

Key

Solve each equation if possible.

1. $|x - 3| = 5$ $x - 3 = 5$ $x - 3 = -5$
 $x = 8$ and $x = -2$

2. $2|x - 4| = 16$ $x - 4 = 8$ $x - 4 = -8$
 $x = 12$ and $x = -4$

3. Why is there no solution to this equation? $|4x + 5| = -1$ because absolute value can not be negative.

Solve each inequality and graph on a number line.

4. $|3d + 7| > 5$
 $3d + 7 > 5$ $3d + 7 < -5$
 $d > -\frac{2}{3}$ $d < -4$

5. $|\frac{2}{3}x + \frac{3}{4}| \leq 4$
 $\frac{2}{3}x + \frac{3}{4} \leq 4$ $\frac{2}{3}x + \frac{3}{4} \geq -4$
 $12 \cdot \frac{2}{3}x + \frac{12 \cdot 3}{4} \leq 48$ $8x + 9 \geq -48$
 $8x \leq 39$ $x \leq \frac{39}{8}$ $8x \geq -57$ $x \geq -\frac{57}{8}$

Solve each system using any method and identify as consistent or inconsistent.

6. $\begin{cases} y = 3x + 7 \\ y = 2x - 6 \end{cases}$ $3x + 7 = 2x - 6$ $3(-13) + 7 = y$
 $x = -13$ $-32 = y$ Consistent

7. $\begin{cases} y = -x + 7 \\ x + y = 7 \\ 28 - 2y = 2x \end{cases}$ $28 - 2(-x + 7) = 2x$ inconsistent
 $28 + 2x - 14 = 2x$

8. $\begin{cases} 4x + 5y = 3 \\ 2x + 5y = -11 \end{cases}$ $4x + 5y = 3$ $4x + 5(-5) = 3$
 $-4x - 10y = 22$ $4x - 25 = 3$ consistent
 $-5y = 25$ $4x = 28$
 $y = -5$ $x = 7$

Make sure
in right
order

$$9. \begin{cases} 2x + 5y = 7 \\ 3y + 2x = 17 \\ -2x + 3y = 17 \end{cases}$$

$$\begin{aligned} 2x + 5y &= 7 \\ -2x + 3y &= 17 \\ \hline 8y &= -10 \\ y &= -1.25 \end{aligned}$$

$$\begin{aligned} 2x + 5y &= 7 \\ -2x + 3y &= -17 \\ \hline 2y &= -10 \\ y &= -5 \end{aligned}$$

$$\begin{aligned} 2x + 5(-5) &= 7 \\ 2x - 25 &= 7 \\ 2x &= 32 \\ x &= 16 \end{aligned}$$

Cond.

$$10. \begin{cases} 2x + y = 1 \\ x + y = 2 \end{cases}$$

$$\begin{aligned} 2x + y &= 1 \\ -2x - 2y &= -4 \\ \hline -y &= -3 \\ y &= 3 \end{aligned}$$

$$\begin{aligned} x + y &= 2 \\ x + 3 &= 2 \end{aligned}$$

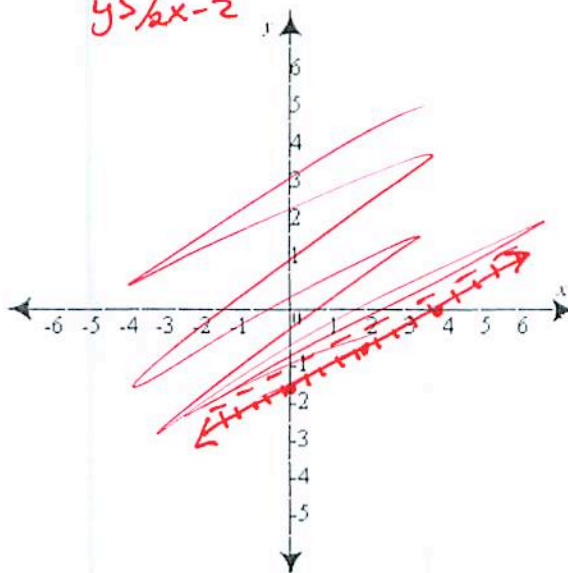
$$x = -1$$

Cond.

Graph the following inequalities.

