

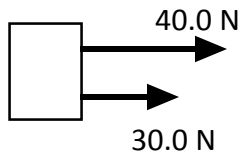
Worksheet - Combining & Resolving Forces

COMBINING FORCES

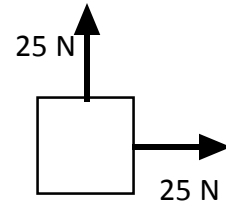
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Find the resultant (net) force in the problems below:

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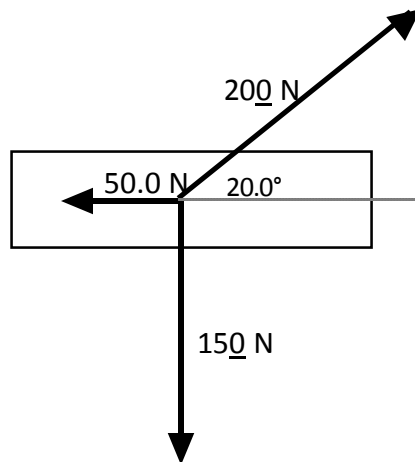
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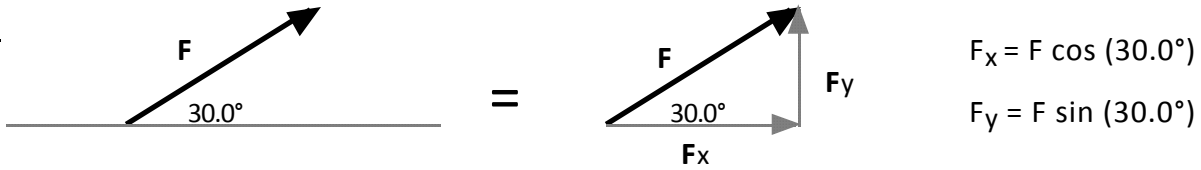


Hint: combining forces two at a time can make this easy.

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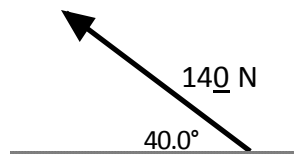
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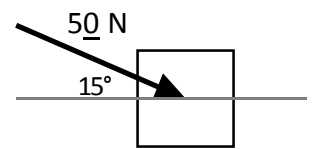


Resolve the forces into x and y components:

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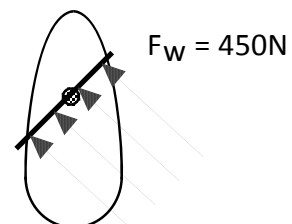
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(wind blows 45° north of west)



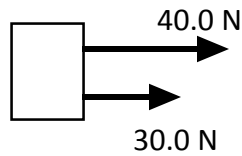
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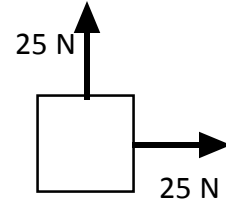
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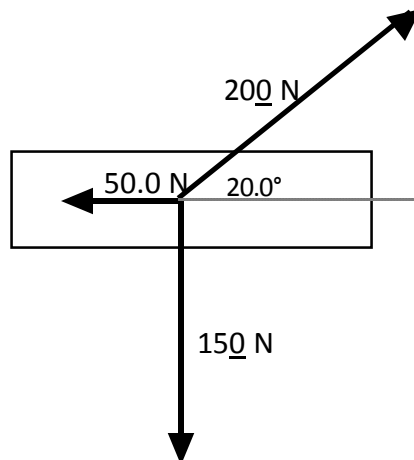
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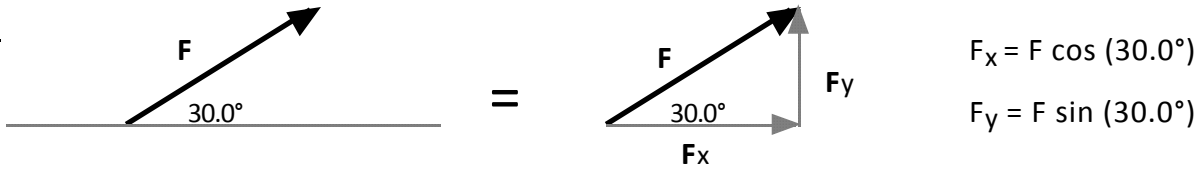


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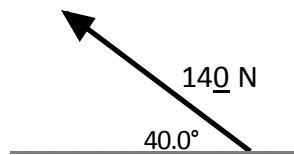
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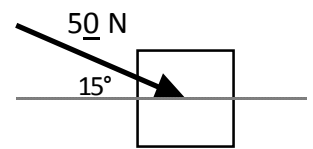


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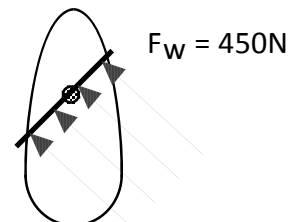
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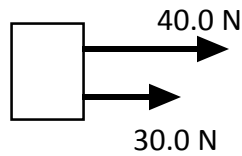
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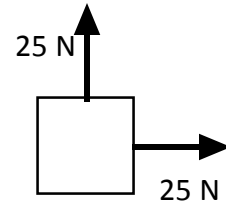
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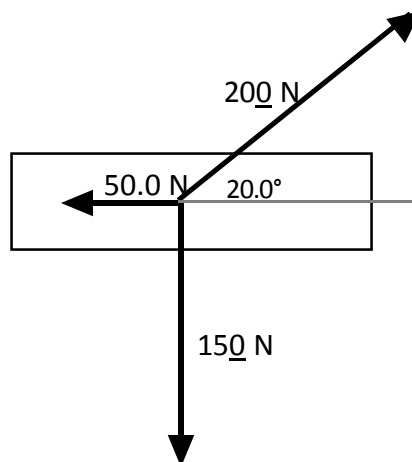
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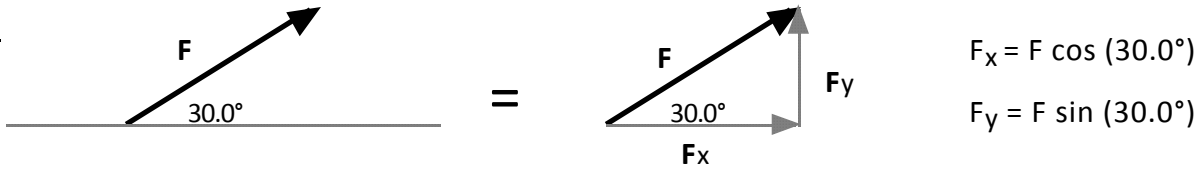


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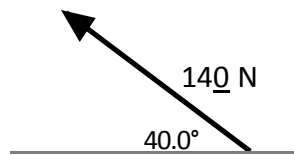
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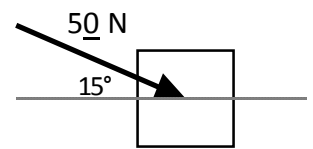


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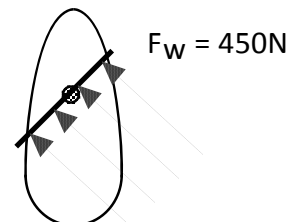
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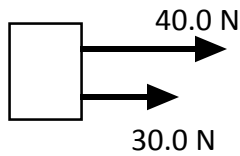
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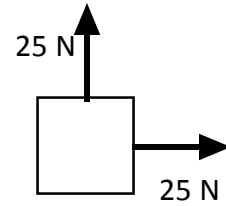
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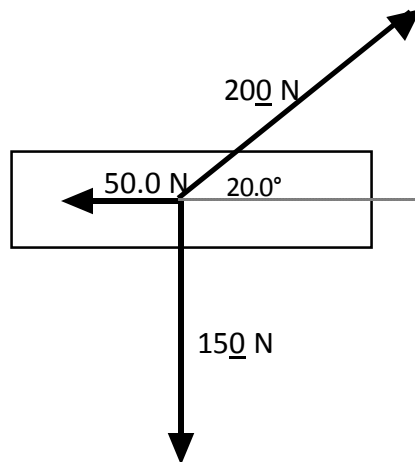
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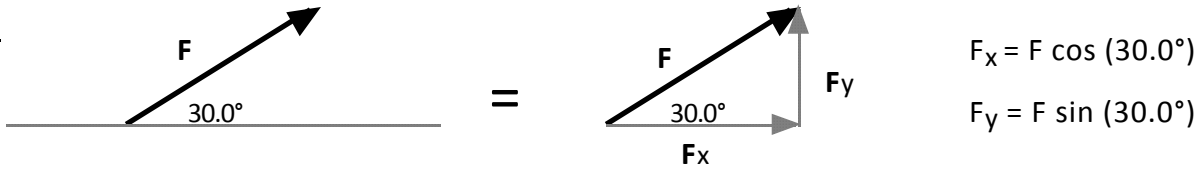


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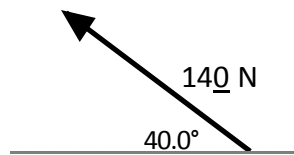
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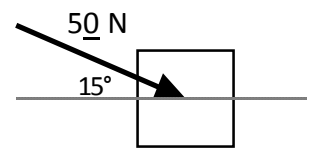


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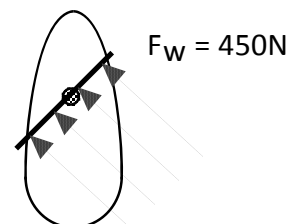
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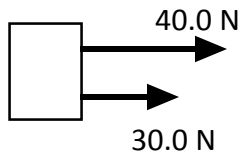
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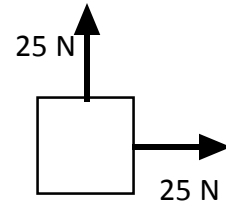
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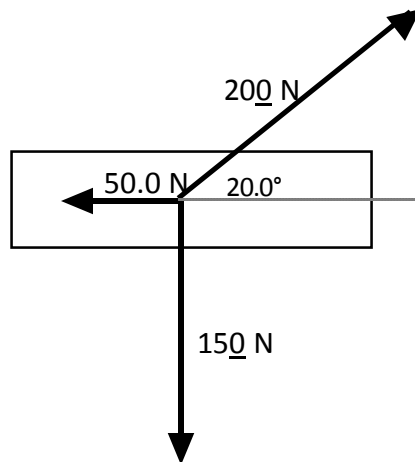
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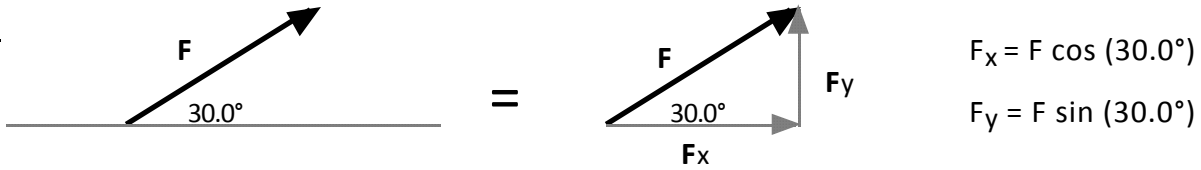


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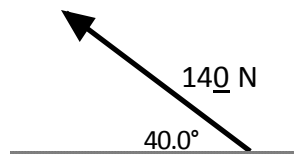
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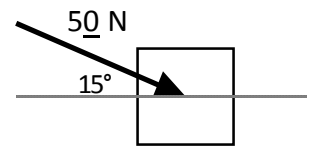


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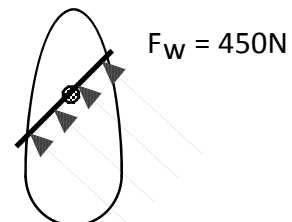
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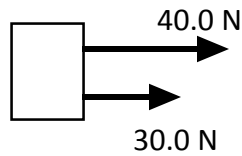
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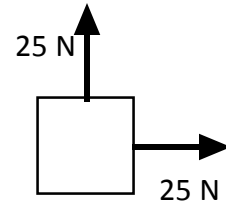
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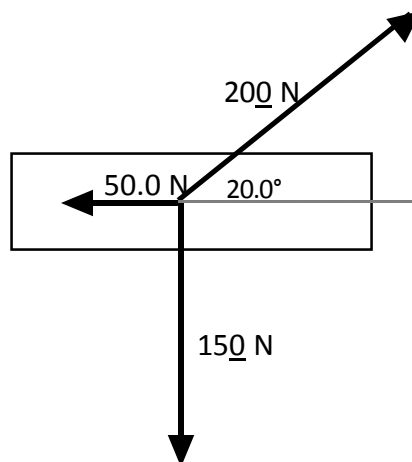
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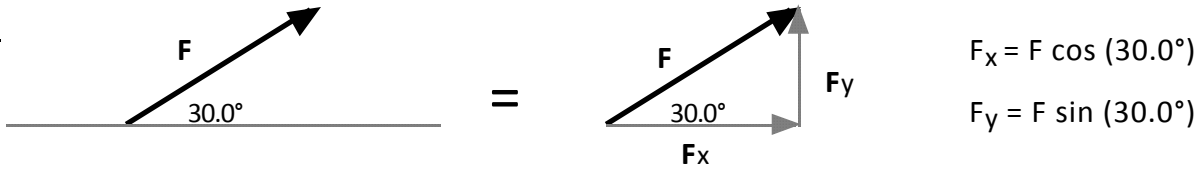


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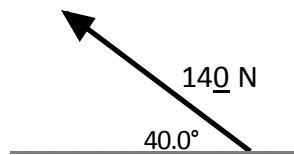
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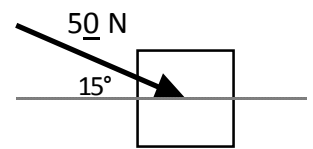


