xylem
Let's Solve Water

**TECHNICAL BROCHURE**
FH-Z300B

# Zoning Made Easy
## Workbook
RULES OF THUMB FOR THE NON-ENGINEER INSTALLER

Bell & Gossett
a xylem brand

A check of its nameplate tells you that this boiler is rated to deliver 100,000 net Btuh. Thermometers on the supply and return pipes tell you that water is leaving the boiler at 190°F and returning at 170°F.

**Q: How much water is probably circulating?**

A: _____ gpm

**Q: What would the probable flow rate be if the boiler were rated for:**

**Q: 150,000 net Btuh?**

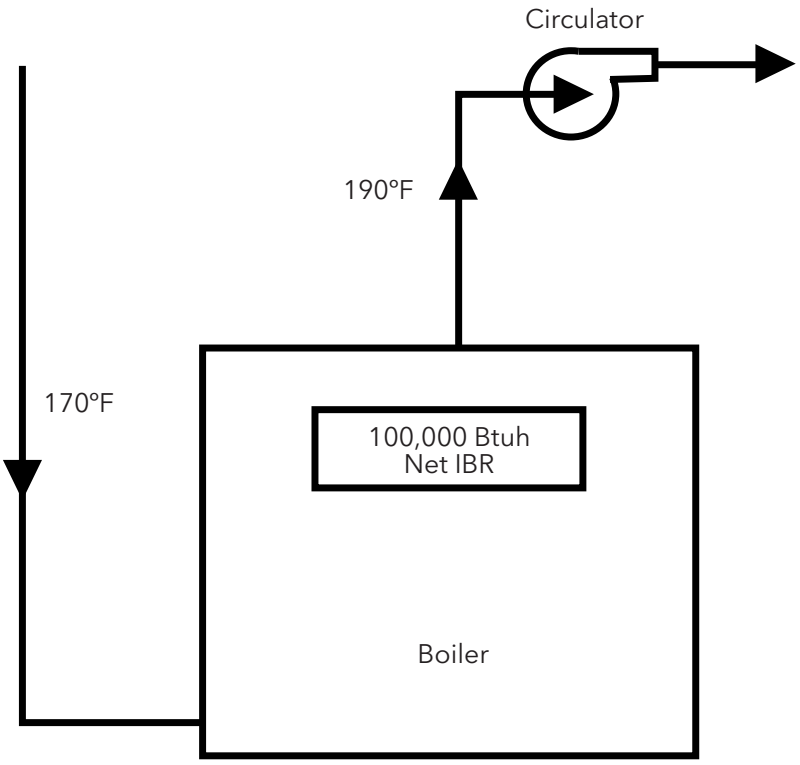
A: _____ gpm

**Q: 200,000 net Btuh?**

A: _____ gpm

**Q: 80,000 net Btuh?**

A: _____ gpm



**Q: Based on "The Law of the Maximum," how much water do you expect would flow through these pipes in a hot water heating system?**

1/2" Copper A: _____ gpm

3/4" Copper A: _____ gpm

1" Copper A: _____ gpm

1 1/4" Copper A: _____ gpm

**Q: In each case, how much heat will this flow carry?**

A: 1/2" _____ Btuh

3/4" _____ Btuh

1" _____ Btuh

1-1/4" _____ Btuh

You're troubleshooting a job where someone used 1/2" copper to feed a 3/4" baseboard loop,

