SOLUTIONS

1. $d = \sqrt{(1-(-3))^2 + (7-4)^2}$

$d = \sqrt{4^2 + 3^2}$

$d = \sqrt{25}$

$d = 5$

2. $d = \sqrt{(-2-4)^2 + (-1-6)^2}$

$d = \sqrt{(-6)^2 + (-7)^2}$

$d = \sqrt{36+49}$

$d = \sqrt{85}$

3. $x = \frac{-2+4}{2}, \quad y = \frac{-1+6}{2}$

$x = \frac{2}{2}, \qquad y = \frac{5}{2}$

$x = 1, \qquad y = \frac{5}{2}$

4. $\frac{3x-6}{x-2} = \frac{3(x-2)}{x-2} = 3$

5. $\frac{3x}{x-1} \cdot \frac{5x-5}{27x^3} = \frac{3x}{x-1} \cdot \frac{5(x-1)}{3 \cdot 9 \cdot x \cdot x \cdot x} = \frac{5}{9x^2}$

6. $\frac{2c+6}{c^2-1} \div \frac{2}{c-1} = \frac{2c+6}{c^2-1} \cdot \frac{c-1}{2} = \frac{2(c+3)(c-1)}{2(c+1)(c-1)} = \frac{c+3}{c+1}$

7. $\frac{3r^2(20)}{4(5r^3)} = \frac{3 \cdot r \cdot r \cdot 4 \cdot 5}{4 \cdot 5 \cdot r \cdot r \cdot r} = \frac{3}{r}$

8. $AB^2 + BC^2 = AC^2$

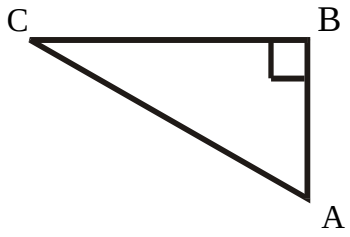
$AB^2 = AC^2 - BC^2$

$AB^2 = 32^2 - 24^2$

$AB^2 = 1024 - 576$

$AB^2 = 448$

$AB = \sqrt{448} = 21.2 \ \textit{units}$



9. $12^2 + 16^2 = x^2$

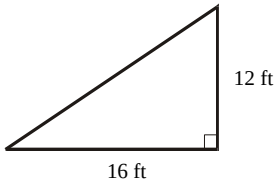
$144 + 256 = x^2$

$400 = x^2$

$x^2 = 400$

$\sqrt{x^2} = \sqrt{400}$

$x = 20 \ \textit{feet}$



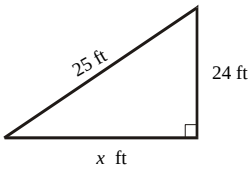
10. $x^2 + 24^2 = 25^2$

$x^2 + 576 = 625$

$x^2 = 49$

$\sqrt{x^2} = \sqrt{49}$

$x = 7$ *feet*



11. $6^2 + 8^2 = x^2$

$36 + 64 = x^2$

$100 = x^2$

$x^2 = 100$

$\sqrt{x^2} = \sqrt{100}$

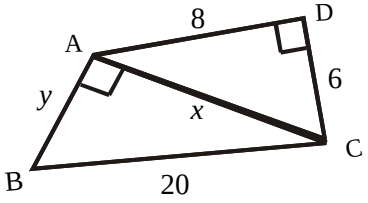
$x = 10$ *units*

$y^2 + 10^2 = 20^2$

$y^2 + 100 = 400$

$y^2 = 300$

$y = 10\sqrt{3} \approx 17.32$ *units*



12. $p = 4s$, *where s is the length of a side*

$4s = p$

$4s = 24$

$s = 6$ *units*

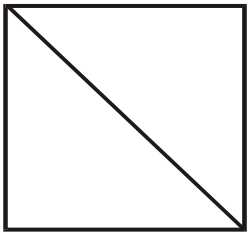
$6^2 + 6^2 = d^2$, *where d is the diagonal*

