

ALGEBRA 2 PACKET INSTRUCTIONS

Students are encouraged to copy down the completed notes onto their blank note sheet. Try some of the problems on the note sheet prior to checking your answers on the completed notes. This will help students process the information better. Links to instructional videos related to each lesson can be found on the teacher's website. Students are encouraged to refer to these videos if they have the means to do so. If students have access to their textbook, they may also refer to Lessons 6-4, 6-5 and 7-5 of their text for additional support. After completing their note sheet, students should then complete the corresponding practice worksheet before moving on to the next page of notes. Complete assignments on your own paper. Below is the set of instructions and order in which to complete this packet.

1) NOTES: Lesson 6-5: Radical Equations (C13). This is the one lesson left in Unit 4 that we did not complete. Copy the completed notes onto your blank note sheet. As you progress through the notes, try a problem yourself and then check it with the completed notes.

2) ASSIGNMENT: C13 Radical Equations Worksheet

* Complete Problems 1-45 odd

3) NOTES: Lesson 6-4: Rational (Fractional) Exponents (C14). Make sure you understand the information in the box in the upper right. Being able to change between radical and exponential forms is important.

4) ASSIGNMENT: C14 Fractional Exponents Worksheet (Note: The numbering of the problems in this worksheet are incorrect. Don't worry about it.)

* Complete the first set of problems 1-8 all; then complete the remaining odd problems on this worksheet through problems 39 (Note: there are no problems 9-16)

5) NOTES: Lesson 6-4: Compute Powers with Rational Exponents (C21). After you copy down several examples from the completed notes, you will probably notice that many of the "no calculator" problems can be done mentally without the need to show work. I showed work to help you see the process and how you/I might mentally work out each problem.

TIP: On most of these problems, find the root (denominator of rational exponent) of the base number and then take this result to the exponent (numerator of rational exponent).

6) ASSIGNMENT: C21 Fractional Exponents/Compute Worksheet

* Complete Problems 1-57 odd

7) NOTES: Lesson 7-5: Exponential Equations #1 (C23).

8) ASSIGNMENT: C23 Exponential Equations #1 Worksheet

- * Complete Problems 1-45 odd

9) NOTES: Lesson 7-5: Exponential Equations #2 (C24).

10) ASSIGNMENT: C24 Exponential Equations #2 Worksheet

- * Complete Problems 1-37 odd

11) ASSIGNMENT: QUIZ 6 Review Worksheet. This is a summative review of the topics taught in Unit 6 (attached lessons notes and assignments/items 1-10 listed above).

[NOTE: There is NO C22 note sheet or worksheet.]

SKILLS TESTS (3rd Quarter)

I've attached a blank skills tests review worksheet, a key to this worksheet and a copy of the four skills tests. The review sheet is optional, but if you have not passed all skills tests this is your opportunity to do so. You only need to retake the test(s) that you have not passed. If you are unsure of which test(s) you need to retake, complete all four tests.

To "turn in" you completed skills tests, please do one of the following. Please make sure your name is on your test and easily identifiable/viewable.

- * Scan and email me your test if this is possible.
- * Take a picture of your test(s) with your smartphone and email me your picture(s).
- * Any other method of sending me a copy of your test electronically.

My email address:

amcneill@siuslaw.k12.or.us

PROCESS: To solve a radical equation (equation with variable inside the radical), solve for the radical – that is, get the $\sqrt[n]{x}$ by itself. Once the $\sqrt[n]{x}$ is by itself, do the opposite to both sides of the equation (if \sqrt{x} , then square both sides; if $\sqrt[3]{x}$, then cube both sides; if $\sqrt[4]{x}$, then take both sides to the 4th power; etc.) Solve the remaining equation.

Solve each for x.

1) $\sqrt{x} = 3$

2) $\sqrt[3]{x} = 3$

3) $\sqrt{x + 1} = 4$

4) $\sqrt[3]{x + 1} = 2$

5) $\sqrt{x} = -2$

6) $2\sqrt{x} + 1 = 5$

7) $4\sqrt{x} - 1 = 11$

8) $-2\sqrt{x} + 8 = 2$

9) $4\sqrt{x - 1} - 2 = 10$

$$10) \quad 2\sqrt[4]{x-1} - 1 = 3$$

$$11) \quad \sqrt{x+2} = \sqrt{2x-3}$$

$$12) \quad \sqrt{x+1} = 2\sqrt{x-2}$$

$$13) \quad \sqrt{x+5} = x - 1$$

$$14) \quad \sqrt{2x+1} = x - 1$$

UNIT 6 (LESSON 6-4)

RATIONAL EXPONENTS

(C14)

$$\text{INDEX} \sqrt[A]{A^{\text{EXPONENT}}} = A^{\frac{\text{EXP}}{\text{IND}}} \quad \sqrt[a]{A^b} = A^{\frac{b}{a}}$$

$$\sqrt[a]{A} = A^{\frac{1}{a}} \quad \sqrt[2]{A} = A^{\frac{1}{2}} \quad \sqrt[3]{A} = A^{\frac{1}{3}}$$

CHANGE FORM

RADICAL	EXPONENTIAL
1) $\sqrt[5]{A}$	
2) $\sqrt[6]{x^3}$	
3) $\sqrt[4]{x^2y^3}$	
4) $\sqrt[5]{x^4y^3z^2}$	
5)	$x^{\frac{7}{10}}$
6)	$x^{\frac{2}{3}}y^{\frac{1}{3}}$
7)	$(ab)^{\frac{4}{5}}$
8)	$(a^3b^9)^{\frac{1}{6}}$

SIMPLIFY: Multiply exponents

$$17) (A^{\frac{3}{4}}B^{\frac{1}{2}})^4$$

$$18) (A^6B^3)^{\frac{1}{3}}$$

Exponent Rules:

$$x^a \cdot x^b = x^{a+b} \quad (\text{add exp})$$

$$(x^a)^b = x^{ab} \quad (\text{mult. exp})$$

$$\frac{x^a}{x^b} = x^{a-b} \quad (\text{sub. exp})$$

SIMPLIFY: Add exponents

$$9) x^{\frac{4}{5}} \cdot x^{\frac{1}{5}}$$

$$10) a^{\frac{3}{4}} \cdot a^{\frac{7}{8}}$$

$$11) 5^{\frac{2}{3}} \cdot 5^{\frac{1}{4}}$$

$$12) 7^{\frac{3}{4}} \cdot 7$$

SIMPLIFY: Subtract exponents

$$13) \frac{a^{\frac{3}{4}}}{a^{\frac{1}{4}}}$$

$$14) \frac{x^{\frac{3}{8}}}{x^{\frac{1}{4}}}$$

$$15) \frac{a^{\frac{7}{10}}b^2}{a^{\frac{1}{2}}b^{\frac{1}{4}}}$$

$$16) \frac{a^{8.1}b^{4.6}}{a^{4.1}b^{2.7}}$$

SIMPLIFY:

$$19) \frac{A^{\frac{2}{3}}A^{\frac{1}{4}}}{A^{\frac{1}{6}}}$$

$$20) \frac{(A^{\frac{1}{2}}B^4)^2}{A(A^{\frac{1}{2}})^3}$$

UNIT 6 (LESSON 6-4)**COMPUTE POWERS WITH
RATIONAL EXPONENTS**

(C21)

Remember:

a) $\sqrt[\text{index}]{x^{\text{exponent}}} = x^{\frac{\text{exponent}}{\text{index}}}$ So $x^{\frac{1}{2}} = \sqrt{x}$ and $x^{\frac{1}{3}} = \sqrt[3]{x}$

b) **Property of Negative Exponents:** $x^{-1} = \frac{1}{x}$ and $\frac{1}{x^{-1}} = x$; so $\left(\frac{a}{b}\right)^{-1} = \frac{b}{a}$

Compute (NO calculator):

$9^{\frac{1}{2}}$

$27^{\frac{1}{3}}$

$\left(\frac{1}{4}\right)^{-1}$

$\left(\frac{4}{25}\right)^{-1}$

$9^{\frac{3}{2}}$

$27^{\frac{2}{3}}$

$\left(\frac{1}{4}\right)^{\frac{1}{2}}$

$\left(\frac{4}{25}\right)^{\frac{1}{2}}$

$9^{\frac{5}{2}}$

$27^{\frac{4}{3}}$

$\left(\frac{1}{4}\right)^{\frac{3}{2}}$

$\left(\frac{4}{25}\right)^{-\frac{1}{2}}$

9^{-1}

$27^{\frac{5}{3}}$

$\left(\frac{9}{4}\right)^2$

$\left(\frac{8}{27}\right)^{\frac{2}{3}}$

Compute (NO calculator):

$$9^{-\frac{1}{2}}$$

$$27^{-1}$$

$$\left(\frac{9}{4}\right)^{-1}$$

$$\left(\frac{8}{27}\right)^{-\frac{2}{3}}$$

$$9^{-\frac{3}{2}}$$

$$27^{-\frac{1}{3}}$$

$$\left(\frac{9}{4}\right)^{\frac{1}{2}}$$

$$\left(\frac{8}{27}\right)^{-\frac{4}{3}}$$

Compute (Use a calculator)

$$6^{\frac{1}{4}}$$

$$8^{\frac{3}{7}}$$

$$\sqrt[5]{17}$$

$$\sqrt[3]{37}$$

PROCESS – FOR POWERS WITH LIKE BASES: To solve an exponential equation where the powers have the same base, set their exponents equal and solve that equation.

Solve each for x.

1) $8^{2x-1} = 8^{3x-7}$

2) $7^{x+4} = 7^{11}$

PROCESS – FOR POWERS WITH DIFFERENT BASES: If possible (in these problems it will be possible), rewrite the larger base as a power of the smaller base. In other words, rewrite the equation so that both sides have the same base.

