

## Manipulating Formulae

2013-12-03

Recall how to manipulate equations:

$$\text{Solve } \frac{3x-10}{\textcircled{2}} = 2(2x-7)$$

$$\Leftrightarrow 3x-10 = 4x-14$$

$$\Leftrightarrow 14-10 = 4x-3x$$

$$\Leftrightarrow 4 = x$$

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$$9(C) = 5(F-32)$$

Rearrange to get "F="  $\Leftrightarrow \frac{9C}{5} = F-32$

"Make F the subject of this formula"

$$\Leftrightarrow +32 \frac{9C}{5} = F-32$$

$$\Leftrightarrow \frac{9C}{5} + 32 = F$$

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make "x" the subject of this formula.

$$-c \quad y = mx + c$$

$$\Leftrightarrow \frac{y-c}{m} = mx \quad \Leftrightarrow x = \frac{y-c}{m}$$

Ex 6.8 p 137 Q1 (odds), 2 (every third question)  
 (i, iii, v, vii, ix, xi, xiii, xv)

$$1. (ii) \quad \cancel{4}y = \frac{16}{\cancel{4}} \Leftrightarrow y = \frac{16}{4} \quad (viii) \quad \cancel{4}a + 3b = 7 - \cancel{4}a$$

$$\Leftrightarrow \cancel{3}b = \frac{7 - \cancel{4}a}{3}$$

$$\Leftrightarrow b = \frac{7 - 4a}{3}$$

$$(iv) \quad \cancel{2}b - \cancel{9} = 5 + \cancel{9}$$

$$\Leftrightarrow \cancel{2}b = \frac{14}{\cancel{2}}$$

$$\Leftrightarrow b = 7$$

$$(vi) \quad \cancel{3}x + \cancel{y} = 9 - \cancel{y}$$

$$\Leftrightarrow \cancel{3}x = \frac{9 - \cancel{y}}{\cancel{3}}$$

$$\Leftrightarrow x = \frac{9 - y}{3}$$

$$(x) \quad \cancel{3}r - \cancel{r} = \cancel{r} - \cancel{4}t$$

$$\Leftrightarrow \cancel{3}r - r = -4t$$

$$\Leftrightarrow \cancel{2}r = \frac{-4t}{\cancel{2}}$$

$$\Leftrightarrow r = -2t$$

2013-12-04

$$2. (iii) \quad \frac{a}{\cancel{2}} - \cancel{1} = 5 + \cancel{1}$$

$$\Leftrightarrow \frac{a}{\cancel{2}} = 6 \quad (2)$$

$$\Leftrightarrow a = 12$$

$$(xi) \quad \frac{2}{\cancel{y}} + \frac{\cancel{3}}{\cancel{x}} = 2 - \frac{\cancel{3}}{\cancel{x}} \Leftrightarrow \frac{1}{\cancel{y}} = \frac{2 - \frac{\cancel{3}}{\cancel{x}}}{\cancel{2}}$$

$$\Leftrightarrow \frac{\cancel{2}}{\cancel{y}} = \frac{2 - \frac{\cancel{3}}{\cancel{x}}}{\cancel{2}} \Leftrightarrow y = \frac{2}{2 - \frac{\cancel{3}}{\cancel{x}}}$$

## Writing Expressions

2013-12-04

Brian is  $x$  years old. Gillian is five years older.  
Jack is five times Brian's age.

Write an expression in  $x$  for → Gillian's age  
→ Jack's age.

$$\text{Gillian} = x + 5$$

$$\text{Jack} = 5x$$

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Jason buys nine shirts.  $y$  of these shirts are blue.  
How many are not blue?

$$9 - y$$

Ex 6.9 p 140 Q5, 6, 7, 8, 9

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How many months are there in:  
(i) four years and five months  
(ii)  $n$  years and  $m$  months

Note:  
12 months per year.

$$(i) 4 \times 12 + 5 = 53$$

$$(ii) n \times 12 + m$$

Ex 6.9 p 140 Q1, 3, 12

$$\begin{aligned} \text{Perimeter} &= 2(\text{length}) + 2(\text{width}) \\ &= 2(10x) + 2(4x - 1) = 20x + 8x - 2 = 28x - 2 \end{aligned}$$

## Solving Problems With Linear Equations 2013-12-04

Emmett is two years older than Shane. Evan is five years younger than Emmett. The sum of their ages is 113. Find the ages of all three.

$$\text{Shane} = S \quad \text{Emmett} = E \quad \text{Evan} = x$$

$$\underline{E = S + 2} \quad x = E - 5$$

$$S + E + x = 113$$

$$\Leftrightarrow S + (S + 2) + ((S + 2) - 5) = 113$$

$$\Leftrightarrow S + S + 2 + S + 2 - 5 = 113$$

$$\Leftrightarrow 3S - 1 = 113$$

$$\Leftrightarrow 3S = 114$$

$$E = 38 + 2 = 40$$

$$\Leftrightarrow S = 38$$

$$x = 40 - 5 = 35$$

Emmett is five years older than Shane. Evan is ten years younger than Emmett. The sum of their ages is 60. Find the ages of all three.

$$\text{Shane} = S \quad \text{Emmett} = E \quad \text{Evan} = x$$

$$E = S + 5 \quad x = E - 10$$

$$\Leftrightarrow S + E + x = 60$$

$$\Leftrightarrow S + (S + 5) + ((S + 5) - 10) = 60$$

$$3S = 60 \quad \Leftrightarrow S = 20$$

Ex 6.10 p 142 Q 2, 5, 6, 9, 15

Homework.

Q1.  $2x + 17 = 35$

$$\Leftrightarrow 2x = 18$$

$$\Leftrightarrow x = 9$$

3.  $3x - 7 = 26$

$$\Leftrightarrow 3x = 33$$

$$\Leftrightarrow x = 11$$

### Solving Problems with Simultaneous Equations

2013-12-05

In a restaurant, a group pays €105 for five main courses, and three desserts. A second group gets ten main courses, and five desserts, which costs them €200. What is the cost per main course, and the cost per dessert?

$x = \text{main}$        $y = \text{dessert}$

①  $5x + 3y = 105$        $[x-2]$

②  $10x + 5y = 200$        $\approx$

①  $5x + 3(10) = 105$

$$5x + 30 = 105$$

$$5x = 75$$

$$x = 15$$

①  ~~$-10x - 6y = -210$~~

②  ~~$10x + 5y = 200$~~

$$-y = -10$$

$$\Leftrightarrow y = 10$$

Ex 6.11 p 164

$$1. \begin{cases} \textcircled{1} x + y = 25 \\ \textcircled{2} 2x + y = 35 \end{cases} \quad [x-1] \quad \begin{cases} \textcircled{1} 10 + y = 25 \\ y = 15 \end{cases}$$

$$\begin{cases} \textcircled{1} -x - y = -25 \\ \textcircled{2} 2x + y = 35 \end{cases}$$

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$$x = 10$$

$$6. \begin{cases} \textcircled{1} x + y = 1.90 \\ \textcircled{2} 5x + 2y = 7.40 \end{cases} \quad [x-2] \quad \begin{cases} \textcircled{1} 1.20 + y = 1.90 \\ y = 0.70 \end{cases}$$

$$\begin{cases} \textcircled{1} -2x - 2y = -3.80 \\ \textcircled{2} 5x + 2y = 7.40 \end{cases}$$

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$$3x = 3.60$$
$$x = 1.20$$

Ex 6.11 Q 7, 10, 13, 14  
Extra homework Q 2, 3, 5, 9