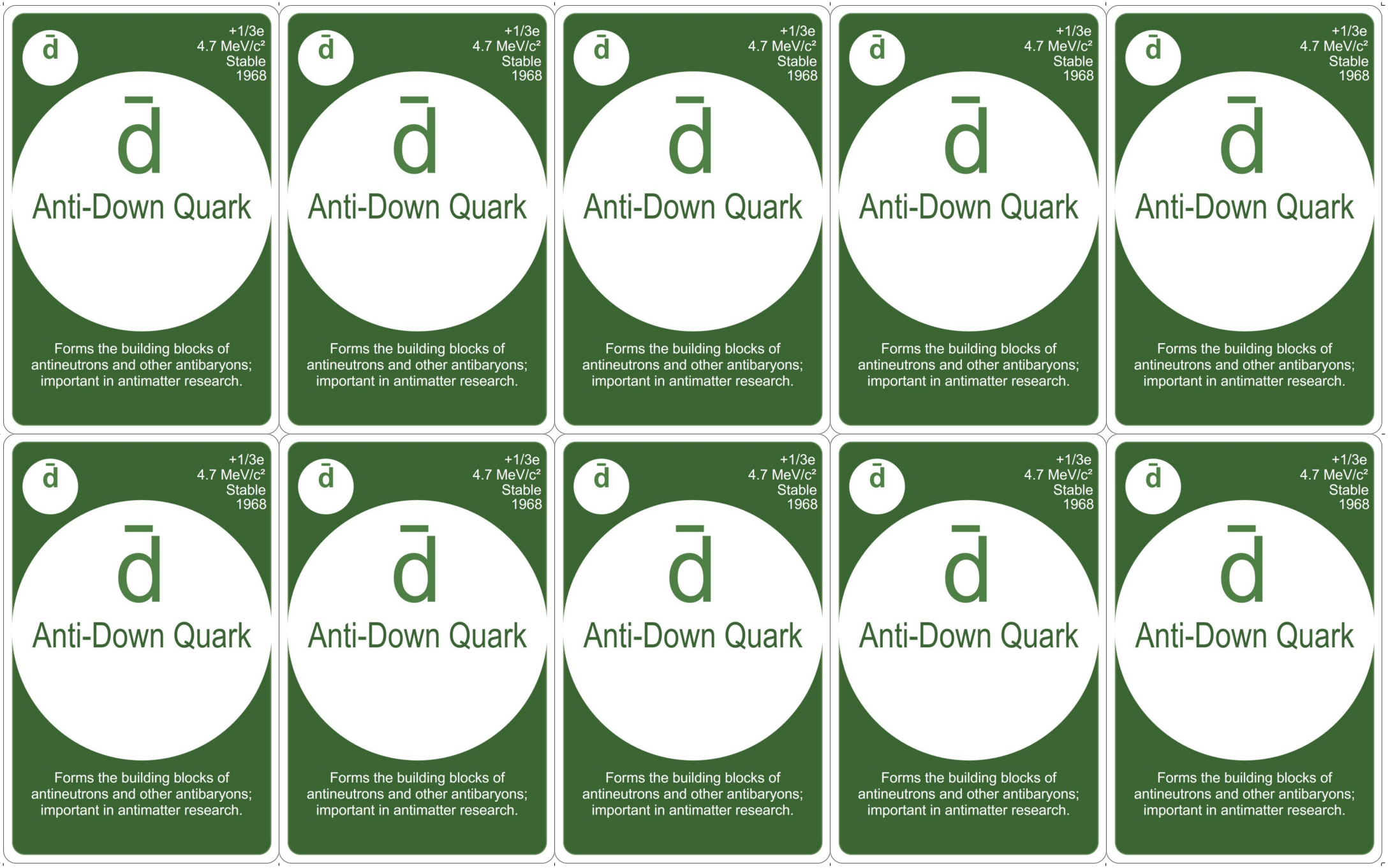
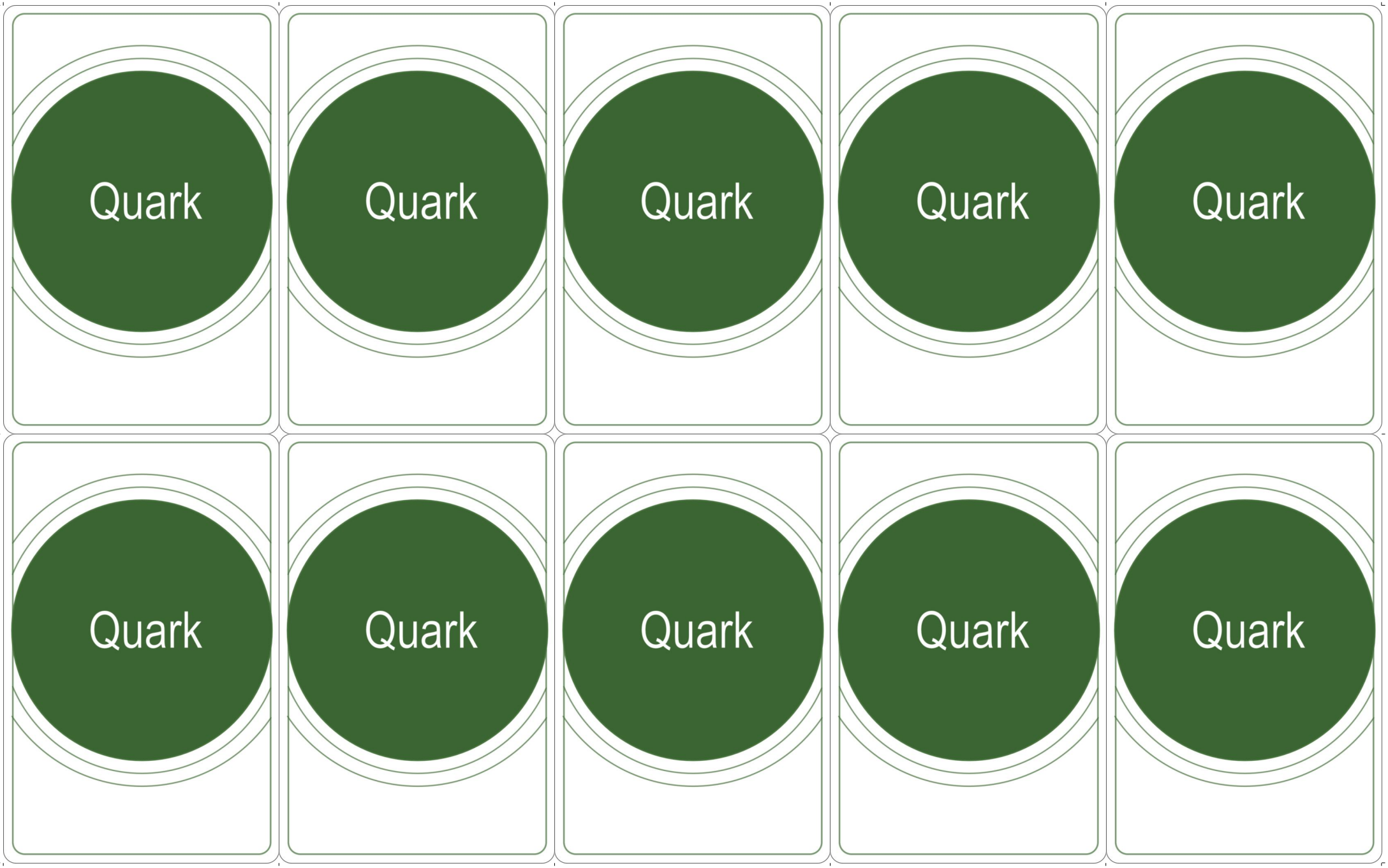

d̄
+1/3e
4.7 MeV/c²
Stable
1968
d̄
Anti-Down Quark
Forms the building blocks of antineutrons and other antibaryons; important in antimatter research.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ū

