



ARTS3047

7cbhYa dcfUfm7 f]hVW`UbX`7 i `hi fU`H\Ycfm

HYfa `H\fYY`##`&\$%-



GWcc`cZH`Y`5ftg`UbX`A`YXJU`#`I`BGK`..5ftg`UbX`GcWJU`GWYbWg

7ci fgY`Cj Yfj]Yk

`GHUZZ7cbhUWhi8YHU]`g`

`7cbj Ybcfg`

B Ua Y	9a U]`	5j U]UV]]]m	@cWWhcb	D\cbY
G][]`>ch_UbXh	g"ch_UbXh4 i bgk "YXi "Ui	H\i fgXUmj`Uh%&	K YVghYf' %%>) *, %

GW\cc`7cbhUWhi`bZcfa Uh]cb

Fcca "` %&Z`Yj Y`` `F cVYfhK YVghYf'6i]X]b[

D\cbY. f\$&L'-',) `(,) *

9a U]: [gUa 4 i bgk "YXi "Ui](#)

K YVg]hY: [\hdg.#gUa "Ufhg"i bgk "YXi "Ui](#)

H\Y`GW\cc`cZhY`5fng`UbX`A YX]U`k ci `X``_Y`hc`F YgdYWwZ ``m5W_bck`YX[Y`hY`HfUX]h]cbU`7i g]cX]Ubgz`
hY`6YXY[U`fP`Ybg]b[hc b`WJa di gLz; UX][U`f7]mUbX`5fh/ `8Yg][b`7 Ua di gYgE`UbX`hY`B [i bbUk U`
dYcd`Y`f5i ghfU`]Ub`8YZYbWV: cfW`5WUXYa m]b`7 UbVYffUe`cZhY`UbXg`k \YfY`YUW`WJa di g`cZI`BGK`]g`
`cWWhYX"

7 ci fgY'8YHJ]`g

7 fYX]h'Dc]b'g *`

Gi a a UfmcZ'h'Y'7 ci fgY

Gi V'Y'W'h'5'f'Y'U.'7` Y'f'eZ

H\]g'W'ci fgY]b'f'c'X'i W'g'm'ci 'h'c'g'ca Y'c'Z'h'Y'W'b'f'U'`h'i' h'g'U'b'X'W'c'b'W'd'h'g']b'h'Y'_'Y'm]b'h'Y'`Y'W'h' U'`a' c'j' Ya' Y'b'h'g' U'b'X'h'Y'c'f]Y'g'Z'f'ca 'h'Y'Y'U'f'm'f'k' Y'b'h]Y'h' W'W'b'h' f'm'h'c' h'Y'd'f'Y'g'Y'b'h'U'g'h'Y'g'Y'V'Y'U'f'c'b'`]h'Y'f'U'f'm'U'b'U'm'g]g'`M'c'i' `k']` Y'I' U'a']b'Y'U'f'U'b[Y'c'Z'f'Y'U'h'X']g'g'i' Y'g']b'W'i' X]b[.

%` \c'k' h'Y'j' Y'f'm'U'g'g'i' a' d'h]c'b'g'c'Z'U'b[i' U[Y'z'W'c'a' a' i' b]W'h]c'b'U'b'X'a' Y'U'b]b[` \U'j' Y'V'Y'Y'b'ei' Y'g'h]c'b'Y'X'Z'f'ca' Y'U'f'm' h'k' Y'b'h]Y'h' W'W'b'h' f'm'h'c' h'Y'd'f'Y'g'Y'b'h'

&` h'Y'f'Y'!W'c'b'W'd'h]c'b'c'Z]X'Y'b'h]m'U'b'X']g']a' d'U'W'h'c'b'`]h'Y'f'U'f'm'W'c'b'g'h'f'i' W'h]c'b/

' ` h'Y'k' U'm'g'd'c']h]W'`g'h'f'i' W'h' f'Y'g'W'c'b'g'h'f'i' W'h'h'Y'f'Y'U'h]c'b'g']d' V'Y'h'k' Y'Y'b' \i' a' U'b'g'i' V'Y'W'g'U'b'X'c'V'Y'W'g'g'i' W'h'U'g' W'c'a' a' c'X]h]Y'g"

