

TD - Manipuler les radicaux carrés

①

$$a) \sqrt{400} = \sqrt{4 \times 100} = \sqrt{4} \times \sqrt{100} = 2 \times 10 = 20$$

$$b) \sqrt{1600} = \sqrt{16 \times 100} = \sqrt{16} \times \sqrt{100} = 4 \times 10 = 40$$

$$c) \sqrt{25^2} = 25$$

$$d) \sqrt{49} = \sqrt{7 \times 7} = 7$$

$$e) \sqrt{576} = \sqrt{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3} = \sqrt{(2 \times 2 \times 2) \times (2 \times 2 \times 2)} \times \sqrt{3 \times 3} = 2 \times 2 \times 2 \times 3 = 24$$

$$f) \sqrt{\frac{25}{36}} = \frac{\sqrt{25}}{\sqrt{36}} = \frac{5}{6}$$

② a) $\sqrt{125} = \sqrt{5 \times 5 \times 5} = \sqrt{5 \times 5} \times \sqrt{5} = 5\sqrt{5}$

$$\text{donc } 3\sqrt{125} = 3 \times 5\sqrt{5} = 15\sqrt{5}$$

$$b) \sqrt{108} = \sqrt{2 \times 2 \times 3 \times 3 \times 3} = \sqrt{2 \times 2} \times \sqrt{3 \times 3} \times \sqrt{3} = 2 \times 3\sqrt{3} = 6\sqrt{3}$$

$$\text{donc } -7\sqrt{108} = -7 \times 6\sqrt{3} = -42\sqrt{3}$$

$$\begin{aligned} c) 2\sqrt{20} - 11\sqrt{80} &= 2\sqrt{4 \times 5} - 11\sqrt{16 \times 5} \\ &= 2 \times \sqrt{4} \times \sqrt{5} - 11 \times \sqrt{16} \times \sqrt{5} \\ &= 2 \times 2\sqrt{5} - 11 \times 4 \times \sqrt{5} \\ &= 4\sqrt{5} - 44\sqrt{5} \\ &= -40\sqrt{5} \end{aligned}$$

③ 1) $\sqrt{16} = \sqrt{4 \times 4} = 4$
 $\sqrt{25} = \sqrt{5 \times 5} = 5$
 $\sqrt{36} = \sqrt{6 \times 6} = 6$
 $\sqrt{100} = \sqrt{10 \times 10} = 10$

2) Pour qu'un nombre ait une racine carrée, il suffit qu'il soit positif. On a donc :

- 10^2 avec $\sqrt{10^2} = 10$
- 9 avec $\sqrt{9} = 3$
- $(-8)^2 = 64$ avec $\sqrt{(-8)^2} = 8$
- 144 avec $\sqrt{144} = 12$
- π de racine carrée $\sqrt{\pi}$.

④ a) $\sqrt{3} \times \sqrt{5} = \sqrt{3 \times 5} = \sqrt{15}$
 b) $3 = \sqrt{9}$
 c) $\frac{\sqrt{2} \times \sqrt{5}}{\sqrt{3} \times \sqrt{7}} = \frac{\sqrt{2 \times 5}}{\sqrt{3 \times 7}} = \frac{\sqrt{10}}{\sqrt{21}} = \sqrt{\frac{10}{21}}$
 d) $\frac{\sqrt{33}}{\sqrt{3}} = \sqrt{\frac{33}{3}} = \sqrt{11}$

⑤ a) $\sqrt{25 \times 9} = \sqrt{25} \times \sqrt{9} = 5 \times 3 = 15$
 b) $\sqrt{900} = \sqrt{9 \times 100} = \sqrt{9} \times \sqrt{100} = 3 \times 10 = 30$
 c) $\sqrt{7} \times \sqrt{28} = \sqrt{7 \times 28} = \sqrt{7 \times 7 \times 4} = \sqrt{7 \times 7} \times \sqrt{4} = 7 \times 2 = 14$

