

To the Test – be sure to bring:

- (1) your personally-prepared 8 ½" by 11" study guide for this test
- (2) your simple, non-graphing calculator
- (3) your pencils
- (4) your BluGold ID

1. Solve for the value of n :

LCD = 24

$$\frac{2n-5}{3} = \frac{11n+24}{8}$$

$$\overset{8}{24} \cdot \frac{2n-5}{3} = \frac{11n+24}{8} \cdot \overset{3}{24}$$

$$\begin{aligned} 8(2n-5) &= 3(11n+24) \\ 16n-40 &= 33n+72 \\ -16n &= -16n \\ \hline -40 &= 17n+72 \\ -72 &= -72 \\ \hline -112 &= 17n \\ \frac{-112}{17} &= \frac{17n}{17} \\ -\frac{112}{17} &= n \end{aligned} \quad \left\{ -\frac{112}{17} \right\}$$

$$\frac{3n+5}{2} = \frac{5n-19}{6}$$

LCD = 6

$$3 \cdot \frac{3n+5}{2} = \frac{5n-19}{6} \cdot 6$$

$$3(3n+5) = 5n-19$$

$$9n+15 = 5n-19$$

$$\begin{aligned} 9n+15 &= 5n-19 \\ -5n &= -5n \\ \hline 4n+15 &= -19 \\ -15 &= -15 \\ \hline 4n &= -34 \\ \frac{4n}{4} &= \frac{-34}{4} \end{aligned} \quad n = -\frac{17}{2}$$

$$\left\{ -\frac{17}{2} \right\}$$

$$\frac{2n-3}{4} = \frac{7n+2}{6}$$

LCD = 12

$$3 \cdot \frac{2n-3}{4} = \frac{7n+2}{6} \cdot 12$$

$$3(2n-3) = 2(7n+2)$$

$$\begin{aligned} 6n-9 &= 14n+4 \\ -6n &= -6n \end{aligned}$$

$$\left\{ -\frac{13}{8} \right\}$$

$$\begin{aligned} -9 &= 8n+4 \\ -4 &= -4 \\ \hline -13 &= 8n \\ \frac{-13}{8} &= \frac{8n}{8} \\ -\frac{13}{8} &= n \end{aligned}$$

Note: one could begin by cross multiplying, rather than use LCD.⁵ In that case, the 1st steps would be:

$$\begin{aligned} 8(2n-5) &= 3(11n+24) \\ 6(3n+5) &= 2(5n-19) \\ 6(2n-3) &= 4(7n+2) \end{aligned}$$

U_{5R2}

2. Solve for the value of p:

$$\frac{4}{p+7} - \frac{9}{p+9} = \frac{9}{p^2+16p+63}$$

LCD = (p+9)(p+7)

$$\frac{4}{\cancel{p+7}} \frac{(p+9)(\cancel{p+7})}{\cancel{p+9}} - \frac{9}{\cancel{p+9}} \frac{(p+9)(\cancel{p+7})}{\cancel{p+7}} = \frac{9}{(\cancel{p+9})(\cancel{p+7})}$$

$$4(p+9) - 9(p+7) = 9$$

careful

$$4p + 36 - 9p - 63 = 9$$

$$\begin{array}{r} -5p - 27 = 9 \\ +5p \quad = +5p \\ \hline -27 = 9 + 5p \\ -9 = -9 \\ \hline -36 = 5p \\ \frac{-36}{5} = p \end{array}$$

$$\frac{8}{p-3} - \frac{3}{p^2-8p+15} = \frac{3}{p-5}$$

(p-5)(p-3)

$$\frac{8(p-5)(\cancel{p-3})}{(\cancel{p-3})(p-5)} - \frac{3(\cancel{p-5})(\cancel{p-3})}{(\cancel{p-5})(\cancel{p-3})} = \frac{3(\cancel{p-5})(\cancel{p-3})}{(\cancel{p-5})}$$

$$8(p-5) - 3 = 3(p-3)$$

$$\begin{array}{r} 8p - 40 - 3 = 3p - 9 \\ 8p - 43 = 3p - 9 \\ -3p \quad = -3p \end{array}$$

$$\begin{array}{r} 5p - 43 = -9 \\ +43 = +43 \end{array}$$

$$\frac{5p}{5} = \frac{34}{5} \quad \left\{ \frac{34}{5} \right\}$$

$$\frac{2}{p+3} = \frac{8}{p+4} - \frac{4}{p^2+7p+12}$$

(p+3)(p+4)

$$\frac{2(\cancel{p+3})(\cancel{p+4})}{\cancel{p+3}} = \frac{8(\cancel{p+3})(\cancel{p+4})}{\cancel{p+4}} - \frac{4(\cancel{p+3})(\cancel{p+4})}{(\cancel{p+3})(\cancel{p+4})}$$

$$2(p+4) = 8(p+3) - 4$$

$$2p+8 = 8p+24-4$$

$$2p+8 = 8p+20$$

$$\begin{array}{r} 2p+8 = 8p+20 \\ -2p \quad = -2p \\ \hline -8 = 6p+20 \\ -20 = -20 \\ \hline -12 = 6p \end{array}$$

$$-12 = \frac{6p}{6}$$

$$-2 = p \quad \left\{ -2 \right\}$$

3. Develop the proportion you need to solve this problem. List it and then solve the problem.

The ratio of students who eat M&Ns to those who don't is 4:3. If 12 don't eat M&Ns, how many do?

