



FIND COUNTERFEIT COIN

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BE A GREAT DETECTIVE

Since you criticized the Emperor's tax laws, you have been locked in the dungeon.

One day, you're suddenly brought before the Emperor who looks even angrier than usual.

One of his twelve governors has been convicted of paying his taxes with a counterfeit coin which has already made its way into treasury.

You have been granted a chance to earn your freedom by identifying the fake.

What you can use is only a balance scale.

Be a detective and find a counterfeit coin.

MISSION Level★

- ◆ Find one **Counterfeit coin** (lighter / heavier)
- ◆ Use only a balance scale





WARM UP



Counterfeit coin is lighter than others





SAME LOOKS

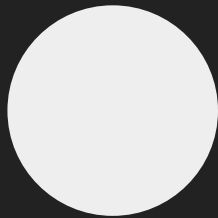




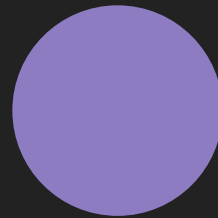
1.
1 **lighter** counterfeit coin
out of 9 Coins

Scale





Equal



Among three coins, there
is a counterfeit one.





Counterfeit coin is
lighter than others.



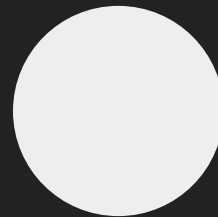
Among three coins,
there is a
counterfeit one.



This is a
counterfeit coin!



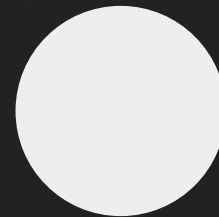
Scale



This is a
counterfeit coin!



Equal



The background is a dark charcoal gray. It features several stylized clouds in yellow and light gray, scattered across the upper half. At the bottom, there are stylized mountain peaks in yellow and light gray. A thin, dashed yellow line forms a large rectangular frame around the central text, with additional dashed lines extending from the corners towards the edges of the image.

LET'S TRY

The background is dark grey with stylized clouds in yellow and grey at the top, and stylized mountains in yellow and grey at the bottom. A large yellow rectangle is centered on the slide, containing the text.

Q2. 1 heavier counterfeit coin out of 13 Coins

**Q3. Find minimum number of using a balance scale
(1 lighter counterfeit coin out of 8 coins)**

**Q4. Find minimum number of using a balance scale
(1 lighter counterfeit coin out of 128 coins)**

***(Q.5 1 lighter / heavier counterfeit coin out of 13 coins)**

2.
1 **heavier** counterfeit coin
out of 13 coins



Key point: How to divide coins

3.
1 **lighter** counterfeit coin
out of 8 coins



Key point: How to divide coins

4.
**1 lighter counterfeit coin
out of 128 coins**



Key point: Find a pattern

2.

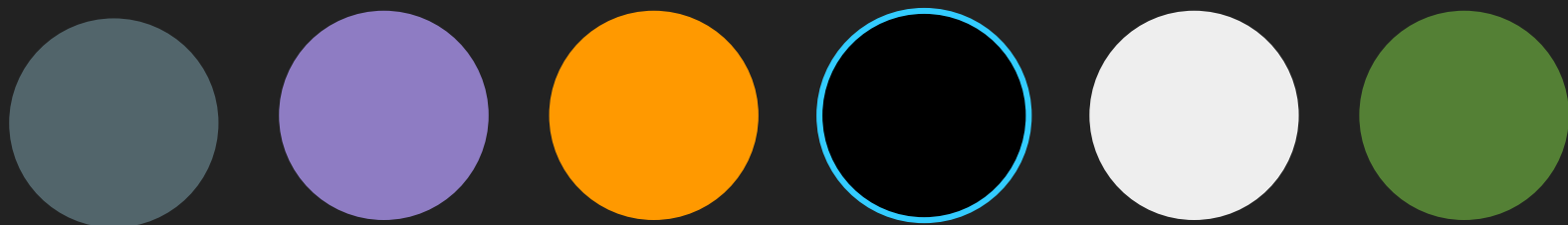
1 heavier counterfeit coin out of 13 coins



Key point: How to divide coins



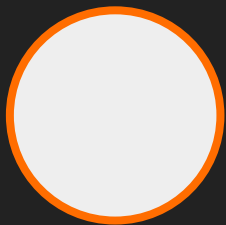
Scale



Equal

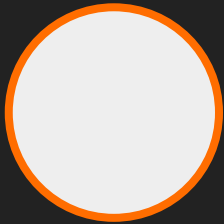
This is a
counterfeit coin!



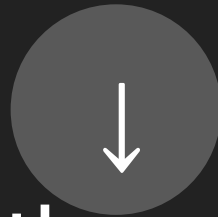


Counterfeit coin is heavier than others.

Among six coins, there is a counterfeit one.



Counterfeit coin
is heavier than
others.



Among three
coins, there is a
counterfeit one.

