



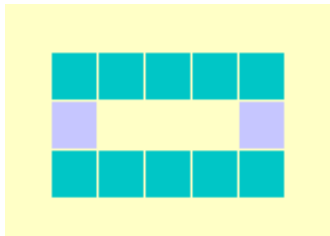
PBS Mathline®

Activity 1

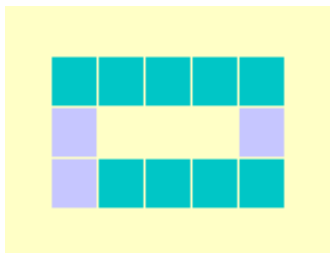
Materials for Building: Answers

1. There are 27 cubic feet of concrete in a cubic yard. If you think about a cubic yard being made up of three layers each 1-foot thick, then each layer is 3 feet on a side. Thus each layer has 9 cubic feet of concrete. Nine cubic feet of concrete per layer x 3 layers = 27 cubic feet of concrete. Using centimeter cubes, Unifix cubes, or Multi-link cubes may help students to figure this out.
2. You will need 14 cubic feet of concrete. To solve this problem, students may find it helpful to model the situation with cubes, since the foundation is 1 foot wide and 1 foot deep. Students might get confused by the fact that the 4 corner cubes are each shared by two sides.

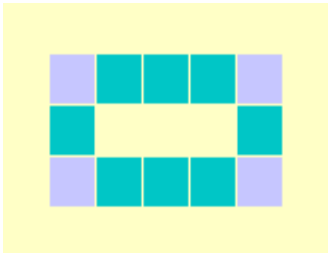
Different ways to approach the solution include:



$5 + 5 + 1 + 1$ (count the long sides first then add the remain blocks on the short sides)



$5 + 2 + 4 + 1$ (count the sides as you go around the rectangle)



$5 + 5 + 3 + 3 - 4$ (count the complete sides and then subtract the four corner blocks that each counted twice)

All of these make sense depending on your strategy.

3. You will need 116 cubic feet of concrete. To solve this problem, students may find it helpful use the strategies they developed on the playhouse to solve this problem. It may be too large for them to each build it with cubes. Again, students might get confused by the fact that the 4 corner cubes are each shared by two sides. Different ways to approach the solution include: $40 + 40 + 18 + 18$, or $40 + 19 + 39 + 18$; or $40 + 40 + 20 + 20 - 4$. All of these make sense depending on your strategy.

4. $116 \text{ cubic feet} \div 27 \text{ cubic feet per cubic yard} = 4 \frac{8}{27}$ cubic yards or approximately 2.3 cubic yards.

5. The inside dimensions of the rectangle are 18 feet by 38 feet.

6. You would need 342 cubic feet of concrete. To determine this, you can calculate the number of squares (or square feet) it would take to cover the floor. One way to think of it is as 18 squares in the first row and there are 38 row so that would take 684 squares. Each square will only be $\frac{1}{2}$ foot thick. So take $684 \times \frac{1}{2} = 342$ cubic feet of concrete. This is another situation in which blocks can help the students model the problem or a similar problem. This is also a good opportunity for them to use calculators.

7. $342 \text{ cubic feet} \div 27 \text{ cubic feet per cubic yard} = 12 \frac{18}{27}$ or $12 \frac{2}{3}$ cubic yards or approximately 2.67 cubic yards.

8. You would need 31 joists. $40 \text{ feet} \times 12 \text{ inches per foot} = 480 \text{ inches}$. $480 \text{ inches} / 16 \text{ inches/joist} = 30 \text{ joists}$. So $30 \text{ joists} + 1 \text{ joist to start} = 31 \text{ joists}$.

9. They would be 620 feet long. $31 \text{ joists} \times 20 \text{ feet} = 620 \text{ feet}$.

10. We would need a joist every 16 inches along the 20-foot side. $20 \text{ feet} \times 12 \text{ inches per foot} = 240 \text{ inches}$. $240 \text{ inches} / 16 \text{ inches/joist} = 15 \text{ joists}$. So $15 \text{ joists} + 1 \text{ joist to start} = 16 \text{ joists}$.

11. They would be 640 feet long. $16 \text{ joists} \times 40 \text{ feet} = 640 \text{ feet}$.