$$\frac{\text{eat}}{\text{don't}} \quad \frac{4}{3} = \frac{x}{12}$$

16 eat M&Ns

$$4 \cdot 12 = 3 \cdot x$$

$$\frac{48}{3} = \frac{3x}{3}$$

$$16 = x$$

4. Develop the proportion you need to solve this problem. List it and then solve the problem.
 An industrial cleaning solution calls for 11 parts water to 3 parts concentrated cleaner. If a worker uses 48 more quarts of water than concentrated cleaner to make a solution, how much concentrated cleaner did she use?

$$\frac{\text{water}}{\text{cleaner}} = \frac{11}{3} = \frac{48+C}{C}$$

$$\begin{aligned} 11C &= 3(48+C) \\ 11C &= 144 + 3C \\ -3C &= -3C \\ \hline 8C &= 144 \\ \frac{8C}{8} &= \frac{144}{8} \\ C &= 18 \end{aligned}$$

She used 18 quarts of cleaner and 66 quarts of water.

5. Develop the proportion you need to solve this problem. List it and then solve the problem.
 With a current flowing at 25 mph, a boat can travel 35 mi with the current in the same amount of time it can go 12 mi against the current. Find the speed of the boat in still water. [$d = r \cdot t$]

$\frac{d}{\text{rate}} = \frac{\text{rate} \cdot \text{time}}{\text{rate}}$ time upstream ^{against current} = time downstream ^{with current}

$$\frac{\text{dist}}{\text{rate}} = \text{time} \quad \frac{\text{dist up}}{\text{rate up}} = \frac{\text{dist down}}{\text{rate down}}$$

$$\frac{12}{b-25} = \frac{35}{b+25}$$

The speed of the boat is a little more than 51 mph.

$$\begin{aligned} \frac{12}{b-25} &= \frac{35}{b+25} \\ 12(b+25) &= 35(b-25) \\ 12b + 300 &= 35b - 875 \\ -12b &= -12b \\ 300 &= 23b - 875 \\ +875 &= +875 \\ \hline 1175 &= 23b \end{aligned}$$

$$\frac{1175}{23} = \frac{23b}{23}$$

51.0869... = b

- A boat can travel 25 mi with the current in the same amount of time it can go 17 mi against the current. If the speed of the boat is 42 mph in still water, find the speed of the current.

$$\frac{\text{dist up}}{\text{rate up}} = \frac{\text{dist down}}{\text{rate down}}$$

$$\begin{aligned} 17(42+C) &= 25(42-C) \\ 714 + 17C &= 1050 - 25C \\ +25C &= +25C \end{aligned}$$

$$\frac{\text{against } 17}{42-C} = \frac{\text{with } 25}{42+C}$$

$$\begin{aligned} 714 + 42C &= 1050 \\ -714 &= -714 \end{aligned}$$

The current flows at 8 mph.

$$\begin{aligned} 42C &= 336 \\ \frac{42C}{42} &= \frac{336}{42} \\ C &= 8 \text{ mph} \end{aligned}$$

U5_{R4}

6. Find the root, if possible. Express your answer as a simplified, improper fraction, if necessary.

$$\frac{-5}{-\sqrt{25}}$$

$$\frac{-7}{-\sqrt{49}}$$

7. Find the root, if possible. Express your answer as a simplified, improper fraction, if necessary.

$$\sqrt[3]{-8}$$

$$\sqrt[3]{-1000}$$

$$-\sqrt[3]{-8000} = -\sqrt[3]{8 \cdot 1000}$$

$$\textcircled{-2}$$

$$\textcircled{-10}$$

$$-(-20) = \textcircled{20}$$

$$(-2)^3 = -8$$

$$(-10)^3 = -1000$$

$$(-20)^3 = -8000$$

8. Rewrite with a positive exponent and evaluate. Express your answer as a simplified, improper fraction, if necessary.

convert to $\frac{1}{64^{2/3}} = \frac{1}{\sqrt[3]{64^2}}$ (negative exp)

$$= \frac{1}{4^2} = \textcircled{\frac{1}{16}}$$

$$27^{2/3} = \frac{1}{\sqrt[3]{27^2}} = \frac{1}{3^2} = \textcircled{\frac{1}{9}}$$

$$16^{3/4} = \frac{1}{\sqrt[4]{16^3}} = \frac{1}{2^3} = \textcircled{\frac{1}{8}}$$

9. Simplify completely. Assume all variables represent positive real numbers. The answer should contain only positive exponents.

