

PENCIL/PAPER SECTION - Use Calculator to help you with numerical calculations only and to check your work. ALL WORK MUST BE SHOWN IN ORDER TO RECEIVE CREDIT!!!

1. Simplify

$$\left(\frac{x^{1/2}}{y^2}\right)^4 \left(\frac{y^{1/3}}{x^{-2/3}}\right)^3$$

$$\frac{x^2}{y^8} \cdot \frac{y^1}{x^{-2}}$$

$$\frac{x^2}{y^8} \cdot \frac{y^1}{x^{-2}} = \frac{x^2}{y^7 x^{-2}} = \frac{x^2 \cdot x^2}{y^7} = \frac{x^4}{y^7}$$

$$1. \frac{x^4}{y^7} \quad (6)$$

2. Multiply and Simplify:

$$\frac{x^2 + 4x - 21}{x^2 + 3x - 28} \div \frac{x^2 + 14x + 48}{x^2 + 4x - 32}$$

$$\frac{(x+7)(x-3)}{(x+7)(x-4)} \cdot \frac{(x+8)(x-4)}{(x+8)(x+6)}$$

$$\frac{x-3}{x+6}$$

$$2. \frac{x-3}{x+6} \quad (5)$$

3. Factor the following completely:

a. $(x-1)^2 - 9y^2$ $B = (x-1)$

a. $(x-1-3y)(x-1+3y)$ (5)

$B^2 - 9y^2$

$(B-3y)(B+3y)$

$((x-1)-3y)((x-1)+3y)$

b. $x^4 - 625$

b. $(x^2+25)(x-5)(x+5)$ (5)

$x^2 - 25$

$(x^2+25)(x-5)(x+5)$

$(x^2+25)(x-5)(x+5)$

c. $6x^4 - 15x^3 - 21x^2$

c. $3x^2(2x-7)(x+1)$ (5)

$3x^2(2x^2 - 5x - 7)$

$3x^2(2x-7)(x+1)$

d. $(9x^3 - 9x^2 - 4x + 4)$ grouping

d. $(x-1)(3x-2)(3x+2)$ (5)

$9x^2(x-1) - 4(x-1)$

$(x-1)(9x^2 - 4)$

$3x \quad 2$

$(x-1)(3x-2)(3x+2)$

4. Rationalize the Denominator : $\frac{5}{(x+\sqrt{3})} \frac{(x-\sqrt{3})}{(x-\sqrt{3})}$ 4. $\frac{5x-5\sqrt{3}}{x^2-3}$ (5)

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

5. Simplify the complex fraction: 5. $\frac{-12}{5}$ (6)

$$\left[\frac{\frac{2}{x+3} - \frac{2}{x-3}}{\frac{5}{x^2-9}} \right] \frac{(x-3)(x+3)}{1} = \frac{2(x-3) - 2(x+3)}{5}$$

$$= \frac{2x-6-2x-6}{5}$$

$$= \frac{-12}{5}$$

7. Given: $P_1 = (2, -3)$ and $P_2 = (-1, 4)$ find the following:

a. Distance between P_1 and P_2

a. $\sqrt{58}$ (4)

Write your answer in simplified Radical Form

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(2 - (-1))^2 + (-3 - 4)^2}$$

$$= \sqrt{3^2 + (-7)^2}$$

$$= \sqrt{9 + 49} = \sqrt{58}$$

b. Midpoint between P_1 and P_2

b. $(\frac{1}{2}, \frac{1}{2})$ (4)

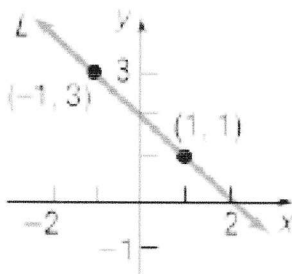
$$\left(\frac{2 + (-1)}{2}, \frac{-3 + 4}{2} \right) = \left(\frac{1}{2}, \frac{1}{2} \right)$$

c. Slope of the line between P_1 and P_2

c. $-\frac{7}{3}$ (4)

$$m = \frac{4 - (-3)}{-1 - 2} = \frac{7}{-3}$$

8. Given the following graph, find the equation of the line: 8. _____ (5)



$$m = \frac{1 - 3}{1 - (-1)} = \frac{-2}{2} = -1$$

$$(y - 1) = -1(x - 1)$$

$$y - 1 = -x + 1$$

$$y = -x + 2$$

9. Given the following function: $x + y^2 - 9 = 0$

a. Find the x-intercept $y = 0$
 (Write your answer as a coordinate point):

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

$$x = 9$$

a. (9, 0) (3)

b. Find the y-intercept $x = 0$
 (Write your answer as a coordinate point):

$$0 + y^2 - 9 = 0$$

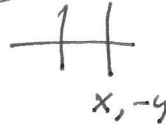
$$y^2 = 9$$

$$y = \pm\sqrt{9} = \pm 3$$

b. (0, 3) (3)
(0, -3)

c. Check for symmetry with respect to the **x-axis** and state your conclusion:

Work for symmetry check: (3 points)



same

$$\begin{cases} x + y^2 - 9 = 0 \\ x + (-y)^2 - 9 = 0 \\ x + y^2 - 9 = 0 \end{cases}$$

Statement of conclusion and how you know: (2 points)

$x + y^2 - 9 = 0$ is symmetric with respect to x-axis since when you substitute $-y$ for y you get the same as the original equation.

10. Find the center and radius of the circle written in standard form:

$$(x-2)^2 + (y+5)^2 = 25$$

$\frac{2}{\quad}$ $\frac{-5}{\quad}$ $r = \sqrt{25}$
 $r = 5$

Center: (2, -5) (2)

Radius: 5 (2)

11. Find an equation for the circle having a center at (4, -1) and a **radius** of length 3 units. Express your answer in standard form.

equation: $(x-4)^2 + (y+1)^2 = 9$ (4)

$h = 4$
 $k = -1$ $(x-4)^2 + (y-(-1))^2 = 3^2$
 $r = 3$ $(x-4)^2 + (y+1)^2 = 9$

12. Find the equation of the circle below by **completing the square**. Express your answer in standard form.

$x^2 + y^2 + 6x - 4y - 1 = 0$ equation: $(x+3)^2 + (y-2)^2 = 14$ (5)

$(x^2 + 6x \quad) + (y^2 - 4y \quad) = 1$ $\left(\frac{6}{2}\right)^2 = 9$
 $(x^2 + 6x + 9) + (y^2 - 4y + 4) = 1 + 9 + 4$ $\left(\frac{-4}{2}\right)^2 = (-2)^2 = 4$
 $(x+3)^2 + (y-2)^2 = 14$

13. Solve for x:

$$(x+3)(x-3) \left(\frac{x}{x-3} + \frac{3}{x+3} \right) = \frac{-14}{x^2-9} (x+3)(x-3)$$

$$x(x+3) + 3(x-3) = -14$$

$$x^2 + 3x + 3x - 9 = -14$$

$$x^2 + 6x - 9 = -14$$

$$x^2 + 6x + 5 = 0$$

$$(x+1)(x+5) = 0$$

$$x = -1 \quad x = -5$$

11. $x = -5 \quad x = -1$ (5)

List the value(s) for x that must be **excluded** as solutions for this problem.

(ie. what can x NOT be?)

$x \neq -3 \quad x \neq 3$ (2)

$$(x+3)(x-3) \neq 0$$

$$x \neq -3 \quad x \neq 3$$