-2/3e
2.2 MeV/c^2
Stable
1968

ū

Anti-Up Quark

The antimatter counterpart of the up quark, it combines with other antiquarks to form antiprotons and other antiparticles.

ū

-2/3e
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1968

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Down Quark

Down quarks combine with up quarks to form neutrons and protons; their mass difference contributes to neutron stability.

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-1/3e
4.7 MeV/c^2
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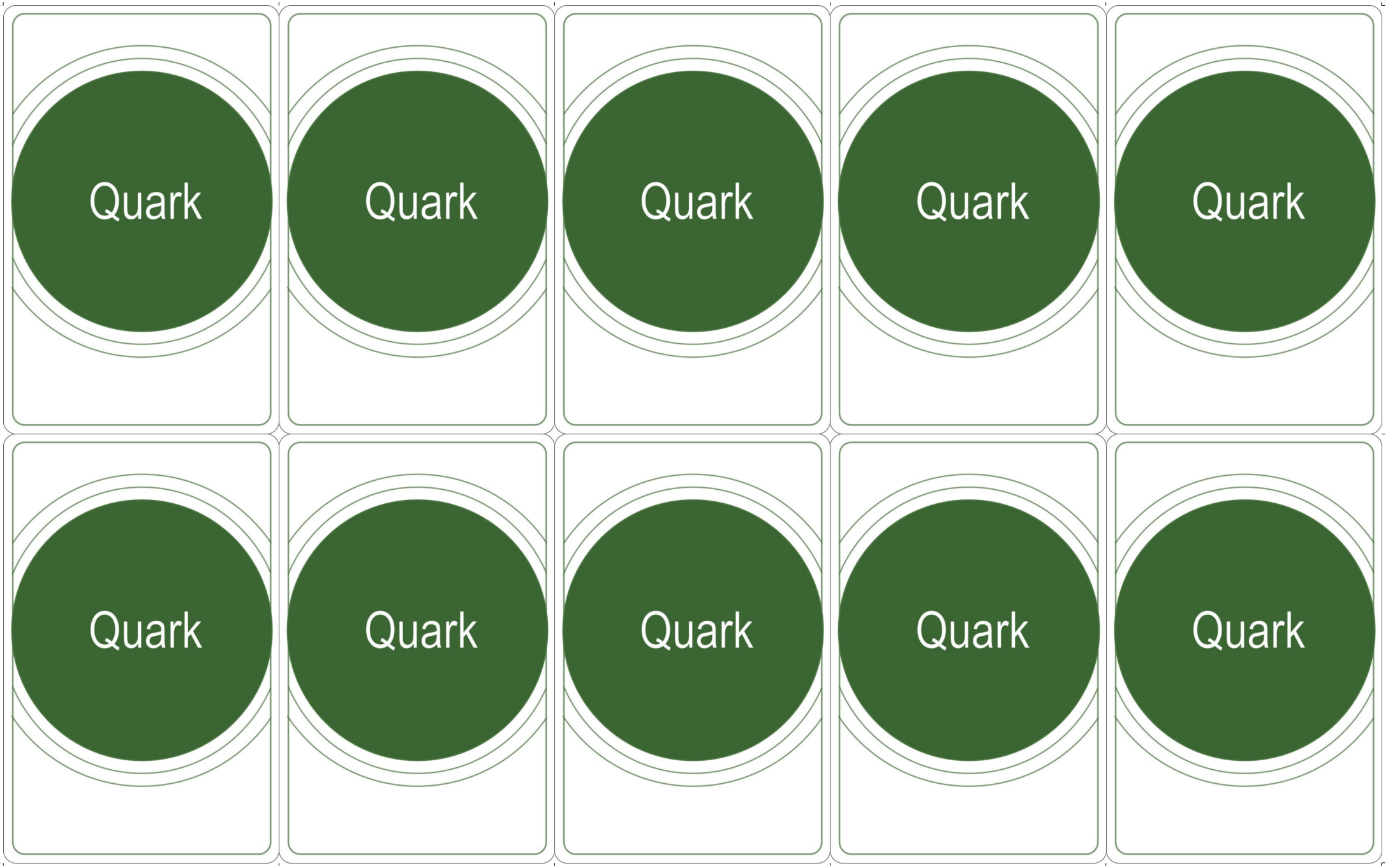
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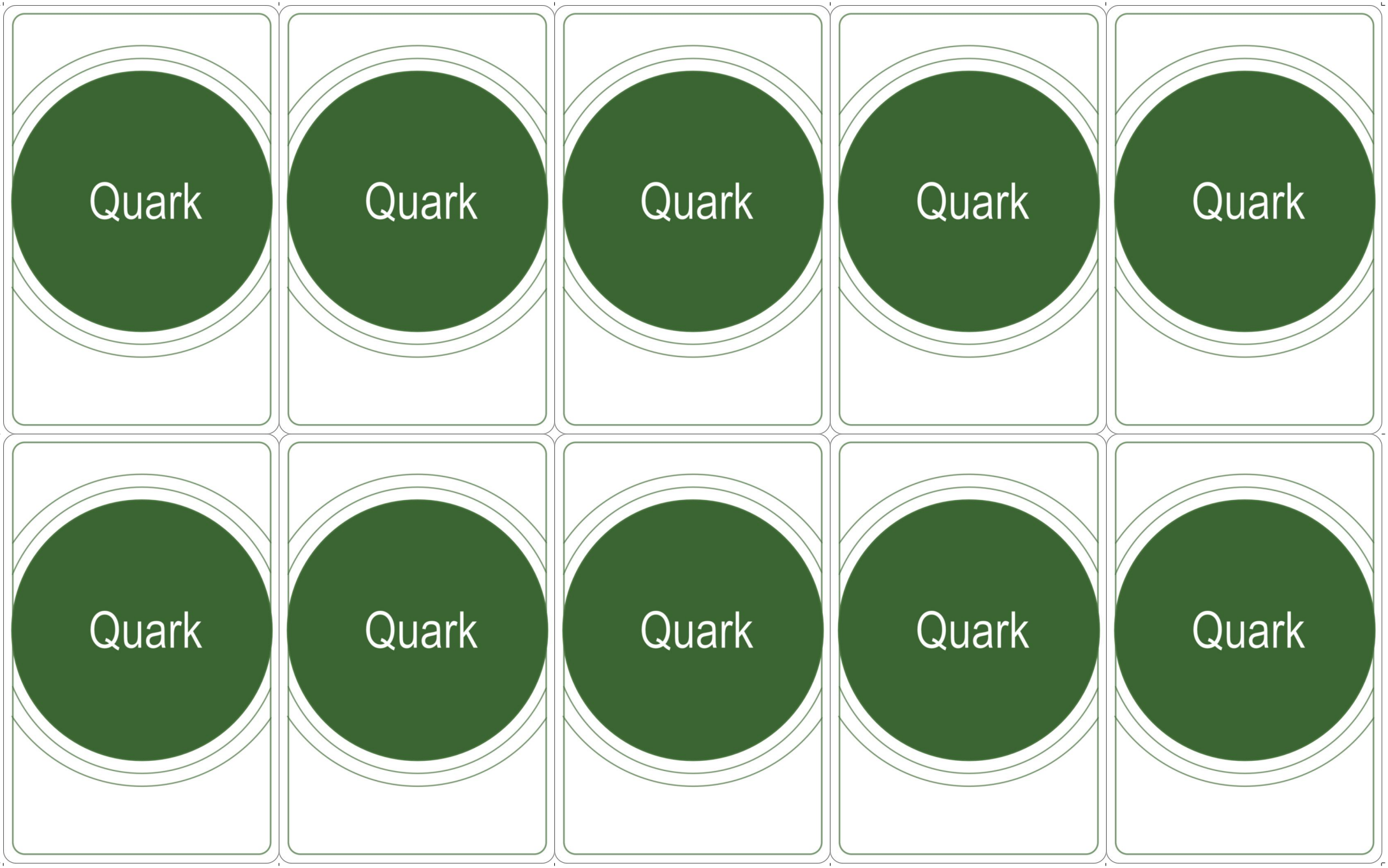
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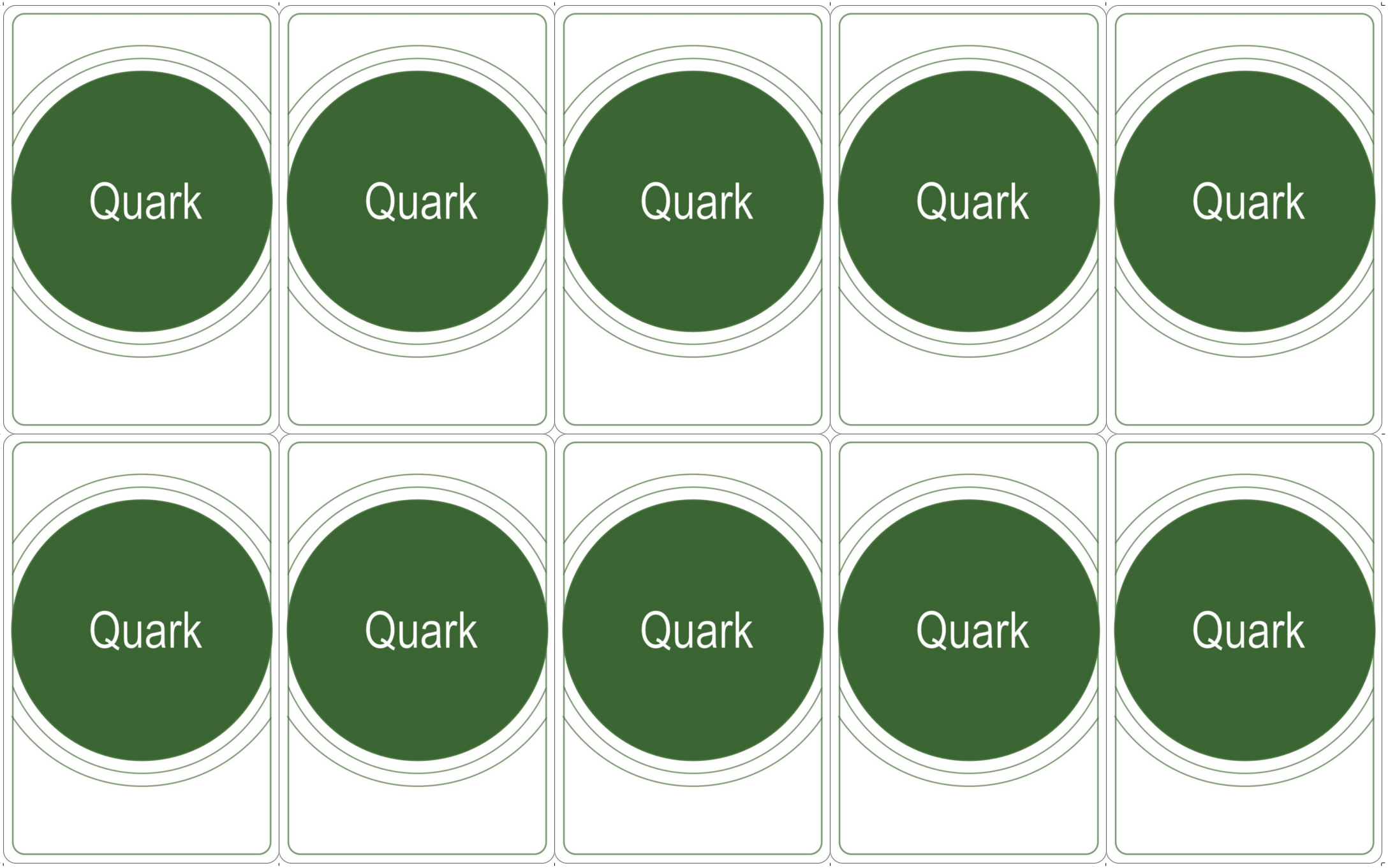
