Unit 2: Coordinate Geometry Quiz Exemplars!

Name _____

Course: IB MYP 9 Math Standard Level

Teachers: Berg, Connelly, Oberembt, Paulson, Perkins

UNIT: ***2 Coordinate Geometry***
Key Concept: ***Forms***
Related Concept(s): ***Model, representation***
Global Context: **Orientation in Space and Time**
Statement of Inquiry: The geographical boundaries in our community can be modeled by different forms and representations.
Task Title: Distance Assessment
Task Description: Students will solve problems using Pythagorean Theorem, distances, and triangle representations.

Use these exemplars to examine and grow from your mistakes!

7 8	• Select appropriate mathematics when solving **challenging problems in both familiar and unfamiliar situations.** • Apply the selected mathematics successfully when solving these problems. • Generally solve these problems correctly.			• All problems are solved correctly ***without error***. (8) -Component form between coordinate points -magnitude -vector operations -Algebraically -Graphically -Application • Vector notation is used **correctly**.

Version 1

1. Consider the points $A = (-4, 3)$ and $B = (5, -2)$.

(a) Write down the vector $\overrightarrow{BA}$.

$\begin{pmatrix} -9 \\ 5 \end{pmatrix}$

(b) Find $|\overrightarrow{BA}|$.

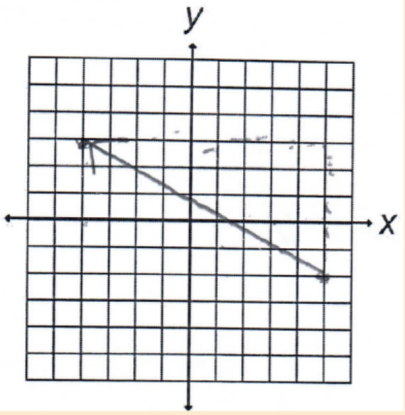
$a^2 + b^2 = c^2$

$9^2 + 5^2 = c^2$

$81 + 25 = c^2$

$\sqrt{106} = c^2$

$\sqrt{106} = c$



Version 1

1. Consider the points $A = (-4, 3)$ and $B = (5, -2)$.

(a) Write down the vector $\overrightarrow{BA}$.

$\begin{pmatrix} x_2 - x_1 \\ y_2 - y_1 \end{pmatrix} = \begin{pmatrix} -4 - 5 \\ 3 - -2 \end{pmatrix} = \begin{pmatrix} -9 \\ 5 \end{pmatrix}$ $\boxed{\overrightarrow{BA} = \begin{pmatrix} -9 \\ 5 \end{pmatrix}}$

(b) Find $|\overrightarrow{BA}|$.

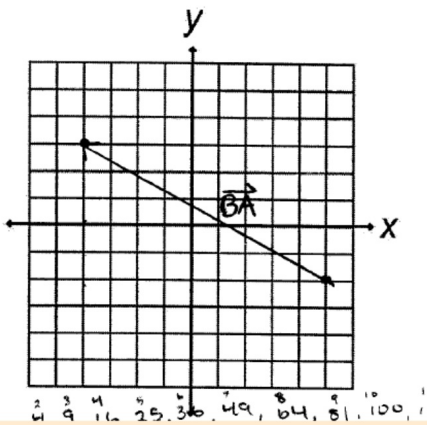
$|\overrightarrow{BA}|^2 = 6^2 + c^2$

$|\overrightarrow{BA}|^2 = -9^2 + 5^2$

$|\overrightarrow{BA}| = \sqrt{-9^2 + 5^2}$

$|\overrightarrow{BA}| = \sqrt{81 + 25}$

$\boxed{|\overrightarrow{BA}| = \sqrt{106} \text{ units} \quad \text{or} \quad \approx 10.3 \text{ units}}$



Version 1

(a) Write down the vector $\overrightarrow{BA}$.

