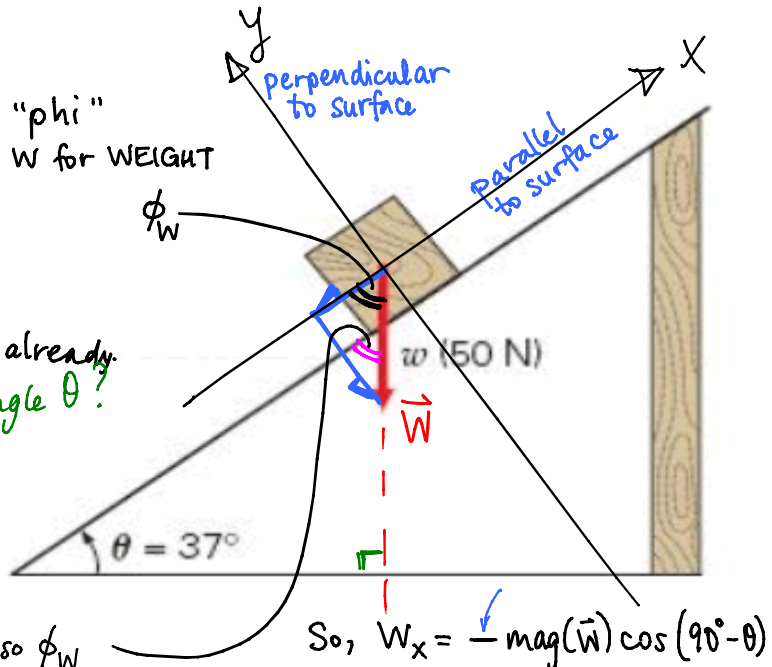
36. •• A block weighing 50 N rests on an inclined plane. Its weight is a force directed vertically downward, as illustrated in ▼Fig. 3.30. Find the components of the force parallel to the surface of the plane and perpendicular to it.

This is important for Ch 4.



Method 1: Ok... but method 2 is better.

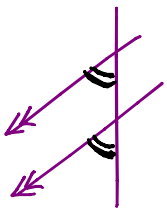
Form a right-triangle with the x-axis.

Find the angle with the x-axis.

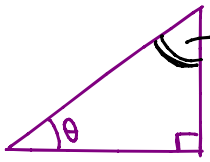
Do not call it θ, the name has been taken already.

How is that angle ϕ_W related to the incline's angle θ?

Do some geometry...



TWO PARALLEL LINES cut by another line
corresponding angles are congruent (equal in size) so, also ϕ_W



In a RIGHT TRIANGLE, the acute angles add up to 90°

so, $\theta + \phi_W = 90°$

or $\phi_W = 90° - \theta = 53°$

So, $W_x = -\text{mag}(\vec{W}) \cos(90° - \theta)$

$= -\text{mag}(\vec{W}) \cos 53°$

Sign error

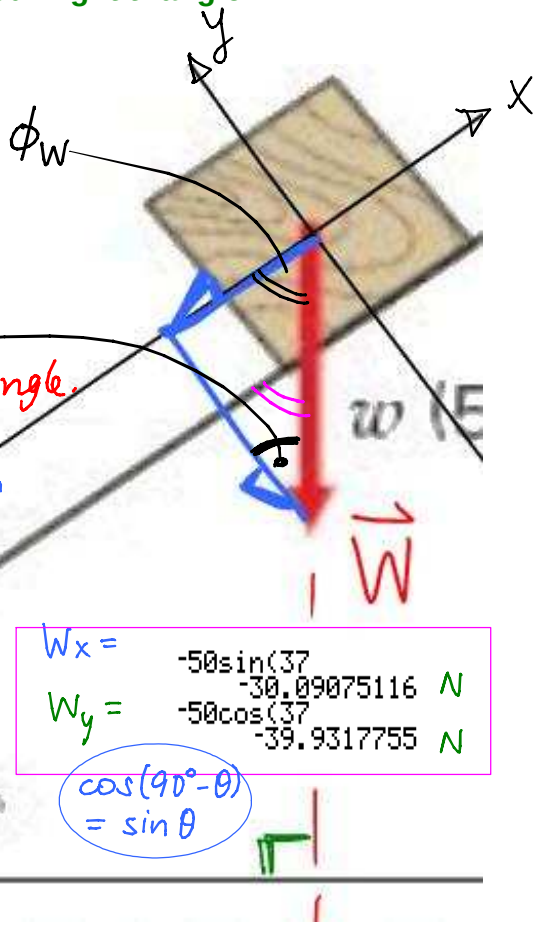
$W_y = -\text{mag}(\vec{W}) \sin(90° - \theta)$

$= -\text{mag}(\vec{W}) \sin 53°$

```
-50cos(53
    -30.09075116 N
-50sin(53
    -39.9317755 N
```

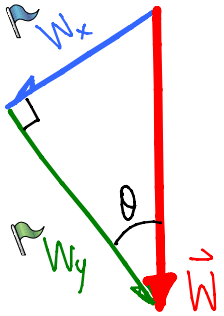
Method 2: Is the incline's angle θ equal to one of the angles in our right triangle?

It could be a little cluttered there.
Redraw a Layer version for clarity



This angle is $90° - \phi_W = 90° - (90° - \theta) = \theta$.

So, it is better to use that angle in our triangle.
But note



$\sin\theta = \frac{\text{OPP TO } \theta}{\text{HYP}} = \frac{W_x}{\text{mag}(\vec{W})}$ look at that again

$\cos\theta = \frac{\text{ADJ TO } \theta}{\text{HYP}} = \frac{W_y}{\text{mag}(\vec{W})}$ look at that again

cosine goes with adjacent
say it again

$W_x =$ -50sin(37 = -30.09075116 N

$W_y =$ -50cos(37 = -39.9317755 N

$\cos(90° - \theta) = \sin\theta$

so, $W_x = -\text{mag}(\vec{W}) \sin\theta_{\text{incline}}$

$W_y = -\text{mag}(\vec{W}) \cos\theta_{\text{incline}}$