$36 + 36 = d^2$

$72 = d^2$

$d^2 = 72$

$d = \sqrt{72} = 6\sqrt{2} \approx 8.49$ *units*

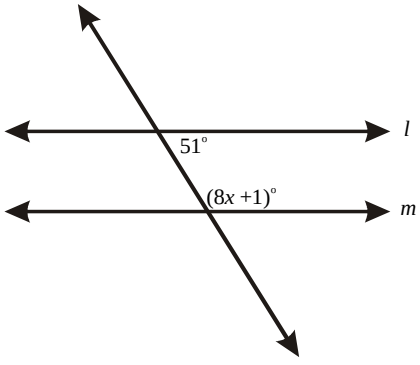


13. $51 + (8x + 1) = 180$ *since consecutive interior angles are supplementary*

$8x + 52 = 180$

$8x = 128$

$x = 16$ *units*

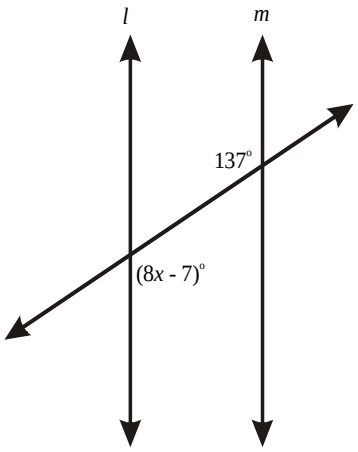


14. $(8x-7)=137$ *since alternate interior angles are congruent*

$8x - 7 = 137$

$8x = 144$

$x = 18$ *units*



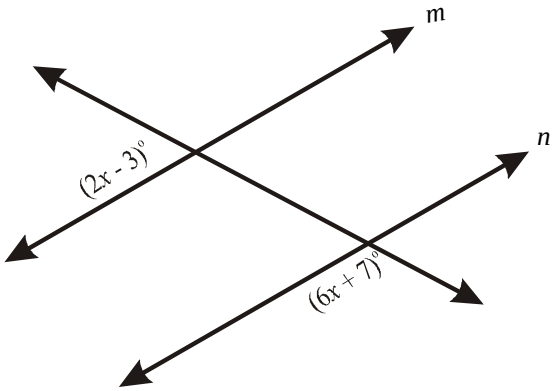
15.

