

Integer Soup

Part One

1

In a far-off land, there are some amazing chefs who cook up the most wonderful soups ever imagined.



2

They prepare their mixtures over a huge cauldron. Their work is very delicate and complex.



3

The chefs use special hot orbs and cold orbs to change the temperature of the soup.



4

Adding a hot orb to the cauldron **increases** the temperature of the soup by 1 unit.



5

What do you think happens to the temperature of the soup when a cold orb is added?



6

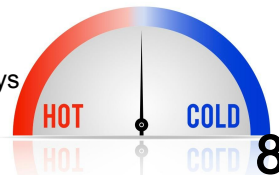
How could we describe the temperature of the soup if there is one hot orb and one cold orb in the cauldron?



7

What are some other ways we could make the temperature of the soup be zero?

See how many ways you can find.



8

What are some other ways we could make the temperature of the soup be zero?

See how many ways you can find.



9

How could we make the temperature of the soup be $+5$?



How could we make the temperature of the soup be $+5$?

PA  **SE**

Can you find more than one way?



How could we make the temperature of the soup be -3 ?



How could we make the temperature of the soup be -3 ?

PA  **SE**

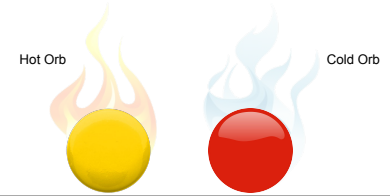
Can you find more than one way?



We can use red and yellow counters to represent hot and cold orbs.



Remember that the chefs use the hot orbs and cold orbs to change the temperature of the soup.



15

Scenario:

The temperature of the soup in this cauldron is zero.

The chef adds three cold orbs.
Next, the chef adds five hot orbs.



Scenario:

The temperature of the soup in this cauldron is zero.

The chef adds six hot orbs.
Next, the chef adds eight cold orbs.



Scenario:

The temperature of the soup in this cauldron is zero.

The chef adds nine cold orbs.
Next, the chef adds two cold orbs.



Scenario:

$$^{-}2 + ^{-}3$$



19

Scenario:

$$^{+}6 + ^{-}10$$



20

Scenario:

$$^{-}1 + ^{+}7 + ^{-}7$$



21

Scenario:

$$^{+}8 + ^{-}3 + ^{-}2$$



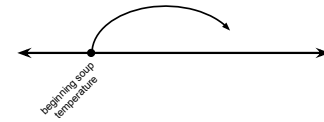
22

What happens to the temperature of the soup when hot orbs are added?



23

Adding hot orbs increases the temperature of the soup.



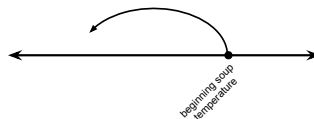
24

What happens to the temperature of the soup when cold orbs are added?



25

Adding cold orbs decreases the temperature of the soup.



26

Integer Soup

Part Two

27

Yesterday, we learned about some amazing chefs in a far off land who cook up wonderful soups.



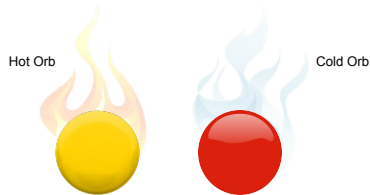
28

Sometimes, the chefs have to adjust the temperature of soup that is too hot or too cold.



29

Remember that they can use hot orbs and cold orbs to change the temperature of the soup.



30

What happens to the temperature of the soup when hot orbs are added?



31

What happens to the temperature of the soup when cold orbs are added?



32

Scenario:

The temperature of the soup in this cauldron is -6 .

What are some possible combinations of hot and cold orbs that could be in this cauldron?



33

Scenario:

The temperature of the soup in this cauldron is -6 .

What are some possible combinations of hot and cold orbs that could be in this cauldron?

PA  **SE**



34

Scenario:

The temperature of the soup in this cauldron is -6 .

The chef decides to add 10 cold orbs to the cauldron.



35

Scenario:

The temperature of the soup in this cauldron is $+9$.

The chef decides to add 4 hot orbs to the cauldron.



Scenario:

The temperature of the soup in this cauldron is -4 .

The chef decides to add 3 hot orbs to the cauldron.



Scenario:

The temperature of the soup in this cauldron is $+6$.

The chef decides to add 3 cold orbs to the cauldron.