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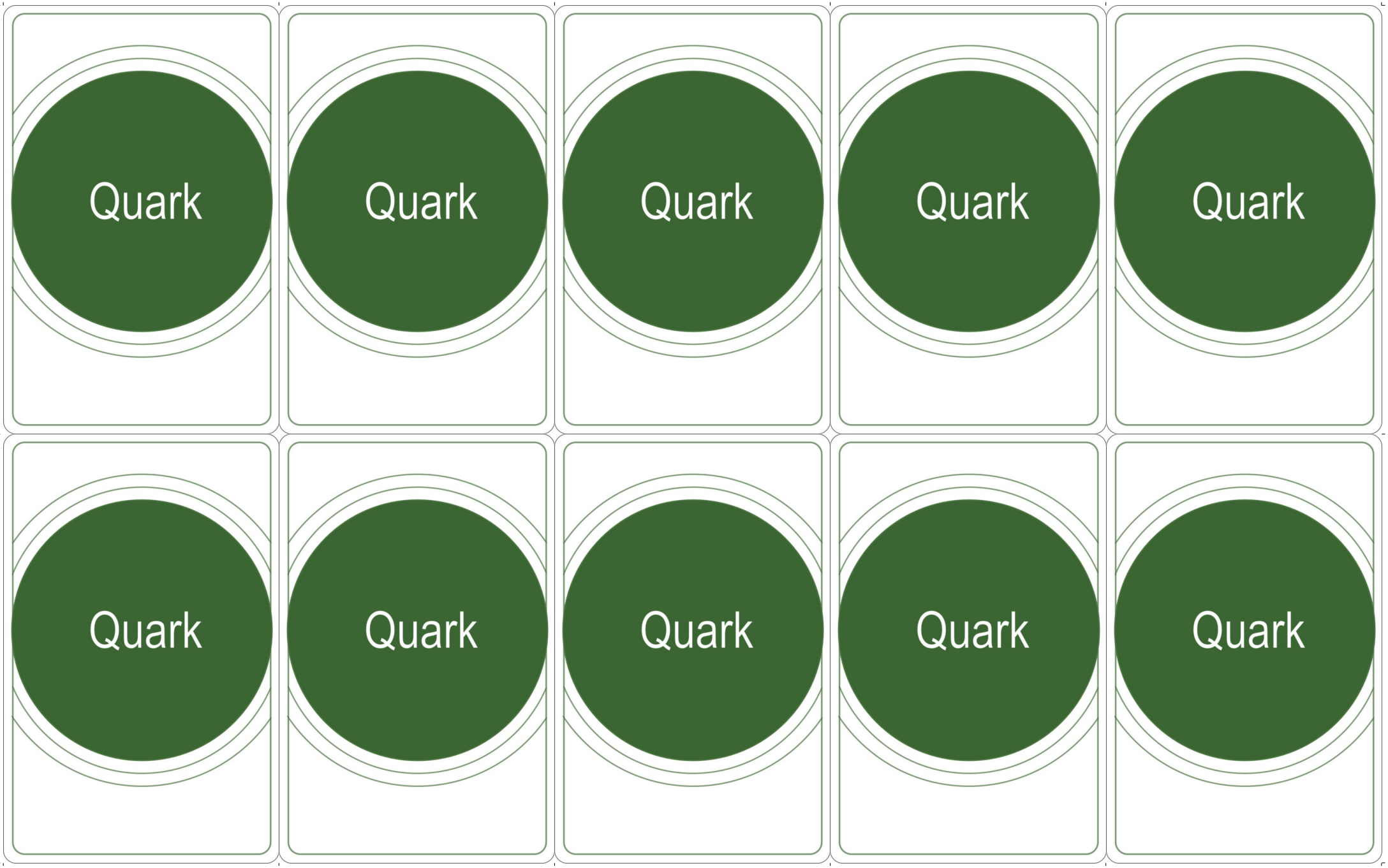
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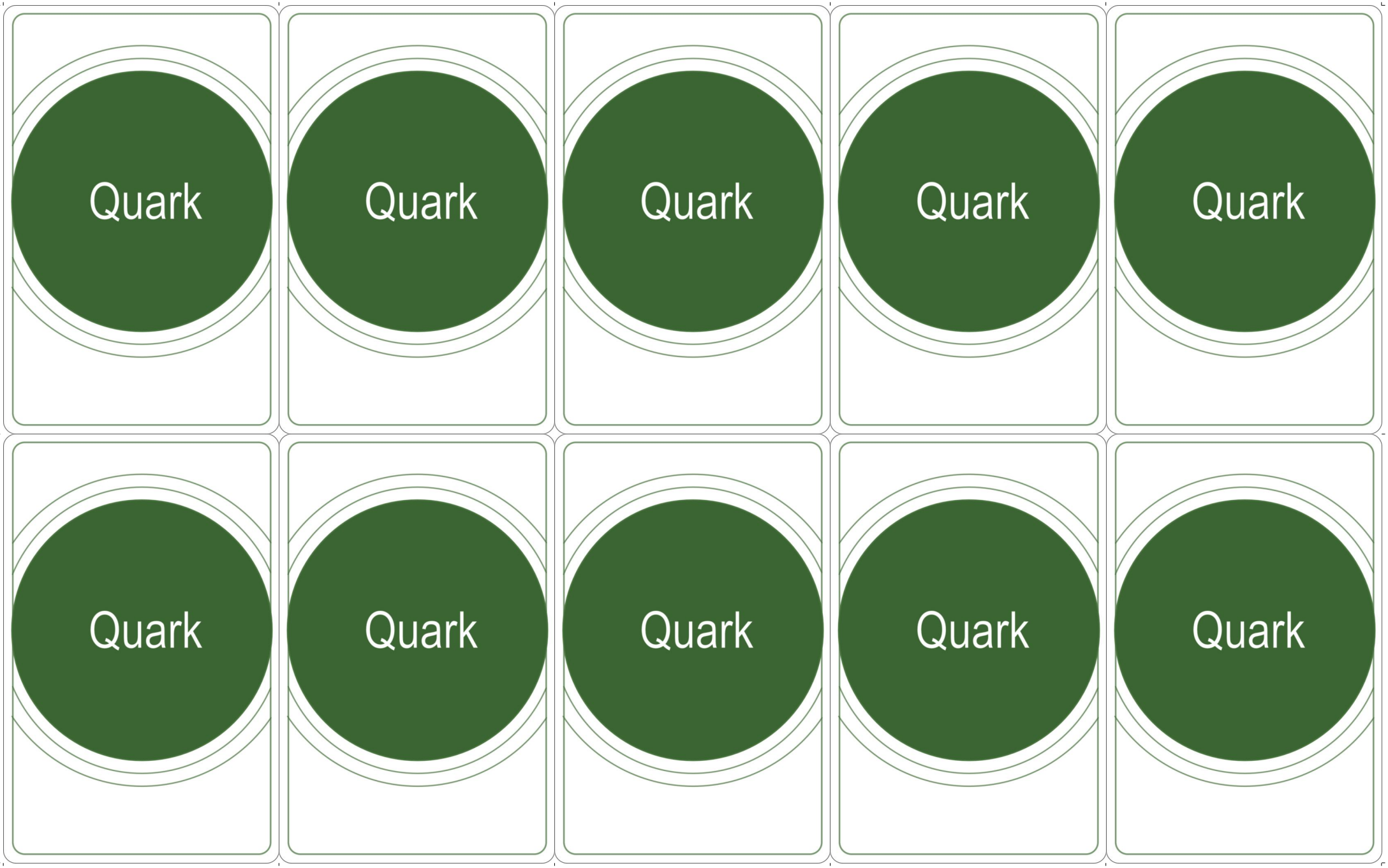
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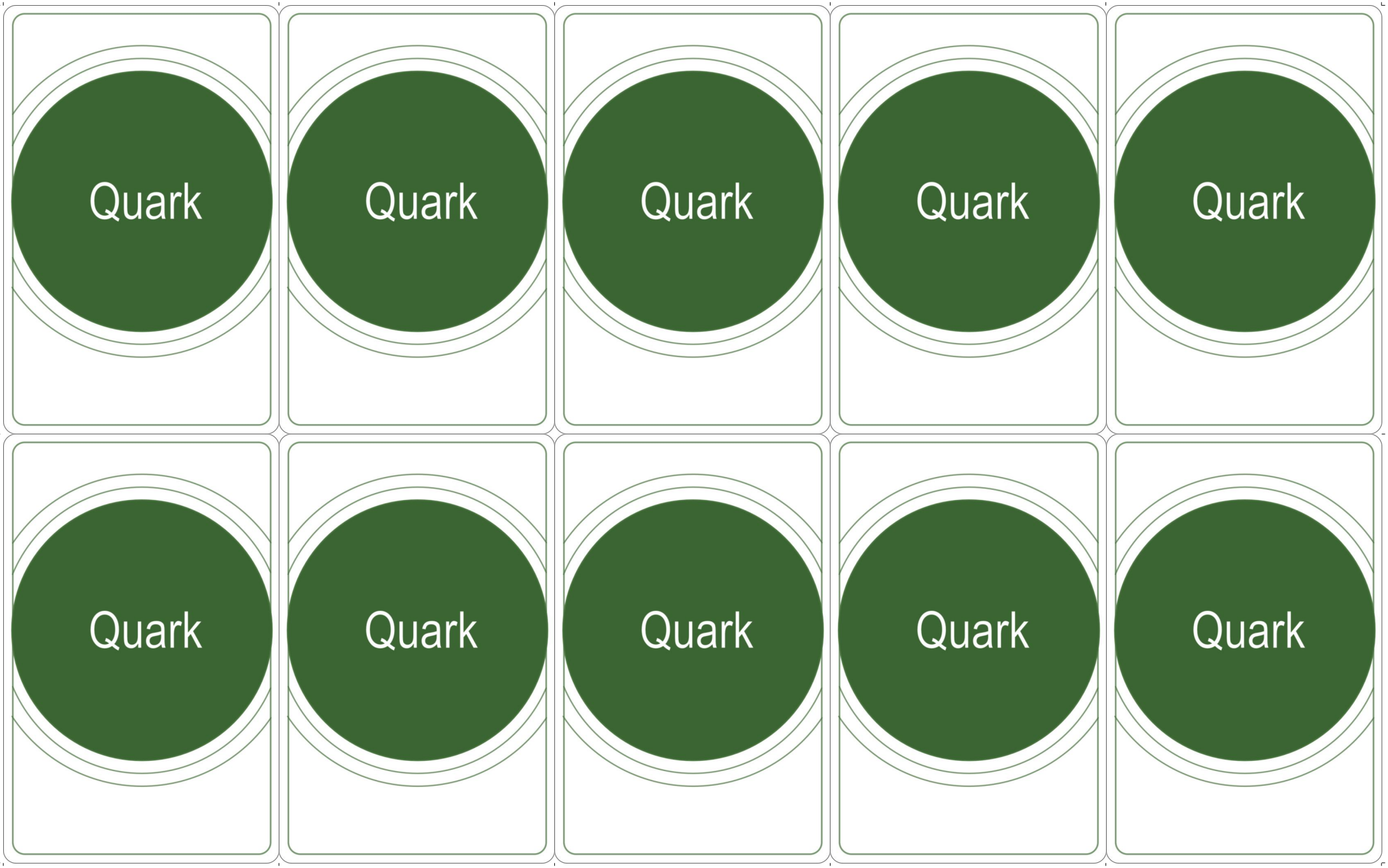
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$\bar{c}$
$\underline{s}$