**Q: How much flow can we expect in the baseboard?**

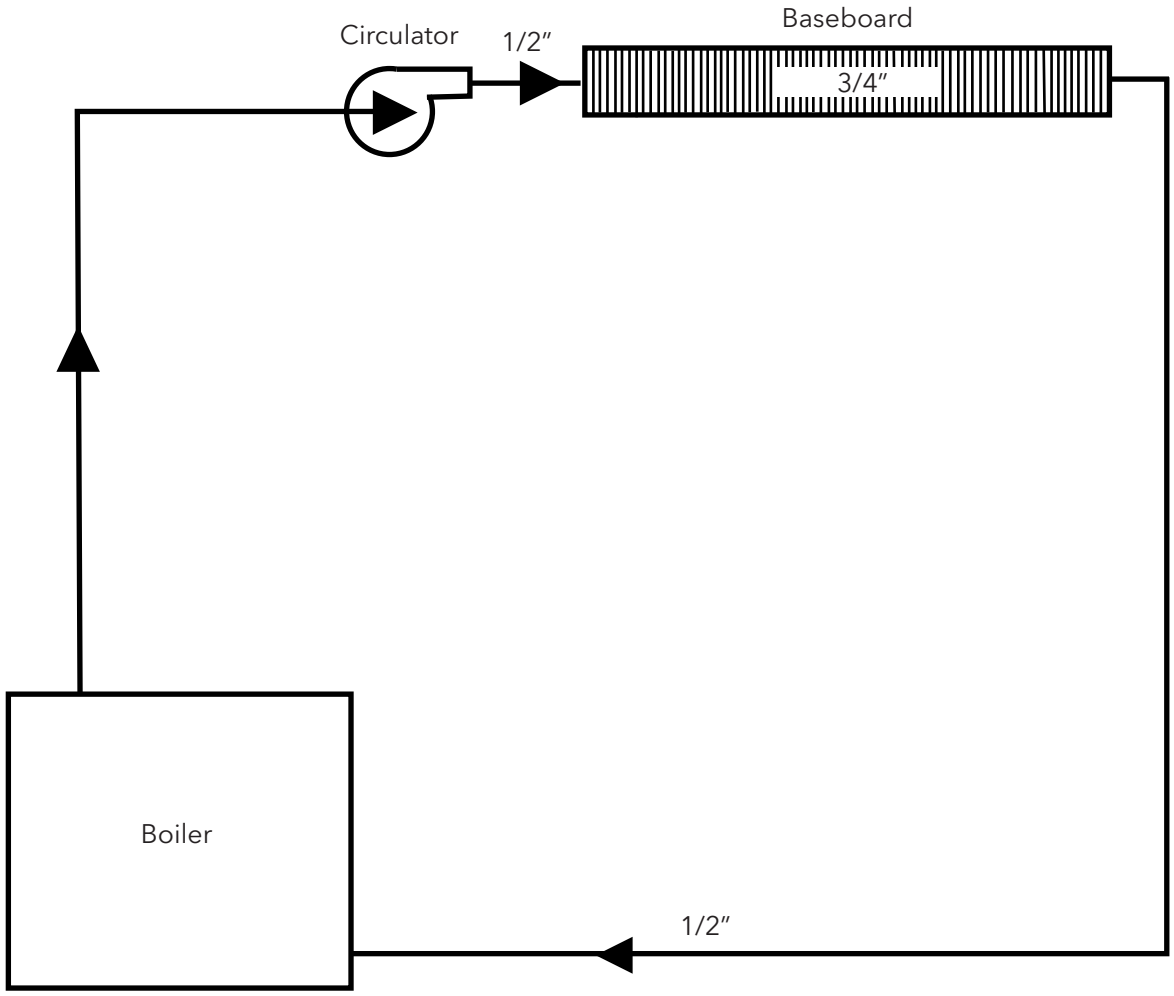
A: _____ gpm

**Q: How many Btus will that represent?**

A: _____ Btuh

**Q: Will that be enough to heat the Zone?**

A: _____



To save money, this installer used 3/4" copper for all the piping around this boiler. As you can see, he's supplying four 3/4" zone valves with a 3/4" manifold.

**Q: When all the zones call, how much flow will each zone probably get?**

A: _____ gpm

**Q: How many Btus will probably be available to each zone?**

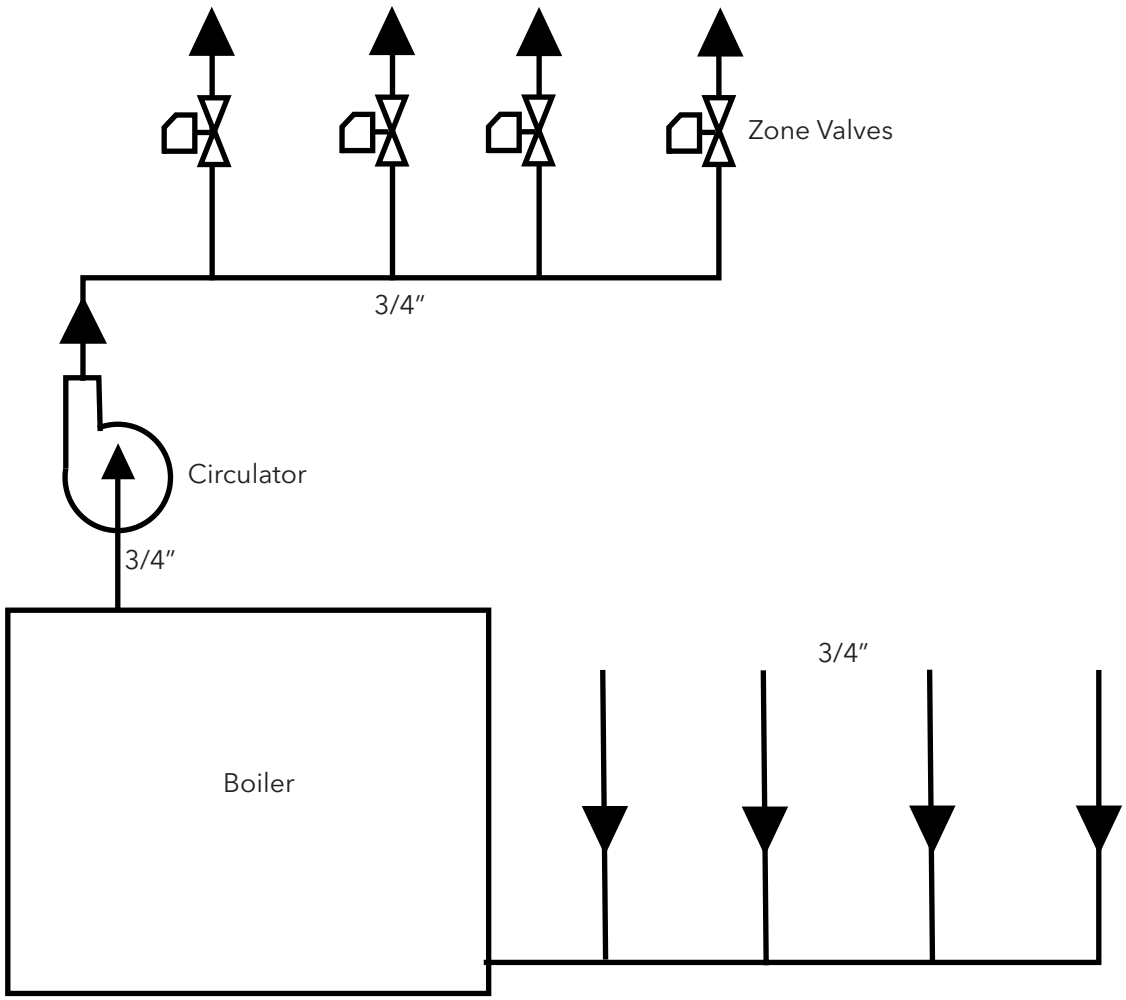
A: _____ Btuh

**Q: Based on this, how many feet of 3/4" baseboard can we use in each zone before the water temperature drops to a point where it's probably too cool to heat the end of the zone on the coldest days.**

A: _____ feet of baseboard.

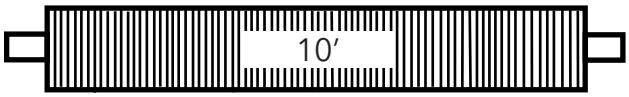
**Q: Will that be enough baseboard to heat the zone?**

A: _____



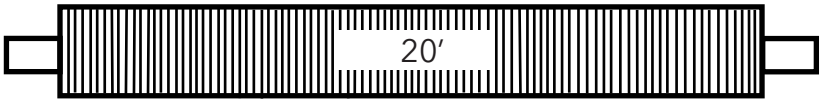
Baseboard manufacturers rate the heat output of their radiators in Btu's per hour, per linear foot.

