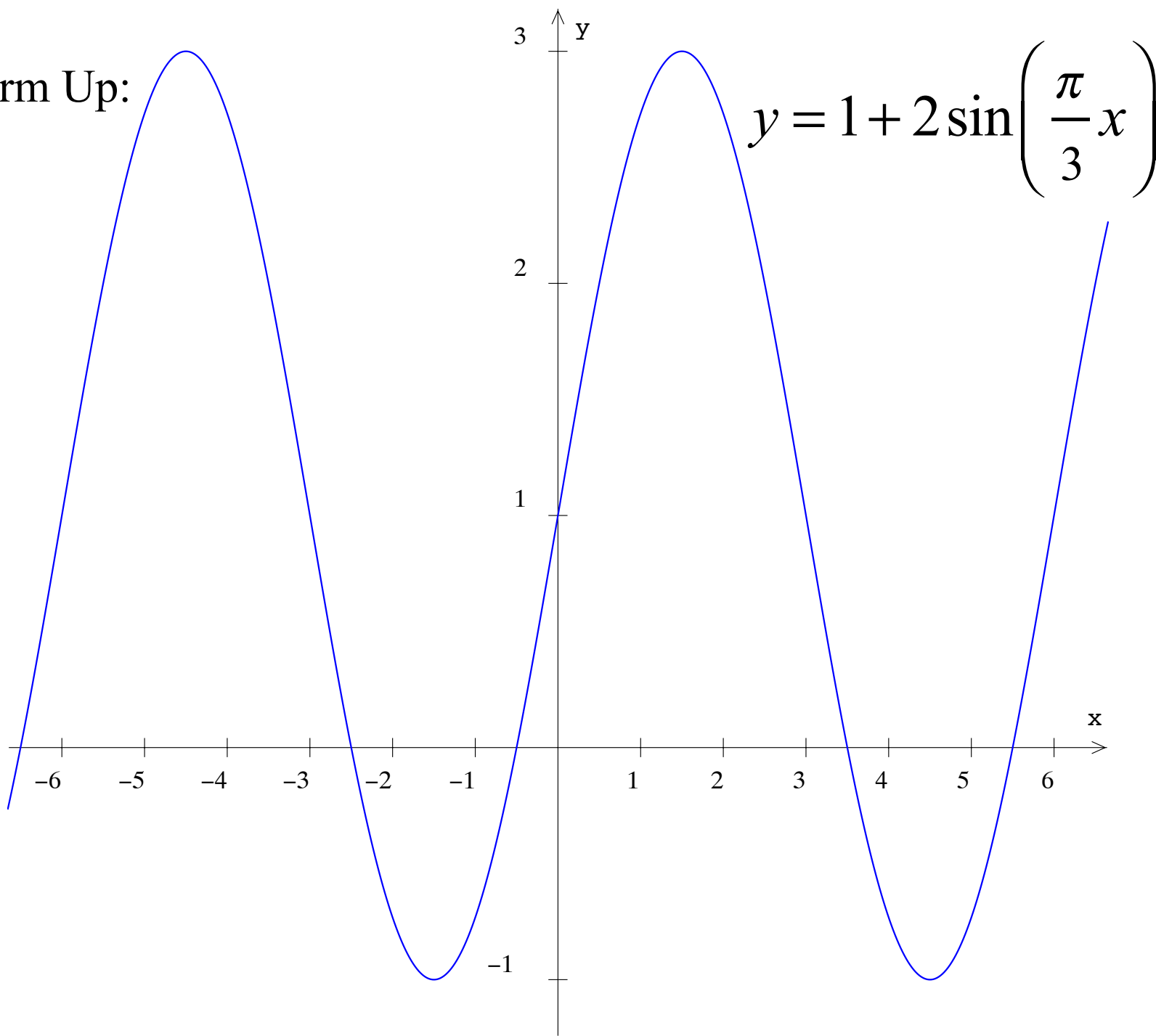


Warm Up:



Sinusoidal Graphs and Values

...and how to apply them to real-life
problems

Example on Pg 95

In a Chemistry experiment, researchers find that the temperature of a compound varies sinusoidally with time. 17 minutes after they started timing, the temperature is its highest, which is 56° Celsius. 12 minutes after it has reached its maximum, the temperature hits its minimum which is 40°

Find the sinusoidal function y in terms of time t

$$y = d + a \cos[b(x - c)]$$

The diagram illustrates the components of the sinusoidal function $y = d + a \cos[b(x - c)]$ with arrows pointing from labels to the corresponding parts of the equation:

- Sinusoidal Axis (vertical shift)** points to d .
- amplitude** points to a .
- Period = $\frac{2\pi}{b}$** points to b .
- Horizontal shift (always opposite the sign in the parentheses)** points to c .

