

## 1.3 Greens we eat

### 1.3.1 Fractions

For background reading have a look at addition, subtraction, multiplication and division of fractions in the *Foundation Maths* support pack (Section 1.1)

1. Perform the following calculations, without using a calculator:

(a)  $\frac{1}{4} \times \frac{3}{2}$

(b)  $\frac{5}{6} \times \frac{2}{3}$

(c)  $\frac{4}{5} \times \frac{1}{2}$

(d)  $\frac{1}{10} \times \frac{4}{5}$

2. Perform the following calculations, without using a calculator:

(a)  $\frac{1}{4} \div \frac{3}{2}$

(b)  $\frac{5}{6} \div \frac{2}{3}$

(c)  $\frac{4}{5} \div \frac{1}{2}$

(d)  $\frac{1}{10} \div \frac{4}{5}$

3. Perform the following calculations, without using a calculator:

(a)  $\frac{1}{4} + \frac{3}{2}$

(b)  $\frac{5}{6} - \frac{2}{3}$

(c)  $\frac{4}{5} - \frac{1}{2}$

(d)  $\frac{1}{10} + \frac{4}{5}$

4. Perform the following calculations, without using a calculator:

(a)  $\left(\frac{1}{4}\right)^2$

(b)  $\left(\frac{5}{6}\right)^0$

(c)  $\left(\frac{4}{5}\right)^1$

(d)  $\left(\frac{4}{5}\right)^{-2}$

### 1.3.2 Removing brackets and factorisation

For background reading have a look at removing brackets and factorising expressions in the *Foundation Maths* support pack (Sections 2.3 and 2.5).

Remove the brackets:

1.  $3(x^2 + 3y)$

2.  $7x\left(-\frac{1}{x} + y^3\right)$

3.  $3xy\left(x + \frac{2}{xy}\right)$

Factorise the following:

1.  $15x + 3x^2 + 3xy$

2.  $\frac{15}{x} - \frac{1}{x^2} + \frac{3y}{x}$
3.  $\frac{x}{3} + \frac{x^2}{1} - \frac{x}{3y}$

### 1.3.3 Transposing equations

For background reading have a look at rearranging equations 1 and 2 in the *Foundation Maths* support pack (Sections 2.10 and 2.11).

Rearrange the following equations to make  $x$  the subject:

1.  $y = 2x + 4x + 5x$
2.  $y = \frac{1}{2x+4x+5x}$
3.  $y = \frac{1}{2x^2+4x^2+5x^2}$
4.  $y = \frac{x}{2x^2+4x^2+5x^2}$
5.  $y = \frac{1}{3x} + d$
6.  $y = \sqrt{x+1}$
7.  $M = \frac{\pi\rho x^3}{6}$

### 1.3.4 Using logarithms

For background reading have a look at what is a logarithm?, laws of logarithms and solving equations involving logarithms and exponentials in the *Foundation Maths* support pack (Sections 2.16, 2.17 and 3.6).

What is the numerical value of  $x$ ?

1.  $20 = \ln x$
2.  $5 = 10^x$
3.  $100 = 5^{x+1}$
4.  $100 = 5^{x^2}$

Answers to: Fractions.

1. Answers below:

- (a)  $\frac{3}{8}$
- (b)  $\frac{10}{18}$
- (c)  $\frac{2}{5}$
- (d)  $\frac{2}{25}$

2. Answers below:

- (a)  $\frac{1}{6}$
- (b)  $\frac{5}{4}$  or  $1\frac{1}{4}$
- (c)  $\frac{8}{5}$  or  $1\frac{3}{5}$
- (d)  $\frac{1}{8}$

3. Answers below:

- (a)  $\frac{7}{4}$  or  $1\frac{3}{4}$
- (b)  $\frac{1}{6}$
- (c)  $\frac{3}{10}$
- (d)  $\frac{9}{10}$

4. Answers below:

- (a)  $\frac{1}{16}$
- (b) 1
- (c)  $\frac{4}{5}$
- (d)  $\frac{25}{16}$  or  $1\frac{9}{16}$

Answers to Removing brackets and factorisation: Remove the brackets:

1.  $3x^2 + 9y$
2.  $-7 + 7xy^3$
3.  $3x^2y + 6$

Factorise the following:

1.  $3x(5 + x + y)$
2.  $\frac{1}{x}\left(15 - \frac{1}{x} + 3y\right)$
3.  $x\left(\frac{1}{3} + x - \frac{1}{3y}\right)$

Answers to Transposing equations:

1.  $x = \frac{y}{11}$
2.  $x = \frac{1}{11y}$
3.  $x = \pm \sqrt{\frac{1}{11y}}$
4.  $x = \frac{1}{11y}$

5.  $x = \frac{1}{3^{(y-d)}}$

6.  $x = y^2 - 1$

7.  $x = \sqrt[3]{\left(\frac{6M}{\pi\rho}\right)}$

Answers to Using logarithms:

1.  $4.85 \times 10^8$

2. 0.699

3. 1.86

4. 1.69