**Q: Assuming water leaves the boiler at a certain temperature and returns 20°F cooler, what Btuh can we expect to get out of these lengths of baseboard?**



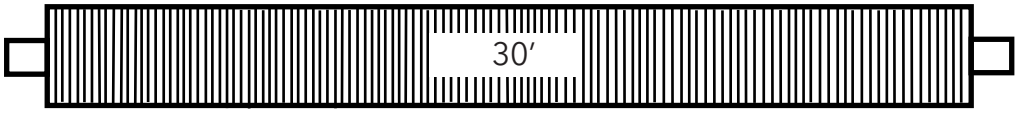

Ten feet of 1/2″

A: _____ Btuh



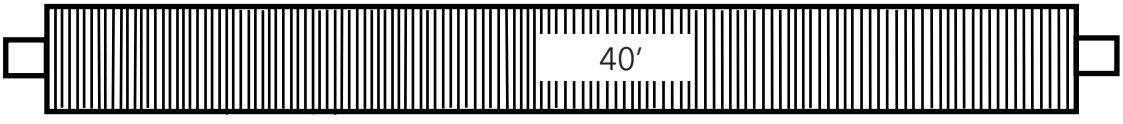

Twenty feet of 3/4″

A: _____ Btuh




Thirty feet of 1″

A: _____ Btuh



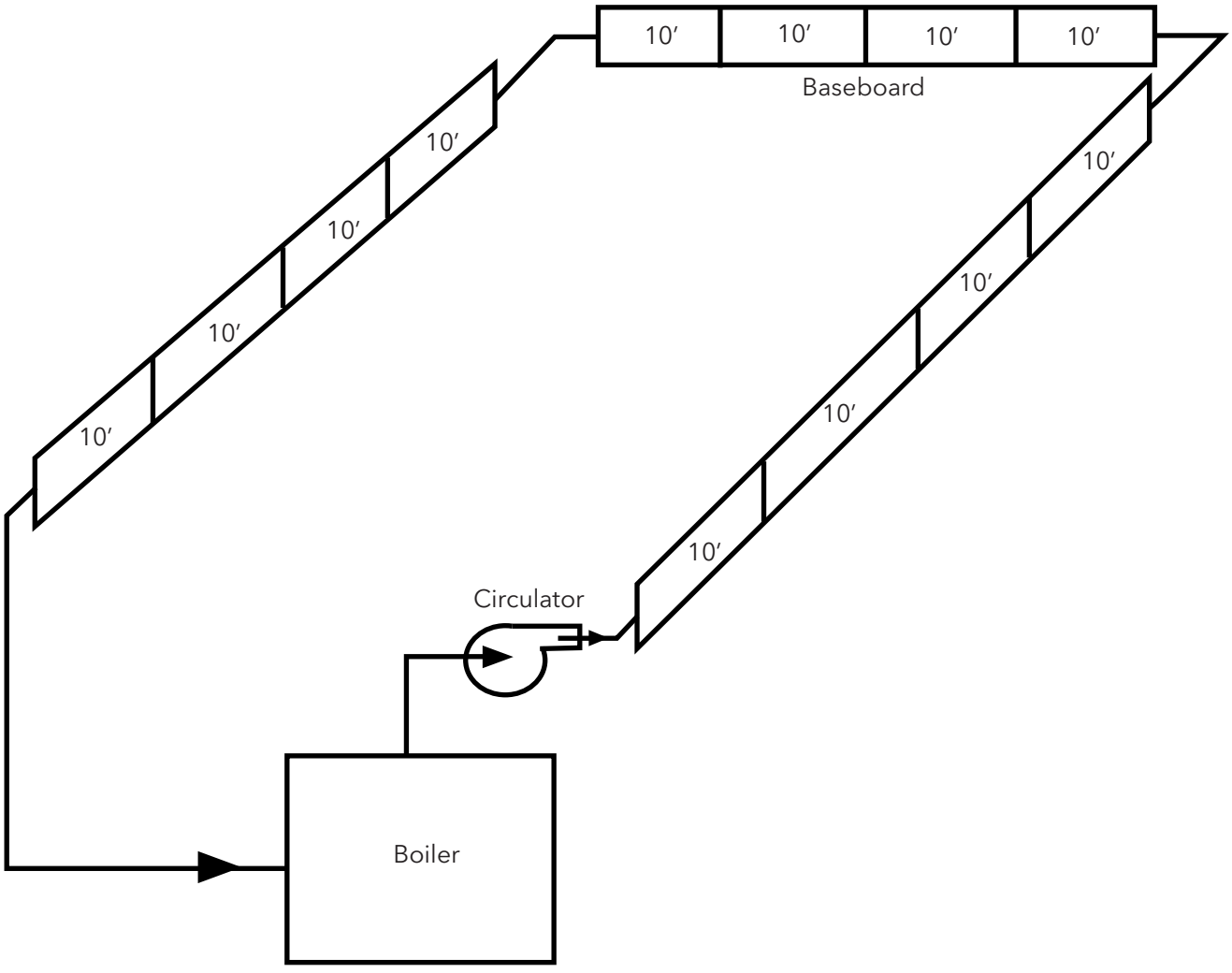

Forty feet of 1-1/4″

A: _____ Btuh

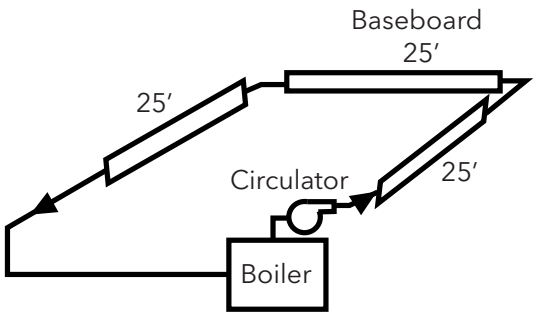
This baseboard loop is 120 feet long. Assuming its size is 1/2", mark the point at which we would expect the water temperature to drop to a point where it would probably be too cool to heat the zone on the coldest day.

Now do the same for 3/4", 1" and 1 1/4" baseboard.

If this were a 3/4" loop, how could we make it better.



This 3/4" zone loop is on the first floor of a building. The total length of all the piping is 100 feet.




