

PCPAP TEST: Chapter 1.1-2.1 Form A
No Calculator

Part I: Multiple Choice. Put the CAPITAL letter in each blank to the left of the problem number.

_____ 1. Expand and simplify the following: $\left(3\sqrt[3]{x} - \frac{2}{x}\right)(5 - 4x^2)$

(A) $15\sqrt[3]{x} - 12\sqrt[3]{x^7} - \frac{1}{10x} + 8x$ (B) $15\sqrt[3]{x} - 12\sqrt[3]{x^7} - \frac{10}{x} + 8x$ (C) $15\sqrt[3]{x} - 12\sqrt[7]{x^3} - \frac{10}{x} + 8x$

(D) $\frac{15\sqrt[3]{x} - 12\sqrt[3]{x^7} - 10 + 8x}{x}$ (E) $15\sqrt[3]{x} - 12\sqrt[3]{x^2} - \frac{1}{10x} + 8x$

_____ 2. Find the domain of $K(x) = \frac{3\sqrt{5-x} + 9}{x^2 - 3x - 70}$. D_K :

(A) $(-\infty, -7) \cup (-7, 5]$ (B) $(-\infty, -10) \cup (-10, 5]$ (C) $(-\infty, -7) \cup (-7, -5]$

(D) $(-\infty, -10) \cup (-10, -5]$ (E) $[5, 10) \cup (10, \infty)$

_____ 3. Simplify: $\frac{5x^{-1}y^{-2} + 2xy^{-1}}{x^{-2}y^2 - 3y}$

(A) $\frac{5x + 2x^3}{y^4 - 3x^2y}$ (B) $\frac{5x + 2x^3y}{y^4 - 3x^2y}$ (C) $\frac{5x^3y^4 + 2x^3y^3}{x^4y^4 - 3x^2y^3}$ (D) $\frac{5x + 2x^3y}{y^4 - 3x^2y^3}$ (E) $\frac{5x^3 + 2x^3y}{y^2 - 3x^2y^4}$

_____ 4. The domain of $f(x) = \frac{\sqrt{2x+1}-5}{(x+1)(4x+3)}$ is D_f :

- (A) $\left[-1, \frac{-3}{4}\right) \cup \left(\frac{-3}{4}, \frac{-1}{2}\right) \cup \left(\frac{-1}{2}, \infty\right)$ (B) $\left[\frac{-3}{4}, \frac{-1}{2}\right) \cup \left(\frac{-1}{2}, \infty\right)$ (C) $\left(-1, \frac{-1}{2}\right) \cup \left(\frac{-1}{2}, \infty\right)$
(D) $(-\infty, \infty)$ (E) $\left[\frac{-1}{2}, \infty\right)$

_____ 5. The domain of $f(x) = \frac{\sqrt[3]{x+1}}{\sqrt{2-3x+2}}$ is D_f :

- (A) $\left(-\infty, \frac{2}{3}\right)$ (B) $\left(-\infty, \frac{2}{3}\right]$ (C) $\left(-\infty, \frac{-2}{3}\right) \cup \left(\frac{-2}{3}, \frac{2}{3}\right]$
(D) $(-\infty, -1) \cup \left(-1, \frac{2}{3}\right]$ (E) $(-\infty, -1) \cup \left(-1, \frac{-2}{3}\right) \cup \left(\frac{-2}{3}, \frac{2}{3}\right]$

_____ 6. Which of the following regarding $P(x) = \frac{x^2 - 3x - 10}{x^2 + 6x + 8}$ is **true**?

- (A) $P(x)$ has a hole at $\left(-2, \frac{-7}{2}\right)$ (B) $P(x)$ has a vertical asymptote at $x = 4$
(C) $P(x)$ has a hole at $(-2, 0)$ (D) $P(x)$ has a vertical asymptote at $x = -2$ (E) $D_P : \{x \mid x \neq -4\}$

_____ 7. How many vertical asymptotes does $J(x) = \frac{(x^2 - x)(x^2 + 5x + 6)}{(x^2 - 2x)(x^2 + 4x + 3)}$ have?

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

Part II: Free Response

Show all work in a logical, vertical sequence. Remember that your process and notation are worth points too, not just your answer. You must communicate your results properly, not just attain them.

10. For the following functions,

$$f(x) = \sqrt{x+5} - 4, \quad g(x) = \sqrt{-x+9}, \quad h(x) = x^2 - 2x - 15 \quad \text{answer the following questions.}$$

(a) Set up and simplify the **equation** for the function $K(x) = g(h(x))$, and then find the domain of $K(x)$ by sketching a graph of your radicand. **Be careful to use parentheses when substituting in for x , so that you may distribute any necessary values** Show the work, including the graph, that leads to your answer. Give your domain in either proper set or interval notation.

(b) Set up the **equation** for the function $R(x) = \frac{2x-10}{h(x)}$. Determine the equation and/or coordinates (x, y) , of any vertical asymptotes and holes, respectively. Show the work that leads to your answer, and use proper notation.

(c) Set up the **equation** for the function $J(x) = \frac{h(x)}{f(x)}$, and then find the domain of $J(x)$. Show the work that leads to your answer. Give your domain in either proper set or interval notation.

(d) Set up and **completely simplify** $\frac{h(x+w) - h(x)}{w}$ for some constant w . Show the work that leads to your answer.