$B = (5, -2)$

$A = (-4, 3)$

$\overrightarrow{BA} = \begin{pmatrix} -9 \\ 5 \end{pmatrix}$

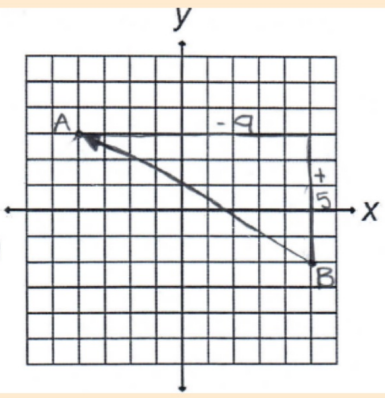
(b) Find $|\overrightarrow{BA}|$.

$-9^2 + 5^2 = c^2$

$81 + 25 = c^2$

$106 = c^2$

$|\overrightarrow{BA}| = \sqrt{106}$ un



Version 1

2. Let $\vec{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\vec{b} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$. $\vec{c} = 3\vec{b} + 2\vec{a}$.

i. Find vector $\vec{c}$ algebraically.

$\vec{c} = 3\begin{pmatrix} 2 \\ -1 \end{pmatrix} + 2\begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\quad \vec{c} = \begin{pmatrix} 12 \\ 1 \end{pmatrix}$

$\vec{c} = \begin{pmatrix} 6 \\ -3 \end{pmatrix} + \begin{pmatrix} 6 \\ 4 \end{pmatrix}$

2. Let $\vec{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\vec{b} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$. $\vec{c} = 3\vec{b} + 2\vec{a}$.

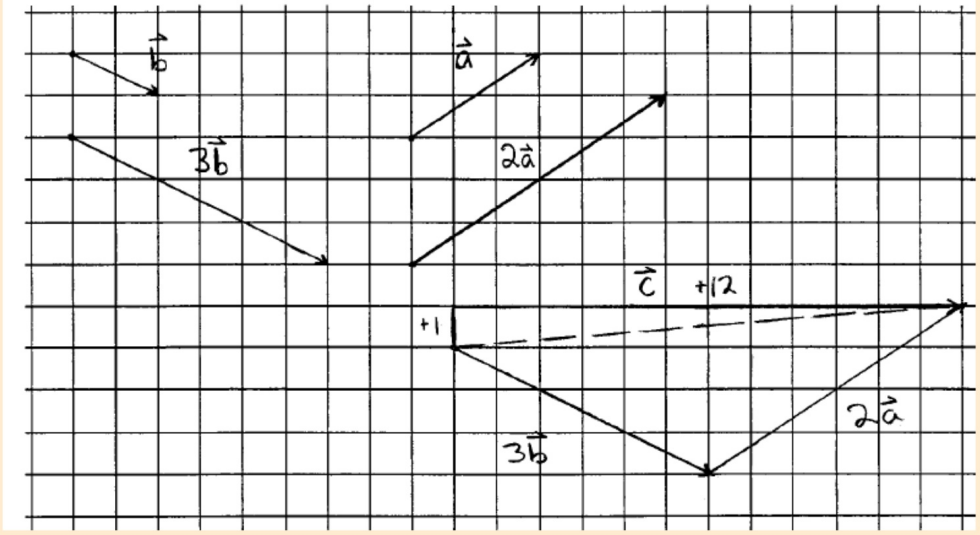
i. Find vector $\vec{c}$ algebraically.

$3\vec{b} = \begin{pmatrix} 6 \\ -3 \end{pmatrix}$ $\quad 2\vec{a} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}$

$\vec{c} = \begin{pmatrix} 6 \\ -3 \end{pmatrix} + \begin{pmatrix} 6 \\ 4 \end{pmatrix} = \vec{c} = \boxed{\begin{pmatrix} 12 \\ 1 \end{pmatrix}}$