7 ci fgY '@YUfb]b[`C'i h'W'c'a' Y'g

%` X'Y'd'c'm'h'Y'c'f'Y'h]W'`h'i' h'g']b'`]h'Y'f'U'f'm'U'b'U'm'g]g
&` W'c'a' d'U'f'Y'j' U'f]c'i' g'h'Y'c'f'Y'h]W'`d'c'g]h]c'b'g'U'b'X'U'd'd'f'c'U'W'X'Y'g
' ` W'c'b'X'i' W'h'f'Y'g'Y'U'f'W']b'h'Y'U'f'Y'U'c'Z'W'c'b'h'Y'a' d'c'f'U'f'm'W'h]W'`h'Y'c'f'm
(` k' f]h'Y'U'W'Y'U'f'U'b'X'Z'i' Y'b'h'Y'g'g'U'm'Y'b[U[Y'X'k']h' h'Y'c'f'Y'h]W'`]g'g'i' Y'g
) ` k' c'f_]b'X'Y'd'Y'b'X'Y'b'h'm'U'b'X']b'W'c'`U'V'c'f'U'h]c'b

HYUW'X]b[`G'h'f'U'h'Y[]Y'g`

H\]g'W'ci fgY]g']b'Z'f'a' Y'X'V'm'U'b'U'd'd'f'c'U'W'X' h'c' h'Y'U'W'X]b[`U'b'X'`Y'U'f'b]b[`h'U'h'Z'c'g'h'f'g']b'h'f'U'W'h]j']m'z'g'h' X'Y'b'h'U[Y'b'W'h' U'b'X'h'Y'd'Y'U'g'i' f'Y'c'Z'_b'c'k' Y'X[Y'` `h'id'f'ca' c'h'Y'g'b'Y'k' `k' U'm'g'Z'c'f'g'h' X'Y'b'h'g' h'c' X'Y'j' Y'c'd' d'f'c'X'i' W'h]j' Y' d'c'g'g]V'`]h]Y'g' Z'f'ca' h'Y'X']g'W'd']b'U'f'm'V'U'g'Y'g'c'Z'h'Y']f'g'h' X'm'U'b'X' h'c' f'Y'W'c']b']g'Y' h'Y' d'c'h'Y'b'h]U']b']b'h'Y'f'X']g'W'd']b'U'f'm'Y'b[U[Y'a' Y'b'h]b' h'Y' \i' a' U'b]h]Y'g' "5'g'U'h']f'X' n'Y'U'f'W'c'i' f'g'Y'z']h'id'f'ca' c'h'Y'g']b'X'Y'd'Y'b'X'Y'b'h'`Y'U'f'b]b[`U'g'f'Y'Z'Y'W'Y'X']b'g'h' X'Y'b'h'Z'c'W'g'g'Y'X' g'Y'a']b'U'f'g'z'h'Y'Y'a' d' \U'g]g'c'b' f'Y'g'Y'U'f'W'z'U'b'X'h'Y'W'c'i' f'g'Y'g'm'a' d'c'g]i' a' "H' \Y'f'Y'k']`V'Y'U'c'b'Y'! \c'i' f'`Y'W'h' f'Y'Y'U'W'X' k' Y'Y'_"5'`Y'W'h' f'Y']g'a' c'f'Y' h'U'b'U'd'f'Y'g'Y'b'h]h]c'b'c'Z]b'Z'f'a' U'h]c'b/]h]g'U'b'U'W'h]j' Y'U'b'X']b'h'f'U'W'h]j' Y'Z'f'i' a' `k' \Y'f'Y']X'Y'U'g'U'b'X'f'Y'U'X]b[`d'f'U'W'h]W'g'U'f'Y'f'Y' \Y'U'f'g'Y'X'z'h'Y'g'h'X'U'b'X'W'X'U'Y'b[Y'X'` `h]g'h'Y'g']h'Y'k' \Y'f'Y'g'h' X'Y'b'h'g' Y'b'W'c'i' b'h'f' h'Y'W'c'bj' Y'b'h]c'b'g'c'Z'd'f'Y'g'Y'b'h]b[`U'W'X'Y'a']W'f'Y'g'Y'U'f'W'X'U'b'X'g'h]U[]b[`U'W'X'Y'a']W'X'Y'V'U'h'`"@Y'W'h' f'Y' U'h'Y' b'X'U'b'W'`]g'g'i' d'd'c'f'h'X'V'm'f'k' c' f'Y'j']g]c'b' h'c'c'g' Y'W'X'c' *\$`U'b'X'c'b!