3) $2^{x+3} = 8$

4) $6^{2-x} = 36$

5) $4^{3x-1} = 16$

6) $3^{x+1} = 1$

7) $2^{x+2} = \frac{1}{2}$

8) $3^{4-x} = \frac{1}{9}$

$$9) 3 \cdot 2^x = 48$$

$$10) 2^{3x-1} = 8^{\frac{2}{3}}$$

UNIT 6 (LESSON 7-5)

EXPONENTIAL EQUATIONS #2

(C24)

PROCESS – FOR POWERS WITH DIFFERENT BASES: If possible (in these problems it will be possible), rewrite the larger base as a power of the smaller base. In other words, rewrite the equation so that both sides have the same base. In some cases, you may have to rewrite both powers to have the same base.

Solve each for x.

$$1) 2^{x+5} = 4^x$$

$$2) 2^{3x-1} = 4^x$$

$$3) 3^{2x-1} = 27^x$$

$$4) 3^{x+1} = 9^{x+3}$$

$$5) \ 2^{x+2} = \left(\frac{1}{2}\right)^x$$

$$6) \ 3^{x+5} = 27^{\frac{2}{3}}$$

$$7) \ 4^{x+1} = 8^{x-1}$$

$$8) \ 25^{2x-1} = 5^{x+3}$$

$$9) \ 9^{2x-1} = 27^{x+1}$$

$$10) \ 2 \cdot 2^{x-1} \cdot 4^{x+1} = 8 \cdot 16^{1-x}$$

PROCESS: To solve a radical equation (equation with variable inside the radical), solve for the radical – that is, get the $\sqrt[n]{x}$ by itself. Once the $\sqrt[n]{x}$ is by itself, do the opposite to both sides of the equation (if \sqrt{x} , then square both sides; if $\sqrt[3]{x}$, then cube both sides; if $\sqrt[4]{x}$, then take both sides to the 4th power; etc.) Solve the remaining equation.

Solve each for x.

$$1) \sqrt{x} = 3$$

$$(\sqrt{x})^2 = 3^2$$

{square both sides}

$x = 9$

$$2) \sqrt[3]{x} = 3$$

$$(\sqrt[3]{x})^3 = 3^3$$

{Cube both sides}

$x = 27$

$$3) \sqrt{x+1} = 4$$

$$(\sqrt{x+1})^2 = 4^2$$

{Square both sides}

$$x+1 = 16$$

-1
-1

$x = 15$

$$4) \sqrt[3]{x+1} = 2$$

$$(\sqrt[3]{x+1})^3 = 2^3$$

{Cube both sides}

$$x+1 = 8$$

-1
-1

$x = 7$

$$5) \sqrt{x} = -2$$

No solution.

There is no value of x such that $\sqrt{x} = -2$.

$\sqrt{4} = 2$, but not -2

$\sqrt{-4} = 2i$, but not -2

$$6) 2\sqrt{x} + 1 = 5$$

* Solve for \sqrt{x}

$$2\sqrt{x} = 4$$

* subtract 1

$$\sqrt{x} = 2$$

* \div by 2

$$(\sqrt{x})^2 = 2^2$$

* Square both sides

$x = 4$

$$7) 4\sqrt{x} - 1 = 11$$

$$4\sqrt{x} = 12$$

$$\sqrt{x} = 3$$

$$(\sqrt{x})^2 = 3^2$$

$x = 9$

$$8) -2\sqrt{x} + 8 = 2$$

$$-2\sqrt{x} = -6$$

$$\frac{-2\sqrt{x}}{-2} = \frac{-6}{-2}$$

$$\sqrt{x} = 3$$

$$(\sqrt{x})^2 = 3^2$$

$x = 9$

$$9) 4\sqrt{x-1} - 2 = 10$$

$$4\sqrt{x-1} = 12$$

$$\sqrt{x-1} = 3$$

$$(\sqrt{x-1})^2 = 3^2$$

$$x-1 = 9$$

+1
+1

$x = 10$

$$10) 2\sqrt[4]{x-1} - 1 = 3$$

$$2\sqrt[4]{x-1} = 4$$

$$\sqrt[4]{x-1} = 2$$

$$(\sqrt[4]{x-1})^4 = 2^4$$

$$x-1 = 16$$

$$\boxed{x = 17}$$

$$11) \sqrt{x+2} = \sqrt{2x-3}$$

$$(\sqrt{x+2})^2 = (\sqrt{2x-3})^2$$

{ Square both sides }

$$x+2 = 2x-3$$

$$2 = x-3$$

$$5 = x$$

$$\boxed{x = 5}$$

$$12) \sqrt{x+1} = 2\sqrt{x-2}$$

$$(\sqrt{x+1})^2 = (2\sqrt{x-2})^2$$

{ Square both sides }

$$x+1 = 4(x-2)$$

$$x+1 = 4x-8$$

$$1 = 3x-8$$

$$9 = 3x$$

$$3 = x$$

$$\boxed{x = 3}$$

Don't forget to square 2

$$(2\sqrt{x-2})(2\sqrt{x-2}) = 4x-8$$

$$\cancel{4} \cdot \cancel{(x-2)}$$

$$13) \sqrt{x+5} = x-1$$

$$(\sqrt{x+5})^2 = (x-1)^2$$

{ Square both sides }

$$x+5 = (x-1)(x-1)$$

$$x+5 = x^2 - 2x + 1$$

{ subtract } x and 5

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

$$0 = (x-4)(x+1)$$

$$x-4=0$$

$$x+1=0$$

$$\boxed{x=4}$$

$$\cancel{x=-1}$$

$$14) \sqrt{2x+1} = x-1$$

$$(\sqrt{2x+1})^2 = (x-1)^2$$

$$2x+1 = x^2 - 2x + 1$$

$$0 = x^2 - 4x$$

$$0 = x(x-4)$$

[x is GCF]

$$x \neq 0 \quad \boxed{x=4}$$

$\hookrightarrow x=0$ is an extraneous solution

* $x=-1$ is an extraneous

solution (does not check)
as it makes the right side

of original equation = -2
and $\sqrt{x+5} \neq -2$
(square root cannot = a - #)

UNIT 6 (LESSON 6-4)

RATIONAL EXPONENTS

(C14)

$$\text{INDEX } \sqrt[n]{A^{\text{EXPONENT}}} = A^{\frac{\text{EXP}}{\text{IND}}} \quad \sqrt[a]{A^b} = A^{\frac{b}{a}}$$

$$\sqrt[a]{A} = A^{\frac{1}{a}} \quad \sqrt[2]{A} = A^{\frac{1}{2}} \quad \sqrt[3]{A} = A^{\frac{1}{3}}$$

CHANGE FORM

RADICAL	EXPONENTIAL
1) $\sqrt[5]{A}$	$A^{\frac{1}{5}}$
2) $\sqrt[6]{x^3}$	$x^{\frac{3}{6}} = x^{\frac{1}{2}}$
3) $\sqrt[4]{x^2y^3}$	$x^{\frac{2}{4}}y^{\frac{3}{4}} = x^{\frac{1}{2}}y^{\frac{3}{4}}$
4) $\sqrt[5]{x^4y^3z^2}$	$x^{\frac{4}{5}}y^{\frac{3}{5}}z^{\frac{2}{5}}$
5) $\sqrt[10]{x^7}$	$x^{\frac{7}{10}}$
6) $\sqrt[3]{x^2y}$	$x^{\frac{2}{3}}y^{\frac{1}{3}}$
7) $\begin{cases} \sqrt[5]{(ab)^4} \\ \sqrt[5]{a^4b^4} \end{cases}$	$(ab)^{\frac{4}{5}}$
8) $\sqrt[6]{a^3b^9}$	$a^{\frac{3}{6}}b^{\frac{9}{6}} \rightarrow a^{\frac{1}{2}}b^{\frac{3}{2}}$

SIMPLIFY: Multiply exponents

$$17) (A^{\frac{3}{4}}B^{\frac{1}{2}})^4 = A^{\frac{3}{4} \cdot 4} B^{\frac{1}{2} \cdot 4} = A^3 B^2$$

$$\frac{3}{4} \cdot 4 = 3 \quad \frac{1}{2} \cdot 4 = 2$$

$$18) (A^6B^3)^{\frac{1}{3}} = A^{\frac{6}{3}}B^{\frac{3}{3}} = A^2B$$

$$26 \cdot \frac{1}{3} = 2 \quad 3 \cdot \frac{1}{3} = 1$$

Exponent Rules:

$$x^a \cdot x^b = x^{a+b} \quad (\text{add exp})$$

$$(x^a)^b = x^{ab} \quad (\text{mult. exp})$$

$$\frac{x^a}{x^b} = x^{a-b} \quad (\text{sub. exp})$$

SIMPLIFY: Add exponents

$$9) x^{\frac{4}{5}} \cdot x^{\frac{1}{5}} = x^{\frac{4}{5} + \frac{1}{5}} = x^1 = \boxed{X} \quad 10) a^{\frac{3}{4}} \cdot a^{\frac{7}{8}} = a^{\frac{3}{4} + \frac{7}{8}} = a^{\frac{13}{8}} = \boxed{a^{\frac{13}{8}}}$$

$$\frac{4}{5} + \frac{1}{5} = \frac{5}{5} = 1 \quad \frac{3}{4} + \frac{7}{8} = \frac{6}{8} + \frac{7}{8} = \frac{13}{8}$$

$$11) 5^{\frac{2}{3}} \cdot 5^{\frac{1}{4}} = 5^{\frac{2}{3} + \frac{1}{4}} = 5^{\frac{11}{12}} = \boxed{5^{\frac{11}{12}}} \quad 12) 7^{\frac{3}{4}} \cdot 7^1 = 7^{\frac{3}{4} + 1} = 7^{\frac{7}{4}} = \boxed{7^{\frac{7}{4}}}$$

$$\frac{2}{3} + \frac{1}{4} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12} \quad \frac{3}{4} + 1 = \frac{3}{4} + \frac{4}{4} = \frac{7}{4}$$

