U6 R1

Math 20 Unit #6 10.7; 11.1 to 11.5, 11.7; 3.7; 1.5; 9.1 to 9.2

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. Simplify completely. Assume all variables represent positive real numbers.
(Careful – depending on your approach, this one may involve a lot of little steps.)

$$\sqrt{\frac{m^5n^9}{19m^6n}} = \sqrt{\frac{n^8}{19m}}$$

$$= \frac{n^4}{\sqrt{19m}} \cdot \left(\frac{\sqrt{19m}}{\sqrt{19m}}\right) = \frac{n^4\sqrt{19m}}{19m}$$

$\sqrt{19^2m^2}$

$$\sqrt{\frac{m^3n^{11}}{20m^4n}} = \frac{\sqrt{n^{10}}}{\sqrt{20m}}$$

$$= \frac{n^5}{2\sqrt{5m}} \quad (n^{4/5})$$

$$= \frac{n^5 \cdot \sqrt{5m}}{2\sqrt{5m} \cdot \sqrt{5m}}$$

$$= \frac{n^5\sqrt{5m}}{2 \cdot 5m} = \frac{n^5\sqrt{5m}}{10m}$$

2. Rationalize the denominator of this rational expression and simplify completely.
Assume the variables represent positive real numbers.

$$\frac{d-4}{\sqrt{d}+2} \cdot \frac{\sqrt{d}-2}{\sqrt{d}-2} \quad \text{(conjugate)}$$

$$\frac{(d-4)(\sqrt{d}-2)}{(\sqrt{d}+2)(\sqrt{d}-2)}$$

$$= \frac{(d-4)(\sqrt{d}-2)}{d-4}$$

$$= \sqrt{d}-2$$

$$\frac{d-64}{\sqrt{d}-8} \cdot \frac{\sqrt{d}+8}{\sqrt{d}+8}$$

$$= \frac{(d-64)(\sqrt{d}+8)}{d-64}$$

$$= \sqrt{d}+8$$

U6 R2

3. Solve for the value of n. If there is more than one answer, separate them with commas.

$12n-180=-3n^2$

$3n^2+12n-180=0$

$\frac{3}{3}(n^2+4n-60)=\frac{0}{3}$

$n^2+4n-60=0$ $m\cdot n=-60$ $m+n=4$ $10,-6$

$(n+10)(n-6)=0$

$n+10=0$ $\quad n-6=0$

$n=-10$ $\quad n=6$

$\{-10,6\}$

$-252=-5n^2-52n$

$5n^2+52n-252=0$

$m\cdot n=5(-252)=-1260$

$m+n=52$ $-12,105$ too wide $-21,60$ too close must be between 12 and 21 $-15,84$ too wide $-18,70$ 52!

$5n^2-18n+70n-252=0$

$n(5n-18)+14(5n-18)=0$

$(5n-18)(n+14)=0$

$5n-18=0$ $\quad n+14=0$

$5n=18$ $\quad n=-14$

$n=18/5$

$\{-14,\frac{18}{5}\}$

4. Solve for the value of n. If there is more than one answer, separate them with commas.

$8n^2=4n$

$8n^2-4n=0$

$4n(2n-1)=0$

$4n=0$ $\quad 2n-1=0$

$n=0$ $\quad 2n=1$

$n=1/2$

$\{0,1/2\}$

$9n^2=-7n$

$9n^2+7n=0$

$n(9n+7)=0$

$n=0$ $\quad 9n+7=0$

$9n=-7$

$n=-7/9$

$\{-7/9,0\}$

5. Solve for the value of x using the square root property.

$(2x-3)^2=11$

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

$2x-3=\pm\sqrt{11}$

$\frac{2x}{2}=\frac{3\pm\sqrt{11}}{2}$

$x=\frac{3\pm\sqrt{11}}{2}$

$\{\frac{3\pm\sqrt{11}}{2}\}$

Don't forget to reduce under radical if possible.

