In [5]:
```
%autosave 3600
```

```
Autosaving every 3600 seconds
```

In [1]:
```
from datascience import *
%matplotlib inline
import matplotlib.pyplot as plots
plots.style.use('fivethirtyeight')
import numpy as np
```

Lecture 24

In [2]:
```
births = Table.read_table('baby.csv')
births
```

Out[2]:

Birth Weight	Gestational Days	Maternal Age	Maternal Height	Maternal Pregnancy Weight	Maternal Smoker
120	284	27	62	100	False
113	282	33	64	135	False
128	279	28	64	115	True
108	282	23	67	125	True
136	286	25	62	93	False
138	244	33	62	178	False
132	245	23	65	140	False
120	289	25	62	125	False
143	299	30	66	136	True
140	351	27	68	120	False

... (1164 rows omitted)

In [3]:
```
babies = births.select('Birth Weight', 'Gestational Days')
babies
```

Out[3]:

Birth Weight	Gestational Days
120	284
113	282
128	279
108	282
136	286
138	244
132	245
120	289
143	299
140	351

... (1164 rows omitted)

In [4]:

```
babies = babies.with_column(
    'Weight per Day',
    babies.column('Birth Weight') / babies.column('Gestational Days'))
babies
```

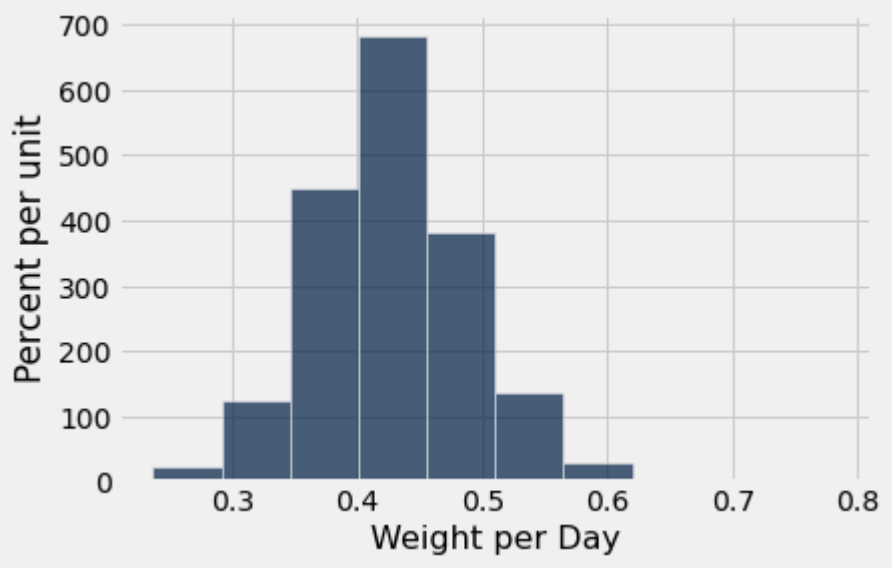
Out[4]:

Birth Weight	Gestational Days	Weight per Day
120	284	0.422535
113	282	0.400709
128	279	0.458781
108	282	0.382979
136	286	0.475524
138	244	0.565574
132	245	0.538776
120	289	0.415225

Birth Weight	Gestational Days	Weight per Day
143	299	0.478261
140	351	0.39886

... (1164 rows omitted)