-2/3e
1280 MeV/c^2
$\sim 10^{-13}$ s
1974

$\bar{c}$
Anti-Charmed Quark
$\underline{s}$

The charm quark was named for the “symmetry it brought to the subnuclear world”; its presence helped prevent "evil" particle decays that would otherwise spoil the theory.

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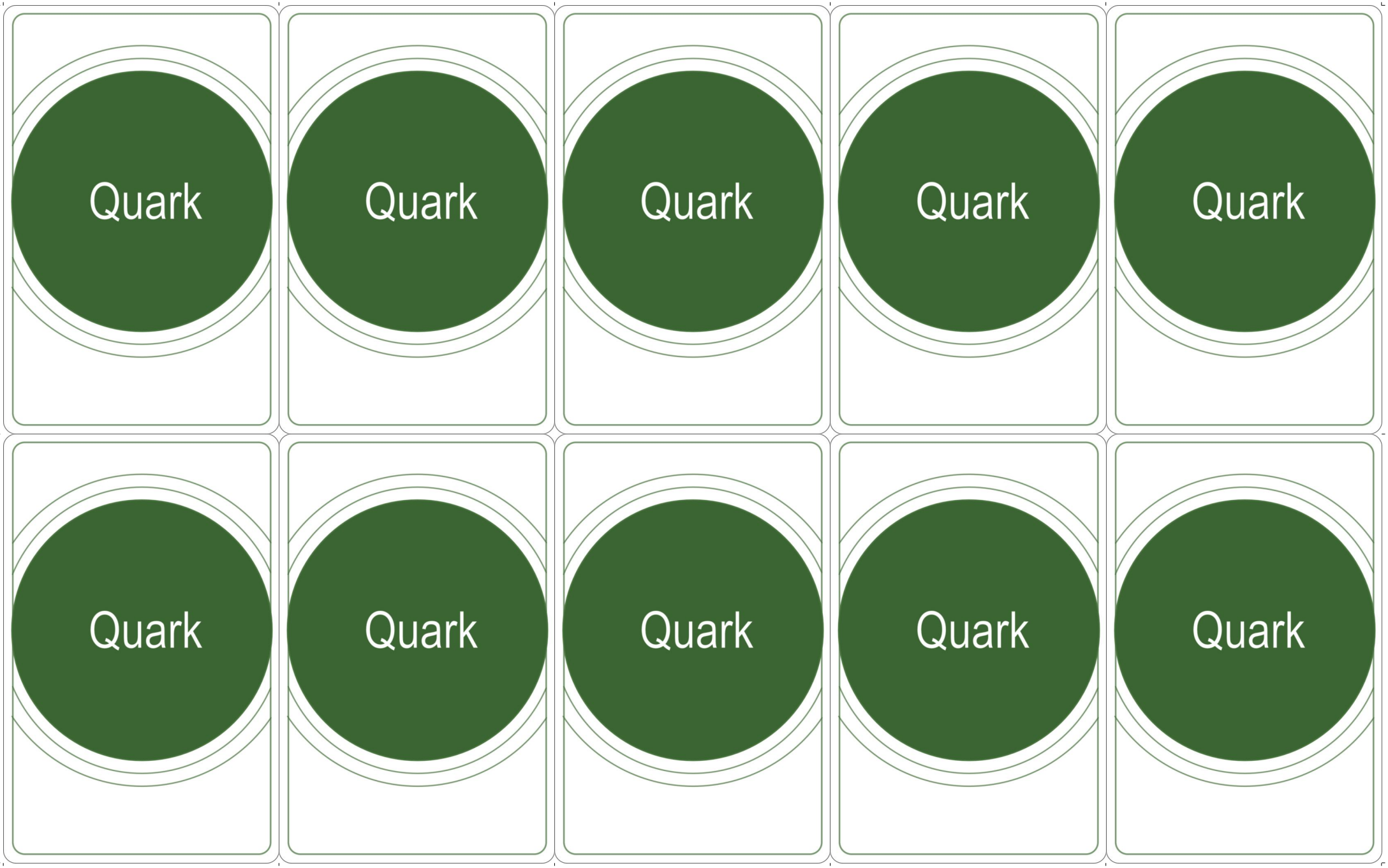
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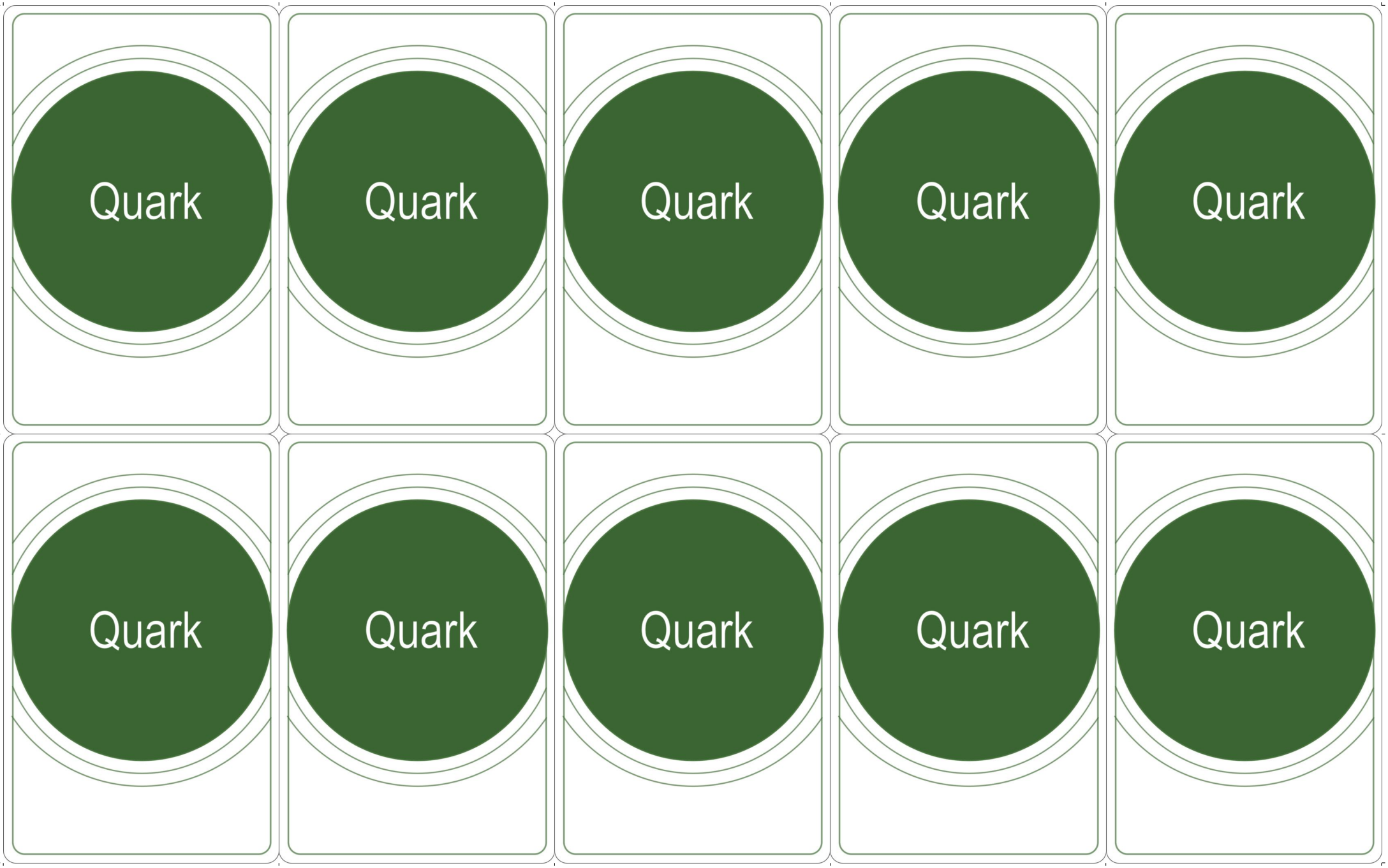
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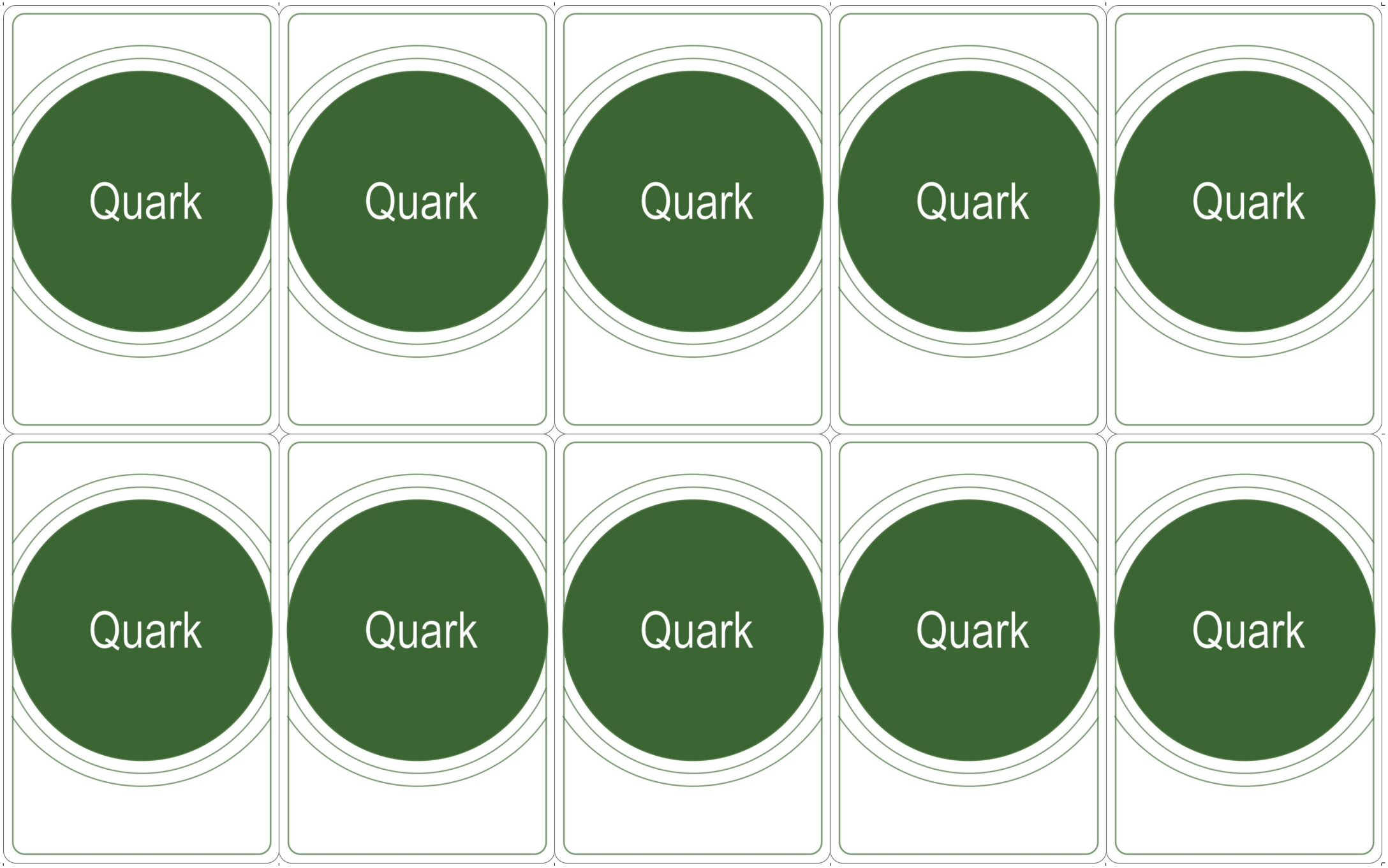
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s
d