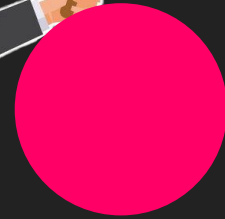
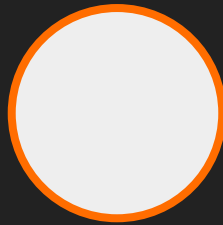
This is a
counterfeit coin!



This is a
counterfeit coin!



Equal



3.
1 **lighter** counterfeit coin
out of 8 coins



Key point: How to divide coins

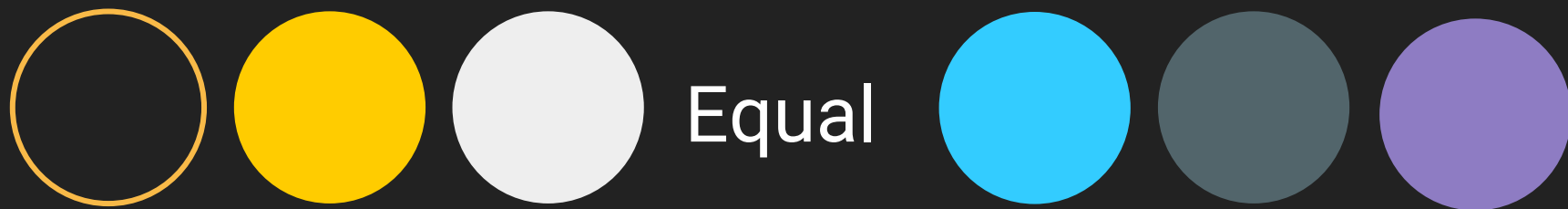
MISSION Level★★

Find **Minimum**
Number of Using
a Scale



Scale ①





Either one is a
counterfeit coin!





Counterfeit coin is lighter than others.

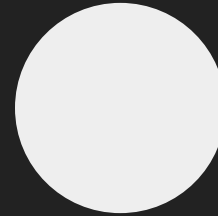


Among three coins, there is a counterfeit one.

This is a
counterfeit coin!!



Scale(2)



This is a
counterfeit coin!



Equal





A. Twice

4.
**1 counterfeit coin out
of 128 coins**



Key point: Find a pattern

MISSION

Level★★

Find **Minimum**
Number of Using
a Scale





8 Coins Twice (Question. 3)

16 Coins Three times

32 Coins Four times

64 Coins Five coins

128 Coins **Six times**





5.

1 lighter / heavier counterfeit coin
out of 13 coins

MISSION Level

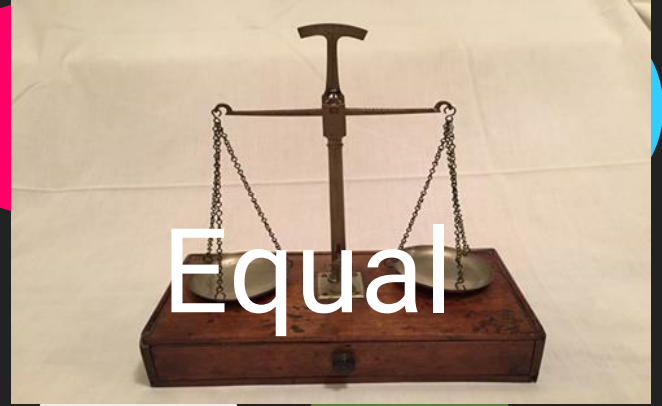


Find one
Counterfeit coin



Scale

Equal



Among five coins, there
is a counterfeit coin!

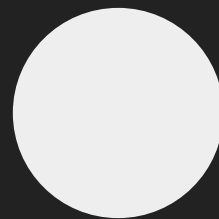
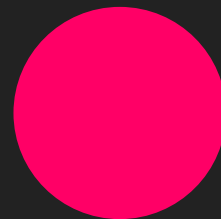




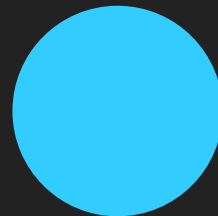
Scale



Equal



Either one is a
counterfeit coin!





S

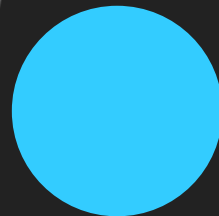
Scale



Equal



This is a counterfeit
coin!(lighter/heavier)





S

Scale

This is a **heavier**
counterfeit coin!



This is a **lighter** counterfeit coin!!



Scale

S

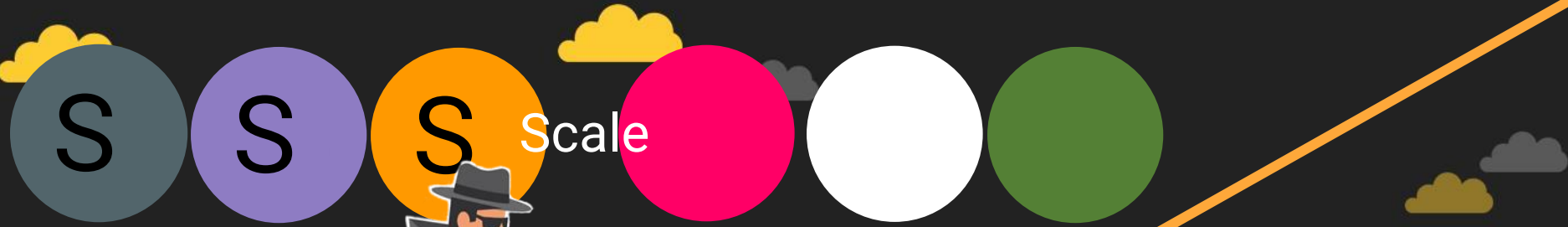


Scale

S



This is a **heavier** counterfeit coin!!



