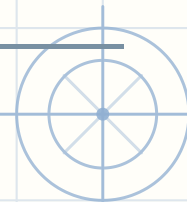


Cycles — Every kind

Name: _____

Date: _____



The number is far too big to write. Find what repeats, and count carefully.

- 1 A number is made by multiplying 333 threes together. No calculator will show it.

What is the remainder when it is divided by 7?

Why Multiply threes together one at a time and the remainders when divided by 7 go 3, 2, 6, 4, 5, 1, then start again — a cycle of 6. 55 whole cycles is $55 \times 6 = 330$, and $333 - 330 = 3$ more, so the 333th lands 3 along the cycle. The remainder is 6.

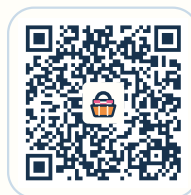
6

- 2 Today is Monday. A comet will be overhead in 632 days' time.

What day of the week will that be?

Why

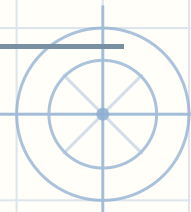
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Cycles — Every kind

Name: _____

Date: _____



(The number is far too big to write. Find what repeats, and count carefully.

- 3** A number is made by multiplying 40 sevens together. It is far too big for any calculator to show.

What is its last digit?

Why

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- 4** A number is made by multiplying 40 eights together. It is far too big for any calculator to show.

What is its last digit?

Why

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Cycles · Every kind — Answer key

If they are stuck

- It cannot be computed, so look at the small cases. Do they settle down?

1. Multiply threes together one at a time and the remainders when divided by 7 go 3, 2, 6, 4, 5, 1, then start again — a cycle of 6. 55 whole cycles is $55 \times 6 = 330$, and $333 - 330 = 3$ more, so the 333th lands 3 along the cycle. The remainder is 6.

3. Powers of 7 end in 7, 9, 3, 1, then start again — a cycle of 4. $40 \div 4 = 10$ exactly, so the 40th lands on the LAST of the four, not the first. Its last digit is 1.

2. Days of the week repeat every 7, so only the leftover matters. 90 whole weeks is $90 \times 7 = 630$ days, and $632 - 630 = 2$ left over. So the comet arrives 2 days after Monday: Wednesday.

4. Powers of 8 end in 8, 4, 2, 6, then start again — a cycle of 4. $40 \div 4 = 10$ exactly, so the 40th lands on the LAST of the four, not the first. Its last digit is 6.