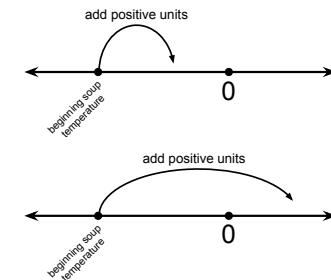
Does adding hot orbs to soup always make the temperature positive?



Does adding hot orbs to soup always make the temperature positive?

PAUSE

Explain!



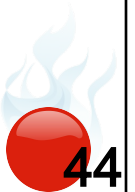
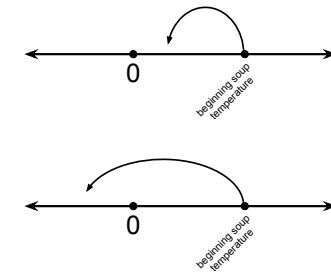
Does adding cold orbs to soup always make the temperature negative?



Does adding cold orbs to soup always make the temperature negative?

PAUSE

Explain!



Integer Soup

Part Three

45

This week, we've been talking about some amazing chefs in a far off land who cook up wonderful soups.



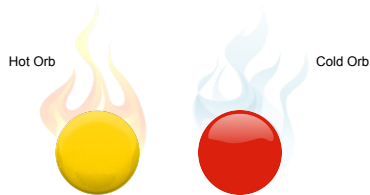
46

Sometimes, the chefs have to adjust the temperature of soup that is too hot or too cold.



47

How does adding hot orbs or cold orbs change the temperature of the soup?



48

Scenario:

The temperature of the soup in this cauldron is -8 .



How could we increase the temperature of the soup?

49

Scenario:

The temperature of the soup in this cauldron is -8 .



Is there a way to increase the temperature without using any hot orbs?

50

Scenario:

The temperature of the soup in this cauldron is -8 .

Is there a way to increase the temperature without using any hot orbs?



51

Scenario:

The temperature of the soup in this cauldron is -8 .

The chef wants to increase the temperature by 2 units, but there are no hot orbs available. Is it possible?



52

Scenario:

The temperature of the soup in this cauldron is -10 .

The chef removes six cold orbs.



53

Scenario:

The temperature of the soup in this cauldron is +5.

The chef removes four hot orbs.



Scenario:

The temperature of the soup in this cauldron is +12.

The chef removes seven hot orbs.



Scenario:

$$-9 - -5$$



Scenario:

$$+6 - +4$$

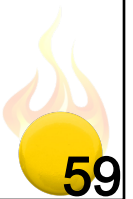


Scenario:

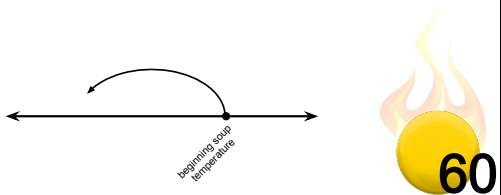
$$-7 - -7$$



What happens to the temperature of the soup when hot orbs are removed?



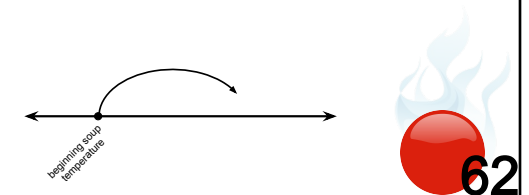
Subtracting hot orbs decreases the temperature of the soup.



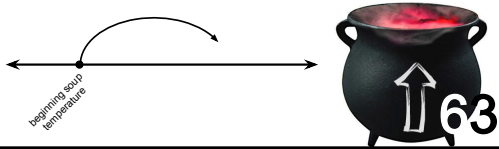
What happens to the temperature of the soup when cold orbs are removed?



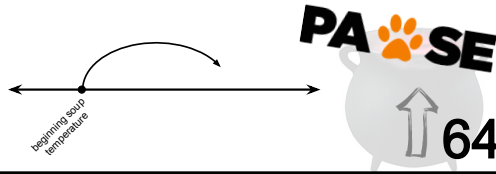
Subtracting cold orbs increases the temperature of the soup.



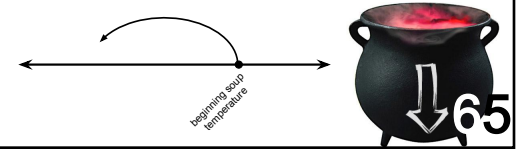
What are the ways a chef can use hot
orbs or cold orbs to **increase** the
temperature of the soup?



What are the ways a chef can use hot
orbs or cold orbs to **increase** the
temperature of the soup?



What are the ways a chef can use hot
orbs or cold orbs to **decrease** the
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What are the ways a chef can use hot
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