

1a $2 - x - 5 = 4x + 8 \Rightarrow 5x = -11 \Rightarrow x = -11/5$

1b $20\left(\frac{1}{2}x\right) = 20\left(\frac{4}{5}x - \frac{1}{4}\right) \Rightarrow 10x = 16x - 5 \Rightarrow x = 5/6$

2 Multiply both sides by $\frac{9}{5}$ to get $\frac{9}{5}C = F - 32$. Thus $F = \frac{9}{5}C + 32$.

3 Let x be the length of the equal sides, so that $2x - 15$ is the length of the third side. The perimeter is the sum of the lengths of the sides, and it is given to be 53. Thus we have

$$x + x + (2x - 15) = 53,$$

or $4x - 15 = 53$. From this we get $4x = 68$, and finally $x = 17$. Therefore the equal sides are 17 cm long, and the third side is 19 cm.

4 Let x be the original price of the suit. Then

$$x - 0.37x = x - 50$$

(37% off equals \$50 off). Then $0.37x = 50$, which solves to give $x = 50/0.37 \approx 135.14$. The original price is \$135.14.

5 Let x be the number of liters of pure dye to be added. We equate liters of pure dye:

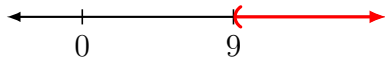
$$0.80x + 0.30(8) = 0.65(x + 8).$$

From this we obtain

$$0.15x = 2.8 \Rightarrow x = \frac{2.8}{0.15} = 18\frac{2}{3}.$$

That is, $18\frac{2}{3}$ liters of the 80% dye solution should be added.

6a $-3x < -27 \Rightarrow x > 9 \Rightarrow (9, \infty)$



6b $-6 \leq 2t \leq 12 \Rightarrow -3 \leq t \leq 6 \Rightarrow [-3, 6]$



7a $x \leq 15$ and $x \geq -7 \Rightarrow -7 \leq x \leq 15 \Rightarrow [-7, 15]$.

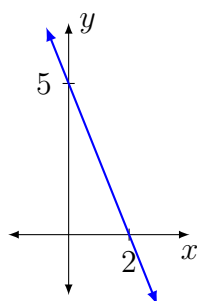
7b $3x < 24$ or $x > 10 \Rightarrow x < 8$ or $x > 10 \Rightarrow (-\infty, 8) \cup (10, \infty)$.

8 $7 - 3x = 16$ or $7 - 3x = -16 \Rightarrow -3x = 9$ or $-3x = -23 \Rightarrow x = -3$ or $x = \frac{23}{3} \Rightarrow \left\{-3, \frac{23}{3}\right\}$

9a $3r - 1 > 11$ or $3r - 1 < -11 \Rightarrow r > 4$ or $r < -\frac{10}{3} \Rightarrow (-\infty, -\frac{10}{3}) \cup (4, \infty)$

9b The inequality becomes $|z - 2| \leq -8$, and so the solution set is \emptyset (i.e. there is no solution). An absolute value can never be less than 0.

10 x -intercept is $(2, 0)$, and y -intercept is $(0, 5)$.



11 Midpoint is at $\left(\frac{2+6}{2}, \frac{-3-8}{2}\right) = \left(4, -\frac{11}{2}\right)$

12 One line has equation $y = 2x - 3$ and thus slope 2, and the other line has equation $y = -\frac{1}{2}x + \frac{3}{2}$ and thus slope $-\frac{1}{2}$. Since the slopes are negative reciprocals, the lines are perpendicular.

13 Slope of the line is

$$m = \frac{10 - 6}{-8 - (-2)} = -\frac{4}{6} = -\frac{2}{3},$$

and so the equation is $y - 6 = -\frac{2}{3}(x + 2)$. Slope-intercept form:

$$y = -\frac{2}{3}x + \frac{14}{3}.$$

Standard form: $2x + 3y = 14$.

14 The line $4x - y = 7$, which can be written $y = 4x - 7$, has slope 4. Thus, the line whose equation we must find has point $(-2, -3)$ and slope 4 also, which gives us the equation $y + 3 = 4(x + 2)$ by the point-slope formula. Slope-intercept form: $y = 4x + 5$. Standard form: $4x - y = -5$.

$$\mathbf{15a} \quad 2p^{-3} = \frac{2}{p^3}$$

$$\mathbf{15b} \quad (v^5)^{-4}v^8 = v^{-20}v^8 = v^{-12} = \frac{1}{v^{12}}$$

$$\mathbf{15c} \quad \frac{(2k)^2m^{-6}}{(km)^{-3}} = \frac{4k^2m^{-6}}{k^{-3}m^{-3}} = \frac{4k^2k^3}{m^6m^{-3}} = \frac{4k^5}{m^3}$$