PHYS 1111 Homework 1
Chapter 1
Problems 37, 40, 41, 48, 49

Tuesday, August 09, 2011
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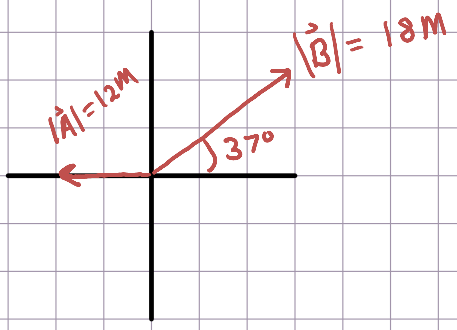
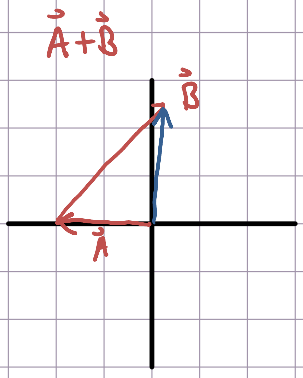
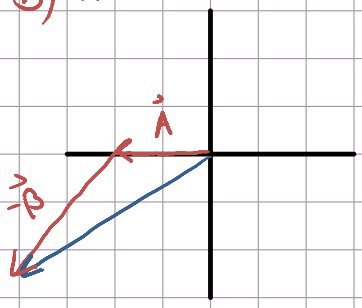


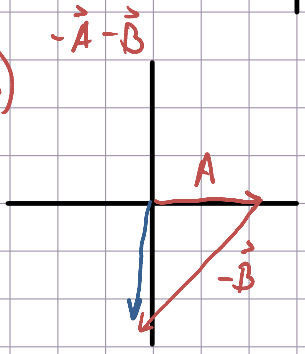
a) $\vec{A}+\vec{B}$



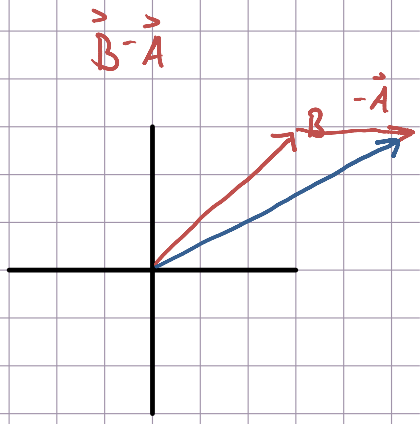
b) $\vec{A}-\vec{B}$



c) $-\vec{A}-\vec{B}$



d) $\vec{B}-\vec{A}$



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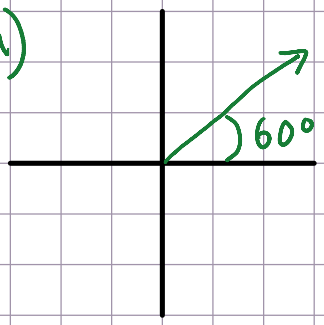
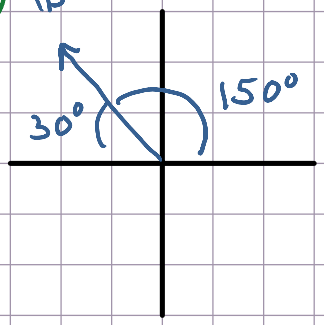
a)



$A_x = |\vec{A}| \cos\theta_A$
$A_x = (50N)\cos(60°)$
$A_x = 25N$

$A_y = |\vec{A}| \sin\theta_A$
$A_y = (50N)\sin(60°)$
$A_y = 43.3N$

b) $|\vec{B}| = 75\ m/s$

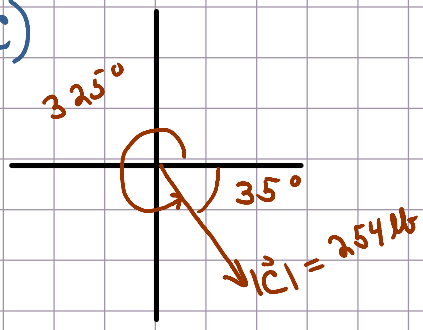


$\frac{5}{6}\pi\ rad\left(\frac{360°}{2\pi\ rad}\right) = 150°$

$B_x = |\vec{B}| \cos\theta_B$
$B_x = (75\ m/s)\cos(30°)$
$B_x = -64.95\ m/s$

$B_y = |\vec{B}| \sin\theta_B$
$B_y = (75\ m/s)\sin(30°)$
$B_y = 37.5\ m/s$

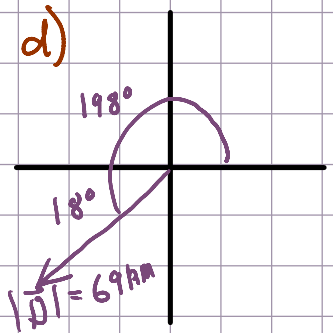
c)



