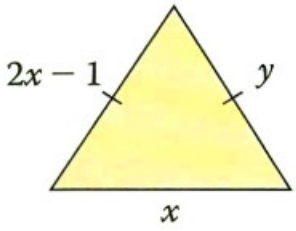
Simultaneous Eqns Problems

1 Solve these problems by using simultaneous equations.

3 lemons *4 oranges* *£1.27*	*4 oranges* *5 lemons* *£1.61*

a How much does a lemon cost?

b The perimeter of this triangle is 30 cm.



How long is the base?

a) Let lemon cost x pence
orange cost y pence

$3x + 4y = 127$ ①
$5x + 4y = 161$ ②

② − ① $2x = 34$

$x = \frac{34}{2}$ $x = 17$

lemon = 17p

b) isosceles △ so $2x - 1 = y$

$2x - y = 1$

Perimeter $2x - 1 + y + x = 30$

$$\underline{3x + y = 31}$$

$2x - y = 1$ ①

$3x + y = 31$ ②

① + ② $5x = 32$

$x = \frac{32}{5}$ $\quad x = 6\frac{2}{5}$ or 6.4

$\underline{\text{Base} = 6.4\text{ cm}}$

2a) Let numbers be x and y

$x + y = 41$ ①

$x - y = 7$ ②

① + ② $2x = 48$

$x = \frac{48}{2}$

$\underline{x = 24}$

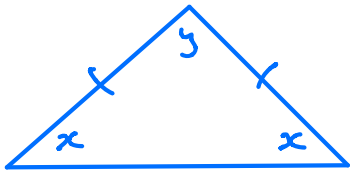
Sub for x in ① $\quad 24 + y = 41$

$y = 41 - 24$

$\underline{y = 17}$

Numbers are 24 and 17

2d)



$y = 2x + 30$

$2x + y = 180$

$$2x - y = -30 \quad (1)$$
$$2x + y = 180 \quad (2)$$

(1) + (2) $\quad 4x = 150$

$$x = \frac{150}{4} \qquad \underline{x = 37.5^\circ}$$

Sub for x in (2)

$$2(37.5) + y = 180$$
$$75 + y = 180$$
$$y = 180 - 75$$
$$\underline{y = 105^\circ}$$

Angles of Δ are $37.5^\circ, 37.5^\circ, 105^\circ$

2b) Let numbers be x and y

$$x - y = 6 \qquad \frac{x+y}{2} = 20$$
$$x + y = 40$$

$$x + y = 40 \quad (1)$$
$$x - y = 6 \quad (2)$$

(1) + (2) $\quad 2x = 46$

$$x = \frac{46}{2} \qquad \underline{x = 23}$$

Sub for x in (1)

$$23 + y = 40$$
$$y = 40 - 23 \qquad \underline{y = 17}$$

2c) People $230 + 29 = 259$

S = number of small coaches

L = number of large coaches

$$S + L = 5 \quad (1)$$

$$39S + 55L = 259 \quad (2)$$

(1) × 55 $\quad 55S + 55L = 275 \quad (3)$

(3) − (2) $\quad 16S = 16$

$$S = \frac{16}{16} \qquad \underline{S = 1}$$

$$\therefore \underline{L = 4}$$

1 small coach 4 large coaches

2e) Numbers x, y

$$x - y = 6 \quad (1)$$

$$2x + y = 6 \quad (2)$$

(1) + (2) $\quad 3x = 12$

$$x = \frac{12}{3} \qquad x = 4$$

sub for x in (2)

$$2(4) + y = 6$$

$$8 + y = 6$$

$$y = 6 - 8$$

$$y = -2$$

Numbers are 4 and −2