Partial Quotients Division Examples
(By C. Elkins 2016)

Problem: 252 ÷ 7

1 x 7 = 7	10 x 7 = 70
2 x 7 = 14	20 x 7 = 140
3 x 7 = 21	30 x 7 = 210
4 x 7 = 28	40 x 7 = 280
5 x 7 = 35	

1. Make a list of easy multiples of 7. Most children know multiples up to 5 quickly. Then use knowledge about multiples of 10 to write companion facts (x10, x20, etc.)
2. I can stop with 40 x 7 because it is greater than my dividend of 252.
3. Show the division problem in the long division format with a long vertical line.
4. Partial quotients will be written down the right side of the line.
5. Ask: How many 7's are in 252?
6. I want to estimate the quotient a part at a time. I can make several choices to get my first estimate, but using my easy list of multiples helps me think of ways multiplication is related to division. I will try 30 because 30 x 7 is the closest to my dividend of 252. **30** x 7 = 210.
7. As I get more experienced with learning multiplication facts and how to double and halve numbers, I can get closer to the actual dividend and reach my answer in less steps.
8. Subtract 252 – 210 = 42.
9. Ask: How many 7s are in 42?
   - Using my easy multiples list, I can try 5. **5** x 7 = 35. (If I know that 6 x 7 = 42, then I can use 6 as my next partial quotient.)
   - Subtract 42 – 35 = 7
10. Ask: How many 7s are in 7?
    - I can get one more group of 7. **1** x 7 = 7
    - Subtract 7 – 7 = 0
11. Since there are 0 left over, I am done dividing.
12. Add all of the partial quotients: 30 + 5 + 1 = 36
13. Answer: 254 ÷ 7 = 36
14. I can check with multiplication: 36 x 7 = 252

Check: 36 x 7

Problem: 1526 ÷ 23

1. Make a list of easy multiples of 23. For double digit divisors, I will make a list using my knowledge of how to multiply x 2 (double) and x 4 (double twice) and x 8 (double again). Then use knowledge about multiples of 10 to write companion facts (x10, x20, etc.)

1 x 23 = 23	10 x 23 = 230
2 x 23 = 46	20 x 23 = 460
4 x 23 = 92	40 x 23 = 920
8 x 23 = 184	80 x 23 = 1840

2. I can stop with 80 x 23 because it is more than my dividend of 1526.
3. Show the division problem in the long division format with partial quotients listed along the right side.
4. Ask: How many 23s are in 1526?
5. I want to estimate the quotient a part at a time. I can make several choices to get my first estimate, but using my easy list of multiples helps me think of ways multiplication is related to division. I will try 40 because 40 x 23 is the closest to my dividend of 1526. **40** x 23 = 920.
6. As I get more experienced with learning multiplication facts and how to double and halve numbers, I can get closer to the actual dividend and reach my answer in less steps.
7. Subtract 1526 -920 = 606
8. Ask: How many 23s are in 606?
   - Using my multiples list, I can see **20** x 23 = 460 is the closest I can get to 606.
   - Subtract 606 – 460 = 146
9. Ask: How many 23s are in 146?
   - Using my easy multiples list, I can see **4** x 23 = 92 is closest to 146.
   - Subtract: 146 – 92 = 54
10. Ask: How many 23s are in 54?
    - Using my easy multiples list, I can see **2** x 23 = 46 is closest to 54.
    - Subtract: 54 – 46 = 8
11. Since the amount left over is less than my divisor of 23, I am done. The remainder is 8.
12. Add all of the partial quotients:
    40 + 20 + 4 + 2 = 66 with a remainder of **8**
13. Answer: 1526 ÷ 23 = 66 r**8**
14. I can check with multiplication:
    (66 x 23) + 8 = 1526

$$23\overline{)1526}$$

$$\begin{array}{r} -920 \quad 40 \times 23 \\ \hline 606 \\ -460 \quad 20 \times 23 \\ \hline 146 \\ -92 \quad 4 \times 23 \\ \hline 54 \\ -46 \quad 2 \times 23 \\ \hline 8 \quad 66 \end{array}$$

$$\begin{array}{r} 40 \\ +20 \\ +4 \\ +2 \\ \hline 66 \end{array}$$

Check: (66 x 23) + 8

x	60	6
20	1200	120
3	180	18

1380 + 138 = ____

$$\begin{array}{r} 1380 \\ +138 \\ + \quad 8 \text{ remainder} \\ \hline 1,526 \checkmark \end{array}$$

Problem: 471 ÷ 9

1. Make a list of easy multiples of 9. Most children know multiples up to 5 quickly. Then use knowledge about multiples of 10 to write companion facts (x10, x20, etc.)