In a Chemistry experiment, researchers find that the temperature of a compound varies sinusoidally with time. 17 minutes after they started timing, the temperature is its highest, which is 56° Celsius. 12 minutes after it has reached its maximum, the temperature hits its minimum which is 40°

Find the sinusoidal function y in terms of time t

$$y = 48 + 8 \cos \left[\frac{\pi}{12} (t - 17) \right]$$

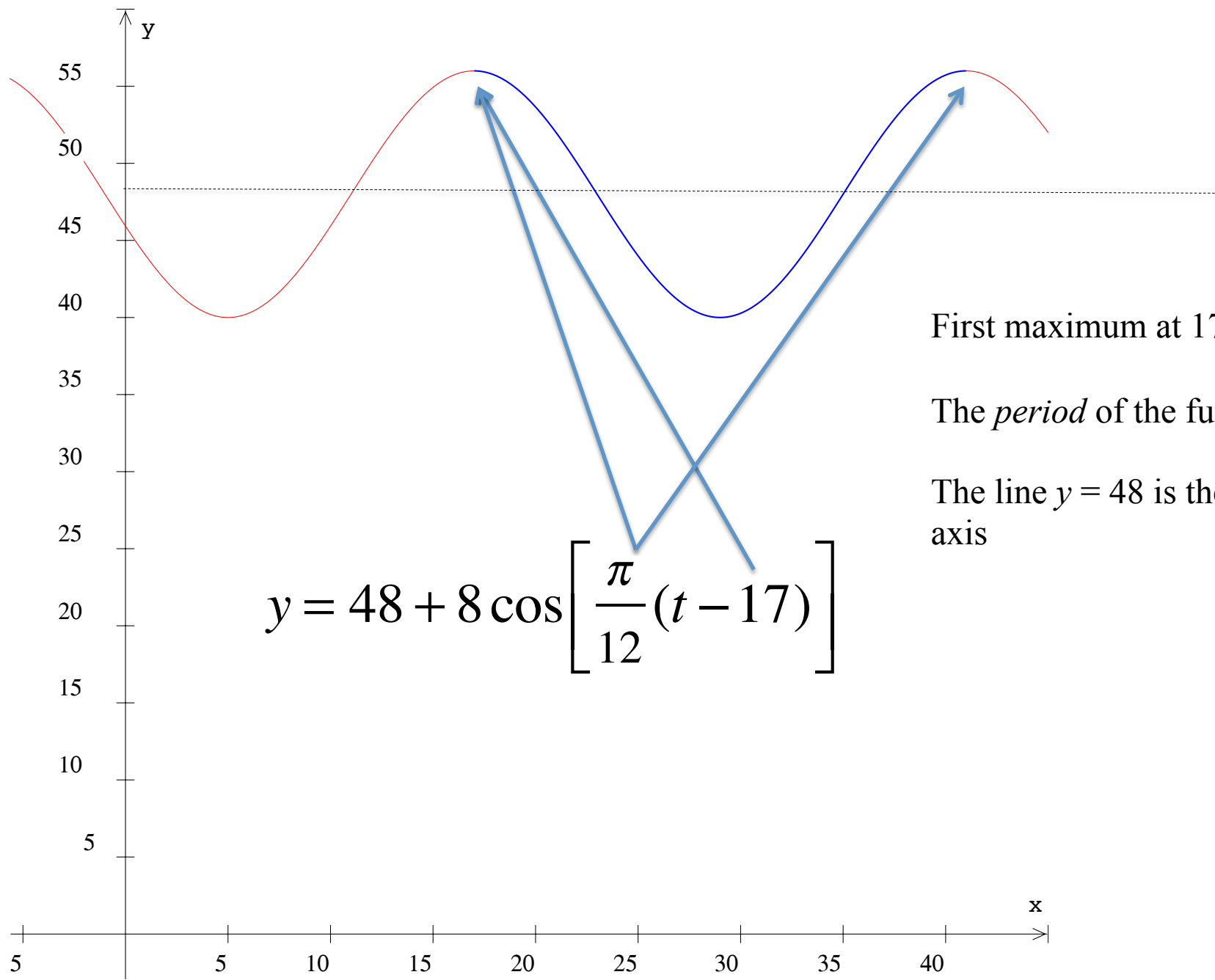
48 is halfway between the max and minimum temp

max temp is 56° and the min temp is 40° . Since this makes the graph's vertical length 16, the amplitude is 8

It takes 12 minutes to go from max to min so the whole period is twice that. And remember that

$$b = \frac{2\pi}{\text{period}}$$

The top of the cosine graph occurs 17 minutes later



In a Chemistry experiment, researchers find that the temperature of a compound varies sinusoidally with time. 10 minutes after they started timing, the temperature is its highest, which is 26° Celsius. 9 minutes after it has reached its maximum, the temperature hits its minimum which is -10°

