HW6 Solutions: Section 12.1:

(4) a. $\$2.30 + c = \$4.00$

b. $8+3=s$

c. $360 \div 6 = n$

d. $(10 \times 12) \div 30 = m$.

(6) a. Distributive property.

b. Commutativity and associativity of addition

c. Commutativity and associativity of multiplication.

d. Distributivity e. Distributivity f. Distributivity.

(7) a. $x(x+5)$ b. $(x \cdot 4)x$ c. $10(n+m)$

d. $(y+3y)+2$ e. $1x^3 = x^3$ f. $\frac{4}{3}n^2 + 0 = \frac{4}{3}n^2$

g. $\frac{3}{4}\left(\frac{x}{y} \cdot \frac{y}{x}\right) = \frac{3}{4} \cdot 1 = \frac{3}{4}$.

(8) $2 \cdot 5^3 - 3 \cdot 5 = 235 \neq 135$.

So $x=5$ does not make $2x^3 - 3x = 135$ true and therefore is not a solution.

(10) a. $x + 2x + (x+12) + (x-3)$

b. $(x+2x+(x+12)+(x-3)) \div 4$

c. $(x-15) + (2x-15) + (x+12-15) + (x-3-15)$.

d. $x + 2x + (x+12) + (x-3) = 119$

$5x + 9 = 119$

$5x = 110$ $x = 22$

$\boxed{\text{Four people had: } 22, 44, 34, 19.}$

e. Suppose Bob has \$9 more than Jim and Tom has 3 times as much as Jim. Together they have \$36. How much money does each have?

$x + x + 9 + 3x = 36$.

$5x + 9 = 36$

$5x = 36 - 9 = 27$ $x = \frac{27}{5} = 5.4$.

Bob has \$14.4, Jim has \$5.4, Tom has \$16.2.

(13) a. $6d$ b. nd c. $2d + 17.95$

d. $0.7d$ e. $40-d$ f. $0.07d$.

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(14) a. $2(x+2+x) = 4x+4$ in b. $x+x+1+x-7 = 3x-6$ in.

c. 45 in. d. $n+n+5+2n+8+2n+7 = 6n+20$ in.

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(15) The first problem requires adding 3 fifties while the second problem requires adding 50 threes. Even though, algebraically, these are the same operation, conceptually they are different: adding 3 things should be easier. So the first problem was probably the one children found easier.

Section 12.2:

(3) a.

$$\begin{array}{r} 6\cdot 10^2 + 4\cdot 10 + 2 \\ + \quad 1\cdot 10^2 + 8\cdot 10 + 8 \\ \hline 7\cdot 10^2 + 12\cdot 10 + 10 \end{array}$$

$= 8\cdot 10^2 + 2\cdot 10 + 10 =$

$= 8\cdot 10^2 + 3\cdot 10. = 830.$

b.

$$\begin{array}{r} 6x^2 + 4x + 2 \\ + \quad x^2 + 8x + 8 \\ \hline 7x^2 + 12x + 10 \end{array}$$

In both cases we add coefficients of powers of 10 or powers of x.

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(5) a. $\frac{5}{16} + \frac{7}{16} = \frac{5+7}{16} = \frac{12}{16} = \frac{3}{4}.$

b. $\frac{3x}{y} + \frac{2x+1}{y} = \frac{3x+(2x+1)}{y} = \frac{5x+1}{y}$

c. $\frac{5}{x+2} + \frac{x}{x+2} = \frac{5+x}{x+2}$

In all three cases, pairs have same denominators and we just add numerators.

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(6) a. $\frac{5}{8} + \frac{3}{4} = \frac{5}{8} + \frac{3\cdot 2}{4\cdot 2} = \frac{5}{8} + \frac{6}{8} = \frac{5+6}{8} = \frac{11}{8}$

b. $\frac{3x}{(x+2)(x+3)} + \frac{2}{x+2} = \frac{3x}{(x+2)(x+3)} + \frac{2(x+3)}{(x+2)(x+3)} = \frac{3x+2(x+3)}{(x+2)(x+3)} =$

$= \frac{5x+6}{(x+2)(x+3)}$

In both cases, one denominator is a multiple of another. So we use this to find the common denominator.

