# AceTest Exercises

## Algebra (Hard)

1. If $\frac{2x-3}{5} + \frac{x+4}{2} = 7$, what is the value of x?

2. The system of equations intercepts at two points in the xy plane. Find the value of the lowest y coordinate for the interceptions:

   $x + y = 7$

   $x^2 + y^2 = 29$

3. In a linear system of equations, the lines of the equation intersect at one point (x,y). Find the value of the x coordinate of the intersection

   $\frac{x+2}{3} = \frac{y-1}{5}$

   $2x + y = 14$

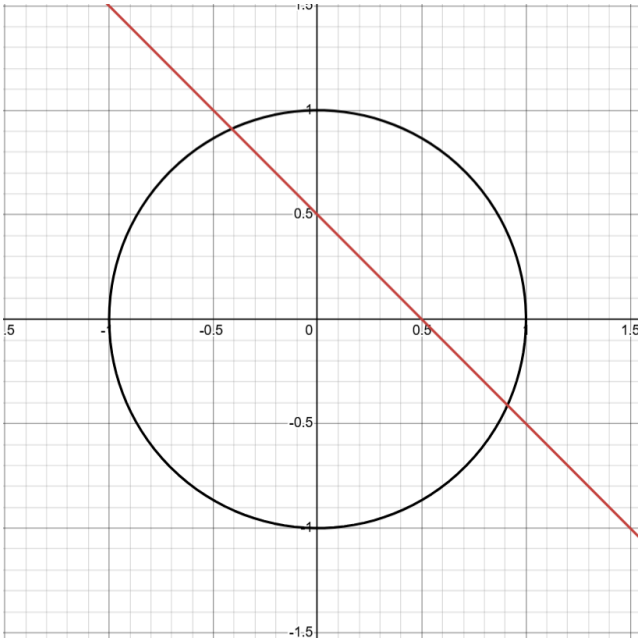
4. The line $y = mx + b$ passes through (2,7) and is perpendicular to the line 3x+ 2y=6. What is the value of m?

5. If $\frac{4}{x} + \frac{3}{x+1} = 2$, what is the value of x?

   - ☐ $\frac{9\pm\sqrt{6}}{4}$
   - ☐ $\frac{10\pm\sqrt{9}}{7}$
   - ☐ $\frac{5\pm\sqrt{57}}{4}$
   - ☐ $\frac{10\pm\sqrt{89}}{7}$

6. $\frac{20x+18}{10r} - \frac{s}{14} = (x - 9)$. If in the equation, s and r are constants, and r>0. If the equation has infinitely many solutions. What is the value of r?

   - ☐ 2
   - ☐ 5
   - ☐ 9
   - ☐ 3

7. 


What set of equations represents the system of equations in the graph?

- ☐ $3x^2 + 6y^2 = 5$ and $3x + 5y = 10$
- ☐ $15x^2 + 21y^2 = 10$ and $\sqrt{x} + \frac{6}{y} = 5$
- ☐ $2x^2 + 6y^2 = 10$ and $x + \frac{5y}{3} = 9$
- ☐ $5x^2 + 5y^2 = 5$ and $20x + 20y = 10$

8. The system of equations intercepts at two points in the x and y plane. What is the value of x+y with the smallest x coordinate of the intercepts?

$x^2 - y = 5$
$2x + y = 115$

9. In the system of equations, “a” is a solution to the system. What is the value of “a”?

$2a + 3b = 17$
$a^2 - b = 11$

- ☐ $a = \frac{-20 \pm \sqrt{26}}{3}$
- ☐ $a = \frac{-1 \pm \sqrt{151}}{3}$
- ☐ $a = \frac{-9 \pm \sqrt{200}}{4}$
- ☐ $a = \frac{-10 \pm \sqrt{760}}{4}$

10. Give the largest solution of $x^2 - 10x + 21 = 0$

11. The function $x^2 - 8x + c = 0$ has exactly one solution. Find the value of c.

12. Give the smallest solution for $2x^2 - 7x - 15 = 0$

13. If the roots of $2x^2 + kx + 9 = 0$ differ by 4, what is the value of k?
    - ☐ $\pm 2\sqrt{13}$
    - ☐ $\pm 2\sqrt{21}$
    - ☐ $\pm 5\sqrt{26}$
    - ☐ $\pm 3\sqrt{70}$

