Divisibility Rules

For each of the following numbers, determine if it is divisible by 2, 3, 4, 5, 6, 8, 9, 10, and 12.

1. 42.
   - 2: YES since it ends in an even number
   - 3: YES since the sum of the digits is divisible by 3 (4+2=6)
   - 4: NO since 42 is not divisible by 4 (use division to show this)
   - 5: NO since it does not end in a 5 or 0
   - 6: YES since it is divisible by both 2 and 3
   - 8: NO since 42 is not divisible by 8 (use division to show this)
   - 9: NO since the sum of the digits is not divisible by 9 (4+2=6)
   - 10: NO since it does not end in a 0.
   - 12: NO since it is not divisible by both 3 and 4.

Overall, 42 is divisible by 2, 3, and 6.

2. 507.
   - 2: NO since it does not end in an even number
   - 3: YES since the sum of the digits is divisible by 3 (5+0+7=12)
   - 4: NO since 7 is not divisible by 4 (use division to show this)
   - 5: NO since it does not end in a 5 or 0
   - 6: NO since it is not divisible by both 2 and 3
   - 8: NO since 507 is not divisible by 8 (use division to show this)
   - 9: NO since the sum of the digits is not divisible by 9 (5+0+7=12)
   - 10: NO since it does not end in a 0.
   - 12: NO since it is not divisible by both 3 and 4.

Overall, 507 is divisible by 3.

3. 100.
   - 2: YES since it ends in an even number
   - 3: NO since the sum of the digits is not divisible by 3 (1+0+0=1)
   - 4: YES since 0 is divisible by 4 (use division to show this)
   - 5: YES since it does ends in a 5 or 0
   - 6: NO since it is not divisible by both 2 and 3
   - 8: NO since 100 is not divisible by 8 (use division to show this)
   - 9: NO since the sum of the digits is not divisible by 9 (1+0+0=1)
   - 10: YES since it ends in a 0.
   - 12: NO since it is not divisible by both 3 and 4.

Overall, 100 is divisible by 2, 4, 5, and 10.

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4. 117
   - 2: NO since it does not end in an even number
   - 3: YES since the sum of the digits is divisible by 3 (1+1+7=9)
   - 4: NO since 17 is not divisible by 4 (use division to show this)
   - 5: NO since it does not end in a 5 or 0
   - 6: NO since it is not divisible by both 2 and 3
   - 8: NO since 117 is not divisible by 8 (use division to show this)
   - 9: YES since the sum of the digits is divisible by 9 (1+1+7=9)
   - 10: NO since it does not end in a 0.
   - 12: NO since it is not divisible by both 3 and 4.

Overall, 117 is divisible by 3 and 9.

5. 360
   - 2: YES since it ends in an even number
   - 3: YES since the sum of the digits is divisible by 3 (3+6+0=9)
   - 4: YES since 60 is divisible by 4 (use division to show this)
   - 5: YES since it ends in a 5 or 0
   - 6: YES since it is divisible by both 2 and 3
   - 8: YES since 360 is divisible by 8 (use division to show this)
   - 9: YES since the sum of the digits is divisible by 9 (3+6+0=9)
   - 10: YES since it ends in a 0.
   - 12: YES since it is divisible by both 3 and 4.

Overall, 360 is divisible by 2, 3, 4, 5, 6, 8, 9, 10, and 12.

6. 15,102
   - 2: YES since it ends in an even number
   - 3: YES since the sum of the digits is divisible by 3 (1+5+1+0+2=9)
   - 4: NO since 2 is not divisible by 4 (use division to show this)
   - 5: NO since it does not end in a 5 or 0
   - 6: YES since it is divisible by both 2 and 3
   - 8: NO since 102 is not divisible by 8 (use division to show this)
   - 9: YES since the sum of the digits is divisible by 9 (1+5+1+0+2=9)
   - 10: NO since it does not end in a 0.
   - 12: NO since it is not divisible by both 3 and 4.

Overall, 15,102 is divisible by 2, 3, 6, and 9.

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