

Equations in Two Variables

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- $3x + 2y = 6; 3 \cdot 10 + 2 \cdot (-12) = 6; 30 + (-24) = 6; 6 = 6; \text{Yes}$
- $3x + 2y = 6; 3 \cdot 8 + 2 \cdot (-5) = 6; 24 + (-10) = 6; 14 \neq 6; \text{No}$
- $3x + 2y = 6; 3 \cdot (-2) + 2 \cdot 0 = 6; -6 + 0 = 6; -6 \neq 6; \text{No}$
- $3x + 2y = 6; 3 \cdot 4 + 2 \cdot (-3) = 6; 12 + (-6) = 6; 6 = 6; \text{Yes}$
- $3x - 3y = 21; 3 \cdot 12 - 3 \cdot (-5) = 21; 36 - (-15) = 21; 36 + 15 = 21; 51 \neq 21; \text{No}$
- $3x - 3y = 21; 3 \cdot 5 - 3 \cdot (-2) = 21; 15 - (-6) = 21; 15 + 6 = 21; 21 = 21; \text{Yes}$
- $3x - 3y = 21; 3 \cdot (-1) - 3 \cdot 3 = 21; -3 - 9 = 21; -12 \neq 21; \text{No}$
- $3x - 3y = 21; 3 \cdot (-3) - 3 \cdot (-10) = 21; -9 - (-30) = 21; -9 + 30 = 21; 21 = 21; \text{Yes}$
- $2x - \frac{y}{2} = -8; 2 \cdot 3 - \frac{28}{2} = -8; 6 - 14 = -8; -8 = -8; \text{Yes}$
- $2x - \frac{y}{2} = -8; 2 \cdot (-5) - \left(\frac{-36}{2}\right) = -8; -10 - (-18) = -8; -10 + 18 = -8; 8 \neq -8; \text{No}$
- $5x + y = 10; 5x - 5x + y = 10 - 5x; y = 10 - 5x$
 (a) $y = 10 - 5x; y = 10 - 5 \cdot (-2); y = 10 - (-10); y = 10 + 10; y = 20$
 (b) $y = 10 - 5x; y = 10 - 5 \cdot 3; y = 10 - 15; y = -5$
- $2x + 5y = 5; 2x - 2x + 5y = 5 - 2x; 5y = 5 - 2x; \frac{5y}{5} = \frac{5}{5} - \frac{2}{5}x; y = 1 - \frac{2}{5}x$
 (a) $y = 1 - \frac{2}{5}x; y = 1 - \frac{2}{5} \cdot 15; y = 1 - 6; y = -5$
 (b) $y = 1 - \frac{2}{5}x; y = 1 - \frac{2}{5} \cdot (-5); y = 1 - (-2); y = 1 + 2; y = 3$
- $3y - 8x = 2; 3y - 8x + 8x = 2 + 8x; 3y = 2 + 8x; \frac{3y}{3} = \frac{2}{3} + \frac{8x}{3}; y = \frac{2}{3} + \frac{8}{3}x$
 (a) $y = \frac{2}{3} + \frac{8}{3}x; y = \frac{2}{3} + \frac{8}{3} \cdot 2; y = \frac{2}{3} + \frac{16}{3}; y = \frac{18}{3}; y = 6$
 (b) $y = \frac{2}{3} + \frac{8}{3}x; y = \frac{2}{3} + \frac{8}{3} \cdot (-1); y = \frac{2}{3} + \left(-\frac{8}{3}\right); y = -\frac{6}{3}; y = -2$
 (c) $y = \frac{2}{3} + \frac{8}{3}x; y = \frac{2}{3} + \frac{8}{3} \cdot \frac{1}{2}; y = \frac{2}{3} + \frac{4}{3}; y = \frac{6}{3}; y = 2$
- $3y - 6x = -3; 3y - 6x + 6x = -3 + 6x; 3y = 6x - 3; \frac{3y}{3} = \frac{6x}{3} - \frac{3}{3}; y = 2x - 1$
 (a) $y = 2x - 1; y = 2 \cdot (-4) - 1; y = -8 - 1; y = -9$
 (b) $y = 2x - 1; y = 2 \cdot 2 - 1; y = 4 - 1; y = 3$
