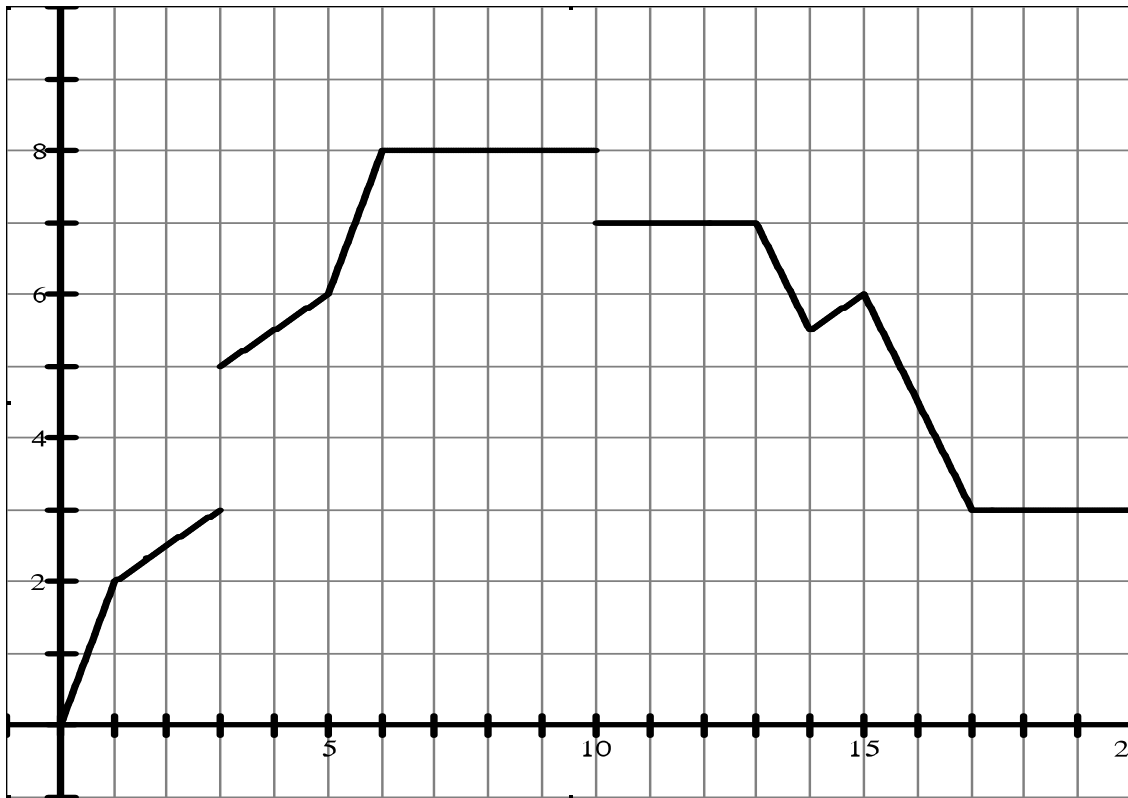


Aquarium Problem



A graph of the aquarium's water level (in inches) as a function of time (in minutes) is shown. When the faucet is on, the water level rises at a steady rate. Similarly, when the plug is pulled out, the water level falls at a steady rate (but slower than the faucet's rate). At various times, some events happen that affect the water level and/or the rate at which the water level changes. In the exercises below, you are to identify at *exactly what time* the given event occurred. Do NOT give an interval of time.

- 1) The plug is pulled out with the faucet turned off.
- 2) A large rock is removed from the aquarium.
- 3) The plug is pulled out with the faucet turned on.
- 4) The plug is put in with the faucet turned off.
- 5) The plug is put in with the faucet turned on.
- 6) The faucet is turned on with the plug in.
- 7) The faucet is turned on with the plug out.
- 8) A bucket of water is dumped into the aquarium all at once.
- 9) The faucet is turned off with the plug in.
- 10) The faucet is turned off with the plug out.
- 11) Now, assume that the rock is placed back in the aquarium at $t=20$ minutes and the faucet is turned back on at the same time. Suppose that the aquarium is 12 inches deep; when will it overflow?