

中2数学B 2019年度春期講習 本問解答

§2 ルートの簡約化と足し算・掛け算

※ 欠席してしまった場合は、問 2.2～問 2.6 を（余裕があれば問 2.7 も）自分で確認し、p.16 の宿題 H2.1～H2.4 に取り組んで提出してください。

問2.1

$$(1) \quad \sqrt{200} = \sqrt{100 \times 2} = \sqrt{100} \times \sqrt{2} = 10\sqrt{2} = 10 \times 1.41421356 \dots = \boxed{14.142} \dots$$

$$(2) \quad \sqrt{20} = \sqrt{4 \times 5} = \sqrt{4} \times \sqrt{5} = 2\sqrt{5},$$
$$\sqrt{320} = \sqrt{64 \times 5} = \sqrt{64} \times \sqrt{5} = 8\sqrt{5}$$

だから、

$$\sqrt{20} + \sqrt{320} = 2\sqrt{5} + 8\sqrt{5} = 10\sqrt{5} = 10 \times 2.2360679 \dots = \boxed{22.360} \dots$$

問2.2

$$(1) \quad 0^2 = \boxed{0}, 1^2 = \boxed{1}, 2^2 = \boxed{4}, 3^2 = \boxed{9}, 4^2 = \boxed{16}, 5^2 = \boxed{25}, 6^2 = \boxed{36}, 7^2 = \boxed{49},$$
$$8^2 = \boxed{64}, 9^2 = \boxed{81}, 10^2 = \boxed{100}, 11^2 = \boxed{121}, 12^2 = \boxed{144}, 13^2 = \boxed{169}, 14^2 = \boxed{196}, 15^2 = \boxed{225},$$
$$16^2 = \boxed{256}, 17^2 = \boxed{289}$$

$$(2) \quad (i) \quad 12 = \boxed{4 \times 3} \quad [= 2^2 \times 3] \qquad (ii) \quad 63 = \boxed{9 \times 7} \quad [= 3^2 \times 7]$$
$$(iii) \quad 96 = \boxed{16 \times 6} \quad [= 4^2 \times 6] \qquad (iv) \quad 108 = \boxed{36 \times 3} \quad [= 6^2 \times 3]$$

$$(3) \quad (i) \quad \sqrt{12} = \sqrt{4 \times 3} = \boxed{2\sqrt{3}} \qquad (ii) \quad \sqrt{63} = \sqrt{9 \times 7} = \boxed{3\sqrt{7}}$$
$$(iii) \quad \sqrt{96} = \sqrt{16 \times 6} = \boxed{4\sqrt{6}} \qquad (iv) \quad \sqrt{108} = \sqrt{36 \times 3} = \boxed{6\sqrt{3}}$$

問2.3

$$(1) \quad \sqrt{12} \times \sqrt{54} = \sqrt{4 \times 3} \times \sqrt{9 \times 6} = 2\sqrt{3} \times 3\sqrt{6} \\ = 2 \times 3 \times \sqrt{3} \times \sqrt{3 \times 2} = 6 \times 3\sqrt{2} = \boxed{18\sqrt{2}}$$

$$(2) \quad \sqrt{14} \times \sqrt{24} \times \sqrt{27} = \sqrt{14} \times \sqrt{4 \times 6} \times \sqrt{9 \times 3} \\ = \sqrt{14} \times 2\sqrt{6} \times 3\sqrt{3} \\ = 2 \times 3 \times \sqrt{7 \times 2} \times \sqrt{2 \times 3} \times \sqrt{3} \\ = 6 \times \sqrt{7} \times 2 \times 3 = \boxed{36\sqrt{7}}$$

問2.4

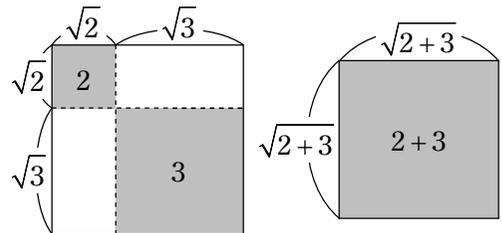
(1) 右図より、

1 辺の長さが $\sqrt{2} + \sqrt{3}$ の正方形の面積は $2+3=5$ より大きいので、

$\sqrt{2} + \sqrt{3}$ は面積 5 の正方形の 1 辺の長さ $\sqrt{5} \left[= \sqrt{2+3} \right]$

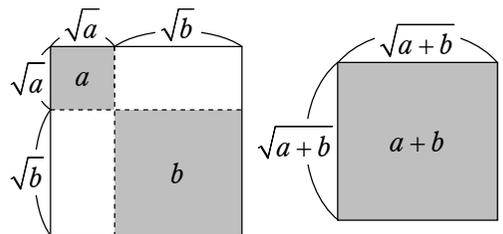
より大きい。

よって、 $\boxed{\sqrt{2} + \sqrt{3} > \sqrt{5}}$



(2) $\sqrt{2} + \sqrt{3} = 1.41421\dots + 1.73205\dots = 3.146\dots$ なので、
 $\sqrt{5} = 2.23606\dots$ より $\sqrt{2} + \sqrt{3}$ は大きい。

