Name _____ #_____ Date _____

Section _____ St. Mary's Physics

Worksheet On Combining Forces, And Resolving Forces

Instructions: Use the graphical method to find the resultant and equilibrant for the following force problems.

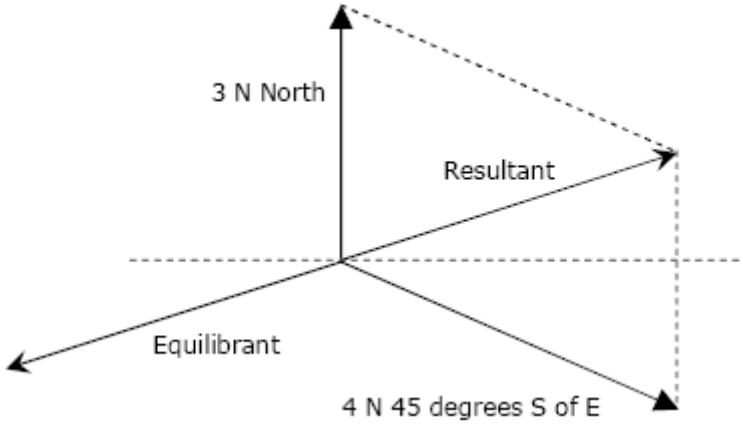
Definitions:

- Resultant - the single force that is equal to 2 or more forces.
- Equilibrant - the single force that will balance 2 or more forces.
    - Equal in magnitude but opposite in direction of the resultant.

Important: 1) Label all vectors AS SHOWN BELOW **(1 point each)**
2) All vectors should have arrows **(1 point each)**
3) The Resultant and Equilibrant should be reported with a magnitude, unit and direction. **(1 point each)**
4) Be neat!!!!! **(Work in pencil)**

EXAMPLE:

3N North + 4N 45° S of E



Resultant
2.75 N 7 ° N of E

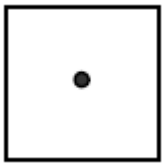
Equilibrant
2.75 N 7 ° S of W

PART I

1) Force of 5N south acts concurrently with a force of 5N 30° South of East.

- **A. Draw the diagram – TAIL to TAIL**
- **B. Label both vectors (see page one for example)**
- **C. Draw and LABEL the resultant and equilibrant**
- **D. Find the magnitude and direction of the resultant and equilibrant**

(scale: 1cm = 1N)



Start vectors at dot

****** REMEMBER: VECTORS HAVE MAGNITUDE AND DIRECTION ******

RESULTANT =
EQUILIBRANT =

2) A force of 9N North acts concurrently with a force of 20N 37° S of West

Create an appropriate scale for this vector drawing (scale : 1cm =___ N)

A. Draw the diagram – "TAIL to TAIL"
B. Label both vectors (see page one for example)
C. Draw and LABEL the resultant and equilibrant
D. Find the magnitude and direction of the resultant and equilibrant

●

Start vectors here

(Did you remember to convert cm to N using your scale??)

RESULTANT =
EQUILIBRANT =

Part II **<u>Concurrent Forces Separated By A 90° Angle</u>**

Find the resultant and equilibrant for the following force problems:

3) 10N North acting concurrently with a force of 10N East.

Come up with a scale that makes sense for this problem: 1 cm = _____ N

A. Draw the diagram – "TAIL to TAIL"
B. Label both vectors (see page one for example)
C. Draw and LABEL the resultant and equilibrant
D. Find the magnitude and direction of the resultant and equilibrant

●

Start here

RESULTANT =
EQUILIBRANT =

4) A 10 N North force is combined with a force of 17 N East.

(scale : 1 cm = ___N)

A. Draw the diagram – TAIL to TAIL
B. Label both vectors (see page one for example)
C. Draw and LABEL the resultant and equilibrant
D. Find the magnitude and direction of the resultant and equilibrant

RESULTANT =
EQUILIBRANT =

5) A force of 9 N North and 12N East act concurrently on a body.

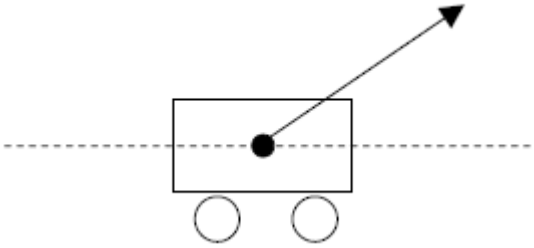
A. Draw the diagram – ***HEAD TO TAIL***
B. Label both vectors (see page one for example)
C. Draw and LABEL the resultant and equilibrant
D. Find the magnitude and direction of the resultant and equilibrant

(scale : 1cm = 2N)

RESULTANT =
EQUILIBRANT =

Part III - Resolution Of Forces
Break down the following forces into their horizontal and vertical components

6) <u>Draw</u> AND <u>label</u> the horizontal and vertical component of the force below



1 cm = 10 N

a) Use the scale given above to find the magnitude (size) of the force drawn _____

b) What is the direction of the force? (include angle and direction) _____

c) What is the magnitude and direction of the horizontal component? _____

d) What is the magnitude and direction of the vertical component _____

7. A force of 6 Newtons 30 degrees south of east acts on the object below.

a) Draw the force on the object b) **Draw** AND **label** the horizontal and vertical component
c) Find the <u>magnitude</u> and <u>direction</u> of the:

Horizontal component_____ Vertical component _____

b) If the angle of the force were increased, the vertical component

would_____and the horizontal component would _____