

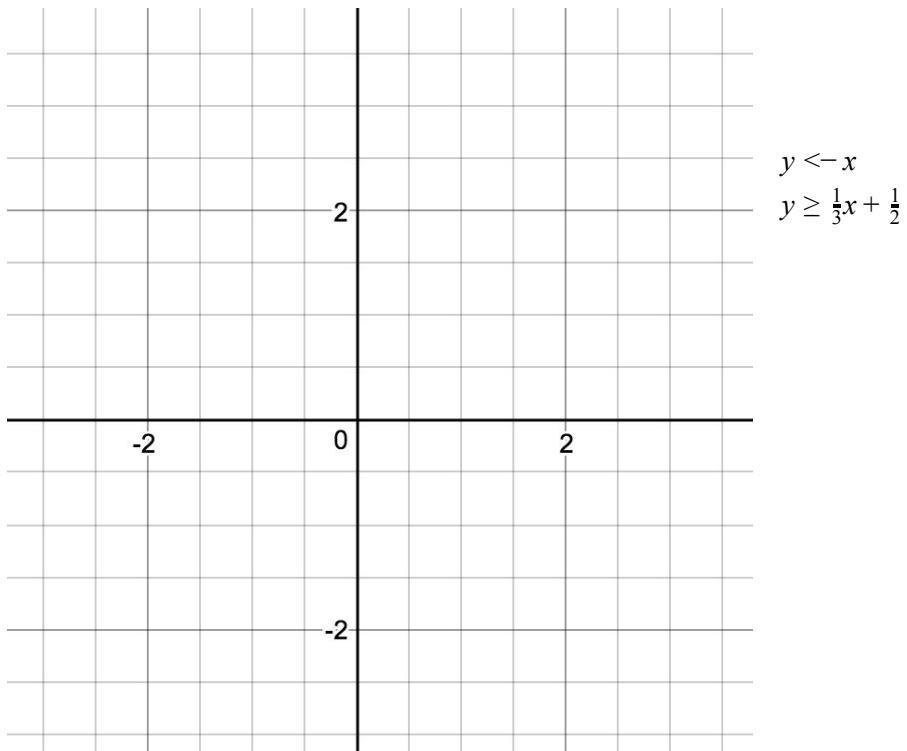
ACT: Math Diagnostic Test

1. Evaluate the expression $a^2b - 2a$ when $a = -1$ and $b = 3$.
2. Solve the equation $V = \frac{1}{3}\pi r^2$ for r .
3. Write an equation to model each scenario:
 - a. You have \$45 in an account and spend \$5 each week on coffee.
 - b. Your car is currently worth \$4000 and loses 12% in value each year.
 - c. The booster club sold hotdogs for \$2 each and drinks for \$1.50 each, making a total of \$400.
4. Write a linear inequality to model the following scenario: You have \$10 and need to make at least \$120 by the end of the summer. Each week you make \$55 mowing lawns.
5. Solve the inequality, and graph the solution on a number line: $-3 \leq 5 - 2x < 7$
6. If $a+2b=6$ and $b-a=3$, what is the value of b ?
7. What is the volume of a cylinder with a radius of 12cm and a height of 1m?
8. Find all solutions for each equation:
 - a. $2x^3 + 16x = 2x^2$
 - b. $4x - x^2 = -5$
9. Find the solution of the system of equations graphically, using the graph space provided.

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

10. Graph the system of inequalities and clearly indicate where the solution region is:



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11. The twenty-five students in Ms. Henning's class score an average of 81% on the final.

Leia's score of 95% is then removed from the class average. What is the new average score?

12. Perform each indicated matrix operation:

a.
$$\begin{bmatrix} 2 & 1 \\ 3 & -1 \end{bmatrix} + \begin{bmatrix} 0 & 5 \\ -6 & 1 \end{bmatrix}$$

b. If $A = \begin{bmatrix} 0 & 6 \\ -2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 9 & 1 \\ \frac{1}{2} & 0 \end{bmatrix}$, find $3A-4B$.

c. Write the system of equations in matrix form:

$$\begin{aligned} 2x - y &= 7 \\ -x + 4y &= 10 \end{aligned}$$

13. Simplify each of the following expressions:

a. $\sqrt{32x^3y}$

b. $\sqrt[3]{27a^5b^9}$

c. $\sqrt{3}(2\sqrt{6} + \sqrt{42})$

d. $\sqrt{\frac{9}{32}}$

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14. Evaluate each trigonometric expression:

a. $\cos\left(\frac{\pi}{6}\right)$

b. $\sin\left(-\frac{\pi}{3}\right)$

c. $\tan\left(\frac{\pi}{2}\right)$

d. $\sec\left(\frac{\pi}{6}\right)$

15. Perform each complex number operation and simplify completely:

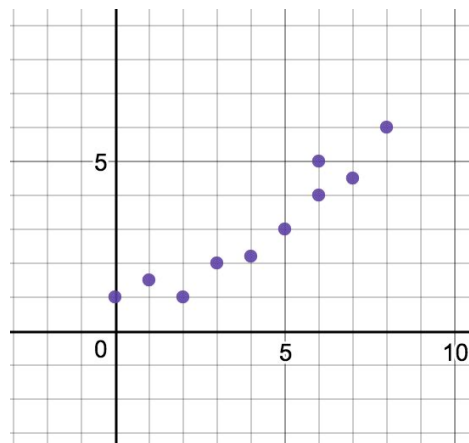
a. $(2i)^2$

b. $(3 - i)(2 + i)$

c. $i^5(2i - 7)$

16. Mark each set of congruent angles in the diagram below, given that l and w are parallel and n is a transversal.

17. Explain the correlation shown in the scatter plot (strong positive, strong negative, weak positive, none, etc.):



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18. If the volume of a sphere is 589 ft^3 , what is the radius of the sphere?

19. Draw a reasonable graph for the function $f(x) = \frac{x-2}{x^2-4}$. Include all relevant asymptotes.

