Jakarta International School

8^{th} Grade – AG1

Practice Test - Blue

Points, Lines, and Planes

Name: SOLUTIONS

Date:

Score: $\frac{\quad}{35}$

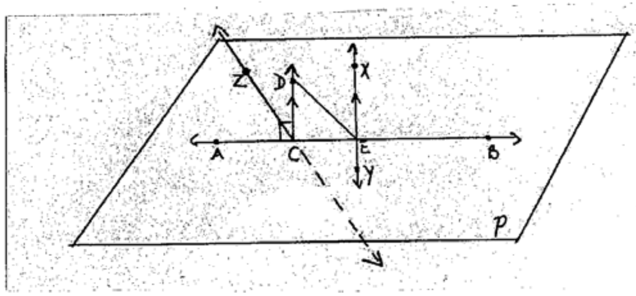
Goal 5: Solve problems using visualization and geometric modeling

Section 1**: *Points, Lines, and Planes***

1. Draw a clear diagram showing the following: (4 points)

Plane P contains :-

- $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersecting at point C so that $\overleftrightarrow{AC} \perp \overleftrightarrow{CD}$.
- $\overleftrightarrow{XY}$ intersects $\overleftrightarrow{AB}$ at point E so that $\overleftrightarrow{XY} \,//\, \overleftrightarrow{CD}$.
- Point D and E are joined to form $\overline{DE}$ and $\triangle CDE$.
- $\overleftrightarrow{CZ}$ intersects plane P at C



SOLUTIONS MAY VARY

Use your diagram to answer True or False to the following: (3 points)

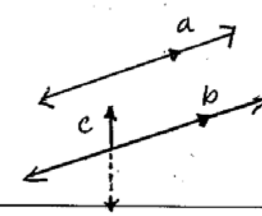
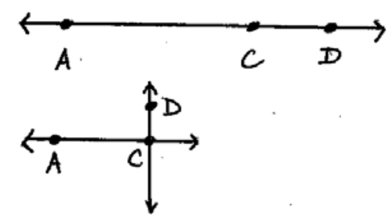
2. Points A, C, D are collinear points. FALSE

3. Exactly one plane contains $\overleftrightarrow{AB}$. FALSE

4. Points Z, C and E are coplanar TRUE

Read the following statements and indicate if each of the following is ALWAYS TRUE **(A)**, SOMETIMES TRUE **(S)** or NEVER TRUE **(N)**. (8 points)

Justify your answer either by a written explanation or a drawing to show your understanding.

#	Statement	A/S /N	Drawing or Explanation
5.	If three planes intersect, then their intersection is a point.	S	This happens, for example, when 2 walls intersect with a ceiling. The corner point of the room is the intersection. However, when 3 walls intersect, the intersection is a line.
6.	If a lines intersects one of two parallel lines, it will also intersect the other parallel line.	S	
7.	$\overleftrightarrow{AC}$ and $\overleftrightarrow{CD}$ are different lines	S	
8.	A line and a plane can intersect in exactly two points?	N	A line can either poke through a plane, intersecting it in a single point, or it can lie in the plane, intersecting it in an infinite number of points.

QUESTIONS 9 - 11 concern your understanding of SPHERICAL GEOMETRY

9. For each property listed from plane Euclidean Geometry, write a corresponding statement for spherical geometry. (3 points)

   a. The shortest path between two points is a straight line segment.

The shortest path between 2 points is an arc of a great circle.

   b. Two lines intersecting to form four right angles are perpendicular.

2 great circles intersecting to form 8 right angles are perpendicular

   c. Through any two points in a plane, there is a unique and infinite straight line.

Through any 2 points in a sphere, there is a unique and finite great circle.

10. Compare the distance between any pole point and its equator to the length of a great circle on the same sphere. (1 point)

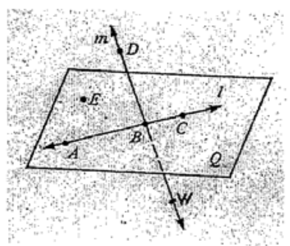
The distance between a pole point and its equator is $\frac{1}{4}$ the length of a great circle on the same sphere.

11. Is it possible for parallel great circles to exist? Explain. (1 point)

No. It is impossible to draw 2 non-intersecting great circles. 2 great circles will always intersect in 2 points.

Section 2: Distance, Line Segments, and Rays

12. Do the two figures named intersect? If so, what is the intersection? (2 points)



$\overline{AB}$ and $\overline{CB}$? $\overline{AC}$

$\overline{DB}$ and $\overline{BW}$? $\overrightarrow{DB}$ OR $\overrightarrow{DW}$

13. If U is between T and B, find the value of x and the measure of $\overline{TU}$. (2 points)

$TU = 1-x, UB = 4x+17, TB = -3x$

$1-x \quad 4x+17$

T U B

$-3x$

$1-x+4x+17 = -3x$

$3x+18 = -3x$

$6x = -18$

$\boxed{x=-3}$

$TU = 1--3$

$\boxed{TU=4}$

14. 2 points, A and B, are on a number line as shown in the figure below. Write an expression that represents the *distance* between the two points. (1 point)

$B-A$ or $|B-A|$ or $|A-B|$

15. Find the value(s) of x satisfying the equation $|x-10|=|x-16|$. Draw a number line that illustrates why your answer makes sense. (2 points)

$\boxed{x=13}$ The distances between 13 and 10 and 13 and 16 are equal as indicated by the equation.

3 3

10 13 16

Section 3: Midpoints

16. **A** and **B** are points on a number line. The coordinate of **A** is **2x+5** and the coordinate of **B** is **-3x-5**. If $\overline{AB}$ = **25** units, find the value of x and the corresponding coordinates of points **A** and **B**. Sketch $\overline{AB}$. (2 points)

25

A B

$2x+5 \quad -3x-5$

$25 = (-3x-5)-(2x+5)$

$25 = -3x-5-2x-5$

$25 = -5x-10$

$35 = -5x$

$-7 = x$ $\begin{cases} A=-9 \\ B=16 \end{cases}$

$\boxed{OR}$

25

B A

$-3x-5 \quad 2x+5$

$(2x+5)-(-3x-5) = 25$

$2x+5+3x+5 = 25$

$5x+10 = 25$

$5x = 15$

$x = 3$ $\begin{cases} A=11 \\ B=-14 \end{cases}$

17. Find the coordinates of the midpoint of the segment $\overline{MN}$ whose endpoints have coordinates **M** (-2,4) and **N** (3,1). (2 points)

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

$\left(\frac{-2+3}{2}, \frac{4+1}{2}\right)$

$\boxed{\left(\frac{1}{2}, \frac{5}{2}\right)}$

Section 4: Constructions

18. An object's **center of mass** is the point where an object balances in all directions. Use the steps listed below to find the Triangle's center of mass.

To Locate a Triangle's Center of Mass

a. Locate the midpoint of each side of the triangle. Do this by using a compass to construct the perpendicular bisector of each side. (2 points)

b. Draw a segment between the midpoint of $\overline{QR}$ and P. (1 point for b-d)

c. Draw a segment between the midpoint of $\overline{PR}$ and Q.

d. Draw a segment between the midpoint of $\overline{PQ}$ and R.

e. The center of mass is the point where these three segments intersect. Label the center of mass C. (1 point)