

# Examples for the **sdiv** Package

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## 1 Basic Usage

### 1.1 Simple Division

Division of 97 by 5:

$$\begin{array}{r} 97 \\ \hline 2 \quad 19 \\ \hline 4 \quad 3 \end{array}$$

Division of 100 by 7:

$$\begin{array}{r} 100 \\ \hline 2 \quad 14 \\ \hline 0 \quad 2 \end{array}$$

### 1.2 With Circle Highlighting

Same divisions with circles highlighting the remainders:

$$\begin{array}{r} 97 \\ \hline \textcircled{2} \quad 19 \\ \hline \textcircled{4} \textcircled{3} \end{array}$$

$$\begin{array}{r} 100 \\ \hline \textcircled{2} \quad 14 \\ \hline \textcircled{0} \textcircled{2} \end{array}$$

### 1.3 With Arrow

Arrow showing reading direction (useful for base conversion):

$$\begin{array}{r} 97 \\ \hline 2 \quad 19 \\ \hline \swarrow \quad 4 \quad 3 \end{array}$$

$$\begin{array}{r} 100 \\ \hline 2 \quad 14 \\ \hline \swarrow \quad 0 \quad 2 \end{array}$$

## 1.4 Both Options Combined

$$\begin{array}{r} 97 \\ \swarrow \quad \searrow \\ \textcircled{2} \quad \textcircled{19} \\ \textcircled{4} \quad \textcircled{3} \end{array}$$

$$\begin{array}{r} 100 \\ \swarrow \quad \searrow \\ \textcircled{2} \quad \textcircled{14} \\ \textcircled{0} \quad \textcircled{2} \end{array}$$

## 1.5 With Underline Highlighting

Underline highlighting using the `underline` option:

$$\begin{array}{r} 97 \\ \underline{\textcircled{2}} \quad \underline{\textcircled{19}} \\ \underline{\textcircled{4}} \quad \underline{\textcircled{3}} \end{array}$$

$$\begin{array}{r} 100 \\ \underline{\textcircled{2}} \quad \underline{\textcircled{14}} \\ \underline{\textcircled{0}} \quad \underline{\textcircled{2}} \end{array}$$

## 1.6 Underline with Arrow

$$\begin{array}{r} 97 \\ \swarrow \quad \searrow \\ \underline{\textcircled{2}} \quad \underline{\textcircled{19}} \\ \underline{\textcircled{4}} \quad \underline{\textcircled{3}} \end{array}$$

## 1.7 All Three Options Combined

Circle, underline, and arrow together:

$$\begin{array}{r} 97 \\ \swarrow \quad \searrow \\ \textcircled{2} \quad \textcircled{19} \\ \textcircled{4} \quad \textcircled{3} \end{array}$$

## 2 Base Conversion

### 2.1 Binary Conversion

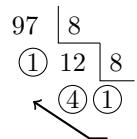
Converting 255 to binary (read remainders from bottom to top):

$$\begin{array}{r} 255 \\ \swarrow \quad \searrow \\ \textcircled{1} \quad \textcircled{127} \\ \textcircled{1} \quad \textcircled{63} \\ \textcircled{1} \quad \textcircled{31} \\ \textcircled{1} \quad \textcircled{15} \\ \textcircled{1} \quad \textcircled{7} \\ \textcircled{1} \quad \textcircled{3} \\ \textcircled{1} \quad \textcircled{1} \end{array}$$

Result:  $255_{10} = 11111111_2$

## 2.2 Octal Conversion

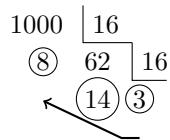
Converting 97 to octal:



Result:  $97_{10} = 141_8$

## 2.3 Hexadecimal Conversion

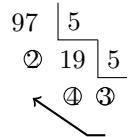
Converting 1000 to hexadecimal:



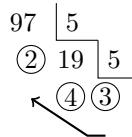
Result:  $1000_{10} = 3E8_{16}$  (where 14 = E)

## 3 Custom Circle Sizes

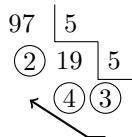
### 3.1 Smaller Circles (inner sep = 0.05)



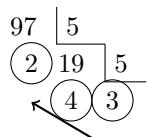
### 3.2 Default Circles (inner sep = 0.25)



### 3.3 Medium Circles (inner sep = 0.3)



### 3.4 Larger Circles (inner sep = 0.5)



## 4 Edge Cases

### 4.1 Dividend Less Than Divisor

When the dividend is smaller than the divisor:

$$\begin{array}{r} 3 \mid 10 \\ \hline (3)0 \end{array}$$

### 4.2 Dividend Equal to Divisor

$$\begin{array}{r} 7 \mid 7 \\ \hline (0)1 \end{array}$$

### 4.3 Dividend is Zero

$$\begin{array}{r} 0 \mid 5 \\ \hline (0)0 \end{array}$$

### 4.4 Single Division Step

$$\begin{array}{r} 10 \mid 3 \\ \hline (1)3 \quad 3 \\ \hline (0)(1) \end{array}$$

## 5 Large Numbers

### 5.1 Million

$$\begin{array}{r} 1000000 \mid 7 \\ \hline (1) \quad 142857 \quad 7 \\ \hline (1) \quad 20408 \quad 7 \\ \hline (3) \quad 2915 \quad 7 \\ \hline (3) \quad 416 \quad 7 \\ \hline (3) \quad 59 \quad 7 \\ \hline (3) \quad 8 \quad 7 \\ \hline (1)(1) \end{array}$$

### 5.2 Large Dividend, Small Divisor

$$\begin{array}{r} 9876543 \mid 11 \\ \hline (6) \quad 897867 \quad 11 \\ \hline (3) \quad 81624 \quad 11 \\ \hline (4) \quad 7420 \quad 11 \\ \hline (6) \quad 674 \quad 11 \\ \hline (3) \quad 61 \quad 11 \\ \hline (6)(5) \end{array}$$

### 5.3 Ten Factorial

$$10! = 3628800$$

$$\begin{array}{r} 3628800 \\ 10 \quad \overline{)329890} \\ 0 \quad \overline{)29990} \\ \quad \quad \quad \overline{)2726} \\ \quad \quad \quad 9 \quad \overline{)247} \\ \quad \quad \quad 5 \quad \overline{)22} \\ \quad \quad \quad 0 \quad 2 \end{array}$$

## 6 In-line Usage

$$\begin{array}{r} 42 \\ 2 \quad \overline{)8} \\ \quad \quad \quad \overline{)5} \end{array}$$

Division can be used in-line as well:  $\begin{array}{r} 3 \\ 2 \quad \overline{)8} \\ \quad \quad \quad \overline{)5} \end{array}$  produces a diagram within the text, though displayed equations ( $\begin{array}{r} 3 \\ 2 \quad \overline{)8} \\ \quad \quad \quad \overline{)5} \end{array}$ ) are recommended for better readability.