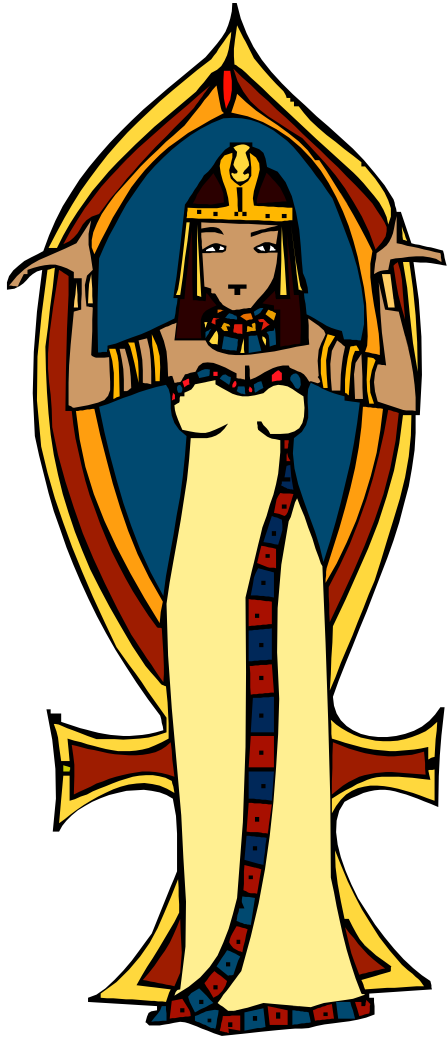


The Princess and the Golden Key





A powerful and
rich queen had
one son.

One day he
would be king.

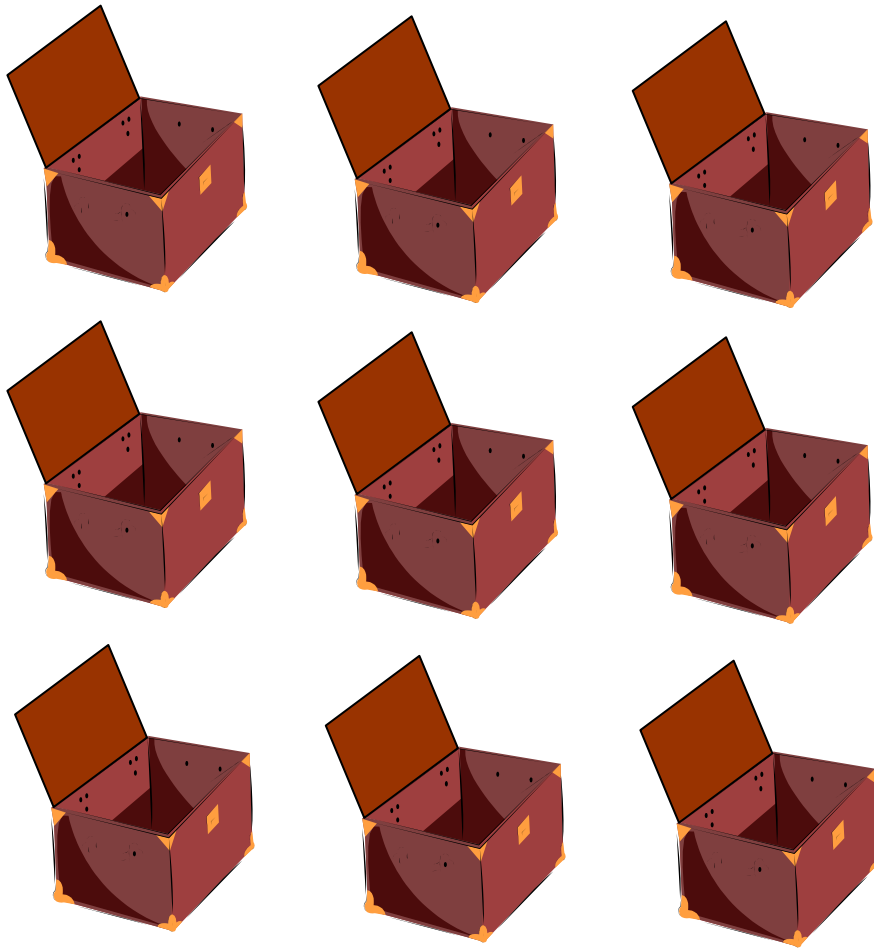


Princesses came
from far and wide
to seek his hand
in marriage.

