

# ANDES: Intro Slide Show

For those of us who cannot seem to get the help menus to work yet. Here it is, with additional notes by SKJulin

## A typical problem

A model airplane hangs from two strings S1 and S2 which are attached to the ceiling. S1 is inclined at 45 deg below horizontal and S2 is inclined 60 deg below the horizontal, they are tied to a third string which hangs straight down, from which the airplane hangs at rest. If the tension in S1 is 50.0 N find the tension in S2 and the mass  $m$ , of the airplane.

# Sketch a representation.

- Identify the system.
- Identify the object of interest.
- Identify the interactions, and the interactions of interest.
- The *ANDES workbench and tutor will interactively allow you to improve your problem solving while you practice*. Unlike a piece of paper... no interaction until given the correct answer to compare yours to.

# First a screen shot of a problem

- **red** color means this is not the ANDES logical step. Interpret as “wrong” but not necessarily as wholly wrong, since each step has a lot of the thinker involved in it.
- Correct is **green**; means ANDES logic is following your logic.

## Andes3 Workbench

s5a Physics

Submit

A model airplane hangs from two strings S1 and S2 which are attached to the ceiling. String S1 is inclined at 45.0 deg, and string S2 is inclined at 60.0 deg, as shown in the figure below.

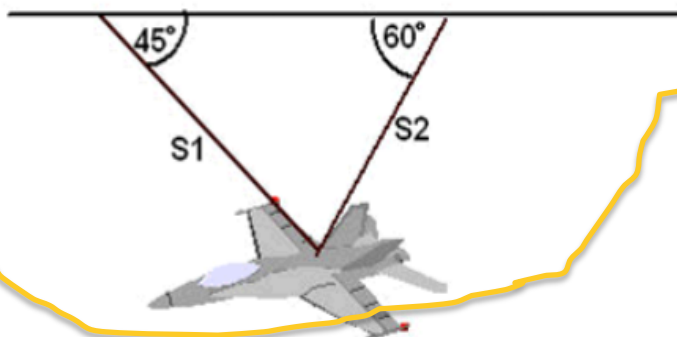
If the tension in string S1 is 50.0 N,

a) find the tension in string S2.

Answer:

b) find the mass of the airplane.

Answer:



$g$  is the acceleration of gravity on earth

$g = 9.8 \text{ m/s}^2$

Some given facts

The problem

Help

Score: 0%

If you need help, click the help button ? below. Click the button above to hide this window.

Define time T0

?

# Andes3 Workbench

s5a Physics Submit

A model airplane hangs from two strings S1 and S2 which are attached to a horizontal bar. String S1 is inclined at 45.0 degrees and string S2 is inclined at 45.0 degrees, as shown in the figure below.

If the tension in string S1 is 100 N, find the tension in string S2.

Answer:

Find the mass of the airplane.

Answer:

Define time T0

$g$  is the acceleration of gravity on earth  
 $g = 9.8 \text{ m/s}^2$

body tool

text entry tool

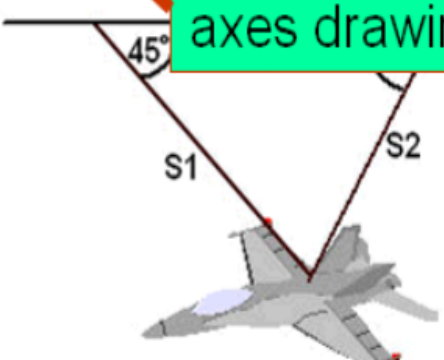
equation entry tool

vector variable entry tool

axes drawing tool

Help Score: 0%

If you need help, click the help button ? below. Click the button above to hide this window.



## Drawing a coordinate axis

s5a Physics Submit

A model airplane hangs from two strings S1 and S2 which are attached to the ceiling. String S1 is inclined at 45.0 deg, and string S2 is inclined at 60.0 deg, as shown in the figure below.

If the tension in string S1 is 50.0 N,

a) find the tension in string S2.

Answer:

b) find the mass of the airplane.

Answer:

Define time T0.

