Dialogue Box

How Many 21s Are In 1,344?

The students in one class have built a multiple tower for 21. The highest number on their tower is 1,029. In Session 3.4, they are considering division problems in which the dividend is not on the multiple tower. Students have solved 1,344 ÷ 21, the first problem on *Student Activity Book* page 55, and are discussing their strategies. The teacher has identified students who used the multiple tower in different ways to share their solutions.

Mercedes started with 1,029, the last number on the class tower.

Mercedes: We already figured out that 1,029 was 49 × 21, so it's easy to know that 50 × 21 = 1,050. I need to get to 1,344, so I added 10 more 21s and got 1,260. I added by 21 and got 1,281; another 21 is 1,302. Then I'm 42 away from 1,344, so that's two more 21s. So let's see, that's 50, 60, 61, 62, 64.

Teacher: What do you mean, 50, 60, 61, 62, 64? Where did those numbers come from?

Mercedes: I was just keeping track of how many 21s I had. First I had 50, then I add 10 more 21s, like that.

The teacher records Mercedes' strategy and labels it A. (See the chart at the end of this **Dialogue Box.**)

Samantha used numbers that are already on the tower and broke the dividend into two pieces, 840 and 504.

Samantha: From the multiple tower, I know that 840 ÷ 21 = 40. I did 1,344 − 840 and it's 504. I looked at the multiple tower and found 504. It's 4 more 21s from 420, so that makes it 24. I added 40 and 24; it equals 64.

The teacher records Samantha's strategy and labels it B.

Renaldo used the multiple tower and a relationship about multiples of 10 to help him find the answer.

Renaldo: I looked at the bottom of the tower, but instead of thinking 21, 42, 63, I thought of them as multiples of 10, so I thought 210, 420, 630, 840, 1,050, 1,260. If 126 is the 6th multiple, then 1,260 is the 60th multiple. Then I wanted to see how many further I had to go. 40 more than 1,260 is 1,300, and 44 more than that is 1,344, so I knew I needed to go 84 more. That's 4 more 21s, so my answer is 64.

Teacher: Can someone else explain how Renaldo used the numbers at the bottom of the tower to figure out that 1,260 is the 60th multiple of 21?

The teacher records Renaldo's strategy and labels it C.

The teacher makes deliberate choices about asking Mercedes, Samantha, and Renaldo to explain their strategies. Samantha simply broke the dividend into two pieces, 840 and 504, and the teacher wants students to see this as a possible strategy for solving division problems. Mercedes and Renaldo both finished in a similar way (going up 84 more from 1,260), but Mercedes added up by 21s to get to 1,344 and then added her partial answers. The teacher understands why Mercedes said, "50, 60, 61, 62, 64" and wants Mercedes to explain her thinking more fully to the class. The teacher also thinks Renaldo noticed an important relationship: that because the 6th multiple of 21 is 126, the 60th multiple is 1,260. So she asks another student to explain Renaldo's idea, to give time for other students to think this through.

(A)

$50 \times 21 = 1{,}050$

$10 \times 21 = 210$	$1{,}050 + 210 = 1{,}260$
$1 \times 21 = 21$	$1{,}260 + 21 = 1{,}281$
$1 \times 21 = 21$	$1{,}281 + 21 = 1{,}302$
$\underline{2 \times 21 = 42}$	$1{,}302 + 42 = 1{,}344$

$64 \times 21 = 1{,}344$

(B)

$840 \div 21 = 40$

$\underline{504 \div 21 = 24}$ $\quad 1{,}344 - 840 = 504$

$1{,}344 \div 21 = 164$

(C)

$60 \times 21 = 1{,}260$	$6 \times 21 = 126$
$\underline{4 \times 21 = 84}$	$1{,}260 + 84 = 1{,}344$

$64 \times 21 = 1{,}344$