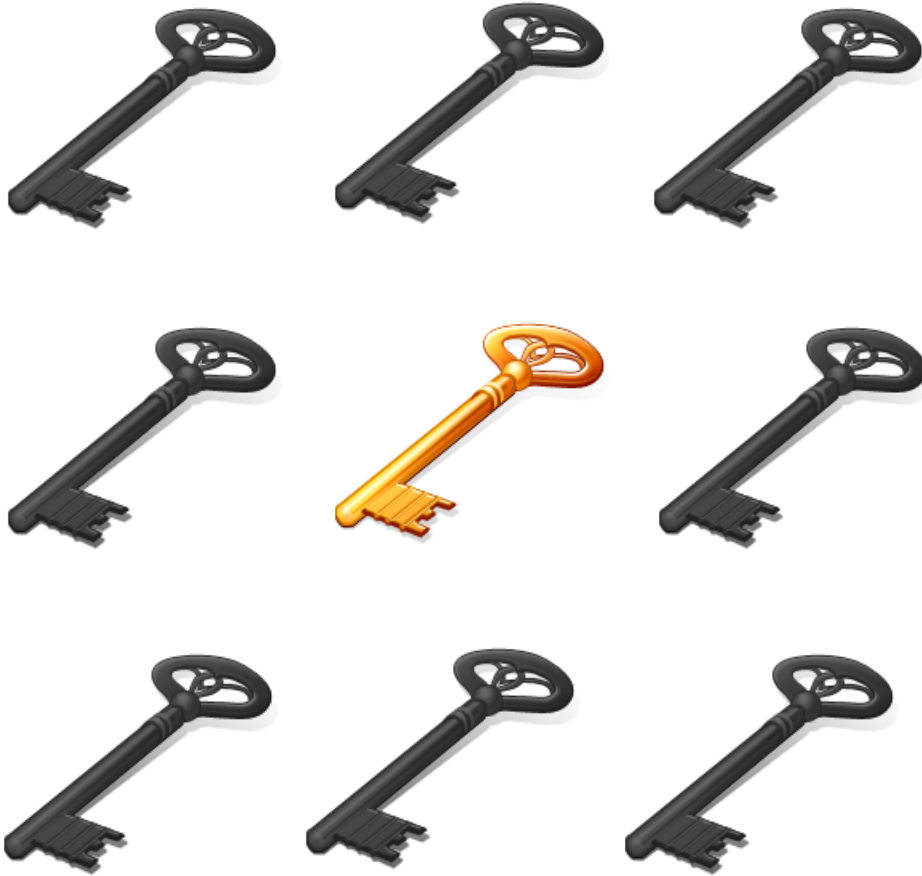




But the queen set a
challenge for them.