- $2(x - 3) + 5 = 4y - 3(x + y); 2x - 6 + 5 = 4y - 3x - 3y; 2x - 1 = y - 3x; 2x - 1 + 3x = y - 3x + 3x; 5x - 1 = y; y = 5x - 1$
 (a) $y = 5x - 1; y = 5 \cdot (-2) - 1 = -10 - 1 = -11; y = -11$
 (b) $y = 5x - 1; y = 5 \cdot 3 - 1 = 15 - 1 = 14; y = 14$
- $3x + 4y = 12; 3x - 3x + 4y = 12 - 3x; 4y = 12 - 3x; \frac{4y}{4} = \frac{12}{4} - \frac{3x}{4}; y = 3 - \frac{3}{4}x$
 (a) $y = 3 - \frac{3}{4}x; y = 3 - \frac{3}{4} \cdot 8; y = 3 - \frac{24}{4}; y = 3 - 6; y = -3$
 (b) $y = 3 - \frac{3}{4}x; y = 3 - \frac{3}{4} \cdot (-4); y = 3 - \left(-\frac{12}{4}\right); y = 3 - (-3); y = 3 + 3; y = 6$
- $5x + 4y = 8; 5x - 5x + 4y = 8 - 5x; 4y = 8 - 5x; \frac{4y}{4} = \frac{8}{4} - \frac{5x}{4}; y = 2 - \frac{5}{4}x$
 (a) $y = 2 - \frac{5}{4}x; y = 2 - \frac{5}{4} \cdot (-4); y = 2 + \frac{20}{4}; y = 2 + 5; y = 7$
 (b) $y = 2 - \frac{5}{4}x; y = 2 - \frac{5}{4} \cdot 0; y = 2 - 0; y = 2$
 (c) $y = 2 - \frac{5}{4}x; y = 2 - \frac{5}{4} \cdot (-3); y = 2 - \left(-\frac{15}{4}\right); y = 2 + \frac{15}{4}; y = \frac{8}{4} + \frac{15}{4}; y = \frac{23}{4}; y = 5\frac{3}{4}$

18. $4x - 2y = 10$; $4x - 4x - 2y = 10 - 4x$;
 $-2y = 10 - 4x$; $\frac{-2y}{-2} = \frac{10}{-2} - \frac{4x}{-2}$; $y = -5 - (-2x)$;
 $y = -5 + 2x$
(a) $y = -5 + 2x$; $y = -5 + 2 \cdot (-2)$; $y = -5 + (-4)$;
 $y = -9$
(b) $y = -5 + 2x$; $y = -5 + 2 \cdot 5$; $y = -5 + 10$; $y = 5$
19. $2(2x - y) + 2 = y - 4$; $2 \cdot 2x - 2 \cdot y + 2 = y - 4$;
 $4x - 2y + 2 = y - 4$; $4x - 4x - 2y + 2 = y - 4 - 4x$;
 $-2y + 2 = y - 4 - 4x$; $-2y + 2 - 2 = y - 4 - 4x - 2$;
 $-2y = y - 6 - 4x$; $-2y - y = y - y - 6 - 4x$;
 $-3y = -6 - 4x$; $\frac{-3y}{-3} = \frac{-6}{-3} - \frac{4x}{-3}$; $y = 2 - \left(-\frac{4}{3}\right)x$;
 $y = 2 + \frac{4}{3}x$
(a) $y = 2 + \frac{4}{3}x$; $y = 2 + \frac{4}{3} \cdot (-3)$; $y = 2 + (-4)$;
 $y = -2$
(b) $y = 2 + \frac{4}{3}x$; $y = 2 + \frac{4}{3} \cdot 9$; $y = 2 + 12$; $y = 14$
20. $3x - 2y = -7$; $3x - 3x - 2y = -7 - 3x$;
 $-2y = -7 - 3x$; $\frac{-2y}{-2} = \frac{-7}{-2} - \frac{3x}{-2}$; $y = \frac{7}{2} - \left(-\frac{3}{2}\right)x$;
 $y = \frac{7}{2} + \frac{3}{2}x$
(a) $y = \frac{7}{2} + \frac{3}{2}x$; $y = \frac{7}{2} + \frac{3}{2} \cdot 3$; $y = \frac{7}{2} + \frac{9}{2}$; $y = \frac{16}{2}$;
 $y = 8$
(b) $y = \frac{7}{2} + \frac{3}{2}x$; $y = \frac{7}{2} + \frac{3}{2} \cdot (-1) = \frac{7}{2} + \left(-\frac{3}{2}\right)$;
 $y = \frac{4}{2}$; $y = 2$
