

Activity 5.1a - Working with X and Y Components of Vectors

Purpose

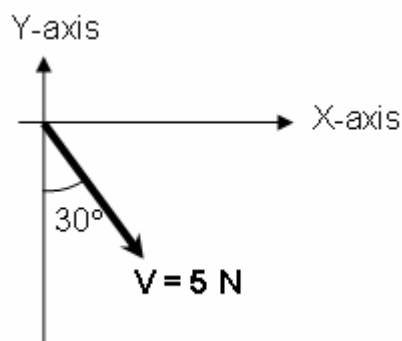
In order to be effective in design work it is necessary to be able to mathematically discover answers to questions. This exercise is designed to help you discover forces and what effect the angle that force is exerted from has on your design.

Equipment

Ruler
Calculator
Pencil and paper

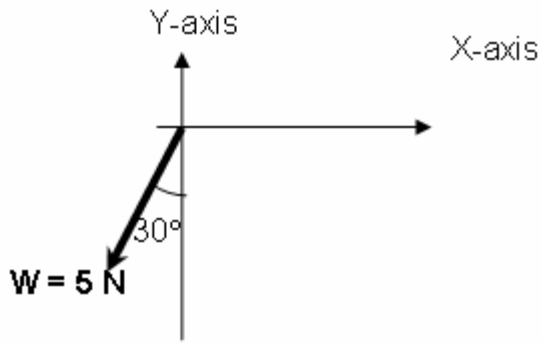
Procedure

1. Find the x and y components of vector V.



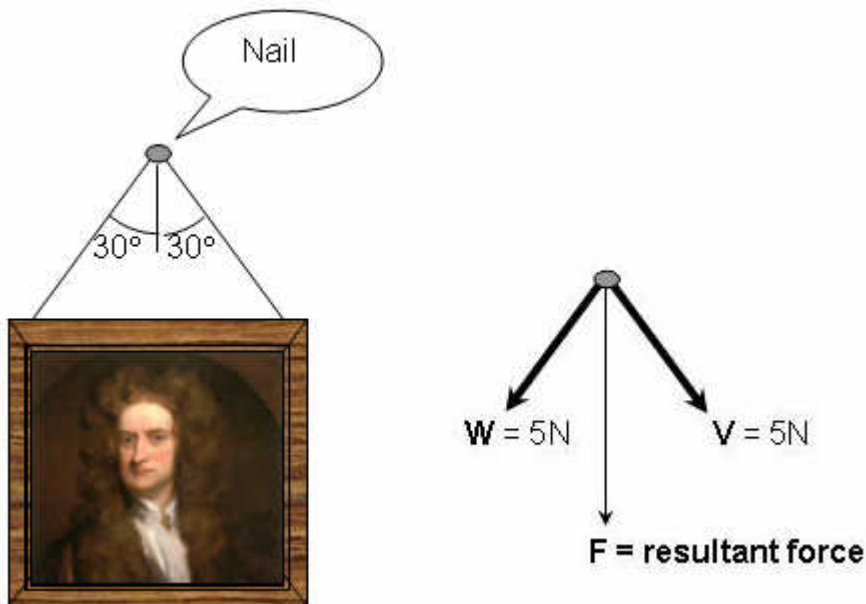
Solution hint: Think of the vector as pointing southeast. You will need to split it up into its y component (pointing south) and its x component (pointing east).

2. Find the x and y components of vector W. Can you predict the solution based on Problem 1?

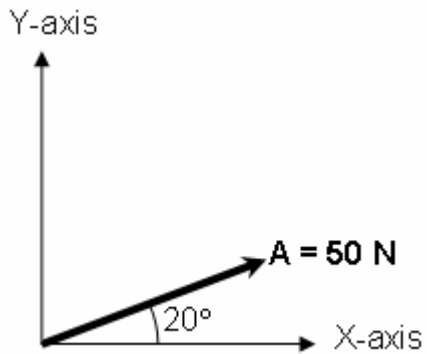


Solution hint: Think of the vector as pointing southwest. You need to split it up into its y component (pointing south, and its x component (pointing west).

3. This picture is hung from a nail with wire. The nail supports two forces $V = 5\text{N}$ and $W = 5\text{N}$. If the resultant of these forces acts vertically downwards, find its X and Y components (Using your solutions from Problems 1 and 2).

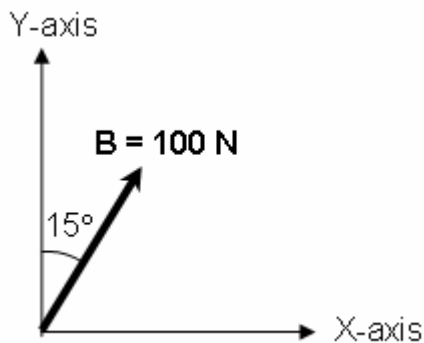


4. Find the x and y components of vector A.



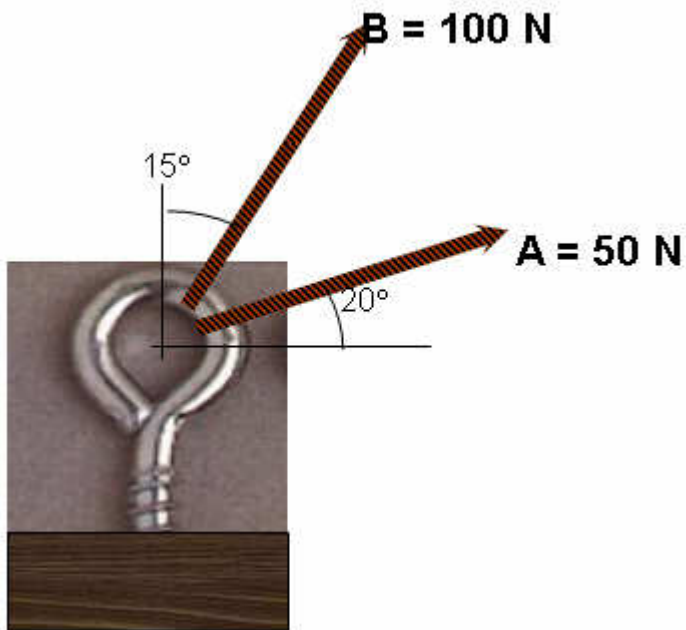
Solution hint: Think of the vector as pointing northeast. You need to split it up into the y component (pointing north, and the x component pointing east).

5. Find the x and y components of vector B.



Solution: Think of the vector as pointing northeast. You need to split it up into the y component (pointing north, and the x component pointing east).

6. Two ropes are attached to the screw eye hook in this picture. Rope B is being pulled with a force of 100N at an angle of 15 degrees to the y-axis. Rope A is being pulled with a force of 50 N at an angle of 20 degrees to the x-axis. Use your solutions from Problems 4 and 5 to find x and y components of the resultant force, F:



Conclusion

1. When you are opening a classroom door what are the forces acting on it and how are they balanced out so the door does not slam shut when released?

2. You have been asked to hang a mirror ball in the center of the gym, ten feet from the ceiling. There are beams that run across the gym but they are not centered. One beam is 10 feet off center in one direction and the other is 7 feet from the center. The mirror ball weighs 67 pounds. How long should each cable be and how much force should each one be able to hold?