$g$  is the acceleration of gravity on earth  
 $g=9.8 \text{ m/s}^2$

airplane

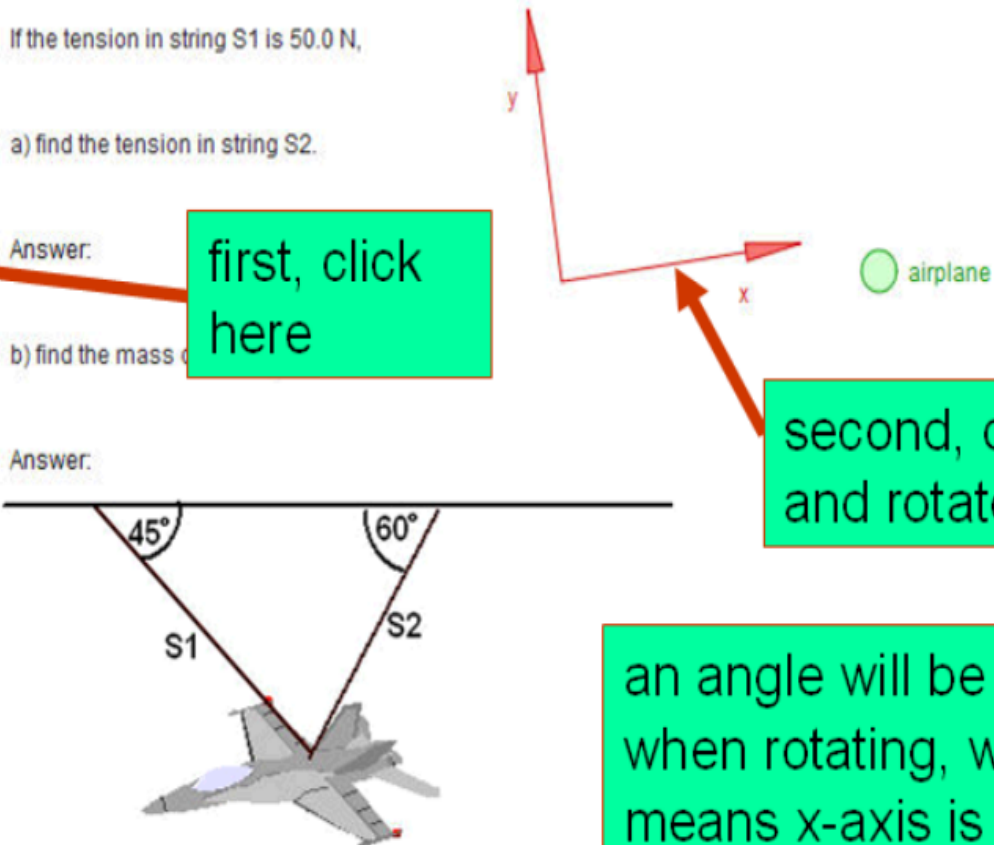
first, click here

second, drag out and rotate the axes

an angle will be shown when rotating, where 0 means x-axis is horizontal

Help Score: 13%

If you need help, click the help button ? below. Click the button above to hide this window.



## Drawing a coordinate axis

s5a Physics Submit

A model airplane hangs from two strings S1 and S2 which are attached to the ceiling. String S1 is inclined at 45.0 deg, and string S2 is inclined at 60.0 deg, as shown in the figure below.

If the tension in string S1 is 50.0 N,

a) find the tension in string S2.

Answer:

b) find the mass of the airplane.

Answer:

Define time T0.

