PHYSICS 534

ANSWERS

EXERCISE-12   **Component Forces Part-2 /2**

Guglielmo Marconi received the Nobel prize for physics in 1909 for his work on wireless telegraphy.
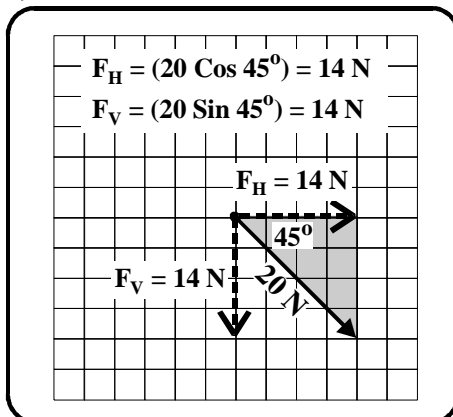
MARCONI

✋ *Note*: This exercise deals with finding the component forces ***mathematically***.

1.   Calculate and sketch the horizontal and vertical components of the following forces. Round off your answers to the nearest whole number.
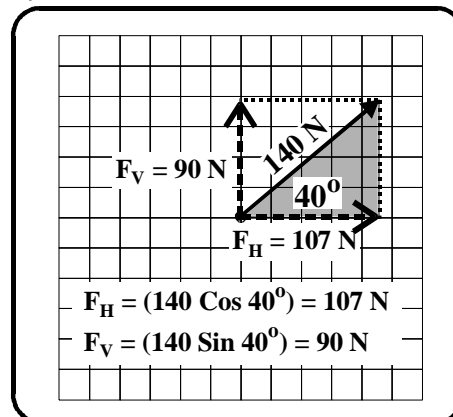
> *Note*:   One of the techniques you should learn as a physics student is to draw neat, clear diagrams ***free hand***. In general, use a ruler to ***measure*** not to draw lines. The more you practice making diagrams, the better you will become. Diagrams should not be too big nor too small. And remember, a diagram is not a picture, it is a sketch displaying only ***relevant*** information.
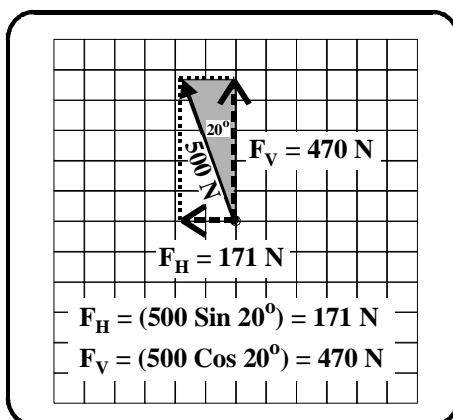
a)   20 N Southeast

$F_H = (20 \cos 45^o) = 14 \text{ N}$
$F_V = (20 \sin 45^o) = 14 \text{ N}$

$F_H = 14 \text{ N}$
45°
$F_V = 14 \text{ N}$ 20 N

$F_H =$ **14 N East** $F_V =$ **14 N South**

b)   140 N 40° from horizontal

$F_V = 90 \text{ N}$ 140 N
40°
$F_H = 107 \text{ N}$

$F_H = (140 \cos 40^o) = 107 \text{ N}$
$F_V = (140 \sin 40^o) = 90 \text{ N}$

$F_H =$ **107 N East** $F_V =$ **90 N North**

c)   500 N, N 20° W

20°
500 N
$F_V = 470 \text{ N}$

$F_H = 171 \text{ N}$

$F_H = (500 \sin 20^o) = 171 \text{ N}$
$F_V = (500 \cos 20^o) = 470 \text{ N}$

$F_H =$ **171 N West** $F_V =$ **470 N North**

d)   500 N, W 20° N

500 N $F_V = 171 \text{ N}$
20°

$F_H = 470 \text{ N}$

$F_H = (500 \cos 20^o) = 470 \text{ N}$
$F_V = (500 \sin 20^o) = 171 \text{ N}$
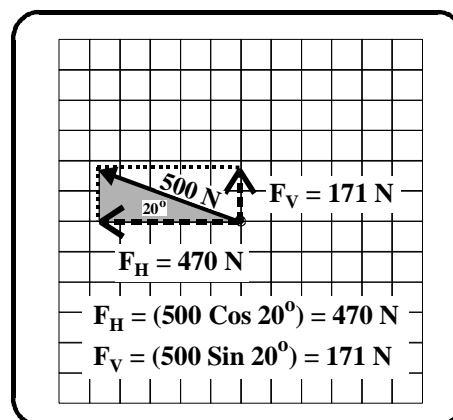
$F_H =$ **470 N West** $F_V =$ **171 N North**