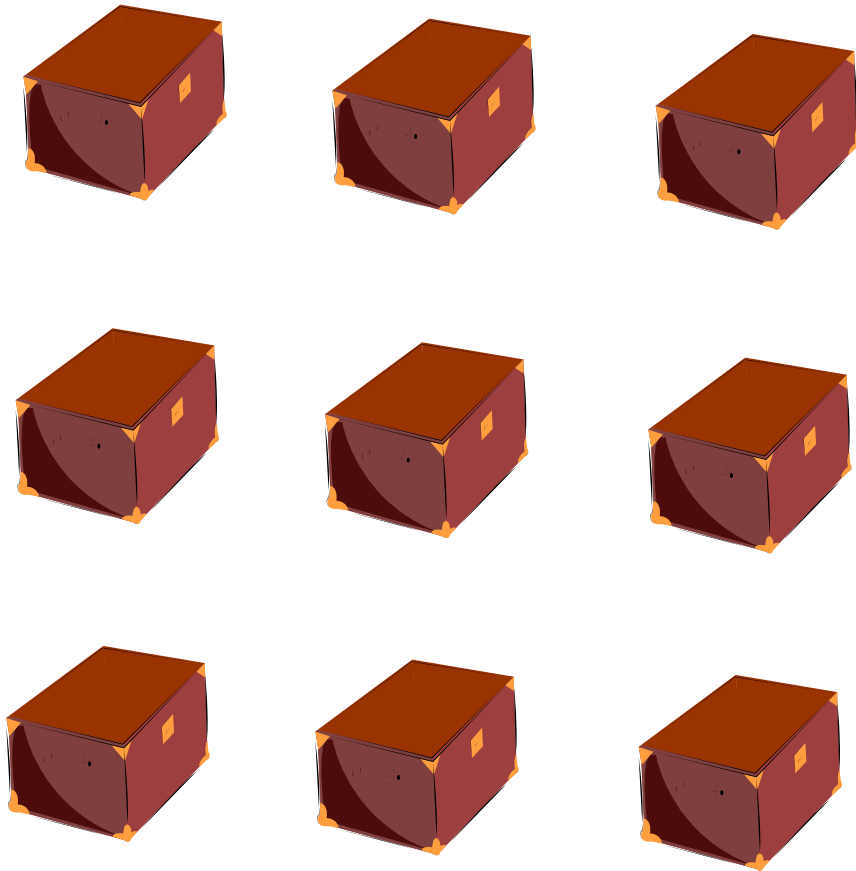


She took nine
small wooden
boxes. They
were all
exactly the
same.



...and nine
keys. Eight
of the keys
were made
of iron and
one of gold.

She locked the
keys in the
boxes. Then
she mixed
them up so
that even she
did not know
which one held
the golden key.



These were the rules of the challenge.

You may choose one
box, and one box
only.



Before you choose,
you may ask me one
question, and if I
know, I will answer
truthfully.



Then you may
borrow anything
from anywhere in my
palace and use it
twice.



But you cannot
damage or open any
of the boxes. Then
you must choose
one box.



If it contains the
golden key to the
palace, you
may marry
the prince.



If it contains an iron
key to the prison, you
will spend the rest of
your life locked
away.



None of the
princesses were
willing to take the
risk.

So they all left in
search of princes
whose mothers were
less demanding.



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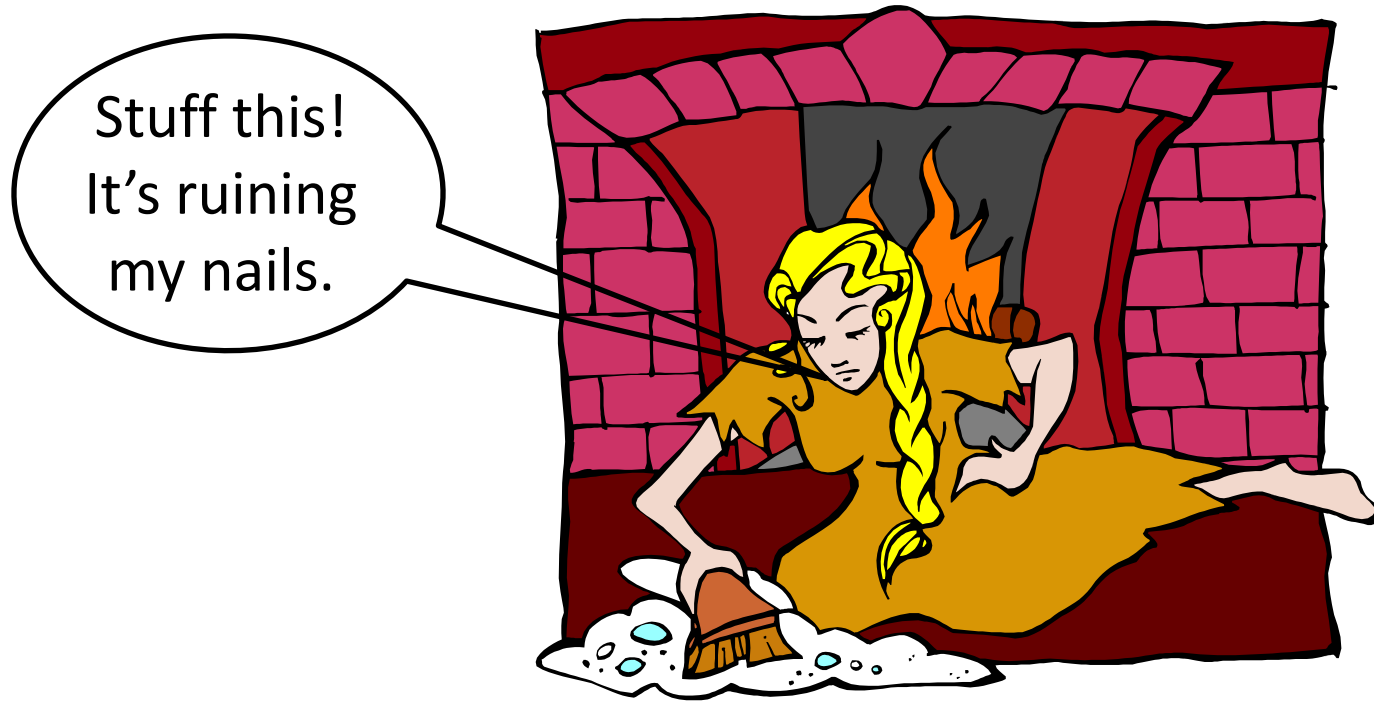
None of the princesses were willing to take the risk.