$g$  is the acceleration of gravity on earth  
 $g = 9.8 \text{ m/s}^2$

airplane

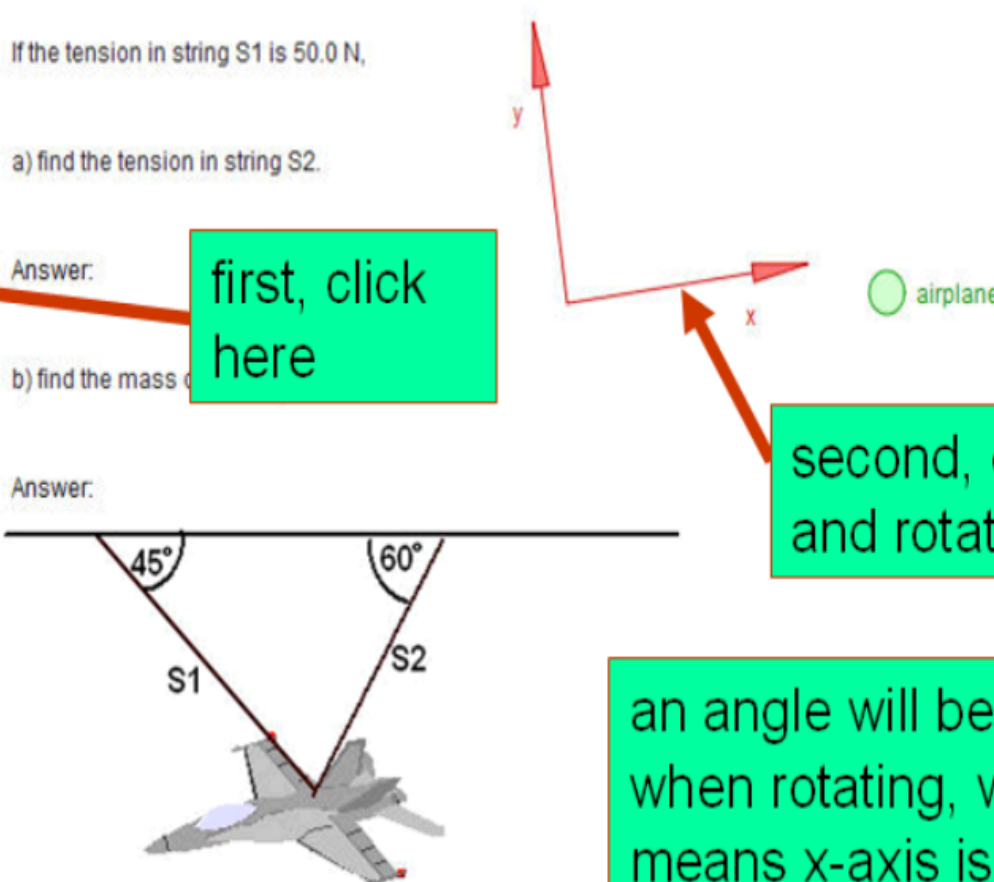
first, click here

second, drag out and rotate the axes

an angle will be shown when rotating, where 0 means x-axis is horizontal

Help Score: 13%

If you need help, click the help button ? below. Click the button above to hide this window.





# Drawing a vector

s5a Physics Submit

A model airplane hangs from two strings S1 and S2 which are attached to the ceiling. String S1 is inclined at 45.0 deg, and string S2 is inclined at 60.0 deg, as shown in the figure below.

If the tension in string S1 is 50.0 N,

a) find the tension in string S2.  
Answer:

b) find the mass of the airplane.  
Answer:

g is the acceleration of gravity on earth  
 $g = 9.8 \text{ m/s}^2$

third, enter the name of the vector and press enter

first, click here

second, drag out the vector in the proper direction

airplane

$F_w$  = weight force on the airplane

100%

?

## Defining a scalar variable

s5a Physics Submit

A model airplane hangs from two strings S1 and S2 which are attached to the ceiling. String S1 is inclined at 45.0 deg, and string S2 is inclined at 60.0 deg, as shown in the figure below.

first, click here

a) find the tension in string S2.

Answer:

b) find the mass of the airplane.

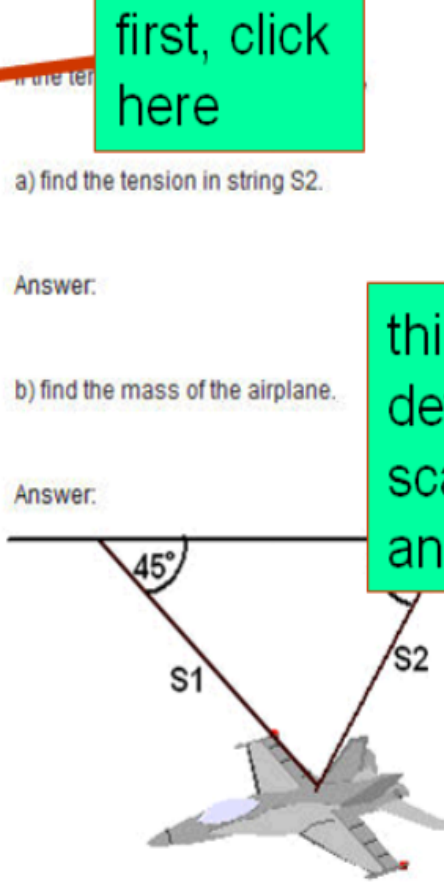
Answer:

g is the acceleration of gravity on earth  
 $g=9.8 \text{ m/s}^2$   
Fw=weight force on the airplane

m=mass of the airplane

second, drag out a dialog box

third, enter a definition of the scalar variable and press enter



Help Score: 24%

If you need help, click the help button ? below. Click the button above to hide this window.