`]b'Y'a' U'h'Y'f]U'`d'c'g'h'X']b'h'Y'k' Y'Y'_U'Z'Y'f'h'Y' `Y'W'h' f'Y'`B'Y']h'Y'f'c'Z'h'Y'g'Y'g'i' d'd'c'f'h]g']g'U'f'Y'd'U'W'`a' Y'b'h'Z'c'f'U'h'Y'b'X'U'b'W'`H' \Y'Y'W'X'c' *\$`]g'U'f'Y'W'c'f'X'c'Z'U'b'Y'j' Y'b'h' b'c'h'U'g'i' a' a' U'f'm'c'Z']b'Z'f'a' U'h]c'b'` `b' _Y'Y'd]b[`k']h' h'Y'c'V'Y'W'h]j' Y'g'c'Z'h']f'X'!m'Y'U'f'g'h' X'm'z'h'Y'g'Y'a']b'U'f'a' c'X'Y' d'f'c'j']X'Y'g'U'a' c'f'Y']b'X'Y'd'Y'b'X'Y'b'h'U'b'X'W'c'`U'V'c'f'U'h]j' Y'`Y'U'f'b]b[`Y'bj']f'c'ba' Y'b'h'k' \]Y'Z' `m'g'i' d'd'c'f'h'X'U'b'X'X']f'Y'W'Y'X'z' h'Y'g'Y'a']b'U'f'U'`c'k'g'g'h' X'Y'b'h'g' h'c'U'g'g'i' a' Y']b'W'f'Y'U'g'Y'X'f'Y'g'd'c'b'g]V']m'Z'c'f'h'Y'X']f'Y'W'h]c'b'c'Z'Y'U'W'X' W'U'g'g'U'b'X'Z'c'f'h'Y'Z'f'a' i' U'h]c'b'c'Z'f'Y'g'Y'U'f'W'X' h'U'g_g'`H' \Y'm'U'f'Y'U'g'c'U'V'Y' h'c' W'h]W'`m'f'Y'Z'Y'W'h]c'b' h'Y'f'c'k' b'd'f'c'W'g'g'Y'g'c'Z'Y'U'f'b]b[`z' k' \]W'X']g'c'Z'd'U'f'h]W'U'f']a' d'c'f'U'b'W'`]b'U'W'c'i' f'g'Y']b'f'c'X'i' W]b[`b'Y'k' W'h]W'`f'Y'U'X]b[`d'f'U'W'h]W'g'`H' \Y'g'Y'a']b'U'f' f'Y'ei']f'Y'g'Y'U'W'X'g'h' X'Y'b'h'c' `i' b'X'Y'f'U'_Y' . d'f'Y'd'U'f'U'h]c'b'z']b'W'i' X]b[`g'ca' Y'W'c'`U'V'c'f'U'h]c'b'k']h' c'h'Y'f'g'h' X'Y'b'h'g' /X']g'W'g'g]c'b'U'b'X'd'f'Y'g'Y'b'h]h]c'b'g'W'c'`U'V'c'f'U'h]j' Y'k' c'f_]b'g'a' U'` [f'c'i' d'g'`H'c'k' U'f'X'g'h'Y'Y'b'X'c'Z'h'Y'W'c'i' f'g'Y'k'Y'k']` \c'X'U'h'Y'a' Y'X'G'm'a' d'c'g]i' a']b'd'U'W'`c'Z'g'Y'a']b'U'f'g'`D'f'Y'!U'f'f'U'b[Y'X' [f'c'i' d'g'k']`Y'U'W'X' []j' Y'U'`%&'a']b'i' h'Y' d'f'Y'g'Y'b'h]h]c'b'c'b'U'h'c'd]W'h'U'h' \U'g'V'Y'Y'b'U'd'd'f'c'j' Y'X'V'm'f'h'Y'W'c'bj' Y'b'c'f'`H' \]g'k']`Y'b'U'V'Y'g'h' X'Y'b'h'g' h'c'Y'b[U[Y'k']h' h'Y'Z' `f'U'b[Y'c'Z'h'd]W'g'U'b'X']b'h'f'Y'g'g'f'U]g'Y'X']b'h'Y'W'c'i' f'g'Y'U'b'X' h'c'g'h' U'h'Y'f'c'k' b'd'c'g]h]c'b'U'g'U'b