So they all left in search of princes whose mothers were less demanding.





Meanwhile, in the palace kitchens, a princess from a nearby kingdom worked as a maid. Her father had thought it would do her good to do some real work before settling down to royal life. She disagreed. So she decided that she was going to marry the prince.



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And she did.

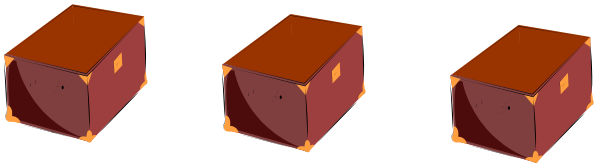
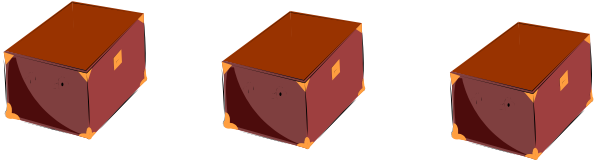
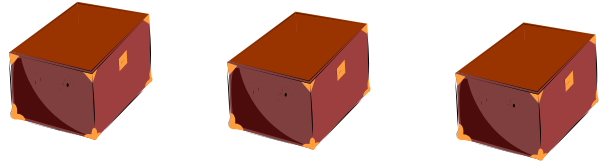
The question is, HOW did she do it?

What question did she ask?

What did she borrow to help her decide?

How did she choose which box to open?

And why was her father right all along?



Nine boxes.

Only one gold key.

Ask one question
(if you need to).

Borrow something
from the palace
and use it twice.

There is a clue on the next slide.

All the boxes look exactly the same. But what will be different about the one with the gold key?

The princess's father was right that it did her some good to do some real work.

What would she have seen in the kitchen that would help her now?

Imagine you have narrowed it down to just three boxes.

What test could you do on two of them that would show you for certain which one held the golden key?

How could you do the same test
to narrow it down to three boxes
in the first place?

The answer starts on the next slide.

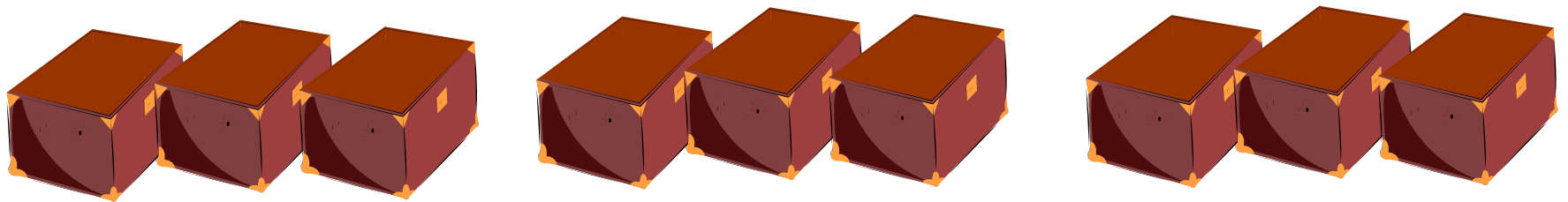
The question you might need to ask is whether the gold key weighs more than the iron ones.