## Entering an equation

s5a Physics Submit

A model airplane hangs from two strings S1 and S2 which are attached to the ceiling. String S1 is inclined at 45.0 deg, and string S2 is inclined at 60.0 deg, as shown in the figure below.

If the tension in string S1 is 50.0 N,

a) find the weight of the airplane.

Answer:

b) find the mass of the airplane.

Answer:

**first, click here**

**second, drag out a box**

**third, enter the equation and press enter**

$F_w$

$F_1 = 50.0 \text{ N}$

$F_1$

$F_2$

airplane

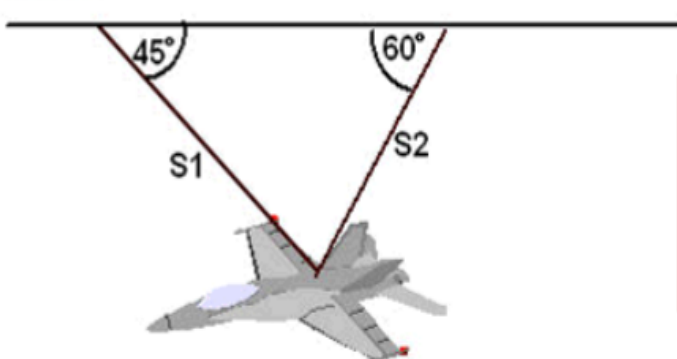
$F_w$

$F_w_y + F_1_y + F_2_y = 0$

$g$  is the acceleration of gravity on earth  
 $g = 9.8 \text{ m/s}^2$   
 $F_w$  = weight force on the airplane  
 $m$  = mass of the airplane  
 $F_1$  = force on the airplane due to S1  
 $F_2$  = force on the airplane due to S2

Help Score: 39%

If you need help, click the help button ? below. Click the button above to hide this window.



Andes3 is like power-point, but gives correct (green) vs. incorrect (red) feedback

s5a Physics Submit

A model airplane hangs from two strings S1 and S2 which are attached to the ceiling. String S1 is inclined at 45.0 deg, and string S2 is inclined at 60.0 deg, as shown in the figure below.

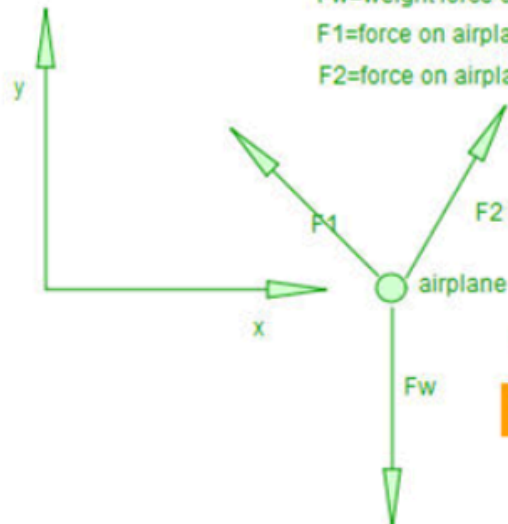
If the tension in string S1 is 50.0 N,

a) find the tension in string S2.

Answer:

b) find the mass of the airplane.

Answer:



g is the acceleration of gravity on earth  
 $g = 9.8 \text{ m/s}^2$   
 m = mass of the airplane  
 $F_w$  = weight force on the airplane  
 $F_1$  = force on airplane due to S1  
 $F_2$  = force on airplane due to S2

$F_1 = 50 \text{ N}$   
 $F_w = m \cdot g$

$F_{w_x} + F_{1_x} + F_{2_x} = 0$   
 $F_{w_y} + F_{1_y} - F_{2_y} = 0$

Define time T0

Help Score: 57%

If you need help, click the help button ? below. Click the button above to hide this window.