21. $2(x + y) - 3(2x - 4) = 4(y - 2)$;
 $2 \cdot x + 2 \cdot y - 3 \cdot 2x - 3 \cdot (-4) = 4 \cdot y - 4 \cdot 2$;
 $2x + 2y - 6x + 12 = 4y - 8$;
 $2y - 4x + 12 = 4y - 8$;
 $2y - 4x + 4x + 12 = 4y - 8 + 4x$;
 $2y + 12 = 4y - 8 + 4x$;
 $2y + 12 - 12 = 4y - 8 - 12 + 4x$;
 $2y = 4y - 20 + 4x$; $2y - 4y = 4y - 4y - 20 + 4x$;
 $-2y = -20 + 4x$; $\frac{-2y}{-2} = \frac{-20}{-2} + \frac{4x}{-2}$;
 $y = 10 + (-2x)$; $y = 10 - 2x$
(a) $y = 10 - 2x$; $y = 10 - 2 \cdot 3$; $y = 10 - 6$; $y = 4$
(b) $y = 10 - 2x$; $y = 10 - 2 \cdot (-1)$; $y = 10 - (-2)$;
 $y = 10 + 2$; $y = 12$
- (c)** $y = 10 - 2x$; $y = 10 - 2 \cdot \left(-\frac{1}{3}\right)$; $y = 10 - \left(-\frac{2}{3}\right)$;
 $y = 10 + \frac{2}{3}$; $y = 10\frac{2}{3}$
22. $\frac{1}{3}x - \frac{2}{5}y = 4$; $\frac{1}{3}x - \frac{1}{3}x - \frac{2}{5}y = 4 - \frac{1}{3}x$;
 $-\frac{2}{5}y = 4 - \frac{1}{3}x$; $\left(-\frac{5}{2}\right) \cdot \left(-\frac{2}{5}y\right) = \left(-\frac{5}{2}\right) \cdot \left(4 - \frac{1}{3}x\right)$;
 $\left(-\frac{5}{2}\right) \cdot \left(-\frac{2}{5}\right)y = \left(-\frac{5}{2}\right) \cdot \left(-\frac{5}{2}\right)4 - \left(-\frac{5}{2}\right) \cdot \left(\frac{1}{3}x\right)$;
 $y = -\frac{20}{2} - \left(-\frac{5}{6}x\right)$; $y = -10 + \frac{5}{6}x$
(a) $y = -10 + \frac{5}{6}x$; $y = -10 + \frac{5}{6} \cdot 12$; $y = -10 + \frac{60}{6}$;
 $y = -10 + 10$; $y = 0$
(b) $y = -10 + \frac{5}{6}x$; $y = -10 + \frac{5}{6} \cdot (-6)$;
 $y = -10 + \left(-\frac{30}{6}\right)$; $y = -10 - 5$; $y = -15$
(c) $y = -10 + \frac{5}{6}x$; $y = -10 + \frac{5}{6} \cdot 3$; $y = -10 + \frac{15}{6}$;
 $y = -10 + 2\frac{3}{6}$; $y = -7\frac{3}{6}$; $y = -7\frac{1}{2}$
23. $\frac{x}{2} + \frac{2}{3}y = x - 2$; $\frac{x}{2} - \frac{x}{2} + \frac{2}{3}y = x - \frac{x}{2} - 2$;
 $\frac{2}{3}y = \frac{1}{2}x - 2$; $\frac{3}{2} \cdot \frac{2}{3}y = \frac{3}{2} \cdot \left(\frac{1}{2}x - 2\right)$;
 $y = \frac{3}{2} \cdot \frac{1}{2}x - \frac{3}{2} \cdot 2$; $y = \frac{3}{4}x - 3$
(a) $y = \frac{3}{4}x - 3$; $y = \frac{3}{4} \cdot (-8) - 3$; $y = -\frac{24}{4} - 3$;
 $y = -6 - 3$; $y = -9$
(b) $y = \frac{3}{4}x - 3$; $y = \frac{3}{4} \cdot 6 - 3$; $y = \frac{18}{4} - 3$;
 $y = 4\frac{1}{2} - 3$; $y = 1\frac{1}{2}$
24. **(a)** Let a represent the number of adult tickets and c represent the number of child tickets.