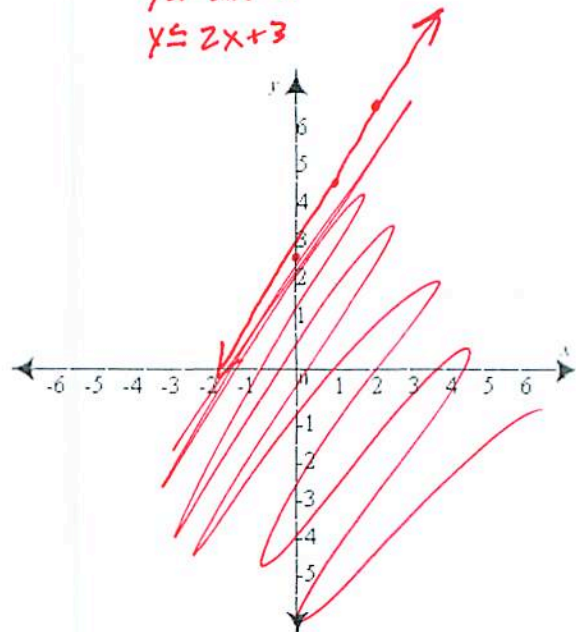
11. $x - 2y < 4$

$$\begin{aligned} -2y &< -x + 4 \\ \frac{-2y}{-2} &\frac{-x + 4}{-2} \\ y &> \frac{1}{2}x - 2 \end{aligned}$$



12. $2x - y \geq -3$

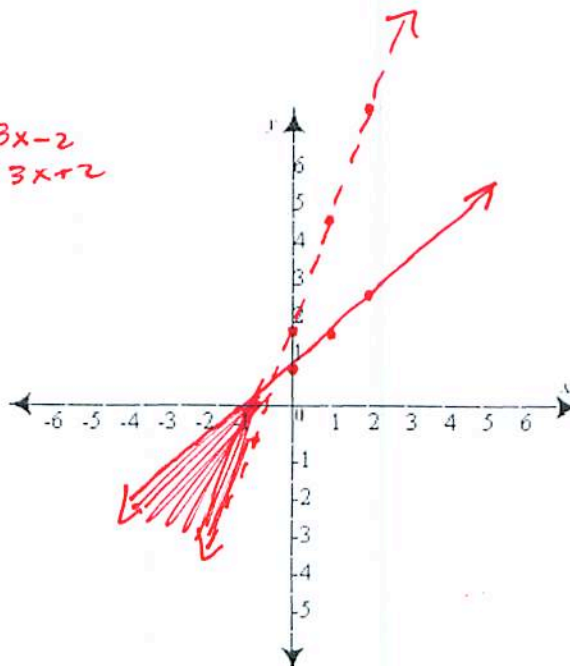
$$\begin{aligned} -y &\geq -2x - 3 \\ y &\leq 2x + 3 \end{aligned}$$



Solve by graphing.

$$13. \begin{cases} 3x - y > -2 \\ x - y \geq -1 \end{cases}$$

$-y > -3x - 2$
 $y < 3x + 2$
 $-y \geq -x - 1$
 $y \leq x + 1$



14. A daughter is 28 years younger than her father. In 5 years, the father will be 3 times as old as his daughter. How old is each now?

$d = \text{daughter}$
 $f = \text{father}$

$$d = f - 28$$

$$3(d + 5) = f + 5$$

$$3d + 15 = f + 5$$

$$3d - f = -10$$

$$3(f - 28) - f = -10$$

$$3f - 84 - f = -10$$

$$2f = 74$$

$$f = 37$$

$$d = 37 - 28$$

$$d = 9$$

15. Milk that is 4% butterfat is mixed with milk that is 1% butterfat to obtain 18 gallons of milk that is 2% butterfat. How many gallons of each type of milk are needed?

$$.04(x) + .01(y) = .02(18)$$

$$x + y = 18$$

$$.04x + .01y = .36$$

$$\begin{cases} 4x + y = 36 \\ -x + y = 18 \end{cases}$$

$$3x = 18$$

$$x = 6$$

$$x + y = 18$$

$$y = 12$$

Simplify

16. $(5p^4)(6p^7)$

$30p^{11}$

17. $\left(\frac{4w^2}{6w^4}\right)^3$

$\left(\frac{2}{3w^2}\right)^3 = \frac{8}{27w^6}$

18. $(5x^{-1}y^3)^2(3x^4y^{-5})$

$(25x^{-2}y^6)(3x^4y^{-5}) = 75x^2y$

19. $\frac{(4x^2)^0}{(2)(2^{-1})}$

$= \frac{1}{1} = 1$

20. $(3.2 \times 10^5)(3.2 \times 10^5)$

$= 10.24 \times 10^{10} \rightarrow 1.024 \times 10^{11}$

$$\begin{array}{r} 3.2 \\ 3.2 \\ \hline 164 \\ 960 \\ \hline 10.24 \end{array}$$

Find the sum or difference. Express your answers in standard form.

21. $(3y^2 + 5y - 6) - (7y^3 - 2y + 4)$ $-7y^3 + 3y^2 + 7y - 10$

22. $(7 - 9x^2 + 3xy) + (3 - 2xy + x^2)$ $-8x^2 - xy + 10$

Find each product.

23. $(x+3)(x-4)$ $x^2 - x - 12$

24. $(4w+z)(2w+3z)$ $8w^2 + 12wz + 2wz + 3z^2 = 8w^2 + 14wz + 3z^2$

25. $(5d+1)(5d-1)$ $25d^2 - 1$

Factor each polynomial completely.

