____

(2) Make a conjecture – a _____ as to what you _____ is happening

(3) Verify the conjecture – use logical reasoning to _____ that it is true in _____ cases.

Important "Definitions": The first three are words that are commonly understood _____ being defined. Some statements such as "a point lies on a line" and "point C lies between A and B" are also not defined.

(a) Point

(b) Line

(c) Plane

(d) Line segment (or just segment) – consists of _____ and all of the points that lie in _____.

IMPORTANT – The _____ of line segment $\overline{AB}$ is AB.

(e) Ray – consists of _____ (A) and all of the points on the line $\overleftrightarrow{AB}$ that lie on the _____ of A that B lies. If C is between A and B, then $\overrightarrow{CA}$ and $\overrightarrow{CB}$ are _____rays.

(f) Collinear – points, segments or rays that _____.

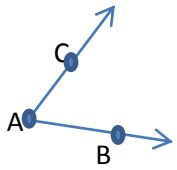
(g) Angle – consists of two different rays that have the _____. The _____ are the sides of the angle. The angles that consists of the rays $\overrightarrow{AB}$ and $\overrightarrow{AC}$ is denoted by $\measuredangle BAC, \measuredangle CAB, or\ by\ \measuredangle A$. The point A is the _____ of the angle. The measure of $\measuredangle A$ is denoted by $m\measuredangle A$.

(i) acute -

(ii) right -

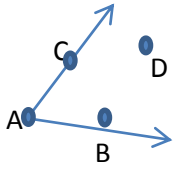
(iii) obtuse -

(iv) straight –



* In geometry, unless specifically stated otherwise, angles are assumed to have a measure that is greater than 0 degrees and less than or equal to 180 degrees. Every nonstraight angle has an interior and an exterior.*

(h) interior – a point is on the interior of an angle if it _____ the points that lie on _____ of the angle.



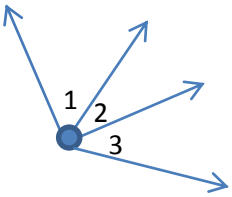
(i) exterior – lies on the _____ of the sides of the angle.

(j) adjacent – two angles are adjacent if they _____, but have _____.

$\measuredangle 1$ *is* _____ *to* $\measuredangle 2$

$\measuredangle 2$ *is* _____ *to* $\measuredangle 3$

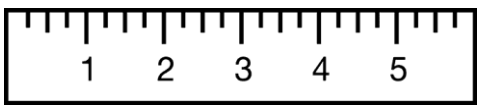
$\measuredangle 1$ *is* _____ *to* $\measuredangle 3$



Geometry Notes 2.2 The Structure of Geometry

Postulates, Theorems, Corollaries, Definitions and Formulas

Postulate 1 – Ruler Postulate: The points on a line can be matched, one-to-one, with the set of real numbers. The real number that corresponds with a point is the coordinate of the point. The distance, AB, between two points, A and B, on a line is equal to the absolute value of the difference between the coordinates of A and B.

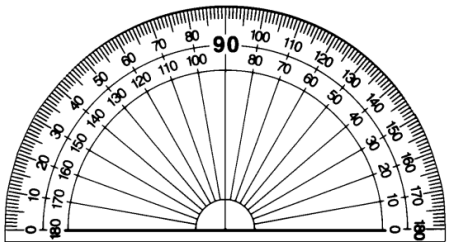


Postulate 2 – Segment Addition Postulate: If B is between A and C, then AB + BC = AC

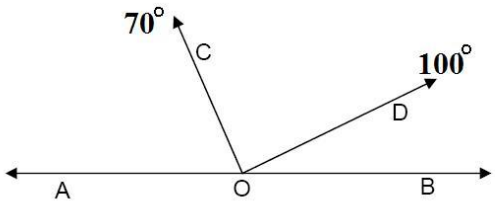
$AB + BC = AC$

Postulate 3 – Protractor Postulate: Let $\overrightarrow{OA}$ be a ray and consider one of the half-planes, P, determined by the line $\overleftrightarrow{OA}$. (The half plane P does not contain the line $\overleftrightarrow{OA}$.)

The rays of the form $\overrightarrow{OD}$, where D is in P, can be put in one-to-one correspondence with the real numbers between 0 and 180 inclusive. If C and D are in the half plane P, then the measure of $\measuredangle COD$ is equal to the absolute value of the difference between the real numbers for $\overrightarrow{OC}$ and $\overrightarrow{OD}$.



Postulate 4 – Angle Addition Postulate: If C is in the interior of $\measuredangle AOD$, then $m\measuredangle AOC + m\measuredangle COD = m\measuredangle AOD$



Geometry Notes 2.3 Segment and Angle Relationships

Vocabulary:

(1) Congruent

(a) Two segments are _____, $\overline{AB} \cong \overline{CD}$, if they have the same _____.

(b) Two angles are _____, $\measuredangle P \cong \measuredangle Q$, if they have the same _____.

(2) The _____ of a segment is the point that divides the segment into _____.

(3) A _____ is a segment, ray, line or plane that _____ a segment at its _____.

(4) An _____ is a ray that divides the angle into _____.

(5) Perpendicular

(a) Two lines are perpendicular (⊥) if they _____ to form a _____.

(b) A line is ⊥to a plane if it is ⊥to _____ in the plane that intersects it.