(b) $21a + 17c = 706$
(c) $21a + 17c = 706$; $21 \cdot 15 + 17c = 706$;
 $315 + 17c = 706$; $315 - 315 + 17c = 706 - 315$;
 $17c = 391$; $\frac{17c}{17} = \frac{391}{17}$; $c = 23$
(d) There are 23 children ages 12 and under.

25. (a) Let n represent the number of novels and r represent the number of reference books.
 (b) $28n + 52r = 984$
 (c) $28n + 52r = 984$; $28 \cdot 24 + 52r = 984$;
 $672 + 52r = 984$; $672 - 672 + 52r = 984 - 672$;
 $52r = 312$; $\frac{52r}{52} = \frac{312}{52}$; $r = 6$
 (d) There are 6 reference books in the box.
26. (a) Let g represent the number of pounds of grapes and p represent the number of pounds of peanuts.
 (b) $2.59g + 1.95p = 26.60$
 (c) $2.59g + 1.95p = 26.60$; $2.59 \cdot 5 + 1.95p = 26.60$;
 $12.95 + 1.95p = 26.60$; $12.95 - 12.95 + 1.95p$
 $= 26.60 - 12.95$; $1.95p = 13.65$;
 $\frac{1.95p}{1.95} = \frac{13.65}{1.95}$; $p = 7$
 (d) Lina bought 7 lb of peanuts.
27. (a) Let m represent the price of the embroidered shirts and s represent the price of the silk-screened shirts.
 (b) $68m + 97s = 2767.75$
 (c) $68m + 97s = 2767.75$;
 $68 \cdot 17.95 + 97s = 2767.75$;
 $1220.60 + 97s = 2767.75$;
 $1220.60 - 1220.60 + 97s = 2767.75 - 1220.60$;
 $97s = 1547.15$; $\frac{97s}{97} = \frac{1547.15}{97}$; $s = 15.95$
 (d) The silk-screened shirts cost \$15.95 each.
28. (a) Let j represent the number of tickets bought by juniors and s represent the number of tickets bought by the other students.
 (b) $15j + 18s = 2532$
 (c) $15j + 18s = 2532$; $15 \cdot 80 + 18s = 2532$;
 $1200 + 18s = 2532$;
 $1200 - 1200 + 18s = 2532 - 1200$;
 $18s = 1332$; $\frac{18s}{18} = \frac{1332}{18}$; $s = 74$
 (d) Seventy-four other students bought tickets to the fundraiser.
29. (a) Let l represent the number of large photos and s represent the number of small photos.
 (b) area of large photo: $1.5 \cdot 2 = 3$; 3 in^2
 area of small photo: $1.2 \cdot 1.5 = 1.8$; 1.8 in^2
 $3l + 1.8s = 162$
 (c) $3l + 1.8s = 162$; $3 \cdot 30 + 1.8s = 162$;
 $90 + 1.8s = 162$; $90 - 90 + 1.8s = 162 - 90$;
 $1.8s = 72$; $\frac{1.8s}{1.8} = \frac{72}{1.8}$; $s = 40$
 (d) Jake and Suki used 40 small photos.
30. (a) Let l represent the number of large pleats and s represent the number of small pleats.
 $6 \text{ yd} = 216 \text{ in.}$; $216 - 92.25 = 123.75$; 123.75 in.
 decrease
 (b) $2.5l + 1.75s = 123.75$
 (c) $2.5l + 1.75s = 123.75$; $2.5 \cdot 25 + 1.75s = 123.75$;
 $62.5 + 1.75s = 123.75$;
 $62.5 - 62.5 + 1.75s = 123.75 - 62.5$;
 $1.75s = 61.25$; $\frac{1.75s}{1.75} = \frac{61.25}{1.75}$; $s = 35$
 (d) The designer made 35 small pleats.