$(8x+9)^2=17$

$\sqrt{(8x+9)^2}=\sqrt{17}$

$8x+9=\pm\sqrt{17}$

$\frac{8x}{8}=\frac{-9\pm\sqrt{17}}{8}$

$x=\frac{-9\pm\sqrt{17}}{8}$

$\{\frac{-9\pm\sqrt{17}}{8}\}$

U6 R3

IMAGINARY

6. Simplify completely.

notice answer format

$\sqrt{-48}$

$\sqrt{-1 \cdot 48}$

$i \cdot 4$

$\sqrt{-1 \cdot 16 \cdot 3}$

$4i\sqrt{3}$

$\sqrt{-500}$

$\sqrt{-1 \cdot 5 \cdot 100}$

$i \quad 10$

$\sqrt{-1 \cdot 5 \cdot 100}$

$10i\sqrt{5}$

$\sqrt{-108}$

$\sqrt{-1 \cdot 9 \cdot 12}$

$i \cdot 3 \quad \cdot 2$

$\sqrt{-1 \cdot 9 \cdot 3 \cdot 4}$

$6i\sqrt{3}$

7. Complete the square for the following expression to obtain a perfect square trinomial. Then factor the perfect square trinomial.

$w^2 + 12w + \underline{36}$ This perfect square trinomial factors into: $(w+6)(w+6)$

$y_2 \cdot 12 = 6$ squared

$w^2 - 20w + \underline{100}$ This perfect square trinomial factors into: $(w-10)(w-10)$

$y_2 \cdot 20 = -10$ squared

$w^2 - 11w + \underline{\frac{121}{4}}$ This perfect square trinomial factors into: $(w - 11/2)(w - 11/2)$

$y_2 \cdot -11$

$-\frac{11}{2}$ squared

8. Solve the equation using the **quadratic formula** for the value of x.

$5k(k-6) = -1$

$5k^2 - 30k = -1$

$5k^2 - 30k + 1 = 0$

$a = 5$

$b = -30$

$c = 1$

$k = \dfrac{-(-30) \pm \sqrt{(-30)^2 - 4(5)(1)}}{2(5)}$

$k = \dfrac{30 \pm \sqrt{900 - 20}}{10}$

$k = \dfrac{30 \pm \sqrt{880}}{10}$

$k = \dfrac{30 \pm \sqrt{16 \cdot 55}}{10} = \dfrac{30 \pm 4\sqrt{55}}{10} = \dfrac{2(15 \pm 2\sqrt{55})}{10} = \dfrac{15 \pm 2\sqrt{55}}{5}$

$4k(k-5) = -2$

$4k^2 - 20k + 2 = 0$

Reduce by 2 first

$2k^2 - 10k + 1 = 0$

$a = 2$

$b = -10$

$c = 1$

$k = \dfrac{-(-10) \pm \sqrt{(-10)^2 - 4(2)(1)}}{2(2)}$

$k = \dfrac{10 \pm \sqrt{100 - 8}}{4} = \dfrac{10 \pm \sqrt{92}}{4}$

$= \dfrac{10 \pm \sqrt{4 \cdot 23}}{4}$

$= \dfrac{10 \pm 2\sqrt{23}}{4} = \dfrac{2(5 \pm \sqrt{23})}{4}$

$= \dfrac{5 \pm \sqrt{23}}{2}$

$x^2 - 7x - 3 = 0$

$a = 1$

$b = -7$

$c = -3$

$x = \dfrac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(-3)}}{2(1)}$

$x = \dfrac{7 \pm \sqrt{49 + 12}}{2}$

$x = \dfrac{7 \pm \sqrt{61}}{2}$

$\dfrac{7 \pm \sqrt{61}}{2}$

U6 R4

9. Solve the equation using the quadratic formula for the value of x. Reduce the answer to simplest form and write in ascending order in the form $a+bi$.

