

A number is divisible by another number if after dividing, the remainder is zero. For example, 18 is divisible by 3 because  $18 \div 3 = 6$  with 0 remainder. However, 25 is not divisible by 4 because  $25 \div 4 = 6$  with a remainder of 1. There are several mental math tricks that can be used to find the remainder after division without actually having to do the division.

**Dividing By 2:** A number is divisible by 2 if the last digit is even.

**Dividing By 3:** A number is divisible by 3 if the sum of all the digits is divisible by 3.

Ex [1] 34,164 is divisible by 3 because  $3+4+1+6+4 = 18$  which is divisible by 3.

\*To find the remainder of a number divided by 3, add the digits and find that remainder. So if the digits added together equal 13 then the number has a remainder of 1 since 13 divided by 3 has a remainder of 1.

**Dividing By 4:** A number is divisible by 4 if the last 2-digits are divisible by 4.

Ex [1] 34,164 is divisible by 4 because 64 is divisible by 4.

\*To find the remainder of a number divided by 4 take the remainder of the last 2 digits. So if the last 2-digits are 13 then the number has a remainder of 1 since 13 divided by 4 has a remainder of 1.

**Dividing By 5:** A number is divisible by 5 if the last digit is a 5 or a 0.

\*To find the remainder of a number divided by 5 simply use the last digit. If it is greater than 5, subtract 5 for the remainder.

**Dividing By 6:** A number is divisible by 6 if it is divisible by 2 and by 3.

Ex [1] 34,164 is divisible by 6 because it is divisible by 2 and 3.

**Dividing By 7:** A number is divisible by 7 if the following is true:

1. Multiply the ones digit by 2.
2. Subtract this value from the rest of the number.
3. Continue this pattern until you find a number you know is or is not divisible by 7.

Ex [1] 7203 is divisible by 7 because

- a)  $2 \times 3 = 6$ .
- b)  $720 - 6 = 714$  which is divisible by 7.

Ex [2] 14443 is not divisible by 7 because

- a)  $3 \times 2 = 6$ .
- b)  $1444 - 6 = 1438$ .
- c)  $8 \times 2 = 16$ .
- d)  $143 - 16 = 127$  which is not divisible by 7.

Note: This method takes a lot of practice and is sometimes easier to just work it out individually.

**Dividing By 8:** A number is divisible by 8 if the last 3-digits are divisible by 8.

Ex [1] 34,168 is divisible by 8 because 168 is divisible by 8.

\*To find the remainder of a number divided by 8 take the remainder of the last 3-digits. So if the last 3-digits are 013 then the number has a remainder of 5.

**Dividing By 9:** A number is divisible by 9 if the sum of the digits is divisible by 9.

Ex [1] 34,164 is divisible by 9 because  $3+4+1+6+4 = 18$  which is divisible by 9.

\*To find the remainder of a number divided by 9, add the digits and find that remainder. So if the digits added together equal 13 then the number has a remainder of 4 since 13 divided by 9 has a remainder of 4.

**Dividing By 10:** A number is divisible by 10 if the last digit is a 0.

\*To find the remainder of a number divided by 10 simply use the last digit.

**Dividing By 11:** A number is divisible by 11 if this is true:

1<sup>st</sup> Step: Starting from the one's digit add every other digit

2<sup>nd</sup> Step: Add the remaining digits together

3<sup>rd</sup> Step: Subtract 1<sup>st</sup> Step from the 2<sup>nd</sup> Step

\*If this value is 0 then the number is divisible by 11. If it is not 0 then this is the remainder after dividing by 11 if it is positive. If the number is negative add 11 to it to get the remainder.

Ex [1] 6613585 is divisible by 11 since  $(5+5+1+6) - (8+3+6) = 0$ .

**Dividing By 12:** A number is divisible by 12 if it is divisible by 3 and by 4.

Ex [1] 34,164 is divisible by 12 because it is divisible by 3 and 4.