Check your signs.

[Explain more](#)

Perhaps the sign of the  $F_{2_y}$  term should be changed.

Click here for "what's wrong" and "next step help"

?

00:04 / 01:51

# Telling Andes to solve your equations

s5a Physics Submit

A model airplane hangs from two strings S1 and S2 which are attached to the ceiling. String S1 is inclined at 45.0 deg, and string S2 is inclined at 60.0 deg, as shown in the figure below.

If the **second, click here**

a) find the tension in string S2

Answer:

b) find the mass of the airplane

Answer:

**first, enter all equations required to solve for a variable**

**third, enter variable to be solve for and press enter**

$g$  is the acceleration of gravity on earth  
 $g=9.8 \text{ m/s}^2$   
 $F_w$ =weight force on the airplane  
 $F_1$ =force on the airplane due to S1  
 $F_2$ =force on the airplane due to S2  
 $m$ =mass of the airplane

$F_w_x + F_1_x + F_2_x = 0$   
 $F_w_y + F_1_y + F_2_y = 0$   
 $F_w = m \cdot g$   
 $F_1 = 50 \text{ N}$   
 $F_w_x = 0$   
 $F_w_y = -F_w$   
 $F_1_y = F_1 \cdot \sin(\theta_{F1})$   
 $F_2_y = F_2 \cdot \sin(\theta_{F2})$   
 $F_2_x = F_2 \cdot \cos(\theta_{F2})$

$F_2 = ?$

Define time T0.

Help Score: 74%

If you need help, click the help button ? below. Click the button above to hide this window.



## Entering answers and submitting your solutions

s5a Physics

A model airplane hangs from two strings S1 and S2 which are attached to the ceiling. String S1 is inclined at 45.0 deg, and string S2 is inclined at 60.0 deg, as shown in the figure below.

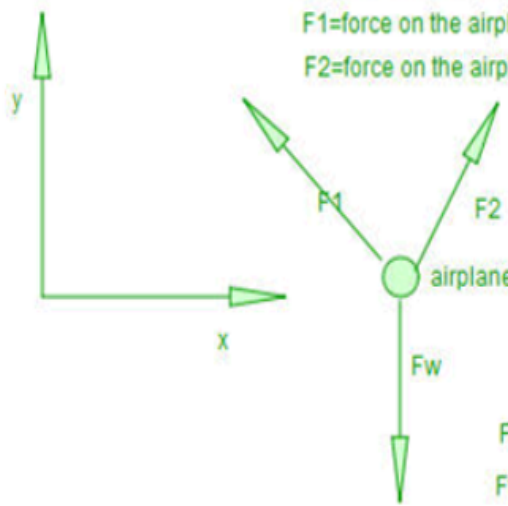
If the tension in string S1 is 50.0 N,

a) find the tension in string S2.

Answer:  $F_2 = 70.7 \text{ N}$

b) find the mass of the airplane.

Answer:  $m = 9.86 \text{ kg}$



$g$  is the acceleration of gravity on earth  
 $g = 9.8 \text{ m/s}^2$   
 $F_w$  = weight force on the airplane  
 $F_1$  = force on the airplane due to S1  
 $F_2$  = force on the airplane due to S2  
 $m$  = mass of the airplane

$F_w_x + F_1_x + F_2_x = 0$   
 $F_w_y + F_1_y + F_2_y = 0$   
 $F_w = m \cdot g$   
 $F_1 = 50 \text{ N}$   
 $F_w_x = 0$   
 $F_w_y = -F_w$   
 $F_1_x = F_1 \cdot \cos(\text{theta}F_1)$   
 $F_1_y = F_1 \cdot \sin(\text{theta}F_1)$   
 $F_2_x = F_2 \cdot \cos(\text{theta}F_2)$   
 $F_2_y = F_2 \cdot \sin(\text{theta}F_2)$   
 $F_2 = 70.7106781186548 \text{ N}$   
 $m = 9.856385982541514 \text{ kg}$

Define time To

Submit

Help Score: 89%

If you need help, click the help button ? below. Click the button above to hide this window.

second, click here to submit your solution

first, double click on "answer", enter answer to 3 places, press enter.



