Things to remember in the last hour before the exam: Level 3 Waves

(This is not a revision sheet – you've done that by now - it's a list of things you might want to memorise at the last minute…)

1. You will probably use most of the equations **and** v = f λ will probably be used more than once. Any constants you need e.g. c = 3 x 10^8 m s^{-1} will be given to you e.g.

Useful data

Speed of light	$= 3.00\times10^{8}$ m s^{-1}
Charge on the electron	$= -1.60\times10^{-19}$ C
Acceleration due to gravity on Earth	$= 9.81$ m s^{-2}
Permittivity of free space	$= 8.85\times10^{-12}$ F m^{-1}
Universal gravitational constant	$= 6.67\times10^{-11}$ N m^2 kg^{-2}

2. You must convert quantities into **SI** before using them in an equation (e.g. 700 nm = 700 x 10^{-9} m) Remember prefixes (n = 10^{-9}, μ=10^{-6}, m = 10^{-3}, c = 10^{-2}, k = 10^3, M = 10^6, G = 10^9)
3. If you can't remember the units, use the units on the other side of the equation e.g. f= v/λ so frequency, f has units of m s^{-1}(from v) ÷ m (from λ) i.e. s^{-1}
4. If you are asked to give the answer to the correct number of significant figures use the information in the question (the least number of significant figures) and write your rounded answer after your calculated answer (and not instead of) – have a guess if you can't remember and it isn't the same rule as Chemistry. This is unlikely to come up and, if it does, only once.
5. The Doppler Effect is best explained by Sheldon "Neeeeaaaaooo!"
6. The Doppler effect is not symmetrical and is only observed when there is relative motion between the observer and the source
7. Doppler effect equation:

$$f' = f\frac{V_w}{V_w \pm V_s}$$

w = wave speed, s = speed of source, + for going away, - for coming toward

8. nλ = dx/L only works for small angles otherwise you must use $d\sin\theta = n\lambda$
9. Diffraction grating d = 1/N (make sure N = number of lines in **m**)
10. Diffraction splits white light into a spectrum because it's a mixture of λ's EXCEPT for the central maxima. Red is diffracted most of visible light.
11. It's about the path difference – 1 or 2 or 3 (etc.) λ difference between two "rays" is constructive interference, ½ or 1½ or 2½ (etc.) λ difference between two "rays" is destructive interference
12. Draw standing waves travelling in one direction in blue and waves travelling in the other in black to make it clear
13. **N**o**D**e is **N**o **D**isplacement (AN is maximum displacement)
14. The fundamental is the simplest standing wave pattern (least number of A or AN)
15. The **second** harmonic is **2 x** fundamental, the **third** harmonic is **3 x** fundamental, etc… Avoid overtones unless the question requires them
16. Strings with transverse waves (fixed at both ends) count the antinodes
17. Open pipes with longitudinal waves count the nodes
18. Closed pipes – you can't get even harmonics e.g. 2^{nd}, 4^{th} - because there is a N and an AN
19. Visualising a closed pipe? Your socks have a hole at one end to put your foot in – but they are "closed"
20. Write down the Beat formula $f_B = I f_1 – f_2 I$ as soon as you are allowed to (because you might not be given it – it isn't on the formulae sheet produced by the NZQA in 2017 or before that)