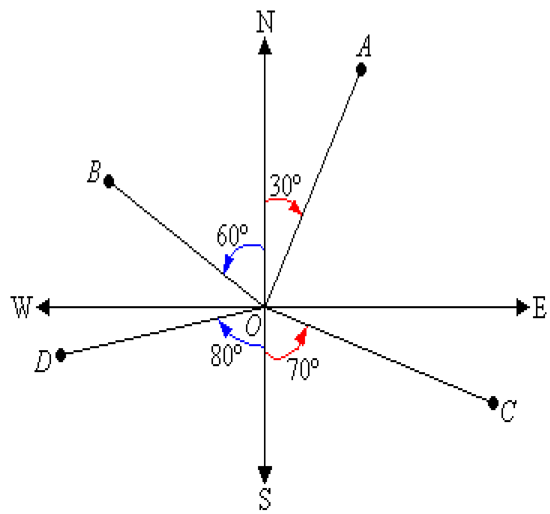
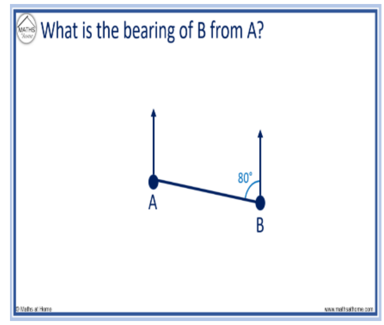
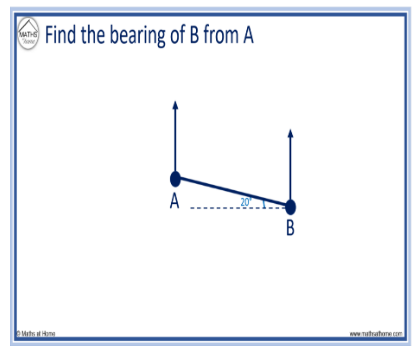
BASIC 7

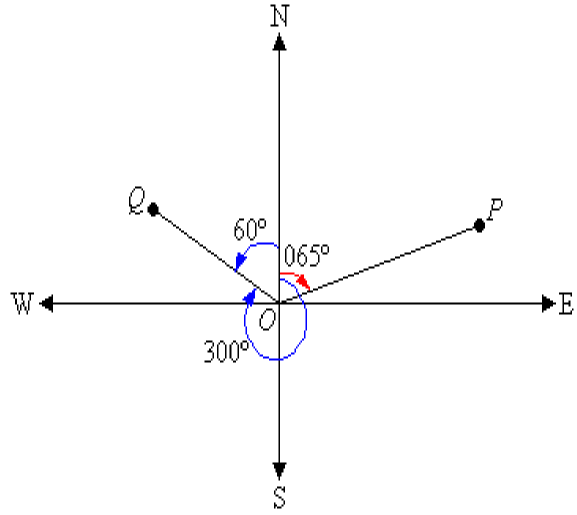
WEEKLY LESSON PLAN – WEEK 6

Strand:	Geometry and Measurement	**Sub-Strand:**	Measurement
Content Standard:	B7.3.3.2 Demonstrate understanding of bearings, vector and its components using real life cases		
Indicator (s)	B7.3.3.2.1 Describe the bearing of a point from another point B7.3.3.2.2 Explain how to find the back bearing when the direction of travel has a bearing which is less than 180˚ and/ or greater than 180 B7.3.3.2.3 Distinguish between scalar and vector quantities B7.3.3.2.4 Represent vector in the column (component) form (x y) and determine its magnitude and direction. B7.3.3.2.5 Convert vectors in the column (component) form (AA) to the magnitude bearing form (,AA)and vice versa	**Performance Indicator:** Learners can find the magnitude of vectors with component forms	
Week Ending	04-08-2023		

Class	B.S.7	**Class Size:**		**Duration:**	
Subject	Mathematics				
Reference	Mathematics Curriculum, Teachers Resource Pack, Learners Resource Pack, Textbook.				
Teaching / Learning Resources	Chart, Metre Rule, Compass, divider, Poster, Pictures.	**Core Competencies:**	• Ability to merge simple/ complex ideas to create novel situation or thing • Exhibit strong memory, intuitive thinking; and respond appropriately		

DAY/DATE	**PHASE 1 : STARTER**	**PHASE 2: MAIN**	**PHASE 3: REFLECTION**

MONDAY	Discuss with the Learners on how to describe a bearing.	1. Assist Learners to identify the 3 main points when measuring bearings. 2. Learners brainstorm to describe the bearing a point from another point. 3. Discuss with the Learners on the 3 rules to follow when measuring a bearing. 4. Demonstrate on calculating a bearing from an angle. **Directions and Bearings** The **direction** to a point is stated as the number of degrees east or west of north or south. For example, the direction of *A* from *O* is N30ºE. *B* is N60ºW from *O*. *C* is S70ºE from *O*. *D* is S80ºW from *O*.  Note: N30ºE means the direction is 30º east of north. The **bearing** to a point is the angle measured in a clockwise direction from the north line.	Learners in small groups to discuss and solve practical questions on calculating a bearing from an angle. **Exercise;** 1. find the bearing of B from A  2. Find the bearing of B from A 