The same amount of gold is heavier than iron, so the gold key will be heavier.

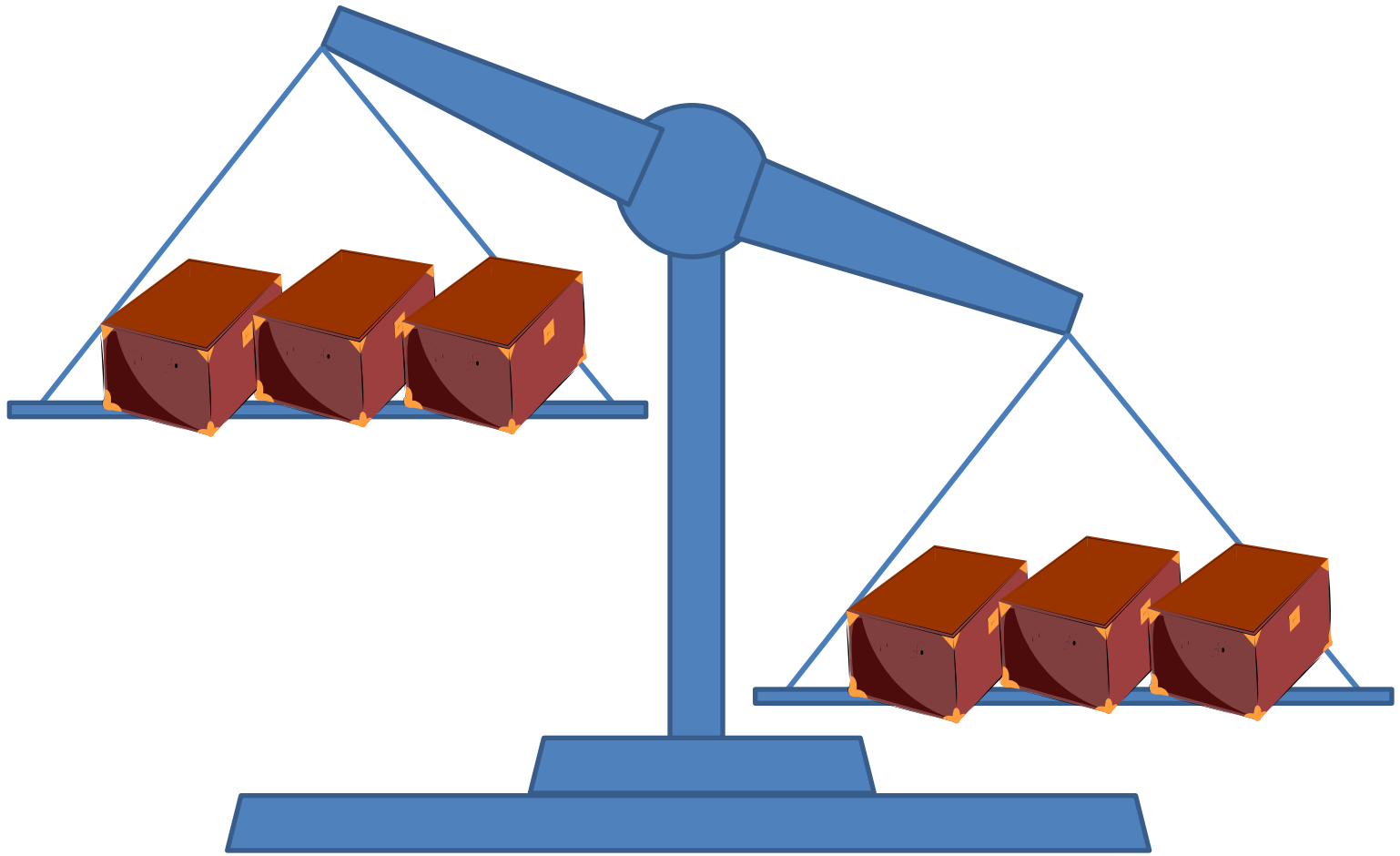
That means the box with the gold key will weigh more.

While working in the kitchen, the princess has seen cooks using the scales, so that is what she asks to borrow.