* Base does not change

SIMPLIFY: Subtract exponents

$$13) \frac{a^{\frac{3}{4}}}{a^{\frac{1}{4}}} = a^{\frac{3}{4} - \frac{1}{4}} = a^{\frac{2}{4}} = \boxed{a^{\frac{1}{2}}} \quad 14) \frac{x^{\frac{3}{8}}}{x^{\frac{1}{4}}} = x^{\frac{3}{8} - \frac{1}{4}} = x^{\frac{1}{8}} = \boxed{x^{\frac{1}{8}}}$$

$$\frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2} \quad \frac{3}{8} - \frac{1}{4} = \frac{3}{8} - \frac{2}{8} = \frac{1}{8}$$

$$15) \frac{a^{\frac{7}{10}}b^2}{a^{\frac{1}{2}}b^{\frac{1}{4}}} = a^{\frac{7}{10} - \frac{1}{2}}b^{\frac{7}{4}} = \boxed{a^{\frac{1}{5}}b^{\frac{7}{4}}} \quad 16) \frac{a^{8.1}b^{4.6}}{a^{4.1}b^{2.7}} = a^{8.1 - 4.1}b^{4.6 - 2.7} = \boxed{a^4 b^{1.9}}$$

$$\frac{7}{10} - \frac{1}{2} = \frac{7}{10} - \frac{5}{10} = \frac{2}{10} = \frac{1}{5} \quad 8.1 - 4.1 = 4$$

$$2 - \frac{1}{4} = \frac{8}{4} - \frac{1}{4} = \frac{7}{4} \quad 4.6 - 2.7 = 1.9$$

SIMPLIFY:

$$19) \frac{\frac{2}{3} \cdot \frac{1}{4}}{A^{\frac{3}{4}}A^{\frac{1}{4}}} = \frac{A^{\frac{11}{12}}}{A^{\frac{1}{6}}} = \boxed{A^{\frac{3}{4}}} \quad \frac{2}{3} + \frac{1}{4} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12}$$

$$\frac{11}{12} - \frac{1}{6} = \frac{11}{12} - \frac{2}{12} = \frac{9}{12} = \frac{3}{4}$$

$$20) \frac{(A^{\frac{1}{2}}B^4)^2}{A(A^{\frac{3}{2}})^3} = \frac{AB^8}{A(A^{\frac{3}{2}})} = \boxed{\frac{B^8}{A^{\frac{3}{2}}}}$$

Remember:

a) $\sqrt[\text{index}]{x^{\text{exponent}}} = x^{\frac{\text{exponent}}{\text{index}}}$ So $x^{\frac{1}{2}} = \sqrt{x}$ and $x^{\frac{1}{3}} = \sqrt[3]{x}$ Reciprocals

b) Property of Negative Exponents: $x^{-1} = \frac{1}{x}$ and $\frac{1}{x^{-1}} = x$; so $(\frac{a}{b})^{-1} = \frac{b}{a}$

Compute (NO calculator):

$$9^{\frac{1}{2}} = \sqrt{9} = 3 \quad 27^{\frac{1}{3}} = \sqrt[3]{27} = 3 \quad (\frac{1}{4})^{-1} = \frac{1}{\frac{1}{4}} = 4 \quad (\frac{4}{25})^{-1} = \boxed{\frac{25}{4}}$$

* The denominator of the rational exponent is the root, such as $\sqrt{}$ or $\sqrt[3]{}$. Compute the root first — then compute power.

$$\begin{array}{lll} 9^{\frac{3}{2}} = (9^{\frac{1}{2}})^3 & 27^{\frac{2}{3}} = (27^{\frac{1}{3}})^2 & (\frac{1}{4})^{\frac{1}{2}} = \sqrt{\frac{1}{4}} = \frac{1}{\sqrt{4}} = \frac{1}{2} \\ \left(\begin{array}{l} = 3^3 \\ = 27 \end{array} \right) & \left(\begin{array}{l} = 3^2 \\ = 9 \end{array} \right) & \left(\begin{array}{l} = \frac{1}{2} \\ = \frac{\sqrt{4}}{\sqrt{25}} \\ = \frac{2}{5} \end{array} \right) \\ \text{or } \rightarrow (\sqrt{9})^3 = 3^3 = 27 & \rightarrow (\sqrt[3]{27})^2 = 3^2 = 9 & - \text{exponent gives us the reciprocal} \\ \left(\begin{array}{l} = 3^5 \\ = 243 \end{array} \right) & \left(\begin{array}{l} = 3^4 \\ = 81 \end{array} \right) & = \boxed{\frac{5}{2}} \\ \text{or } \rightarrow (\sqrt{9})^5 = 3^5 & \text{or } \rightarrow (\sqrt[3]{27})^4 = 3^4 & \end{array}$$

$$\begin{array}{lll} 9^{-1} = \boxed{\frac{1}{9}} & 27^{\frac{5}{3}} = (27^{\frac{1}{3}})^5 & (\frac{9}{4})^2 = \boxed{\frac{81}{16}} \\ \left(\begin{array}{l} = 3^5 \\ = 243 \end{array} \right) & \left(\begin{array}{l} = 3^5 \\ = 243 \end{array} \right) & \left(\begin{array}{l} = (\frac{9}{4})(\frac{9}{4}) = \frac{81}{16} \\ = \frac{9^2}{4^2} = \frac{81}{16} \end{array} \right) \\ \text{or } \rightarrow (\sqrt[3]{27})^5 = 3^5 & & \left(\begin{array}{l} = \sqrt[3]{\frac{8}{27}} \\ = \frac{\sqrt[3]{8}}{\sqrt[3]{27}} \\ = \frac{2}{3} \\ = \boxed{\frac{4}{9}} \end{array} \right) \end{array}$$

Compute (NO calculator):

$$9^{-\frac{1}{2}} = \left(9^{\frac{1}{2}}\right)^{-1}$$

$$= 3^{-1}$$

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

$$27^{-1} = \boxed{\frac{1}{27}}$$

$$\left(\frac{9}{4}\right)^{-1} = \boxed{\frac{4}{9}}$$

Reciprocals

$$\left(\frac{8}{27}\right)^{-\frac{2}{3}} = \left(\frac{27}{8}\right)^{\frac{2}{3}}$$

$$\begin{aligned} \sqrt[3]{27} &\rightarrow \left(\frac{3}{2}\right)^2 \\ \sqrt[3]{8} &\rightarrow \boxed{\frac{9}{4}} \end{aligned}$$

or $\rightarrow (\sqrt{9})^{-1} = 3^{-1} = \frac{1}{3}$

$$9^{-\frac{3}{2}} = \left(9^{\frac{1}{2}}\right)^{-3}$$

$$= 3^{-3}$$

$$= \frac{1}{3^3} \leftarrow$$

$$= \boxed{\frac{1}{27}}$$

$$27^{-\frac{1}{3}} = \left(27^{\frac{1}{3}}\right)^{-1}$$

$$= 3^{-1}$$

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

$$\left(\frac{9}{4}\right)^{\frac{1}{2}} = \sqrt{\frac{9}{4}} = \boxed{\frac{3}{2}}$$

$$\left(\frac{8}{27}\right)^{-\frac{4}{3}} = \left(\frac{27}{8}\right)^{\frac{4}{3}}$$

$$\begin{aligned} \sqrt[3]{27} &\rightarrow \left(\frac{3}{2}\right)^4 \\ \sqrt[3]{8} &\rightarrow \frac{3^4}{2^4} \end{aligned}$$

$$= \boxed{\frac{81}{16}}$$

* Above problems should be done mentally, with no work.

Compute (Use a calculator)

$$6^{\frac{1}{4}} \approx 1.57$$

$$8^{\frac{3}{7}} \approx 2.44$$

$$\sqrt[5]{17} = 17^{\frac{1}{5}}$$

$$\sqrt[3]{37} = 37^{\frac{1}{3}}$$

↓ Key Strokes:



$$\downarrow \approx 1.76$$

$$\downarrow \approx 3.33$$

$$6^{\wedge}(1/4) =$$

$$8^{\wedge}(3/7) =$$

$$17^{\wedge}(1/5) =$$

$$37^{\wedge}(1/3) =$$

- or -

$$6 y^x (1/4) = \quad 8 y^x (3/7) = \quad 17 y^x (1/5) = \quad 37 y^x (1/3) =$$

- or -

$$6 y^x (1/4) = \quad 8 y^x (3/7) = \quad 17 y^x (1/5) = \quad 37 y^x (1/3) =$$

* or convert
to radical form:

$$6^{\frac{1}{4}} = \sqrt[4]{6} \text{ then}$$

$$8^{\frac{3}{7}} = \sqrt[7]{8^3}$$

$$4 \sqrt[4]{6} =$$

$$7 \sqrt[5]{(8^1)^3} =$$

EX: $27^{\frac{2}{3}} \rightarrow$ Read this
as the "cube root of 27
squared." So the cube
root of 27 is 3 and
3 squared is 9.
 $27^{\frac{2}{3}} = (\sqrt[3]{27})^2 = 3^2 = 9$

PROCESS – FOR POWERS WITH LIKE BASES: To solve an exponential equation where the powers have the same base, set their exponents equal and solve that equation.

Solve each for x.

1) $8^{2x-1} = 8^{3x-7}$

Because bases are equal,
you can set the exponents equal.

$$2x-1 = 3x-7$$

$$6 = x$$

2) $7^{x+4} = 7^{11}$

$$x+4 = 11$$

$$x = 7$$

PROCESS – FOR POWERS WITH DIFFERENT BASES: If possible (in these problems it will be possible), rewrite the larger base as a power of the smaller base. In other words, rewrite the equation so that both sides have the same base.

