

EXERCISES ON WAVE PROPERTIES

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Tolentino Tuition, Year 10 Physics

23 July 2026

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EXERCISE 1

Isaac Newton demonstrated that colour is a quality of light. Light behaves like a **wave** – and hence we may describe colour by considering the **wave properties** of visible light.

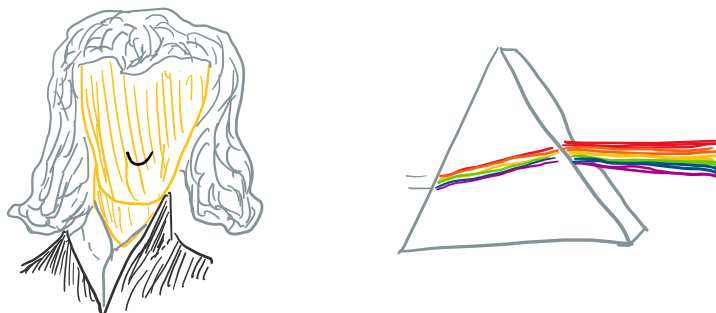


Table 1. Typical wave properties of the visible spectrum of light

Colour of light	Wavelength (λ , nm)	Frequency (f , 10^{14} Hz)
Red	650	4.62
Orange	600	
Yellow	580	5.16
Green	550	
Blue	500	5.99
Cyan	450	6.66
Violet	400	

1. λ is often expressed in units of *metres*. Please algebraically manipulate the equation $1 \text{ nm} = 10^{-9} \text{ m}$ to express all wavelengths in *Table 1* in *metres* and scientific notation.
2. The speed of light is colloquially known as the ‘cosmic speed limit’ and denoted by the symbol c . Can you use the information in *Table 1* to prove that $c \approx 3.0 \times 10^8 \text{ m/s}$?
3. Using the approximate value of c from (2), please determine the missing frequencies in *Table 1*.
4. Please determine the periodic time for each colour of light in *Table 1*, and interpret the practical meaning of your answers.