5ggYgga Ybh

A midfYZffYX'fYZfYbW]b['ghmY'Zcf'kY'A U'cf'YggUm]g'A cXYfb'@Ub[i U[Yg'5ggcW]U]cb'fA @5'ghmY' : cf Yl Ua d'Yg'cZ\ck 'hc' i gY'k]gžgYY

[\hdg.#ghmY"a`U"cf\[#cf_g!W\]hX!U!ei \]W!\[i \]XY#](#)

[\hd.#\]VfUfm'WcbWcfX\]U"WU#AY'd#W\]hb\[#a`U"d\ d](#)

5ggYgga YbhHUg_g`

5ggYgga YbhHUg_	K Y][\h	8i Y'8UH	Gh XYbh@YUfb]b[Ci hWca Yg'5ggYggYX
6`c['FYZYW]cb'fUg_	&\$!	\$, #/##&\$%- '\$) . \$\$'DA	%ž&ž ž
Gma dcg]i a 'DfYgYb]U]cb'	' \$!	%(#/##&\$%- '\$+ . \$\$'DA	%ž&ž ž
A U'cf'YggUm) \$!	&- #/##&\$%- '\$) . \$\$'DA	%ž&ž ž(ž)

5ggYgga Ybh8YHJ]`g

5ggYgga Ybh% '6`c['FYZYW]cb'fUg_

GhUfhXUH.

@Yb[h. '%\$\$\$

8YHJ]`g. '%\$\$\$'k cfXg]b'hcU""@cW]h'U'W' h' fU'cf']h'fUfm]h' h'UbX'k f]h'U'fYZYW]cb'cb']h'Yl d'cf]b['\ck]h]'i ghU]h'g'cbY'cZ'hY'h'YcfY]W]`WcbW]d]g'Zca 'h'Y'Wci fgY""8c'h.]g'Zcf'h'fY'X]Z]fYbhk YY_'m]hd]W]g""Mci a UmbchV'c['cb'h'Y'h'cd]WcZmci f'Gma dcg]i a 'dfYgYb]U]cb'Vi ha UmV'c['cb'h'Y'h'YcfY]W]`WcbW]dhmci XYU'k]h']b' mci f'a U'cf'YggUm]Gi Va]gg]cb'bc]h'g. 'GhU[[YfYX'gi Va]gg]cbg'cb'Wci fgY'fYUXYf'V'c['Zca k YY_'&'K f]h'Y'b'Z]YXVUW_'UbX'bi a Yf]W]`[fUXY'j]U'@A G"