3) $2^{x+3} = 8$

$$2^{x+3} = 2^3$$

$$x+3 = 3$$

$$x = 0$$

$$2^3 = 8$$

4) $6^{2-x} = 36$

$$6^{2-x} = 6^2$$

$$2-x = 2$$

$$-x = 0$$

$$x = 0$$

$$6^2 = 36$$

5) $4^{3x-1} = 16$

$$4^{3x-1} = 4^2$$

$$3x-1 = 2$$

$$3x = 3$$

$$x = 1$$

$$4^2 = 16$$

6) $3^{x+1} = 1$

$$3^{x+1} = 3^0$$

$$x+1 = 0$$

$$x = -1$$

$$3^0 = 1$$

$$\left. \begin{array}{l} 3^3 = 27 \\ 3^2 = 9 \end{array} \right\} \div 3$$

$$\left. \begin{array}{l} 3^1 = 3 \\ 3^0 = 1 \end{array} \right\} \div 3$$

$$\left. \begin{array}{l} 3^{-1} = \frac{1}{3} \\ 3^{-2} = \frac{1}{3^2} = \frac{1}{9} \end{array} \right\} \div 3$$

$$\left. \begin{array}{l} 3^{-3} = \frac{1}{3^3} = \frac{1}{27} \\ 3^{-4} = \frac{1}{3^4} = \frac{1}{81} \end{array} \right\} \div 3$$

7) $2^{x+2} = \frac{1}{2}$

$$\left[\frac{1}{2} = 2^{-1} \right]$$

$$2^{x+2} = 2^{-1}$$

$$x+2 = -1$$

$$x = -3$$

8) $3^{4-x} = \frac{1}{9}$

$$3^{4-x} = 3^{-2}$$

$$4-x = -2$$

$$-x = -6$$

$$x = 6$$

*Remember that
any # raised to 0
is equal to one

$$9) 3 \cdot 2^x = 48$$

$$\begin{aligned} \frac{3 \cdot 2^x}{3} &= \frac{48}{3} \\ 2^x &= 16 \\ 2^x &= 2^4 \\ \boxed{x = 4} \end{aligned}$$

$$10) 2^{3x-1} = 8^{\frac{2}{3}}$$

$$\begin{aligned} 2^{3x-1} &= 2^2 \\ 3x-1 &= 2 \\ 3x &= 3 \\ \boxed{x = 1} \end{aligned}$$

$$\begin{aligned} 8^{\frac{2}{3}} &= \left(8^{\frac{1}{3}}\right)^2 \\ &\downarrow \\ &\left(\sqrt[3]{8}\right)^2 \\ &\downarrow \\ &2^2 \end{aligned}$$

UNIT 6 (LESSON 7-5)

EXPONENTIAL EQUATIONS #2

(C24)

PROCESS – FOR POWERS WITH DIFFERENT BASES: If possible (in these problems it will be possible), rewrite the larger base as a power of the smaller base. In other words, rewrite the equation so that both sides have the same base. In some cases, you may have to rewrite both powers to have the same base.

Solve each for x.

$$\begin{aligned} 1) 2^{x+5} &= 4^x \\ 2^{x+5} &= 2^{2x} \\ x+5 &= 2x \\ 5 &= x \\ \boxed{x = 5} \end{aligned}$$

$$\begin{aligned} 2) 2^{3x-1} &= 4^x \\ 2^{3x-1} &= 2^{2x} \\ 3x-1 &= 2x \\ \boxed{x = 1} \end{aligned}$$

$$\begin{aligned} 3) 3^{2x-1} &= 27^x \\ 3^{2x-1} &= 3^{3x} \\ 2x-1 &= 3x \\ -1 &= x \\ \boxed{x = -1} \end{aligned}$$

$$\begin{aligned} 4) 3^{x+1} &= 9^{x+3} \\ 3^{x+1} &= 3^{2x+6} \\ x+1 &= 2x+6 \\ -5 &= x \\ \boxed{x = -5} \end{aligned}$$

$$\begin{cases} 9 = 3^2 \\ 9^{x+3} = (3^2)^{x+3} \\ 9^{x+3} = 3^{2(x+3)} \\ 9^{x+3} = 3^{2x+6} \end{cases}$$

$$5) 2^{x+2} = \left(\frac{1}{2}\right)^x$$

$$2^{x+2} = 2^{-x}$$

$$x+2 = -x$$

$$2x = -2$$

$$\boxed{x = -1}$$

$\left\{ \begin{array}{l} \frac{1}{2} = 2^{-1} \\ \left(\frac{1}{2}\right)^x = (2^{-1})^x \\ \left(\frac{1}{2}\right)^x = 2^{-x} \end{array} \right.$

$$6) 3^{x+5} = 27^{\frac{2}{3}}$$

$$3^{x+5} = 3^2$$

$$x+5 = 2$$

$$\boxed{x = -3}$$

\downarrow
 $(\sqrt[3]{27})^2$
 \downarrow
 3^2

$$7) 4^{x+1} = 8^{x-1}$$

$$(2^2)^{x+1} = (2^3)^{x-1}$$

$$2^{2x+2} = 2^{3x-3}$$

$$2x+2 = 3x-3$$

$$5 = x$$

$$\boxed{x = 5}$$

$4 = 2^2$
 $8 = 2^3$

$$8) 25^{2x-1} = 5^{x+3}$$

$$(5^2)^{2x-1} = 5^{x+3}$$

$$5^{4x-2} = 5^{x+3}$$

$$4x-2 = x+3$$

$$3x = 5$$

$$\boxed{x = \frac{5}{3}}$$

$(2^2)^{x+1} = 2^{2x+2}$
 $(2^4)^{1-x} = 2^{4-4x}$

$$9) 9^{2x-1} = 27^{x+1}$$

$$(3^2)^{2x-1} = (3^3)^{x+1}$$

$$3^{4x-2} = 3^{3x+3}$$

$$4x-2 = 3x+3$$

$$x-2 = 3$$

$$\boxed{x = 5}$$

$9 = 3^2$
 $27 = 3^3$

Rewrite each term as a base 3 power

$$10) 2 \cdot 2^{x-1} \cdot 4^{x+1} = 8 \cdot 16^{1-x}$$

$$2^1 \cdot 2^{x-1} \cdot 2^{2x+2} = 2^3 \cdot 2^{4-4x}$$

Add exponents Add exponents

$$2^{3x+2} = 2^{7-4x}$$

$$3x+2 = 7-4x$$

$$7x+2 = 7$$

$$7x = 5$$

$$\boxed{x = \frac{5}{7}}$$

M5 C13

C13

RADICAL EQUATIONS

SOLVE FOR X

1. $\sqrt{x} = 4$

2. $\sqrt{x} = 10$

3. $\sqrt{x} = 7$

4. $\sqrt[3]{x} = 2$

5. $\sqrt[3]{x} = 5$

6. $\sqrt[4]{x} = 2$

7. $\sqrt{x+1} = 3$

8. $\sqrt{x-1} = 5$

9. $\sqrt{x+4} = 10$

10. $\sqrt[3]{x+1} = 2$

11. $\sqrt[3]{x-1} = 3$

12. $\sqrt[4]{x+1} = 2$

13. $\sqrt{x}-1=5$

14. $\sqrt{x}+2=7$

15. $\sqrt{x}-1=6$

16. $2\sqrt{x}=20$

17. $3\sqrt{x}=21$

18. $2\sqrt{x}=7$

19. $2\sqrt{x}+1=7$

20. $3\sqrt{x}-1=5$

21. $4\sqrt{x}+1=10$

22. $-2\sqrt{x}+10=2$

23. $-3\sqrt{x}+16=1$

24. $-4\sqrt{x}+4=0$

25. $2\sqrt{x+1}+2=4$

26. $3\sqrt{x-1}+1=7$

27. $4\sqrt{x+2}-8=16$

28. $2\sqrt[3]{x+1}-1=19$

29. $2\sqrt[3]{x+1}-2=6$

30. $5\sqrt[4]{x-1}-1=19$

31. $\sqrt{x+2}=\sqrt{2x-1}$

32. $\sqrt{x+3}=\sqrt{2x-5}$

33. $\sqrt{3x+1}=\sqrt{x+15}$

34. $\sqrt{x+1}=2\sqrt{x-1}$

35. $\sqrt{x+6}=3\sqrt{x-1}$

36. $\sqrt{x+10}=4\sqrt{x-1}$

37. $\sqrt{2x}=x-4$

38. $\sqrt{x}=x-6$

39. $\sqrt{5x}=x$

40. $\sqrt{8x+1}=x+2$

41. $\sqrt{3x+7}=x+3$

42. $\sqrt{3x+1}=x-1$

43. $\sqrt{3x-5}-3\sqrt{x}=0$

44. $\sqrt{2x+10}-2\sqrt{x}=0$

45. $\sqrt{2x+3}+\sqrt{x+6}=0$

M5 C14

C14

FRACTIONAL EXPONENTS

CHANGE TO FRACTIONAL EXPONENTS

$$\begin{array}{llll} 1. \sqrt[6]{A} & 3. \sqrt[3]{x^2} & 5. \sqrt[4]{x^3 y^2} & 7. \sqrt[5]{x^3 y^4 z^2} \\ 2. \sqrt[4]{5} & 4. \sqrt[4]{x^3} & 6. \sqrt{x^3 y^4} & 8. \sqrt[6]{A^4 B^5 C} \end{array}$$

CHANGE TO RADICALS

$$\begin{array}{llll} 1. x^{3/10} & 3. x^{1/3} y^{2/3} & 5. (AB)^{3/4} & 7. (A^3 B^5)^{1/6} \\ 2. w^{4/7} & 4. M^{4/5} N^{3/5} & 6. (BC)^{4/5} & 8. (A^7 B^3)^{1/8} \end{array}$$

SIMPLIFY (ADD EXPONENTS)

$$\begin{array}{llll} 17. x^{3/4}, x^{1/4} & 19. B^{3/4}, B^{1/10} & 21. 8^{1/3}, 8^{1/4} & \\ 18. A^{1/2}, A^{2/3} & 20. 5^{1/4}, 5^{3/4} & 22. z^{3/4}, z^{1/2}, z & \end{array}$$

SIMPLIFY (SUBTRACT EXPONENTS)

$$\begin{array}{lll} 23. \frac{A^{3/4} B^{1/10}}{A^{1/4} B^{1/20}} & 25. \frac{A^{4/5} B^2}{A^{1/5} B^{1/2}} & 27. \frac{A^{9/10} B^4 C^4}{A^{1/5} B^{1/2} C^{1/2}} \\ 24. \frac{A^{3/4} B}{A^{1/6} B^{1/3}} & 26. \frac{A^{1/2} B^2}{A^{1/4} B^{1/2}} & 28. \frac{A^{1/2} B^{4/8} C^{1/8}}{A^{-1/8} B^2 C^{1/8}} \end{array}$$