26. $9r^2 - 4$ $(3r-2)(3r+2)$

27. $m^2 - 10m + 25$ $(m-5)^2 = (m-5)(m-5)$

28. $b(b-5) + 2(b-5)$ $(b+2)(b-5)$

29. $7a^3 + 28a^2 - 35a$ $7a(a^2 + 4a - 5) = 7a(a+5)(a-1)$

30. $2r^2 - 7r - 15$ $\begin{array}{r} 30 \\ 1, 30 \\ 2, 15 \\ 3, 10 \end{array}$ $(2r^2 - 10r + 3r - 15)$
 $2r(r-5) + 3(r-5) = (2r+3)(r-5)$

Solve each equation by factoring.

31. $x^2 + 3x - 4 = 0$ $(x+4)(x-1) = 0$ $\begin{array}{l} x+4=0 \\ x=-4 \end{array}$ $\begin{array}{l} x-1=0 \\ x=1 \end{array}$ or $\begin{array}{l} x=-4 \\ x=1 \end{array}$

32. $t^2 - 4 = 0$ $(t+2)(t-2) = 0$ $\begin{array}{l} t+2=0 \\ t=-2 \end{array}$ $\begin{array}{l} t-2=0 \\ t=2 \end{array}$ or $\begin{array}{l} t=-2 \\ t=2 \end{array}$

33. $n^2 - 8n = -15$ $(n-3)(n-5) = 0$ $\begin{array}{l} n-3=0 \\ n=3 \end{array}$ $\begin{array}{l} n-5=0 \\ n=5 \end{array}$ or $\begin{array}{l} n=3 \\ n=5 \end{array}$
 ~~$n^2 - 8n + 15 = 0$~~

Simplify the radical, if possible.

34. $\sqrt{24} = \sqrt{4} \cdot \sqrt{6} = \boxed{2\sqrt{6}}$

35. $\sqrt{72} = \sqrt{36} \cdot \sqrt{2} = \boxed{6\sqrt{2}}$

36. $\sqrt{10} = \boxed{\sqrt{10}}$

Solve the equation using square roots.

34. $(x+1)^2 - 1 = 0$

$(x+1)^2 = 1$

$x = 0 \text{ or } x = -2$

35. $6(x-3)^2 - 12 = 0$

$6(x-3)^2 = 12$

$x-3 = \pm\sqrt{2}$

$x = 3 \pm \sqrt{2}$

36. $3x^2 = 135$

$x^2 = 45$

$x = \pm 3\sqrt{5}$

37. $\sqrt{x^2} = \frac{25}{81}$

$x = \pm \frac{5}{9}$

Solve the equation by completing the square.

38. $x^2 - 2x - 15 = 0$

$x^2 - 2x + \underline{\quad} = 15 + \underline{\quad}$

$x^2 - 2x + 1 = 15 + 1$

$(x-1)^2 = 16$

$x-1 = \pm 4$

$x = 5 \text{ or } x = -3$

39. $x^2 + 4x = 1$

$x^2 + 4x + 4 = 1 + 4$

$(x+2)^2 = 5$

$x+2 = \pm\sqrt{5}$

$x = -2 \pm \sqrt{5}$

40. $x^2 + x - 6 = 0$

$x^2 + x = 6$

$x^2 + x + .25 = 6.25$

$(x+.5)^2 = 6.25$

$x+.5 = \pm 2.5$

$x = 2 \text{ or } x = -3$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Find the discriminant and tell how many real solutions.

$b^2 - 4ac = \text{Discriminant}$

41. $3g^2 - 2g + 5 = 0$

$a=3$
 $b=-2$
 $c=5$

$(-2)^2 - 4(3)(5)$

$4 - 60 = -56$

$D < 0$

no real solutions

42. $-2x^2 + 7x = 5$

$-2x^2 + 7x - 5 = 0$

$a=-2$
 $b=7$
 $c=-5$

$(7)^2 - 4(-2)(-5)$

$49 - 40 = 9$

$D > 0$

two real solutions

Solve using the quadratic formula

43. $2y^2 - 8y = 8$

$a=2$ $b=-8$ $c=-8$

43. $x = \frac{8 \pm \sqrt{(-8)^2 - 4(2)(-8)}}{2(2)}$

$x = \frac{8 \pm \sqrt{64 + 64}}{4}$

$x = \frac{8 \pm \sqrt{128}}{4}$

$x = \frac{8 \pm 8\sqrt{2}}{4}$ $x = 2 \pm 2\sqrt{2}$

44. $x^2 + 9x = 0$

$a=1$ $b=9$ $c=0$

44. $x = \frac{-9 \pm \sqrt{(9)^2 - 4(1)(0)}}{2}$

$x = \frac{-9 \pm \sqrt{81}}{2}$

$x = \frac{-9 \pm 9}{2}$ $x = 0 \text{ or } x = -9$