14. A system of linear equations intercepts at (2,y). Give the y coordinate of the interception.

    $3x + 7y = 6$

    $3x + 4y = 6$

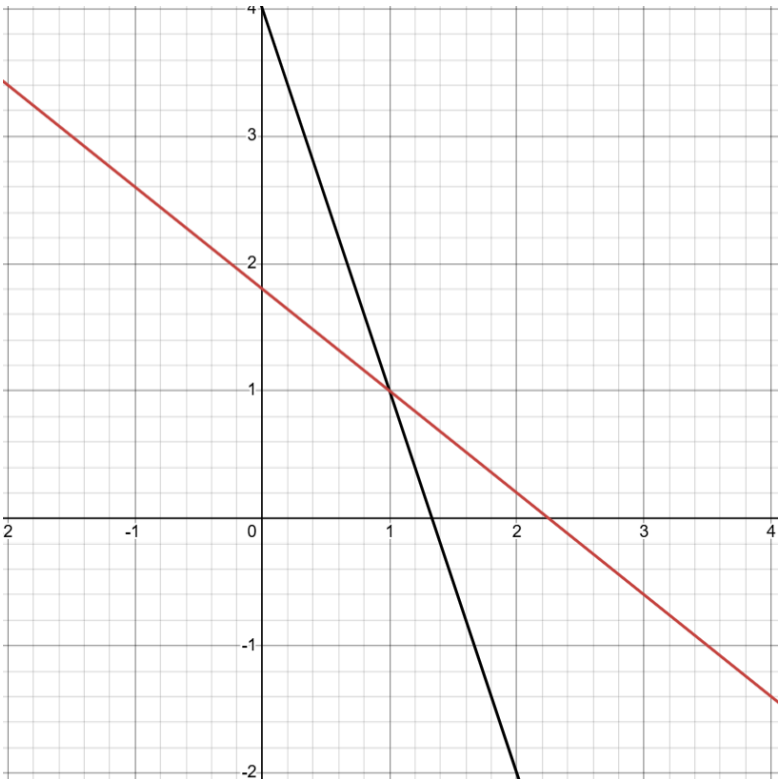
15. Which of the following points is a solution to the following inequalities

    $3x + 6 < 10$

    $10x + \frac{3}{8} > 8$

    - ☐ (1,9)
    - ☐ (9,6)
    - ☐ (9,0)
    - ☐ (2,1)

16. What is a solution for the following equation: $|2x - 5| \geq 7$
    - ☐ (3,6)
    - ☐ (1,6)
    - ☐ (-3,5)
    - ☐ (3,-3)

17. 


The following system of linear equations is represented by which graph

- ☐ $15y + 3x = 3$ and $8y + 10x = 18$
- ☐ $3y + 9x = 12$ and $10y + 8x = 18$
- ☐ $3y + 9x = 3$ and $4y + 9x = 3$
- ☐ $2y + 5x = 3$ and $3y + 7x = 3$

18. In a system of equations, $3x - 2 > 7y - 2$ and $2x + 5 < 2y + 5$, which of the following points is a solution of the system of equations?.
    - ☐ (-3,1)
    - ☐ (-3,7)
    - ☐ (-4,-3)
    - ☐ (-4,-4)

19. In the xy plane, the graph of the equation $ax + by = 6$ falls on the points (2,0) and (10,-3). If a, b, and c are constants, what is the value of a+b?.

20. Ben used a kit of tools to remove candy from a vending machine at a constant rate. The vending machine contained 1400 unknown candy bars when Ben started removing the candy bars. After 7 hours of the removal, only 200 candy bars remained in the machine. If Ben continues to remove candy at the same rate, how many hours will it take Ben to obtain 1357 candy bars?.

21. The following table shows three values for the quadratic equation G. If G is equal to $ax^2 + bx + c$, what is the value of a+b+c?

| X | G(x) |
|---|---|
| 0 | 12 |
| -2 | 2 |
| -3 | 15 |

22. A theater sold 200 tickets for a show. Adult tickets cost $12, and student tickets cost $8. If the theater collected $2,080, how many student tickets were sold?

23. One company sells two products. Each unit of product A brings in $50 profit, and each unit of product B brings in $80 profit. If the company sold 120 units in total and made $7,200 in profit, how many units of product B were sold?

24. Line $f(x) = 5x + 5$ is perpendicular to line g(x). What is the slope of line g(x)?.

25. In the given system of equations, a and b are constants. Both lines intersect at the point (2,y) in the xy-plane. What is the value of b?.

$$ax + by = 16$$
$$8x + 10y = 2$$

26. The following table shows three values for the linear equation f(x). If f(x) is equal to $mx + b = y$, what is the value of b?

| X | f(x) |
|---|---|
| 2 | 5 |
| 4 | 8 |

27. What is the minimum value of the quadratic equation? $h(x) = x^2 + 2x + 5$

28. In the system of equations, lines f(x) and g(x) intersect at two points in the xy-plane. What is the lowest integer value of x for all intercepts?.

$f(x) = \frac{x+4}{x-2}$

$g(x) = 3x + 7y = -10$

29. Line $f(x) = \sqrt{x - 5}$ is displaced 4 units up and 7 units left in the xy-plane, resulting in line g(x). What is the minimum value of line g(x)?.