SIMPLIFY (MULTIPLY EXPONENTS)

$$\begin{array}{lll} 29. (A^{1/2} B^2)^4 & 31. (A^{4/5} B)^2 & 33. \left(\frac{A^{4/5} B^{2/3}}{C^{1/10} D^{1/3}} \right)^{20} \\ 30. (A^{2/3} B^{1/2})^{12} & 32. (A^2 B^3)^{1/3} & \end{array}$$

SIMPLIFY

$$\begin{array}{lll} 34. \frac{A^{3/4}, A^{1/2}}{A^{3/8}} & 36. \frac{(A^4 B^6)^{2/3}}{(A^{10} B^5)^{1/5}} & 38. \frac{(A^4 B^6)^2 (A^6 B^4)^{1/3}}{(A B^4)^{1/2} (A B^2)^{1/4}} \\ 35. \frac{(B^{4/5} C^{3/4})^{20}}{(B^{1/2} C)^2} & 37. \frac{(A^{24} B^{16})^{3/4}}{(A^{10} B^{14})^{1/2}} & 39. ((A^2 A^{1/2})^2 A)^{1/2} \end{array}$$

M5 C21

C21

FRACTIONAL EXPONENTS / COMPUTE

COMPUTE (NO CALCULATOR)

- | | | | |
|----------------------|------------------------|-------------------------|-------------------------|
| 1. $4^{\frac{1}{2}}$ | 6. $16^{\frac{1}{4}}$ | 11. $4^{-\frac{1}{2}}$ | 16. $27^{\frac{2}{3}}$ |
| 2. $8^{\frac{1}{3}}$ | 7. $16^{\frac{3}{4}}$ | 12. $8^{-\frac{1}{3}}$ | 17. $27^{-\frac{2}{3}}$ |
| 3. $8^{\frac{2}{3}}$ | 8. $16^{\frac{5}{4}}$ | 13. $8^{-\frac{2}{3}}$ | 18. $27^{\frac{4}{3}}$ |
| 4. $8^{\frac{4}{3}}$ | 9. $32^{\frac{2}{5}}$ | 14. $16^{-\frac{1}{2}}$ | 19. $27^{-\frac{5}{3}}$ |
| 5. $8^{\frac{5}{3}}$ | 10. $32^{\frac{3}{5}}$ | 15. $16^{-\frac{1}{4}}$ | 20. $25^{\frac{3}{2}}$ |

- | | | | |
|------------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| 21. $(\frac{1}{4})^{\frac{1}{2}}$ | 24. $(\frac{1}{9})^{-\frac{1}{2}}$ | 27. $(\frac{4}{9})^{-\frac{1}{2}}$ | 30. $(\frac{9}{4})^{-\frac{3}{2}}$ |
| 22. $(\frac{1}{4})^{-\frac{1}{2}}$ | 25. $(\frac{1}{16})^{-\frac{3}{4}}$ | 28. $(\frac{25}{36})^{\frac{1}{2}}$ | 31. $(\frac{27}{125})^{\frac{2}{3}}$ |
| 23. $(\frac{1}{4})^{-\frac{3}{2}}$ | 26. $(\frac{4}{9})^{\frac{1}{2}}$ | 29. $(\frac{25}{36})^{-\frac{1}{2}}$ | 32. $(\frac{8}{27})^{-\frac{2}{3}}$ |

*Nearest hundredth

COMPUTE (USE

A CALCULATOR)

- | | |
|------------------------|-------------------------|
| 33. $8^{\frac{1}{4}}$ | 36. $16^{\frac{5}{4}}$ |
| 34. $6^{\frac{2}{3}}$ | 37. $124^{\frac{2}{5}}$ |
| 35. $24^{\frac{3}{4}}$ | 38. $163^{\frac{3}{5}}$ |

- | |
|--------------------|
| 39. $\sqrt[8]{60}$ |
| 40. $\sqrt[4]{80}$ |
| 41. $\sqrt[3]{71}$ |

- | |
|----------------------|
| 42. $\sqrt[10]{271}$ |
| 43. $\sqrt[4]{50}$ |
| 44. $\sqrt[3]{50}$ |

45. $\sqrt[4]{18^{\frac{2}{3}}}$

47. $\sqrt[3]{20^{\frac{1}{3}}}$

49. $\sqrt[3]{\sqrt{50}}$

51. $\sqrt[3]{\sqrt{427}}$

46. $\sqrt[4]{14^{\frac{1}{4}}}$

48. $\sqrt[4]{30^{-\frac{1}{4}}}$

50. $\sqrt[4]{\sqrt{17}}$

52. $\sqrt[3]{11^{-\frac{1}{4}}}$

EVALUATE (NO CALCULATOR)

- | | | |
|--|--|--|
| 53. $(16^{\frac{1}{2}}, 8^{\frac{1}{3}})^2$ | 55. $(27^{\frac{2}{3}} \cdot 9^{\frac{1}{2}})^{\frac{1}{3}}$ | 57. $(\frac{9}{25})^{-\frac{1}{2}} (\frac{4}{9})^{-\frac{1}{2}}$ |
| 54. $(16^{\frac{1}{2}} \cdot 8^{\frac{1}{3}})^{\frac{2}{3}}$ | 56. $(\frac{4}{9})^{-1} (\frac{9}{25})^{\frac{1}{2}}$ | 58. $(\frac{8}{27})^{\frac{2}{3}} (\frac{8}{25})^{-\frac{1}{3}}$ |

$$\begin{array}{lll}
\frac{b}{e} = \frac{e}{1+x} & 54 & \frac{4e}{e} = \frac{e-x}{x} \cdot 4t \\
\frac{t}{e} = \frac{e}{1-x} & 44 & \frac{e}{e} = \frac{e}{1-x} \cdot 8 \\
\frac{se}{e} = \frac{e}{1+x} & 43 & \frac{8}{e} = \frac{e}{1+x} \cdot 6e
\end{array}$$

$$\begin{array}{lll}
1 = \frac{e \cdot b}{1+x} & 9e & 5e = \frac{e \cdot 6}{1+x} \cdot 8e \\
1 = \frac{e \cdot t}{1-x} & 5e & 5t = \frac{e \cdot 5}{1+x} \cdot e \\
e = \frac{e \cdot e}{1+x} & 7e & 8t = \frac{e \cdot e}{1-x} \cdot 1e \\
t = \frac{e \cdot t}{e+x} & 3e & 0t = \frac{e \cdot 5}{1-x} \cdot 0e \\
& & 9e = \frac{e \cdot 4}{1+x} \cdot be
\end{array}$$

$$\begin{array}{lll}
\frac{b}{t} = \frac{e}{1+x} \cdot te & bh = \frac{e}{1-xe} \cdot b \\
\frac{t}{t} = \frac{e}{1+x} \cdot te & 9e = \frac{e}{x-1} \cdot 8 \\
\frac{e}{t} = \frac{e}{1+x} \cdot te & se = \frac{e}{1-x} \cdot 6 \\
1 = \frac{e}{1-xe} \cdot te & 9t = \frac{e}{1+x} \cdot 9 \\
1 = \frac{e}{1+x} \cdot te & b = \frac{e}{1+x} \cdot 5
\end{array}$$

$$\begin{array}{lll}
bh = \frac{e}{1-xe} \cdot b & 8t = \frac{e}{1-x} \cdot 11 \\
9e = \frac{e}{x-1} \cdot 8 & 9t = \frac{e}{xe} \cdot 11 \\
se = \frac{e}{1-x} \cdot 6 & 9t = \frac{e}{1-x} \cdot 11 \\
9t = \frac{e}{1+x} \cdot 9 & 8 = \frac{e}{1+x} \cdot 10
\end{array}$$

$$\begin{array}{lll}
b = \frac{e}{1-xe} \cdot b & x-1 = \frac{e}{1-xe} \cdot 6 \\
8 = \frac{e}{1-xe} \cdot 8 & 5 = \frac{e}{1-xe} \cdot 5 \\
10 = \frac{e}{1-xe} \cdot 10 & 4 = \frac{e}{1-xe} \cdot 4
\end{array}$$

SOLVE FOR X

#1 EXPONENTIAL EQUATIONS

M5 C23

C23

$$x^{-1} \cdot 5e \cdot 15e = \frac{5 \cdot 5}{1+x^2} \cdot 8 \quad 38$$

EXTRA

$$\frac{8}{1+x} = \frac{9}{h-x}$$

$$\frac{9e}{1+x} = \frac{9}{h}$$

$$\frac{5e}{1+x} = \frac{5e}{xe}$$

$$\frac{4}{1+x} = \frac{4}{x^2}$$

36

35

34

33

$$\frac{4e}{1+x} = \frac{b}{1-x}$$

$$\frac{5e}{x} = \frac{b}{h+x}$$

$$\frac{e^b}{e+x} = \frac{e}{h}$$

$$\frac{e^b}{1+x} = \frac{be}{h}$$

36

31

30

29

$$\frac{5}{1+x} = \frac{8e}{e-x}$$

$$\frac{8}{x} = \frac{9}{e+x}$$

$$\frac{4e}{1-x} = \frac{b}{1+x}$$

$$\frac{4}{1+x} = \frac{h}{1-x}$$

$$4e = \frac{1}{1+x} e \cdot he$$

$$4e = \frac{e}{x} ee$$

$$he = \frac{e}{h+x} ee$$

$$e = \frac{e \cdot e}{1+x} ie$$

$$\frac{\left(\frac{4}{1}\right)}{x} = \frac{e+1}{xe} \cdot 2e$$

$$\frac{\left(\frac{5e}{1}\right)}{x} = \frac{5}{x-1} \cdot 91$$

$$\frac{\left(\frac{e}{1}\right)}{x} = \frac{e}{1+xe} \cdot 81$$

$$\frac{\left(\frac{4}{1}\right)}{x} = \frac{4}{1+x} e \cdot 61$$

$$\frac{5e}{1+x} = \frac{5}{x-e} \cdot 91$$

$$\frac{91}{1+x} = \frac{91}{e+x} \cdot 51$$

$$\frac{b}{e+x} = \frac{e}{1-x} \cdot h1$$

$$\frac{h}{1-x} = \frac{h}{h+x} e \cdot ei$$

$$\frac{8}{x} = \frac{8}{1-x}$$

$$\frac{4}{x} = \frac{4}{1+x}$$

$$\frac{5}{x} = \frac{5}{x-e}$$

$$\frac{5}{x} = \frac{5}{1-xe}$$

$$\frac{4e}{x} = \frac{e}{1-x} \cdot 8$$

$$\frac{4e}{x} = \frac{e}{x-e} \cdot 6$$

$$\frac{b}{x} = \frac{3}{h+x} e \cdot 6$$

$$\frac{b}{x} = \frac{3}{1+x} e \cdot 5$$

SOLVE EACH

$$\frac{h}{x} = \frac{e}{x-1} \cdot h1$$

$$\frac{h}{x} = \frac{e}{1+xe} \cdot e$$

$$\frac{8}{x} = \frac{8}{1-xe} e \cdot e$$

$$\frac{4}{x} = \frac{4}{h+x} e \cdot 1$$

EXPONENTIAL EQUATIONS #2

M5 cat

C24

ALGEBRA 2 - REVIEW FOR QUIZ 6

(Fractional Exponents & Solving Exponential Equations)