**Q: Using "The Law of the Maximum," size the Pump Head.**

A: _____ feet of head.

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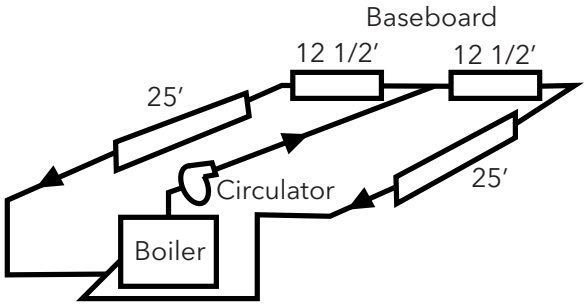
Now we've split the loop in half by running a 1" main to the far end.




**Q: What would be the Pump Head now?**

A: _____ feet of head.

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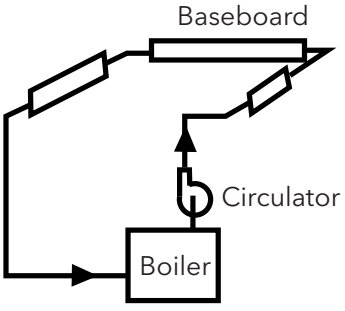
Suppose the zone loop were on the third floor instead of the first floor. Its total length is still 100 feet.




**Q: Will the pump head be different?**

A: _____

This system has a 3/4" main feeding 12 low pressure drop convectors through Monoflo tees. Each convector is 6" wide and 36" long in a two-foot-high cabinet. On a very cold day, the last two convectors on the line never seem to get hot enough. You've tried bleeding them, but when you do, you get very little air. The convectors do get hot for a while after you've bled cold water from them, but the next day, the call comes back in.

**Q: What do you suppose could be causing the problem?**

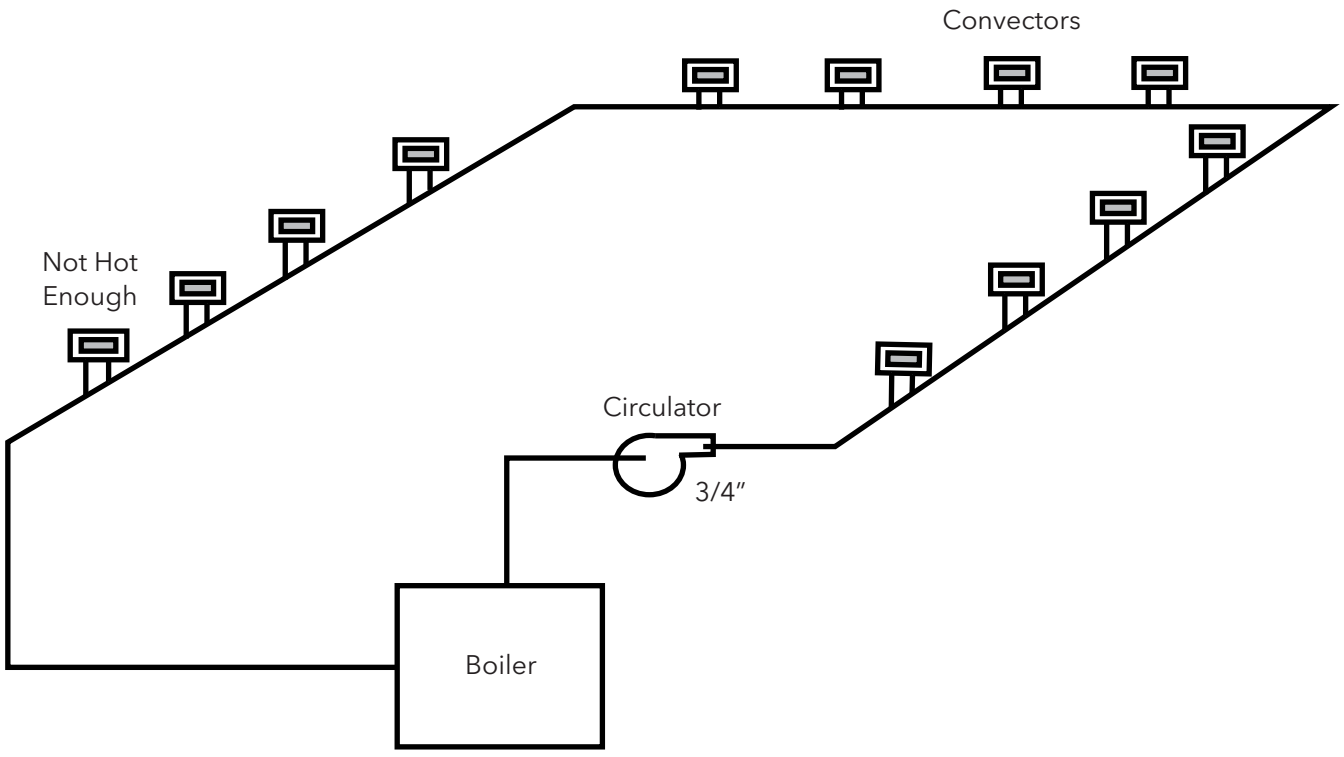
A: _____

_____

**Q: How could the original installer have avoided the problem?**

A: _____

_____



This house has two zones. Each zone has a circulator on the return and a Flo-Control valve on the supply. The problem is that when Zone #1 is on and Zone #2 is off, the last radiator in Zone #2 gets hot.