1 x 9 = 9	10 x 9 = 90
2 x 9 = 18	20 x 9 = 180
3 x 9 = 27	30 x 9 = 270
4 x 9 = 36	40 x 9 = 360
5 x 9 = 45	50 x 9 = 450

2. I can stop with 50 x 9 because it is very close to my divided of 471.
3. Show the division problem in the long division format with partial quotients listed along the right side.
4. Ask: How many 9s are in 471?
5. I want to estimate the quotient a part at a time. I can make several choices to get my first estimate, but using my easy list of multiples helps me think of ways multiplication is related to division. I will try 50 because **50** x 9 is the closest to my dividend of 471. 50 x 9 = 450.
6. As I get more experienced with learning multiplication facts and how to double and halve numbers, I can get closer to the actual dividend and reach my answer in less steps.
7. Subtract 471 – 450 = 21
8. Ask: How many 9s are in 21?
   - Using my easy multiples list, I can see **2** x 9 = 18 is the closest I can get to 21.
   - Subtract 21 – 18 = 3
9. Since the amount left over is less than my divisor of 9, I am done. The remainder is 3.
10. Add all of the partial quotients:
    50 + 2 = 52 with a remainder of 3
11. Answer: 471 ÷ 9 = 52 r 3.
12. I can check with multiplication:
    (52 x 9) + 3 = 471

$$9 \overline{)471}$$
$$-450 \quad | \quad 50 \times 9$$
$$\overline{21}$$
$$-18 \quad | \quad 2 \times 9$$
$$\overline{3} \quad | \quad 52 \rightarrow \text{Add}$$

Remainder

$$\begin{array}{r} 50 \\ +2 \\ \hline 52 \end{array}$$

Check: $(52 \times 9) + 3$

x	50	2
9	450	18

$$\begin{array}{r} 450 \\ +\ 18 \\ +\ \ 3 \text{ remainder} \\ \hline 471 \checkmark \end{array}$$

Other Examples of Partial Quotients Division:

Example 1

$$6\overline{)98}$$
$$-60 \quad | \quad 10 \times 6$$
$$\underline{}$$
$$38$$
$$-30 \quad | \quad 5 \times 6$$
$$\underline{}$$
$$8$$
$$-6 \quad | \quad 1 \times 6$$
$$\underline{}$$
$$2 \quad | \quad 16$$

1×6=6	10×6=60
2×6=12	20×6=120
3×6=18	
4×6=24	
5×6=30	

How many 6's in 98?

Ans: 16 R 2

Check: $(16 \times 6) + 2$

×	10	6
6	60	36

$$\begin{array}{r} 60 \\ +36 \\ +\ \ 2\,R \\ \hline 98 \checkmark \end{array}$$

Example ④

$$7\overline{)465}$$
$$-350 \quad | \quad 50 \times 7$$
$$\underline{}$$
$$115$$
$$70 \quad | \quad 10 \times 7$$
$$\underline{}$$
$$45$$
$$-35 \quad | \quad 5 \times 7$$
$$\underline{}$$
$$10$$
$$7 \quad | \quad 1 \times 7$$
$$\underline{}$$
$$3 \quad | \quad 66$$

1×7=7	10×7=70
2×7=14	20×7=140
3×7=21	30×7=210
4×7=28	40×7=280
5×7=35	50×7=350

How many 7's in 465?

Ans. 66 R 3

Check: $(66 \times 7) + 3$

×	60	6
7	420	42

$$\begin{array}{r} 420 \\ +\ 42 \\ +\ \ \ 3\,R \\ \hline 465 \checkmark \end{array}$$

Example

$$8\overline{)1542}$$
$$-800 \quad | \quad 100 \times 8$$
$$\underline{}$$
$$742$$
$$-400 \quad | \quad 50 \times 8$$
$$\underline{}$$
$$342$$
$$-320 \quad | \quad 40 \times 8$$
$$\underline{}$$
$$22$$
$$-16 \quad | \quad 2 \times 8$$
$$\underline{}$$
$$6 \quad | \quad 192$$

1×8=8	10×8=80
2×8=16	20×8=160
3×8=24	30×8=240
4×8=32	40×8=320
5×8=40	50×8=400
	100×8=800

How many 8's in 1542?

Ans: 192 R 6

Check: $(192 \times 8) + 6$

×	100	90	2
8	800	720	16

$$\begin{array}{r} 800 \\ +720 \\ +\ 16 \\ +\ \ 6\,R \\ \hline 1542 \checkmark \end{array}$$

Example

$$9\overline{)154}$$
$$90 \quad | \quad 10 \times 9$$
$$\underline{}$$
$$64$$
$$45 \quad | \quad 5 \times 9$$
$$\underline{}$$
$$19$$
$$-18 \quad | \quad 2 \times 9$$
$$\underline{}$$
$$1 \quad | \quad 17$$

1×9=9	10×9=90
2×9=18	20×9=180
3×9=27	
4×9=36	
5×9=45	

How many 9's in 154?

Ans: = 17 R 1

Check $(17 \times 9) + 1$

×	10	7
9	90	63

$$\begin{array}{r} 90 \\ +63 \\ +\ \ 1\,R \\ \hline 154 \checkmark \end{array}$$

Partial Quotients

How many ___ in ___?

