

iemisc: Construction Measurement Examples

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Replicate the R code

Note: If you wish to replicate the R code below, then you will need to copy and paste the following commands in R first (to make sure you have all the packages and their dependencies):

```
install.packages(c("install.load", "iemisc", "units"))  
# install the packages and their dependencies
```

```
# load the required packages  
install.load::load_package("iemisc", "units")  
# load needed packages using the load_package function from the install.load  
# package (it is assumed that you have already installed these packages)
```

```
import::from(fpCompare, "%==%")
```

Fraction (or Mixed number) to a Decimal (Numeric Vector)

Example 1

```
trxt <- "1 1/3"

frac_to_numeric(trxt)

## [1] 1.333333

tlrxy <- "4 1/8 inches"

frac_to_numeric(tlrxy)

## [1] 4.125

tmrxy <- "12 13/16 inches"

frac_to_numeric(tmrxy)

## [1] 12.8125
```

Construction Decimal

Example 1

```
t1 <- "34'-3 1/2\"
t2 <- "34-3 1/2\"
t3 <- "34' 3 1/2\"
t4 <- "34'-3 1/2"
t5 <- "34-3 1/2"
t6 <- "34 3 1/2"
t7 <- "34 ft 3 1/2 in"
t8 <- "34 3 1/2"
t9 <- "34 fts 3 1/2 in"
t10 <- "34 foot 3 1/2 in"
t11 <- "34 foot 3 1/2 inch"
t12 <- "34 foot 3 1/2 in"
t13 <- "34 feet 3 1/2 in"
t14 <- "34 feet 3 1/2 inch"
t15 <- "34 feet 3 1/2 in"
t16 <- "34 FEET 3 1/2 IN"

# a)
```

```

(construction_decimal(t1, result = "traditional", output = "vector") * construction_decimal(t2,
  result = "traditional", output = "vector") * 4)/43560 # acres

## [1] 0.1079815
# b)

(construction_decimal(t1, result = "traditional", output = "vector")^2 * 4)/43560 # acres

## [1] 0.1079815
# a) and b) can be expressed using the following as well:

t1_ft2 <- set_units((construction_decimal(t1, result = "traditional", output = "vector") *
  construction_decimal(t2, result = "traditional", output = "vector") * 4), US_survey_foot^2)

t1_acres <- t1_ft2

units(t1_acres) <- make_units(acre)
t1_acres

## 0.1079815 [acre]

t1_ft2s <- set_units((construction_decimal(t1, result = "traditional", output = "vector")^2 *
  4), US_survey_foot^2)

t1_acress <- t1_ft2s

units(t1_acress) <- make_units(acre)
t1_acress

## 0.1079815 [acre]

sum(construction_decimal(t1, result = "traditional", output = "vector"), construction_decimal(t2,
  result = "traditional", output = "vector"), construction_decimal(t3, result = "traditional",
  output = "vector"), construction_decimal(t4, result = "traditional", output = "vector"),
  construction_decimal(t5, result = "traditional", output = "vector"))

## [1] 171.4583
# traditional result for t1 - t16

construction_decimal(t1, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t2, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t3, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t4, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t5, result = "traditional", output = "vector")

```

```

## [1] 34.29167
construction_decimal(t6, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t7, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t8, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t9, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t10, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t11, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t12, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t13, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t14, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t15, result = "traditional", output = "vector")

## [1] 34.29167
construction_decimal(t16, result = "traditional", output = "vector")

## [1] 34.29167
# librecad result result for t1 - t16

construction_decimal(t1, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t2, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t3, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t4, result = "librecad", output = "vector")

## [1] 411.5

```

```

construction_decimal(t5, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t6, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t7, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t8, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t9, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t10, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t11, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t12, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t13, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t14, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t15, result = "librecad", output = "vector")

## [1] 411.5
construction_decimal(t16, result = "librecad", output = "vector")

## [1] 411.5

```

Example 2

```

m1 <- "33'-3 1/2\"
m2 <- "32'-1\"
m3 <- "32'-1\"
m4 <- "32'-1\"
m5 <- "32'-1\"
m6 <- "33'-3 1/2\"

msum <- sum(construction_decimal(m1, result = "traditional", output = "vector"),

```

```

    construction_decimal(m2, result = "traditional", output = "vector"), construction_decimal(m3,
      result = "traditional", output = "vector"), construction_decimal(m4, result = "traditional",
      output = "vector"), construction_decimal(m5, result = "traditional", output = "vector"),
    construction_decimal(m6, result = "traditional", output = "vector"))
msum

## [1] 194.9167
construction_decimal("194'-11", result = "traditional", output = "vector") %==% msum # check

## [1] TRUE

