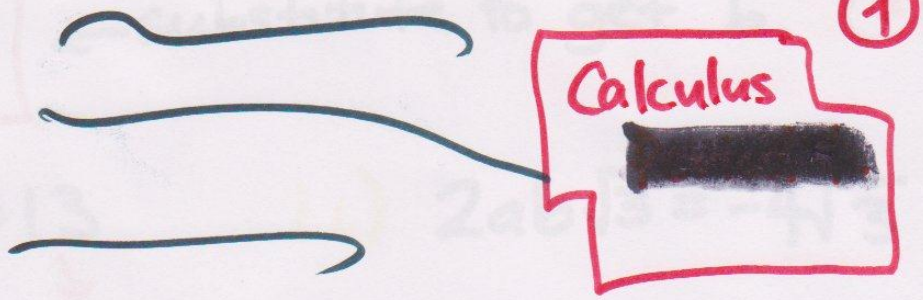
Snapshot:



Classwork: Simplify/find a and b

$$\left(\sqrt{13-4\sqrt{3}}\right)^2 = (a+b\sqrt{3})^2$$

$$13-4\sqrt{3} = a^2 + 2(a)(b\sqrt{3}) + b^2 \cdot 3$$

$$13 - 4\sqrt{3} = a^2 + 2ab\sqrt{3} + 3b^2$$

i) $a^2 + 3b^2 = 13$ ii) $2ab\sqrt{3} = -4\sqrt{3}$

* solve for a in terms of b

wisest:

$$\frac{2ab\sqrt{3}}{2b\sqrt{3}} = \frac{-4\sqrt{3}}{2b\sqrt{3}}$$

$$\boxed{a = \frac{-2}{b}}$$

← use this to substitute into equation i

$a = \frac{-2}{b}$ ← substitute to get b. (2)

i) $a^2 + 3b^2 = 13$ ii) $2ab\sqrt{3} = -4\sqrt{3}$

$\left(\frac{-2}{b}\right)^2 + 3b^2 = 13$

$b^2\left(\frac{4}{b^2} + 3b^2\right) = (13)b^2$ ← get rid of fraction

$\frac{4b^2}{b^2} + 3b^4 = 13b^2$

$4 + 3b^4 = 13b^2$ ← set equal to 0

$-13b^2 \quad -13b^2$

$4 + 3b^4 - 13b^2 = 0$ ← rearrange

$3b^4 - 13b^2 + 4 = 0$ ← substitue: $x = b^2$

$3x^2 - 13x + 4 = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{13 \pm \sqrt{169 - 48}}{6} = \frac{13 \pm \sqrt{121}}{6} = \frac{13 \pm 11}{6}$

$$x = \frac{13 \pm \sqrt{121}}{6}$$

$$x = \frac{13 \pm 11}{6}$$

$$x = \frac{13+11}{6} \qquad x = \frac{13-11}{6}$$

$$x = \frac{24}{6} \qquad x = \frac{2}{6}$$

$$\boxed{x = 4} \qquad \boxed{x = \frac{1}{3}}$$

Recall: $x = b^2$

$x = 4$

$\downarrow$

$b^2 = 4$

$\boxed{b = \pm 2}$

$x = \frac{1}{3}$

$\downarrow$

$b^2 = \frac{1}{3}$

$\boxed{b = \pm \frac{1}{\sqrt{3}}}$

$\boxed{a = \frac{-2}{b}}$ ← substitute [redacted] b to find a.

Sol. 1

$b = 2$

$a = \frac{-2}{b}$

$a = \frac{-2}{2}$

$a = -1$

$a = -1, b = 2$

Sol. 2

$b = -2$

$a = \frac{-2}{b}$

$a = \frac{-2}{-2}$

$a = 1$

$a = 1, b = -2$

Sol. 3

$b = \frac{1}{\sqrt{3}}$

$a = \frac{-2}{b}$

$a = \frac{-2}{\left(\frac{1}{\sqrt{3}}\right)}$

$a = \frac{\left(\frac{-2}{1}\right)}{\left(\frac{1}{\sqrt{3}}\right)}$

$a = \frac{-2}{1} \cdot \frac{\sqrt{3}}{1}$

$a = \frac{-2\sqrt{3}}{1}$

$a = -2\sqrt{3}$

$a = -2\sqrt{3}, b = \frac{1}{\sqrt{3}}$

Sol. 4

$b = -\frac{1}{\sqrt{3}}$

$a = \frac{-2}{b}$

$a = \frac{-2}{\left(-\frac{1}{\sqrt{3}}\right)}$

$a = \frac{\frac{-2}{1}}{-\frac{1}{\sqrt{3}}}$

$a = \frac{2}{1} \cdot \frac{\sqrt{3}}{1}$

$a = 2\sqrt{3}$

$a = 2\sqrt{3}, b = -\frac{1}{\sqrt{3}}$

Sol 1

$a=-1$, $b=2$

Check if true:

$\sqrt{13-4\sqrt{3}} = a+b\sqrt{3}$

$\left(\sqrt{13-4\sqrt{3}}\right)^2 = (-1+2\sqrt{3})^2$

$13-4\sqrt{3} = 1+2(-1)(2\sqrt{3})+4\cdot 3$

$13-4\sqrt{3} = 1-4\sqrt{3}+12$

$13-4\sqrt{3} = 13-4\sqrt{3}$

✓

Sol 2

$a=1$, $b=-2$

$\sqrt{13-4\sqrt{3}} = a+b\sqrt{3}$

$= 1-2\sqrt{3}$

negative

Doesn't work, needs to be a positive number.

✗

Sol 3

$a=-2\sqrt{3}$, $b=\frac{1}{\sqrt{3}}$

$\sqrt{13-4\sqrt{3}} = -2\sqrt{3}+\frac{1}{\sqrt{3}}\sqrt{3}$

$= -2\sqrt{3}+1$

negative

✗

Sol 4

$a=2\sqrt{3}$, $b=-\frac{1}{\sqrt{3}}$

$\sqrt{13-4\sqrt{3}} = +2\sqrt{3}-\frac{1}{\sqrt{3}}\sqrt{3}$

$= 2\sqrt{3}-1$

same as first solution.

✓

Classwork/Homework:

Simplify the following square roots:

① $\sqrt{7-4\sqrt{3}}$

② $\sqrt{6+2\sqrt{5}}$

Study for tomorrow's quiz!