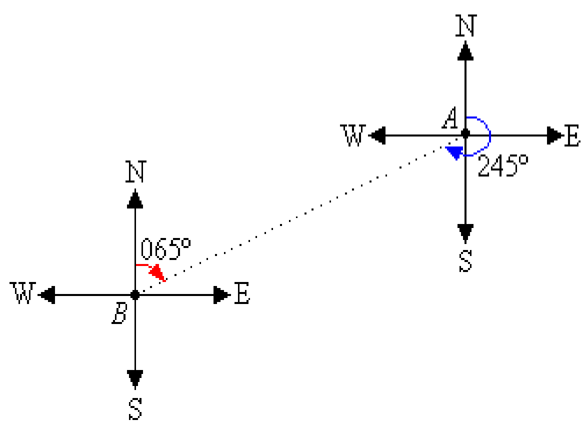
For example, the bearing of *P* from *O* is 065º.
The bearing of *Q* from *O* is 300º.

Note:

The direction of *P* from *O* is N65ºE.
The direction of *Q* from *O* is N60ºW.

A **bearing** is used to represent the direction of one point relative to another point.

For example, the bearing of *A* from *B* is 065º.
The bearing of *B* from *A* is 245º.



Note:

- Three figures are used to give bearings.
- All bearings are measured in a horizontal plane.

		The 3 rules to follow when measuring a bearing: • Always measure the angle in a clockwise direction • Always measure the angle from north • Always give a 3-figure bearing (E.g. 030° instead of 30°) **How to Calculate a Bearing From an Angle** To find a bearing from a given angle, use the following angle facts: • Co-interior 'c' angles add to 180°. • Alternate 'z' angles are equal. • Angles on a straight line add to 180°. • Angles in a full turn add to 360°.	
TUESDAY	Assist Learners to explain the difference between scalar and vector quantity	1. Learners brainstorm to identify examples of scalar and vector quantities. 2. Discuss with Learners on the similarities between scalar and vector quantities. 3. Demonstrate on how to find the magnitude and direction of a vector with its components. 4. Assist Learners to find the magnitude and direction of a vectors. **Scalar Quantities:** Scalar quantities are physical quantities that have only magnitude and no direction. Scalar quantities can be represented by a single number or an algebraic expression. Examples of scalar quantities include speed, distance, mass, temperature, and energy. For instance, the speed of a vehicle, the mass of an object, and the temperature of a room are all examples of scalar quantities. **Examples of Scalar Quantities** There exist many forms of scalar quantities some of them are listed below: • Mass • Speed • Distance • Time • Area	Reflect on how to find the magnitude and directions of vectors. **Exercise;** 1. Given u=⟨3,−2⟩ and v=⟨−1, 4⟩, find two new vectors u+v, and u−v. 2. Show that vector v with initial point at (5,−3)(5,−3) and terminal point at (−1,2)(−1,2) is equal to vector $\vec{u}$ with initial point at (−1,−3)(−1,−3) and terminal point at (−7,2)(−7,2). Draw the position vector on the same grid as v and $\vec{u}$. Next, find the magnitude and direction of each vector.

- Volume
- Density
- Energy
- Temperature
- Electric Charge
- Gravitational force

Vector Quantities:

Vector quantities, on the other hand, are physical quantities that have both magnitude and direction. Vector quantities can be represented graphically using arrows. The length of the arrow represents the magnitude of the quantity, while the direction of the arrow indicates its direction. Examples of vector quantities include velocity, force, displacement, and acceleration. For example, if we want to describe the velocity of a car, we need to specify both its magnitude (speed) and its direction (north, south, east or west).

Examples of Vector Quantities

There are countless examples of vector quantities in daily life. The list of some of them is down below!

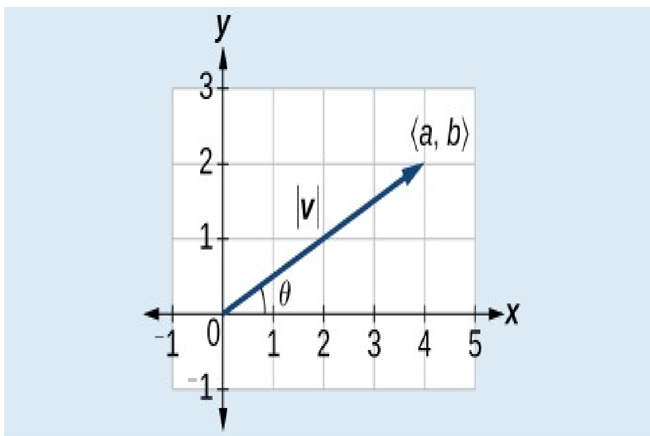
- Velocity
- Force
- Pressure
- Displacement
- Acceleration
- Thrust
- Linear momentum
- Electric field
- Polarization
- Weight

