Practice Test

ANSWERS AND SOLUTIONS

1. $\vec{d}_x = d\cos\theta$

Convert 33° W of S to 57° S of W

$\vec{d}_x = (12\text{ m})(\cos 57°)$
$= -6.5\text{ m}$

B is the answer.

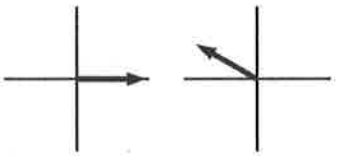
2. $\vec{d}_y = d\sin\theta$

Convert 33° W of S to 57° S of W

$\vec{d}_y = (12\text{ m})(\sin 57°)$
$= -10\text{ m}$

D is the answer.

3.



10 m east 20.0 m 30.0° N of W

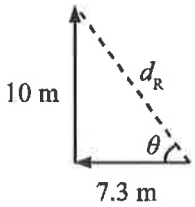
Consider east and north directions as positive

$\vec{d}_{1x} = 10\text{ m}$

$\vec{d}_{2x} = d_2\cos\theta$
$= (20\text{ m})(\cos 30°)$
$= -17.3\text{ m}$

$\vec{d}_{1y} = 0$

$\vec{d}_{2y} = d_2\sin\theta$
$= (20\text{ m})(\sin 30°)$
$= 10\text{ m}$



$\sum d_x = 10\text{ m} - 17.3\text{ m}$
$= -7.3\text{ m}$

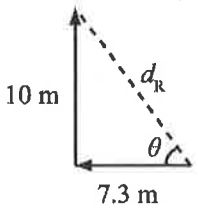
$\sum d_y = 10\text{ m}$

Magnitude of the displacement is

$d_R = \sqrt{d_x^2 + d_y^2}$
$= \sqrt{(7.3\text{ m})^2 + (10\text{ m})^2}$
$= 12.4\text{ m}$

A is the answer.

4. From solution **3**,

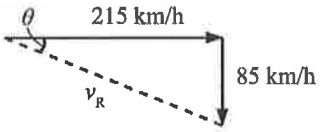


$\tan\theta = \dfrac{\text{opp}}{\text{adj}}$
$= \dfrac{10\text{ m}}{7.3\text{ m}}$
$\theta = 54°$

Direction of Marco's resultant displacement is 54° N of W

D is the answer.

5.

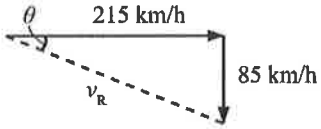


The speed is,

$v_R = \sqrt{v_x^2 + v_y^2}$
$= \sqrt{(215\text{ km/h})^2 + (85\text{ km/h})^2}$
$= 231\text{ km/h}$

C is the answer.

6. From **5**,



$\tan\theta = \dfrac{\text{opp}}{\text{adj}}$
$= \dfrac{85\text{ km/h}}{215\text{ km/h}}$
$\theta = 22°$

Direction of the pilot's resultant displacement is 22° S of E.

B is the answer.

7. A projectile has a vertical and a horizontal component which are independent of each other. The time that this projectile is in the air, it is accelerating uniformly toward the ground. Because the initial vertical velocity is zero, no matter how fast it is thrown horizontally, the time remains the same.

C is the answer.