Hi fb]h]b'gYH]b[. 'H\]g']g'bchU'Hi fb]h]b'Ugg][ba Ybh

5ggYgga Ybh& 'Gma dcg]i a 'DfYgYb]U]cb

GhUfhXUH. '%+##\$#&\$%- '\$- . \$\$'5A

8YHJ]`g. 'H\Y'Gma dcg]i a ']g'U'a]b]!WcbZfYbW'fi b'Vmi'h'Y'gh'XYbhg'h'ck UfXg'h'Y'YbX'cZ'h'Y'Wci fgY" Gh XYbhg'UfY'cf[Ub]gYX']b]c' [fci dg'UbX'a Y]hcb']bY'UbX'Z]W' h'c'Z]W' h'c' dfYdUfY'h'Y]f' dfYgYb]U]cb'cb'U h'Yl h'Zca 'h'Y'Z]bU'a cXi 'Y']b'h'Y'Wci fgY""H\]g']g'h'Y'Z]bU'UggYgga YbhHUg_"Gh XYbhg'fYW]j' Y'U'a Uf_g\Y]h h'UhXYHJ]`g' h'c' [fUXYg'cbY'Zcf'h'Y' [fci d'k cf_'Ug'U'k \c'Y'UbX'cbY'Zcf'h'Y]f']bX]j]Xi U' Wcb]f]Vi h]cb"K f]h'Y'b'Z]YXVUW_'UbX'bi a Yf]W]`[fUXY'j]U'@A G"

5XX]h]cbU'XYHJ]`g.

H\]g'mYUfžk Y'k]''\c'X' h'c' '7 f]h]W]'H\Ycfm]Gma dcg]U"

D`YUgY`bchZmci`UfY`cb`mifYei`]fYX`hc`dfYgYbhUhcby`cZhYa`zY]hYf`Uh`hY`gYa`]bUf`cZ%+h`C`W`cVYfz`cf`Uh`hY`gYa`]bUf`cZ%(`h`Bcj`Ya`VYf`"

5ggYgga Ybh' . A U`cf`YggUm

GHUfhXUH`.

8YHJ`g.`&) \$\$`k`cfXg`"H\]g`]g`hY`Z]bU`UggYgga YbhUg_"Gh`XYbhg`k`j`"fYW]j`Y`k`f]hYb`ZYXVUW`_UbX`U`bi`a`Yf]W`" [fUXY`"

Hi`fb]h]b`gYh]b[.`H\]g`Ugg][`ba`Ybh]g`gi`Va`]hYX`h`fci`[\`Hi`fb]h]b`UbX`gh`XYbhg`Xc`bchgYY`Hi`fb]h]b`g]a`]Uf]mifYdcfng`"

F Ygci fWg

DfYgWf]VYX 'F Ygci fWg'

A cghcZHY 'fYei]fYX' hI hg' UfY' Zca' 'hY'

Gi Va]gg]cb`cZ5ggYgga YbhHUg_g

Gi Va]gg]cb`cZ5ggYgga YbhHUg_g

Hi fb]h]b`Gi Va]gg]cb

≠mci`YbWci bHYf`U`dfcV`Ya`k`Yb`U`HYa`dh]b[`hc`gi`Va`]hmc`i`f`Ugg][`ba`Ybh`h`fci`[`\`Hi`fb]h]b`z`d`YUgY`
HY`Yd`cbY`9I`HYfbU`Gi`ddcfhcb`-`,`),`'`,`'`,`%cf`Ya`U]`h`Ya`cb`YI`HYfbU`HY`hgi`ddcfh4`i`bgk`"YXi`"Ui`"Gi`ddcfh`
`ci`fg`UfY`,`.\$\$Ua`-`%\$.\$\$da`cb`k`YY`XUmg`UbX`-`.\$\$Ua`-`,`).\$\$da`cb`k`YY`YbXg`f1`*)`XUmg`U`mY`UfL`≠mci`
UfY`i`bUV`Y`hc`gi`Va`]hmc`i`f`Ugg][`ba`YbhXi`Y`hc`U`ZU`ihk`]h`Hi`fb]h]b`mci`a`Um`Udd`mi`Zc`f`Ub`YI`HYbg]cb`z`Vi`hmc`i`
a`i`ghfY`hU]b`mci`f`h]W`Yhbi`a`VYf`Zca`9I`HYfbU`Gi`ddcfhfU`cb[`k`]h`Ubmc`h`Yf`fY`Yj`UbhXcW`a`Yb`hg`L`hc`
]bWi`XY`Ug`Yj`]XYbW`hc`gi`ddcfhmc`i`f`YI`HYbg]cb`Udd`]W]h]cb"≠mci`Ya`U]`9I`HYfbU`Gi`ddcfhmc`i`k`]"`

5 WUXYa]W<c bYghmUbX`D`U[]Uf]ga

D`U[]Uf]ga `]g`i g]b[`hY`k cfXg`cf]XYUg`cZchYfg`UbX`dfYgYbh]b[`hYa `Ug`mci f`ck b" `hWUb`hU`Y`a Ubm
Zcfa gž`Zca `XY`]VYfUHY`WXYU]b[`hc`UWV]XYbhU`mW`dm]b[`Zca `U`gci fW`k]h`ci hUW_bck`YX[Ya Ybh`

I BGK `[fci dg`d`U[]Uf]ga `]bhc`hY`Zc`ck]b[`WUHY`[cf]Yg.