$x^2-6x+18=0$

$a=1$
$b=-6$
$c=18$

$$x=\frac{-(-6)\pm\sqrt{(-6)^2-4(1)(18)}}{2(1)}$$

$$x=\frac{6\pm\sqrt{36-72}}{2}$$

$$x=\frac{6\pm\sqrt{-36}}{2}$$

$$x=\frac{6\pm 6i}{2}=\frac{2(3\pm 3i)}{2}$$

$\{3\pm 3i\}$

$-4x+8=-x^2$

$x^2-4x+8=0$

$a=1$
$b=-4$
$c=8$

$$x=\frac{-(-4)\pm\sqrt{(-4)^2-4(1)(8)}}{2(1)}$$

$$x=\frac{4\pm\sqrt{16-32}}{2}$$

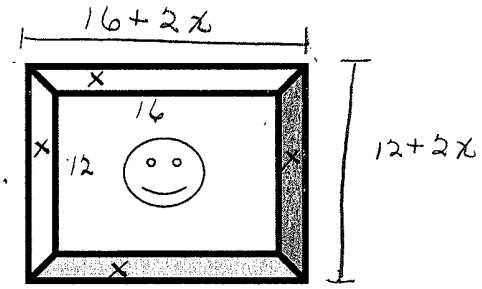
$$x=\frac{4\pm\sqrt{-16}}{2}$$

$$x=\frac{4\pm 4i}{2}=\frac{2(2\pm 2i)}{2}$$

$\{2\pm 2i\}$

10. Develop the equation you need to solve this problem. Then, set up the quadratic formula with the appropriate values to solve the problem.

A painting measures 12 in. by 16 in. A man wants to put the painting in a wood frame of uniform width then send it to his parents. Due to shipping regulations, the total area of the painting **plus** frame must be no more than 396 square inches. What is the widest piece of wood he can use to make the sides of the frame and still be able to ship the painting mounted inside the frame to his parents?



Equation: $(16+2x)(12+2x)=396$

$192+32x+24x+4x^2=396$

Quadratic Formula with appropriate values from the equation:

$4x^2+56x-204=0$ reduce by 4 to have smaller numbers

$x^2+14x-51=0$

only $\pm$ 3 makes sense

3"

$a=1$
$b=14$
$c=-51$

$$x=\frac{-14\pm\sqrt{(14)^2-4(1)(-51)}}{2(1)}$$

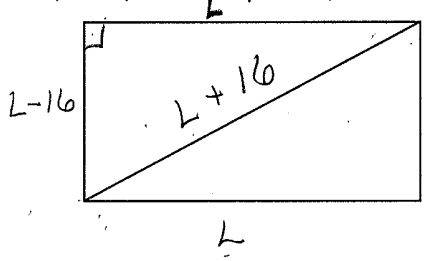
$$x=\frac{-14\pm\sqrt{196+204}}{2}=\frac{-14\pm\sqrt{400}}{2}=\frac{-14\pm 20}{2}=\frac{-14+20}{2}=\frac{6}{2}$$

$$=\frac{-14-20}{2}=-\frac{34}{2}$$

U6 RS

11. Develop the equation you need to solve this problem, list it, label the picture, and solve the problem.

The height of a wide-screen TV is 16 inches less than its length. The diagonal of the rectangular screen is 16 inches more than the length. What is the PERIMETER of the screen? What is the 'size' of the TV is sizes are based on the size of the diagonal?



