## **Complex Passwords**

In an ongoing commitment to bolster your digital defenses, let's focus on a powerful tool: complex passwords. Often times, applying a simple but innovative approach – using pass-phrases rather than passwords – can be an easy way to greatly enhance data security.

Pass-phrases are memorable strings of words that offer superior complexity. As displayed by the graphic below, this heightened complexity significantly raises the time needed to crack your password from brute force attacks by a bad actor. This is why we want long, but easy to remember passwords!

A good passphrase should be lengthy, use a mix of upper and lower-case letters, include numbers and special characters, and ideally, be unrelated words or phrases. It should also be easy for you to remember but hard for others to guess. Examples for a good passphrase password could be something like IDrinkCoffee@7:30 or Lose5Poundsin0924!

Remember, make a long password and easy to remember so it isn't necessary to write it down.

| Number of<br>Characters | Numbers<br>Only | Lowercase<br>Letters | Upper and<br>Lowercase<br>Letters | Numbers,<br>Upper and<br>Lower Case<br>Letters | Numbers,<br>Upper and<br>Lowercase<br>Letters,<br>Symbols |
|-------------------------|-----------------|----------------------|-----------------------------------|--|---|
| 4                       | Instantly       | Instantly            | Instantly                         | Instantly                                      | Instantly   |
| 5                       | Instantly       | Instantly            | Instantly                         | Instantly                                      | Instantly   |
| 6                       | Instantly       | Instantly            | Instantly                         | 1 sec  | 5 secs  |
| 7                       | Instantly       | Instantly            | 25 secs                           | 1 min  | 6 mins  |
| 8                       | Instantly       | 5 secs               | 22 mins                           | 1 hour   | 8 hours   |
| 9                       | Instantly       | 2 mins               | 19 hours                          | 3 days   | 3 weeks   |
| 10                      | Instantly       | 58 mins              | 1 month                           | 7 months                                       | 5 years   |
| 11                      | 2 secs          | 1 day                | 5 years                           | 41 years                                       | 400 years   |
| 12                      | 25 secs         | 3 weeks              | 300 years                         | 2k years                                       | 34k years   |
| 13                      | 4 mins          | 1 year               | 16k years                         | 100k years                                     | 2m years  |
| 14                      | 41 mins         | 51 years             | 800k years                        | 9m years                                       | 200m years  |
| 15                      | 6 hours         | 1k years             | 43m years                         | 600m years                                     | 15bn years  |
| 16                      | 2 days          | 34k years            | 2bn years                         | 37bn years                                     | 1tn years   |
| 17                      | 4 weeks         | 800k years           | 100bn<br>years                    | 2tn years                                      | 93tn years  |
| 18                      | 9 months        | 23m years            | 6tn years                         | 100tn years                                    | 7qd years   |