Physics 11
Spring 2026

ave. = 5.4
σ = 3.2

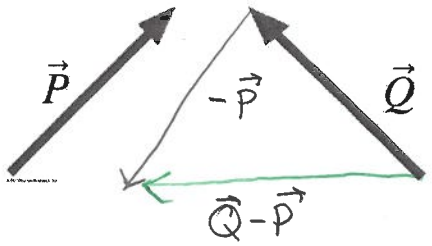
Name Answer Key

Quiz #3: Vectors and Motion in Two Dimensions

Problem 1 (2 points)
Two vectors appear as in the figure below. Which combination points directly to the left?

C

a) $\vec{P}+\vec{Q}$
b) $\vec{P}-\vec{Q}$
(c) $\vec{Q}-\vec{P}$
d) $-\vec{Q}-\vec{P}$
e) none of the above



Problem 2 (3 points)
Find the magnitude and direction of the sum of the two displacement vectors $\vec{A}$ and $\vec{B}$. Vector $\vec{A}$ has components A_x = 5.0 m and A_y = -2.5 m. Vector $\vec{B}$ has components B_x = -9.5 m and B_y = 4.0 m.

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

$C_x = A_x + B_x = 5.0\text{m} + (-9.5\text{m}) = -4.5\text{m}$

$C_y = A_y + B_y = -2.5\text{m} + (4.0\text{m}) = 1.5\text{m}$

$C = \sqrt{C_x^2 + C_y^2} = \sqrt{(-4.5\text{m})^2 + (1.5\text{m})^2} \rightarrow$ **C = 4.7m**

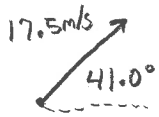
$\theta = \tan^{-1}\left(\frac{C_y}{C_x}\right) = \tan^{-1}\left(\frac{1.5\text{m}}{-4.5\text{m}}\right)$

$= -18.4° \rightarrow$ wrong quadrant

$\theta = -18.4° + 180°$

θ = 162°

Problem 3 (5 points)
A football is kicked upward from the ground with an initial velocity of 17.5 m/s at an angle of 41.0° above the horizontal. **(a)** How long a time does it take for the ball to reach its maximum height? **(b)** What is the ball's maximum height? **(c)** What is the ball's speed at its maximum height?



$V_{0x} = (17.5\text{m/s})\cos 41.0° = 13.2\text{m/s}$

$V_{0y} = (17.5\text{m/s})\sin 41.0° = 11.5\text{m/s}$

y_0	y	V_{0y}	V_y	a_y	t
0m	?	11.5m/s	0m/s	-9.8m/s^2	?

(a) $V_y = V_{0y} + a_y t \rightarrow t = \frac{-V_{0y}}{a_y} = \frac{-11.5\text{m/s}}{(-9.80\text{m/s}^2)} \rightarrow$ **t = 1.17s**

(b) $y = y_0 + V_{0y} t + \frac{1}{2} a_y t^2$

$y = (11.5\text{m/s})(1.17\text{s}) + \frac{1}{2}(-9.80\text{m/s}^2)(1.17\text{s})^2 \rightarrow$ **y = 6.75m**

(c) $V = \sqrt{V_x^2 + V_y^2} = V_x = V_{0x} =$ **13.2m/s**