

## A Gross Fortnightly Fraction

January 2020						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2	3	4
				5		
5	6	7	8	9	10	11
				12		
12	13	14	15	16	17	18
				19		
19	20	21	22	23	24	25
				26		
26	27	28	29	30	31	
				32		

It has been the standard convention over many decades for Government employees to receive a fortnightly salary equal to  $\frac{12}{313}$  of their annual gross income. The reader is urged to check their pay slip to verify this.

The fraction  $\frac{1}{26}$  corresponding to a fortnight's pay is avoided simply because there are not exactly 26 fortnights in a year. The product  $26 \times 14 = 364$  days falls short by a single day, so a preferred method was installed many years ago.

Whilst there are not exactly 26 fortnights in a year, there are 313 fortnights plus an extra day in a period of 12 years, and so using the fraction  $\frac{12}{313}$  diminishes the error substantially. However, it still doesn't account for exactly 12 years of gross income.

To correct the extra day anomaly requires a better fraction. Fourteen sets of 12 years accrue 14 of these extra days. Therefore 168 years must contain a precise total of  $14 \times 313 + 1 = 4383$  fortnights, and the better fraction becomes  $\frac{168}{4383}$ .

For example, a regular fortnightly installment of a salary of \$80,000

1. Using the fraction  $\frac{1}{26}$  is determined as \$3,076.92
2. Using the fraction  $\frac{12}{313}$  is determined as \$3,067.09
3. Using the fraction  $\frac{168}{4383}$  is determined as \$3,066.39

However there is a price in time to pay when using the fraction  $\frac{168}{4383}$  because it is going to take 168 years for an employee to fully realize the correct remuneration and this is clearly not going to happen often!

Hence the fraction  $\frac{12}{313}$  represents a sort of compromise position between time and accuracy, akin to an old definition of efficiency. Nonetheless there is a more significant problem to solve caused by our reluctance to move away from this fortnightly scheme.

Paydays are usually fortnightly Thursdays and in most years there will be two months containing three paydays and eight months containing two paydays. Once every twelve years however this pattern changes and it's worth exploring the ramifications.

Ignoring the anomaly of that single day, there are 313 paydays of gross salary received by an employee over any 12-year period. 26 of those are evenly distributed each fortnight of each year for 11 consecutive years. That accounts for 286 paydays. In the 12th year there are 27 paydays bringing the total number to 313. In that year, there are three months with three paydays.

But this uneven distribution means that for 11 years the actual annual amount received by an employee on a nominal annual income of  $A$  dollars is given by  $26 \times \frac{12}{313} \times A$  or  $\frac{312}{313} A$ . To get some perspective on this, the shortfall on a gross income of, say, \$80,000 p.a. is \$256.59 per year or \$2811.50 across 11 years. In the 12th year these shortfalls are restored by the inclusion of a 27th payday but what happens if the employee has resigned, retired, or passed away before that year? In recent years there has been a marked increase in employee mobility and this has increased the likelihood of such a situation occurring.

Moreover if the government could invest that yearly shortfall of \$256.59 per year at 6% p.a. they would save over a thousand dollars of their \$2,811.50 liability. At 13.1% p.a. they would cover their entire liability. While there would be little chance of securing those rates today, it might go some way to explain the government's reluctance to change to a fairer system.

Perhaps a fairer system is one based on calendar months.

Many organisations have moved to monthly paydays, the most common being payday installments of  $\frac{A}{12}$  on a specified day number of each month. Most home bills are paid monthly, quarterly or annually so a monthly payday is a nice fit. Despite months having different sizes, there are exactly twelve of them and pro rata arrangements can be easily be made for employees commencing or retiring on any particular day.

The fraction  $\frac{12}{313}$  is nothing more than a relic of a by-gone era. Gone are the days when clerks, rolling trolleys of cash from corridor to corridor with armed guards, paid employees in cash on every second Thursday. In today's world, electronic cash transfers can be made on any day and at any time.

It is certainly something to think about.