Tutorial 1 - Printed test, Version 1
Student Name: _____
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1. Chapter 1, Practice Reading Question 1/05

A direction cosine is:

a. The cosine of the angle between a vector and a particular coordinate axis.

b. A unit vector that points in the direction of a vector.

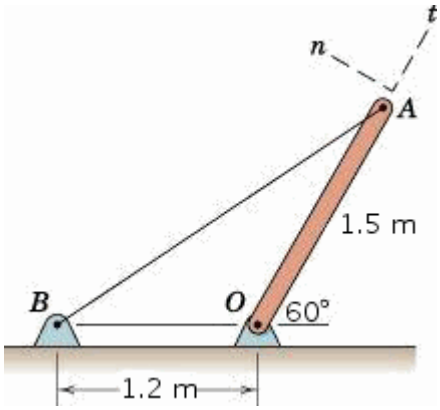
c. The cosine of the angle between a vector and the horizontal plane.

d. The magnitude of a vector.

Answer: _____

2. Chapter 2, Practice Problem 2/06

The cable *AB* prevents bar *OA* from rotating clockwise about the pivot *O*. If the cable tension is 750 N, determine the *n*- and *t*-components of this force acting on point *A* of the bar.

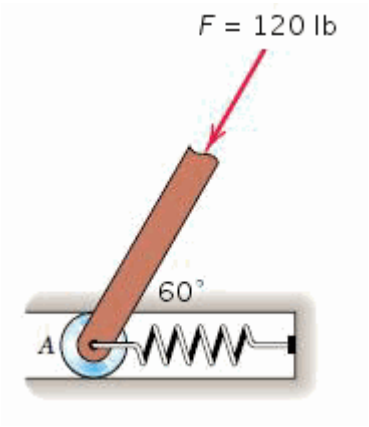


Answers:

T_n = [ ] *1 N
T_t = [ ] *2 N
*1 - *significant digits are disabled; notolerance*
*2 - *significant digits are disabled; notolerance*

3. Chapter 2, Problem 2/020

Determine the magnitude F_s of the tensile spring force in order that the resultant of **F***s* and **F** is a vertical force. Determine the magnitude *R* of this vertical resultant force.



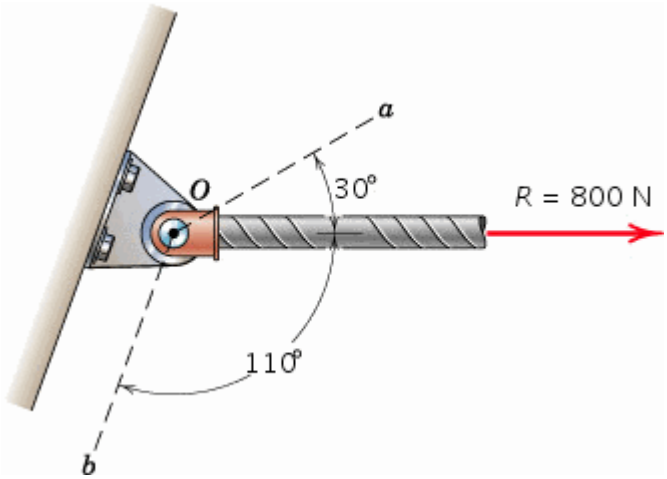
Answers:

F_s = [*1] lb
R = [*2] lb

*1 - significant digits are disabled; notolerance
*2 - significant digits are disabled; notolerance

4. Chapter 2, Problem 2/023 (video solution to similar problem attached)

Determine the scalar components R_a and R_b of the force **R** along the nonrectangular axes *a* and *b*. Also determine the orthogonal projection P_a of **R** onto axis *a*.



Answers:

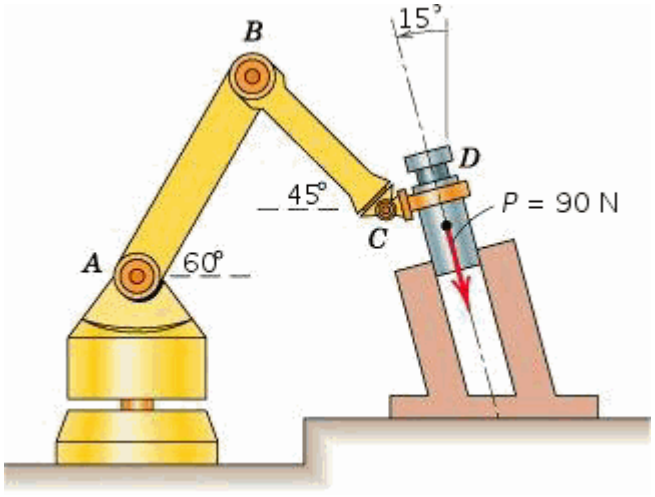
R_a = [*1] N
R_b = [*2] N
P_a = [*3] N

*1 - significant digits are disabled; notolerance
*2 - significant digits are disabled; notolerance
*3 - significant digits are disabled; notolerance

5. Chapter 2, Problem 2/029

In the design of the robot to insert the small cylindrical part into a close-fitting circular hole, the robot arm must exert a 90-N force *P* on the part parallel to the axis of the hole as shown. Determine the components of the force which the

part exerts *on* the robot along axes (*a*) parallel and perpendicular to the arm *AB*, and (*b*) parallel and perpendicular to the arm *BC*. The parallel direction is *t* and the perpendicular direction is *n*. Report your answers as positive numbers.