4x =

1	4
2	8
3	12
4	16
5	20
10	40
20	80
30	120
100	400

$4\overline{)78}$
-40 10
$\underline{38}$
-20 **5**
$\underline{18}$
-16 + 4
$\overline{2}$ | 19 R 2

$4\overline{)97}$
-80 20
$\underline{17}$
-16 + 4
$\overline{1}$ | 24 R 1

$4\overline{)539}$
-400 100
$\overline{139}$
-120 30
$\underline{19}$
-16 + 4
$\overline{3}$ | 134 R 3

10 + 9
$4 | 40 | 36 |$ = 76
+ 2
78

20 + 4
$4 | 80 | 16 |$ 96
+ 1
97

100 + 30 + 4
$4 | 400 | 120 | 16 |$
400
120
16
536
+ 3
539

Check w/ multip. using area model.

5x =

1	5
2	10
3	15
4	20
5	25
10	50
20	100
30	150
100	500

$5\overline{)63}$
-50 10
$\underline{13}$
-10 + 2
$\overline{3}$ | 12 R 3

10 + 2
$5 | 50 | 10 |$ = 60
+ 3
63

$5\overline{)428}$
-150 30
$\overline{278}$
-150 30
$\overline{128}$
-100 20
$\overline{28}$
-25 + 5
$\overline{3}$ | 85 R 3

80 + 5
$5 | 400 | 25 |$ 425
+ 3
428

$5\overline{)832}$
-500 100
$\overline{332}$
-250 50
$\overline{82}$
-50 10
$\overline{32}$
-30 + 6
$\overline{2}$ | 166 R 2

100 + 60 + 6
$5 | 500 | 300 | 30 |$ = 830
+ 2
832

- Divide
- Multiply
- Subtract

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6x =

1	6
2	12
3	18
4	24
5	30
10	60
20	120
30	180
100	600

$6 \overline{)75}$
-60 | 10
$\overline{15}$
-12 | +2
$\overline{3}$ | 12 R3

10 + 2
$6 \overline{)\,60\,|\,12\,}$ = 72
+ 3
$\overline{75}$

$6 \overline{)98}$
-60 | 10
$\overline{38}$
-30 | 5
$\overline{8}$
-6 | +1
$\overline{2}$ | 16 R2

10 + 6
$6 \overline{)\,60\,|\,36\,}$ | 96
+2
$\overline{98}$

$6 \overline{)321}$
-300 | 50
$\overline{21}$
-18 | +3
$\overline{3}$ | 53 R3

50 + 3
$6 \overline{)\,300\,|\,18\,}$ = 318
+ 3
$\overline{321}$

Check w/ multip. using area model.

7x =

1	7
2	14
3	21
4	28
5	35
10	70
20	140
30	210
100	700

$7 \overline{)87}$
-70 | 10
$\overline{17}$
-14 | +2
$\overline{3}$ | 12 R3

10 + 2
$7 \overline{)\,70\,|\,14\,}$ = 84
+3
$\overline{87}$

$7 \overline{)156}$
-70 | 10
$\overline{86}$
-70 | 10
$\overline{16}$
-14 | +2
$\overline{2}$ | 22 R2

20 + 2
$7 \overline{)\,140\,|\,14\,}$ = 154
+ 2
$\overline{156}$

$7 \overline{)465}$
-350 | 50
$\overline{115}$
70 | 10
$\overline{45}$
-35 | 5
$\overline{10}$
-7 | +1
$\overline{3}$ | 66 R3

60 + 6
$7 \overline{)\,420\,|\,42\,}$ | 462
+ 3
$\overline{465}$

• Divide
• Multiply
• Subtract

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Partial Quotients

How many ___ in ___?

8x =

1	8
2	16
3	24
4	32
5	40
10	80
20	160
30	240
100	800

```
8 | 98
   -80  | 10
    18
   -16  | +2
     2  | 12 R 2
```

10 + 2
```
8 | 80 | 16 | = 96
              +2
              98
```

```
8 | 281
   -240  | 30
     41
    -40  | +5
      1  | 35 R 1
```

30 + 5
```
8 | 240 | 40 | = 280
               +1
               281
```

```
8 | 1542
   -800  | 100
    742
   -400  | 50
    342
   -320  | 40
     22
     16  | 2
      6  | 192 R 6
```

100 + 90 + 2
```
8 | 800 | 720 | 16
```
```
 800
 720
  16
1536
 + 6
1542
```

Check w/multip. using area model.

9x =

1	9
2	18
3	27
4	36
5	45
10	90
20	180
30	270
100	900

```
9 | 154
   -90  | 10
    64
   -45  | 5
    19
   -18  | +2
     1  | 17 R 1
```

10 + 7
```
9 | 90 | 63
```
```
  90
 +63
 153
  +1
 154
```

```
9 | 628
   -270  | 30
    358
   -270  | 30
     88
    -45  | 5
     43
    -36  | +4
      7  | 69 R 7
```

60 + 9
```
9 | 540 | 81
```
```
 540
 +81
 621
  +7
 628
```

```
9 | 1428
    900  | 100
   4528
   -450  | 50
     78
    -72  | +8
      6  | 158 R 6
```

100 + 50 + 8
```
9 | 900 | 450 | 72
```
```
 900
 450
  72
1422
 + 6
1428
```

- Divide
- Multiply
- Subtract

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