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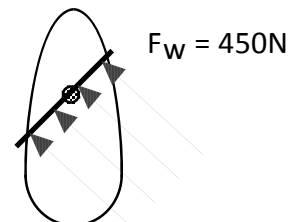
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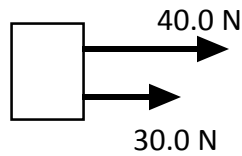
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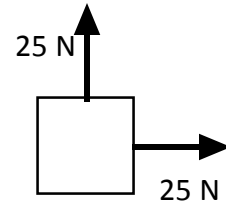
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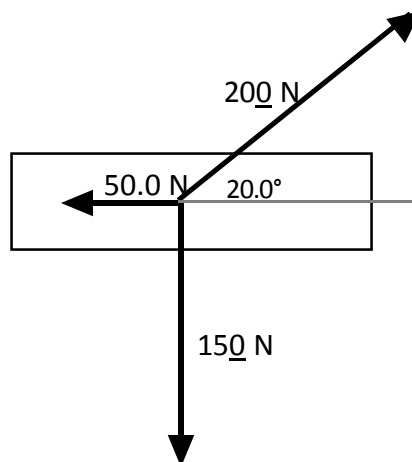
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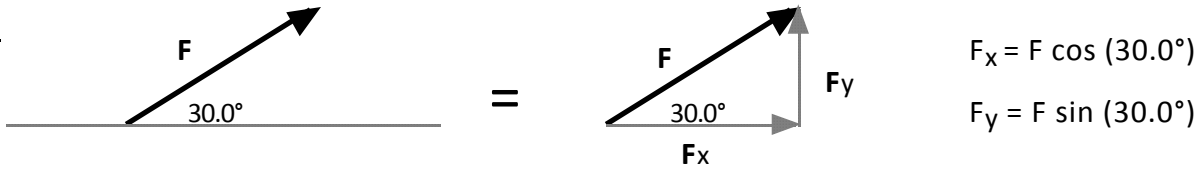


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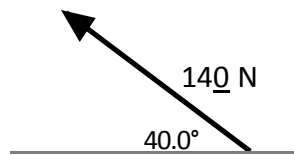
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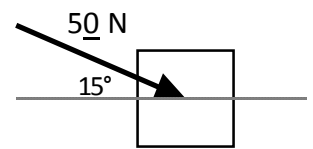


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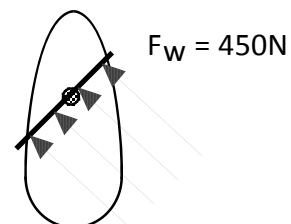
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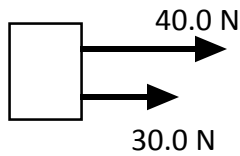
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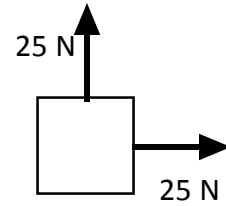
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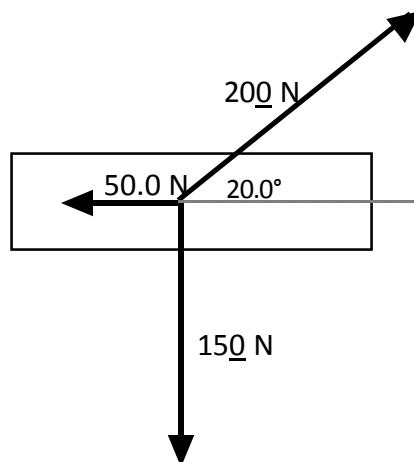
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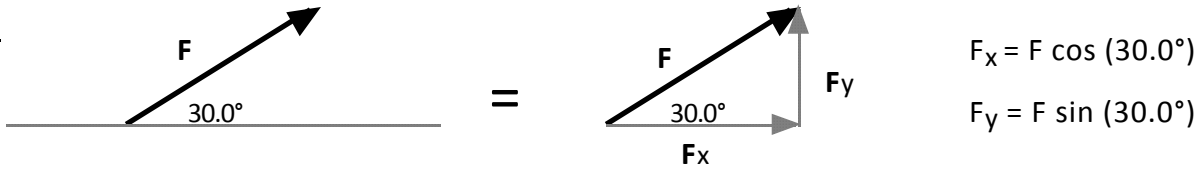


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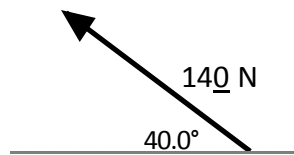
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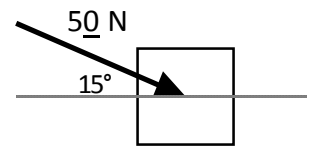


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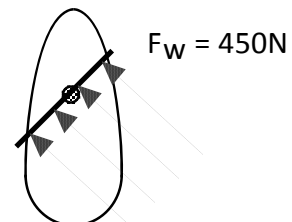
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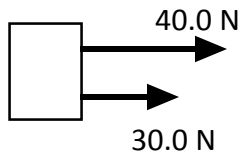
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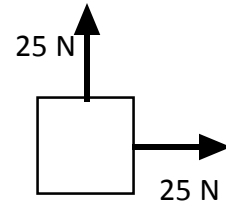
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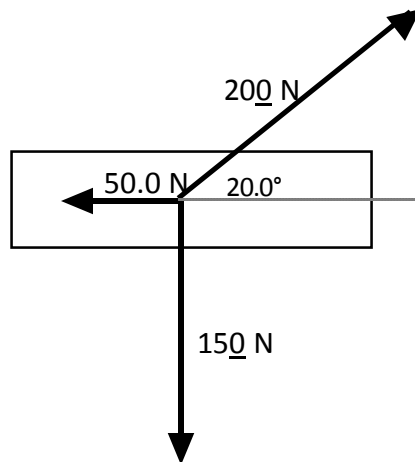
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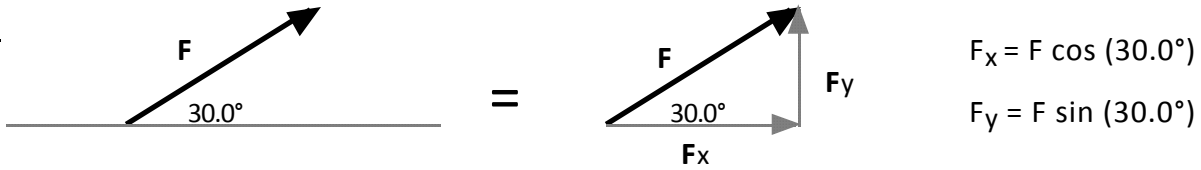


Hint: combining forces two at a time can make this easy.

RESOLUTION OF FORCES

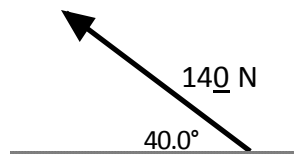
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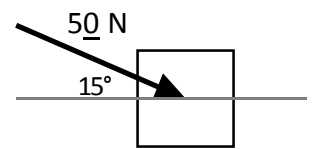


Resolve the forces into x and y components:

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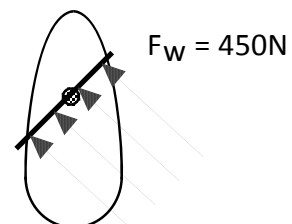
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(wind blows 45° north of west)



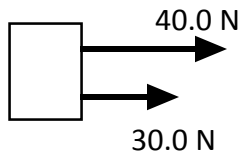
Worksheet - Combining & Resolving Forces

COMBINING FORCES

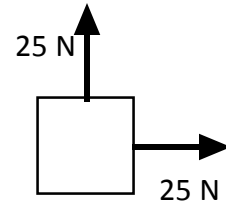
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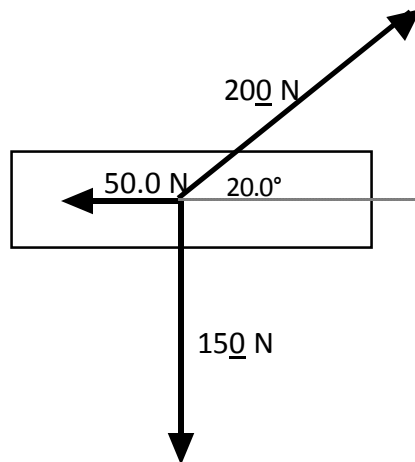
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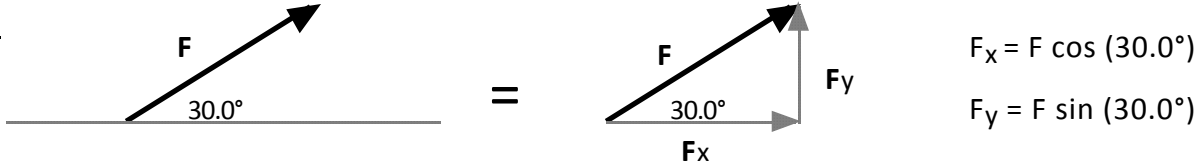


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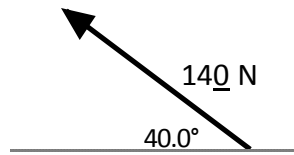
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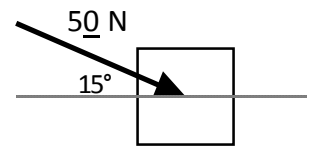


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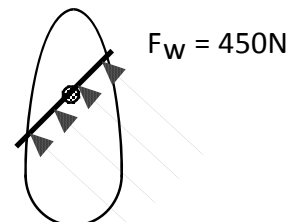
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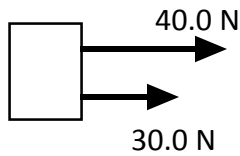
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COMBINING FORCES

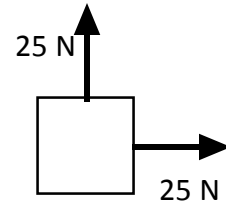
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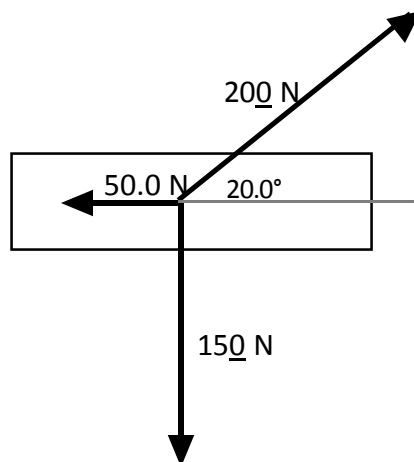
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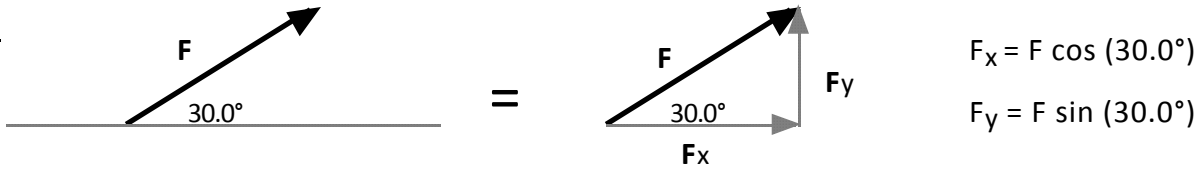


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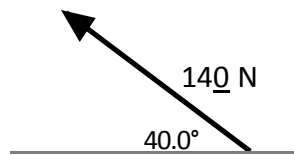
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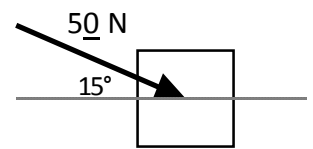


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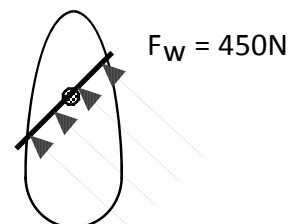
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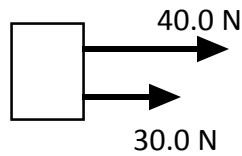
Worksheet - Combining & Resolving Forces

COMBINING FORCES

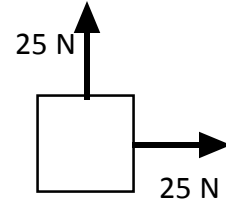
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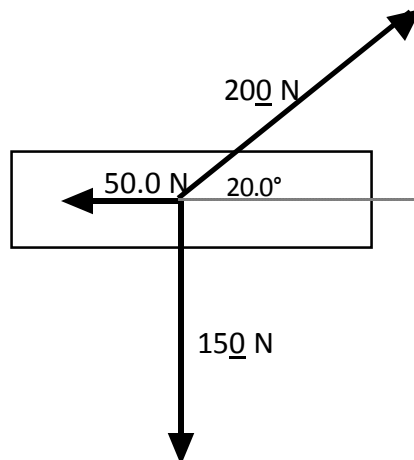
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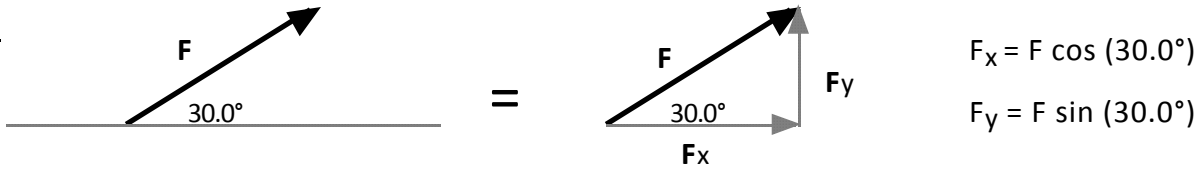


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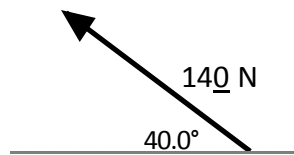
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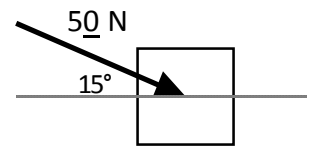


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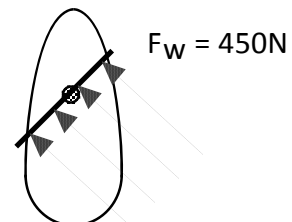
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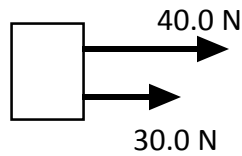
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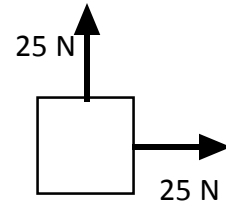
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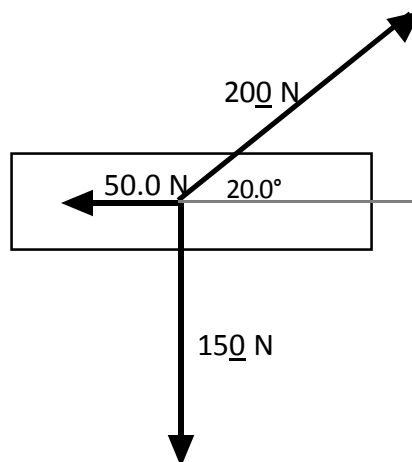
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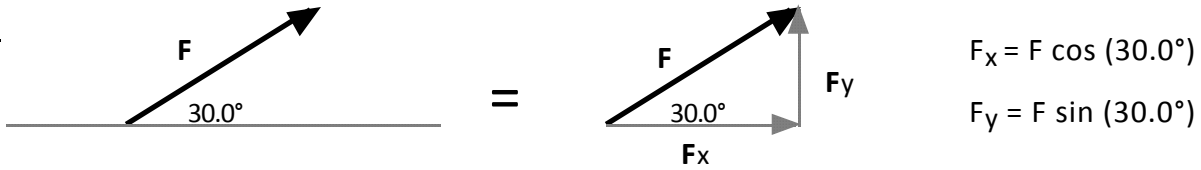


