MATH 10 — **RADICAL EXPRESSIONS** — Name: KEY

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[3] **1.** Label all the indicated parts of a radical expression:

index → $\sqrt[4]{9x}$ ← radicand

radical symbol

[8] **2.** Express mixed radicals an entire radicals:

-index 2 $\quad 6x^3\sqrt{4x}$ $=\sqrt{4x(6x^3)^2} = \sqrt{4x(36)x^6}$ $=\sqrt{144x^7}$	-index 3 $\quad 4x^5\sqrt[3]{2x^2}$ $=\sqrt[3]{(4x^5)^3(2x^2)} = \sqrt[3]{64x^{15}\cdot 2x^2}$ $=\sqrt[3]{128x^{17}}$
-index 3 $\quad 5ay^2\sqrt[3]{y}$ $=\sqrt[3]{(5ay^2)^3y} = \sqrt[3]{125a^3y^6y^1}$ $=\sqrt[3]{125a^3y^7}$	index 2 $\quad -4a^5b^3\sqrt{2ab}$ $=-\sqrt{(4a^5b^3)^2 2ab} = -\sqrt{16a^{10}b^6 2ab}$ $=-\sqrt{32a^{11}b^7}$

[8] **3.** Express entire radicals as mixed radicals if possible. If not possible, state why.

-index 3 $\quad \sqrt[3]{54x^4}$ $=\sqrt[3]{2\cdot 3^3x^3\cdot x}$ $=3x\sqrt[3]{2x}$	index 2 $\quad \sqrt{2a^3b^6}$ $=\sqrt{2a^2ab^2b^2b^2}$ $ab^3\sqrt{2a}$
-index 2 $\quad \sqrt{144xb^3}$ $=\sqrt{12^2xb^2b}$ $=12b\sqrt{xb}$	-index 4 $\quad \sqrt[4]{80a^7b^4}$ $=\sqrt[4]{5\cdot 2^4a^4a^3b^4}$ $=2ab\sqrt[4]{5a^3}$

[12] **4.** Simplify, add and subtract when possible. Show your work.

$$2\sqrt{48x^3} + 5x\sqrt{27x}$$

$= 2\cdot\sqrt{3\cdot 4^2\cdot x^2 x} + 5x\cdot\sqrt{3\cdot 3^2 x}$

$= 8x\sqrt{3x} + 15x\sqrt{3x}$

$= \boxed{23x\sqrt{3x}}$

! $x \geq 0$

$$-\sqrt{5x} + 6\sqrt{5x^3} + \sqrt[2]{125x}$$

$= -\sqrt{5x} + 6x\sqrt{5x} + 5\sqrt{5x}$

$= 4\sqrt{5x} + 6x\sqrt{5x}$

$= \sqrt{5x}\,(4+6x)$

$= \underline{2\sqrt{5x}\,(2+3x)}$

! $x \geq 0$

$$-a\sqrt[3]{ab} - 7a\sqrt[3]{ab}$$

$= \underline{-8a\sqrt[3]{ab}}$

! no restrictions

$$\sqrt{147c} + \sqrt{108c} - \sqrt{3c^5}$$

$= \sqrt{7^2\cdot 3c} + \sqrt{6^2\cdot 3c} - \sqrt{3c^2c^2c}$

$= 7\sqrt{3c} + 6\sqrt{3c} - c^2\sqrt{3c}$

$= 13\sqrt{3c} - c^2\sqrt{3c}$

$= \underline{\sqrt{3c}\,(13-c^2)}$

! $c \geq 0$