Name _____

Period _____

1) Rewrite using fractional exponents (C14)

a) $\sqrt[4]{x^3}$

b) $\sqrt[3]{A^2B^5}$

2) Rewrite in radical form (C14)

a) $x^{\frac{2}{5}}y^{\frac{4}{5}}$

b) $(A^4B^5)^{\frac{2}{3}}$

3) Compute without a calculator (C21)

a) $27^{\frac{2}{3}}$

b) $\left(\frac{9}{25}\right)^{-\frac{3}{2}}$

4) Simplify. Write with positive exponents. (C14)

a) $A^{\frac{3}{4}} \cdot A^{\frac{1}{3}}$

b) $5^{\frac{2}{3}} \cdot 5^{\frac{1}{2}}$

c) $32^{\frac{4}{5}}$

d) $\left(\frac{8}{27}\right)^{\frac{2}{3}}$

c) $\frac{x^{\frac{7}{8}}}{x^{\frac{1}{4}}}$

d) $\frac{(A^4B^6)^{\frac{2}{3}}}{(A^{10}B^5)^{\frac{1}{5}}}$

5) Solve each for x. (C23)

a) $5 \cdot 2^{2x-1} = 40$

b) $3^{2x+1} = \frac{1}{9}$

c) $2^{4x+1} = 32^{\frac{3}{5}}$

6) Solve each for x. (C24)

a) $5^{2-x} = 25^{x+3}$

b) $4^{2x+1} = \left(\frac{1}{8}\right)^x$

c) $16^{x-4} = 8^{x+1}$

d) $8^{x+1} = 32^x$

e) $3^{2x-1} = \left(\frac{1}{27}\right)^{x+1}$

f) $2^x \cdot 4^{x+1} = 8^{x-2} \cdot 2$

C13

Key

1-45 ODD

C13

(1) 16

(13) $\sqrt{x} = 6$

(19) $2\sqrt{x} = 6$

(3) 49

$x = 36$

$\sqrt{x} = 3$

(5) 125

(15) $\sqrt{x} = 7$

$x = 9$

(7) 8

$x = 49$

(21) $4\sqrt{x} = 9$

(9) 96

(17) $\sqrt{x} = 7$

$\sqrt{x} = \frac{9}{4}$

$$\left(\frac{9}{4}\right)^2 = \frac{9}{4} \cdot \frac{9}{4} = \frac{81}{16}$$

(11) 28

$x = 49$

$x = \frac{81}{16}$

(23) $-3\sqrt{x} = -15$

$\sqrt{x} = 5$

$x = 25$

(29) $2\sqrt[3]{x+1} = 8$

$\sqrt[3]{x+1} = 4$

$x+1 = 64$

$x = 63$

(35) ~~$x+6 = 9(x^2 - 2x + 1)$~~

~~$x+6 = 9x^2 - 18x + 9$~~

~~$0 = 9x^2 - 18x + 3$~~

~~$0 = ()$~~

(25) $2\sqrt{x+1} = 2$

$\sqrt{x+1} = 1$

$x+1 = 1$

$x = 0$

(31) $x+2 = 2x-1$

$3 = x$

$x = 3$

(35) $x+6 = 9(x-1)$

$x+6 = 9x - 9$

$15 = 8x$

$x = \frac{15}{8}$

(27) $4\sqrt{x+2} = 24$

$\sqrt{x+2} = 6$

$x+2 = 36$

$x = 34$

(33) $3x+1 = x+15$

$2x = 14$

$x = 7$

(37) $2x = x^2 - 8x + 16$

$0 = x^2 - 10x + 16$

$0 = (x-8)(x-2)$

$x = 8 \quad x = 2$

(39) $5x = x^2$

$0 = x^2 - 5x$

$0 = x(x-5)$

$x = 0 \quad x = 5$

(41) $3x+7 = x^2 + 6x + 9$

$0 = x^2 + 3x + 2$

$0 = (x+2)(x+1)$

$x = -2 \quad x = -1$

(43) $\frac{1}{2} \cdot (45)$

ON BACK

$$\textcircled{43} \quad \sqrt{3x-5} = 3\sqrt{x}$$

$$3x-5 = 9x$$

$$-5 = 6x$$

$$x = \frac{-5}{6}$$

No solution

$$\textcircled{45} \quad \sqrt{2x+3} = \sqrt{x+6}$$

$$2x+3 = x+6$$

$$x = 3$$

\textcircled{35}

$$9x^2 - 19x + 3 = 0$$

$$a = 9 \quad b = -19 \quad c = 3$$

$$x = \frac{19 \pm \sqrt{361 - 4(9)(3)}}{18}$$

$$x = \frac{19 \pm \sqrt{361 - 108}}{18}$$

$$x = \frac{19 \pm \sqrt{253}}{18}$$

KEY TO C14 - FRACTIONAL EXPONENTS

C14

① $A^{\frac{1}{6}}$

③ $X^{\frac{2}{3}}$

⑤ $X^{\frac{3}{4}}y^{\frac{1}{2}}$

⑦ $X^{\frac{3}{5}}y^{\frac{4}{5}}z^{\frac{2}{5}}$

② $5^{\frac{1}{4}}$

④ $X^{\frac{3}{4}}$

⑥ $X^{\frac{3}{2}}y^2$

⑧ $A^{\frac{2}{3}}B^{\frac{5}{6}}C^{\frac{1}{6}}$

ODDS

* NOTE: Numbering is off.

① $\sqrt[10]{x^3}$

③ $\sqrt[3]{xy^2}$

⑤ $\sqrt[4]{A^3B^3}$

⑦ $\sqrt[6]{A^3B^5}$

⑯ X

⑯ $B^{\frac{3}{4}} \cdot B^{\frac{1}{10}} = B^{\frac{17}{20}}$

⑯ $8^{\frac{1}{3}} \cdot 8^{\frac{1}{4}} = 8^{\frac{7}{12}}$

$$\frac{3}{4} + \frac{1}{10} = \frac{15}{20} + \frac{2}{20} = \frac{17}{20}$$

$$\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$$

⑯ $A^{\frac{1}{2}}B^{\frac{1}{20}}$

⑯ $A^{\frac{3}{5}}B^{\frac{3}{2}}$

⑯ $A^{\frac{7}{10}}B^{\frac{1}{2}}C^{\frac{7}{2}}$

⑯ A^2B^8

⑯ $A^{\frac{8}{5}}B^2$

⑯ $\frac{A^{16}B^{\frac{40}{3}}}{C^2D^{\frac{20}{3}}}$

⑯ $\frac{B^{16}C^{15}}{B^1C^2} = B^{15}C^{13}$

⑯ $\frac{A^{18}B^{12}}{A^5B^7} = A^{13}B^5$

⑯ $((A^4 \cdot A)A)^{\frac{1}{2}} = (A^6)^{\frac{1}{2}} = A^3$

KEY TO C21 - COMPUTE FRACTIONAL EXPONENTS

C21
KEY

- | | | | |
|----------------|----------------|--------------------|-------------------------------|
| (1) 2 | (6) 2 | (11) $\frac{1}{2}$ | (16) $3^2 = 9$ |
| (2) 2 | (7) $2^3 = 8$ | (12) $\frac{1}{2}$ | (17) $3^{-2} = \frac{1}{9}$ |
| (3) $2^2 = 4$ | (8) $2^5 = 32$ | (13) $\frac{1}{4}$ | (18) $3^4 = 81$ |
| (4) $2^4 = 16$ | (9) $2^2 = 4$ | (14) $\frac{1}{4}$ | (19) $3^{-5} = \frac{1}{243}$ |
| (5) $2^5 = 32$ | (10) $2^3 = 8$ | (15) $\frac{1}{2}$ | (20) $5^3 = 125$ |

- | | | | |
|--------------------|--------------------|--------------------|--|
| (21) $\frac{1}{2}$ | (24) 3 | (27) $\frac{3}{2}$ | (30) $\left(\frac{3}{2}\right)^{-3} = \left(\frac{2}{3}\right)^3 = \frac{8}{27}$ |
| (22) 2 | (25) 8 | (28) $\frac{5}{6}$ | (31) $\left(\frac{3}{5}\right)^2 = \frac{9}{25}$ |
| (23) 8 | (26) $\frac{2}{3}$ | (29) $\frac{6}{5}$ | (32) $\left(\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$ |

ODDS (use a calculator)

- | | | |
|---------------------------------------|---------------------------------------|--------------------------------------|
| (33) $8^{\frac{1}{4}} \approx 1.68$ | (37) $124^{\frac{2}{5}} \approx 6.88$ | (39) $60^{\frac{1}{8}} \approx 1.67$ |
| (35) $24^{\frac{3}{4}} \approx 10.84$ | $\hookdownarrow 124^{0.4}$ | (41) $71^{\frac{1}{3}} \approx 4.14$ |
| $\hookrightarrow 24^{0.75}$ | | (43) $50^{\frac{1}{2}} \approx 7.07$ |