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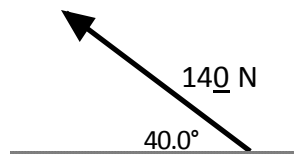
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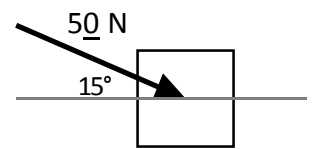


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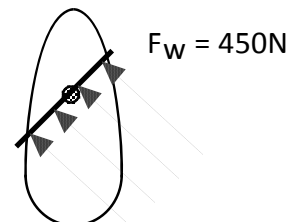
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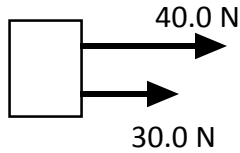
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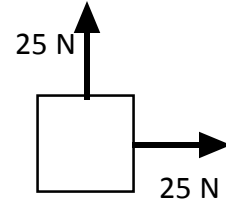
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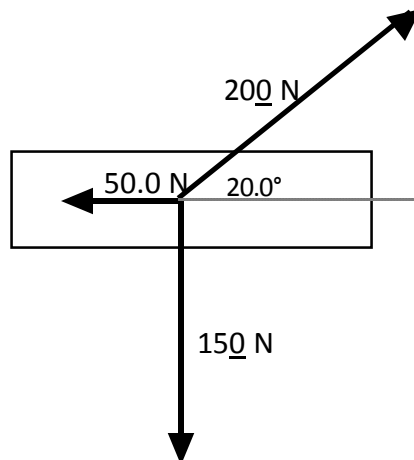
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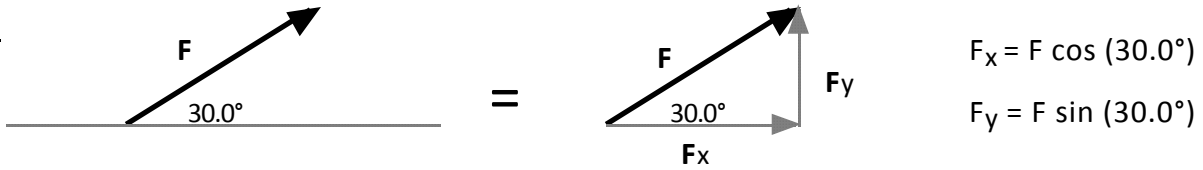


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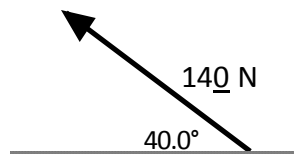
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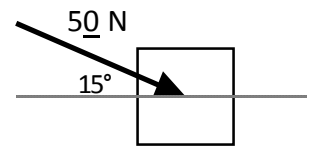


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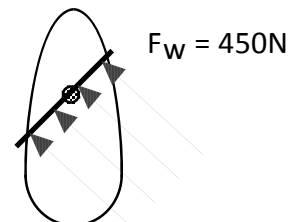
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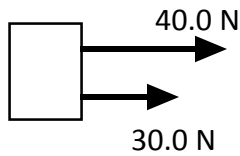
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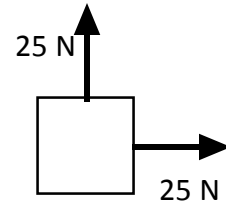
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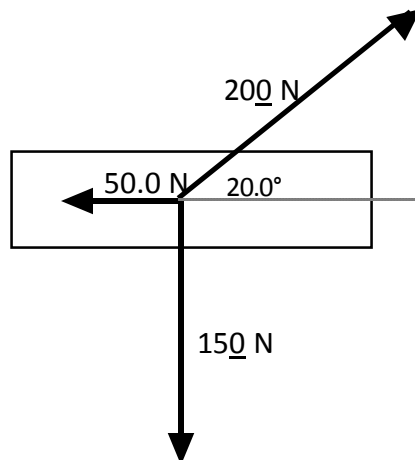
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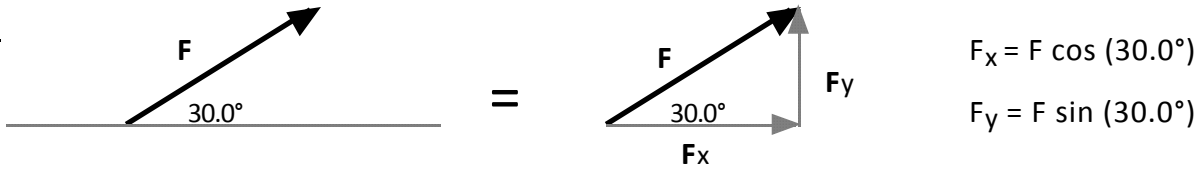


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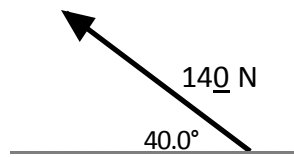
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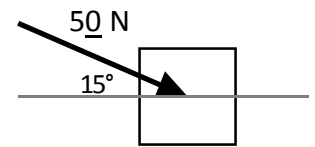


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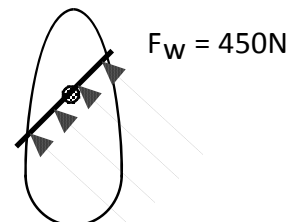
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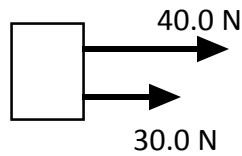
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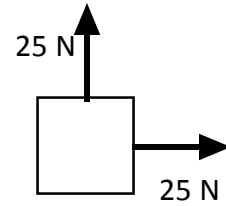
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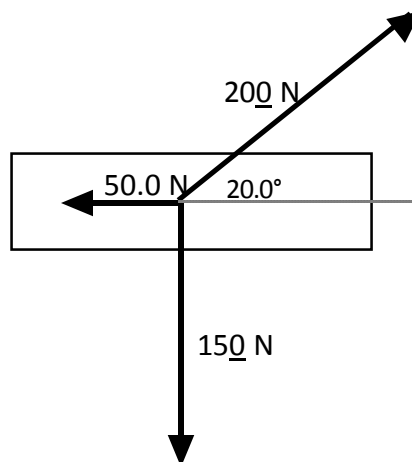
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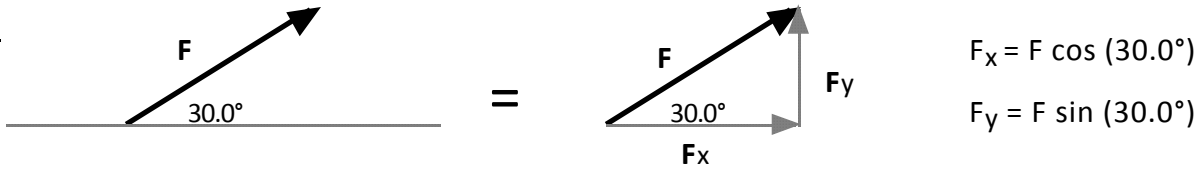


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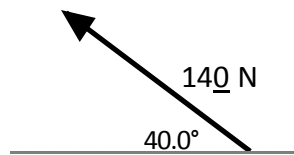
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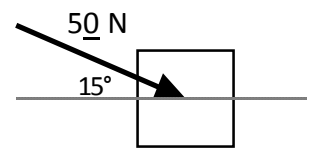


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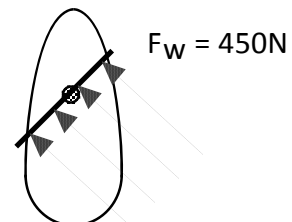
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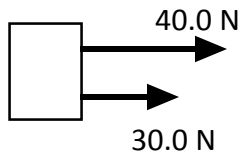
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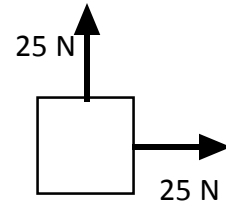
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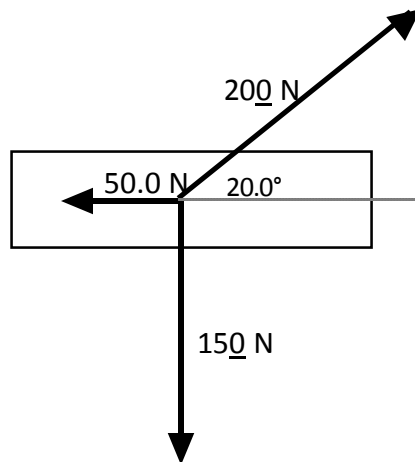
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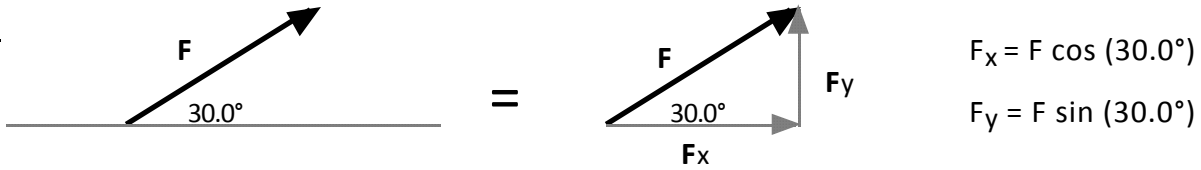


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RESOLUTION OF FORCES

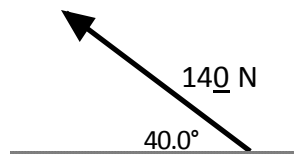
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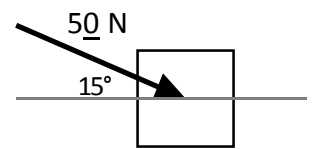


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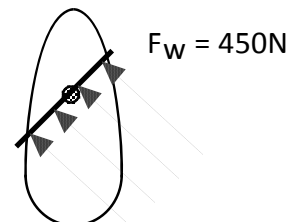
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(wind blows 45° north of west)



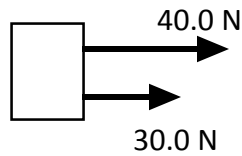
Worksheet - Combining & Resolving Forces

COMBINING FORCES

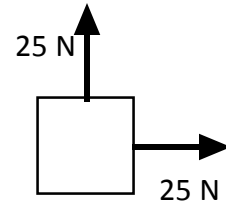
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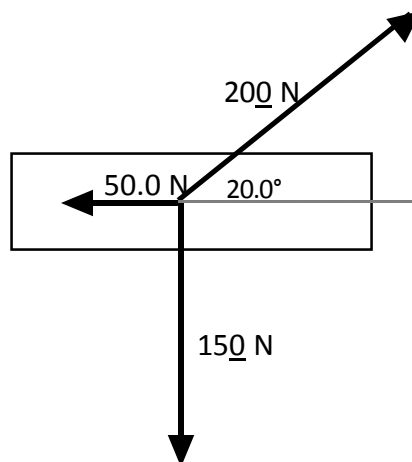
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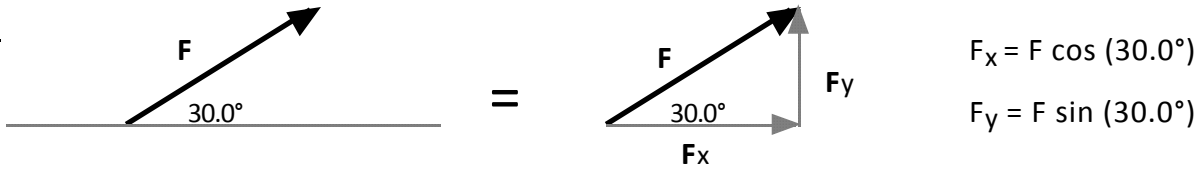


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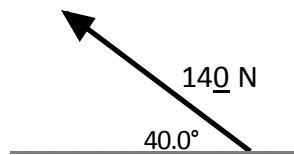
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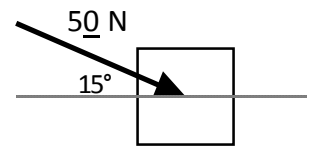


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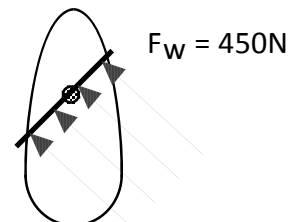
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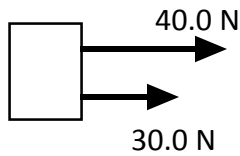
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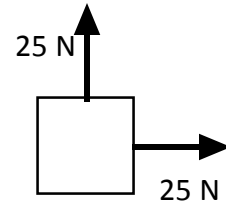
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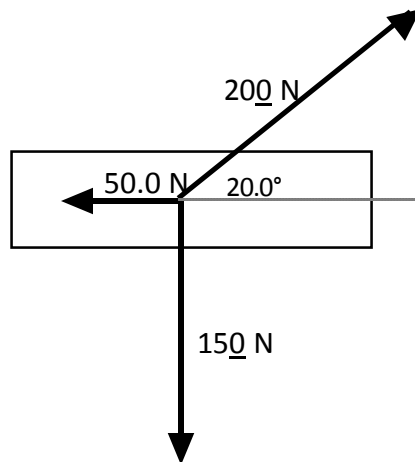
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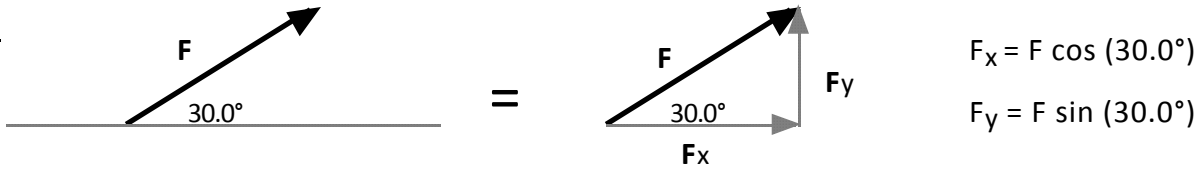


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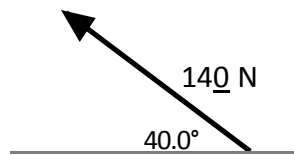
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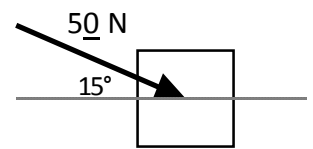