.

Definitions – can always be interpreted "forward" and "backward"

i.e. – "If two segments have the same measure, than they are ≅." AND "If two segments are ≅ then they have the same measure"

Distance Formula: Let $A = (x_1, y_1)$ and $B = (x_2, y_2)$ be points on a coordinate plane. The distance between A and B is:

$$AB =$$

(E1.) Find the distance between $(-1,2) and\ (2, -4)$.

(P1.) Find the distance between $(0, 4) and\ (2, 3)$.

Geometry Notes 2.4 Conditional Statements

Conditional statement (aka _____ statement) – a type of logical statement that may be _____.

I.E. "If you eat an apple every day, then you will not need to see the doctor".

_____ _____

a. A conditional statement has two parts: the _____, denoted by p, and the _____, denoted by q.

b. In symbols, the statement "If p then q" is written as $p \Rightarrow q$

Converse (of a conditional statement) is formed by _____ the _____ and the _____. This also may be true or false.

I.E. "If you do not need to see the doctor, then you eat an apple every day".

To prove that a conditional statement is _____, you must present an argument that the conclusion follows for _____ cases that fulfill the _____.

To prove that a conditional statement is _____, you only need _____ in which the hypothesis is fulfilled and the_____ is NOT fulfilled. This is called a _____.

<u>Biconditional Statement</u> – "*p* if and only if *q*" is written as $p \Leftrightarrow q$. This is equivalent to writing the _____ and its _____.

I.E. "An angle is a right angle if and only if it measures 90 degrees". {iff}

Point, line, and plane postulates.

Postulate 5: Through any two distinct points there exists exactly one line

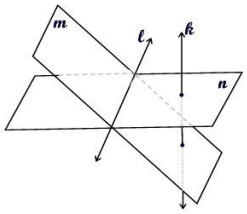
Postulate 6: A line contains at least two points

Postulate 7: Through any three noncollinear points there exists exactly one plane

Postulate 8: A plane contains at least three noncollinear points

Postulate 9: If two distinct points lie in a plane, then the line containing them lies in the plane

Postulate 10: If two distinct planes intersect, then their intersection is a line



Geometry Notes 2.5 Reasoning with Properties from Algebra

Algebraic properties being applied to geometry:

P.O.E. Properties of equality – Let a, b, and c be real numbers.

_____ Property of Equality – If a = b, then _____

_____ Property of Equality – If a = b, then _____

_____ Property of Equality – If a = b, then _____

_____ Property of Equality – If a = b, and c ≠0, then _____

_____ Property of Equality – For any real number a, _____

_____ Property of Equality – If a = b, then _____

_____ Property of Equality – If a = b and b = c, then _____

_____ Property of Equality – If a = b, then a may be _____ for b in any equation or expression.

_____ Property of Equality – _____ = ab + ac or _____ = ac + bc

These are the properties we will use most often. There are other properties we will use listed on page 736 of your text under Properties of Addition and Multiplication.

Also, these properties can be used as properties of _____.

****Two geometric objects are _____ if they have the _____.****

P.O.C. Properties of _____

_____ Property of Congruence – Any geometric object is congruent to itself.

_____ Property of Congruence – If one geometric object is congruent to a second, then the second object is congruent to the first.

_____ Property of Congruence – If one geometric object is congruent to a second, and the second is congruent to a third, then the first object is congruent to the third object.

Proof

(1) An _____ in which your first goal is to convince yourself that the _____.

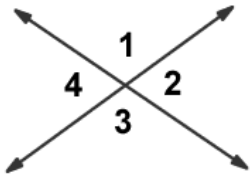
(2) Your second goal is to _____ your thoughts and write them down in a way that _____ your _____.

(3) There are different _____ of proofs

(4) It is important to realize that _____ step in your proof should be _____ or be justified by a _____.

Geometry Notes 2.6 Deductive Reasoning

Vertical Angles (aka scissor angles)– two angles are vertical angles if their _____ form two pairs of _____.



Linear Pair – two adjacent angles are a linear pair if their _____ are opposite rays.

Complementary – two angles are complementary if the _____of their measures is _____. Each angle is known as the _____ of the other.

Supplementary – two angles are supplementary if the _____ of their measures is _____. Each angle is known as the _____of the other.

Postulate 11 - Linear Pair Postulate (aka LPP): If two angles form a linear pair, then they are supplementary, i.e., the sum of their measures is 180°

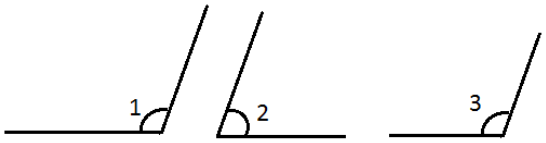
Using Deductive Reasoning

When you add a new term, theorem or postulate, you are adding more structure to geometry.

Deduce – being able _____ from known _____.

Deductive reasoning – used when you prove a theorem; by using the _____ to _____ parts of the structure.

Theorem 2.1 - Congruent Supplements Theorem : If two angles are supplementary to the same angle or congruent angles, then they are congruent



Theorem 2.2 - Congruent Complements Theorem: If two angles are complementary to the same angle or to congruent angles, then they are congruent

Theorem 2.3 - Vertical Angles Theorem (aka VAT): If two angles are vertical angles, then they are congruent