30. In the following system of equations, q is a constant. If the system has no solution, what is the value of q

$\frac{10}{3}x + 9y = 20$

$rx + 12y = 14$

- ☐ 9
- ☐ 7
- ☐ $\frac{10}{9}$
- ☐ $\frac{40}{9}$

31. How many solutions does the equation $15(2 + 9x) = 10(-23 + 7x)$ have?

- ☐ Exactly one
- ☐ Exactly two
- ☐ Infinite many
- ☐ Zero

32. Which of the following is a correct expression of $(2x^{\frac{3}{2}})(x^{\frac{1}{2}})$

- ☐ $x^2$
- ☐ $2x$
- ☐ $2x^2$
- ☐ 2

33. The population of a country amounts to 25 million persons in 2025. Analysts conducted an investigation using data sets from the government's country and determined that its population will continue to grow by 10% every 5 years. If it continues to grow at the estimated pace, how large will the country's population be in 2050?. (In millions).

34. Two perpendicular lines in the linear systems of equations intersect at the point $(\frac{1}{2}, 0)$ in the xy-plane. If r and q are constants, what is the value of r?.

$$-\frac{1}{2}x + 2y = 2$$

$$2x + ry = 9$$

- ☐ $\frac{1}{2}$
- ☐ $\frac{5}{2}$
- ☐ 3
- ☐ 1

35. In the xy-plane, line E intersects at point (0,3) with line Q. Likewise, line Q passes over point (4,3) and (2, K), which also intersect with line E. What is the value of K?.

36. The following table shows three values for the linear equation f(x). If f(x) is equal to $a^x + b = y$, what is the value of b?

| X | f(x) |
|---|---|
| 3 | 6 |
| 4 | 18 |

- ☐ $-5.87$
- ☐ $-4.24$
- ☐ $6.39$
- ☐ $9.38$

37. Which point (x,y) is the solution to the system of equations in the xy-plane?.

$$y \geq 5x + 3$$

$$y \leq 9x + 10$$

- ☐ (0,1)
- ☐ (0,3)
- ☐ (1,9)
- ☐ (9,3)

38. What table of three values falls on the line $\frac{7}{4}x - \frac{8}{9}y = 3$?

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| X | f(x) |
|---|---|
| 0 | $-\frac{5}{27}$ |
| 3 | $\frac{98}{3}$ |
| 5 | $\frac{156}{31}$ |

☐

| X | f(x) |
|---|---|
| 0 | $-\frac{27}{8}$ |
| 3 | $\frac{81}{32}$ |
| 5 | $\frac{207}{32}$ |

☐

| X | f(x) |
|---|---|
| 0 | 13 |
| 3 | 9 |
| 5 | 8 |

☐

| X | f(x) |
|---|---|
| 0 | $\frac{76}{5}$ |
| 3 | $-\frac{34}{7}$ |
| 5 | $-\frac{21}{4}$ |

39. In the xy-plane, line E intersects at point (0,9) with line Q. Likewise, line Q passes over point (10,67) and (R, 7), which also intersect with line E. What is the value of K?.

40. What table of three values falls on the line $10x + 7y = 24$?

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| X | f(x) |
|---|---|
| 1 | 7 |
| 2 | 2 |
| 3 | $-3$ |

☐

| X | f(x) |
|---|---|
| 1 | 1 |
| 2 | 8 |
| 3 | $-4$ |

☐

| X | f(x) |
|---|---|
| 1 | $\frac{100}{6}$ |
| 2 | $\frac{40}{6}$ |
| 3 | $-\frac{48}{3}$ |

☐

| X | f(x) |
|---|---|
| 1 | 6 |
| 2 | $-9$ |
| 3 | $-3$ |

Answers:

1. $\frac{56}{9}$
2. 2
3. 2.64
4. $m = 2/3$
5. $\frac{5\pm\sqrt{57}}{4}$
6. 2
7. $5x^2 + 5y^2 = 5$ and $20x + 20y = 10$
8. 127
9. $a = \frac{-1\pm\sqrt{151}}{3}$
10. 7
11. -9
12. $-\frac{3}{2}$
13. $\pm\ 2\sqrt{13}$
14. 0
15. (1,9)
16. (-3,5)
17. $3y + 9x = 12$ and $10y + 8x = 18$
18. (-4,-3)
19. 11
20. 7.916
21. 35
22. 80
23. 40
24. $-\frac{1}{5}$
25. 80
26. 2
27. -1
28. -1
29. -2
30. $\frac{40}{9}$
31. Exactly one
32. $2x^2$
33. 40.3
34. $\frac{1}{2}$
35. 3
36. -4.24
37. (1,9)

38.

| X | f(x) |
|---|---|
| 0 | $-\frac{27}{8}$ |
| 3 | $\frac{81}{32}$ |
| 5 | $\frac{207}{32}$ |

39. -3.45

40.

| X | f(x) |
|---|---|
| 1 | 7 |
| 2 | 2 |
| 3 | $-3$ |