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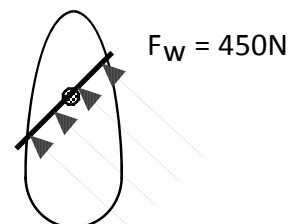
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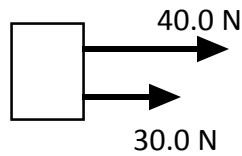
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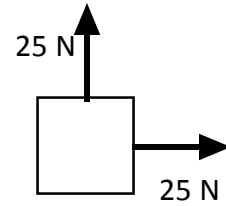
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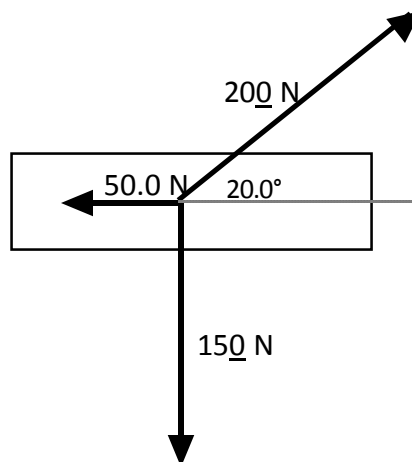
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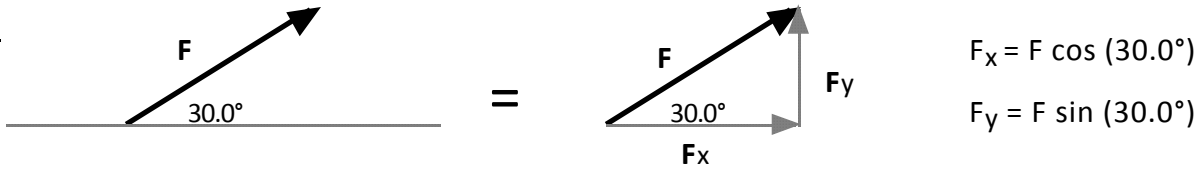


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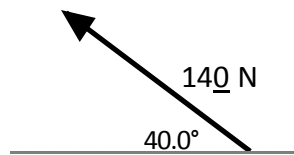
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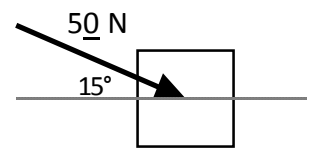


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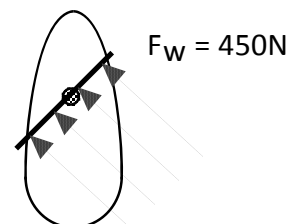
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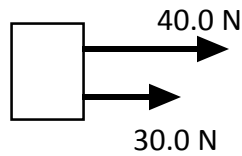
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COMBINING FORCES

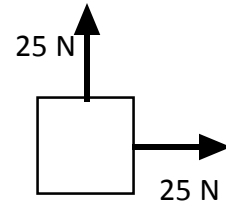
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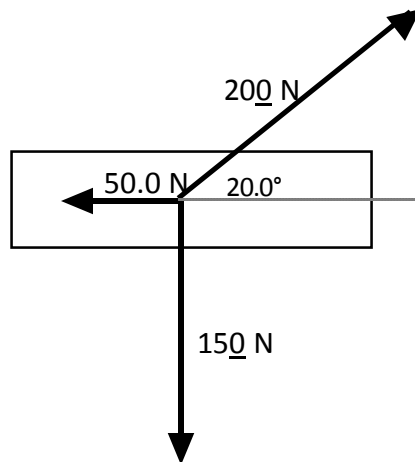
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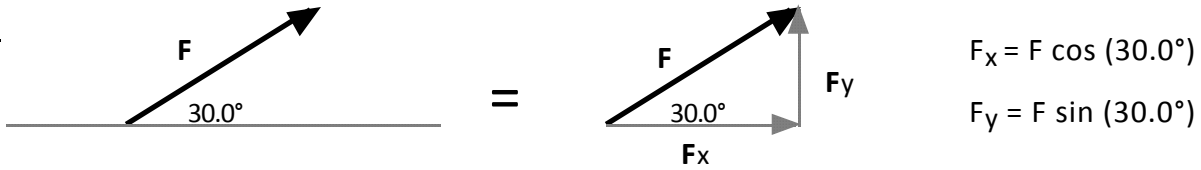


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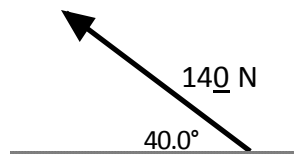
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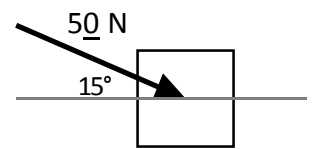


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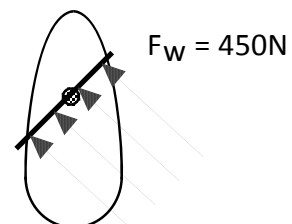
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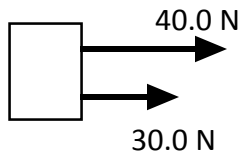
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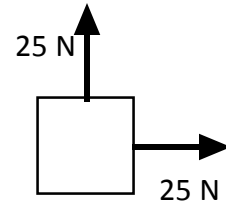
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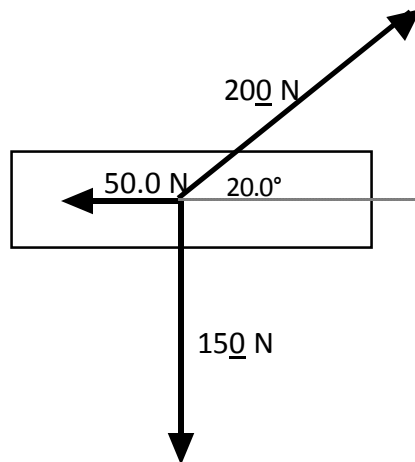
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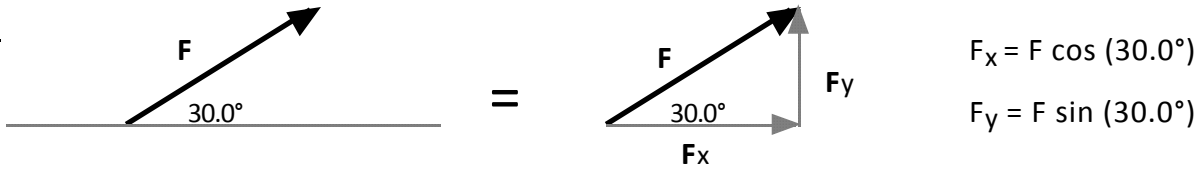


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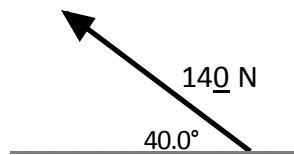
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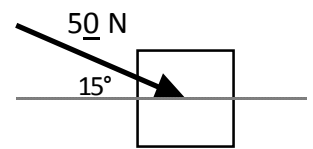


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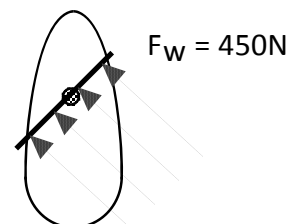
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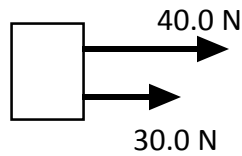
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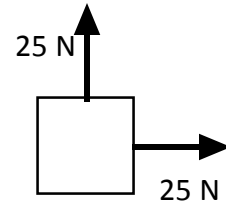
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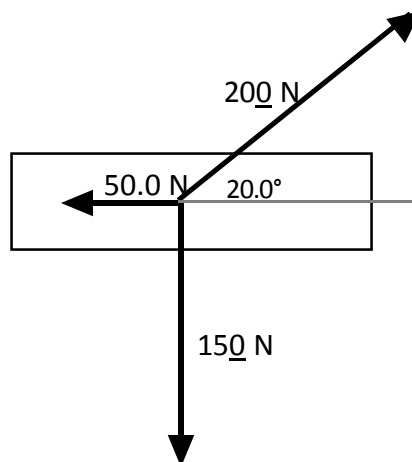
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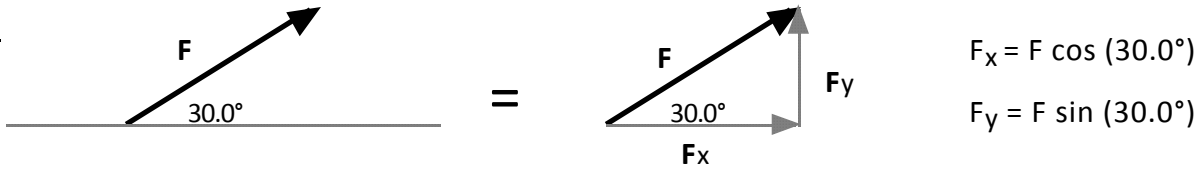


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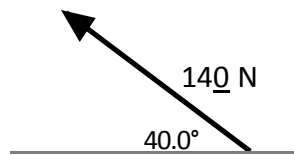
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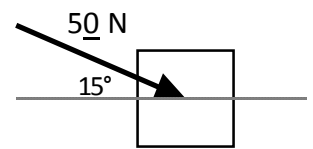


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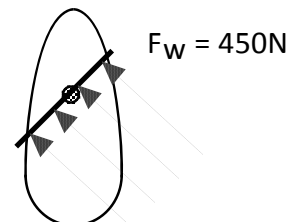
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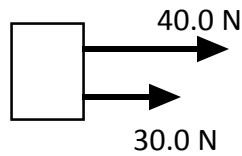
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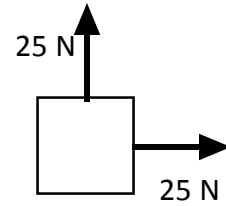
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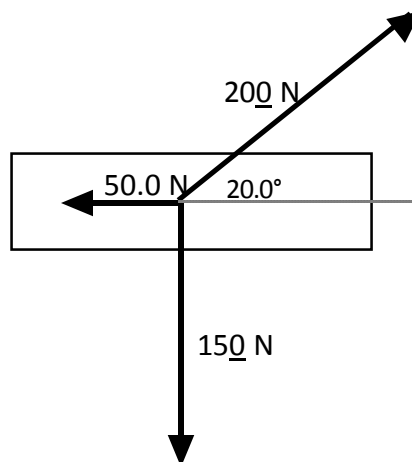
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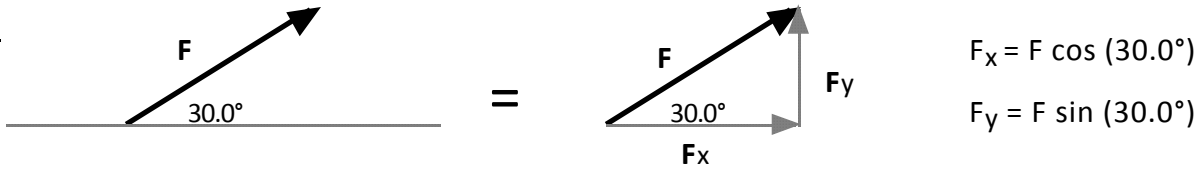


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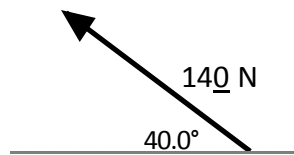
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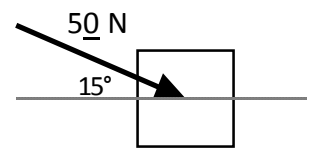


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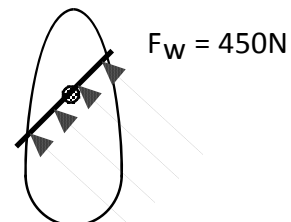
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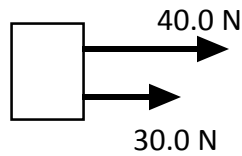
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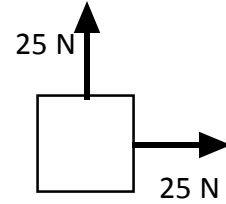
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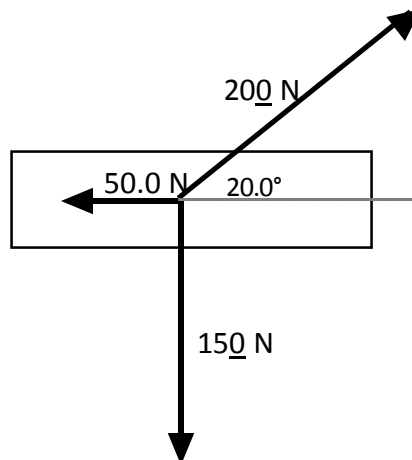
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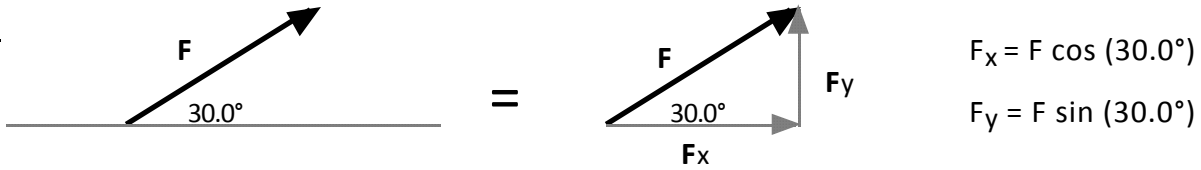


Hint: combining forces two at a time can make this easy.