$(2x-3)+(6x+7)=180$

$8x + 4 = 180$

$8x = 176$

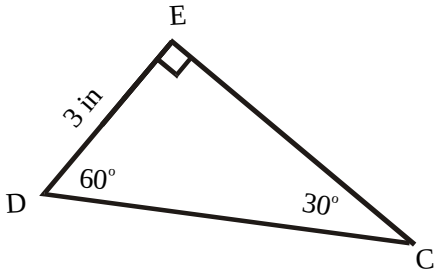
$x = 22$ *units*



16. The ratio of the sides in a 30°-60°-90° triangle is $1:\sqrt{3}:2$, so:

$\frac{1}{3} = \frac{2}{CD}$

$CD = 6$ *in.*

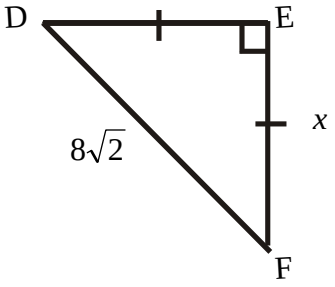


17. The ratio of the sides in a 45°-45°-90° triangle is $1:1:\sqrt{2}$, so:

$\frac{1}{x} = \frac{\sqrt{2}}{8\sqrt{2}}$

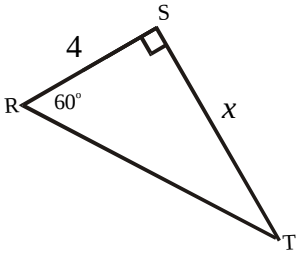
$\sqrt{2}x = 8\sqrt{2}$

$x = 8$ *units*



18. $\frac{1}{4} = \frac{\sqrt{3}}{x}$

$x = 4\sqrt{3}$ *units*

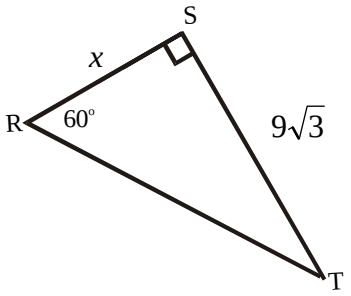


19. $\frac{1}{x} = \frac{\sqrt{3}}{9\sqrt{3}}$

$\sqrt{3}x = 9\sqrt{3}$

$\frac{\sqrt{3}x}{\sqrt{3}} = \frac{9\sqrt{3}}{\sqrt{3}}$

$x = 9$ *units*

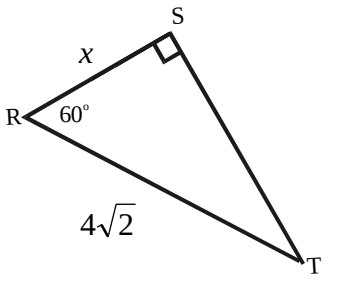


20. $\frac{1}{x} = \frac{2}{4\sqrt{2}}$

$2x = 4\sqrt{2}$

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

$x = 2\sqrt{2}$ *units*

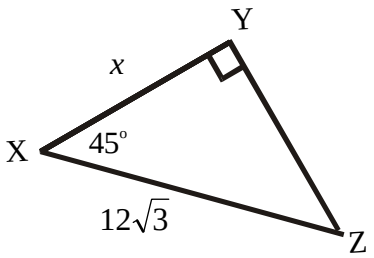


21. $\frac{1}{x} = \frac{\sqrt{2}}{12\sqrt{3}}$

$\sqrt{2}x = 12\sqrt{3}$

$\frac{\sqrt{2}x}{\sqrt{2}} = \frac{12\sqrt{3}}{\sqrt{2}}$

$x = \frac{12\sqrt{3}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{6}}{\sqrt{4}} = \frac{12\sqrt{6}}{2} = 6\sqrt{6}$ *units*



22. $\frac{(2a^4)(3a^2)}{6a^3} = \frac{6a^{4+2}}{6a^3} = \frac{6a^6}{6a^3} = \frac{a^{6-3}}{a^{3-3}} = \frac{a^3}{a^0} = \frac{a^3}{1} = a^3$

23. $(2x^{-2})^3 = 2^3 x^{-2\cdot 3} = 8x^{-6} = \frac{8}{x^6}$

24. $\frac{c^3 d^7}{c^{-3} d^{-1}} = \frac{c^{3-(-3)} d^{7-(-1)}}{c^{-3-(-3)} d^{-1-(-1)}} = \frac{c^6 d^8}{c^0 d^0} = \frac{c^6 d^8}{1 \cdot 1} = c^6 d^8$

25. $8\left(x^5 y^{-2} z^6\right)^0$ Remember that anything to the zero power is 1.

$8 \cdot (1) = 8$

26. Slope = $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-9}{0-(-9)} = \frac{-8}{9}$

$(y - y_1) = m(x - x_1)$

$(y - 9) = \frac{-8}{9}(x - (-9))$

$y - 9 = \frac{-8}{9}x - \frac{8}{9}(9)$

$y - 9 = \frac{-8}{9}x - 8$

$y = \frac{-8}{9}x + 1$

27. $(y - y_1) = m(x - x_1)$

$(y - (-4)) = \frac{2}{5}(x - 3)$

$y + 4 = \frac{2}{5}x + \frac{2}{5}(-3)$

$y + 4 = \frac{2}{5}x - \frac{6}{5}$

$y = \frac{2}{5}x - \frac{6}{5} - \frac{20}{5}$

$y = \frac{2}{5}x - \frac{26}{5}$

28. Using $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1-6}{-2-4} = \frac{-7}{-6} = \frac{7}{6}$, $m = \frac{7}{6}$.

$(y - y_1) = m(x - x_1)$

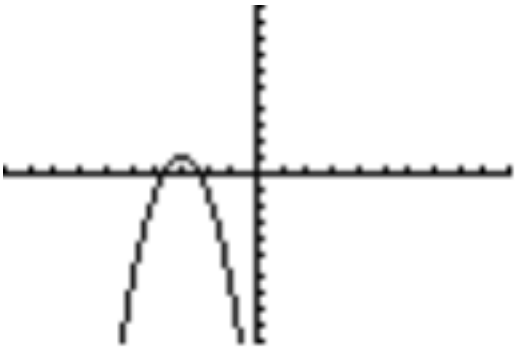
$(y - (-1) = \frac{7}{6}(x - (-2))$

$y + 1 = \frac{7}{6}(x + 2)$

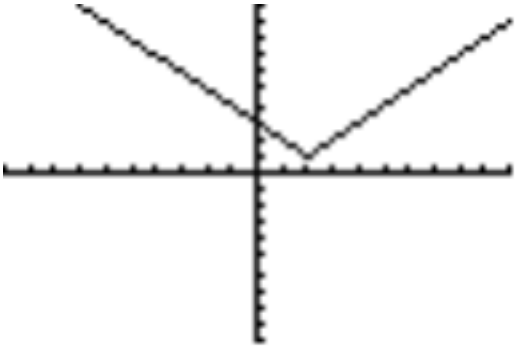
$y + 1 = \frac{7}{6}x + \frac{7}{3}$

$y = \frac{7}{6}x + \frac{4}{3}$

29.



