

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Class worksheet: Alg2H  
 Radicals and Complex Numbers extra-fun  
 (book chapter 7)

Factor  
 (show your work!)

$$6x^2 + x - 12$$

$$\begin{array}{r} \boxed{MATH} \\ \hline -72 | 19,8 \\ \hline \end{array}$$

$$6x^2 + 9x - 8x - 12 = 3x(2x+3) - 4(2x+3) \\ = \boxed{(3x-4)(2x+3)}$$

Find the slope of the line perpendicular to the line:

$$3x + 5y = -13$$

$$5y = -3x - 13$$

$$y = -\frac{3}{5}x - \frac{13}{5}$$

$$m_1 = -\frac{3}{5} \quad \boxed{m_2 = \frac{5}{3}}$$

1. Is the expression  $2 \cdot \sqrt{\frac{2}{3}}$  (in words: Two times square-root of two over three)

equal to, greater than, or smaller than,  $\sqrt{2\frac{2}{3}}$  (in words: square-root of two and two thirds) ?

(Show your work).

$$2 \cdot \sqrt{\frac{2}{3}} = \sqrt{4 \cdot \frac{2}{3}} = \sqrt{\frac{8}{3}}$$

$$\sqrt{2\frac{2}{3}} = \sqrt{\frac{8}{3}} \rightarrow \boxed{EQUAL}$$

2. (challenging) Solve:

$$\frac{2}{3}\sqrt{4.5} + \frac{3}{2}\sqrt[3]{16} + \frac{1}{4}\sqrt{72} \leftarrow \sqrt{72} = \sqrt{2 \cdot 36} = 6\sqrt{2}$$

$$\sqrt{4.5} = \sqrt{\frac{9}{2}} = \frac{3}{\sqrt{2}}$$

$$\sqrt[3]{16} = \sqrt[3]{2^3 \cdot 2} = 2 \cdot \sqrt[3]{2}$$

$$\frac{2}{3} \cdot \sqrt{4.5} = \frac{2}{3} \cdot \sqrt{\frac{3^2}{2}} = \frac{2}{3} \cdot \frac{3}{\sqrt{2}} = \frac{2\sqrt{2}}{3}$$

$$\Rightarrow \sqrt{2} + \frac{3}{2} \cdot \sqrt[3]{2} + \frac{1}{4} \cdot 6\sqrt{2} = \boxed{2.5\sqrt{2} + 3\sqrt[3]{2}}$$

3. (challenging) Without using a calculator, determine which is larger:

$$5\sqrt[3]{2} \text{ or } 2\sqrt[3]{31}.$$

$$5\sqrt[3]{2} = \sqrt[3]{5^3 \cdot 2} = \sqrt[3]{125 \cdot 2} = \sqrt[3]{250} \leftarrow \begin{matrix} \text{greater} \\ \text{than} \end{matrix}$$

$$2\sqrt[3]{31} = \sqrt[3]{2^3 \cdot 31} = \sqrt[3]{8 \cdot 31} = \sqrt[3]{248} \leftarrow$$

$$\boxed{5\sqrt[3]{2} > 2\sqrt[3]{31}}$$

4. (challenging) Find the value of:

$$x = \sqrt{6 + \sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}}$$

$$( )^2 \quad x^2 = 6 + \underbrace{\sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}}_x$$

$$x^2 = 6 + x \Rightarrow x^2 - x - 6 = 0.$$

$$x_{1,2} = \frac{1 \pm \sqrt{1+24}}{2} = \frac{1 \pm 5}{2} = \begin{cases} \rightarrow 3 \\ \rightarrow -2 \end{cases} \quad x \text{ not valid} \Rightarrow \boxed{x=3}$$