شكراً لتحميلك هذا الملف من موقع المناهج الإماراتية

ملخص ومراجعة درس Vectors الأشعة

تاريخ نشر الملف على موقع المناهج: 2024-02-14 08:57:53 | اسم المدرس: Marey Ahmed

التواصل الاجتماعي بحسب الصف التاسع المتقدم

روابط مواد الصف التاسع المتقدم على تلغرام

التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة فيزياء في الفصل الثاني

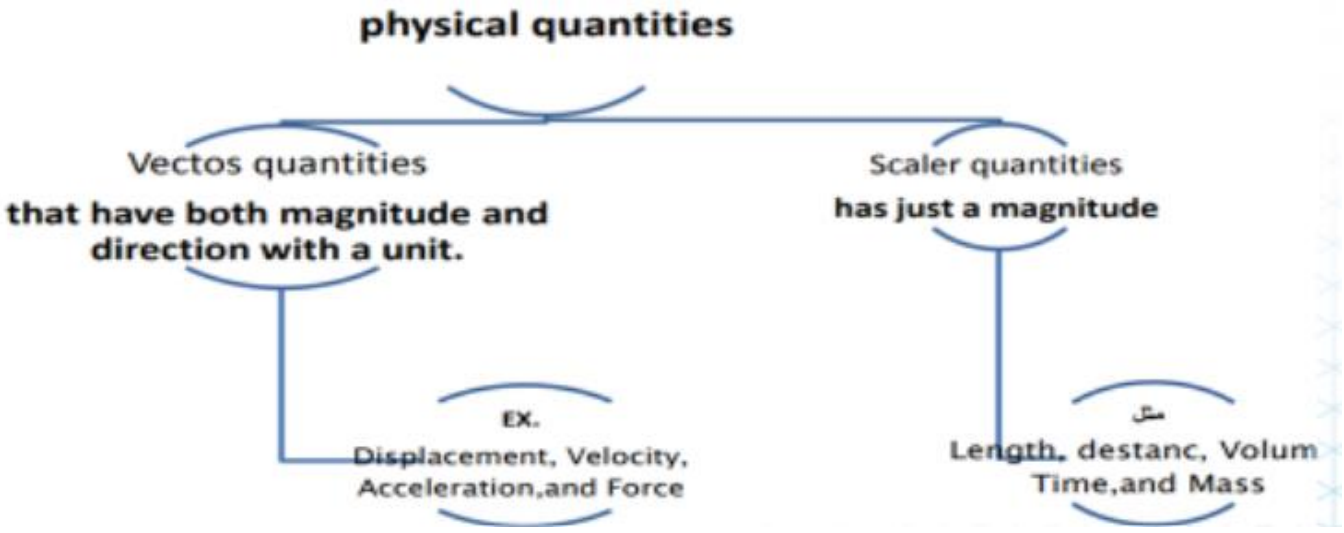
1	ملخص ومراجعة الدرس الثالث Law Third s'Newton قانون نيوتن الثالث
2	ملخص ومراجعة الدرس الثاني Force Drag and Weight الوزن وقوة السحب
3	ملخص ومراجعة ثانية الدرس الأول Motion and Force القوة والحركة
4	ملخص ومراجعة الدرس الأول Motion and Force القوة والحركة

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة فيزياء في الفصل الثاني	
5	ملخص الوحدة الرابعة Forces القوى

LESSON 1
VECTORS

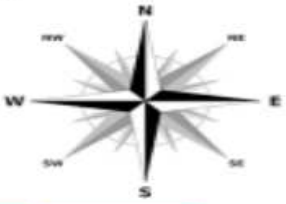
Review Vocabulary

vector: a quantity, such as position, that has both magnitude and direction.



Vectors

Vector is a quantitiy that has magnitude and direction
ex: force (F), velocity (v) and displacement (Δx)



magnitude (mag): is number with unit
direction (dir) : can be left or right, + or –

Write the magnitude and direction:
v = 3 m/s north F = – 7 N Δx = 5 m right

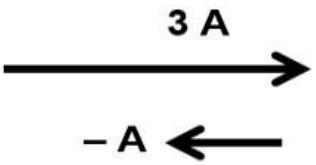
Vectors can be added graphically or algebrically.
The sum of two vectors produce resultant vector (R).