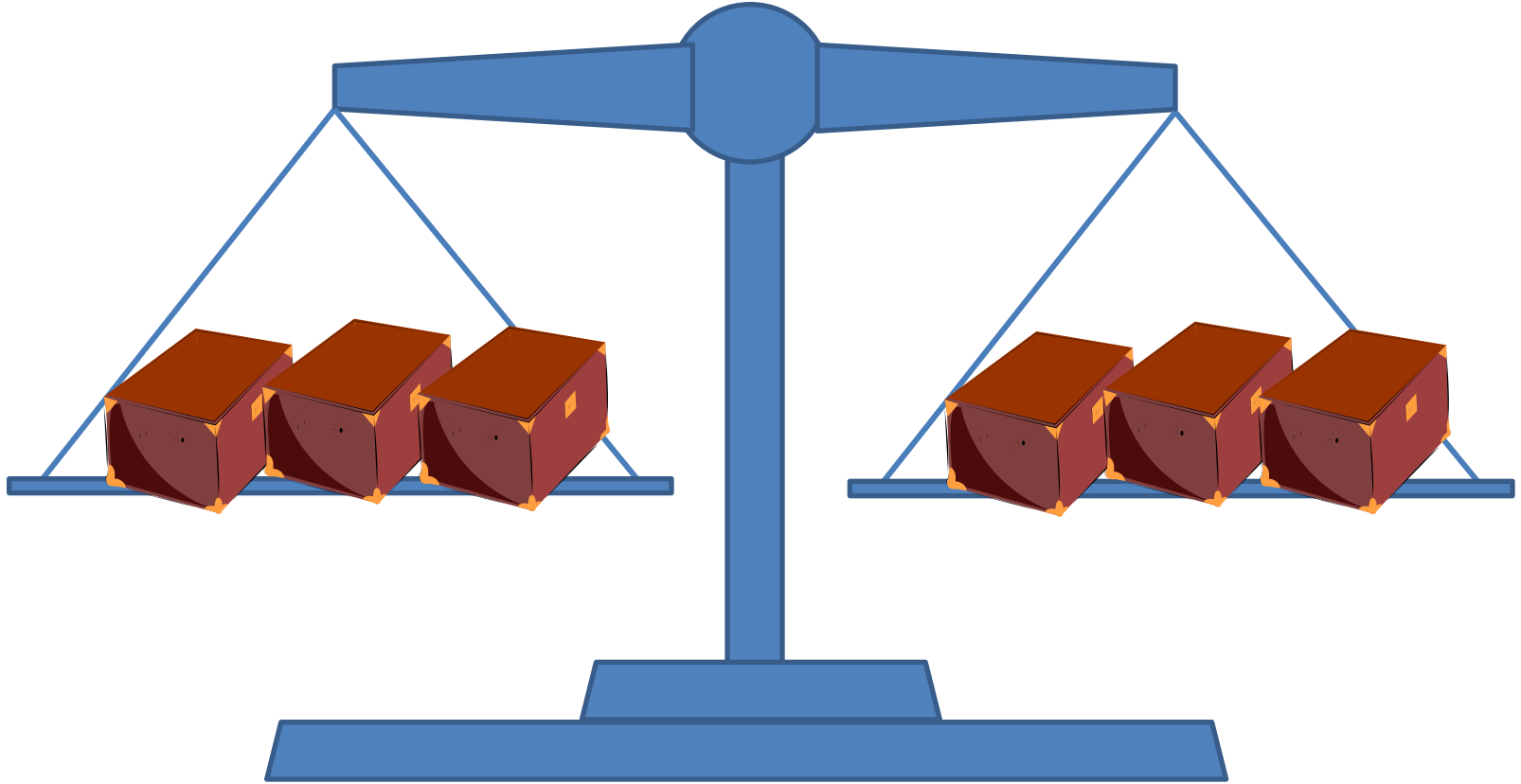
First, split the boxes into three sets of three. It doesn't matter which ones go in which set.



Then choose two sets to weigh against each other. It doesn't matter which sets you weigh.

