Section 1.3

1. a. \(3\times4 = 4 + 4 + 4 + 4 = 12\)
   b. \(3^4 = 3\times3\times3\times3 = 81\)

3. a. \(2^4 = 2\times2\times2\times2 = 16\)
   b. \(1^5 = 1\); multiplying 1 times itself any number of times is still 1.
   c. \(\left(\frac{1}{4}\right)^2 = \frac{1}{4} \times \frac{1}{4} = \frac{1}{16}\)
   d. \((-3)^2 = -3 \times -3 = 9\)
   e. \((-3)^3 = -3 \times -3 \times -3 = -27\)

5. a. 1
   b. Any nonzero real number raised to the zeroth power equals 1.

7. a. The numbers in c, d, and e are different but are so close to 0 that they appear to lie in the same spot on the number line.

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\[\begin{array}{cccccc}
e & d & 0.5 & 1 & 1.5 & 2 \\
0 & & & & & \\
\end{array}\]
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b. 0
\[10^{-3} = .00001\]
\[10^{-6} = .000001\]
\[10^{-7} = .0000001\]
c. No, the numbers get closer to 0 but never become negative.

9. a. \(1.089 \times 10^3\) feet/second
b. \(4.84 \times 10^6\) miles
c. \(2.0 \times 10^{-3}\) m

11. a. The temperature of the earth's atmosphere warms \(0.035\)°F per year. Divide by 100 years.

b. 365 to find the temperature rise per day. Enter .035 + 365, the calculator displays 9.59 \times 10^{-5}\)°F.
scientific notation: 9.59 \times 10^{-5}\)°F
decimal notation: .0000959°F

b. \(51 \times 270000000 = 1.377 \times 10^{10}\) g/day
scientific notation: \(1.377 \times 10^{10}\) g/day
decimal notation: 13,770,000,000 g/day

13. c is the incorrect answer, 144 + 2 = 72 not 12.

15. a. 10 is slightly greater than the perfect square 9, so \(\sqrt{10}\) is a bit more than \(3\). A good estimate is 3.1.

b. 42 is about halfway between the perfect squares 36 and 49, so \(\sqrt{42}\) is about halfway between \(\sqrt{36} = 6\) and \(\sqrt{49} = 7\). A good estimate is 6.5.

c. 80 is slightly less than the perfect square 81, so \(\sqrt{80}\) is a slightly less than \(\sqrt{81} = 9\). A good estimate is 8.9.

Skills and Review 1.3

17. a. \(15\) minutes \(\times\) \(\frac{1\) hour}{60\) minutes} = \(15\) hours \(\div\) \(60\) hours
= \(\frac{1}{4}\) hours
= .25 hours

b. 0 minutes = 0 hours

c. 30 minutes \(\times\) \(\frac{1\) hour}{60\) minutes} = \(30\) hours \(\div\) \(60\) hours
= \(\frac{1}{2}\) hours
= .5 hours