7cdm]b[.`i g]b[`hY`gUa Y`cf`j Yfmg]a]Uf`k cfXg`hc`hY`cf][]bU`hYI hcf]XYU`k]h`ci hUW_bck`YX[]b[`hY`
gci fW`cf`i g]b[`ei chU]cb`a Uf_g" `H\]g`U`gc`Udd`]Yg`hc`]a U[YgžUfhUbX`XYg][b`dfc`YWgžUg`k Y`Ug
dfYgYbhU]cbg`k \YfY`gca YcbY`dfYgYbh]g`UbchYf`g]XYUg`cf`k cfXg`k]h`ci hWYX]h`

hUddfcdf]UHY`dUfUd`fUg]b[.`7`Ub[]b[`U`ZYk`k cfXg`UbX`d`fUgYg`k`Y`a cghmifYU]b]b[`hY`cf][]bU`
ghfi W`fY`UbX`#`f`dfc[fYgg]cb`cZ]XYUg`cZ`hY`cf][]bU`ž`UbX`]bZcfa U]cb`k]h`ci hUW_bck`YX[Ya Ybh`H\]g`U`gc
Udd`]Yg`]b`dfYgYbhU]cbg`k \YfY`gca YcbY`dUfUd`fUgYg`UbchYf`g]XYUg`cf`k cfXg`k]h`ci hWYX]hU`bX`hc
d]YW]b[`hc[YhYf`ei chYg`UbX`dUfUd`fUgYg`]bhc`U`bYk`k \c`Yž`k]h`ci hUddfcdf]UHY`fYZYfYbW]b["

7c`i g]cb.`k cf_]b[`k]h`chYfg`Vi hdUgg]b[`cZ`hY`k cf_]Ug`U`dYfgcb`g`]bX]j]Xi U`k cf_]7c`i g]cb`U`gc
]bWi XYg`dfcj]X]b[`mci f`k cf_]hc`UbchYf`gh`XYbhVYZc`fY`hY`Xi Y`XUHYž`cf`Zc`f`hY`di fdcgY`cZ`hY`a

- i bXYfghUbx'mci f'f][\hg'UbX'fYgdcbg]V]h]Yg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[]Uf]ga ž'Wc'dmf][\hž' BGK 'Gh XYbh7cXY'cZ7cbXi W'Ubx'5Ww'dhUV'Y'I gY'cZ I BGK '⇒H'F Ygci fW'g'Dc`]Wm
- VY'Uk UfY'cZh'Y'ghUbxUfXg'cZVY\Uj]ci f'YI dYW'X'cZYj Yfmcby`]b'h'Y'I BGK 'Wc'a a i b]m
- `cWJh'gYfj]Wg'UbX']bZcfa Uh'cb'UVci hl BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZh'YgY'UfYUg'k]`VY'ZJa]]Uf'hc'mci ž'c'h'Yfg'k]`VY'bYk "; U]b]b['U'gc`X'i bXYfghUbx]b['cZU`h'Y fY'UH'X'UgdYW'g'cZ9@G9'k]`Y'd'mci 'a U_Y'h'Y'a cghcZmci f'gh X]Yg'Uhl BGK ""

[\hhd.##ji V'YWf'i \]XYg" \]VfUfm'i bgk "YXi "Ui #' \]gY#JVci h' \]gY](#)

5 WUXYa]WbZcfa Uhcb`

: cfYggYbhU`ghi XYbh]bZcfa Uhcb`fY`Uh]b[`rc.

- fYei Ygh`ZcfYI hYbg]cb/
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