RESOLUTION OF FORCES

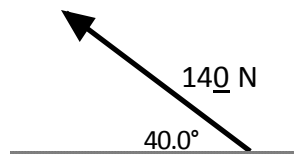
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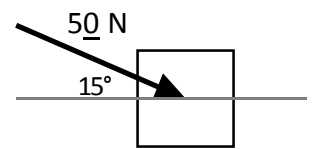


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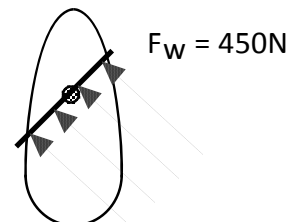
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(wind blows 45° north of west)



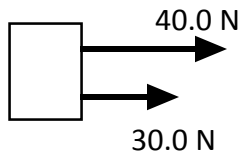
Worksheet - Combining & Resolving Forces

COMBINING FORCES

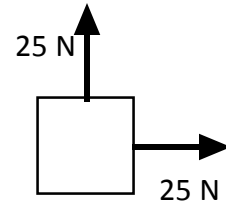
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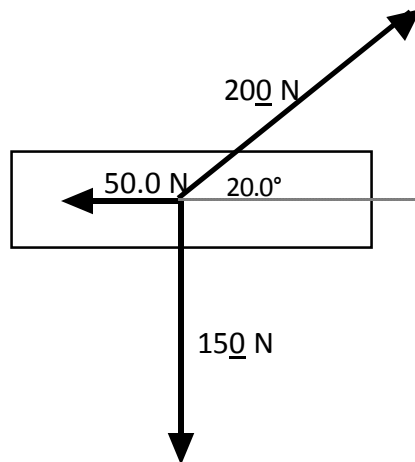
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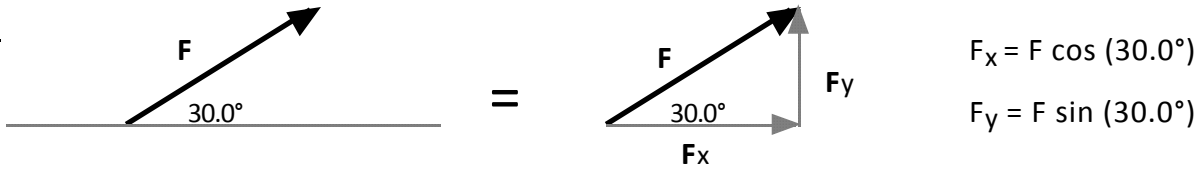


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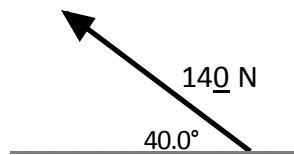
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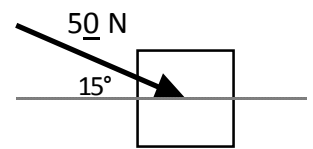


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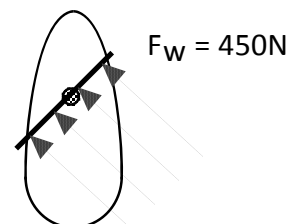
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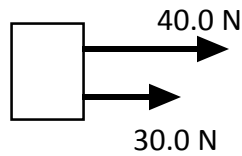
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COMBINING FORCES

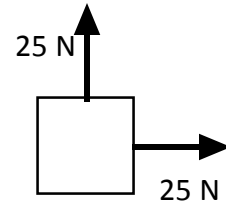
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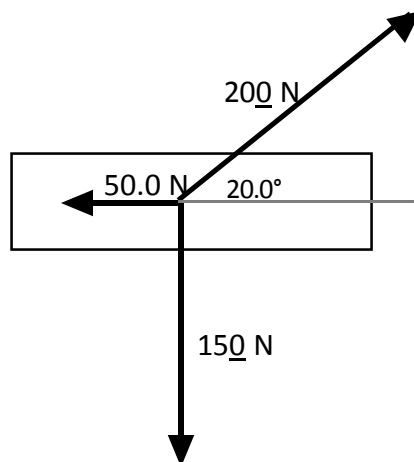
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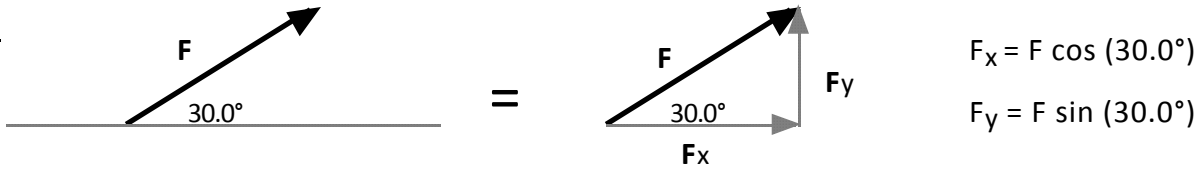


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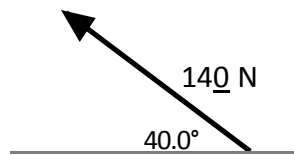
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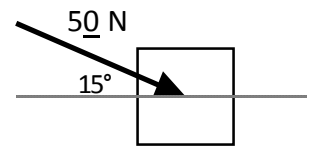


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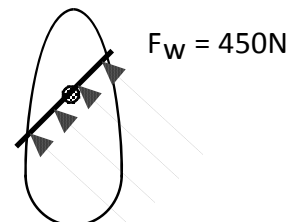
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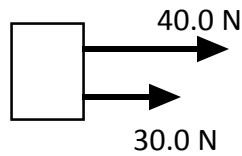
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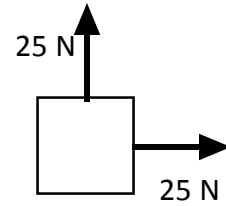
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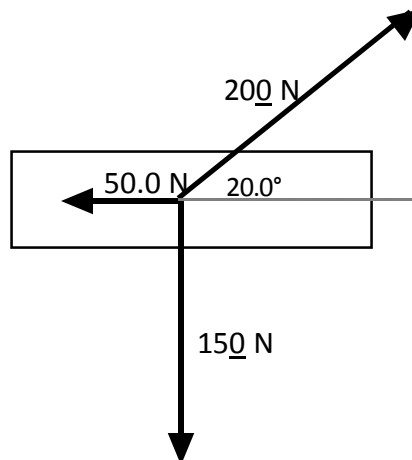
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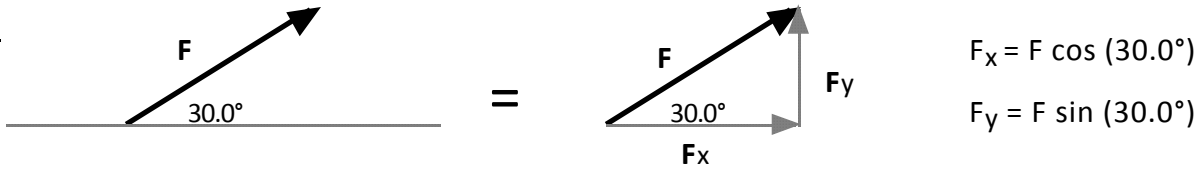


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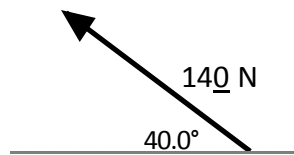
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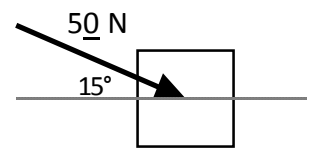


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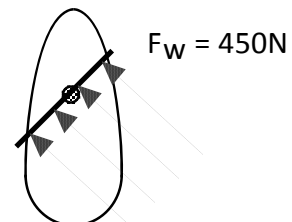
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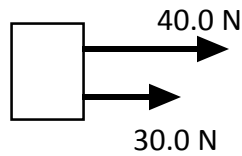
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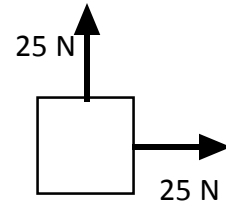
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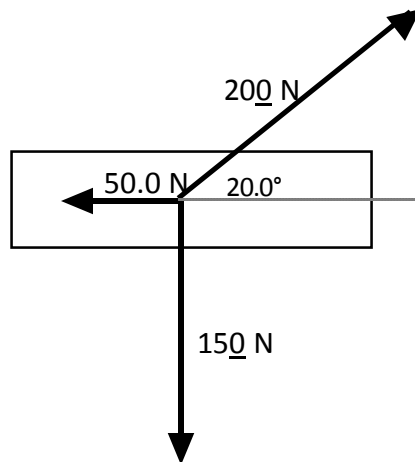
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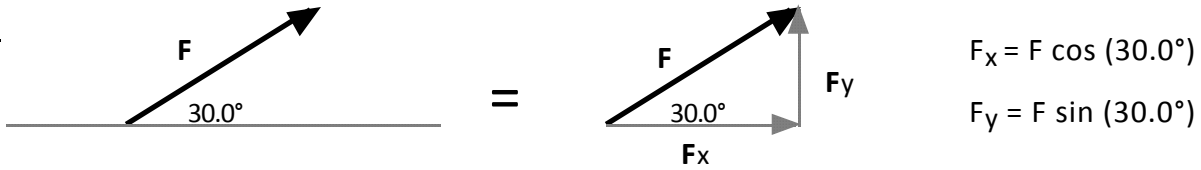


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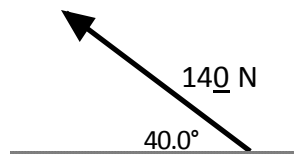
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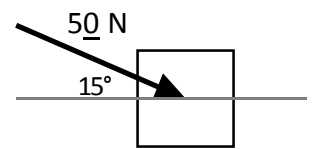


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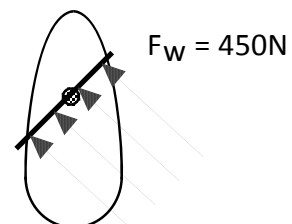
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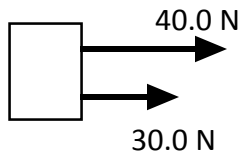
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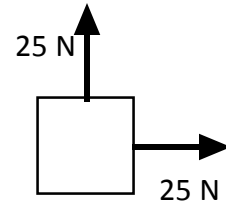
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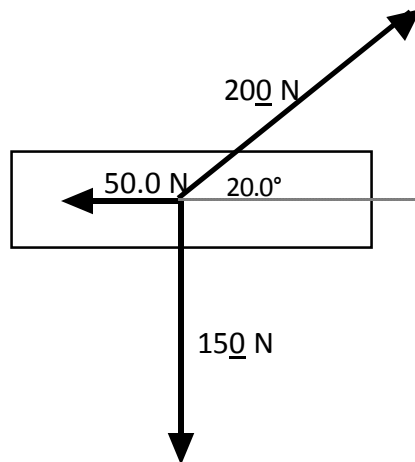
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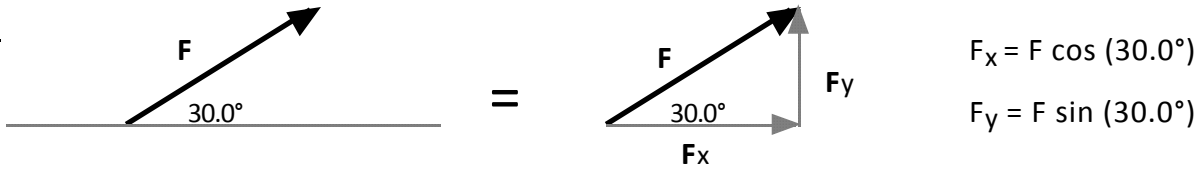


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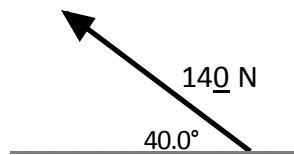
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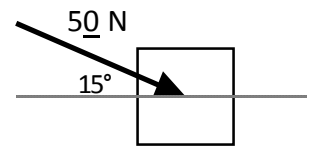


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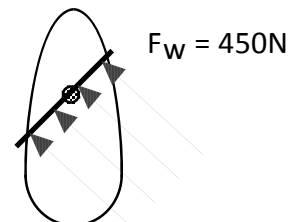
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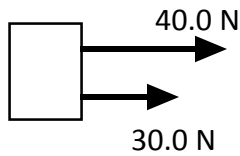
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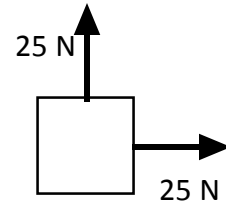
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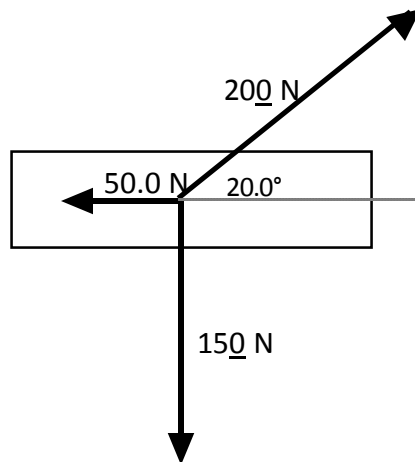
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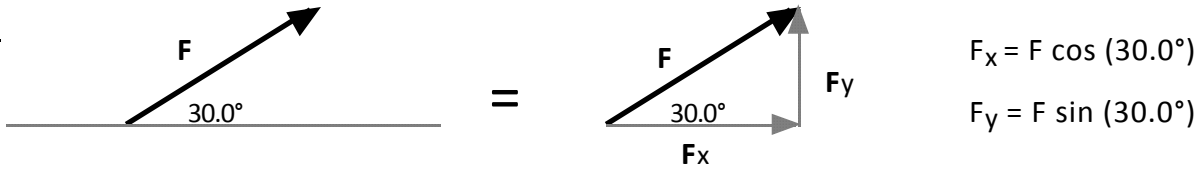


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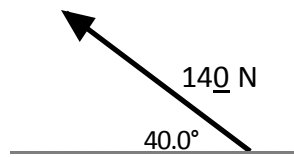
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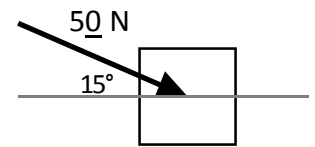


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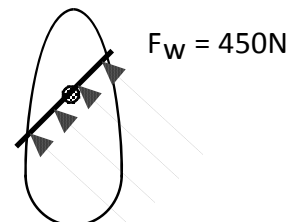
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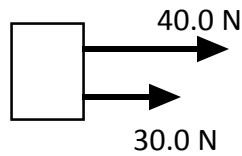
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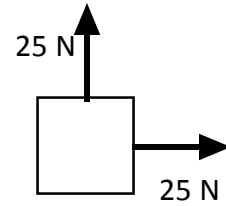
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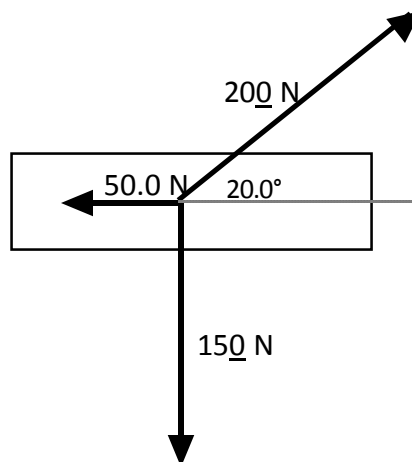
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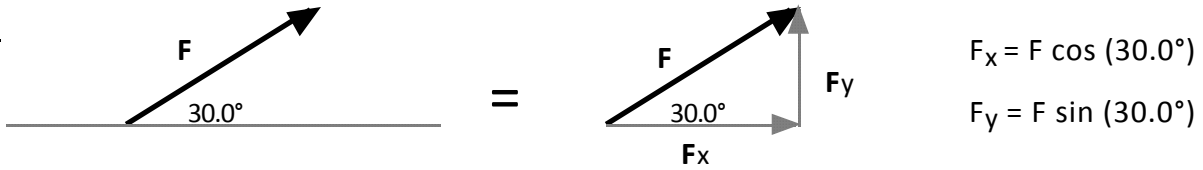


