Division Problems

```
                  xx8xx
        _____
xxx | xxxxxxxx
   ↑      xxx              ←  PROD 1
  DIV   _____
          xxxx
            xxx            ←  PROD 2
          _____
            xxxx
            xxxx           ←  PROD 3
          _____
```

Substitute a digit between 0-9 for each X. Initial digits are never 0.

Look for special features.

Division Problems

```
                  xx8xx
        _____
xxx | xxxxxxxx
   ↑      xxx              ←  PROD 1
  DIV   _____
          xxxx
            xxx            ←  PROD 2
          _____
            xxxx
            xxxx           ←  PROD 3
          _____
```

Special features:

PROD 1 not placed under the first 3 digits?

PROD 2 result of known multiplier: 8
Multiplying DIV by 8 yields a 3 digit number. Thus DIV must be a small number in the range 100-125 (since 125*8 = 1000). So PROD 2 is a number between 800-992.

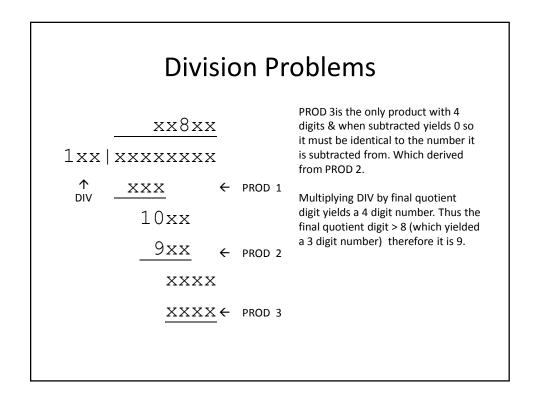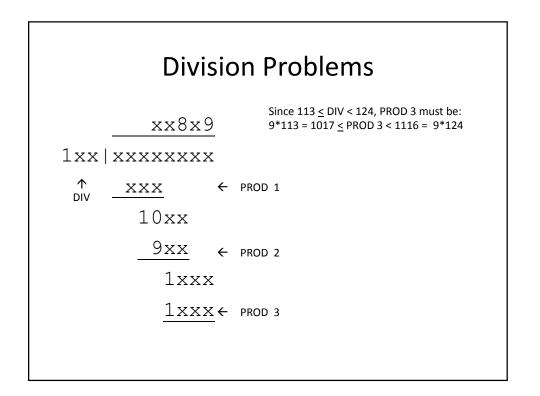# Division Problems

PROD 2   PROD 2

Special features:

PROD 2 is a number between 800-992.
It is subtracted from a 4 place number but yields a 2 place result. The only combination for which this can hold is when a 1 is carried to the second column to cancel a 9.

```
 xxxx      xxxx
-8xx      -9xx
───────   ───────
  xx        xx
```

Therefore DIV*8 > 900 so DIV $\geq$ 113 < 124.

```
   10xx
  -9xx
  ───────
    xx
```

Division Problems

```
        xx8xx
       ───────────
1xx|xxxxxxxx
↑      xxx        ←  PROD 1
DIV   ───────
      10xx
       9xx        ←  PROD 2
      ───────
      xxxx
      xxxx        ←  PROD 3
      ───────
```

PROD 3is the only product with 4 digits & when subtracted yields 0 so it must be identical to the number it is subtracted from. Which derived from PROD 2.

Multiplying DIV by final quotient digit yields a 4 digit number. Thus the final quotient digit > 8 (which yielded a 3 digit number) therefore it is 9.

Division Problems

```
              xx8x9
         _____
    1xx|xxxxxxxx
     ↑     xxx          ←  PROD 1
    DIV    _____
           10xx
            9xx          ←  PROD 2
           _____
            1xxx
            1xxx  ←  PROD 3
            _____
```

Division Problems

PROD 2

```
10xx
-9xx
_____
  1x
```

Special features:

PROD 2 is a number between 800-992.
Only 2 digits must be carried down.
What does the one beneath PROD2 imply?
The X's in column have a difference of one. And a one must be carried over to the 9 in column 3.The only pairs for which this holds are 0-9, 0-8, or 1-9 (in the last 2 cases a 1 must be carried from the first column). Thus PROD 2 is either 99X or 98X. Which implies DIV is either 123 or 124.
Note:
1. Whenever a number is carried down and the result is < DIV we place a 0 in the quotient digit.
2. The PROD 1 subtraction pattern is identical to the PROD 2 subtraction pattern. Thus the first quotient digit must an 8.

Division Problems

```
            80809
  _____
124|10020316
     992
  _____
       1003
        992
     _____
        1116
        1116
        _____
```

DIV is either 123 or 124 and the quotient must be 80809. By testing each of these possible divisors by the quotients to produce the products one will find that only 124 yields a result that satisfies all the constraints.