① (v) $x^2 + 5\sqrt{5}x - 70 = 0$

$D = b^2 - 4ac$

$= (5\sqrt{5})^2 - 4 \times 1 \times (-70)$

$= 125 + 280$

$= 405$

$\because D > 0$

$\therefore$ roots are real

$x = \frac{-b \pm \sqrt{D}}{2a}$

$= \frac{-5\sqrt{5} \pm \sqrt{405}}{2 \times 1}$

$= \frac{-5\sqrt{5} \pm 9\sqrt{5}}{2}$

$x = \frac{-5\sqrt{5} - 9\sqrt{5}}{2}$ | $x = \frac{-5\sqrt{5} + 9\sqrt{5}}{2}$

$= \frac{-14\sqrt{5}}{2}$ | $= \frac{4\sqrt{5}}{2}$

$= -7\sqrt{5}$ | $= 2\sqrt{5}$

② let given no. $= x$

acc. to condition

$x^2 - 84 = 3(8 + x)$

$\Rightarrow x^2 - 84 = 24 + 3x$

$\Rightarrow x^2 - 3x - 108 = 0$

$\Rightarrow x^2 - 12x + 9x - 108 = 0$

$\Rightarrow x(x - 12) + 9(x - 12) = 0$

$\Rightarrow (x - 12)(x + 9) = 0$

$\Rightarrow x - 12 = 0, \quad x + 9 = 0$

$\Rightarrow x = 12, \quad x = -9$

$x = -9$ rejected [$\because$ no. is natural]

$\therefore$ given no. $= 12$

③ let given no. $= x$

acc. to con.

$x + 12 = 160 \times \frac{1}{x}$

$\Rightarrow x^2 + 12x - 160 = 0$

$\Rightarrow x^2 + 20x - 8x - 160 = 0$

$\Rightarrow x(x + 20) - 8(x + 20) = 0$

$\Rightarrow (x + 20)(x - 8) = 0$

$\Rightarrow x + 20 = 0, \quad x - 8 = 0$

$\Rightarrow x = -20, \quad x = 8$

$x = -20$ rejected [$\because$ given no. is natural]

$\therefore$ given no. $= 8$

④ let original speed $= x$ km/h

increased speed $= (x + 5)$ km/h

distance $= 360$ km

$\frac{360}{x} - \frac{360}{x+5} = \frac{48}{60}$

$\left[\because \text{time} = \frac{\text{distance}}{\text{speed}}\right]$

$\Rightarrow 360\left[\frac{1}{x} - \frac{1}{x+5}\right] = \frac{4}{5}$

$\Rightarrow \frac{x + 5 - x}{x^2 + 5x} = \frac{4}{5} \times 360$ (90)

$\Rightarrow x^2 + 5x - 2250 = 0$

$\Rightarrow x^2 + 50x - 45x - 2250 = 0$

$\Rightarrow x(x + 50) - 45(x + 50) = 0$

$\Rightarrow (x + 50)(x - 45) = 0$

$\Rightarrow x + 50 = 0, \quad x - 45 = 0$

$\Rightarrow x = -50, \quad x = 45$

rejected

$\therefore$ original speed $= 45$ km/h