```

Example 3

```

# Calculate the square area

sum(construction_decimal("0 3", result = "traditional", output = "vector"), construction_decimal("0 8",
  result = "traditional", output = "vector"), construction_decimal("0 6", result = "traditional",
  output = "vector")) * sum(construction_decimal("0 2 5/8", result = "traditional",
  output = "vector"), 3 * construction_decimal("2 6 3/4", result = "traditional",
  output = "vector"), construction_decimal("0 2 5/8", result = "traditional", output = "vector"))

## [1] 11.51042

```

Example 4

```

# Calculate the amount of surface area fill, in acres, for riprap placement and
# the volume of fill in yards ^ 3 along a streambank

bank <- set_units(construction_decimal("72 3 1/3", result = "traditional", output = "vector"),
  "US_survey_foot")
# 72 feet 3 1/3 inches
bank

## 72.27778 [US_survey_foot]
riprap <- set_units(construction_decimal("0 15.0", result = "traditional", output = "vector"),
  "US_survey_foot")
riprap

## 1.25 [US_survey_foot]
riprap_yd <- riprap
units(riprap_yd) <- make_units(yd)
riprap_yd

## 0.4166675 [yd]
OHWM_width <- set_units(25, "US_survey_foot")
OHWM_width

```

```

## 25 [US_survey_foot]
width <- set_units(47, "US_survey_foot")
width

## 47 [US_survey_foot]
bank_area1 <- width * bank
bank_area1

## 3397.056 [US_survey_foot^2]
bank_area2 <- bank_area1
units(bank_area2) <- make_units(yd^2)
bank_area2

## 377.4521 [yd^2]
bank_area3 <- bank_area1
units(bank_area3) <- make_units(acres)
bank_area3

## 0.07798566 [acres]
vol_bank <- riprap_yd * bank_area2
vol_bank

## 157.272 [yd^3]
bank_area_OHWM1 <- OHWM_width * bank
bank_area_OHWM1

## 1806.944 [US_survey_foot^2]
bank_area_OHWM2 <- bank_area1
units(bank_area_OHWM2) <- make_units(yd^2)
bank_area_OHWM2

## 377.4521 [yd^2]
bank_area_OHWM3 <- bank_area1
units(bank_area_OHWM3) <- make_units(acres)
bank_area_OHWM3

## 0.07798566 [acres]
vol_bank_OHWM <- riprap_yd * bank_area_OHWM2
vol_bank_OHWM

## 157.272 [yd^3]
fill_ft2 <- bank_area_OHWM1
fill_ft2

## 1806.944 [US_survey_foot^2]
fill_acres <- bank_area_OHWM3
fill_acres

## 0.07798566 [acres]
fill_yd2 <- bank_area_OHWM2
fill_yd2

```

```
## 377.4521 [yd^2]
fill_yd3 <- vol_bank_OHWM
fill_yd3

## 157.272 [yd^3]
```

Example 5

```
# Examples from the Spike Reference

psst <- "7' 4 5/16\"
pssts <- "0 3 3/8\"
wall1 <- "12' 7\"
wall2 <- "40' 9\"

construction_decimal(psst, result = "traditional", output = "vector")

## [1] 7.359375
construction_decimal(pssts, result = "traditional", output = "vector")

## [1] 0.28125
construction_decimal(wall1, result = "traditional", output = "vector")

## [1] 12.58333
construction_decimal(wall2, result = "traditional", output = "vector")

## [1] 40.75

# Since pssts is a fraction representing 3 3/8 inches, it is better to use the
# frac_to_numeric function instead of the construction_decimal function after
# removing the 0 representing the feet measurement is removed. The following
# now matches the decimal value from the Spike Reference.

pssts1 <- "3 3/8\"

frac_to_numeric(pssts1)

## [1] 3.375
# or more simply

pssts1b <- "3 3/8 in"

frac_to_numeric(pssts1b)

## [1] 3.375
frac_to_numeric(pssts1) %==% frac_to_numeric(pssts1b)
```



```
## [1] TRUE
```