$C_x = |\vec{C}| \cos\theta_C$
$C_x = (254lb)\cos(35°)$
$C_x = 208\ lb$

$C_y = |\vec{C}| \sin\theta_C$
$C_y = (254lb)\sin(35°)$
$C_y = -145.7\ lb$

d)



$1.1\pi\ rad\left(\frac{360°}{2\pi\ rad}\right) = 198°$

$D_x = |\vec{D}| \cos\theta_D$
$D_x = (69km)\cos(18°)$
$D_x = -65.6\ km$

$D_y = |\vec{D}| \sin\theta_D$
$D_y = (69km)\sin(18°)$
$D_y = 21.3\ km$

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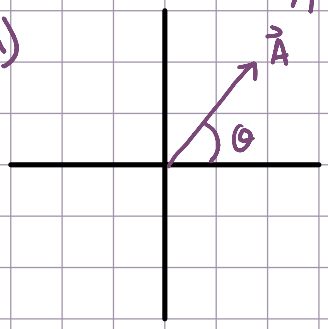
a) $\vec{A} = (4m, 5m)$



$|\vec{A}| = \sqrt{A_x^2 + A_y^2}$

$|\vec{A}| = \sqrt{(4m)^2 + (5m)^2}$

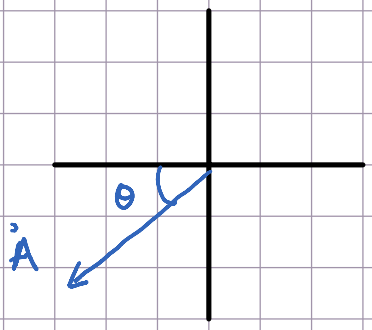
$|\vec{A}| = 6.4\ m$

$\theta = \tan^{-1}\left(\frac{A_y}{A_x}\right)$

$\theta = \tan^{-1}\left(\frac{5m}{4m}\right)$

$\theta = 51.3°$

b) $\vec{A} = (-3\ km, -6\ km)$



$|\vec{A}| = \sqrt{A_x^2 + A_y^2}$

$|\vec{A}| = \sqrt{(-3\ km)^2 + (-6\ km)^2}$

$|\vec{A}| = 6.7\ km$

$\theta = \tan^{-1}\left(\frac{A_y}{A_x}\right)$

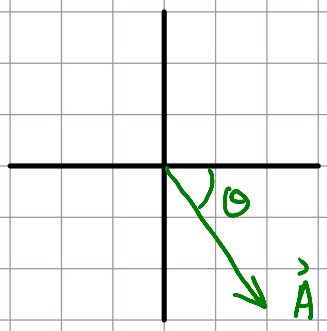
$\theta = \tan^{-1}\left(\frac{-6km}{-3km}\right)$

$\theta = 63.4°$

or from +x axis

$180° + 63.4° = 243.4°$

C) $\vec{A} = (9\ m/s, -17\ m/s)$



$|\vec{A}| = \sqrt{A_x^2 + A_y^2}$

$|\vec{A}| = \sqrt{(9m/s)^2 + (-17m/s)^2}$

$|\vec{A}| = 19.2\ m/s$

$\theta = \tan^{-1}\left(\frac{A_y}{A_x}\right)$

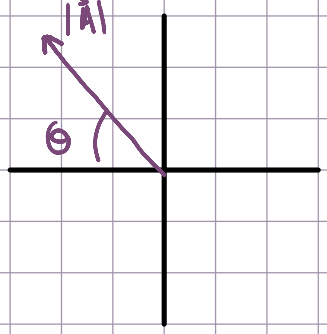
$\theta = \tan^{-1}\left(\frac{-17\ m/s}{9\ m/s}\right)$

$\theta = 62°$

or from (+) X axis

$360° - 62° = 298°$

d) $\vec{A} = (-8N, 12N)$



$|\vec{A}| = \sqrt{A_x^2 + A_y^2}$

$|\vec{A}| = \sqrt{(-8N)^2 + (12N)^2}$

$|\vec{A}| = 14.42\ N$

$\theta = \tan^{-1}\left(\frac{A_y}{A_x}\right)$

$\theta = \tan^{-1}\left(\frac{12N}{-8N}\right)$

$\theta = 56.3°$

or from (+) X axis

$180° - 56.3° = 123.7°$

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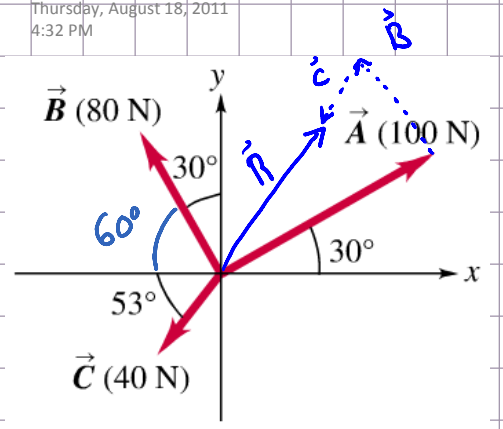