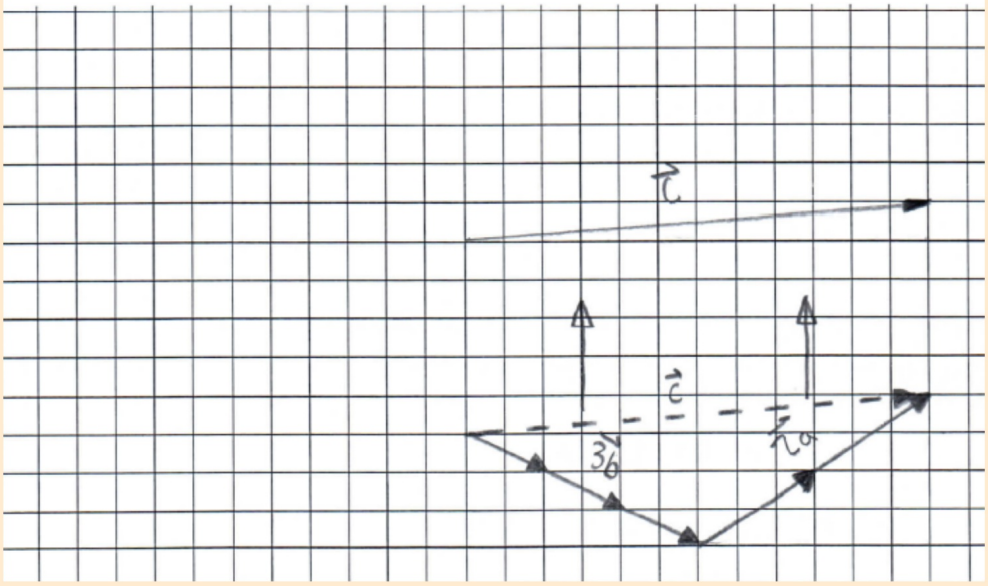
Version 1

ii. Represent $\vec{c} = 3\vec{b} + 2\vec{a}$ graphically.



Version 1

ii. Represent $\vec{c} = 3\vec{b} + 2\vec{a}$ graphically.



Version 1

(a) Write Isabel's two walking trips as column vectors.
(Component form)

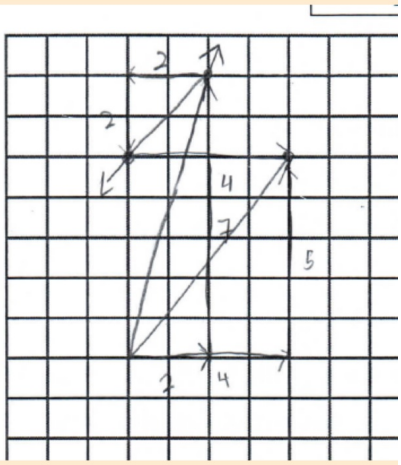
School to Grocery = $\begin{pmatrix} 2 \\ 7 \end{pmatrix}$

Grocery to home = $\begin{pmatrix} -2 \\ -2 \end{pmatrix}$

(b) How far did Isabel walk in total?

2 + 7 + 2 + 2

= 13 blocks



Version 1

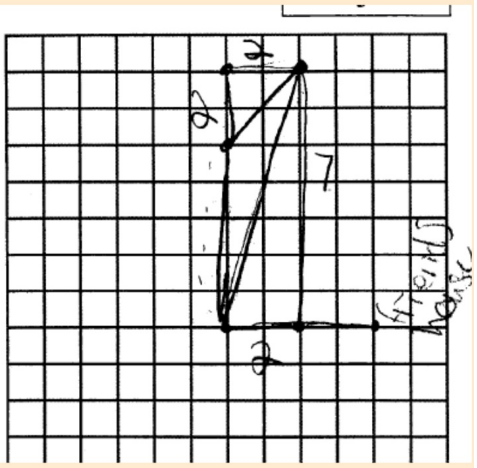
(a) Write Isabel's two walking trips as column vectors.
(Component ~~form~~)

$\begin{pmatrix} 2 \\ 7 \end{pmatrix} \begin{pmatrix} -2 \\ -2 \end{pmatrix}$

(b) How far did Isabel walk in total?