**Q: How can this happen?**

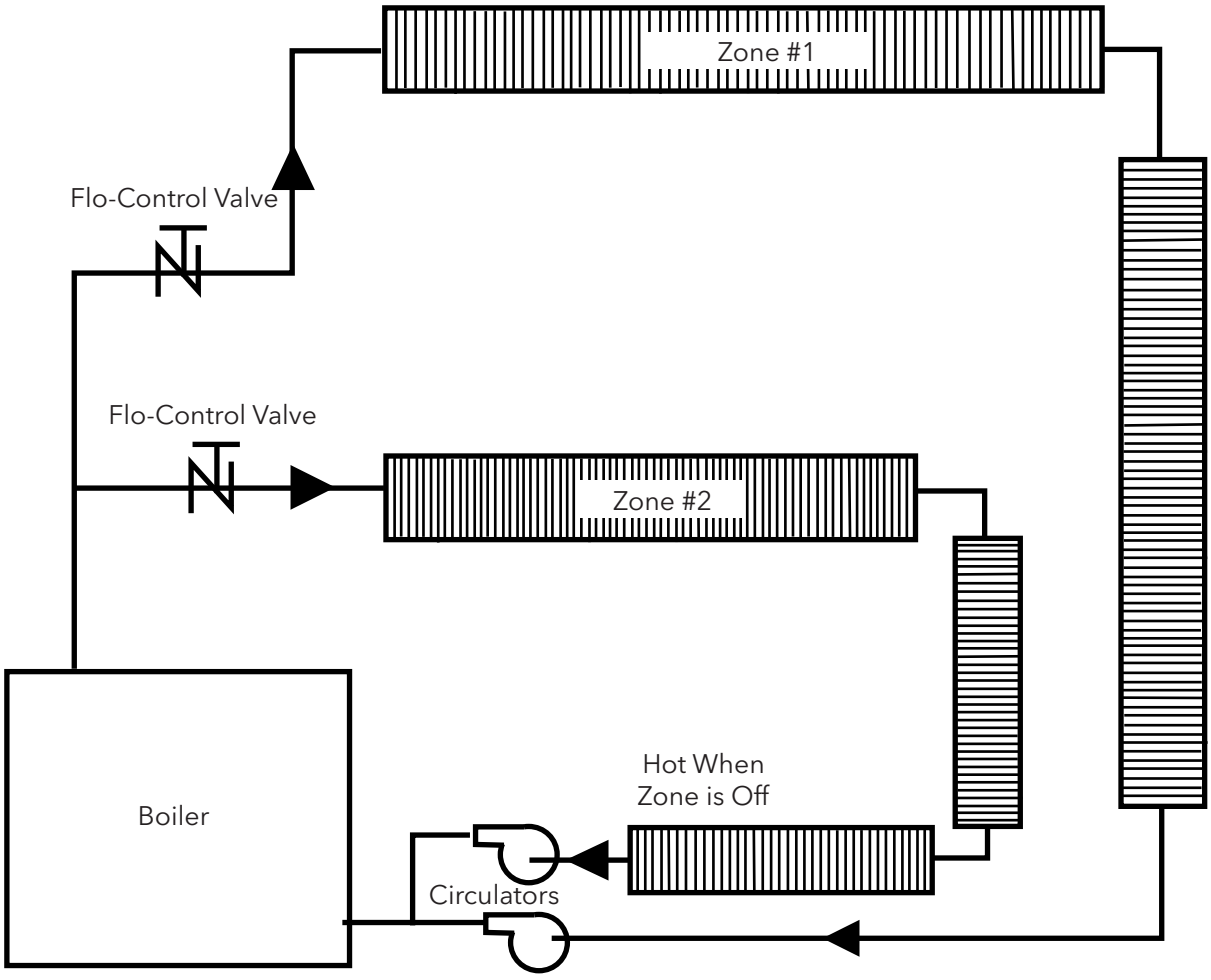
A: _____

_____

**Q: What should you do to solve the problem?**

A: _____

_____



This system is zoned with four 3/4″ zone valves and one circulator.

**Q: What flow rate should we expect to see in each zone?**

A: _____ gpm

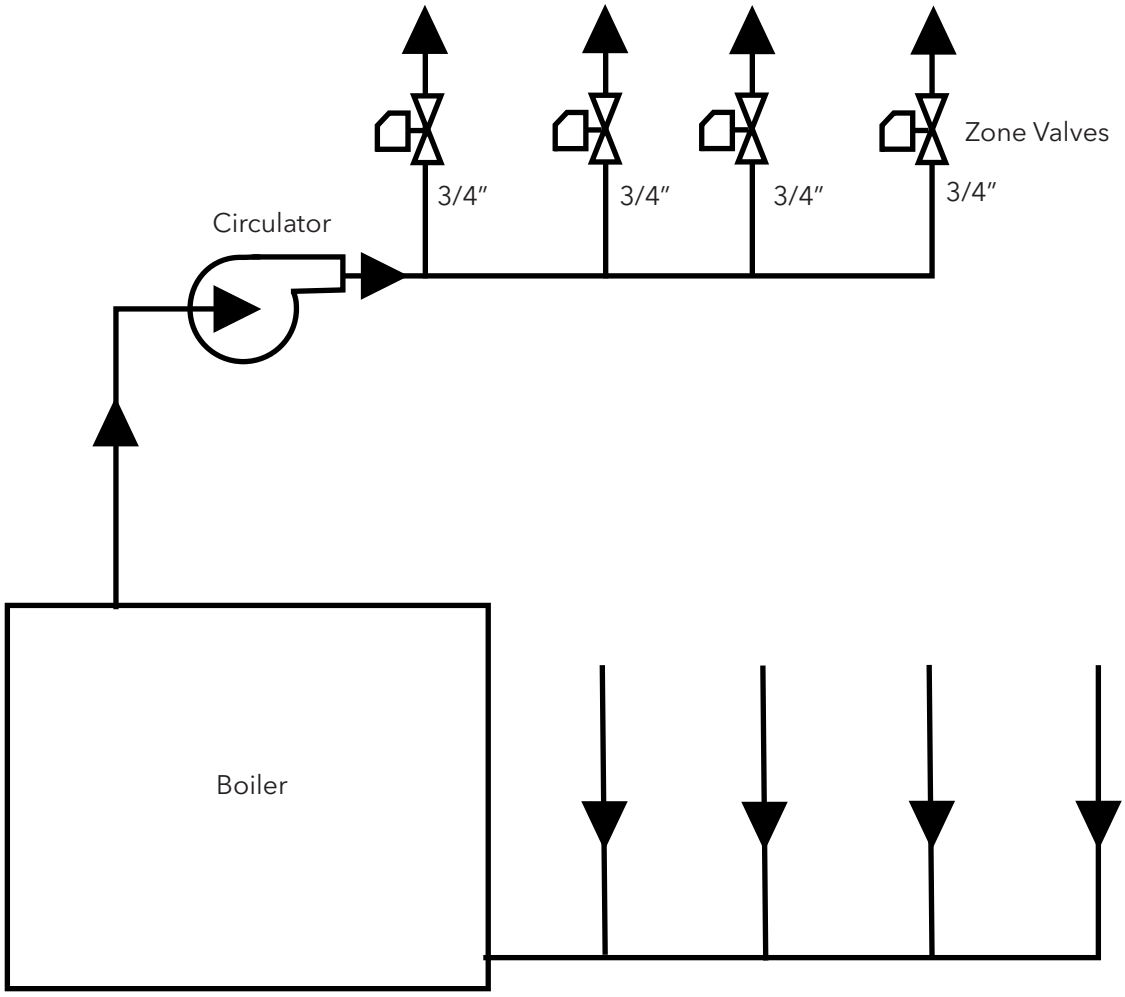
**Q: How many feet of baseboard could we run in each zone before the water temperature dropped to a point where it would probably be too cool to heat the end of the zone on the coldest day?**