In [5]:
```
babies.hist('Weight per Day')
```



In [6]:
```
percentile(50, babies.column('Weight per Day'))
```

Out[6]:
```
0.42907801418439717
```

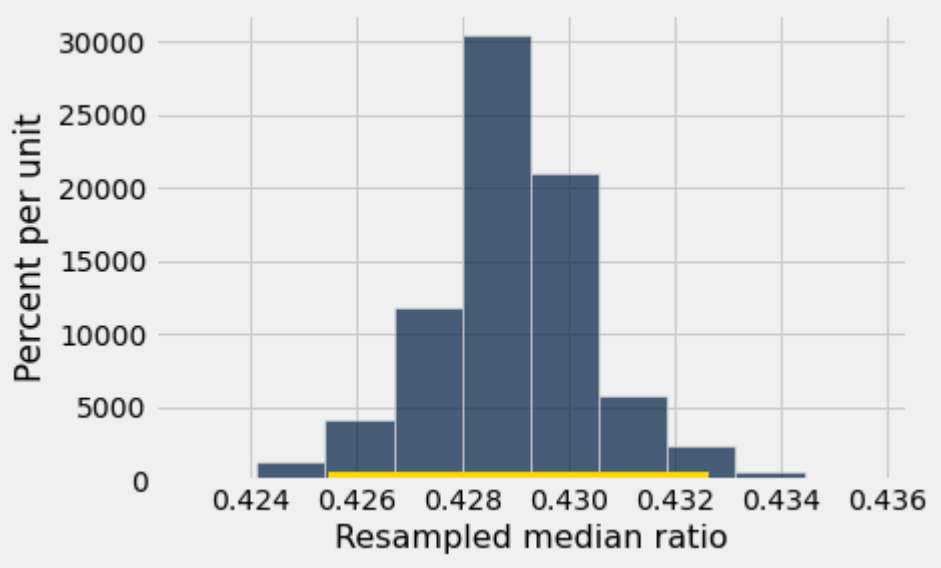
In [7]:
```
# Bootstrap for median

medians = make_array()

for i in np.arange(1000):
    resampled = babies.sample()
    median = percentile(50, resampled.column('Weight per Day'))
    medians = np.append(medians, median)
```

In [8]:
```
interval_95 = make_array(percentile(2.5, medians), percentile(97.5, medians))
interval_95
```

Out[8]:
```
array([0.42545455, 0.43262411])
```

In [9]:
```
Table().with_column('Resampled median ratio', medians).hist()
plots.plot(interval_95, [0, 0], color='gold', lw=8)
print('95% Confidence Interval for Median Weight/Days ratio')
print(interval_95)
```

```
95% Confidence Interval for Median Weight/Days ratio
[0.42545455 0.43262411]
```



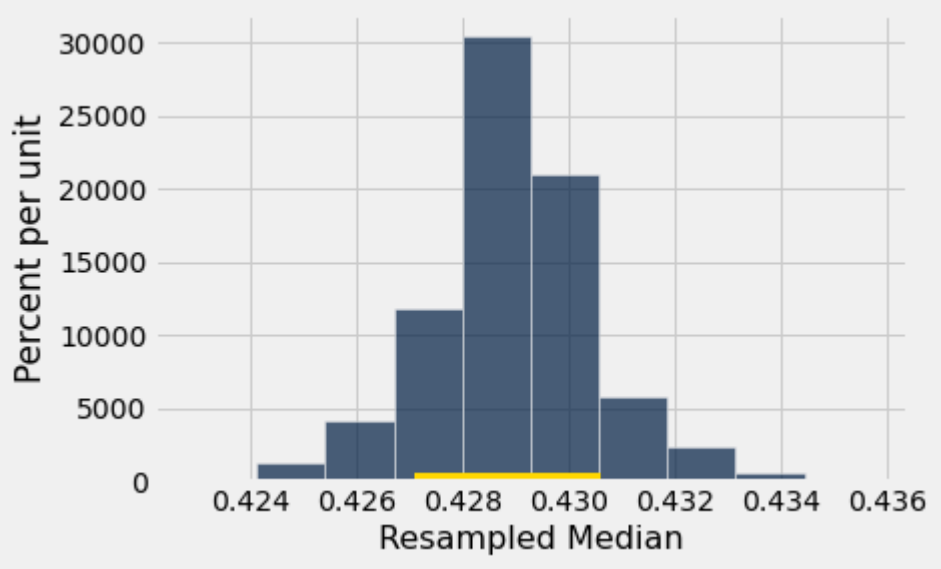
In [10]:
```
interval_80 = make_array(percentile(10, medians), percentile(90, medians))
interval_80
```

Out[10]:
```
array([0.42708333, 0.43060498])
```

In [11]:
```
Table().with_column('Resampled Median', medians).hist()
plots.plot(interval_80, [0, 0], color='gold', lw=8)
print('80% Confidence interval for median weight/days ratio in population:')
print(np.round(interval_80, 3))
```

```
80% Confidence interval for median weight/days ratio in population:
```

```
[0.427 0.431]
```