Resultant (R) can be any vector like force, velocity or acceleration.

Mr / Ahmed Marey

Vectors in One Dimension

A Vector can be represented by an arrow,
the length of arrow represents the magnitude
orientation of arrow represents vector direction.



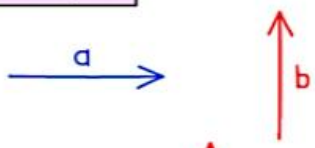
Identical vectors must have same magnitude and same direction.

Adding vectors in two dimensions

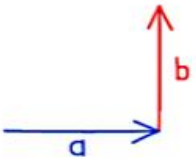
Perpendicular vectors

MAGNITUDE OF THE RESULTANT VECTOR, R

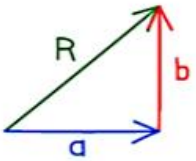
1. ADD TWO VECTORS a & b



2. LINK THE VECTORS HEAD–TO–TAIL

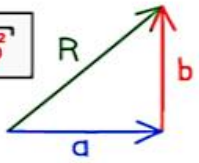


3. FORM THE RESULTANT VECTOR FROM LINKING THE TAIL OF a TO THE HEAD OF b



4. CALCULATE R USING PYTHAGORAS' THEOREM

$R = \sqrt{a^2 + b^2}$



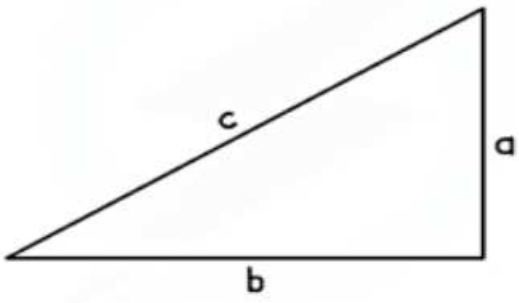
Use Pythagoras' Theorem to find the resultant vector

Use trigonometry to find the angle

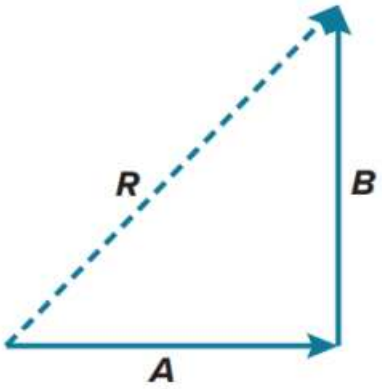
$$\text{SIN} = \frac{\text{OPPOSITE}}{\text{HYPOTENUSE}}$$

$$\text{COS} = \frac{\text{ADJACENT}}{\text{HYPOTENUSE}}$$

$$\text{TAN} = \frac{\text{OPPOSITE}}{\text{ADJACENT}}$$

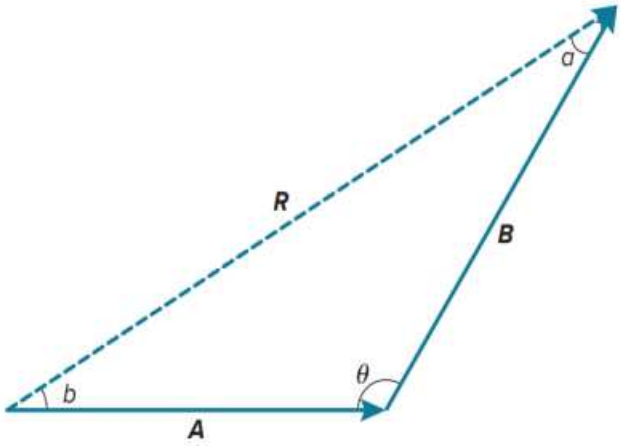


Perpendicular vectors



$$R^2 = A^2 + B^2$$

Angles other than 90°



$$R^2 = A^2 + B^2 - 2AB\cos\theta$$

1 - You and your family are out for a drive. You drive 125.0 km due west, then turn due south and drive for another 65.0 km. What is the magnitude of your displacement? Solve this problem both graphically and mathematically, and check your answers against each other.

2-On a fine, sunny day, you and your siblings decide to go for a nearby hike. You walk 4.5 km in one direction, then make a 45° turn to the right and walk another 6.4 km. What is the magnitude of your displacement?