$2+2+7+2=13$

13 blocks



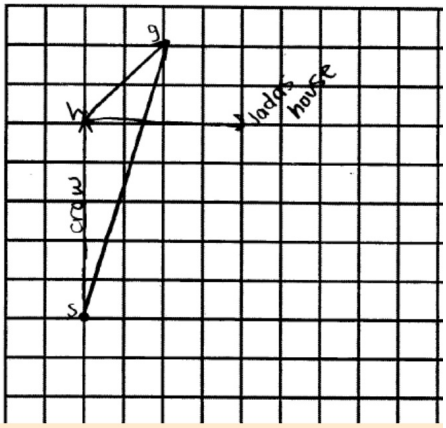
Version 1

3. Isabel walked from her school (S) to the grocery store (G), then she walked home (H). To get to the grocery store Isabel needs to walk 2 blocks east and 7 blocks north. From the grocery store to home, Isabel needs to walk 2 blocks west and 2 blocks south.

(a) Write Isabel's two walking trips as column vectors. (Component form)

$\overrightarrow{SG} = \begin{pmatrix} 2 \\ 7 \end{pmatrix}$

$\overrightarrow{GH} = \begin{pmatrix} -2 \\ -2 \end{pmatrix}$



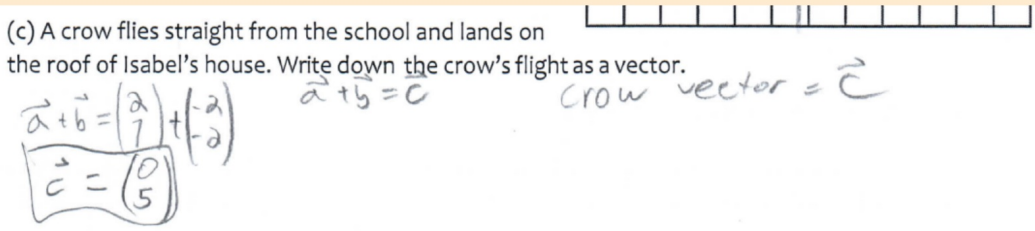
(b) How far did Isabel walk in total?

$2 + 7 + 2 + 2 = 13$

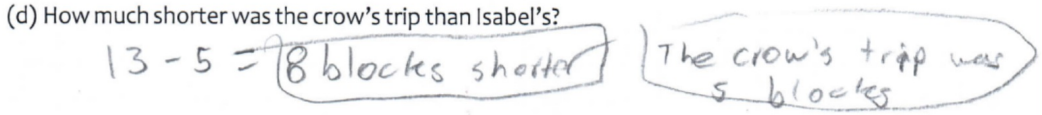
13 blocks

Version 1

(c) A crow flies straight from the school and lands on the roof of Isabel's house. Write down the crow's flight as a vector.



(d) How much shorter was the crow's trip than Isabel's?



Version 1

(e) After getting home, Isabel leaves to study at her friend Jada's house. Jada lives exactly 4 block east. Write two equations representing Isabel's **entire** trip that day. **Use component form for one equation and the names of your vectors for the other equation.**

J = Jada's house

$\overrightarrow{HJ} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$

$\overrightarrow{SG} + \overrightarrow{GH} + \overrightarrow{HJ} = \overrightarrow{SJ}$

$\begin{pmatrix} 3 \\ 7 \end{pmatrix} + \begin{pmatrix} -2 \\ -2 \end{pmatrix} + \begin{pmatrix} 4 \\ 0 \end{pmatrix} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$

$\overrightarrow{SJ} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$

Version 1

(e) After getting home, Isabel leaves to study at her friend Jada's house. Jada lives exactly 4 blocks east. Write two equations representing Isabel's **entire** trip that day. **Use component form for one equation and the names of your vectors for the other equation.**

$$\begin{pmatrix} 2 \\ 7 \end{pmatrix} + \begin{pmatrix} -2 \\ -2 \end{pmatrix} + \begin{pmatrix} 4 \\ 0 \end{pmatrix} = \boxed{\begin{pmatrix} 4 \\ 5 \end{pmatrix}}$$

$\overrightarrow{EH} + \overrightarrow{WS} + \overrightarrow{F} = \boxed{\overrightarrow{SH}}$

(use capital letters for endpoints)

Version 1

(e) After getting home, Isabel leaves to study at her friend Jada's house. Jada lives exactly 4 blocks east. Write two equations representing Isabel's **entire** trip that day. **Use component form for one equation and the names of your vectors for the other equation.**

