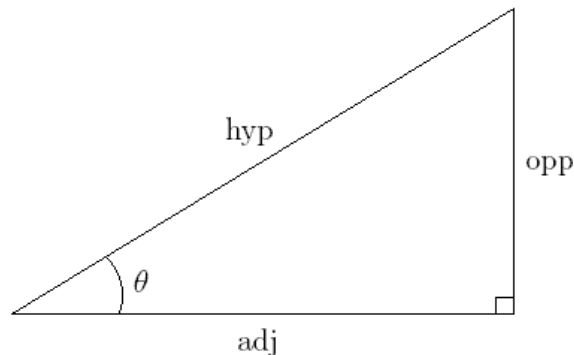# Vector Resolution

Honors Physics

What do you do if you have 2 or more vectors?

We use the term **VECTOR RESOLUTION** to suggest that any vector which **IS NOT** on an axis MUST be broken down into *horizontal and vertical components*.

BUT --- the ultimate and recurring themes in physics is take any and all vectors and turn them all into **ONE BIG RIGHT TRIANGLE.**

TIPS

1. **Make a drawing showing all the vectors, angles, and given directions.**
2. **Make a chart with all the horizontal components in one column and all the vertical components on the other.**
3. **Make sure you assign a negative sign to any vector which is moving WEST or SOUTH.**
4. **Add all the horizontal components to get ONE value for the horizontal. Do the same for the vertical.**
5. **Use the Pythagorean Theorem to find the resultant and Tangent to find the direction.**

Example

A search and rescue operation produced the following search patterns in order:

1: 30 meters, west

2: 65 meters, 32 degrees East of South

3: 130 meters, east
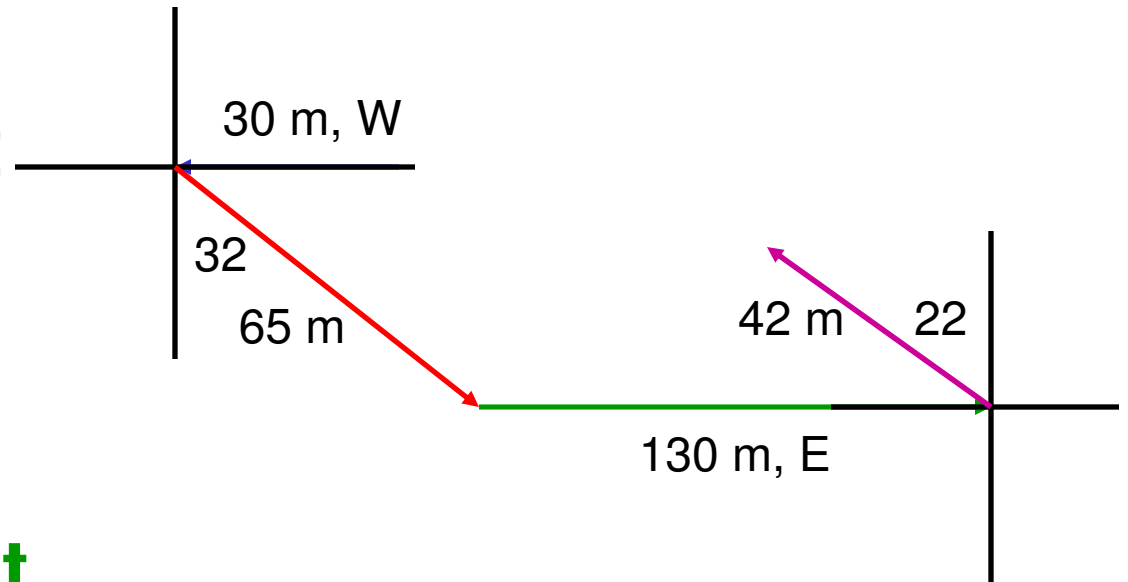
4: 42 meters, 22 degrees West of North

1: **30 meters, west**

2: **65 meters, 32 degrees East of South**

3: **130 meters, east**

4: **42 meters, 22 degrees West of North**

30 m, W

32

65 m

42 m   22

130 m, E

1: 30 meters, west

2: 65 meters, 32 degrees East of South

3: 130 meters, east

4: 42 meters, 22 degrees West of North

Leg	Horizontal	Vertical
1	30 m	0 m
2		
3	130 m	0 m
4		

Tip #2 - **Make a chart with all the horizontal components in one column and all the vertical components on the other.**