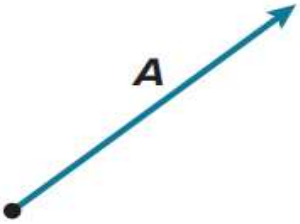
3- After picking up school supplies, you and your caregiver walk from the door of the mall to the car. You first walk 250.0 m down a lane of cars, and then turn 90° to the right and walk an additional 60.0 m. How far is the car from the door to the mall? Solve this problem both graphically and mathematically, and check your answers against each other

4-CHALLENGE An ant crawls on the sidewalk. It first moves south a distance of 5.0 mm. It then turns southwest and crawls 4.0 mm. What is the magnitude of the ant's displacement?

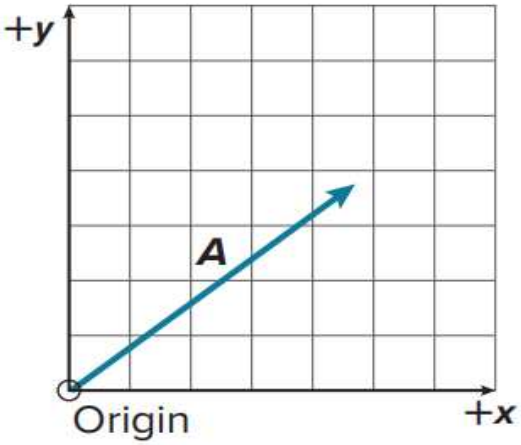
Vector Components

Components, which are a vector parallel to the x-axis and another vector parallel to the y-axis

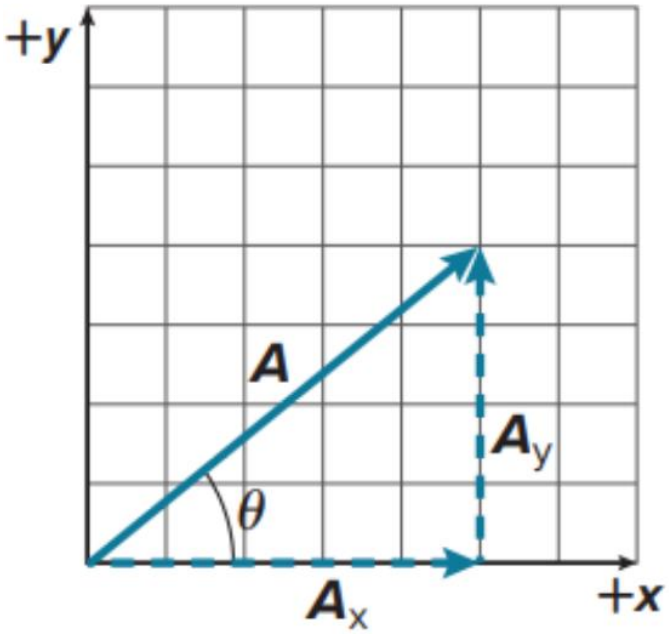
The process of breaking a vector into its components is sometimes called a vector resolution.



You may place the vector on any coordinate system as long as the vector's direction and magnitude remain unchanged.