(3) $\sqrt{a} + \sqrt{b}, \sqrt{a+b}$ についても、
 右図のように 1 辺の長さが $\sqrt{a} + \sqrt{b}, \sqrt{a+b}$ の正方形を考えれば、
 ($\sqrt{a} + \sqrt{b} > \sqrt{a+b}$ であって、)
 $\sqrt{a} + \sqrt{b} = \sqrt{a+b}$ は成り立たないと分かる。



問2.5

$$(1) \quad \sqrt{3} + \sqrt{3} = (1+1)\sqrt{3} = \boxed{2\sqrt{3}}$$

$$(2) \quad -7\sqrt{3} + 9\sqrt{3} = (-7+9)\sqrt{3} = \boxed{2\sqrt{3}}$$

$$(3) \quad -7\sqrt{3} - 9\sqrt{3} = (-7-9)\sqrt{3} = \boxed{-16\sqrt{3}}$$

$$(4) \quad \frac{1}{2}\sqrt{3} - \frac{1}{3}\sqrt{3} = \left(\frac{1}{2} - \frac{1}{3}\right)\sqrt{3} = \frac{3-2}{6}\sqrt{3} = \boxed{\frac{1}{6}\sqrt{3}} \left[= \frac{\sqrt{3}}{6} \right]$$

$$(5) \quad \sqrt{7} + \sqrt{3} + 2\sqrt{7} = \sqrt{3} + (1+2)\sqrt{7} = \boxed{\sqrt{3} + 3\sqrt{7}}$$

$$(6) \quad \sqrt{5} - 4 - 2\sqrt{5} = (1-2)\sqrt{5} - 4 = \boxed{-\sqrt{5} - 4}$$

問2.6

$$(1) \quad \sqrt{2} + \sqrt{8} = \sqrt{2} + 2\sqrt{2} = (1+2)\sqrt{2} = \boxed{3\sqrt{2}}$$

$$(2) \quad \sqrt{3} + \sqrt{12} - \sqrt{27} = \sqrt{3} + 2\sqrt{3} - 3\sqrt{3} = (1+2-3)\sqrt{3} = 0 \times \sqrt{3} = \boxed{0}$$

$$(3) \quad -\sqrt{20} - \sqrt{27} + \sqrt{48} = -2\sqrt{5} - 3\sqrt{3} + 4\sqrt{3} = -2\sqrt{5} + (-3+4)\sqrt{3} = \boxed{-2\sqrt{5} + \sqrt{3}}$$

$$(4) \quad 2\sqrt{18} + \sqrt{49} - \sqrt{32} = 2 \times 3\sqrt{2} + 7 - 4\sqrt{2} = (6-4)\sqrt{2} + 7 = \boxed{2\sqrt{2} + 7}$$

$$\begin{aligned} (5) \quad \sqrt{8}(\sqrt{54} - \sqrt{12}) - \sqrt{27}(\sqrt{25} - \sqrt{98}) &= 2\sqrt{2}(3\sqrt{6} - 2\sqrt{3}) - 3\sqrt{3}(5 - 7\sqrt{2}) \\ &= 2\sqrt{2} \times 3\sqrt{6} - 2\sqrt{2} \times 2\sqrt{3} - 3\sqrt{3} \times 5 - 3\sqrt{3} \times (-7\sqrt{2}) \\ &= 6 \times \sqrt{2} \times \sqrt{2} \times 3 - 4\sqrt{6} - 15\sqrt{3} + 21\sqrt{6} \\ &= 6 \times 2\sqrt{3} - 4\sqrt{6} - 15\sqrt{3} + 21\sqrt{6} \\ &= (12-15)\sqrt{3} + (-4+21)\sqrt{6} = \boxed{-3\sqrt{3} + 17\sqrt{6}} \end{aligned}$$

問2.7

$\sqrt{12} = \sqrt{4 \times 3} = 2\sqrt{3}$, $\sqrt{27} = \sqrt{9 \times 3} = 3\sqrt{3}$, $\sqrt{48} = \sqrt{16 \times 3} = 4\sqrt{3}$ なので、

$$\begin{aligned} \sqrt{3} + \sqrt{12} + \sqrt{27} + \sqrt{48} &= \sqrt{3} + 2\sqrt{3} + 3\sqrt{3} + 4\sqrt{3} \\ &= (1+2+3+4)\sqrt{3} \\ &= 10\sqrt{3} = \sqrt{10^2 \times 3} = \sqrt{300} \end{aligned}$$

よって、 $n = \boxed{300}$