- | | | |
|----------------------|----------------------------------|---|
| <u>ODDS</u> | | |
| (53) $(4 \cdot 2)^2$ | (55) $(9 \cdot 3)^{\frac{1}{3}}$ | (57) $\left(\frac{5}{3}\right)\left(\frac{3}{2}\right) = \boxed{\frac{5}{2}}$ |
| $8^2 = \boxed{16}$ | $27^{\frac{1}{3}} = \boxed{3}$ | |

KEY TO EXPONENTIAL EQUATIONS #1

C23
KEY

(ODDS)

$$\textcircled{1} \quad x+3=10$$

$x=7$

$$\textcircled{5} \quad x+6=3x-2$$

$$8=2x$$

$x=4$

$$\textcircled{7} \quad 2x=x+10$$

$x=10$

$$\textcircled{3} \quad 2x-1=7$$

$$2x=8$$

$x=4$

$$\textcircled{9} \quad 2x+7=x-19$$

$x=-26$

$$\textcircled{11} \quad 2^{x-1}=2^4$$

$$x-1=4$$

$x=5$

$$\textcircled{15} \quad 3^{x+1}=3^2$$

$$x+1=2$$

$x=1$

$$\textcircled{21} \quad 3^{2x-1}=3^0$$

$$2x-1=0$$

$$2x=1$$

$x=\frac{1}{2}$

$$\textcircled{13} \quad 2^{x-1}=2^5$$

$$x-1=5$$

$x=6$

$$\textcircled{17} \quad 5^{x-1}=5^2$$

$$x-1=2$$

$x=3$

$$\textcircled{23} \quad 2^{x+1}=2^{-2}$$

$$x+1=-2$$

$x=-3$

$$\textcircled{25} \quad 2^x=4$$

$$2^x=2^2$$

$x=2$

$$\textcircled{29} \quad 3^{x+1}=3^2$$

$$x+1=2$$

$x=1$

$$\textcircled{33} \quad 2^{x+2}=2^0$$

$$x+2=0$$

$x=-2$

$$\textcircled{27} \quad 3^x=3^2$$

$x=2$

$$\textcircled{31} \quad 3^{1-2x}=3^2$$

$$1-2x=2$$

$$-2x=1$$

$x=-\frac{1}{2}$

$$\textcircled{35} \quad 2^{2x+1}=2^{-2}$$

$$2x+1=-2$$

$$2x=-3$$

$x=-\frac{3}{2}$

$$\textcircled{37} \quad 2^{2x+1}=2^1$$

$$2x+1=1$$

$$2x=0$$

$x=0$

$$\textcircled{39} \quad 4^{x+3}=4^1$$

$$x+3=1$$

$x=-2$

$$\textcircled{41} \quad 2^{1-x}=2^3$$

$$1-x=3$$

$$-x=2$$

$x=-2$

$$\textcircled{43} \quad 5^{x+1}=5^3$$

$x=2$

$$\textcircled{45} \quad 3^{2x+1}=3^{-2}$$

$$2x+1=-2$$

$$2x=-3$$

$x=-\frac{3}{2}$

KEY TO EXPONENTIAL EQUATIONS (ODDS)

#2

C24
KEY

$$\textcircled{1} \quad 2^{x+4} = 2^{2x}$$

$$x+4 = 2x$$

$$\boxed{x=4}$$

$$\textcircled{3} \quad 2^{3x+1} = 2^{2x}$$

$$3x+1 = 2x$$

$$\boxed{x=-1}$$

$$\textcircled{5} \quad 3^{x+1} = 3^{2x}$$

$$x+1 = 2x$$

$$\boxed{x=1}$$

$$\textcircled{7} \quad 3^{2-x} = 3^{3x}$$

$$2-x = 3x$$

$$2 = 4x$$

$$\boxed{x=\frac{1}{2}}$$

$$\textcircled{9} \quad 5^{2x-1} = 5^{3x}$$

$$2x-1 = 3x$$

$$\boxed{x=-1}$$

$$\textcircled{11} \quad 7^{x+1} = 7^{2x}$$

$$x+1 = 2x$$

$$\boxed{x=1}$$

$$\textcircled{13} \quad 2^{x+4} = 2^{2x-2}$$

$$x+4 = 2x-2$$

$$\boxed{x=6}$$

$$\textcircled{15} \quad 4^{x+3} = 4^{2x+2}$$

$$2x+2 = x+3$$

$$\boxed{x=1}$$

$$\textcircled{17} \quad 2^{x+1} = 2^{-x}$$

$$x+1 = -x$$

$$2x = -1$$

$$\boxed{x=-\frac{1}{2}}$$

$$\textcircled{19} \quad 5^{1-x} = 5^{-2x}$$

$$1-x = -2x$$

$$1 = -x$$

$$\boxed{x=-1}$$

$$\textcircled{21} \quad 2^{x+1} = 2^0$$

$$x+1 = 0$$

$$\boxed{x=-1}$$

$$\textcircled{23} \quad 3^x = 3^2$$

$$\boxed{x=2}$$

$$\textcircled{25} \quad 2^{2x-2} = 2^{3x+3}$$

$$3x+3 = 2x-2$$

$$\boxed{x=-5}$$

$$\textcircled{27} \quad 2^{4x+8} = 2^{3x}$$

$$4x+8 = 3x$$

$$\boxed{x=-8}$$

$$\textcircled{29} \quad 2^{2x+2} = 2^6$$

$$2x+2 = 6$$

$$2x = 4$$

$$\boxed{x=2}$$

$$\textcircled{31} \quad 3^{2x+8} = 3^{3x}$$

$$3x = 2x+8$$

$$\boxed{x=8}$$

$$\textcircled{33} \quad 2^{10x} = 2^{3x+3}$$

$$10x = 3x+3$$

$$7x = 3$$

$$\boxed{x=\frac{3}{7}}$$

$$\textcircled{35} \quad 6^{x+1} = 6^{2x+20}$$

$$2x+20 = x+1$$

$$\boxed{x=-19}$$

$$\textcircled{37} \quad 2^1 \cdot 2^{x+1} \cdot 2^{2x} = 2^3 \cdot 2^{4x}$$

$$2^{3x+2} = 2^{4x+3}$$

$$4x+3 = 3x+2$$

$$\boxed{x=-1}$$

ALGEBRA 2 - REVIEW FOR QUIZ 6

 Name _____ Key
 (Fractional Exponents & Solving Exponential Equations) Period _____

1) Rewrite using fractional exponents (C14)

a) $\sqrt[4]{x^3} = x^{\frac{3}{4}}$

b) $\sqrt[3]{A^2 B^5} = A^{\frac{2}{3}} B^{\frac{5}{3}}$

3) Compute without a calculator (C21)

a) $27^{\frac{2}{3}} = 3^2 = 9$

b) $\left(\frac{9}{25}\right)^{-\frac{3}{2}} = \left(\frac{3}{5}\right)^{-3} = \frac{125}{27}$

c) $32^{\frac{4}{5}} = 2^4 = 16$

d) $\left(\frac{8}{27}\right)^{\frac{2}{3}} = \left(\frac{2}{3}\right)^2 = \frac{4}{9}$

5) Solve each for x. (C23)

a) $5 \cdot 2^{2x-1} = 40$

$$\begin{aligned} 2^{2x-1} &= 8 \\ 2^{2x-1} &= 2^3 \\ 2x-1 &= 3 \\ 2x &= 4 \\ x &= 2 \end{aligned}$$

b) $3^{2x+1} = \frac{1}{9}$

$$\begin{aligned} 3^{2x+1} &= 3^{-2} \\ 2x+1 &= -2 \\ 2x &= -3 \\ x &= -\frac{3}{2} \end{aligned}$$

6) Solve each for x. (C24)

a) $5^{2-x} = 25^{x+3}$
 $5^{2-x} = (5^2)^{x+3}$
 $5^{2-x} = 5^{2x+6}$
 $2-x = 2x+6$
 $-4 = 3x$
 $x = -\frac{4}{3}$

d) $8^{x+1} = 32^x$
 $(2^3)^{x+1} = 2^{5x}$

$$3x+3 = 5x$$

 $3 = 2x$

$$x = \frac{3}{2}$$

2) Rewrite in radical form (C14)

a) $x^{\frac{2}{5}} y^{\frac{4}{5}} = \sqrt[5]{x^2 y^4}$

b) $(A^4 B^5)^{\frac{2}{3}} = A^{\frac{8}{3}} B^{\frac{10}{3}}$

4) Simplify. Write with positive exponents. (C14)

a) $A^{\frac{3}{12}} \cdot A^{\frac{1}{12}} = A^{\frac{13}{12}}$

b) $5^{\frac{2}{3}} \cdot 5^{\frac{1}{2}} = 5^{\frac{3}{6}} \cdot 5^{\frac{3}{6}} = 5^{\frac{7}{6}}$

c) $\frac{x^{\frac{7}{8}}}{x^{\frac{1}{4}}} = \frac{x^{\frac{7}{8}}}{x^{\frac{2}{8}}} = x^{\frac{5}{8}}$

d) $\frac{(A^4 B^6)^{\frac{2}{3}}}{(A^{10} B^5)^{\frac{1}{5}}} = \frac{A^{\frac{8}{3}} B^{\frac{12}{5}}}{A^{\frac{6}{5}} B^{\frac{1}{5}}} = A^{\frac{2}{3}} B^{\frac{3}{5}}$

c) $2^{4x+1} = 32^{\frac{3}{5}}$

$$\begin{aligned} 2^{4x+1} &= 2^3 \\ 4x+1 &= 3 \\ 4x &= 2 \\ x &= \frac{2}{4} = \frac{1}{2} \end{aligned}$$

b) $4^{2x+1} = \left(\frac{1}{8}\right)^x$

$$\begin{aligned} 4^{2x+1} &= 2^{-3x} \\ (2^2)^{2x+1} &= 2^{-3x} \\ 2^{4x+2} &= 2^{-3x} \\ 4x+2 &= -3x \end{aligned}$$