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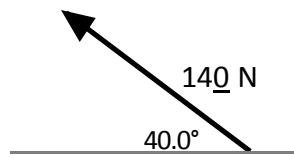
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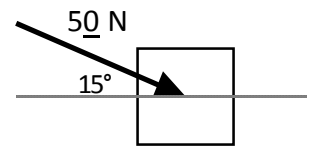


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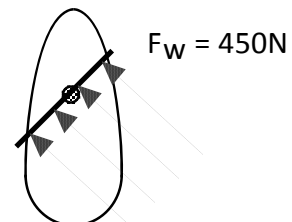
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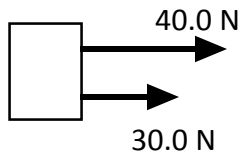
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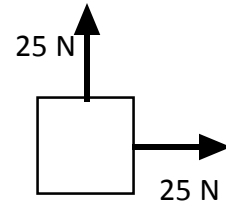
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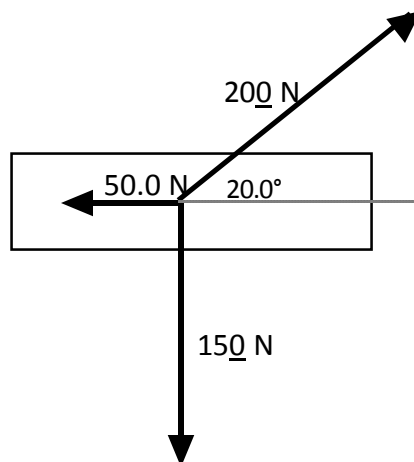
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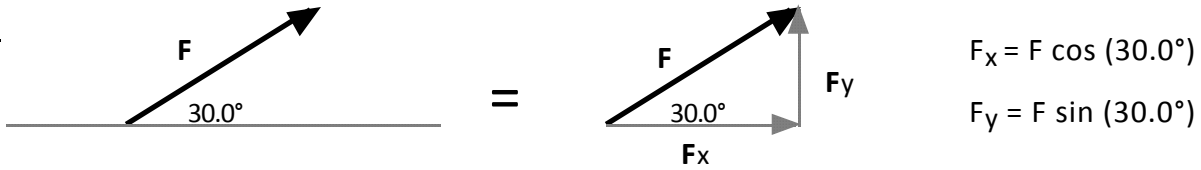


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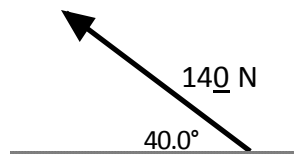
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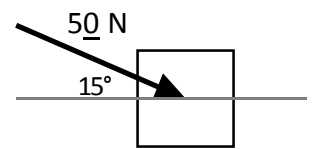


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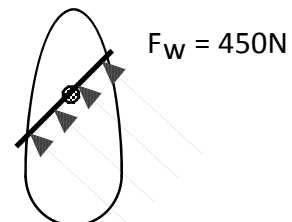
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(wind blows 45° north of west)



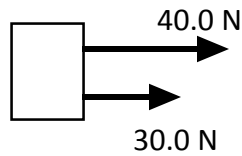
Worksheet - Combining & Resolving Forces

COMBINING FORCES

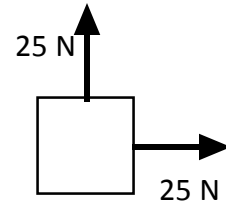
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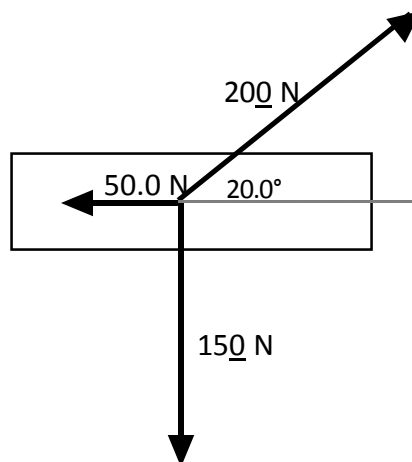
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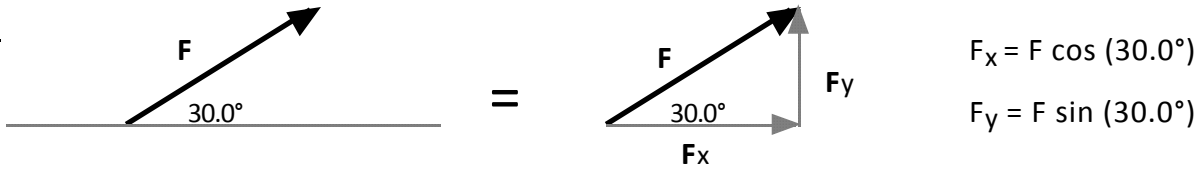


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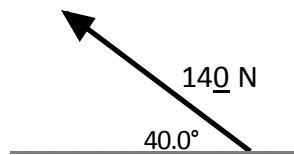
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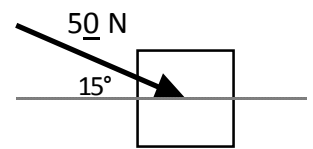


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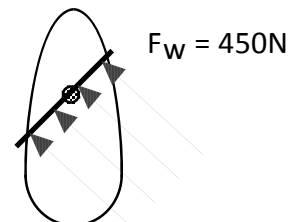
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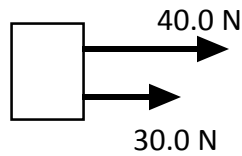
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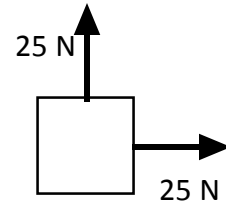
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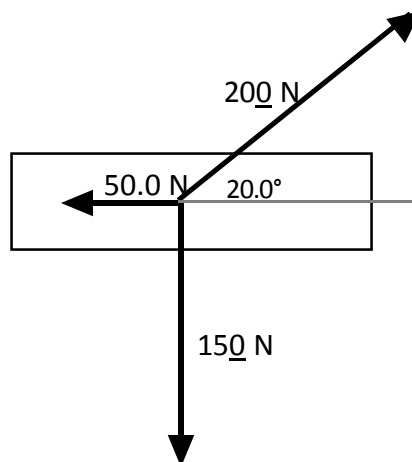
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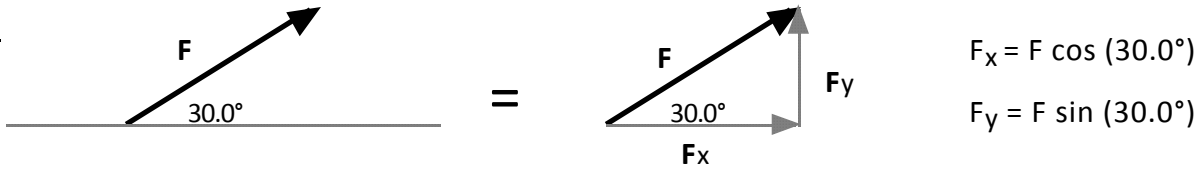


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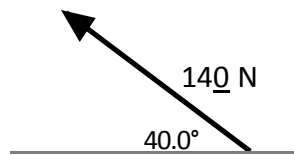
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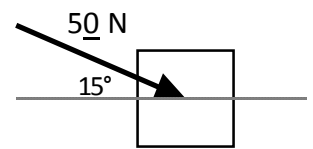


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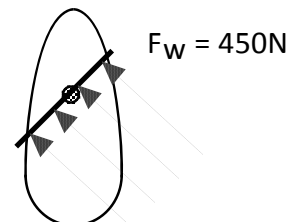
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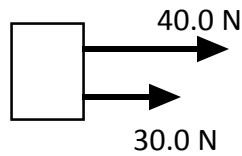
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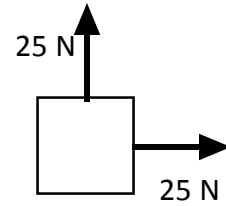
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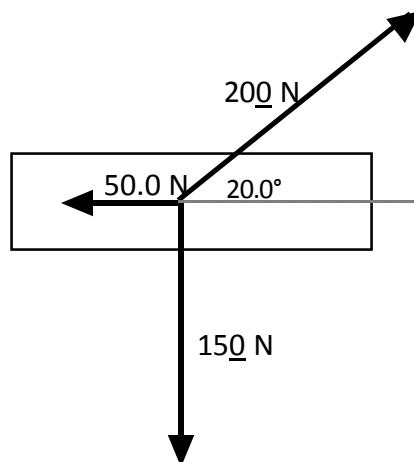
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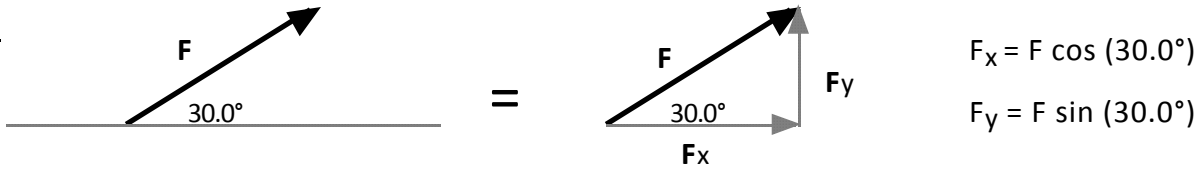


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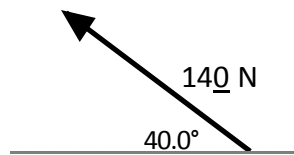
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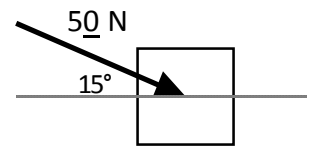


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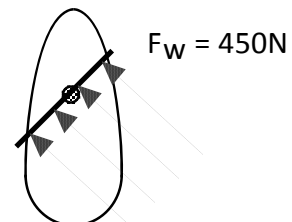
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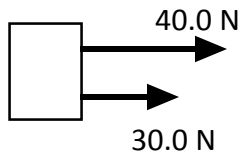
Worksheet - Combining & Resolving Forces

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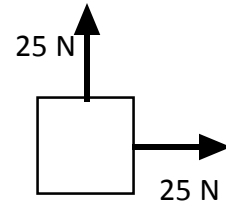
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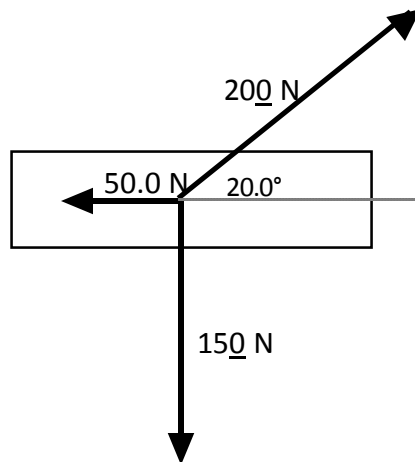
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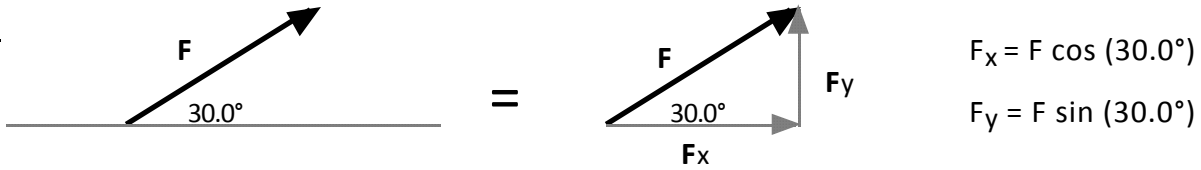


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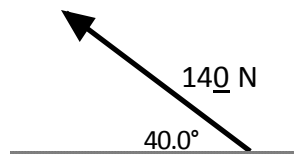
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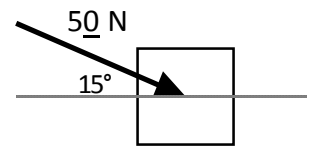


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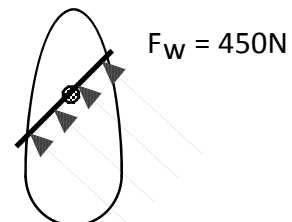
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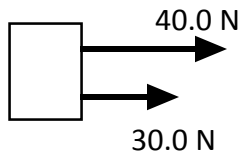
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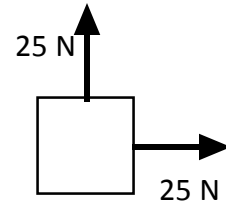
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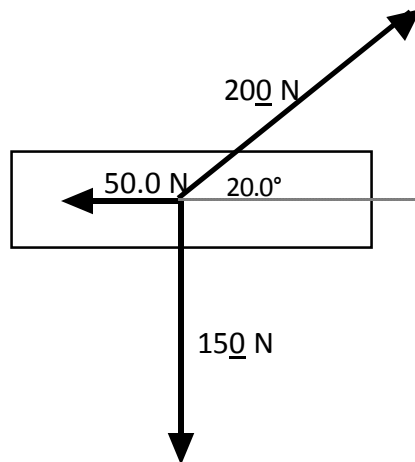
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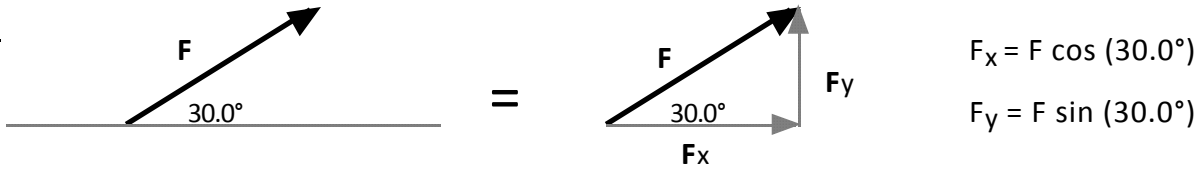


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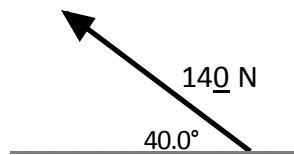
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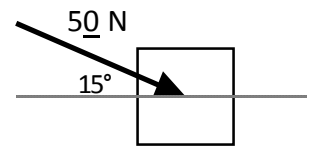


