

A Number applications: Ratios in a diagram

Measure the dimensions of the front cover of this book and then make a scale drawing $\frac{1}{4}$ the size. Show your measurements in millimetres.

Skill 2.3

B Number skills: Working with surds

1 Simplify these surds:

(a) $2\sqrt{18}$	(b) $3\sqrt{27}$	(c) $4\sqrt{50}$	(d) $2\sqrt{98}$
(e) $\sqrt{180}$	(f) $\sqrt{44}$	(g) $\sqrt{153}$	(h) $\sqrt{333}$
(i) $\sqrt{52}$	(j) $6\sqrt{18}$	(k) $7\sqrt{50}$	(l) $10\sqrt{27}$

2 Simplify:

(a) $3\sqrt{2} - 8\sqrt{2}$	(b) $8\sqrt{3} + 2\sqrt{3} + 11\sqrt{3}$	(c) $5\sqrt{5} - 6\sqrt{2} - 10\sqrt{5}$
(d) $2\sqrt{3} \times \sqrt{7}$	(e) $5\sqrt{2} \times 3\sqrt{2}$	(f) $5\sqrt{3} \times 3\sqrt{5}$
(g) $\frac{\sqrt{21}}{\sqrt{3}}$	(h) $\frac{\sqrt{36}}{\sqrt{12}}$	(i) $\frac{4\sqrt{3}}{2\sqrt{3}}$
(j) $\frac{7\sqrt{3}}{3\sqrt{6}}$	(k) $\frac{2\sqrt{10}}{3\sqrt{2}}$	(l) $\frac{6\sqrt{15}}{2\sqrt{3}}$

Skill 1.7

C Number applications: Using ratios within a population

Skill 2.2

- 1 In my orchid collection the ratio of colours are 1:2:7:9 (green, white, red, brown). If I have 105 red ones, then:
- (a) How many of the other colours do I have? (b) What is the total number of the collection?
- 2 Balloons are produced from a factory in the ratio 1:11:13:21 (red, blue, yellow, green). If 8203 yellow balloons are made each week, then:
- (a) How many of the other colours are produced? (b) What is the total production in that week?

D Algebra: Solving simple quadratic equations

Skill 3.10

Solve these for x :

1 $\frac{x^2}{3} = 3$	2 $x^2 - 11 = 25$	3 $(3x + 1)(x - 2) = 0$
4 $\left(\frac{x}{3} + 4\right)(x + 1) = 0$	5 $3(x + 1)(x - 2) = 0$	6 $\frac{2}{3}(x - 6)\left(\frac{x}{2} + 1\right) = 0$
7 $x^2 + 3x + 2 = 0$	8 $x^2 - 2x - 15 = 0$	9 $2x^2 + x - 3 = 0$
10 $3x^2 + 5x - 2 = 0$	11 $4x^2 - 3x - 1 = 0$	12 $5x^2 + 6x + 1 = 0$

E Indices: Negative powers

Skill 4.6

1 Express with positive powers:

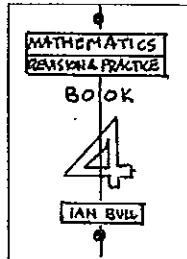
(a) $2^{-3}ab^{-2}$	(b) $5^{-2}a^{-2}b$	(c) $6^{-3}a^4b^{-3}$	(d) $3a^{-2}b^{-4}c$
(e) $2^{-4}ab^{-4}$	(f) $3^{-2}a^{-2}b^3$	(g) $9^{-1}a^4b^{-3}$	(h) $3^{-3}b^4c^{-3}$
(i) $7^{-3}a^{-2}b$	(j) $8^{-2}a^{-3}b^4$		

2 Expand the brackets:

(a) $(3a^2b^{-4})^{-1}$	(b) $\left(\frac{4a^2b^3}{c^4}\right)^{-2}$	(c) $\left(\frac{2^3a^{-4}b}{c^{-4}}\right)^{-3}$	(d) $(6^2a^{-4}b^3)^{-3}$
(e) $\left(\frac{3^{-2}a^{-4}b}{c^4}\right)^{-2}$	(f) $\left(\frac{11a^{-4}b}{c^{-4}}\right)^{-3}$	(g) $\left(\frac{2a^4b^{-3}}{c^2}\right)^{-2}$	(h) $\left(\frac{3a^2b^{-4}}{c^8}\right)^{-1}$
(i) $\left(\frac{12ab^{-2}}{c^{-8}}\right)^{-2}$			

Worksheet 8

A 24.375 mm



33,75 mm

Check that you calculated the overall dimensions correctly and that the internal detail matches.

- B 1 (a) $6\sqrt{2}$ (b) $9\sqrt{3}$ (c) $20\sqrt{2}$ (d) $14\sqrt{2}$
 (e) $6\sqrt{5}$ (f) $2\sqrt{11}$ (g) $3\sqrt{17}$ (h) $13\sqrt{2}$
 (i) $2\sqrt{13}$ (j) $18\sqrt{2}$ (k) $35\sqrt{2}$ (l) $30\sqrt{3}$
- 2 (a) $-5\sqrt{2}$ (b) $21\sqrt{3}$ (c) $-6\sqrt{2} - 5\sqrt{5}$
 (d) $2\sqrt{21}$ (e) 30 (f) $15\sqrt{15}$ (g) $\sqrt{7}$
 (h) $\sqrt{3}$ (i) 2 (j) $\frac{7}{3\sqrt{2}}$ (k) $\frac{2\sqrt{5}}{3}$
 (l) $3\sqrt{5}$

- C 1 15 green, 30 white, 135 brown – total 285 orchids
 2 631 red, 6941 blue, 13 251 green – total 29 026 balloons

- D 1 $x = \pm 3$ 2 $x = \pm 6$ 3 $x = -\frac{1}{3}, 2$
 4 $x = -12, -1$ 5 $x = -1, 2$ 6 $x = 6, -2$
 7 $x = -1, -2$ 8 $x = 5, -3$ 9 $x = -1\frac{1}{2}, 1$
 10 $x = \frac{1}{3}, -2$ 11 $x = -\frac{1}{4}, 1$ 12 $x = -\frac{1}{5}, 1$

- E 1 (a) $\frac{a}{8b^2}$ (b) $\frac{b}{25a^2}$ (c) $\frac{a^4}{216b^3}$
 (d) $\frac{3c}{a^2b^4}$ (e) $\frac{a}{16b^4}$ (f) $\frac{b^3}{9a^2}$
 (g) $\frac{a^4}{9b^3}$ (h) $\frac{b^4}{27c^3}$ (i) $\frac{b}{343a^2}$
 (j) $\frac{b^4}{64a^3}$
- 2 (a) $\frac{b^4}{3a^2}$ (b) $\frac{c^8}{16a^4b^6}$ (c) $\frac{a^{12}c^{12}}{512b^3}$
 (d) $\frac{a^{12}}{46656b^9}$ (e) $\frac{81a^8c^8}{b^2}$ (f) $\frac{a^{12}}{1331b^3c^{12}}$
 (g) $\frac{b^6c^4}{4a^8}$ (h) $\frac{b^4c^8}{3a^2}$ (i) $\frac{b^4}{144a^2c^{16}}$