A: _____ feet

**Q: What B&G circulator should we use on this job?**

A: _____

_____

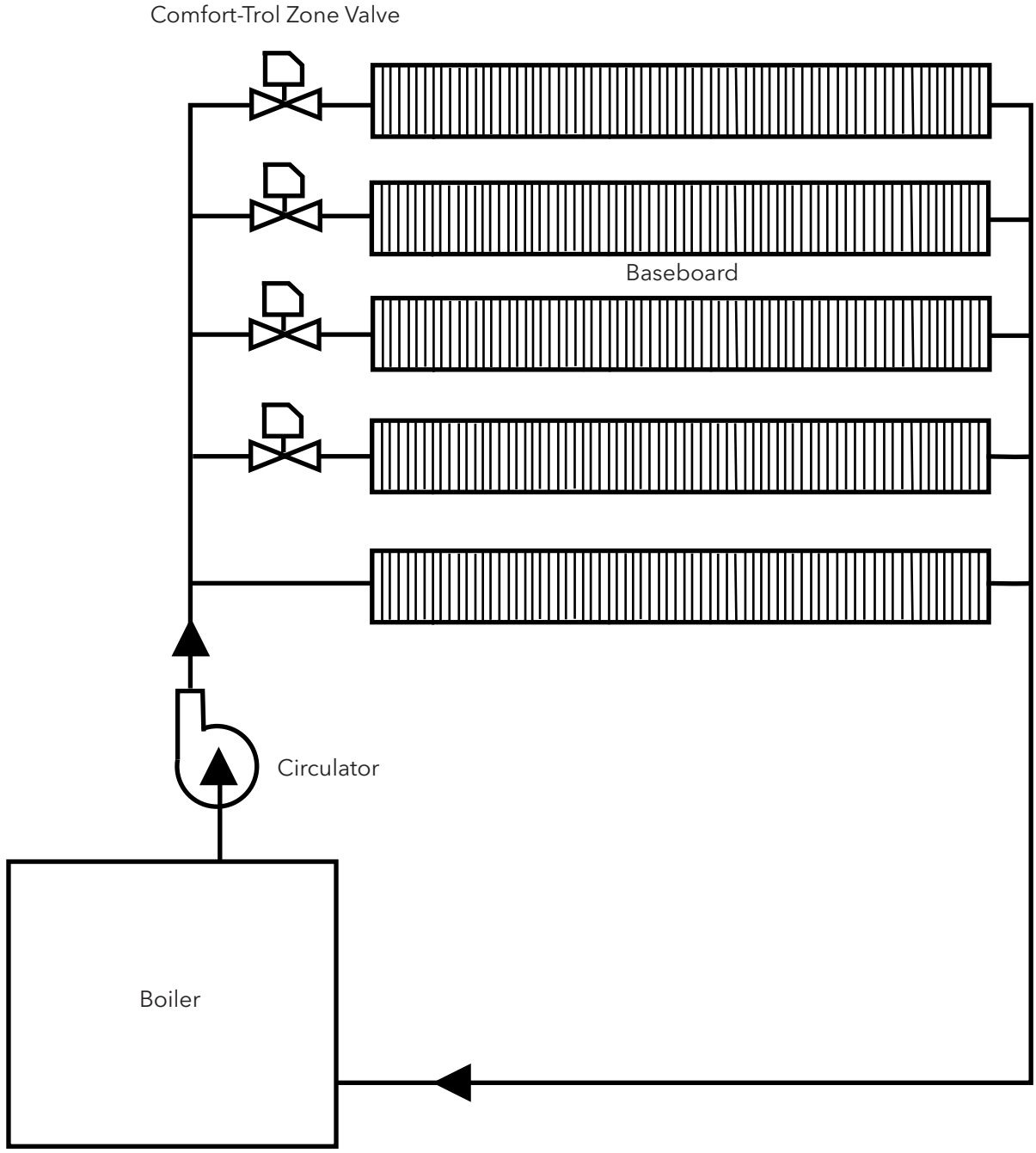


This small apartment house is zoned with B&G Comfort-Trol zone valves.
There is one radiator in the lobby that is not zoned.
The circulator runs continuously during the winter.

**Q: What should you add to the system to avoid velocity noise?**

A: _____

_____



This building has four 3/4" zones. As you can see, some of the zones are longer than others. When all four zones call, there seems to be more heat in the shorter zones than there is in the longer zones.