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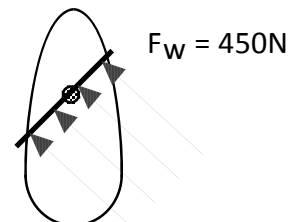
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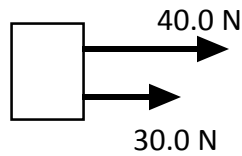
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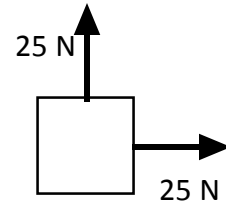
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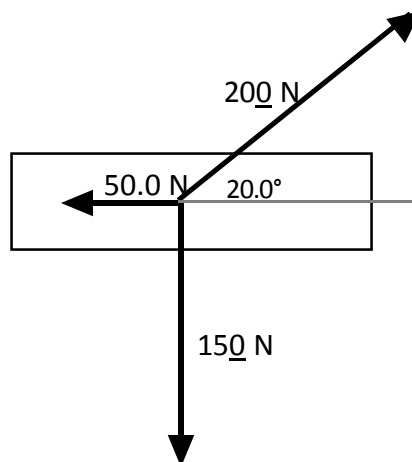
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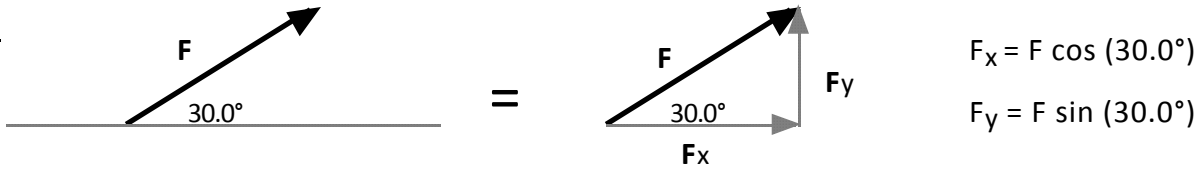


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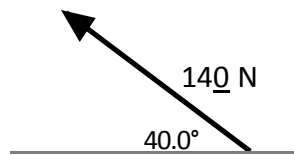
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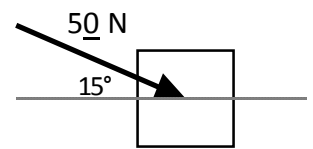


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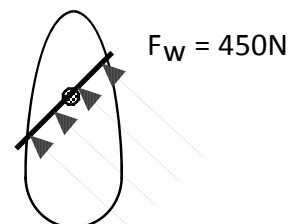
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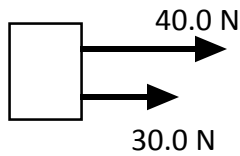
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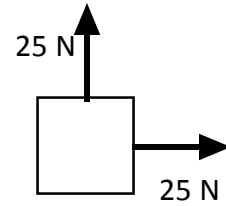
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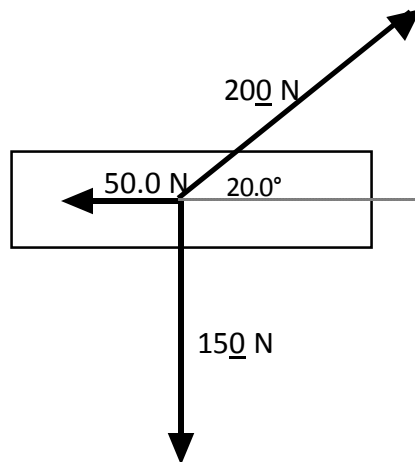
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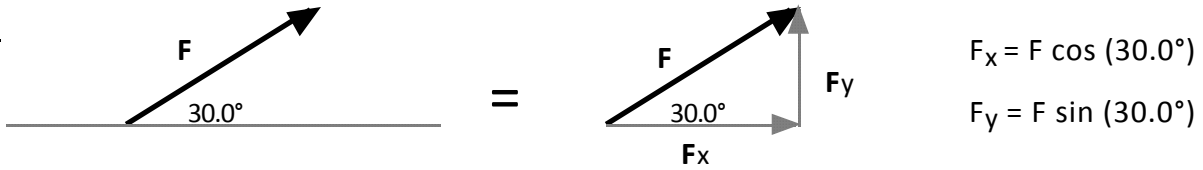


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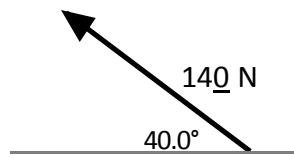
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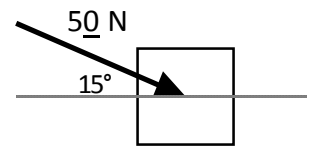


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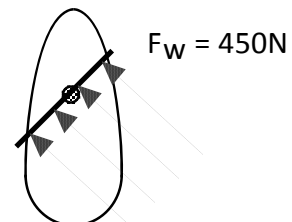
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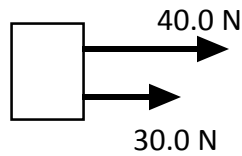
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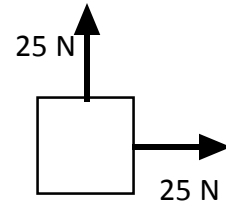
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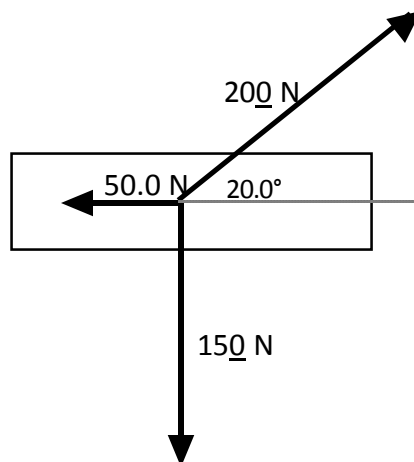
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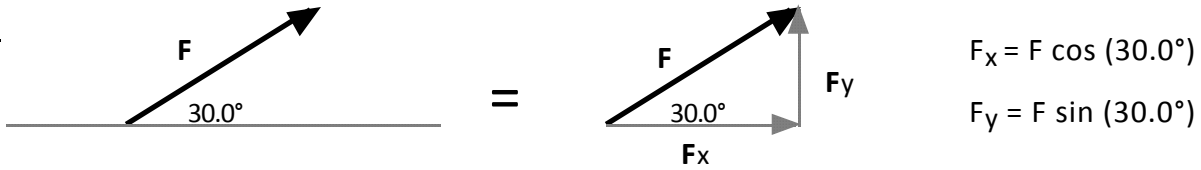


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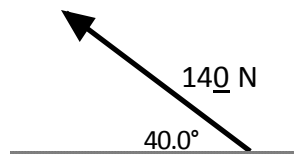
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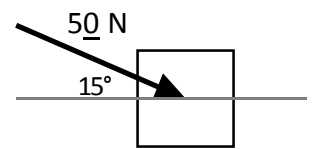


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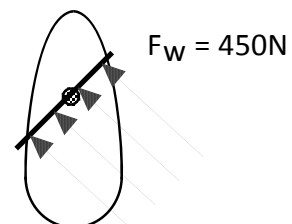
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(wind blows 45° north of west)



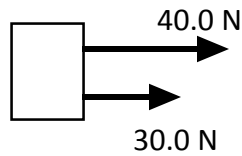
Worksheet - Combining & Resolving Forces

COMBINING FORCES

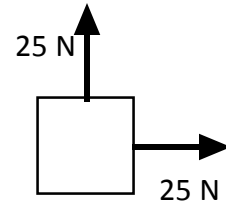
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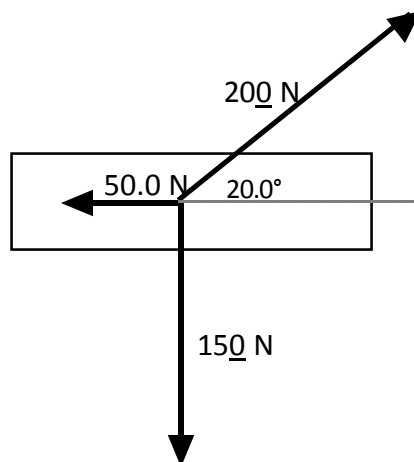
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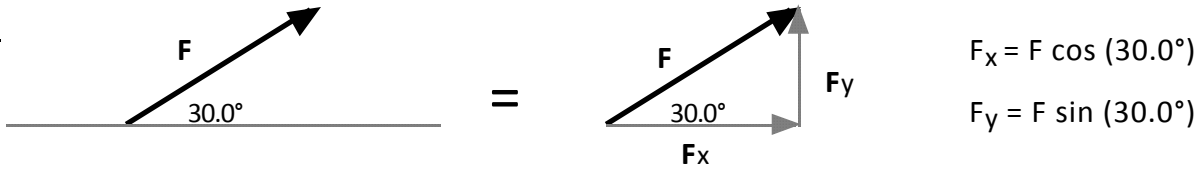


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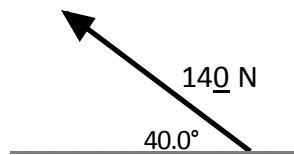
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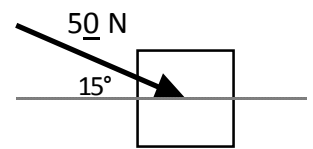


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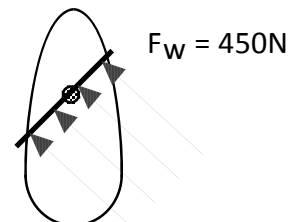
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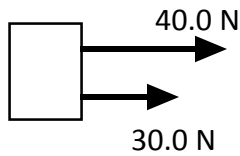
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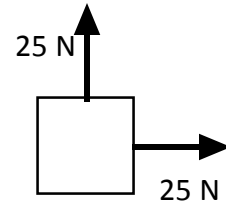
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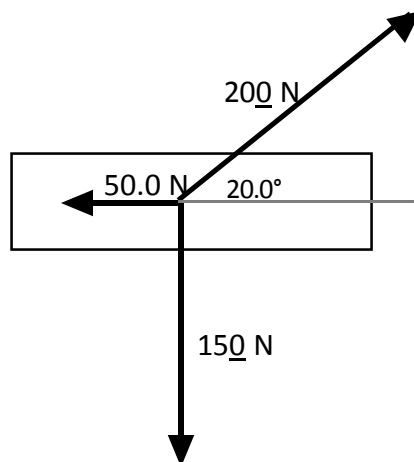
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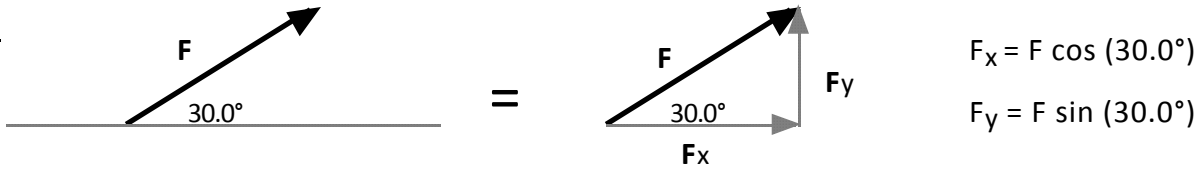


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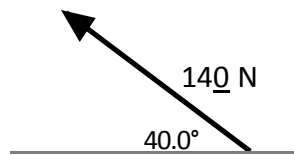
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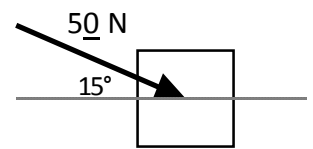


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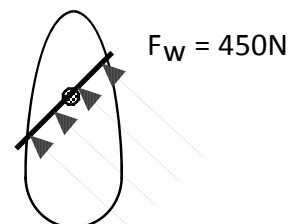
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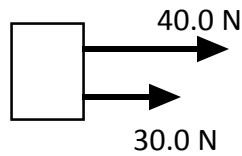
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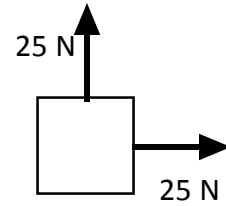
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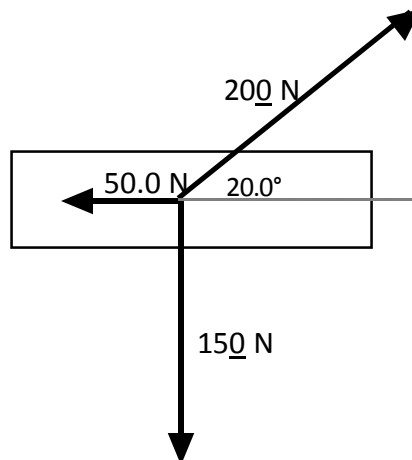
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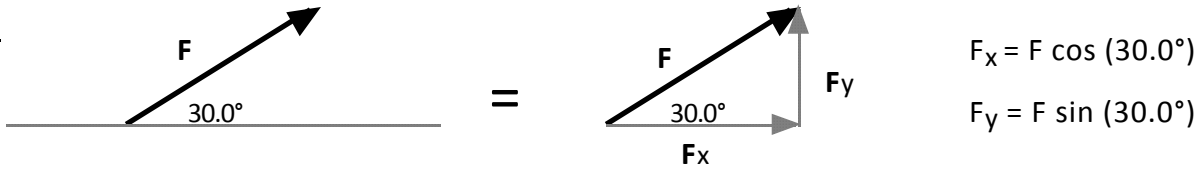


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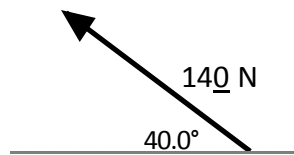
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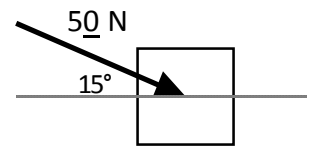


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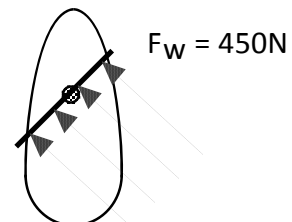
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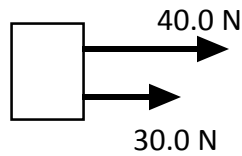
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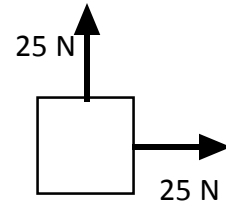
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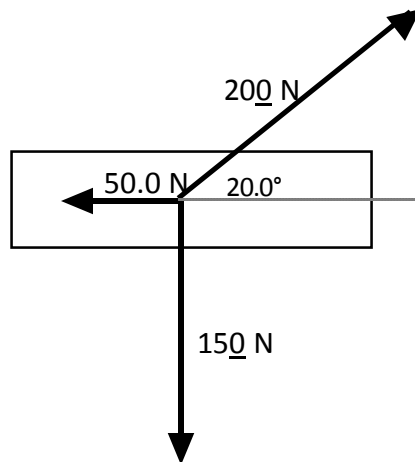
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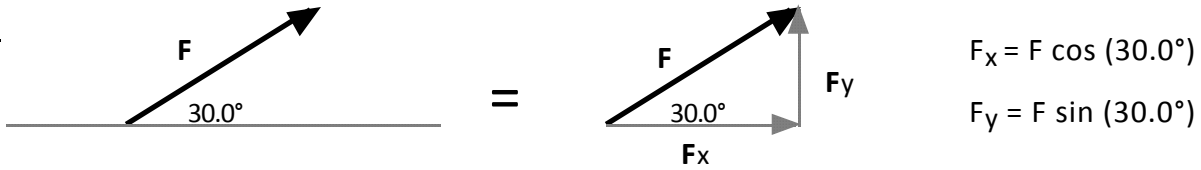