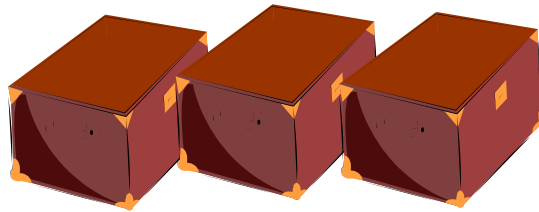


If one set is heavier, you know the gold key is somewhere in that set.

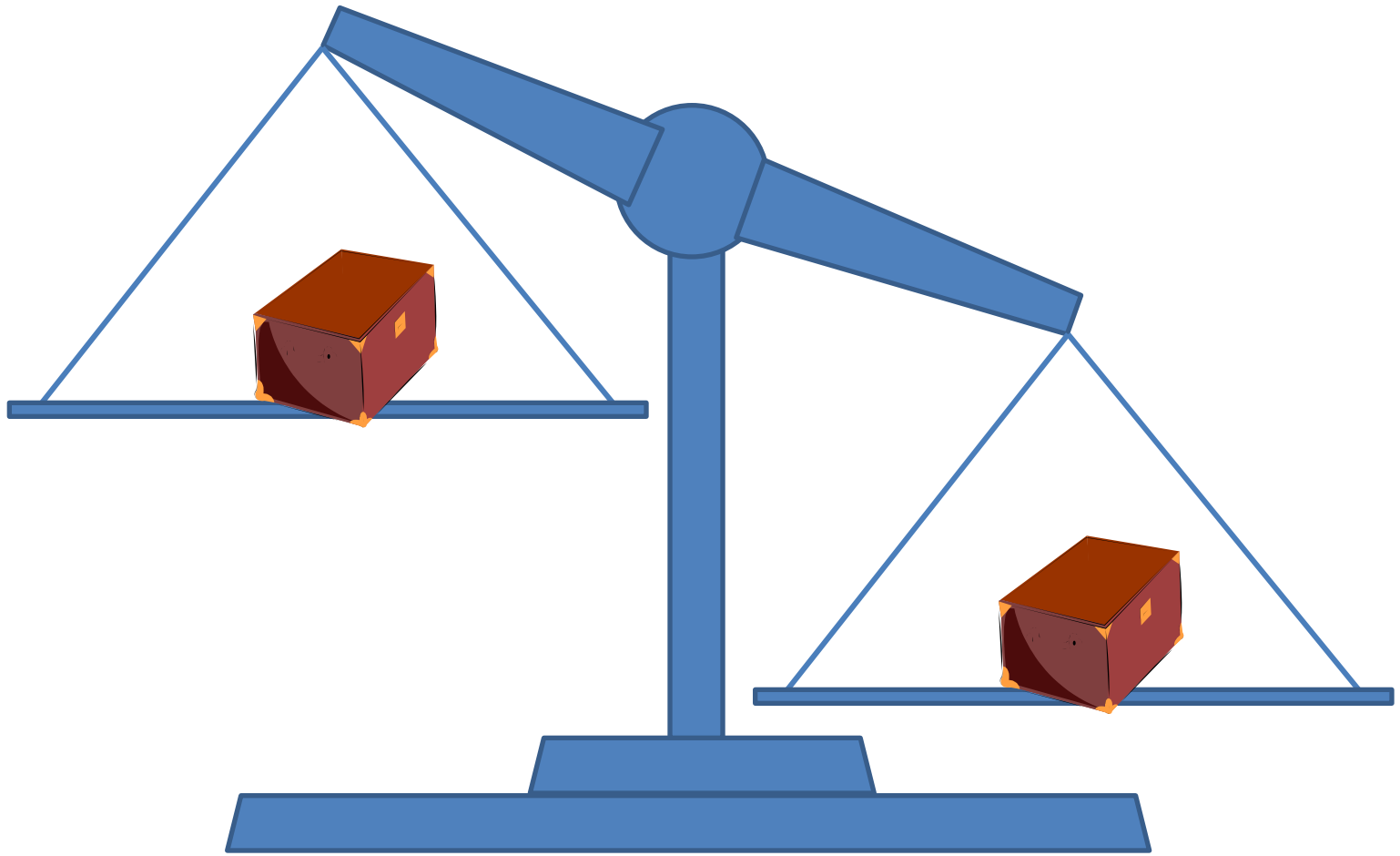


If they weigh the same, all the keys they contain must be iron, so the gold key is in the set you haven't weighed.

