



## Math Olympiad and Problem Solving Programs

F120 - Intermediate Problem Solving

Problem Set 20.1 - Extra Ones

Name:

Date:

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1. Draw a pipe on your paper in front of you. Now draw cuts so that the pipe is split into 10 segments. How many lines did you use to cut the pipe? NINE. So there are 9 cuts required to cut the segment into 10 pieces. Each cut takes 1 minute, so it takes  $9 \times 1 = \boxed{9 \text{ min}}$ .
2. Like the problem before this, if you drew 18 street blocks, there would be 17 spaces between street blocks. So Calvin is in charge of  $\boxed{17}$  water stations.
3. Since the girls are in a circle, there are 15 spaces between the girls. So there is room for  $\boxed{15}$  boys.
4. If 10 boys are lined up, there are 9 spaces between boys. So there is room for  $\boxed{9}$  girls.
5. In a space of three seconds, the clock chimes once at the 0th second, once at the 1st second, once on the 2nd second, and once on the third second. In other words, if you started a stopwatch at the first chime, the four chimes would finish by the time the stopwatch said 3 seconds. So a second goes by between each chime. If there are 15 chimes, there are 14 spaces between each chime. So it takes  $\boxed{14 \text{ s}}$ .
6.  $\boxed{19}$
7. When we count stories in a building, we need to count *flights of stairs*. To get from the first floor to the second floor of a building, you need to climb one flight of stairs. To get from the first floor to the third floor, we need to climb 2 flights of stairs, one to get from floor 1 to floor 2, and the second to get from floor 2 to floor 3.  
So if Nicholas climbs to the fifth floor, he has climbed 4 flights of stairs. He used 100 seconds, so he used  $100 \text{ s} \div 4 = 25$  seconds per flight of stairs. To get to the 10th floor, he needs to climb 5 more flights of stairs. This will take him  $25 \text{ s} \times 5 = \boxed{125 \text{ s}}$ .
8. If Matthew walked 64 steps, he has climbed  $64 \div 16 = 4$  flights of stairs. But this does NOT mean he is on the fourth floor! If he climbs 4 flights of stairs, he used one to get from floor 1 to floor 2, the second to get to floor 3, the third to get to floor 4 and the fourth to get to the  $\boxed{5\text{th floor}}$ .
9. If there are 20 students in the band, and each row has 4 students, then there are  $20 \div 4 = 5$  rows. There are 4 spaces between the rows, and each space is 1 m, so the length of the marching band is  $4 \times 1 = \boxed{4 \text{ m}}$ .
10. From the 8th floor to the 5th floor, Albert uses 3 flights of stairs. It takes him 90 seconds, so he takes  $90 \div 3 = 30$  seconds per flight of stairs. From the 5th floor to the 1st floor, Albert uses 4 flights of stairs. It takes him 30 seconds per flight, so it takes him  $4 \times 30 \text{ s} = \boxed{120 \text{ s}}$ .