BOOK shows $\left(\frac{x^{5/9}}{x^{-5/6}}\right)^{18}$ (flip)

$$\left(\frac{x^{5/6}}{y^{4/9}}\right)^{-18}$$

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

I bring the exponent in first

$$\left(\frac{x^{5 \cdot \frac{18}{6}}}{y^{4 \cdot \frac{18}{9}}}\right) = \textcircled{\frac{x^{15}}{y^8}}$$

$$\frac{x^{-3/5 \cdot -5}}{y^{2/5 \cdot -5}} = \frac{x^3}{y^{-2}} = \textcircled{x^3 y^2}$$

U5_{RS}

10. Perform the indicated operation and simplify. Assume all variables represent positive real numbers.

$$\sqrt{\frac{64}{2}} = \sqrt{32}$$

↑
16 · 2

$$\sqrt{16} \cdot \sqrt{2}$$

4√2

$$\sqrt{\frac{100}{5}} = \sqrt{20}$$

↑
4 · 5

$$\sqrt{4} \cdot \sqrt{5}$$

2√5

$$\sqrt{75}$$

↑
3 · 25

5

$$\sqrt{3} \sqrt{25}$$

5√3

11. Perform the indicated operation and simplify. Assume all variables represent positive real numbers.

$$\sqrt{3a^6b^7} \cdot \sqrt{21ab^2}$$

$$\sqrt{63a^7b^9}$$

↑
9 · 7 · a⁶ · a · b⁸ · b

3 a³ b⁴

$$\sqrt{9 \cdot 7 \cdot a^6 \cdot a \cdot b^8 \cdot b}$$

3 a³ b⁴ √7ab

$$\sqrt{2a^4b^5} \cdot \sqrt{10ab^2}$$

$$\sqrt{20a^5b^7}$$

2 a² b³

4 · 5 a⁴ b⁶

$$\sqrt{4 \cdot 5 \cdot a^4 \cdot b^6}$$

2 a² b³ √5ab

$$(\sqrt{x})^6 \cdot \sqrt{x^8}$$

$$\sqrt{x^{14}}$$

= x⁷

Think of power as root

12. Simplify completely.

$$\sqrt[3]{54}$$

↑
27 · 2

3³ · 2

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

$$\sqrt[3]{40}$$

↑
8 · 5

2

$$\sqrt[3]{8 \cdot 5}$$

2√[3]{5}

$$\sqrt[3]{500}$$

↑
125 · 4

5

$$\sqrt[3]{125 \cdot 4}$$

5√[3]{4}

13. Perform the indicated operation and simplify. Assume y represents a positive real number.

$$\sqrt[3]{y^2} \cdot \sqrt[3]{y^{14}}$$

$$\sqrt[5]{\frac{y^{48}}{y^{18}}} = \sqrt[5]{y^{30}}$$

$$y^{\frac{30}{5}} = y^6$$

y⁶

$$\sqrt[3]{y^{16}}$$

Think of y^{16/3} = y^{5 1/3}

$$y^{15} \cdot y^1$$

$$\sqrt[3]{y^{15} \cdot y^1} = y^5 \sqrt[3]{y}$$

U5R6

14. Perform the indicated operation and simplify. *must have like radicands*

$$\begin{aligned}
& 2\sqrt{63} - \sqrt{28} + 3\sqrt{700} \\
& \quad \begin{matrix} \wedge & \wedge & \wedge \\ 9 \cdot 7 & 4 \cdot 7 & 100 \cdot 7 \end{matrix} \\
& 2\sqrt{9 \cdot 7} - \sqrt{4 \cdot 7} + 3\sqrt{100 \cdot 7} \\
& 6\sqrt{7} - 2\sqrt{7} + 30\sqrt{7} = \boxed{34\sqrt{7}}
\end{aligned}$$

15. Perform the indicated operation and simplify.

$$\begin{aligned}
& 4\sqrt{24t} + 8\sqrt{6t} \\
& 4\sqrt{4 \cdot 6t} \\
& 8\sqrt{6t} + 8\sqrt{6t} \\
& \boxed{16\sqrt{6t}}
\end{aligned}$$

$$\begin{aligned}
& 2\sqrt{54w} + 5\sqrt{6w} \\
& 2\sqrt{9 \cdot 6w} + 5\sqrt{6w} \\
& 6\sqrt{6w} + 5\sqrt{6w} \\
& \boxed{11\sqrt{6w}}
\end{aligned}$$

16. Multiply and simplify. Assume all variables represent non-negative real numbers.

$$\begin{aligned}
& 8(5 - 4\sqrt{3b}) \\
& \boxed{40 - 32\sqrt{3b}}
\end{aligned}$$

$$\begin{aligned}
& (\sqrt{a} + 3\sqrt{4b})(\sqrt{a} - 3\sqrt{4b}) \\
& \sqrt{a}^2 - 3\sqrt{4ab} + 3\sqrt{4ab} - 9\sqrt{4^2 b^2} \\
& a - 9 \cdot 4 \cdot b \\
& \boxed{a - 36b}
\end{aligned}$$