**Q: What could you add to the system to solve this problem?**

A: _____

**Q: Where would you install this?**

A: _____

**Q: If all the zones were calling, how much water would probably be flowing out to this system?**

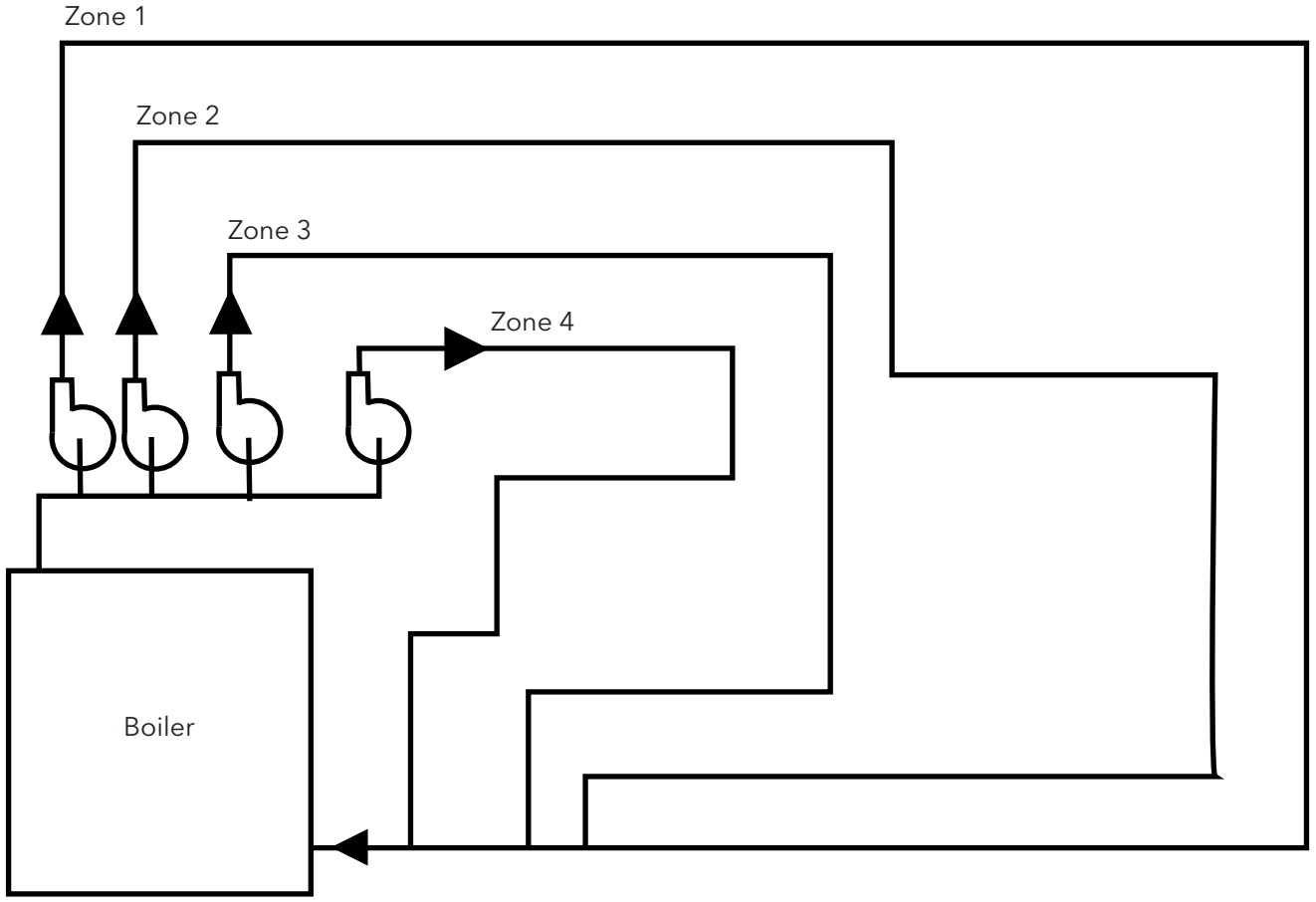
A: _____ gpm

**Q: What size should the supply and return manifolds be?**

A: _____

**Q: If we were sizing this job from scratch, which B&G circulators could we use on each zone?**

A: _____

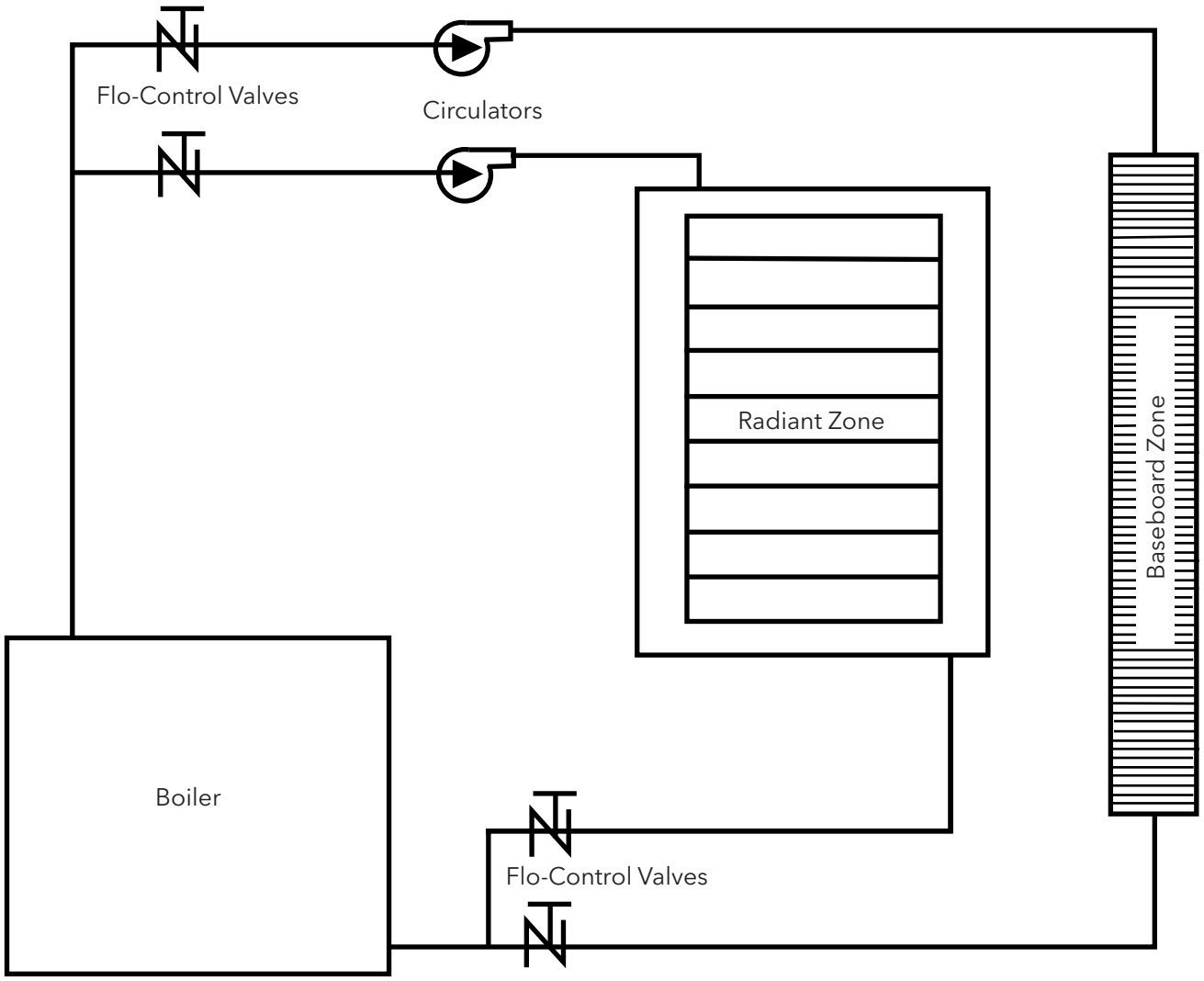


The people who live in this house want to use radiant heat in their new playroom. They already have a 3/4" baseboard loop zone in the house. The baseboard loop needs 190°F supply water temperature on the coldest day; the radiant system needs only 120°F water.

**Q: How can you deliver two different supply temperatures at the same time without using a lot of complicated controls?**

A: _____

