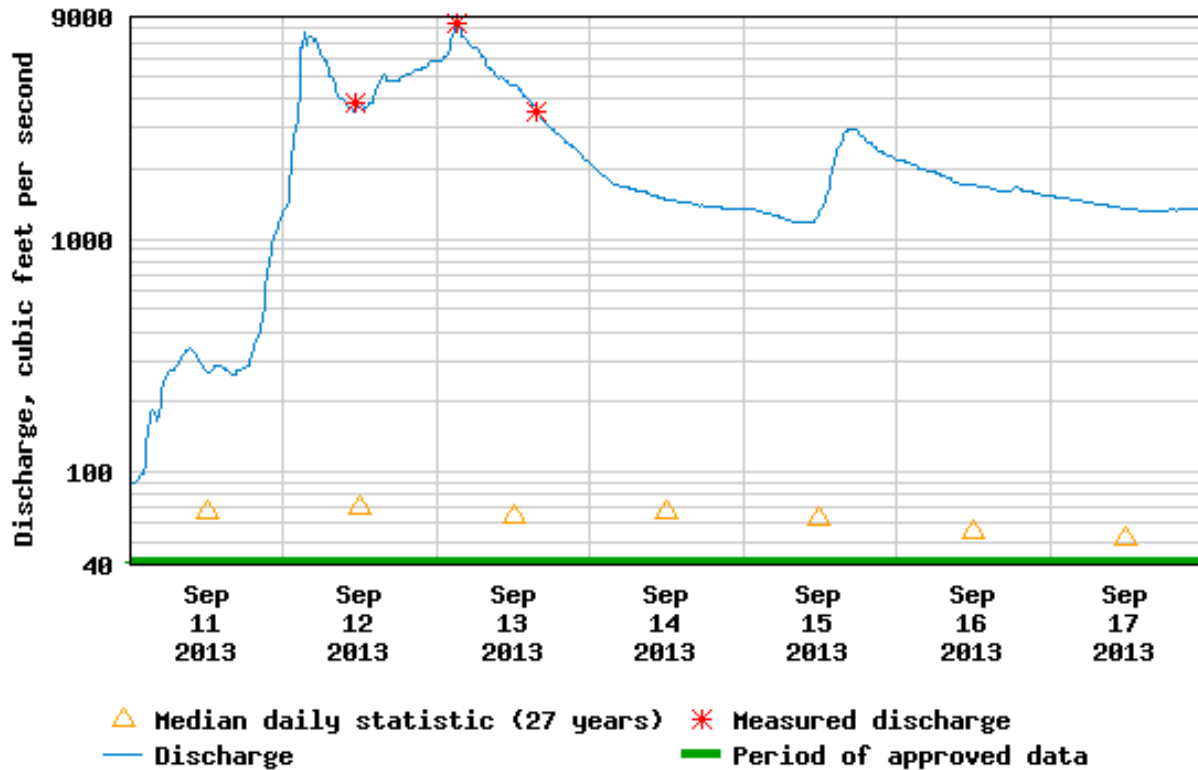


The graph below depicts Boulder Creek flow during the September 2013 Colorado flood, as measured by the U.S. Geological Survey (USGS). The graph uses a logarithmic scale; that is, the horizontal lines above 100 represent 200, 300, 400, 500, 600, 700, 800, 900, 1000, then 2000, 3000, etc.