$\vec{a} = \begin{pmatrix} 2 \\ 7 \end{pmatrix}$ $\vec{b} = \begin{pmatrix} -2 \\ -2 \end{pmatrix}$ $\vec{c} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$

$$\begin{pmatrix} 2 \\ 7 \end{pmatrix} + \begin{pmatrix} -2 \\ -2 \end{pmatrix} + \begin{pmatrix} 4 \\ 0 \end{pmatrix} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$$

$\vec{d} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$

$$\vec{a} + \vec{b} + \vec{c} = \vec{d}$$

Version 2

1. Consider the points $A = (-2, 5)$ and $B = (7, -3)$.

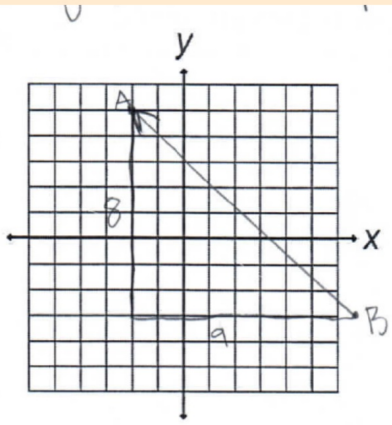
(a) Write down the vector $\overrightarrow{BA}$.

$\overrightarrow{BA} = \begin{pmatrix} -9 \\ 8 \end{pmatrix}$

(b) Find $|\overrightarrow{BA}|$.

$|\overrightarrow{BA}| = 9^2 + 8^2 = 81 + 64$

$|\overrightarrow{BA}| = \sqrt{145}$



Version 2

2. Let $\vec{a} = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$ and $\vec{b} = \begin{pmatrix} -2 \\ -1 \end{pmatrix}$. $\vec{c} = 3\vec{b} + 2\vec{a}$.

i. Find vector $\vec{c}$ algebraically.

$C = 3\begin{pmatrix} -2 \\ -1 \end{pmatrix} + 2\begin{pmatrix} -1 \\ 3 \end{pmatrix}$

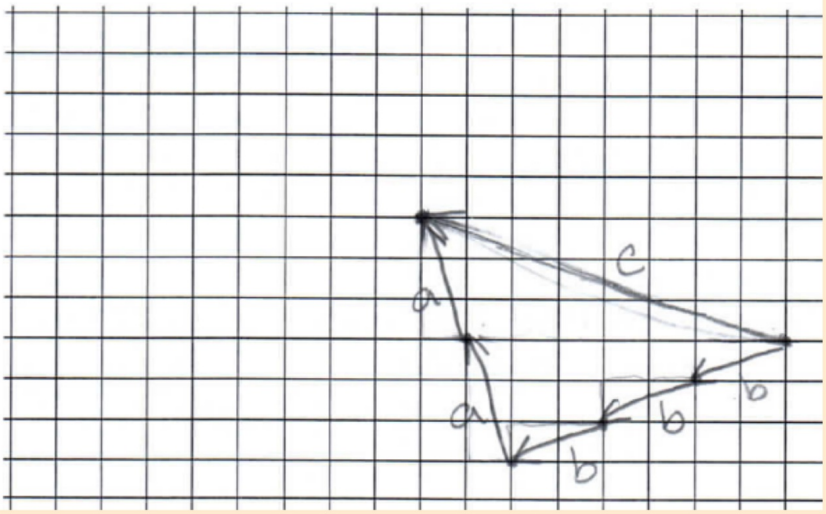
$C = \begin{pmatrix} -6 \\ -3 \end{pmatrix} + \begin{pmatrix} -2 \\ 6 \end{pmatrix}$

$C = \begin{pmatrix} -6-2 \\ -3+6 \end{pmatrix}$

$C = \begin{pmatrix} -8 \\ 3 \end{pmatrix}$

Version 2

ii. Represent $\vec{c} = 3\vec{b} + 2\vec{a}$ graphically.

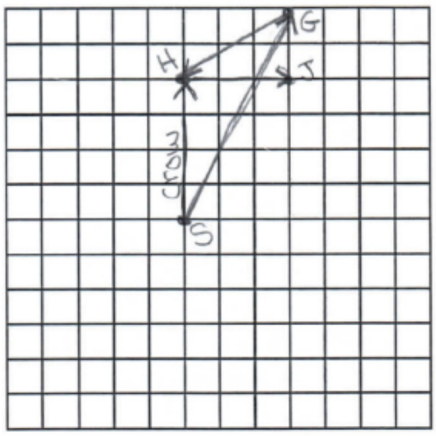


Version 2

3. Isabel walked from her school to the grocery store, then she walked home. To get to the grocery store Isabel needs to walk 3 blocks east and 6 blocks north. From the grocery store to home, Isabel needs to walk 3 blocks west and 2 blocks south.

(a) Write Isabel's two walking trips as column vectors. (Component form).

$\overrightarrow{SG} = \begin{pmatrix} 3 \\ 6 \end{pmatrix}$ $\overrightarrow{GH} = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$



(b) How far did Isabel walk in total?

$3+6+3+2 = 14$

14 blocks

Version 2

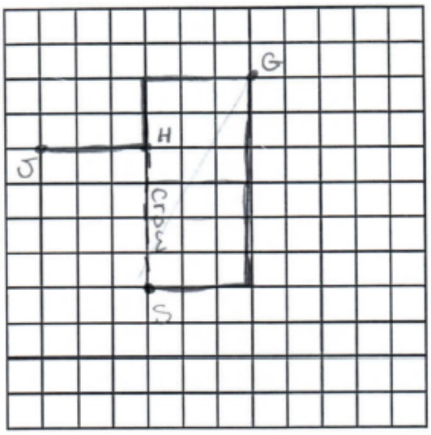
3. Isabel walked from her school to the grocery store, then she walked home. To get to the grocery store Isabel needs to walk 3 blocks east and 6 blocks north. From the grocery store to home, Isabel needs to walk 3 blocks west and 2 blocks south. S=school G=grocery H=home J=Jada's house

(a) Write Isabel's two walking trips as column vectors. (Component form).

$\overrightarrow{SG} = \begin{pmatrix} 3 \\ 6 \end{pmatrix}$ $\overrightarrow{GH} = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$

(b) How far did Isabel walk in total?

3+3+6+2= 14 blocks



Version 2

(c) A crow flies straight from the school and lands on the roof of Isabel's house. Write down the crow's flight as a vector.

$\overrightarrow{SH} = \begin{pmatrix} 9 \\ 4 \end{pmatrix}$

(d) How much shorter was the crow's trip than Isabel's?

Crow = 4 blocks
Isabel = 14 blocks
10 blocks shorter

Version 2

(e) After getting home, Isabel leaves to study at her friend Jada's house. Jada lives exactly 3 blocks east of Isabel. Write two equations representing Isabel's **entire** trip that day. **Use component form for one equation and the names of your vectors for the other equation.**

$\vec{SG} + \vec{GH} + \vec{HJ} = \vec{SJ}$

$\begin{pmatrix} 3 \\ 6 \end{pmatrix} + \begin{pmatrix} -3 \\ -2 \end{pmatrix} + \begin{pmatrix} 3 \\ 0 \end{pmatrix} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

Version 2

(c) A crow flies straight from the school and lands on the roof of Isabel's house. Write down the crow's flight as a vector.

$\begin{pmatrix} 3-3 \\ 6-2 \end{pmatrix} = \begin{pmatrix} 0 \\ 4 \end{pmatrix}$

(d) How much shorter was the crow's trip than Isabel's?

$14 - 4 = 10$ 10 blocks shorter

Version 2

(e) After getting home, Isabel leaves to study at her friend Jada's house. Jada lives exactly 3 blocks east of Isabel. Write two equations representing Isabel's **entire** trip that day. **Use component form for one equation and the names of your vectors for the other equation.**

$\begin{pmatrix} 3 \\ 6 \end{pmatrix} + \begin{pmatrix} -3 \\ -2 \end{pmatrix} + \begin{pmatrix} 3 \\ 0 \end{pmatrix} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ Component

$\overrightarrow{SG} + \overrightarrow{GH} + \overrightarrow{HJ} = \overrightarrow{SJ}$ Names