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Problem 1:

4	$1\frac{1}{2}$	2
$\frac{1}{2}$	$2\frac{1}{2}$	$4\frac{1}{2}$
3	$3\frac{1}{2}$	1

Total: $7\frac{1}{2}$

Problem 2:

9	$10\frac{1}{2}$	3
$1\frac{1}{2}$	$7\frac{1}{2}$	$13\frac{1}{2}$
12	$4\frac{1}{2}$	6

Total: $22\frac{1}{2}$

Problem 3:

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

Total: 5

Problem 4:

$\frac{3}{4}$	2	$\frac{1}{4}$
$\frac{1}{2}$	1	$1\frac{1}{2}$
$1\frac{3}{4}$	0	$1\frac{1}{4}$

Total: 3

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Problem 1: ? = 5,200

Explanation: Remove $\bullet$ from both sides on 2nd balance so $\square\square = 2,400$. Divide both sides in thirds so $\triangle = 800$. Substitute 800 for each $\triangle$ on 1st balance so $100 + \bullet\bullet = \smile + 800 + 800 + 800 + 800 + 800$. Remove $100 + \smile$ from both sides so $\bullet\bullet = 3,900$. Divide in thirds so $\smile = 1,300$. $\bullet\bullet = 1,300 \times 4 = 5,200$

Problem 2: ? = 2,000

Explanation: Divide both sides on 2nd balance in half so $\smile = \blacklozenge\blacksquare$. Substitute $\blacklozenge\blacksquare$ for $\smile$ on 1st balance so $\ominus\blacklozenge\blacksquare\blacklozenge\blacksquare = 1,000 + \ominus$. Remove $\ominus$ from both sides so $\blacklozenge\blacksquare\blacklozenge\blacksquare = 1,000$. Divide above in half so $\blacklozenge\blacksquare = 500$. Substitute 1,000 for $\blacklozenge\blacksquare$ on 2nd balance so $\ominus = 1,000$. Divide in half so $\smile = 500$. $\ominus\blacklozenge\smile = 1,000 + 500 + 500 = 2,000$.

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Problem 1: b = 8

c = 70

d = 90

a x c = 420

Problem 2: a = 80

c = 30

d = 6

b x c = 1,500

Problem 3: a = 900

b = 500

d = 90

a x d = 81,000

Problem 4: a = 10

b = 1,000

c = 100

b x d = 1,000,000

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Problem 1: ? = $\frac{1}{10}$

Explanation: Remove $\triangle$ from both sides on 2nd balance so $\bullet\blacklozenge\blacklozenge\bullet = \square$. Divide both sides in half so $\bullet\blacklozenge = \triangle$. Substitute $\triangle$ for $\bullet\blacklozenge$ on 1st balance so $\square\square\square = \frac{1}{2}$. Divide both sides into fifths so $\triangle = \frac{1}{10}$.

Problem 2: ? = 360

Explanation: Divide both sides on 2nd balance in fifths so $\smile = 160$. Double so $\ominus = 320$. Substitute 320 for each $\ominus$ on 1st balance so $\blacklozenge\blacklozenge + 100 = \blacklozenge + 320 + 320$. Remove $100 + \blacklozenge$ from both sides so $\blacklozenge\blacklozenge = 540$. Divide both sides in thirds so $\blacklozenge = 180$. $\blacklozenge = 180 \times 2 = 360$.

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Problem 1:

$1\frac{3}{5}$	$\frac{1}{5}$	$1\frac{1}{5}$
$\frac{3}{5}$	1	$1\frac{2}{5}$
$\frac{4}{5}$	$1\frac{4}{5}$	$\frac{2}{5}$

Total: 3

Problem 2:

$\frac{1}{3}$	$1\frac{1}{2}$	$\frac{2}{3}$
$1\frac{1}{6}$	$\frac{5}{6}$	$\frac{1}{2}$
1	$\frac{1}{6}$	$1\frac{1}{3}$

Total: $2\frac{1}{2}$

Problem 3:

$\frac{5}{9}$	$1\frac{1}{9}$	$\frac{1}{3}$
$\frac{4}{9}$	$\frac{2}{3}$	$\frac{8}{9}$
1	$\frac{2}{9}$	$\frac{7}{9}$

Total: 2

Problem 4:

$\frac{1}{12}$	$\frac{1}{2}$	$\frac{5}{12}$
$\frac{2}{3}$	$\frac{1}{3}$	0
$\frac{1}{4}$	$\frac{1}{6}$	$\frac{7}{12}$

Total: 1

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Problem 1: a = 48

c = 8

d = 4

b ÷ d = 16

Problem 3: a = 100

b = 5

d = 10

b ÷ c = 1

Problem 2: b = 360

c = 3

d = 6

a ÷ c = 80

Problem 4: a = 1

b = 2

c = 2

a ÷ d = 2

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Problem 1: ? = $\frac{1}{12}$

Explanation: Double both sides on 2nd balance so $\bullet = \frac{1}{2}$. Substitute $\frac{1}{2}$ for $\bullet$ on 1st balance so $\blacklozenge + \frac{1}{2} = \square\square\blacklozenge\square\square$. Remove $\blacklozenge$ both sides so $\frac{1}{2} = \square\square$. Divide both sides in thirds so $\frac{1}{6} = \square$. Divide both sides in half so $\triangle = \frac{1}{12}$.