USGS 06730200 BOULDER CREEK AT NORTH 75TH ST. NEAR BOULDER, CO

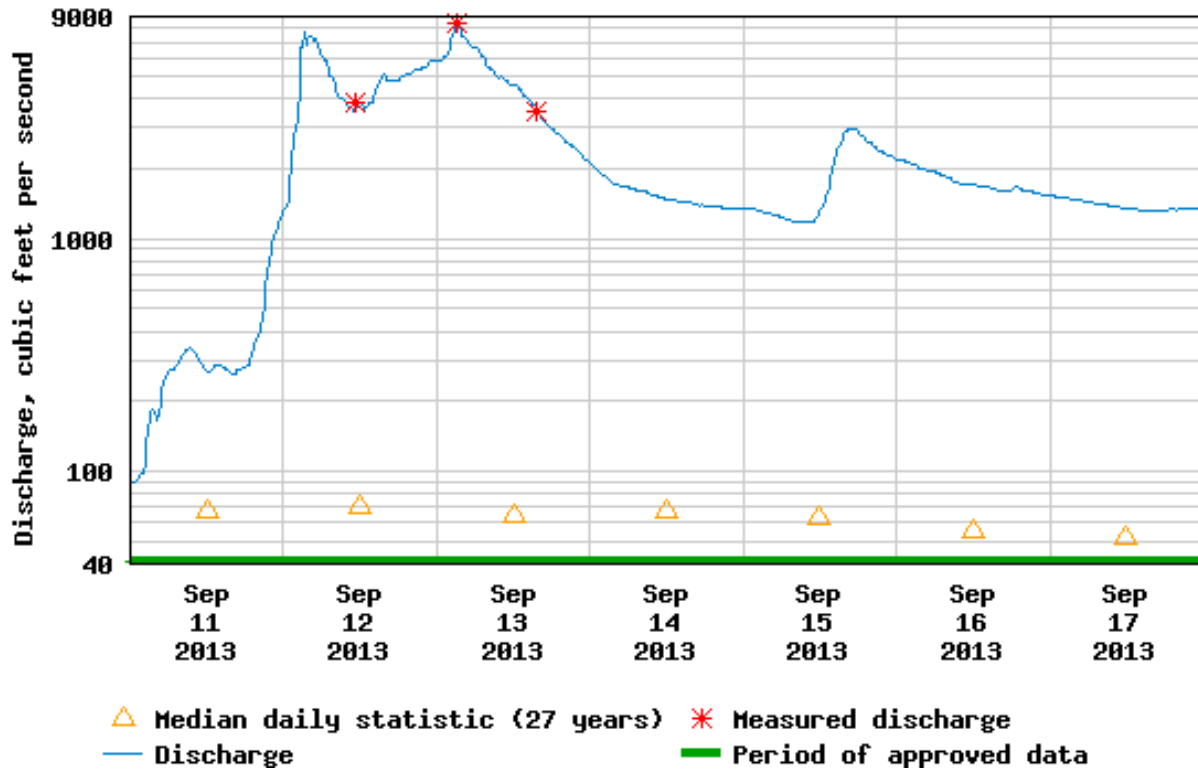


(The red asterisks represent certain redundant measurements that were used for calibration. You needn't worry about these.)

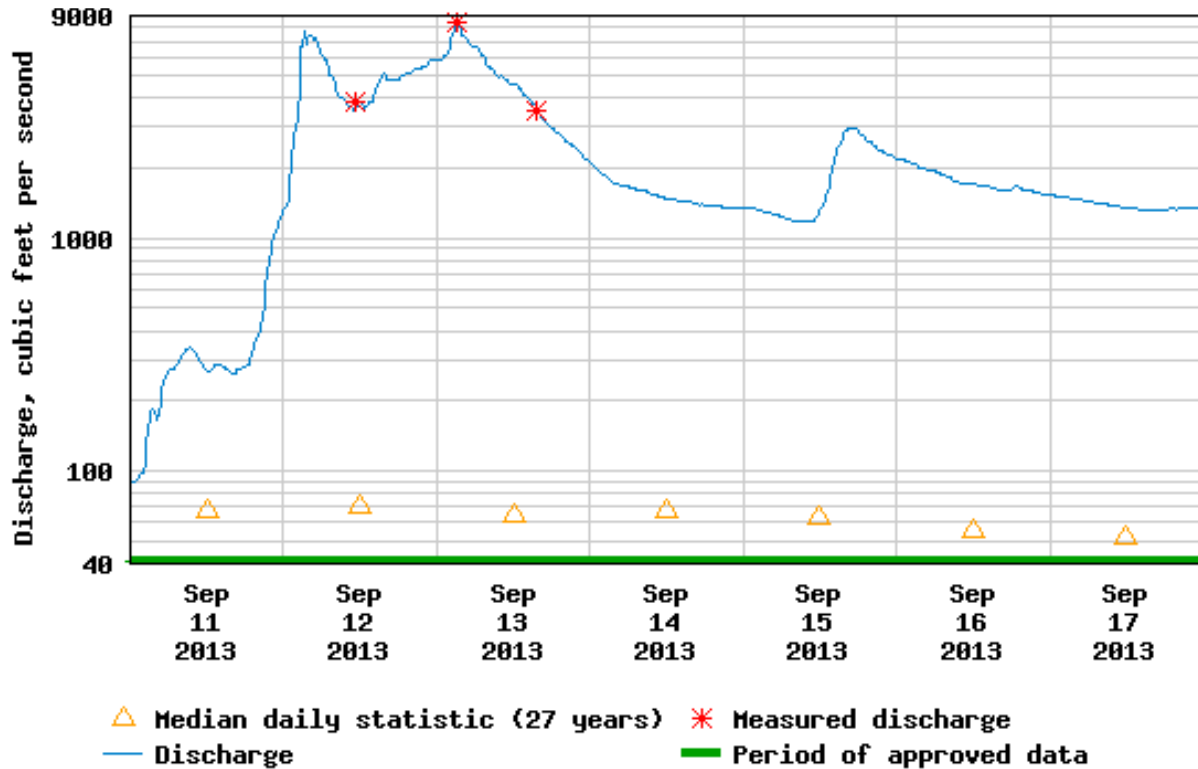
(a) What was the approximate flow rate at noon on Thursday, September 12, 2013?

- (b) Using *only* your answer to part (a), approximate the quantity of water (in cubic feet) that flowed through Boulder Creek at this station during the day (24-hour period) of Thursday, September 12, 2013.
- (c) What is the 27-year median flow rate (the “median daily statistic”) for September 12? Approximate the median quantity of water that would have flowed through Boulder Creek at this station on the 12th of September, during this 27-year period.

USGS 06730200 BOULDER CREEK AT NORTH 75TH ST. NEAR BOULDER, CO



- (d) Take $\Delta t = 12$ hours, and use a left-endpoint Riemann sum to approximate the total quantity of water that flowed through Boulder Creek at this station from the beginning of Wednesday, September 11 through the end of Tuesday, September 17. *Draw your boxes directly on top of the graph above* (and write your calculations below).



- (e) Use the median daily statistic data, and a Riemann sum with $\Delta t = 24$ hours, to approximate the median quantity of water that would have flowed through the creek over the course of these same dates, during the 27-year period considered. *Draw your boxes directly on top of the graph above* (and write your calculations below).

For more flow data, see <http://waterdata.usgs.gov/nwis/uv?06730200> and <http://www.dwr.state.co.us/SurfaceWater/data/district.aspx?div=1&dist=6>