Among three coins,
there is a **heavier**
counterfeit one.



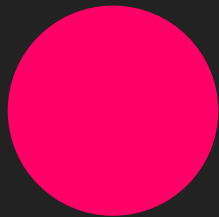
Among three coins,
there is a **lighter**
counterfeit one.



Counterfeit coin is lighter



This is a counterfeit coin



Scale



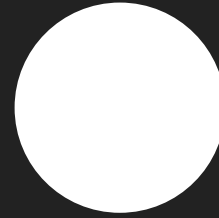
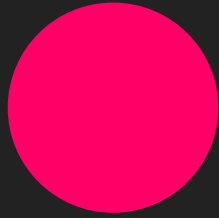
Counterfeit coin is heavier

This is a counterfeit coin





Equal

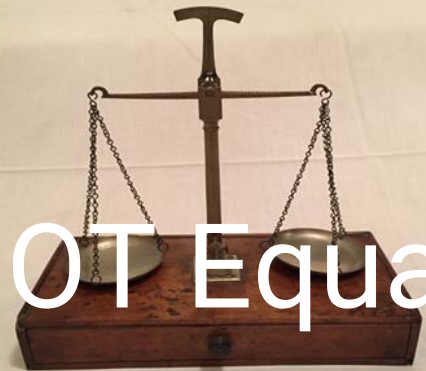


- Counterfeit coin is **lighter**
→ This is a lighter counterfeit coin
- Counterfeit coin is **heavier**
→ This is a heavier counterfeit coin



Scale

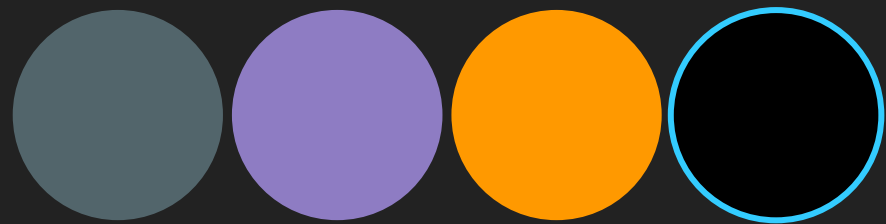
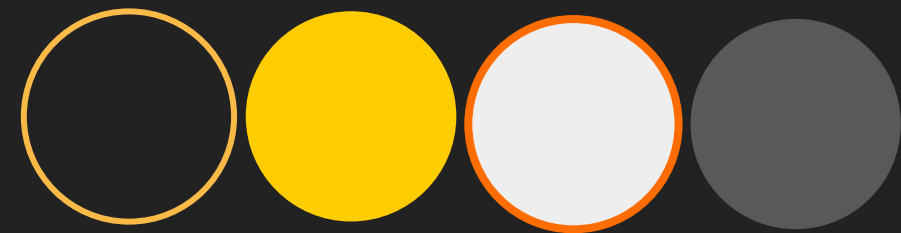
NOT Equal



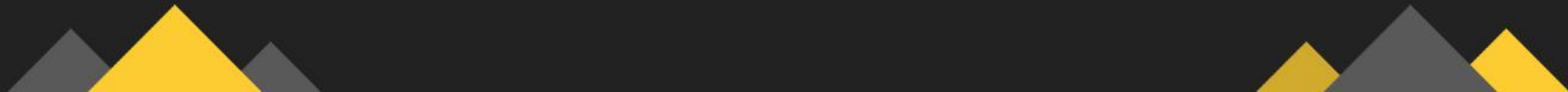
○●● NOT Equal



Lighter



Heavier





Equal



Either one is a **lighter**
counterfeit coin!



Counterfeit coin is **lighter**
→ This is a counterfeit coin



Scale



NOT Equal



Among these 6 coins, there is a counterfeit coin!

“L” might be a lighter
counterfeit coin



“H” might be a heavier
counterfeit coin



Among three coins, there
is a counterfeit coin.



H

Equal

H

This is a **lighter**
counterfeit coin!



L



H

Scale

H



This is a **heavier**
counterfeit coin!



L



Conclusion

- Use the way to be free from the dungeon.
 - Find a pattern to make calculations easier!
 - Find the best solution! (There might be other solutions no one knows...)
- 
- 



**THANK YOU FOR
PARTICIPATING!**



References

<https://www.youtube.com/watch?v=tE2dZLDJSjA>

<http://www.moxbit.com/2013/05/scales-question-ans.html>

<https://mathtrain.jp/coin>

