

## When will I mint a peercoin block? How much will I mint?

Peercoin use *proof-of-stake* blocks to secure the network in a energy efficient way. While it is easy to find the probability and the reward to mine a *proof-of-work* block, I haven't found those informations for minting a *proof-of-stake* block. So here there are.

If you don't know anything about Peercoin, or about *proof-of-stake*, you should read the [Peercoin white paper](#) first.

### Coin age

The minting operation is based on the concept of *coin age* which is the amount of coins multiplied by the age of a given transaction. Thus, if I've received  $m$  Peercoins  $x$  days ago I currently have a coin age  $\alpha$  of  $m \times x$  *coins-days*. Transferred coins lose their age.

For the purpose of minting, coins must be **at least 30 days old** <sup>1</sup>, and the maximum *coin age* possible is 90 days <sup>2</sup> (if a coin is older we still counting it as a 90 days old coin). Let's call  $\alpha'$  the *minting coin-age*:

$$\alpha' = \max(0, \min(\alpha, 90) - 30)$$

By definition,  $0 \leq \alpha' \leq 60$ .

### Minting expectancy

The probability  $p(T)$  to mint a block in the next period of  $T$  seconds depends on both my  $\alpha'$  *minting coin age* and on  $d$  the network *proof-of-stake* difficulty. Those variables are linked by the following formula:

$$p(T) = \frac{\alpha' \times T}{d \times d_1}$$

where  $d_1$  is the difficulty 1 target, fixed at `0xffff0000` ie 4294901760 <sup>3</sup>.

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<sup>1</sup>[source code](#)

<sup>2</sup>[source code](#)

<sup>3</sup>[source code](#)

### Example 1

If I've received 10,000 Peercoins 60 days ago, how likely will I mint a block in the next hour at a network difficulty of 7.2?

$$p(T = 60 \times 60) = \frac{(60 - 30) \times 10000 \times 60 \times 60}{7.2 \times 4294901760} = 0.0359 = 3.59\%$$

### Example 2

In the same conditions, how much time should I wait to have a probability of 0.5 to mint a block?

$$T = \frac{0.5 \times 7.2 \times 4294901760}{(60 - 30) \times 10000} = 51538s \approx 14h19m$$

### Reward

When you mint a block you create a special transaction called *coinstake*. This transaction contains newly generated Peercoins as a reward for your minting operation. The reward is calculated so you will have an annual interest of 1%, it uses the following formula:

$$r = \frac{\max(\alpha, 90) \times m \times 0.01}{365.242424}$$

where  $\alpha$  is the *coin age* and  $m$  the amount of coins <sup>4</sup>.

### Example 3

In the same conditions, what will be my minting reward ?

$$r = \frac{60 \times 10000 \times 0.01}{365.242} = 16.4274454 \text{ PPC}$$

I hope it helps!

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<sup>4</sup>[source code](#)