Friday, February 8/13
Physics 112/111

1. Quiz - Intro Material
2. Worksheet - Graphical Manipulation of Vectors
3. Mathematical Laws and Trigonometric Ratios
4. Finding a Resultant Analytically

P2 + P4

5. Worksheet - Analytical Manipulation of Vectors

P4

Physics 112/111

Chapter 2 – Graphical Manipulation of Vectors (MHR)

$\frac{7.0\text{mm}}{7.0} = \frac{56\text{m/s}}{7.0}$

1. Hamilton drew a 7.0 mm long vector to represent a velocity of 56 m/s. What scale did he use? 1.0 mm = 8.0 m/s

2. A vector that is 4.0 cm long represents a displacement of 24 km. How long should you draw a vector to represent a displacement of 32 km if the same scale is used? 5.3 cm

$4.0\text{cm} = 24\text{km} \rightarrow 1.0\text{cm} = 6\text{km}$

3. Find the resultant of the following vectors using the tip-to tail method on graph paper by
   a) drawing the vectors in the order given
   b) mixing up the order of the vectors

$32\text{km} \times \frac{1.0\text{cm}}{6\text{km}} = 5.3\text{cm}$

$32\text{km} \times \frac{4.0\text{cm}}{24\text{km}} = 5.3\text{cm}$

$\vec{R} = 36, N.$

5 blocks, W
8 blocks, S
12 blocks, E
15 blocks, N
4 blocks, W
7 blocks, N
9 blocks, E
8 blocks, S
14 blocks, W
3 blocks, S
2 blocks, E

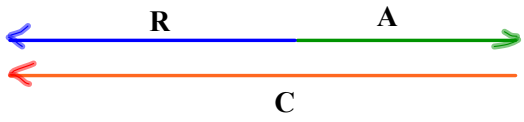
4. If **A** = 6.0 m/s, E, **B** = 10 m/s, N, **C** = 14 m/s, W and **D** = 8.0 m/s, S find the resultant of the following using scaled diagrams and the tip-to-tail method. Express answers with 2 SDs.

Level 1

a)	**A + C**	(8.0 m/s, W)
b)	**C + D**	(16 m/s, 30° S of W)
c)	**B + C + D**	(14 m/s, 8.1° N of W)
d)	**A + B + C + D**	(8.2 m/s, 14° N of W)
e)	**B – A**	(12 m/s, 59° N of W)
f)	**C + D – B**	(23 m/s, 52° S of W)
g)	**A – D – C**	(22 m/s, 22° N of E)
h)	**D - B - C – A**	(20 m/s, 66° S of E)

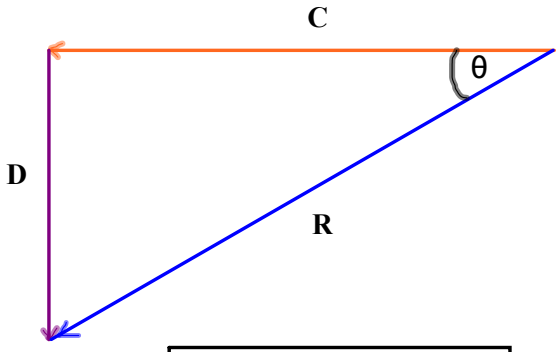
scale	1
arrows	1
labels (**A, B**, **C**...**R**, θ)	1
magnitude and direction of **R**	2

a) Let 1.0 cm = 1.0 m/s



R = 8.0 m/s, W

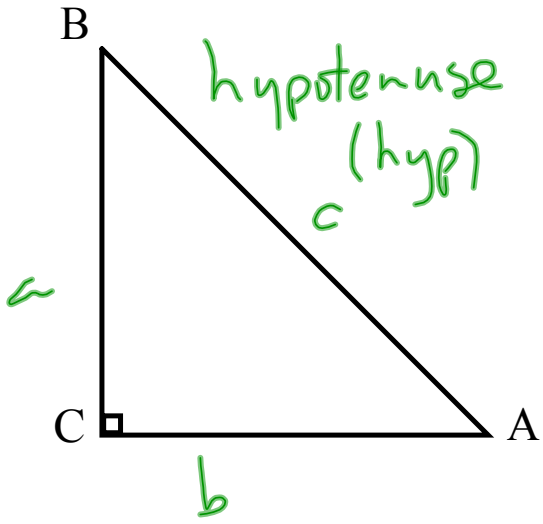
b) Let 1.0 cm = 1.0 m/s



R = 16 m/s, 30° S of W

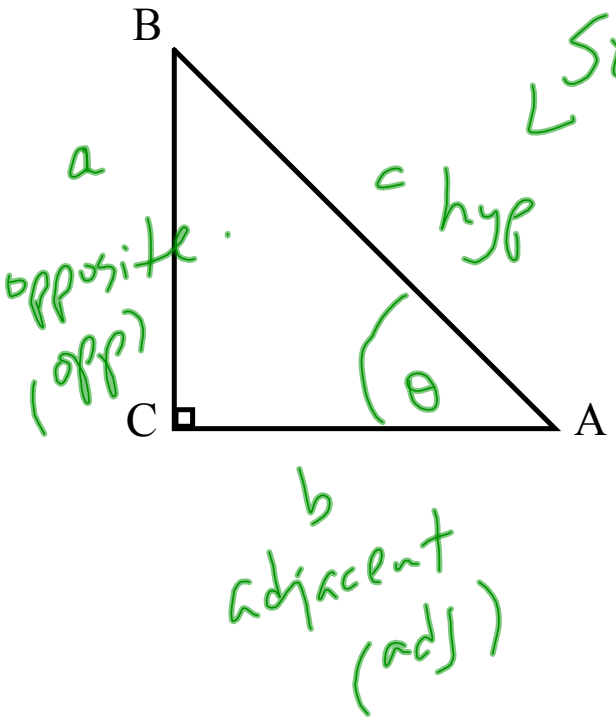
Mathematical Laws and Trigonometric Ratios

Law of Pythagoras



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

Trigonometric Ratios



SOH CAH TOA

$\sin\theta = \frac{a}{c}$

$\cos\theta = \frac{b}{c}$

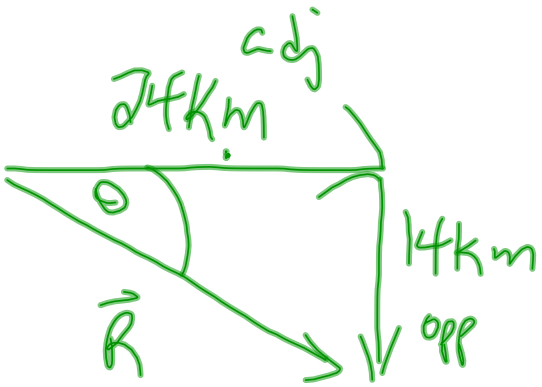
$\tan\theta = \frac{a}{b}$

Examples - Finding a Resultant Analytically

labelled sketch (**A**, **B**,...**R**, θ and arrows)	2
magnitude of **R**	1
direction of **R**	1

1. Find the resultant of the following displacements: 24 km, east and 14 km, south.

28 km, 30° S of E



$R = \sqrt{(24)^2 + (14)^2}$

$R = 28\ km$ (2sf)

$\vec{R} = 28km, 30° S of E$

$\tan\theta = \frac{14}{24}$

$\theta = 30°$

p4-F8