

Math 050 – Department Final Exam – Practice with Multiple-Choice Questions

Believe it or not, it can be **more** difficult than you think to answer multiple-choice mathematics question. The problem that students usually have is that they leap at a particular answer without slowing down to evaluate all the choices. For example, take a look at this one.

1. Simplify: $\sqrt{x^2 + 25}$

- a. $x+5$ b. $|x+5|$ c. $x+10$ d. None of these
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Did you fall for choice **a** or choice **b**? Those are both awfully tempting choices, but both are incorrect. Recall that you cannot simplify a square root over addition, only over multiplication or division, and so the correct choice is actually **d**.

If you at least look at all the answers before making your selection, you can be more sure that you have not accidentally jumped at something that is tempting, but incorrect. Here's another.

2. Simplify: $\frac{x^2 + 12x + 35}{x^2 + 9x + 20} \div \frac{x^2 - 49}{x^2 + 7x + 12}$

- a. $\frac{x+3}{x-7}$ b. $\frac{x-7}{x+3}$ c. $\frac{(x+7)^2(x-7)}{(x+4)^2(x+3)}$ d. $\frac{(x+4)^2(x+3)}{(x+7)^2(x-7)}$
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Did you catch the division sign? Whether the problem is multiplication or division makes a big difference in the choice you pick. The correct choice for that one was **a**.

What if you don't see your answer in the choices to the problem? Try this one.

3. Solve: $x^2 + 12 = 0$

- a. $x = \pm 2\sqrt{3}i$ b. $x = \pm\sqrt{12}i$ c. $x = \pm 2\sqrt{3}$ d. $x = \pm 4\sqrt{3}i$
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Suppose you solved this and got a solution of $x = \pm\sqrt{12}i$. Notice that none of the choices quite match this answer. Choice **b** is the closest, but in choice **b** the i is underneath the radical sign, so it's not actually the same. Before you abandon hope, make sure that you have completely simplified your answer. In fact, $\sqrt{12} = 2\sqrt{3}$, so the correct choice is **a**.

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Here's one more to try. Notice that all the answers are written in interval notation, so you'll have to convert your answer to interval notation too.

4. Solve: $|2x-1| < 3$

- a. $(-1,2)$ b. $[-1,2]$ c. $(-\infty,-1)\cup(2,\infty)$ d. $(-\infty,-1]\cup[2,\infty)$
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To solve this one, we write $-3 < 2x-1 < 3$ and solve the new equation to get $-1 < x < 2$. In interval notation this is $(-1,2)$, or choice **a**.

Here's another type of multiple-choice problem to try.

5. Which of the following statements is false?
- The graph of $f(x) = \log x$ has a vertical asymptote.
 - The graph of $f(x) = 2^x$ has a horizontal asymptote.
 - The graph of $f(x) = b^x$ is increasing for all b .
 - The domain of $f(x) = \sqrt{x-2}$ is $[2,\infty)$.
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When you are trying to find the false statement, remember that only one of the statements may be false. Choice **a** is not a false statement because the graph has a vertical asymptote. The false statement is choice **c**, since $f(x) = b^x$ would be decreasing for $0 < b < 1$.

Here are a few more multiple choice questions to practice with. The answers to problems 6-14 follow problem 14.

6. Simplify: $\sqrt[3]{-128x^{15}y^{27}}$

- a. $-4y^3\sqrt[3]{2x^{15}}$ b. $-8x^5y^9\sqrt[3]{2}$ c. $8x^5y^9\sqrt[3]{2}$ d. $-4x^5y^9\sqrt[3]{2}$

7. Simplify: $\frac{y^{-1/5}y^{1/2}}{y^{2/5}}$

- a. $\frac{1}{y^{3/10}}$ b. $y^{3/10}$ c. $y^{1/10}$ d. $\frac{1}{y^{1/10}}$

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8. The graph of $f(x) = x^2 + 6x - 3$ has a vertex at

- a. $(3, 24)$ b. $(-3, -12)$ c. $(6, 59)$ d. $(6, -3)$

9. Simplify: $(3 - 4i)(4 + 3i)$

- a. $12 - 12i$ b. 24 c. $24 - 7i$ d. $7 - i$

10. Let $f(x) = \sqrt[5]{x-2}$, find $f^{-1}(x)$.

- a. $f^{-1}(x) = x^5 + 2$ b. $f^{-1}(x) = x^5 - 2$
c. $f^{-1}(x) = (x-2)^5$ d. $f^{-1}(x) = (x-2)^{1/5}$

11. Let $f(x) = x^2 + 4$ and $g(x) = x - 4$. Find $(f \circ g)(x)$.

- a. $x^2 + 20$ b. $x^2 - 20$ c. x^2 d. $x^2 - 8x + 20$

12. Solve the system:
$$\begin{cases} 6x + 5y = 13 \\ 7y = 33 - x \end{cases}$$

- a. $(6, 5)$ b. $(2, -5)$ c. $(-2, 5)$ d. $(6, -5)$

13. Solve $\sqrt{10 + 2x} = 5 + x$

- a. 3 or 5 b. -1 or 3 c. 1 or -3 d. -3 or -5

Answers: 6. d; 7. d; 8. b; 9. c; 10. a; 11. d; 12. c. 13. d