Equation: $L^2 + (L-16)^2 = (L+16)^2$

$L^2 + L^2 - 32L + 256 = L^2 + 32L + 256$

$L^2 - 32L - 32L = 0$

$L^2 - 64L = 0$

$L(L-64) = 0$

$L = 0 \quad L-64 = 0$

$L = 64$

WIDTH $= 64 - 16$

$w = 48$

Perimeter $=$

$64 + 48 + 64 + 48$

$= 224$ inches

Diagonal $= 64 + 16$

Diagonal $= 80''$

Size $= 80''$

12. Solve the inequality for the value of k. Write the answer in **interval notation**.

$$-14 \le 2k - 12 \le -10$$

$2K-12$

$-14 \qquad -10$

$-14 \le 2K - 12$

$+12 \qquad +12$

$\frac{-2}{2} \le \frac{2K}{2}$

$2K - 12 \le -10$

$+12 \qquad +12$

$\frac{2K}{2} \le \frac{2}{2}$

$-1 \qquad 1$

$-1 \le K \le 1$

$[-1, 1]$

$$-2 < 5k - 13 \le 1$$

$5K-13$

$-2 \qquad 1$

$-2 < 5K - 13$

$+13 \qquad +13$

$\frac{11}{5} < \frac{5K}{5}$

$\frac{11}{5} < K$

$5K - 13 \le 1$

$+13 \qquad +13$

$\frac{5K}{5} \le \frac{14}{5}$

$K \le \frac{14}{5}$

$\frac{11}{5} \qquad \frac{14}{5}$

$\left(\frac{11}{5}, \frac{14}{5}\right]$

Parenthesis means endpoint IS NOT included

bracket means endpoint is included

U6 R6

13. Add or subtract as indicated.

$|-5+9|+3|-8-(-11)|$ mark off absolute value groups

$|4|+3|-8+11|$

$|4|+3|3|$

$4+3\cdot 3$

$4+9 = 13$

$|-3-(-8)|+5|-16+6|$

$|-3+8|+5|-10|$

$|5|+5\cdot 10$

$5+50 = 55$

14. Solve for the value of p.

$|6x-2|=16$

-16 16

$6x-2=-16$ OR $6x-2=16$

$+2=+2$ $+2=+2$

$\frac{6x}{6} = \frac{-14}{6}$ $\frac{6x}{6} = \frac{18}{6}$

$x=-7/3$ $x=3$ $\{-\frac{7}{3}, 3\}$

$|4x+6|=18$

-18 18

$4x+6=-18$ OR $4x+6=18$

$-6=-6$ $-6=-6$

$\frac{4x}{4} = \frac{-24}{4}$ $\frac{4x}{4} = \frac{12}{4}$

$x=-6$ $x=3$ $\{-6, 3\}$

$|4x+6|=-14$

STOP! Absolute value CANNOT Be negative, therefore Empty Set

NO SOLUTION $\varnothing$

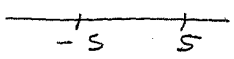
U 6 R7

15. Solve for the value of x.

FIRST Isolate the absolute value.

$|w+5|-2=3$
$+2 \quad +2$

$|w+5| = 5$

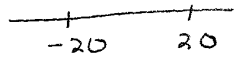


$w+5=-5$ OR $w+5=5$
$-5=-5 \quad -5=-5$
$w=-10 \quad w=0$

$\{-10, 0\}$

$|3q+4|-7=13$
$+7=+7$

$|3q+4| = 20$



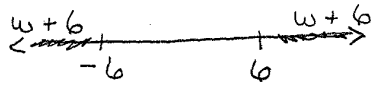
$3q+4=-20$ or $3q+4=20$
$-4=-4 \quad -4=-4$
$3q=-24 \quad 3q=16$

$\frac{3q}{3}=\frac{-24}{3}$ or $\frac{3q}{3}=\frac{16}{3}$
$q=-8 \quad q=\frac{16}{3}$
$\{-8, \frac{16}{3}\}$

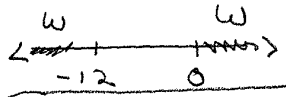
16. (5pts) Solve the inequality for the value of p. Write the answer in **interval notation**.

Isolate first

$|w+6|-4 \geq 2$
$+4=+4$
$|w+6| \geq 6$



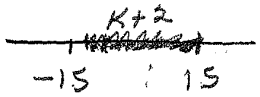
$w+6 \leq -6 \quad w+6 \geq 6$
$-6 \quad -6 \quad -6 \quad -6$
$w \leq -12 \quad w \geq 0$



$(-\infty, -12] \cup [0, \infty)$

$|k+2|-3 \leq 12$
$+3 \quad +3$

$|K+2| \leq 15$



$-15 \leq K+2 \leq 15$
$-15 \leq K+2 \quad K+2 \leq 15$
$-2 \quad -2 \quad -2 \quad -2$
$-17 \leq K \quad K \leq 13$

$[-17, 13]$

$K+2 \leq 15$

$-15 \leq K+2$