

First 3 letters of last name:

K E Y

Printed name: BLUE

Circle your section:

513 514 515 516 517 518

1. (6 points) Completely multiply out

$$[(x+4)(x-4)]^2$$

FOIL

$$[x^2 - 16]^2 = (x^2 - 16)(x^2 - 16) =$$

$$x^2 - 32x + 256$$

2. (10 points) Perform polynomial long division on $(x^3 - 2x + 8) \div (x - 2)$. Identify the remainder and express it as a fraction of the divisor.

A) $\frac{-12}{x-2}$

B) $\frac{4}{x+2}$

C) $\frac{12}{x-2}$

D) $\frac{-4}{x+2}$

E) None of these

$$\begin{array}{r} x^2 + 2x + 2 \\ x-2 \overline{) x^3 + 0x^2 - 2x + 8} \\ \underline{-(x^3 - 2x^2)} \\ 2x^2 - 2x \\ \underline{-(2x^2 - 4x)} \\ 2x + 8 \\ \underline{-(2x - 4)} \\ 12 \end{array}$$

should have been $x-2$

3. (9 points) Solve for x :

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

$$(\sqrt{x+10})^2 = (2 + \sqrt{x})^2$$

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

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

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

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

4. (8 points) Find all possible solutions for x .

$$-2|-2-x| = 2x-8$$

A) $x \in \{2, 1\}$ B) $x \in \{3, 1\}$ C) $x \in \{-6, 1\}$ D) $x \in \{1\}$ E) None of these

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

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

$$-2 = 4$$

No solution

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

$$2x = 2$$

$$x = 1$$

5. (6 points) Fully simplify leaving a radical symbol in your answer (no fractional exponents):

$$\sqrt[14]{3^{14}x^{28}y^{14}z^{15}}$$

$$3x^2yz\sqrt[14]{z} \quad \text{or} \quad 3x^2|y||z|\sqrt[14]{z}$$

6. (8 points) Simplify completely

$$\frac{2x-10}{x^2+x-2} \div \frac{x^2-25}{x^2+9x+14}$$

$$\frac{\cancel{2(x-5)}}{\cancel{(x+2)}(x-1)} \cdot \frac{(x+7)\cancel{(x+2)}}{(x+5)\cancel{(x-5)}} = \boxed{\frac{2(x+7)}{(x-1)(x+5)}}$$

(5 points extra credit) state all restrictions on the variable x in the equation above.

$$x \neq -2, 1, 5, -5, -7$$

7. (10 points) Simplify completely and state all restrictions on the variable.

$$\frac{\frac{3}{y} - \frac{6}{5y+2}}{7 - \frac{8}{y}}$$

common denominator

$$\frac{\frac{3}{y} \cdot \frac{(5y+2)}{(5y+2)} - \frac{6}{5y+2} \cdot \left(\frac{y}{y}\right)}{7 \cdot \frac{y}{y} - \frac{8}{5}}$$

$$\frac{15y+6 - 6y}{y(5y+2)} = \frac{9y+6}{y(5y+2)}$$

$$\frac{9y+6}{y(5y+2)} = \frac{y}{7y-8} = \boxed{\frac{9y+6}{(5y+2)(7y-8)}}$$

$$y \neq 0, \frac{8}{7}, -\frac{2}{5}$$

8. (8 points) Let a be a positive real number; $a > 0$. Solve for x :

$$|2x - 3| \geq 8a + 1$$

- A) $(-\infty, -4a+1] \cup [4a+2, \infty)$ B) $(-\infty, -4a-2] \cup [4a+2, \infty)$ C) $[-4a+1, 4a+2]$
 D) $[-4a-2, 4a+2]$ E) None of these

$$2x - 3 \geq 8a + 1$$

$$2x \geq 8a + 4$$

$$x \geq 4a + 2$$

$$[4a+2, \infty)$$

$$-2x + 3 \geq 8a + 1$$

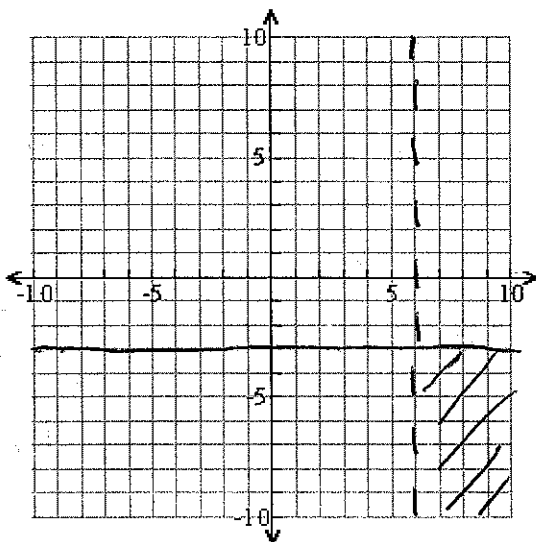
$$-8a + 2 \geq 2x$$

$$-4a + 1 \geq x$$

$$(-\infty, -4a+1]$$

$$a > 0 \text{ so } -4a+1 < 4a+2$$

9. (5 points) Shade the region of the coordinate plane that contains the set of ordered pairs $\{x, y | x > 6, y \leq -3\}$



10. (6 points) Fully simplify

$$(\sqrt{-16} - 1)(-5 + 6i)$$

$$(4i - 1)(-5 - 6i) = (-1 + 4i)(-5 - 6i) = \text{FOIL}$$

$$5 + 6i - 20i - 24i^2 = 5 - 14i + 24 =$$

$$\begin{matrix} F & O & I & L \\ 5 & 0 & 1 & 4 \end{matrix}$$

$$\boxed{29 - 14i}$$

11. (6 points) Fully simplify

- A) $\sqrt{65}$ B) 25 C) $3\sqrt{65}$ D) 33 E) None of these

Method 1:
 $|wz| = |w||z|$
 $3|7-4i| = 3\sqrt{49+16}$
 $= 3\sqrt{65}$

Method 2: multiply out
 $|-3(7-4i)|$
 $|-21+12i|$
 $= \sqrt{441+144} = \sqrt{585}$
 $= \sqrt{9 \cdot 65} = 3\sqrt{65}$

$$\begin{array}{r} 3 \overline{)585} \\ \underline{3 \ 195} \\ 5 \overline{)65} \\ \underline{5 \ 65} \\ 13 \end{array}$$

12. (8 points) Find the standard equation of the circle whose center is the midpoint of the line segment with endpoints $(-2, 4)$ and $(8, 6)$ and whose diameter is $\sqrt{2}$.

- A) $(x-3)^2 + (y-5)^2 = \frac{1}{2}$ B) $(x+5)^2 + (y+1)^2 = 2$ C) $(x+5)^2 + (y+1)^2 = \frac{1}{2}$
 D) $(x-3)^2 + (y-5)^2 = 2$ E) None of these

midpt = center = $\left(\frac{-2+8}{2}, \frac{4+6}{2} \right) = (3, 5) = (h, k)$

radius = $\frac{\sqrt{2}}{2}$ $r^2 = \frac{2}{4} = \frac{1}{2}$ $(x-h)^2 + (y-k)^2 = r^2$

13. (10 points) Fully simplify

- A) 5^{44} B) $\frac{-5}{24}$ C) $\frac{1}{24}$ D) $\frac{-13}{60}$ E) none of these

$$\frac{5^{20} + 5^{22}}{5^{21} - 5^{23}} = \frac{5^{20}(1+5^2)}{5^{21}(1-5^2)} = \frac{13}{5(-24)} = \frac{-13}{60}$$

