
FCE 9 – MA103

GENERAL INSTRUCTIONS: Read all instructions carefully.

1. You have 55 minutes to complete the Fundamental Concepts Exam (FCE).
2. This exam evaluates the understanding of the math concepts fundamental to each cadet at this stage of his/her academic development. This is a non-technology exam. No references of any kind may be used.
3. Including this cover page, there are eight pages to the exam.
4. Write your name on every exam page.
5. Show as much work as possible to maximize credit. ***Unless the question states “simplify,” you do not need to simplify your answers.***
6. Clearly indicate your answer (e.g. $0 < x < 5$, or $\boxed{0 < x < 5}$).
7. Should you require additional space, use a blank sheet of paper and clearly identify that the problem is continued on both the exam and on the continuation sheet. Be sure to put your name on any extra pages you use.
8. Early departure is authorized. Make sure you comply with exam turn-in requirements as outlined by your instructor.

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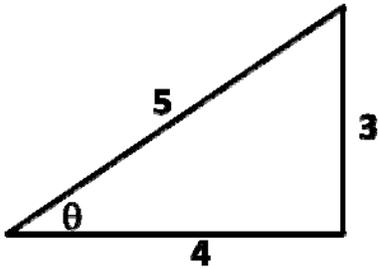
1. Express $\frac{1}{\sqrt{3x+2}}$ in the rational exponent form.

2. Solve for the roots of the following polynomial: $x^2 - 7x + 10 = 0$.

3. Solve $x^2 - 3x + 2 > 0$ for x .

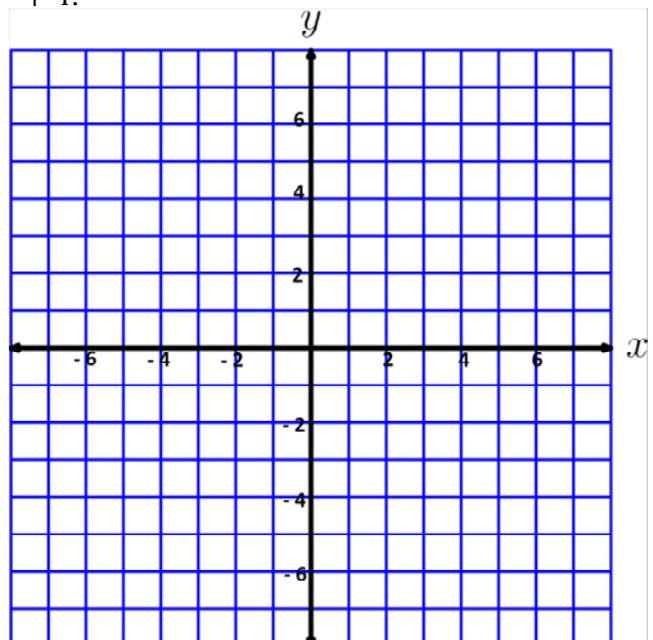
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4. Using the right triangle below, determine $\tan(\theta)$.



5. Find the domain of the real valued function $(x) = \frac{1}{\sqrt{x^2-4}}$.

6. Sketch a graph of the function $f(x) = (x - 2)^2 + 4$.



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7. Find the equation of a line perpendicular to the line $2y - 5x = 8$ and passing through the point (3,4).

8. Write 48 as a product of prime factors.

9. Solve the system of linear equations $\begin{cases} 3x + 6y = 8 \\ x - 3y = 6 \end{cases}$.

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10. Solve the equation $\log_2 x = 4$ for x .

11. Identify the dependent variable for the following real valued function: $z = f(t) = \frac{t^2}{t-4}$.

12. Simplify the expression $x^{-2} y^3 x^{\frac{1}{2}} y^{\frac{1}{3}}$.

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13. Simplify the expression in terms of $\sin(\alpha)$ and $\cos(\alpha)$: $\frac{\sec(\alpha)\cot(\alpha)}{\sin(\alpha)}$.

14. What is the surface area of a cube with side length of 2ft?

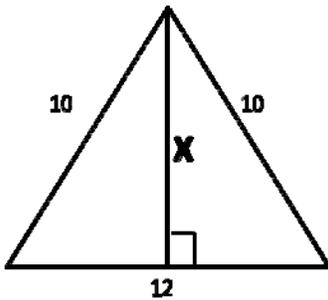
15. Write $\frac{5\pi}{3}$ *radians* in terms of degrees.

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16. Given $f(x) = x^2 - 4x + 5$, find $f(4s)$.

17. Express 35,240,000 using scientific notation.

18. Given the triangle below, find the length of side x .



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19. Solve $|x + 5| > 8$ for x .

20. Find the straight line distance between the two points A(3,4) and B(-4,-5).