Answer on Question #63070, Physics / Mechanics | Relativity

1. an automobile travels 9 miles due south, then 20 miles in a direction 40 degrees south of east, determine the resultant displacement.

Solution:

α=180-40=140° Cosine Law d=sqrt{9²+20²-2•9•20•cos140°} =23,5 miles

Answer: 23.5 miles

2. find the sum or resultant of the following displacements: A, 10 ft northwest, B, 20 ft 30 degrees north of east; C, 35 ft due south.

Solution:



1 units =5 ft

At the terminal point of A place the initial point of B. At the terminal point of B place the initial point of C. The resultant D is formed by joining the initial point of A to the terminal point of C, i.e. D = A+B+C. Graphically the resultant is measured to have magnitude of 4.1 units = 20.5 ft and direction 60° south of east.

Answer: 20.5 ft and 60° south of east

3. Which of the vector r = xi+yj+zk makes with the positive directions of the coordinate axes.

Answer:

zk makes with the positive directions of the coordinate axes

4. An airplane pilot sets a course due north and his speed is 150km/hr. There is a wind 40km/hr from the east. What is the actual velocity of the airplane?

Solution:

v=sqrt{1252+402)=155 km/hr

Answer: 155 km/hr

5. A river flows at a steady speed of 3m/s. A man wishes to cross in a motorboat, which travels at 5 km/hr to reach a point directly across the river. In what direction should he steer?

Solution:

 $(1.4 \text{ m/s})^2 + (3.0 \text{ m/s})^2 = \text{R}^2$ 1.96 m²/s² + 9 m²/s² = R²

 $10.96 \text{ m}^2/\text{s}^2 = \text{R}^2$

SQRT (10.96 m^2/s^2) = R

3.3 m/s = R

The direction

tan (theta) = (opposite/adjacent) tan (theta) = (1.4/3)

theta = invtan (1.4/3)

theta =24.9 degree

Answer: 24.9 degree

6. If r1 = 2i-j+k, r2 = i+3j-2k, r3 = -2i+j-3k and r4 = 3i+2j+5k, find the scalars a, b, c such that r4=ar1+br2+cr3

Solution:

```
We require

3i + 2j + 5k = a(2i - j + k) + b(i + 3j - 2k) + c(-2i + j - 3k) = (2a + b - 2c)i + (-a + 3b + c)j + (a - 2b - 3c)k.

Since

i, j, k are non-coplanar we have,

2a + b - 2c = 3,

-a + 3b + c = 2,

a - 2b - 3c = 5.

a = -2,

b = 1,

c = -3

and

r4 = -2r1 + r2 - 3r3.

Answer: a = -2, b = 1, c = -3
```

https://www.AssignmentExpert.com