Vector Quantity	Scalar Quantity
Has both magnitude and direction	Has only magnitude
Examples include velocity, acceleration, and force	Examples include mass, time, and temperature

Can be represented by arrows in diagrams	Cannot be represented by arrows in diagrams
Can be added or subtracted using vector algebra	Can be added or subtracted using simple arithmetic

Magnitude and Direction of a vector;

Given a position vector v⃗ =⟨a,b⟩, the magnitude is found by |v|=a2+b2.The direction is equal to the angle formed with the x-axis, or with the y-axis, depending on the application. For a position vector, the direction is found by tanθ=(ba)⇒θ=tan−1(ba)tan



Finding the Magnitude and Direction of a Vector

Find the magnitude and direction of the vector with initial point P(−8,1) and terminal point Q(−2,−5).Draw the vector.

Solution

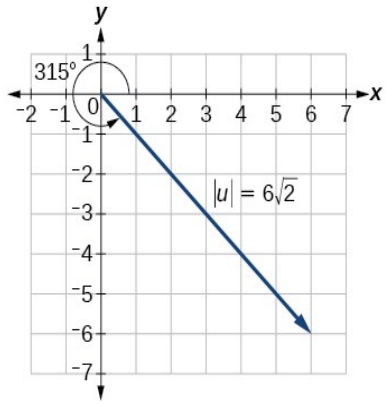
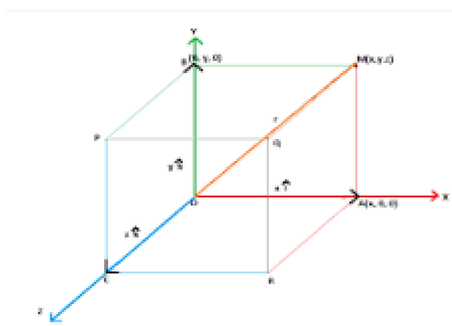
First, find the position vector.

u=⟨−2,−(−8),−5−1⟩=⟨6,−6⟩

We use the Pythagorean Theorem to find the magnitude.

|u|=(6)2+(−6)2−−−−−−−−−−√=72−−√=62−−√|

The direction is given as

		tanθ=−66=−1→θ=tan−1(−1)=−45°tan However, the angle terminates in the fourth quadrant, so we add 360° to obtain a positive angle. Thus, −45°+360°=315°−45°+360°=315°. 	
THURSDAY	Demonstrate on multiplying vectors by a scaler.	1. Assist Learners to multiply vectors by a scaler. 2. Discuss with Learners on the formula for component of vectors. 3. Demonstrate on how to write a vector in component form given the magnitude and direction. 4. Learners to practice finding the magnitude of vectors with component forms. 5. Assist Learners to rewrite a vector in component form. **The formula for component of vector;**  The components of a vector in two dimension coordinate system are usually considered to be x-component and y-component. It can be represented as, V = (v_x, v_y), where V is the vector. These are the parts of vectors generated along the axes. **Vector direction from components**	Learners in small groups to practice finding examples of magnitudes of vectors with two components. **Exercise;** 1. find the direction of (3,4)(3,4) 2. find the direction of (3,−4)(3,−4) 3. find the direction of (−3,4)(−3,4)left parenthesis, minus, 3, comma, 4, right parenthesis. First, notice that (−3,4)(−3,4)left parenthesis, minus, 3, comma, 4, right parenthesis is in Quadrant IIIstart text, I, I, end text.

The direction angle of (*a*,*b*) left parenthesis, a, comma, b, right parenthesis is *ϑ*=tan−1(*ab*)theta, equals, tangent, start superscript, minus, 1, end superscript, left parenthesis, start fraction, b, divided by, a, end fraction, right parenthesis plus a correction based on the quadrant.

What are vector magnitude and direction?

We are used to describing vectors in **component form**. For example, (3,4)(3,4)left parenthesis, 3, comma, 4, right parenthesis. We can plot vectors in the coordinate plane by drawing a directed line segment from the origin to the point that corresponds to the vector's components: (*a*,*b*)left parenthesis, a, comma, b, right parenthesis

Magnitude from components

To find the magnitude of a vector from its components, we take the square root of the sum of the components' squares (this is a direct result of the Pythagorean theorem):

2||(*a*,*b*)||=*a*2+*b*2vertical bar, vertical bar, left parenthesis, a, comma, b, right parenthesis, vertical bar, vertical bar, equals, square root of, a, squared, plus, b, squared, end square root

For example, the magnitude of (3,4)(3,4)left parenthesis, 3, comma, 4, right parenthesis is 32+42=25=532+42=25 =5square root of, 3, squared, plus, 4, squared, end square root, equals, square root of, 25, end square root, equals, 5.

Name of Teacher: ***School:*** ***District:***