Example 6

```
librecad1 <- "1 2 7/16\"
construction_decimal(librecad1, result = "traditional", output = "vector")

## [1] 1.203125
construction_decimal(librecad1, result = "traditional", output = "table")

##      Measurement Units
## 1:  14.4375000      in
## 2:   1.2031250      ft
## 3:   0.4010417      yd
## 4: 366.7125000      mm
## 5:  36.6712500      cm
## 6:   0.3667125       m
construction_decimal(librecad1, result = "librecad", output = "vector")

## [1] 14.4375
construction_decimal(librecad1, result = "librecad", output = "table")

##      Measurement Units
## 1:  14.4375000      in
## 2:   1.2031250      ft
## 3:   0.4010417      yd
## 4: 366.7125000      mm
## 5:  36.6712500      cm
## 6:   0.3667125       m
librecad2 <- "6' 8 3/4 in"
construction_decimal(librecad2, result = "traditional", output = "vector")

## [1] 6.729167
construction_decimal(librecad2, result = "traditional", output = "table")

##      Measurement Units
## 1:  80.750000      in
## 2:   6.729167      ft
## 3:   2.243056      yd
## 4: 2051.050000      mm
## 5:  205.105000      cm
## 6:   2.051050       m
construction_decimal(librecad2, result = "librecad", output = "vector")

## [1] 80.75
construction_decimal(librecad2, result = "librecad", output = "table")
```

```

##      Measurement Units
## 1:   80.750000      in
## 2:    6.729167      ft
## 3:    2.243056      yd
## 4:  2051.050000      mm
## 5:   205.105000      cm
## 6:    2.051050       m

librecad3 <- "6'-5 3/256\"

construction_decimal(librecad3, result = "traditional", output = "vector")

## [1] 6.417643

construction_decimal(librecad3, result = "traditional", output = "table")

##      Measurement Units
## 1:   77.011719      in
## 2:    6.417643      ft
## 3:    2.139214      yd
## 4:  1956.097656      mm
## 5:   195.609766      cm
## 6:    1.956098       m

construction_decimal(librecad3, result = "librecad", output = "vector")

## [1] 77.01172

construction_decimal(librecad3, result = "librecad", output = "table")

##      Measurement Units
## 1:   77.011719      in
## 2:    6.417643      ft
## 3:    2.139214      yd
## 4:  1956.097656      mm
## 5:   195.609766      cm
## 6:    1.956098       m

```

Construction Fraction

Example 1

```

checker <- "6'-5 3/256 in"

checkers <- construction_decimal(checker, result = "traditional", output = "vector")

checkers

## [1] 6.417643

```

```

construction_fraction(checkers, type = "traditional", result = "traditional", fraction = 0)

## [1] "6 ft 5 in"
construction_fraction(checkers, type = "traditional", result = "traditional", fraction = 2)

## [1] "6 ft 5 0/2 in"
construction_fraction(checkers, type = "traditional", result = "traditional", fraction = 4)

## [1] "6 ft 5 0/4 in"
construction_fraction(checkers, type = "traditional", result = "traditional", fraction = 8)

## [1] "6 ft 5 0/8 in"
construction_fraction(checkers, type = "traditional", result = "traditional", fraction = 16)

## [1] "6 ft 5 0/16 in"
construction_fraction(checkers, type = "traditional", result = "traditional", fraction = 32)

## [1] "6 ft 5 0/32 in"
construction_fraction(checkers, type = "traditional", result = "traditional", fraction = 64)

## [1] "6 ft 5 1/64 in"
construction_fraction(checkers, type = "traditional", result = "traditional", fraction = 100)

## [1] "6 ft 5 1/100 in"
construction_fraction(checkers, type = "traditional", result = "traditional", fraction = 128)

## [1] "6 ft 5 2/128 in"
construction_fraction(checkers, type = "traditional", result = "traditional", fraction = 256)

## [1] "6 ft 5 3/256 in"

```

Example 2

```

checkin <- 77.6875

construction_fraction(checkin, type = "librecad", result = "traditional", fraction = 0)

## [1] "6 ft 5 in"
construction_fraction(checkin, type = "librecad", result = "traditional", fraction = 2)

## [1] "6 ft 5 1/2 in"
construction_fraction(checkin, type = "librecad", result = "traditional", fraction = 4)

## [1] "6 ft 5 3/4 in"
construction_fraction(checkin, type = "librecad", result = "traditional", fraction = 8)

## [1] "6 ft 5 5/8 in"

```

```

construction_fraction(checkin, type = "librecad", result = "traditional", fraction = 16)

## [1] "6 ft 5 11/16 in"
construction_fraction(checkin, type = "librecad", result = "traditional", fraction = 32)

## [1] "6 ft 5 22/32 in"
construction_fraction(checkin, type = "librecad", result = "traditional", fraction = 64)

## [1] "6 ft 5 44/64 in"
construction_fraction(checkin, type = "librecad", result = "traditional", fraction = 100)

## [1] "6 ft 5 69/100 in"
construction_fraction(checkin, type = "librecad", result = "traditional", fraction = 128)

## [1] "6 ft 5 88/128 in"
construction_fraction(checkin, type = "librecad", result = "traditional", fraction = 256)

## [1] "6 ft 5 176/256 in"

```

Construction Decimal Engineering (LibreCAD Style)

Examples

```

librecad1a <- "6' 8 3/4 in"

construction_decimal_eng(librecad1a)

## [1] "6'-8.75\"
librecad2a <- "6'-5 3/256\"
construction_decimal_eng(librecad2a)

## [1] "6'-5.01171875\"

```

Works Cited

Spike, 1 January 2022, “Foot and Inch to Decimal Format Conversion”, <https://www.spikevm.com/calculators/fraction-decimal-calculators.php>.

EcoC²S Links

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