c) $16^{x-4} = 8^{x+1}$
 $(2^4)^{x-4} = (2^3)^{x+1}$

$$\begin{aligned} 2^{4x-16} &= 2^{3x+3} \\ 4x-16 &= 3x+3 \\ x &= 19 \end{aligned}$$

e) $3^{2x-1} = \left(\frac{1}{27}\right)^{x+1}$

$$\begin{aligned} 3^{2x-1} &= (3^{-3})^{x+1} \\ 3^{2x-1} &= 3^{-3x-3} \end{aligned}$$

f) $2^x \cdot 4^{x+1} = 8^{x-2} \cdot 2^{x+2}$

$$\begin{aligned} 2^x \cdot 2^{2x+2} &= 2^{3x+6} \cdot 2^{x+2} \\ 2^{3x+2} &= 2^{4x+4} \end{aligned}$$

$$3x+2 = 4x-4$$

$$\begin{aligned} 5x &= -2 \\ x &= -\frac{2}{5} \end{aligned}$$

$$\begin{aligned} 6 &= x \\ x &= 6 \end{aligned}$$

3rd QTR SKILLS TESTS REVIEW

Name _____

SKILLS TEST 1: Solve each system of equations using any method. *Show work.*

$$1) \begin{cases} 2x + 3y = 12 \\ 5x - y = 13 \end{cases}$$

$$2) \begin{cases} y = -2x + 4 \\ 3x + 5y = 13 \end{cases}$$

$$3) \begin{cases} 3x + 4y = -13 \\ 5x + 6y = -19 \end{cases}$$

SKILLS TEST 2: Simplify each expression. Write answers using positive exponents. Circle final answers.

$$4) x^5 \cdot x^8$$

$$5) (7a^5b) \cdot (-4a^3b)$$

$$6) (a^5b^2)^3$$

$$7) (3a^4b^2)^3$$

$$8) \frac{a^7}{a^2}$$

$$9) \frac{35a^3}{7a^5}$$

$$10) \frac{-15x^7}{20x^3}$$

$$11) \frac{28a^4b^7}{4a^9b^5}$$

$$12) \left(\frac{a^3}{b^4}\right)^5$$

SKILLS TEST 3: Find all solutions to each quadratic equation. Use any method. Write answers as simplified radicals (no decimals). *Show all work.*

$$13) \ 3x^2 + 18x - 9 = 0$$

$$14) \ 3x^2 = 13x + 10$$

$$15) \ 5x^2 + 4x + 2 = 0$$

SKILLS TEST 4: Simplify each expression. Write answers as complex numbers ($a \pm bi$).

$$16) \ (5 + 8i) - (3 - 4i)$$

$$17) \ (4i)(7 - 2i)$$

$$18) \ (5 + 3i)(4 - 7i)$$

$$19) \frac{7}{2i}$$

$$20) \ \frac{5}{4-i}$$

$$21) \ \frac{5-i}{2+3i}$$

3rd QTR SKILLS TESTS REVIEW

Name Key

SKILLS TEST 1: Solve each system of equations using any method. Show work.

$$1) \begin{cases} 2x + 3y = 12 \\ 5x - y = 13 \end{cases}$$

$$\begin{array}{rcl} 2x + 3y & = & 12 \\ 15x - 3y & = & 39 \\ \hline 17x & = & 51 \\ x & = & 3 \end{array}$$

$$\begin{array}{rcl} 2(3) + 3y & = & 12 \\ 6 + 3y & = & 12 \\ 3y & = & 6 \\ y & = & 2 \end{array}$$

$$\boxed{(3, 2)}$$

$$2) \begin{cases} y = -2x + 4 \\ 3x + 5y = 13 \end{cases}$$

$$\begin{array}{l} 3x + 5(-2x + 4) = 13 \\ 3x - 10x + 20 = 13 \\ -7x + 20 = 13 \\ -7x = -7 \\ x = 1 \end{array}$$

$$\begin{array}{l} y = -2(1) + 4 \\ y = 2 \\ \boxed{(1, 2)} \end{array}$$

$$3) \begin{cases} 3x + 4y = -13 \\ 5x + 6y = -19 \end{cases}$$

$$\begin{array}{rcl} 15x + 20y & = & -65 \\ -15x - 18y & = & 57 \\ \hline 2y & = & -8 \\ y & = & -4 \end{array}$$

$$\begin{array}{l} 3x + 4(-4) = -13 \\ 3x - 16 = -13 \\ 3x = 3 \end{array}$$

$$\boxed{(1, -4)}$$

SKILLS TEST 2: Simplify each expression. Write answers using positive exponents. Circle final answers.

$$4) x^5 \cdot x^8$$

$$x^{13}$$

$$5) (7a^5b) \cdot (-4a^3b)$$

$$-28a^8b^2$$

$$6) (a^5b^2)^3$$

$$a^{15}b^6$$

$$7) (3a^4b^2)^3$$

$$27a^{12}b^6$$

$$\frac{a^3}{a^5} = a^{-2} = \frac{1}{a^2}$$

$$(3a^4b^2)(3a^4b^2)(3a^4b^2)$$

$$8) \frac{a^7}{a^2}$$

$$a^5$$

$$9) \frac{35a^3}{7a^5}$$

$$\frac{5}{a^2}$$

$$10) \frac{-15x^7}{20x^3}$$

$$\frac{-3x^4}{4}$$

$$11) \frac{28a^4b^7}{4a^9b^5}$$

$$\frac{7b^2}{a^5}$$

$$12) \left(\frac{a^3}{b^4}\right)^5$$

$$\frac{a^{15}}{b^{20}}$$

$$\frac{-15}{20} \quad \frac{x^7}{x^3}$$

SKILLS TEST 3: Find all solutions to each quadratic equation. Use any method. Write answers as simplified radicals (no decimals). *Show all work.*

13) $\frac{3x^2 + 18x - 9}{3} = 0$

$$x^2 + 6x - 3 = 0$$

$$x^2 + 6x + 9 = 3 + 9$$

$$\sqrt{(x+3)^2} = \sqrt{12}$$

$$x+3 = \pm 2\sqrt{3}$$

$$x = -3 \pm 2\sqrt{3}$$

14) $3x^2 = 13x + 10$

$$3x^2 - 13x - 10 = 0$$

$$x = \frac{13 \pm \sqrt{169 - 4(3)(-10)}}{6}$$

$$= \frac{13 \pm \sqrt{289}}{6}$$

$$= \frac{13 \pm 17}{6}$$

$$= \frac{13 + 17}{6} = 5$$

$$= \frac{13 - 17}{6} = \frac{-4}{6} = \frac{-2}{3}$$

$$(x = 5, -\frac{2}{3})$$

15) $5x^2 + 4x + 2 = 0$

$$x = \frac{-4 \pm \sqrt{16 - 4(5)(2)}}{10}$$

$$= \frac{-4 \pm \sqrt{-24}}{10} \quad \frac{\sqrt{4 \cdot 6}}{2\sqrt{6}}$$

$$= \frac{-4 \pm 2i\sqrt{6}}{10}$$

$$= \frac{-2 \pm i\sqrt{6}}{5}$$

SKILLS TEST 4: Simplify each expression. Write answers as complex numbers ($a \pm bi$).

16) $(5 + 8i) - (3 - 4i)$

$$[2 + 12i]$$

17) $(4i)(7 - 2i)$

$$28i - 8i^2$$

$$[8 + 28i]$$

18) $(5 + 3i)(4 - 7i)$

$$20 - 35i + 12i - 21i^2$$

$$[41 - 23i]$$

19) $\frac{7}{2i} \cdot \frac{-i}{-i}$

$$\frac{-7i}{-2i^2} = \boxed{\frac{-7i}{2}}$$

20) $\frac{5}{4-i} \cdot \frac{4+i}{4+i}$

$$\frac{20 + 5i}{16 - i^2}$$

$$\boxed{\frac{20 + 5i}{17}}$$

21) $\frac{5-i}{2+3i} \cdot \frac{2-3i}{2-3i}$

$$\frac{10 - 17i + 3i^2}{4 - 9i^2}$$

$$\boxed{\frac{7 - 17i}{13}}$$

QUARTER 3 – BASIC SKILLS TESTS
[ALGEBRA 2]

Name _____
Period _____ (70% or higher to pass each)

SKILLS TEST 1 – SYSTEMS OF EQUATIONS

PASS

Solve each system of equations using any method. Write answers as ordered pairs. *Show all work.*

1) $6x - 3y = -33$
 $2x + 3y = 9$

2) $x + 2y = 10$
 $3x - y = 9$

1) _____

2) _____

3) $y = x + 1$
 $2x + y = 7$

4) $2x - 5y = 11$
 $4x + 10y = 18$

3) _____

4) _____

SKILLS TEST 2 – OPERATIONS WITH EXPONENTS

PASS

Simplify each expression. Use positive exponents.

1) $(2x^5)(4x^2)$

2) $(a^3b^4)^3$

3) $(2x^5)^4$

1) _____

2) _____

3) _____

4) $\frac{a^3b^7}{a^5b^2}$

5) $\left(\frac{x^2}{y^5}\right)^3$

4) _____

5) _____

SKILLS TEST 3 - QUADRATIC EQUATIONS**PASS**

Find all solutions to each quadratic equation. Use any method. Write answers as simplified radicals (no decimals). *Show all work.*

1) $x^2 - 8x - 5 = 0$

2) $x^2 + 3x = 4$

1) _____

2) _____

3) $3x^2 - 5 = 4x$

4) $x^2 - 2x + 10 = 0$

3) _____

4) _____

SKILLS TEST 4 - COMPLEX/IMAGINARY NUMBERS**PASS**

Simplify each expression.

1) $(-3 + 5i) - (7 - 3i)$

1) _____

2) $(3i)(-5 + 2i)$

2) _____

3) $(3 - 2i)(-4 + 5i)$

3) _____

Write the quotient as a complex number (simplify the quotient).

4) _____

4) $\frac{5}{3+i}$

5) $\frac{4+i}{3-2i}$

5) _____