⑥ a) $\sqrt{300} = \sqrt{100 \times 3} = \sqrt{100} \times \sqrt{3} = 10 \times \sqrt{3} = 10\sqrt{3}$
 b) $2\sqrt{3} + 5\sqrt{3} = 7\sqrt{3}$
 c) $5\sqrt{2} - \sqrt{18} = 5\sqrt{2} - \sqrt{9 \times 2} = 5\sqrt{2} - \sqrt{9} \times \sqrt{2} = 5\sqrt{2} - 3\sqrt{2} = 2\sqrt{2}$
 d) $4\sqrt{12} + 3\sqrt{27} = 4 \times \sqrt{4 \times 3} + 3 \times \sqrt{9 \times 3}$
 $= 4 \times \sqrt{4} \times \sqrt{3} + 3 \times \sqrt{9} \times \sqrt{3}$
 $= 4 \times 2\sqrt{3} + 3 \times 3 \times \sqrt{3} = 8\sqrt{3} + 9\sqrt{3} = 17\sqrt{3}$

$$\textcircled{7} \quad a) \sqrt{50} + 4\sqrt{18} - 7\sqrt{8} \\ = \sqrt{25 \times 2} + 4\sqrt{9 \times 2} - 7\sqrt{4 \times 2} = 5\sqrt{2} + 12\sqrt{2} - 14\sqrt{2} = \textcircled{3\sqrt{2}}$$

$$b) 4\sqrt{54} - 2\sqrt{150} + \sqrt{96} \\ = 4\sqrt{9 \times 6} - 2\sqrt{25 \times 6} + \sqrt{16 \times 6} \\ = 12\sqrt{6} - 10\sqrt{6} + 4\sqrt{6} \\ = \textcircled{6\sqrt{6}}$$

$$\textcircled{8} \quad a) \sqrt{0,0049} = \sqrt{\frac{49}{10000}} = \frac{\sqrt{49}}{\sqrt{10000}} = \frac{7}{100} = \textcircled{0,07}$$

~~$$b) \sqrt{\frac{0,81}{49}} = \frac{\sqrt{0,81}}{\sqrt{49}} = \frac{0,9}{7} = 0,12857$$~~

$$b) \sqrt{\frac{0,81}{49}} = \sqrt{\frac{81}{4900}} = \frac{\sqrt{81}}{\sqrt{49 \times 100}} = \frac{9}{7 \times 10} = \textcircled{\frac{9}{70}}$$

$$c) \sqrt{0,036} \times \sqrt{0,049} = \sqrt{\frac{36}{1000}} \times \sqrt{\frac{49}{1000}} = \frac{\sqrt{36}}{\sqrt{1000}} \times \frac{\sqrt{49}}{\sqrt{1000}} \\ = \frac{6 \times 7}{\sqrt{1000} \times \sqrt{1000}} = \frac{6 \times 7}{1000} = \frac{42}{1000} = \textcircled{0,042}$$

$$\textcircled{9} \quad a) -2\sqrt{\frac{3}{8}} + 3\sqrt{\frac{147}{18}} \\ = -2\sqrt{\frac{3}{4 \times 2}} + 3\sqrt{\frac{49 \times 3}{9 \times 2}} \\ = -\frac{2}{\sqrt{4}}\sqrt{\frac{3}{2}} + 3 \times \sqrt{\frac{49}{9}} \times \sqrt{\frac{3}{2}} \\ = -\sqrt{\frac{3}{2}} + 7\sqrt{\frac{3}{2}} = \textcircled{6\sqrt{\frac{3}{2}}}$$

$$b) 3\sqrt{\frac{20}{63}} - 10\sqrt{\frac{45}{28}} = 3\sqrt{\frac{4 \times 5}{9 \times 7}} - 10\sqrt{\frac{9 \times 5}{4 \times 7}} = 3 \times \frac{2}{3} \times \sqrt{\frac{5}{7}} - 10 \times \frac{3}{2} \times \sqrt{\frac{5}{7}} \\ = 2\sqrt{\frac{5}{7}} - 15\sqrt{\frac{5}{7}} = \textcircled{-13\sqrt{\frac{5}{7}}}$$