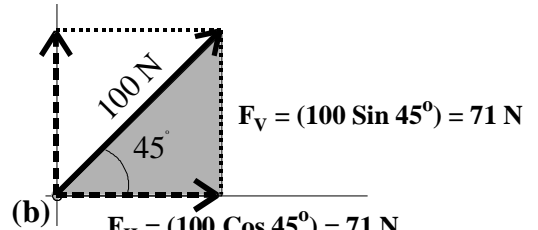**2.** Mathematically, find the horizontal and vertical components of the following forces:
Round off your answers to the nearest whole number.
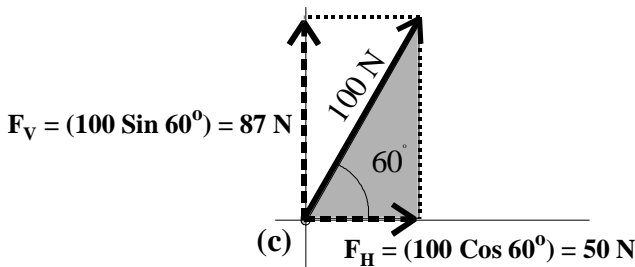
(a) 100 N

$F_H = $ **100 N East**

$F_V = $ **0**

(b) 100 N   45°
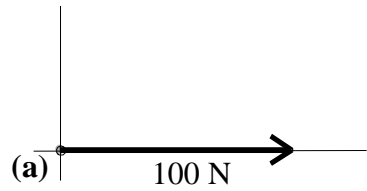
$F_V = (100 \sin 45^\circ) = 71$ N

$F_H = (100 \cos 45^\circ) = 71$ N

$F_H = $ **71 N East**

$F_V = $ **71 N North**

(c) 100 N   60°

$F_V = (100 \sin 60^\circ) = 87$ N

$F_H = (100 \cos 60^\circ) = 50$ N

$F_H = $ **50 N East**

$F_V = $ **87 N North**

(d) 400 N   45°
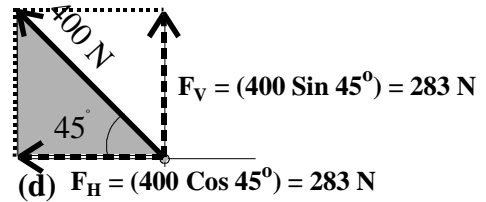
$F_V = (400 \sin 45^\circ) = 283$ N

$F_H = (400 \cos 45^\circ) = 283$ N

$F_H = $ **283 N West**

$F_V = $ **283 N North**

(e) 50 N   60°

$F_H = (50 \cos 60^\circ) = 43$ N

$F_V = (50 \sin 60^\circ) = 25$ N

$F_H = $ **43 N West**

$F_V = $ **25 N South**

(f) 1000 N   60°   120°
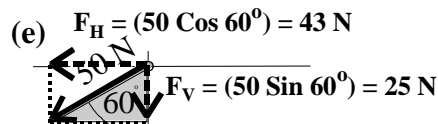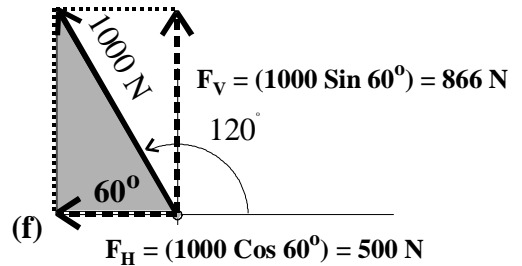
$F_V = (1000 \sin 60^\circ) = 866$ N

$F_H = (1000 \cos 60^\circ) = 500$ N

$F_H = $ **500 N West**

$F_V = $ **866 N North**

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