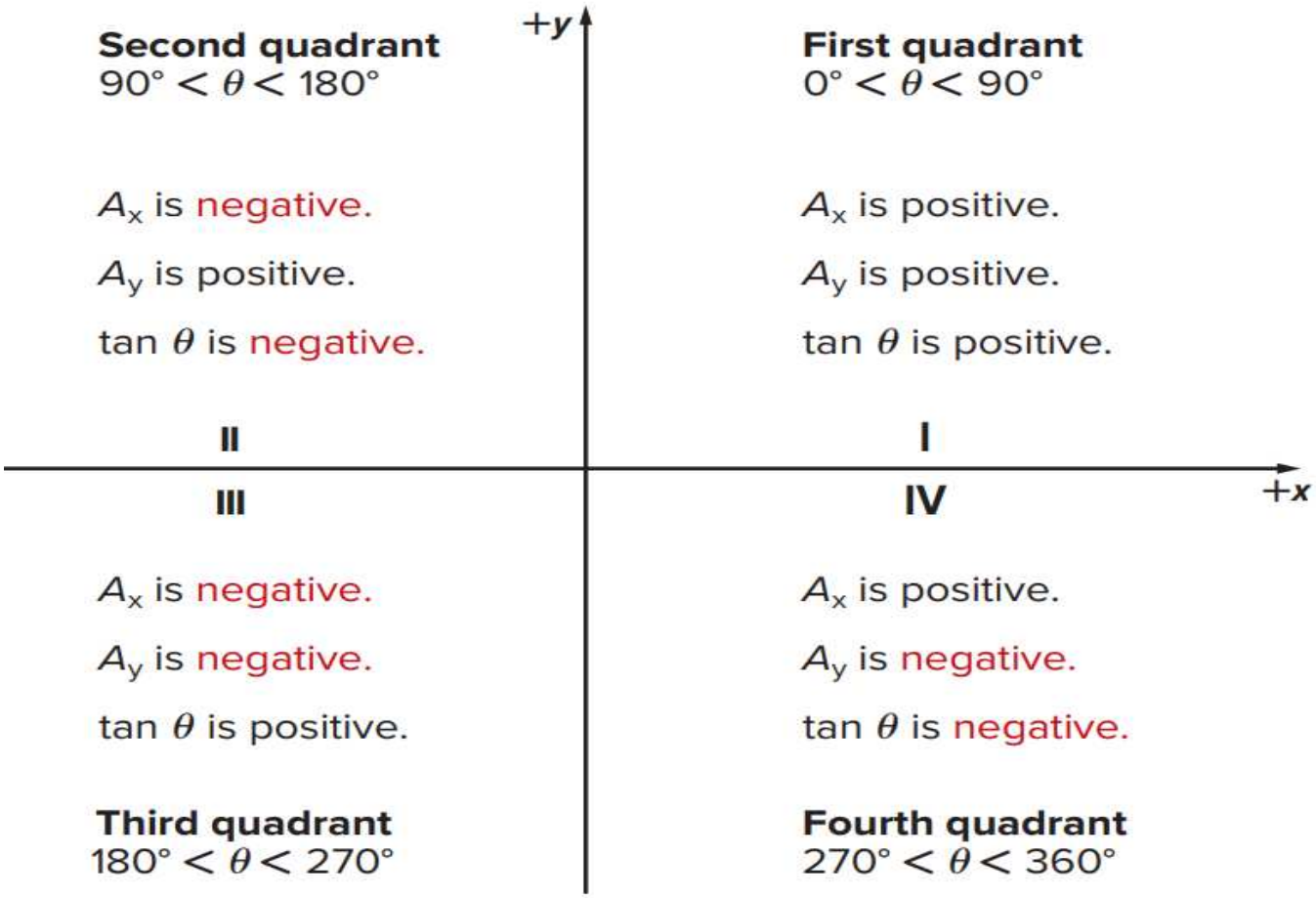
The coordinate system can be oriented to make the problem easier to solve.



$$A_x = A\cos\theta$$

$$A_y = A\sin\theta$$

Coordinate System



Second quadrant
$90° < \theta < 180°$

A_x is negative.

A_y is positive.

tan θ is negative.

First quadrant
$0° < \theta < 90°$

A_x is positive.

A_y is positive.

tan θ is positive.

Third quadrant
$180° < \theta < 270°$

A_x is negative.

A_y is negative.

tan θ is positive.

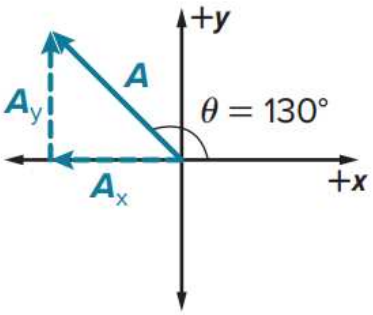
Fourth quadrant
$270° < \theta < 360°$

A_x is positive.

A_y is negative.

tan θ is negative.