$A_x = |\vec{A}| \cos\theta_A$
$A_x = (100N)\cos(30°)$
$A_x = 86.6\,N$

$A_y = |\vec{A}| \cos\theta_A$
$A_y = (100N)\sin(30°)$
$A_y = 50N$

$B_x = |\vec{B}| \cos\theta_B$
$B_x = (80N)\cos(60°)$
$B_x = -40N$

$B_y = |\vec{B}| \sin\theta_B$
$B_y = (80N)\sin(60°)$
$B_y = 69.28\,N$

$C_x = |\vec{C}| \cos\theta_C$
$C_x = (40N)\cos(53°)$
$C_x = -24.07N$

$C_y = |\vec{C}| \sin\theta_C$
$C_y = (40N)\sin(53°)$
$C_y = -31.9\,N$

$\vec{R} = \vec{A} + \vec{B} + \vec{C}$

so

$R_x = A_x + B_x + C_x$
$R_x = 86.6N + (-40N) + (-24.07N)$
$R_x = 22.53\,N$

$R_y = A_y + B_y + C_y$
$R_y = 50N + 69.28N + (-31.9N)$
$R_y = 87.38\,N$

$|\vec{R}| = \sqrt{R_x^2 + R_y^2}$

$|\vec{R}| = \sqrt{(22.53N)^2 + (87.38N)^2}$

$|\vec{R}| = 90.2\,N$

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

$\theta = \tan^{-1}\left(\frac{87.38N}{22.53N}\right)$

$\theta = 75.5°$ //

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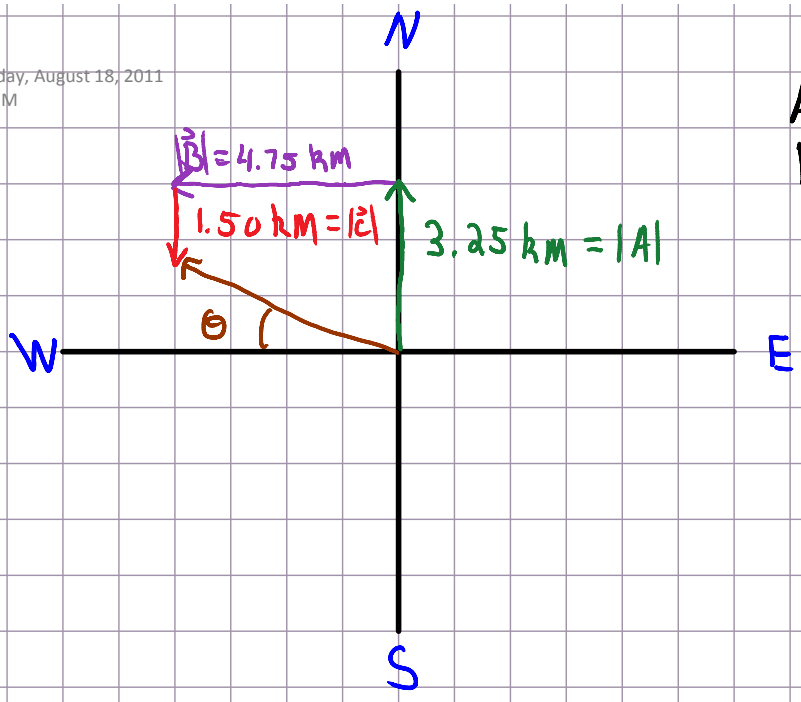

$A_x = 0$ $A_y = 3.25\ km$

$B_x = -4.75\ km$ $B_y = 0$

$C_x = 0$ $C_y = -1.5\ km$

$$\vec{R} = \vec{A} + \vec{B} + \vec{C}$$

$$R_x = A_x + B_x + C_x$$
$$R_x = 0 + (-4.75\ km) + 0$$
$$R_x = -4.75\ km$$

$$R_y = A_y + B_y + C_y$$
$$R_y = 3.25\ km + 0 + (-1.5\ km)$$
$$R_y = 1.75\ km$$

$$|\vec{R}| = \sqrt{R_x^2 + R_y^2}$$

$$|\vec{R}| = \sqrt{(-4.75\ km)^2 + (1.75\ km)^2}$$

$$|\vec{R}| = 5.06\ km$$

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

$$\theta = \tan^{-1}\left(\frac{1.75\ km}{-4.75\ km}\right)$$

$$\theta = 20.22^\circ$$