**Decimal Multiplication and Division – Cheat Sheet**

**Multiplication**

To multiply two arbitrary numbers:

**Step 1)** Ignore the decimal points and multiply your numbers as if they were whole numbers.

**Step 2)** Reinsert the decimal point into your answer. You can do this by counting the number of times you multiplied each of your numbers by 10 at the start of step 1, and dividing your final answer by 10 this number of times to reverse the effect.

**Step 3)** Sometimes you can check your answer by doing a mental approximation.

**Examples:**

**41.2 × 2.2**

412 **×** 22 = 9064

(using long multiplication)

Therefore 41.2 \* 2.2 = 90.64

(since we divided both 412 and 22 by 10, and thus divide the answer by 100)

This sounds right as an approximation is 40 \* 2 = 80, which is close to 90.64

**0.4 × 0.003**

4 **×** 3 = 12

Therefore 0.4 **×** 0.003 = 0.00012

(since you divided 4 by 10, and divided 3 by 1000, and thus divided the result by 10,000).

Tip: remember that dividing and multiplying by 10 involves shifting the decimal point. We shifted it to the right **1** time to get from 4 to 0.4, and **3** times to get from 3 to 0.003, so we shift it **4** times to get from 12 to 0.00012)

**Division**

**Tip 1:** If we have *a* ÷ *b*, then we can multiply *a* and *b* by the same number without changing the result. Multiply *a* and *b* by 10 until both are whole numbers.

Examples:

**4.2** ÷ **0.14**

= 420 ÷ 14 (by multiplying both numbers by 100)

= 30

**Tip 2:** If we have a ÷ $\frac{b}{c}$ , then this is the same as a **×** $\frac{c}{b}$ . Only use this method if you can express the number you’re dividing by (i.e. the ‘divisor’) as a fraction, and we get a ‘clean’ result in which the digits after the decimal point don’t go on forever.

**Examples:**

*42 ÷ 0.01*

= 42 ÷ $\frac{1}{100}$ (express decimal as a fraction)

= 42 × 100 (in switching from division to multiplication, we flip the fraction, i.e. **take the reciprocal**)

= 4200

*14 ÷ 0.875*

= 14 ÷ $\frac{7}{8}$

= 14 × $\frac{8}{7}$

= 16 (pro tip: it’s easier to divide by the denominator first before multiplying by the numerator)

**Tip 3:** If we’re dividing a number by something larger than itself, or where we can’t divide the dividend nicely by the divisor:

**Step 1)** Similar to before (in Tip 1), multiply both numbers by 10 until the divisor is a whole number.

**Step 2)** Do *long division*, ignoring the decimal point to begin with. Add extra zeros to the dividend when necessary.

**Step 3)** Reinsert decimal point in the dividend, andinsert a decimal point in the result in the same position as the dividend.

Examples:

7.3 ÷ 0.17

= 730 ÷ 17

 4 2\_

17 | 7 3 0

 6 8 \_

 5 0

 3 4

 1 6

Uh oh, we have remainder not divisible by 17! Let’s chuck some 0s on the end of the dividend and keep going.

 4 2 9 4\_

17 | 7 3 0 0 0

 6 8 \_

 5 0

 3 4

 1 6 0

 1 5 3

 7 0

 6 8

 2

And so on (we can add more and more 0s to keep going). We want 730 ÷ 17, so reinsert decimal point:

 4 2.9 4\_

17 | 7 3 0.0 0

0.91 / 0.7

= 9.1 / 7

 1 3

7 | 9 1

Reinsert decimal point:

 1.3

7 | 9.1

Aligned with decimal point below.

Reinsert decimal point.