

Formulae- Rearranging and Substituting - ANSWERS

1) :

$$\begin{aligned} \text{a. } y &= 5x - 2 \\ y + 2 &= 5x \\ \frac{y+2}{5} &= x \end{aligned}$$

$$\begin{aligned} \text{b. } a &= bc + d \\ a - d &= bc \\ \frac{a-d}{b} &= c \end{aligned}$$

$$\begin{aligned} \text{c. } h &= \frac{d-k}{5} \\ 5h &= d - k \\ 5h + k &= d \end{aligned}$$

$$\begin{aligned} \text{d. } f &= \frac{9}{5}c + 32 \\ f - 32 &= \frac{9}{5}c \\ \frac{5}{9}(f - 32) &= c \end{aligned}$$

$$\begin{aligned} \text{e. } s &= \frac{u+v}{2} \times t \\ 2s &= (u+v)t \\ \frac{2s}{u+v} &= t \end{aligned}$$

2) :

$$\begin{aligned} \text{a. } y &= 5 \times 2 - 2 \\ &= 10 - 2 \\ &= 8 \end{aligned}$$

$$\begin{aligned} \text{b. } a &= 10 \times 5 + 12 \\ &= 50 + 12 \\ &= 62 \end{aligned}$$

$$\begin{aligned} \text{c. } h &= \frac{1.4-0.2}{5} \\ &= \frac{1.2}{5} \\ &= 0.24 \end{aligned}$$

$$\begin{aligned} \text{d. } f &= \frac{9}{5} \times 25 + 32 \\ &= 9 \times 5 + 32 \\ &= 45 + 32 \\ &= 77 \end{aligned}$$

$$\begin{aligned} \text{e. } s &= 0 \times 10 + \frac{9.81 \times 10^2}{2} \\ &= 0 + \frac{9.81 \times 100}{2} \\ &= \frac{981}{2} \\ &= 490.5 \end{aligned}$$

$$\begin{aligned} \text{3) } P &= \frac{v^2}{R} \\ PR &= v^2 \\ v &= \sqrt{PR} \\ &= \sqrt{25 \times 4} \\ &= \sqrt{100} \\ &= 10 \text{ watts} \end{aligned}$$

$$\begin{aligned} \text{4) } t_2 &= \frac{2500}{\sqrt{1 - \frac{(5.00 \times 10^4)^2}{(3.00 \times 10^8)^2}}} \\ &= \frac{2500}{\sqrt{1 - \frac{25 \times 10^8}{9 \times 10^{16}}}} \\ &= \frac{2500}{\sqrt{1 - \frac{25}{9} \times 10^{-8}}} \\ &= \frac{2500}{\sqrt{1 - 2.667 \times 10^{-8}}} \\ &= \frac{2500}{\sqrt{1 - 0.000\,000\,026\,67}} \\ &= \frac{2500}{\sqrt{0.999\,999\,973\,33}} \\ &= \frac{2500}{0.999\,999\,986} \\ &= 2\,500.000\,003\,4 \end{aligned}$$

(As you can see, the time dilation effect is tiny - here it is 0.000 003 4 of a second - unless the relative velocity v is close to the speed of light, which is approximately 30 million metres per second. A speed of 50 thousand metres per second may seem fast, but it is only just fast enough to produce a measurable effect.)