_____

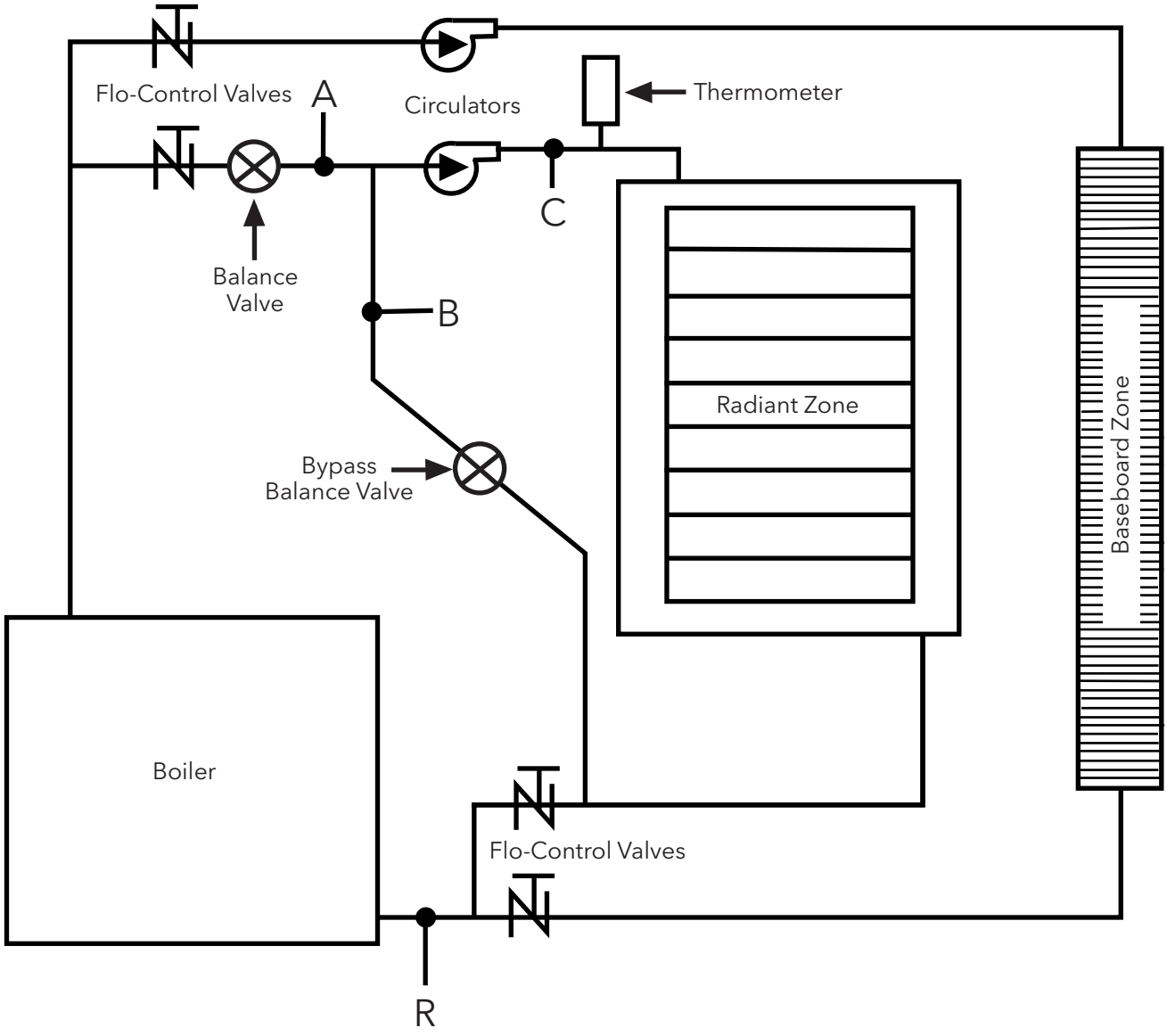


Both zones have a 40,000 Btuh heat loss and were designed with a 20°F temperature drop on the coldest day. The radiant zone requires 4 GPM at 120°F supply water. The baseboard zone needs 190°F. Using the weighted average equation below, what flow is required at points A & B?

**$(Flow_A \times Temp_A) + (Flow_B \times Temp_B) = (Flow_C \times Temp_C)$**

Point A _____ gpm

Point B _____ gpm




**Extra Credit Question:**

What is the boiler return water temperature at point R?

Point R _____ °F

# Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

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Let's Solve Water

Xylem Inc.
8200 N. Austin Avenue
Morton Grove, Illinois 60053
Phone: (847) 966-3700
Fax: (847) 965-8379
www.xyleminc.com/bellgossett