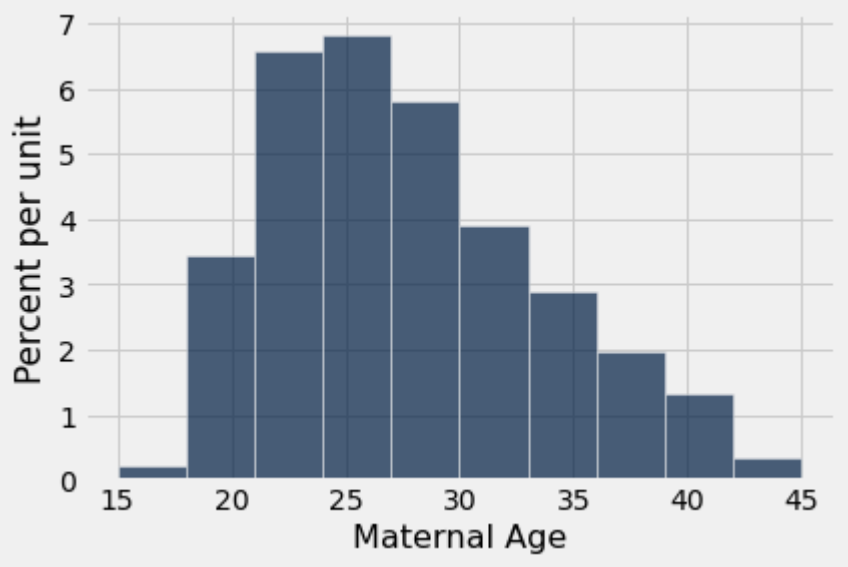
In [12]:
```
births
```

Out[12]:

Birth Weight	Gestational Days	Maternal Age	Maternal Height	Maternal Pregnancy Weight	Maternal Smoker
120	284	27	62	100	False
113	282	33	64	135	False
128	279	28	64	115	True
108	282	23	67	125	True
136	286	25	62	93	False
138	244	33	62	178	False
132	245	23	65	140	False
120	289	25	62	125	False
143	299	30	66	136	True
140	351	27	68	120	False

... (1164 rows omitted)

In [13]:
```
births.hist('Maternal Age')
```



In [14]:
```
np.mean(births.column('Maternal Age'))
```

Out[14]:
```
27.228279386712096
```

In [15]:
```
# Bootstrap for mean

means = make_array()

for i in np.arange(1000):
    resampled = births.sample()
    mean = np.mean(resampled.column('Maternal Age'))
    means = np.append(means, mean)
```

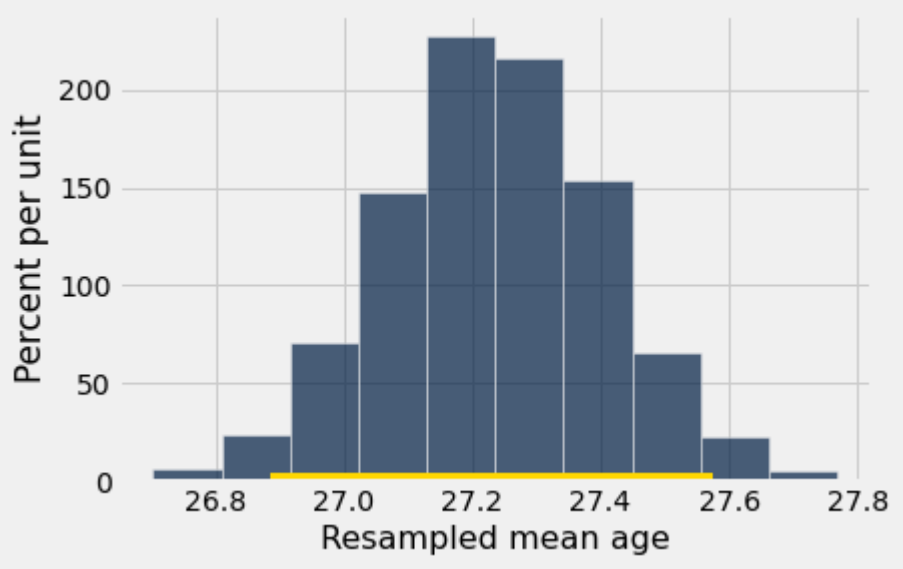
In [16]:
```
interval_95 = make_array(percentile(2.5, means), percentile(97.5, means))
interval_95
```

Out[16]:
```
array([26.88415673, 27.57325383])
```

In [17]:
```
Table().with_column('Resampled mean age', means).hist()
plots.plot(interval_95, [0, 0], color='gold', lw=8)
```

```
print('95% Confidence Interval for Mean Age')
print(interval_95)
```

```
95% Confidence Interval for Mean Age
[26.88415673 27.57325383]
```



In [ ]:

In [ ]: