

Math 303

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- #1. (a) 5:21 (y consonant) (b) 21:5 (c) 21:26
 3:10 (y vowel) 10:3 10:13
 1:4 (y consonant or vowel) 4:1 1:5

(d) (Answers will vary)

Samples: write, scale

#2. (a) 2:5 There are $2x$ boys and $3x$ girls.
 The total number of students is $2x + 3x = 5x$.
 The ratio $2x : 5x$ simplifies to 2:3.

(b) $m : (m+n)$ (c) $1 - \frac{3}{5} = \frac{2}{5}$ Therefore $\frac{2}{5}$ of the class is boys.
 $\frac{3}{5} : \frac{2}{5}$ simplifies to 3:2.

#3. (a) $\frac{12}{x} = \frac{18}{45}$

$$\frac{45 \cdot 12}{45 \cdot x} = \frac{18x}{45x}$$

$$540 = 18x$$

$$30 = x$$

(b) $\frac{x}{7} = \frac{-10}{21}$

$$\frac{3x}{3 \cdot 7} = \frac{-10}{3 \cdot 7}$$

$$3x = -10$$

$$x = -\frac{10}{3} = -3\frac{1}{3}$$

(c) $\frac{5}{7} = \frac{3x}{98}$

$$\frac{5 \cdot 14}{7 \cdot 14} = \frac{3x}{7 \cdot 14}$$

$$70 = 3x$$

$$x = \frac{70}{3} = 23\frac{1}{3}$$

(d) $\frac{3\frac{1}{2}}{5} = \frac{x}{15}$

$$\frac{(3\frac{1}{2})(3)}{5 \cdot 3} = \frac{x}{5 \cdot 3}$$

$$x = 9\frac{3}{2} = 10\frac{1}{2}$$

#4. $\frac{2}{5} = \frac{N}{90}$

$$\frac{2 \times 18}{5 \times 18} = \frac{N}{5 \times 18}$$

$$N = 36$$

The 90-pound person would have approximately 36 pounds of muscle.

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#5. $\frac{4}{80} < \frac{12}{180}$ grapefruits per cost

$\frac{80}{4} > \frac{12}{180}$ Cost per grapefruit.

or

$20 > 15$

$\frac{12}{240} < \frac{12}{180}$

The 12 grapefruits for \$1.80 is the better buy.

#6. $\frac{\frac{1}{3}}{5} = \frac{18}{N}$

#7. $\frac{40}{50} = \frac{N}{80}$

$\frac{4}{5} = \frac{N}{80}$

$\frac{\frac{1}{3}N}{5N} = \frac{5 \cdot 18}{5N}$

$5N = 320$

$N = 64$

$\frac{1}{3}N = 90$

David would read 64 pages in 80 minutes.

$N = 270$

The distance between New York and Aluossin is 270 miles.

#8. (a) $3n + 4n = 98$

(b) $(3n)(4n) = 768$

$7n = 98$

$12n^2 = 768$

$n = 14$

$n^2 = 64$

$3n = 42, 4n = 56$

$n = -8$ or $n = 8$

The numbers are 42 and 56.

The numbers are -24 and -32, or 24 and 32.

#9. $2n + 4n + 5n = 82,000$

$11n = 82,000$

$n = 7454.54$

$$\begin{array}{r} 7454.54 \\ 11 \overline{) 82000.00} \\ \underline{-77} \\ 50 \\ \underline{-44} \\ 60 \\ \underline{-55} \\ 50 \end{array}$$

$2n = 14909.09$

$4n = 29818.18$

$5n = 37272.72$

Gary, Bill, and Carmella will receive \$14,909.09, \$29,818.18, and \$37,272.72, respectively.

Note that all but 1¢ is accounted for.

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$$\#10. \quad (3\frac{1}{2})n + (4\frac{1}{2})n = 176 \quad (3\frac{1}{2})n = \frac{7}{2} \cdot \frac{22}{1} = 77$$

$$8n = 176 \quad (4\frac{1}{2})n = \frac{9}{2} \cdot \frac{22}{1} = 99$$

$$n = 22$$

Sheila and Dora were paid \$77 and \$99, respectively.

$$\#11. \quad \frac{5}{9} = \frac{75}{n} \quad \text{Vonna had 135 attempts on goal.}$$

$$5n = 9 \cdot 75$$

$$n = 9 \cdot 15 = 135$$

$$\#12. \quad (a) \quad \frac{1}{6} : 1 \quad (b) \quad \frac{1}{3} : \frac{1}{3} \quad (c) \quad \frac{1}{6} : \frac{2}{7}$$

$$1 : 6 \quad 1 : 1 \quad \frac{7}{42} : \frac{12}{42}$$

$$\frac{1}{6} \quad \frac{1}{1} \quad 7 : 12$$

$$\frac{7}{12}$$

$$\#13. \quad \frac{12d}{36 \text{ doz}} = \frac{16d}{48 \text{ doz}}, \quad \frac{36 \text{ doz}}{12d} = \frac{48 \text{ doz}}{16d}, \quad \frac{36 \text{ doz}}{48 \text{ doz}} = \frac{12d}{16d}, \quad \frac{48 \text{ doz}}{36 \text{ doz}} = \frac{16d}{12d}$$

$$\#14. (a) \quad \frac{10}{\frac{1}{2}(28)} = \frac{10}{14} = \frac{5}{7}$$

$$5 : 7$$

$$(b) \quad \frac{n}{\frac{1}{2}(16)} = \frac{3}{4}$$

$$\frac{n}{8} = \frac{3}{4}$$

$$\frac{n}{8} = \frac{6}{8}$$

$$n = 6$$

The rise is 6 feet.

$$\#15. (a) \quad \frac{4}{6} = \frac{18}{N} \quad \text{The large gear has 27 teeth.}$$

$$4N = 6 \cdot 18$$

$$4N = 108$$

$$N = 27$$

$$(b) \quad \frac{200}{600} = \frac{N}{60} \quad \text{The small gear has 20 teeth.}$$

$$\frac{20}{60} = \frac{N}{60}$$

$$N = 20$$

$$\#16. \quad \frac{230}{195} = \frac{40}{N}$$

$$\frac{23}{195} = \frac{4}{N}$$

$$23N = 780$$

$$N = \frac{780}{23}$$

$$\begin{array}{r} 33.9 \\ 23 \overline{) 780.0} \\ \underline{-69} \\ 90 \\ \underline{-69} \\ 210 \\ \underline{-207} \\ 3 \end{array}$$

The model's wingspan would be about 33.9 centimeters.

$$\left[33 \frac{21}{23} \approx 33.9 \right]$$

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$$\#17. \frac{120}{N} = \frac{160}{416}$$

$$\frac{3}{N} = \frac{4}{416}$$

$$\frac{3}{N} = \frac{1}{104}$$

$$N = 3 \cdot 104 = 312$$

Amy would weigh + #19.
312 pounds on
Jupiter.

#18. (a) Use ratio (alter) to (original)
The ratio is 2:3; therefore,
use $\frac{2}{3}$ of the original ingredients.

mustard $\frac{2}{3}$ tsp.
scallions $\frac{2}{3} \cdot \frac{3}{2} = 1$ cup.
beans $\frac{2}{3} \cdot \frac{13}{4} = \frac{13}{6} = 2\frac{1}{6}$ cups

(b) The ratio is $1:\frac{1}{2}$ or 2:3.
Use $\frac{2}{3}$ of the original ingredients.

same as (a)

(c) The ratio is $1\frac{3}{4}:3\frac{1}{4}$ or 7:13.
Use $\frac{7}{13}$ of the original ingredients.

mustard $\frac{7}{13}$ tsp.
tomato $\frac{7}{13} \cdot 3 = \frac{21}{13} = 1\frac{8}{13}$ cups
scallions $\frac{7}{13} \cdot \frac{3}{2} = \frac{21}{26}$ cups

$$\#19. \frac{4.2}{5} = \frac{N}{18}$$

$$5N = 4.2(18)$$

$$N = \frac{75.6}{5} = 15.12$$

The resistance of the
18 foot wire is 15.12 ohms.

$$\#20. \frac{d}{188} = \frac{2.3}{5.8}$$

$$58d = 188(23)$$

$$d = \frac{4324}{58} \approx 74.6$$

The daughter is approximately
74.6 centimeters tall.

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TIMSS

$$\frac{1}{3} = \frac{1 \times 9}{3 \times 9} = \frac{9}{27}$$

Marin collected 27 bottles.

Worksheet

$$\#2. \quad 6 : \frac{1}{2}(18)$$

$$6 : 9$$

$$2 : 3$$

The pitch of the roof is 2:3.

$$\#4. \quad \frac{325}{5} = \frac{65}{1}$$

The speed is 325 miles per hour.

$$\#5. \quad \frac{25}{9} = \frac{175}{N}$$

$$\frac{N}{9} = \frac{175}{25}$$

$$\frac{N}{9} = 7$$

$$N = 63$$

It will take Kim
63 weeks to save \$175.

$$\#7. (a) \quad \frac{3}{8} = \frac{N}{56}$$

$$\frac{21}{56} = \frac{N}{56}$$

$$N = 21$$

$$\#7. (b) \quad \frac{14}{18} = \frac{n}{27}$$

$$\frac{7}{9} = \frac{n}{27}$$

$$\frac{21}{27} = \frac{n}{27}$$

$$n = 21$$

$$\#7. (d) \quad \frac{9}{c} = \frac{3}{53}$$

$$\frac{9}{c} = \frac{9}{159}$$

$$c = 159$$

$$\#7. (e) \quad \frac{16}{7} = \frac{96}{x}$$

$$\frac{16 \cdot 6}{7 \cdot 6} = \frac{96}{x}$$

$$\frac{96}{42} = \frac{96}{x}$$

$$x = 42$$