Example:



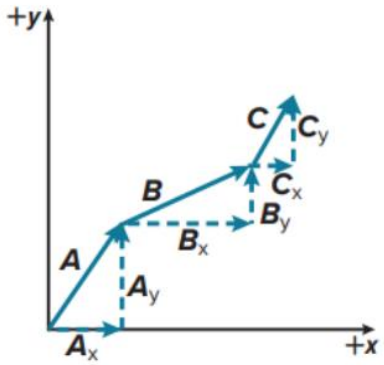
- ***A*** is in 2nd quadrant.
- Expect A_x to be negative:

$$A_x = A \cos \theta = (5.0 \text{ N}) \cos 130° = -3.2 \text{ N}$$

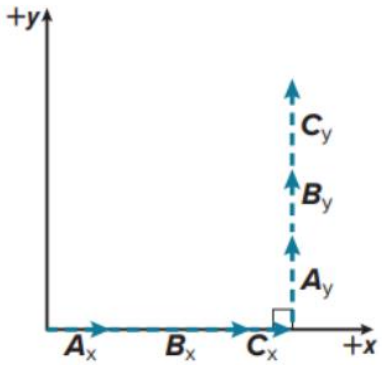
- Expect A_y to be positive:

$$A_y = A \sin \theta = (5.0 \text{ N}) \sin 130° = 3.8 \text{ N}$$

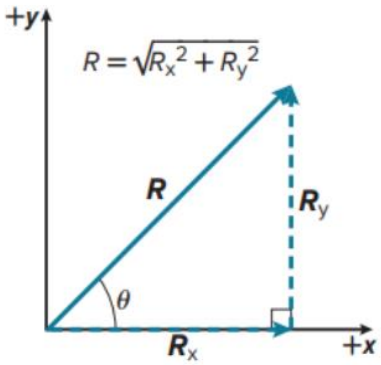
Algebraic Addition of Vectors



Add the vectors graphically by placing them tip to tail.



Add the *x*-components together and the *y*-components together.



The magnitude of ***R*** can be calculated using the Pythagorean theorem.

$$R_y = A_y + B_y + C_y. \qquad R_x = A_x + B_x + C_x.$$

$$R^2 = R_x^2 + R_y^2 \qquad \theta = \tan^{-1}\left(\frac{R_y}{R_x}\right)$$

5. Sudhir walks 0.40 km in a direction 60.0° west of north, then goes 0.50 km due west. What is his displacement?

6. You first walk 8.0 km north from home then walk east until your displacement from home is 10.0 km. How far east did you walk?

7. In a coordinate system in which the positive *x*-axis is east, for what range of angles is the *x*-component positive? For what range is it negative?

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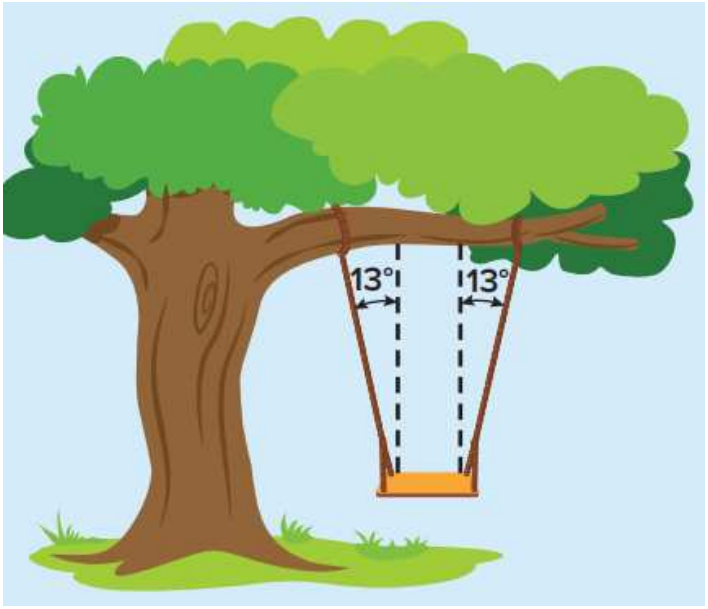
9. Two ropes tied to a tree branch hold up a child's swing as shown in **Figure 7.** The tension in each rope is 2.28 N. What is the combined force (magnitude and direction) of the two ropes on the swing?



10. CHALLENGE Afua and Chrissy are going to sleep overnight in their tree house and are using some ropes to pull up a 3.20-kg box containing their pillows and blankets. The girls stand on different branches, as shown in **Figure 8,** and pull at the angles with the forces indicated. Find the *x*- and *y*-components of the initial net force on the box. *Hint: Draw a free-body diagram so you do not leave out a force.*