7. a. $\frac{7}{9} - \frac{2}{9} = \frac{7-2}{9} = \frac{5}{9}$.

b. $\frac{2x}{7y} - \frac{4}{7y} = \frac{2x-4}{7y}$

In both cases, the pairs have same denominators, so we just subtract numerators

8. a. $\frac{3}{4} - \frac{1}{7} = \frac{3\cdot 7}{4\cdot 7} - \frac{1\cdot 4}{4\cdot 7} = \frac{21-4}{4\cdot 7} = \frac{17}{28}$

b. $\frac{3}{xy} - \frac{4x}{9n} = \frac{3\cdot 9n}{xy\cdot 9n} - \frac{4x\cdot xy}{9n\cdot xy} = \frac{27n - 4x^2y}{9xyn}$

In both cases, we find the common denominator by multiplying the denominators of pairs.

10. a. $\frac{5}{6} \div \frac{2}{3} = \frac{5}{6} \times \frac{3}{2} = \frac{15}{12} = \frac{5}{4}$.

b. $\frac{x^2}{2y} \div \frac{xy}{3} = \frac{x^2}{2y} \times \frac{3}{xy} = \frac{3x^2}{2yxy} = \frac{3x}{2y^2}$

In both cases, the quotient was found by inverting the divisor and then multiplying.

Section 12.3:

1. a. ABAB ; B b. ABBA ; B c. 9.7, 10.5, 11.3, 12.1 ; 21.7.

d. 80, 75, 70, 65; −45 e. 162, 486, 1458, 4374

f. 0.3125, 0.15625, 0.078125, 0.0390625.

g. $\frac{1}{6}, \frac{1}{7}, \frac{1}{8}, \frac{1}{9}; \frac{1}{100}$ h. $\frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9}; \frac{100}{101}$.

i. 2, 4, 6, 8 ; 4 j. 2, 8, 5, 7 ; 8.

k. c and d are arithmetic series.

l. e and f are geometric series.

3. a. Count how many zeros are in the power of 10 and move the decimal ~~point~~ that many places to make a smaller number.

b. This method works because our number system is a decimal system.

c. $1\% = \frac{1}{100}$th part, so finding 1% of something would be equivalent to dividing by 100.
$10\% = \frac{1}{10}$th part, so finding 10% of something would be equivalent to dividing by 10.

4 a. 2006 $(10 + 4 \times 499)$ b. $24\frac{3}{4}$ $\left(6\frac{3}{4} + \frac{3}{4} \times 24\right)$ c. 7 $(7 + 50 \times 5)$ d. 16. $(16 + 100 \times 4.5)$

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5 a. 13, 21, 34, 55.

b. For $n=1$, $\dfrac{(1+\sqrt{5})^1 - (1-\sqrt{5})^1}{2^1\sqrt{5}} = \dfrac{2\sqrt{5}}{2\sqrt{5}} = 1.$

For $n=2$, $\dfrac{(1+\sqrt{5})^2 - (1-\sqrt{5})^2}{2^2\sqrt{5}} = \dfrac{(1+2\sqrt{5}+5)-(1-2\sqrt{5}+5)}{4\sqrt{5}} = \dfrac{4\sqrt{5}}{4\sqrt{5}} = 1.$

c. The values get closer and closer to 1.618 ($\frac{1+\sqrt{5}}{2}$, exactly).

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8 a. 9 b. 9 c. 1

d. The <u>ones</u> digits follow a repeating cycle of four digits: 7, 9, 3, 1. Find out how many full cycles there are in n, and look at the remainder by calculating $n \div 4$, which will tell you which number to go to in the cycle. For example, 7^{778} will end in 9 because $778 \div 4 = 194$ with remainder 2.

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9 The square numbers are so called because they give the areas of squares with whole-number sides. If the side of a square is s then s^2 gives the area of the square.

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10 a. The first eight triangular numbers are:

1, 3, 6, 10, 15, 21, 28, 36,

with differences between two consecutive numbers increasing by 1 each time.

b. Yes, each bottom row increases by 1 from one triangle to the next.