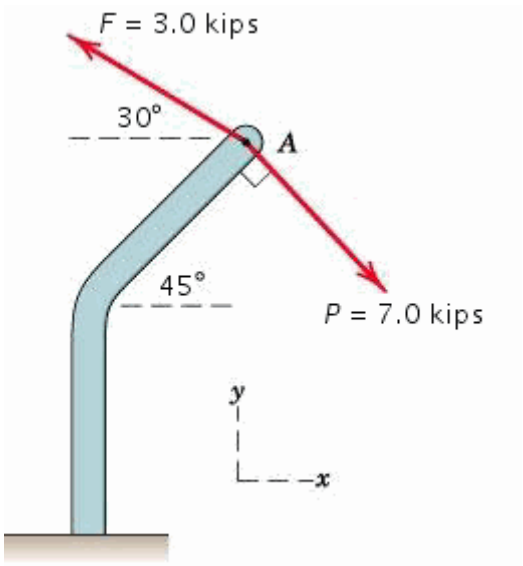
Answers:

(*a*) *AB*: P_t = [*1]N, P_n = [*2]N
(*b*) *BC*: P_t = [*3]N, P_n = [*4]N

*1 - *significant digits are disabled; notolerance*
*2 - *significant digits are disabled; notolerance*
*3 - *significant digits are disabled; notolerance*
*4 - *significant digits are disabled; notolerance*

6. Chapter 2, Supplemental Problem 2/03

The two forces shown act at point *A* of the bent bar. Determine the resultant **R** of the two forces.

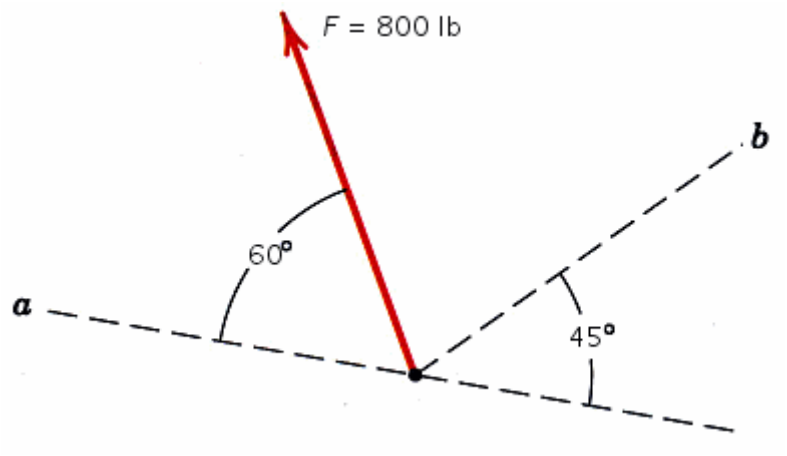


Answer: **R** = ([*1]**i** + [*2]**j**) kips

*1 - *significant digits are disabled; notolerance*
*2 - *significant digits are disabled; notolerance*

7. Chapter 2, Supplemental Problem 2/06 (detailed solution attached)

Determine the components of the 800-lb force **F** along the oblique axes *a* and *b*. Also, determine the projections of **F** onto the *a*- and *b*-axes.



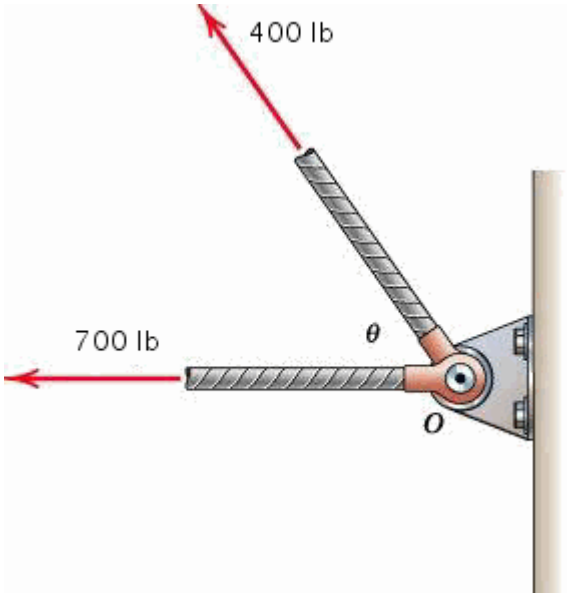
Answers:

Components:	F_a = [ ]*1 lb,	F_b = [ ]*2 lb
Projections:	P_a = [ ]*3 lb,	P_b = [ ]*4 lb

*1 - *significant digits are disabled; notolerance*
*2 - *significant digits are disabled; notolerance*
*3 - *significant digits are disabled; notolerance*
*4 - *significant digits are disabled; notolerance*

8. Chapter 2, Supplemental Problem 2/08

At what angle θ must the 400-lb force be applied in order that the resultant **R** of the two forces have a magnitude of 1000 lb? For this condition what will be the angleβ between **R** and the horizontal?



Answers:

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θ = [*1]°
β = [*2]°

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