-1/3e
96 MeV/c²
~10⁻⁸ s
1964

s

Strange Quark

p

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s
d

-1/3e
96 MeV/c²
~10⁻⁸ s
1964

s

Strange Quark

p

Strange quarks were named after the "strangely" long lifetime of the K particle, the first composite particle found to contain this quark.

$\bar{b}$
c

+1/3e
4180 MeV/c²
~10⁻¹² s
1977

$\bar{b}$

Anti-Bottom Quark

$\underline{c}$

The heavy third generation quarks Bottom and Top were sometimes called Beauty and Truth in the past, but even physicists thought that was too cute.

$\bar{b}$
c

+1/3e
4180 MeV/c²
~10⁻¹² s
1977

$\bar{b}$

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~10⁻¹² s
1977

$\bar{b}$

Anti-Bottom Quark

$\underline{c}$

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$\bar{t}$
$\bar{b}\bar{s}\bar{d}$

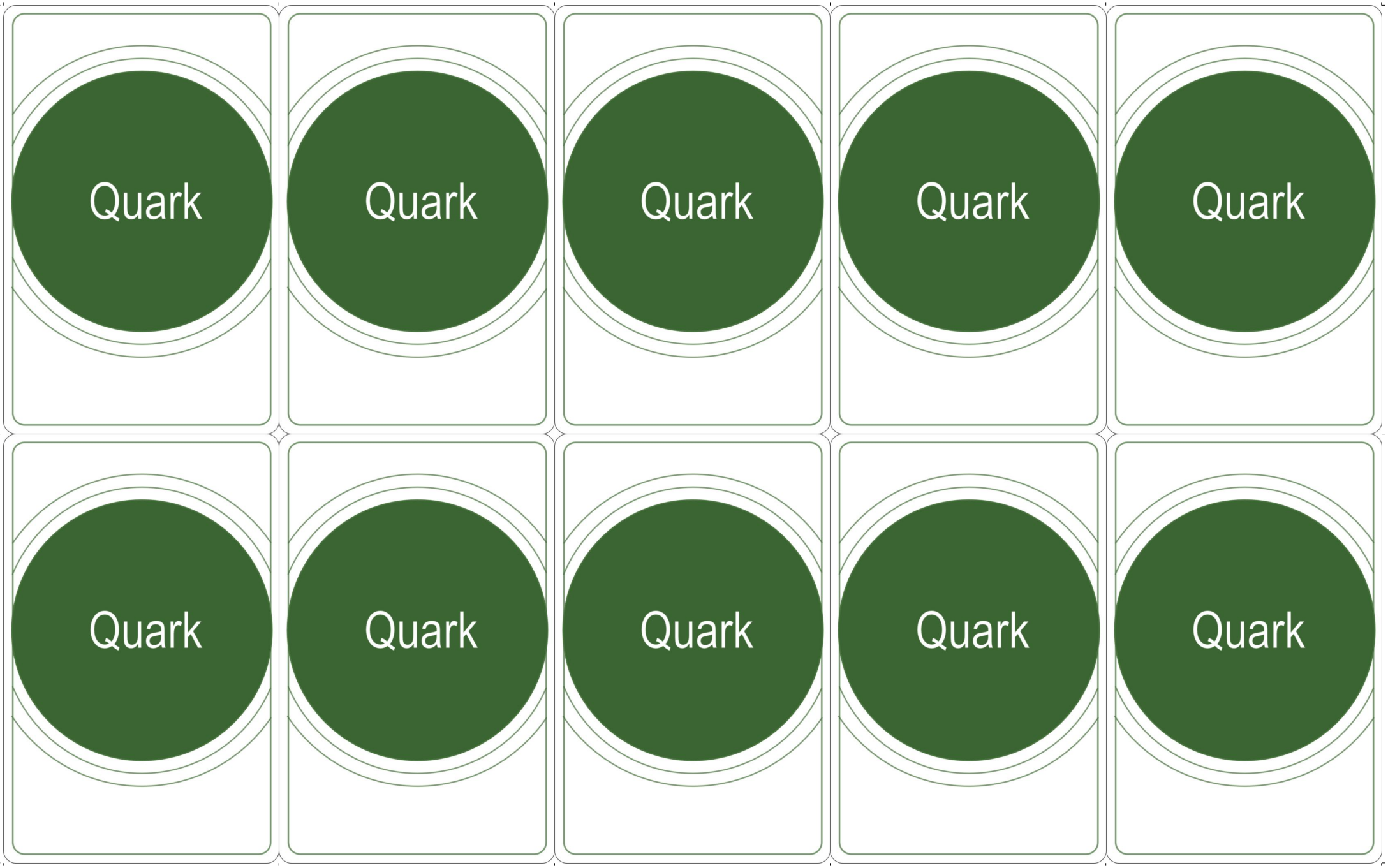
-2/3e
173100 MeV/c²
~5×10⁻²⁵ s
1995

$\bar{t}$

Anti-Top Quark

$\underline{p}\underline{s}\underline{q}$

Extremely short-lived antimatter partner of the top quark; its properties are tested in high-energy collider experiments.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$\bar{t}$
$\bar{b}\bar{s}\bar{d}$