Find the sinusoidal function y in terms of time t

$$y = 8 + 18 \cos \left[\frac{\pi}{9} (t - 10) \right]$$

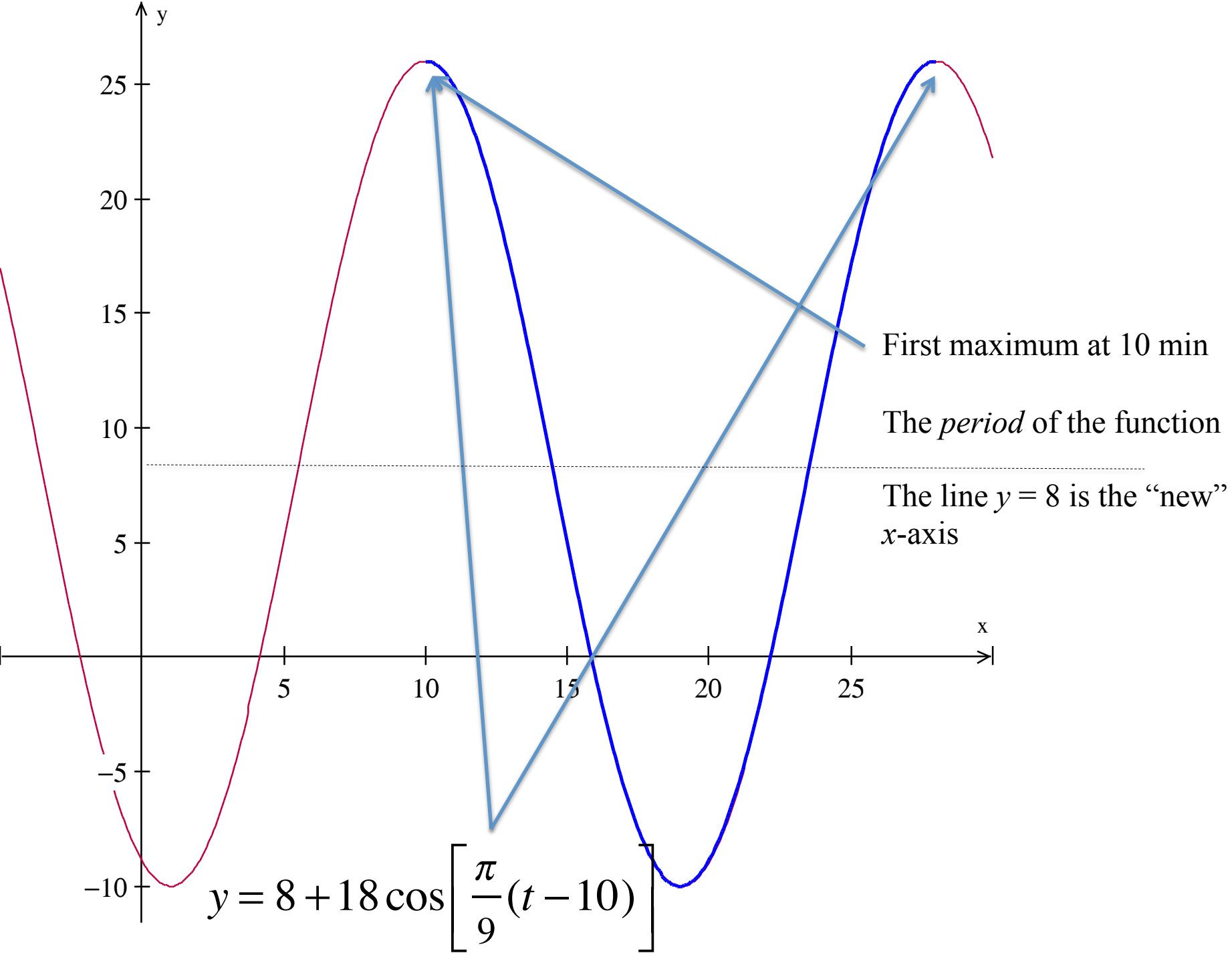
8 is halfway between the max and minimum temp

max temp is 26° and the min temp is -10° . Since this makes the graph's vertical length 36, the amplitude is 18

The top of the cosine graph occurs 10 minutes later

It takes 9 minutes to go from max to min so the whole period is twice that. And remember that

$$b = \frac{2\pi}{18}$$



$$y = d + a \cos[b(x - c)]$$

Sinusoidal Axis
(vertical shift)

amplitude

$$\text{Period} = \frac{2\pi}{b}$$

Horizontal shift
(always opposite the
sign in the parentheses)

Max – amplitude

Half the
distance
from the
max to the
min

$$b = \frac{2\pi}{\text{period}}$$

Period is
twice the
time it takes
to go from
max to min

Where does the
problem say the
first maximum
value occurs?