65 meters, 32 degrees East of South

65cos32 = 55.12 m
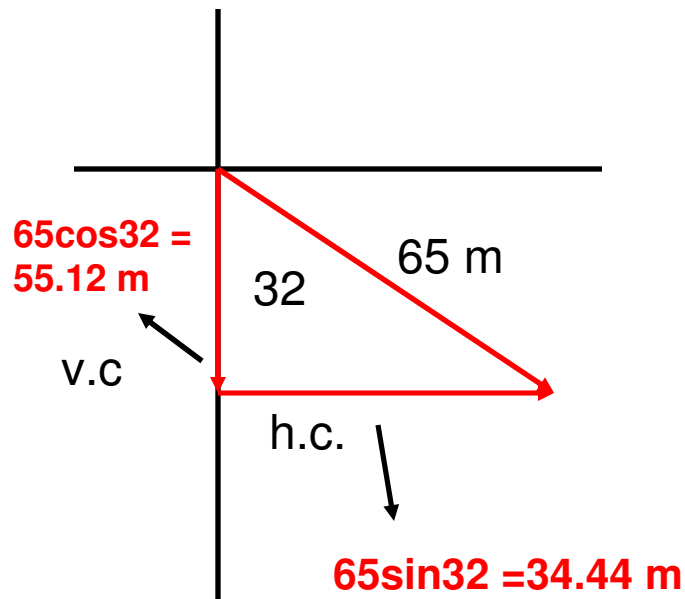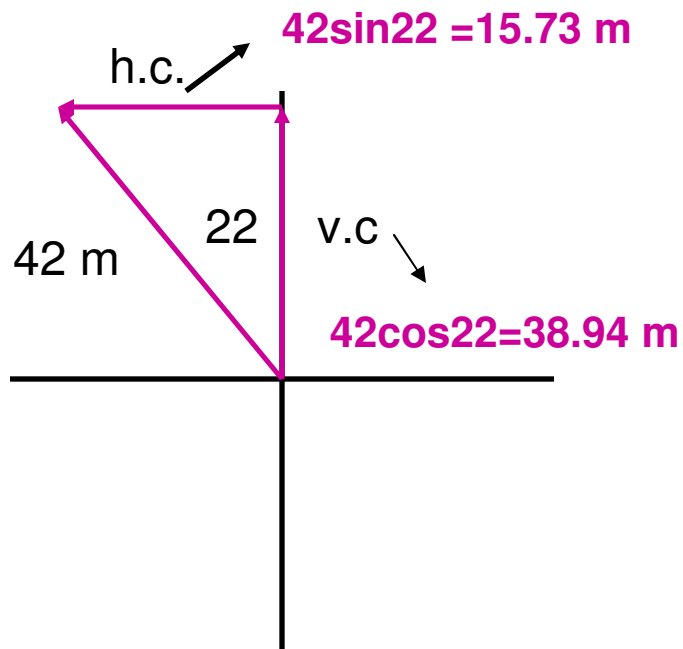
65 m

32

v.c

h.c.

65sin32 =34.44 m

Leg	Horizontal	Vertical
1	30 m	0 m
2	34.44 m	55.12 m
3	130 m	0 m
4		

42 meters, 22 degrees West of North

h.c.

$42\sin 22 = 15.73$ m

22

v.c

42 m

$42\cos 22 = 38.94$ m

Leg	Horizontal	Vertical
1	30 m	0 m
2	34.44 m	55.12 m
3	130 m	0 m
4	15.73 m	38.94 m

Tip #3 : Assign a negative sign to any vector which is moving **WEST** or **SOUTH.**

**1: 30 meters, west**

2: 65 meters, 32 degrees East of South

3: 130 meters, east

4: 42 meters, 22 degrees West of North

Leg	Horizontal	Vertical
1	- 30 m	0 m
2	34.44 m	- 55.12 m
3	130 m	0 m
4	- 15.73 m	38.94 m

Tip #4 : Add all the horizontal components to get ONE value for the horizontal. Do the same for the vertical.

1: 30 meters, west

2: 65 meters, 32 degrees East of South

3: 130 meters, east

4: 42 meters, 22 degrees West of North
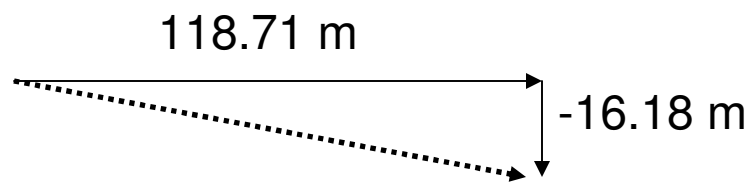
118.71 m

-16.18 m

Leg	Horizontal	Vertical
1	-30 m	0 m
2	34.44 m	-55.12 m
3	130 m	0 m
4	-15.73 m	38.94 m
Total	118.71 m	-16.18 m

What does this mean???

Tip #5: Use the Pythagorean Theorem to find the resultant and Tangent to find the direction.
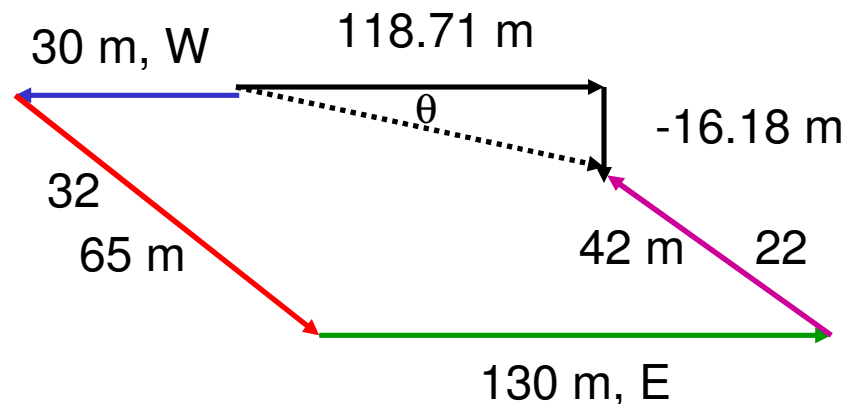
$$R = \sqrt{118.71^2 + (-16.18)^2} = 119.81m$$

$$Tan\theta = \frac{16.18}{118.71} = 0.136$$

$$\theta = Tan^{-1}(0.136) = 7.76^\circ$$

Final Answer: 119.81 m, 7.76 degrees, South of East