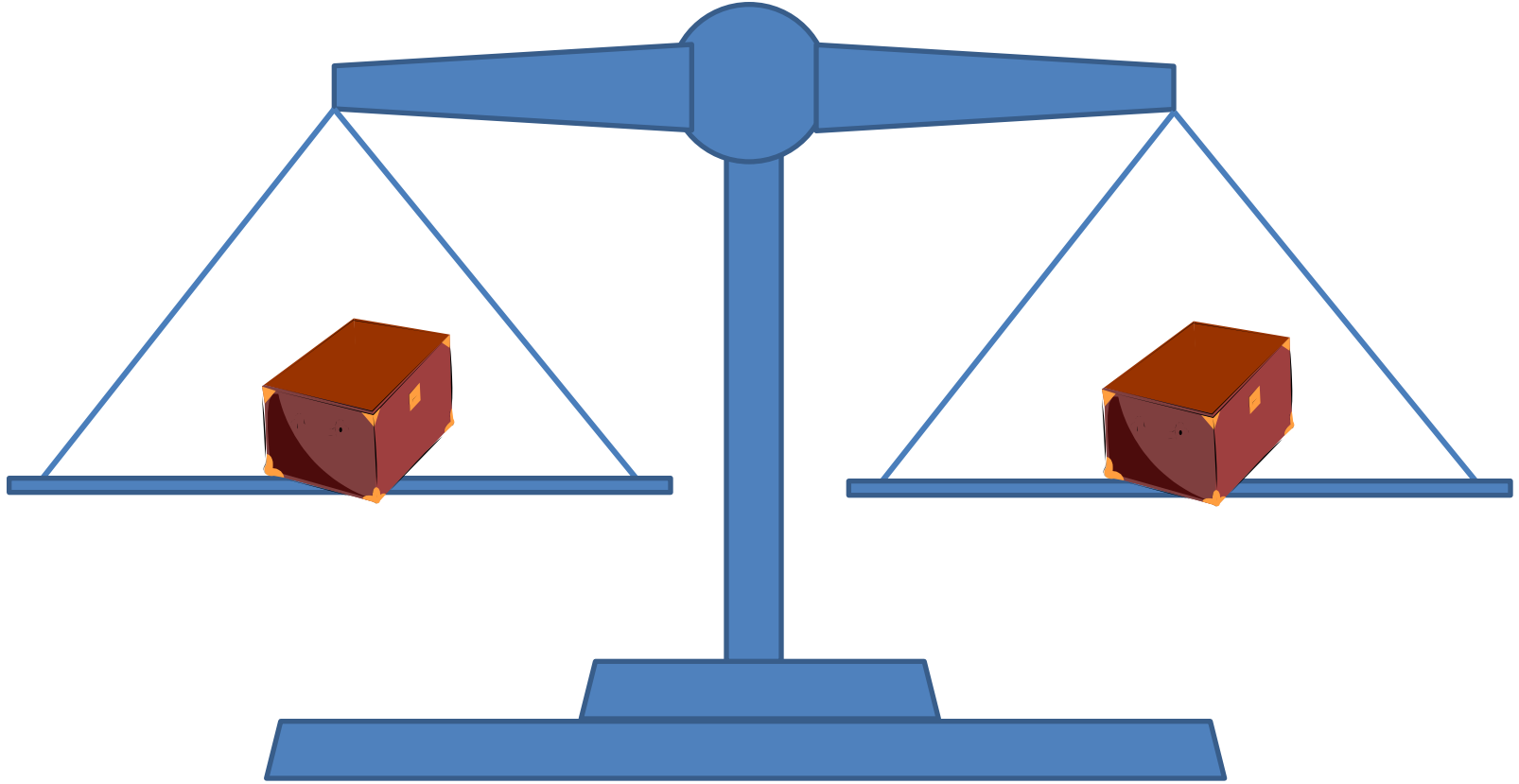
Now you have a shortlist of three boxes.



You choose any two boxes to weigh against each other. Again, it doesn't matter which you choose.



If one box is heavier, it's the one with the golden key.



If they weigh the same, the gold key is in the box you haven't weighed.

So the princess married the prince...



and they lived fairly happily for quite
a while.

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