30.



$a = 4, b = -3, c = -2$

$x = \dfrac{3 \pm \sqrt{(-3)^2 - 4(4)(-2)}}{2(4)}$

31. $x = \dfrac{3 \pm \sqrt{9 + 32}}{8}$

$x = \dfrac{3 \pm \sqrt{41}}{8}$

$9n^2 - 6n - 24 = 0$

$3(3n^2 - 2n - 8) = 0$

$3(3n + 4)(n - 2) = 0$

32. $3n + 4 = 0$ *and* $n - 2 = 0$

$3n = -4$ *and* $n = 2$

$n = \dfrac{-4}{3}$ *and* $n = 2$

$5y^2 - 6 = 7y$

$5y^2 - 7y - 6 = 0$

$(5y + 3)(y - 2) = 0$

33. $5y + 3 = 0$ *and* $y - 2 = 0$

$5y = -3$ *and* $y = 2$

$y = \dfrac{-3}{5}$ *and* $y = 2$

$-2(x - 2)^2 + 98 = 0$

$-2(x - 2)^2 = -98$

$\dfrac{-2(x - 2)^2}{-2} = \dfrac{-98}{-2}$

34. $(x - 2)^2 = 49$

$\sqrt{(x - 2)^2} = \pm\sqrt{49}$

$x - 2 = \pm 7$

$x = 2 \pm 7$

$x = 9$ *or* $x = -5$

$\sqrt{-50}$

35. $\sqrt{25} \cdot \sqrt{2}\sqrt{-1}$

$5i\sqrt{2}$

$(2 + 3i) - (-1 - 6i)$

36. $(2 + 3i) + (1 + 6i)$

$2 + 3i + 1 + 6i$

$3 + 9i$

$(3 - 2i)(7 + 6i)$

$21 + 18i - 14i - 12i^2$

37. $21 + 4i - 12(-1)$

$21 + 4i + 12$

$33 + 4i$

$\frac{3}{2+3i} =$

38. $\frac{3}{2+3i} \cdot \frac{(2-3i)}{(2-3i)} = \frac{6-9i}{4-6i+6i-9i^2} =$

$\frac{6-9i}{4-9(-1)} = \frac{6-9i}{13}$

$2x^3 + 3x^2 - 8x - 12$

$2x^3 - 8x + 3x^2 - 12$

39. $2x(x^2-4) + 3(x^2-4)$

$(x^2-4)(2x+3)$

$(x+2)(x-2)(2x+3)$

$6x^2 + 21x + 15$

40. $3(2x^2 + 7x + 5)$

$3(2x+5)(x+1)$

41. $x^2 - 10x + 24$

$(x-6)(x-4)$

42. $x^2 - 5x - 6$

$(x-6)(x+1)$

43. $5xy(a^2-2)$

44. $(x+9)(x-2)$

45. $(-2x+3)(x-5)$

46. $(3ab^2 - 5b^2)(3ab^2 + 5b^2)$

47. $(x-4)(x^2+4x+16)$

48. $(2x+5)(4x^2 - 10x + 25)$

49. $y = x^2$

Domain: All real numbers
Range: All real numbers ≥ 0

50. $g(x) = x + 2$

Domain: All real numbers
Range: All real numbers

51. $y = |x+2|$

Domain: All real numbers
Range: All real numbers greater than 0

$\sqrt{2x-4} = -3$

$(\sqrt{2x-4})^2 = (-3)^2$

$2x - 4 = 9$

52. $2x = 13$

$x = \frac{13}{2}$

$x \neq \frac{13}{2}$ *Extraneous*!

$\sqrt{x+7} = x+1$

$(\sqrt{x+7})^2 = (x+1)^2$

$x + 7 = (x+1)(x+1)$

$x + 7 = x^2 + 2x + 1$

53. $0 = x^2 + x - 6$

$0 = (x+3)(x-2)$

$x = -3$ *and* $x = 2$

$x \neq -3$ *Extraneous*!

Therefore $x = 2$

$\sqrt{x+4} = \sqrt{3x}$

$(\sqrt{x+4})^2 = (\sqrt{3x})^2$

54. $x + 4 = 3x$

$4 = 2x$

$x = 2$