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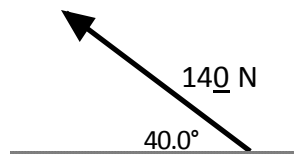
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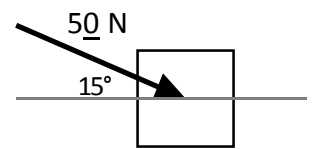


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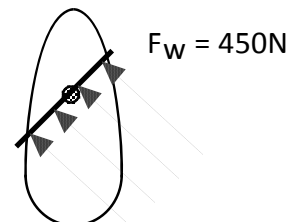
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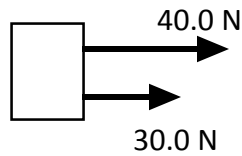
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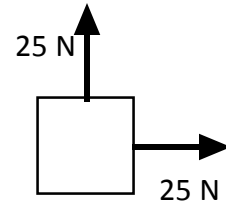
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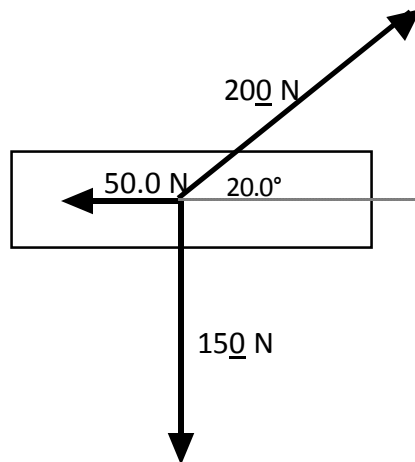
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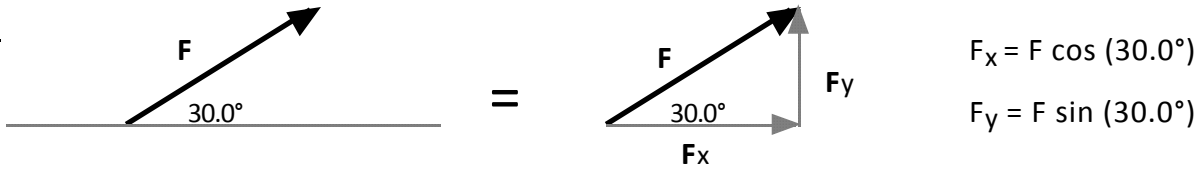


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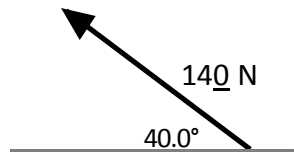
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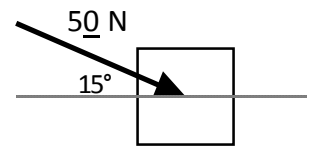


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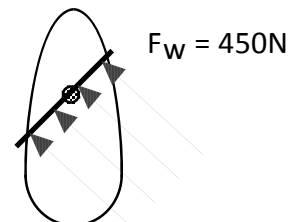
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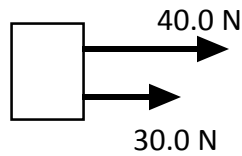
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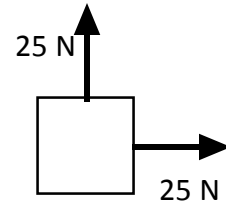
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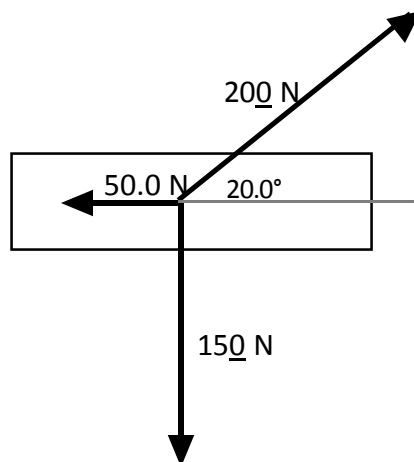
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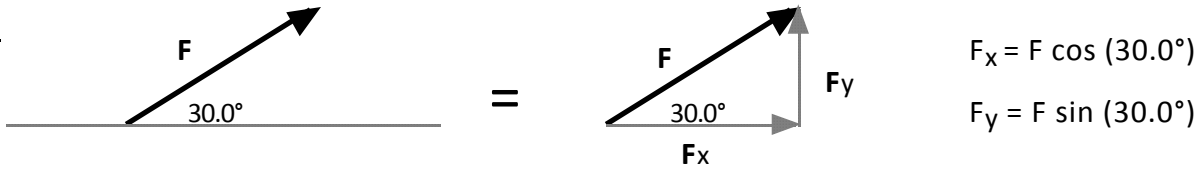


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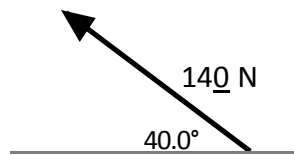
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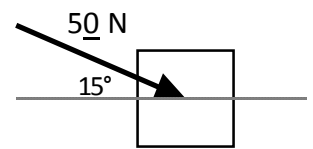


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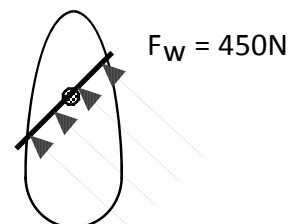
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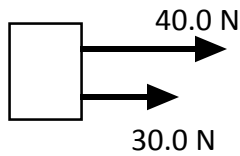
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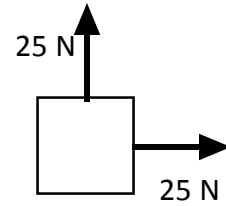
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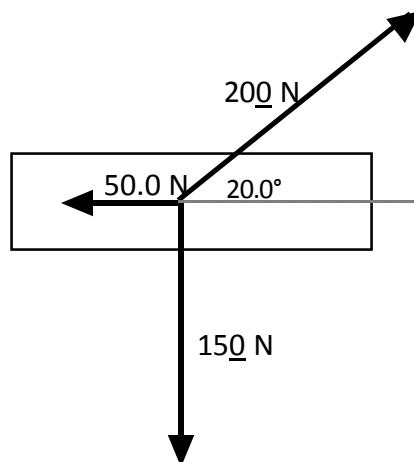
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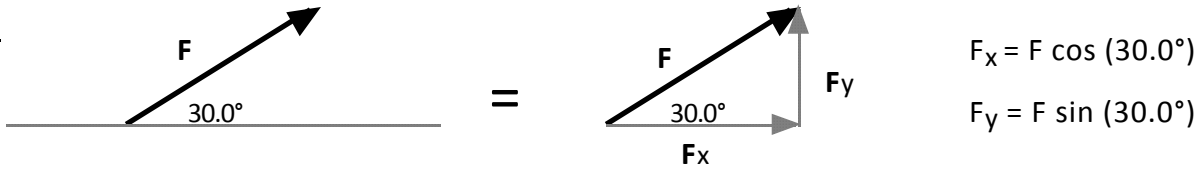


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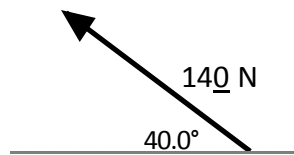
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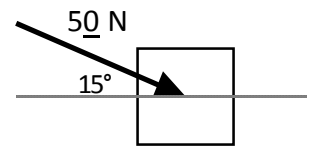


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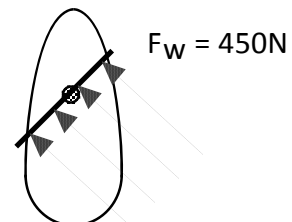
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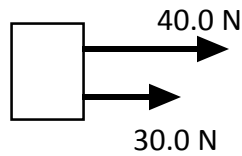
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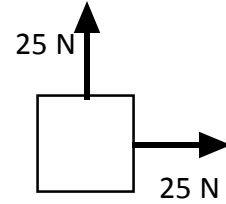
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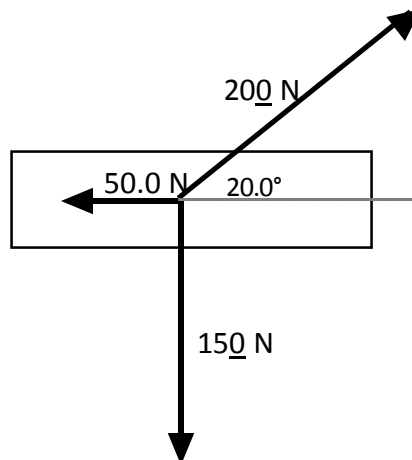
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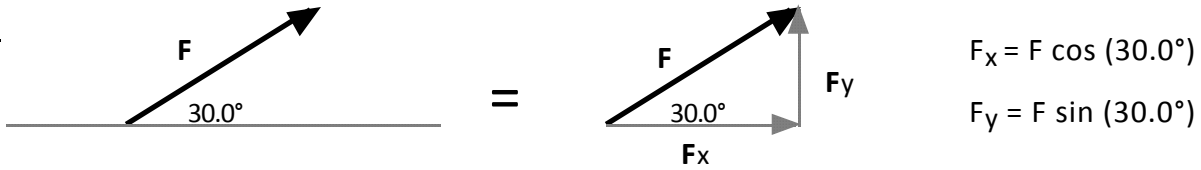


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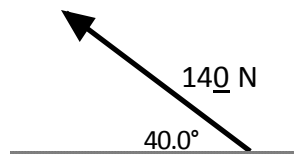
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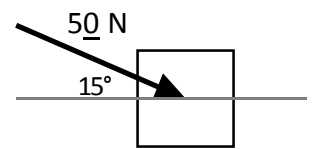


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1.)



2.)



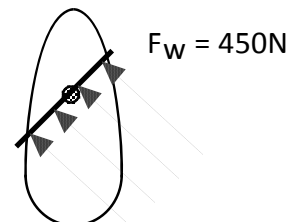
3.) The angle between components is always ? .

4.) A woman pushes on a lawn mower handle with a force of 80.0 N. If the handle makes an angle of 30.0° with the ground, find the vertical and horizontal components of the force.

5.) A car is parked on a 10.0° incline. If the weight of the car is 1250 lb (acting straight down), find the components of the weight perpendicular to the incline and parallel to the incline.

6.) The wind catches the sail of a sailboat as depicted in fig 1. Find the component of the wind that pushes the boat forward. Should the captain turn right or left 30° for more efficient use of the wind? If the mass of the boat is 1500 kg, find the forward acceleration of the boat.

(wind blows 45° north of west)



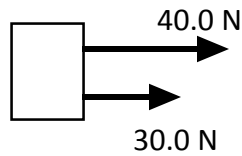
Worksheet - Combining & Resolving Forces

COMBINING FORCES

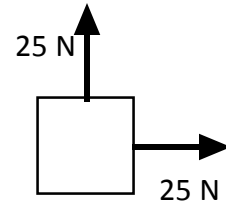
Remember that force is a *vector* quantity. This means that when more than one force act concurrently on an object then the *resultant* (net) force can be found by adding the vectors head to tail. For simplicity, we assume that the forces all act at the center of the object.

Find the resultant (net) force in the problems below:

1.)



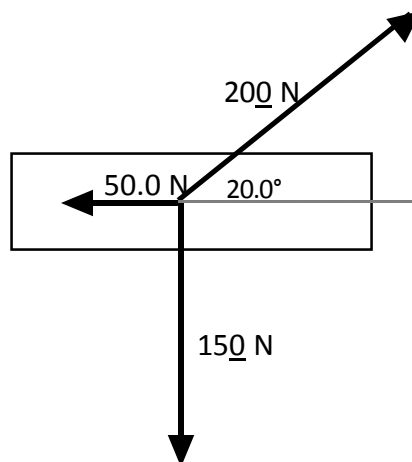
2.)



3.) 133 N west and 58 N north.

4.) 150 N south and 75 N @ 30.0° west of north.

5.)

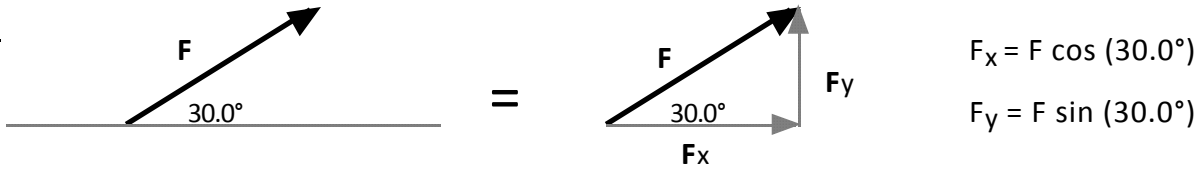


Hint: combining forces two at a time can make this easy.

RESOLUTION OF FORCES

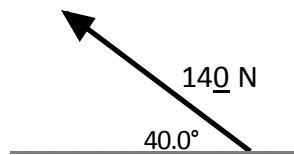
Recall, when vectors point in directions other than vertically or horizontally, you can use right triangle trigonometry to break the vector up into its horizontal and vertical components. This process is called *resolving forces into components*.

Ex:

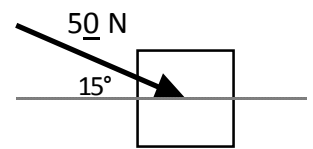


Resolve the forces into x and y components:

1.)



2.)



3.) The angle between components is always ?.

4.) A woman pushes on a lawn mower handle with a force of 80.0 N. If the handle makes an angle of 30.0° with the ground, find the vertical and horizontal components of the force.

5.) A car is parked on a 10.0° incline. If the weight of the car is 1250 lb (acting straight down), find the components of the weight perpendicular to the incline and parallel to the incline.

6.) The wind catches the sail of a sailboat as depicted in fig 1. Find the component of the wind that pushes the boat forward. Should the captain turn right or left 30° for more efficient use of the wind? If the mass of the boat is 1500 kg, find the forward acceleration of the boat.

(wind blows 45° north of west)