-2/3e
173100 MeV/c²
~5×10⁻²⁵ s
1995

$\bar{t}$

Anti-Top Quark

psq

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b
c

-1/3e
4180 MeV/c²
~10⁻¹² s
1977

b

Bottom Quark

ɔ

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b
c

-1/3e
4180 MeV/c²
~10⁻¹² s
1977

b

Bottom Quark

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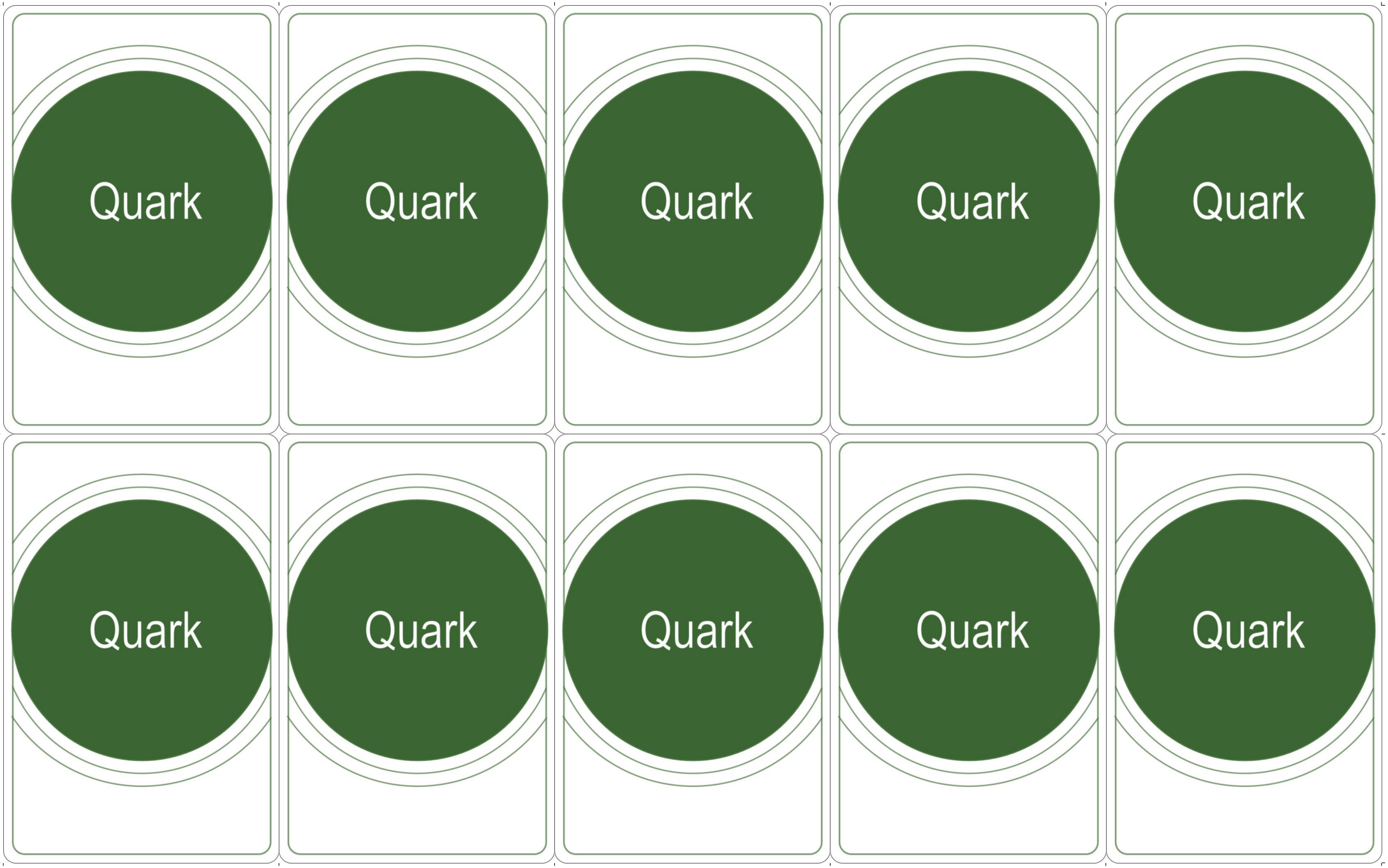
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Quark

b
c

-1/3e
4180 MeV/c²
~10⁻¹² s
1977

b

Bottom Quark

ɔ

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t
bsd

+2/3e
173100 MeV/c²
~5×10⁻²⁵ s
1995

t

Top Quark

psq

The top quark is the heaviest known elementary particle and decays so quickly it does not form hadrons, providing unique insights into the Standard Model.

t
bsd

+2/3e
173100 MeV/c²
~5×10⁻²⁵ s
1995

t

Top Quark

psq

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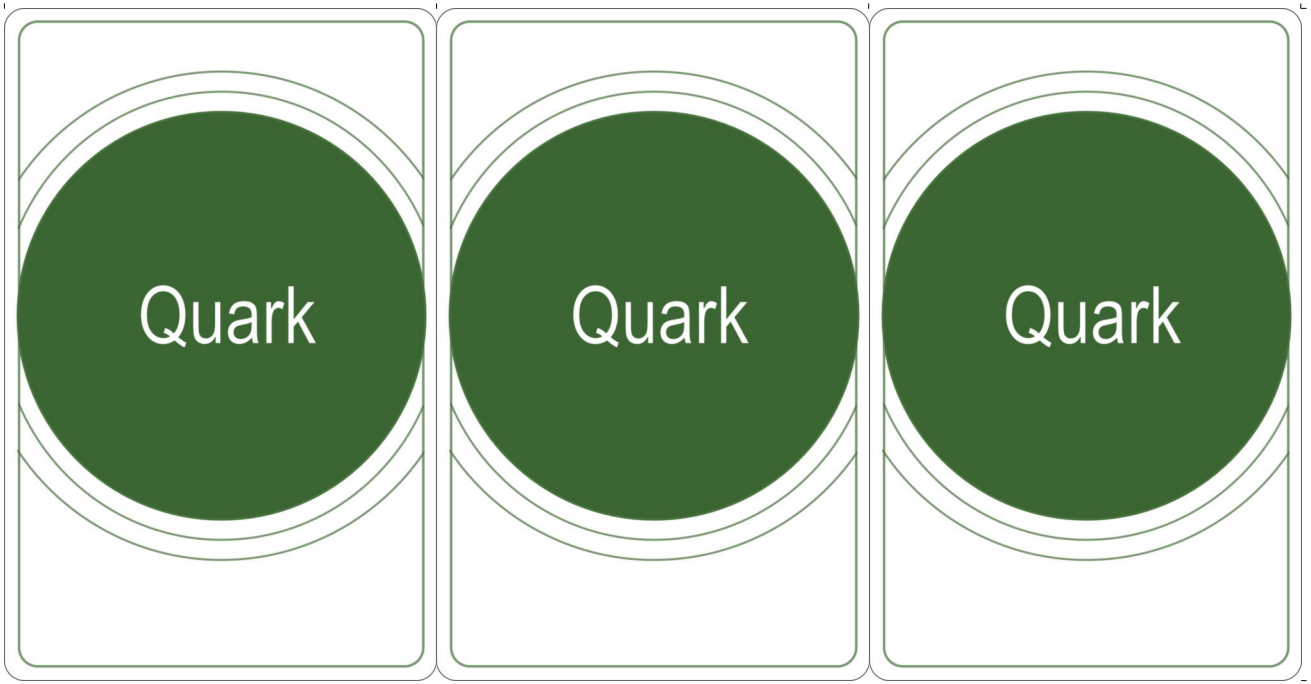
Quark
Quark
Quark