Formulas & equations

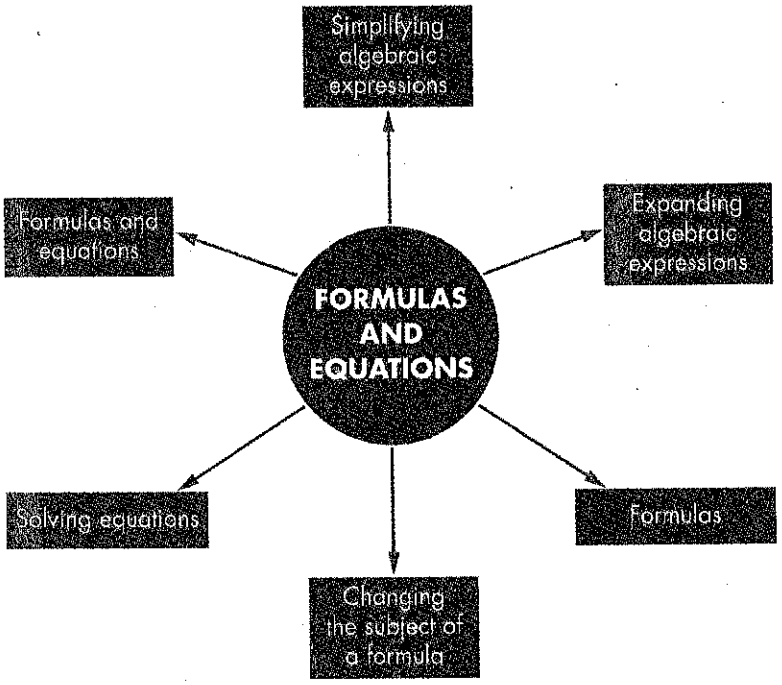
2. CHAPTER SUMMARY

This chapter, Formulas and equations, revised basic and extended algebra skills. Make sure you master the algebraic techniques required to:

Algebra review

- simplify expressions
- expand expressions
- solve equations
- work with formulas
- change the subject of a formula.

Make a summary of this topic. Use the chapter outline at the beginning of this chapter and the mind map below as a guide. Use your own words, symbols, diagrams, boxes and reminders. Gain a 'whole picture' view of the topic and identify any weak areas.



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2. TEST YOURSELF

Exercise 2.01

1 Simplify each expression.

a $5ut + 2t^2 - t^2 + 4ut$

b $3k^2 \times 5k$

c $-9d \times \frac{2d}{3}$

d $8p^2 \times 4p^3$

e $-1 + 4h + 8 - 10h$

f $\frac{16r^3}{2r}$

g $(-3d^2)^3$

h $\frac{9n^2}{15n^2}$

i $-3v^2w^2 \div 21vw$

j $10x^2 + 7x - 2x^2 + x$

k $\frac{24bc}{8b^2}$

l $\frac{-a}{a^3}$

m $\frac{48r}{6} \div 4r$

n $\frac{4y}{3} \times \frac{5v}{10}$

o $\frac{10x}{18p} \times \frac{3p}{20}$

p $\frac{3y}{2a} \div \frac{9dy}{10d}$

Exercise 2.02

2 Expand each expression.

a $5(2x - 4)$

b $-3(a + 7)$

c $4(12t - y)$

d $-9(r^2 + 2w)$

e $8mn(m - n)$

f $-2d(4d - d^2)$

Exercise 2.02

3 Expand and simplify each expression.

a $3(4x + 1) + 2(x - 2)$

b $2n(n - 1) + (n - 1)$

c $6(2 - d) - 4(d - 3)$

d $p(p + 4) - p(p + 8)$

e $3(4u + 5) - (u + 7)$

f $h(5h - 1) + 3h(h + 9)$

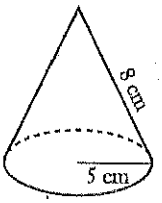
Exercise 2.03

4 If $p = 4$, $q = -5$ and $r = 20$, then evaluate each expression.

a $3p^2 + 4r$ **b** $\frac{7r}{q}$ **c** pqr **d** $\sqrt{p(r - q)}$

Exercise 2.03

5 The surface area of a cone is given by the formula $S = \pi r(r + s)$, where r is the radius of the base and s is the slant height of the cone. Find, correct to two decimal places, the surface area of a cone with base radius 5 cm and slant height 8 cm.



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6 Brett earns a weekly wage of \$480 plus a commission of 10% of the value of the insurance plans he sells in excess of \$1200. His total weekly pay, \$$P$, is given by the formula $P = 480 + \frac{V - 1200}{10}$, where V is the value of the insurance plans sold. Calculate Brett's pay for a week in which he sold \$3400 worth of insurance plans.

Exercise 2.03

7 Solve each equation.

Exercise 2.04

a	$5p - 4 = 21$	**b**	$-2a + 6 = 8$	**c**	$\frac{b-3}{2} = -6$
d	$23 - 8r = 19$	**e**	$\frac{4n}{5} = 11$	**f**	$\frac{r}{3} + 7 = 1$
g	$\frac{20 - 4n}{4} = 7$	**h**	$3t + 13 = t - 12$	**i**	$5(2g - 4) = -30$

8 If an object is travelling with initial speed u m/s, accelerating at a rate of a m/s^2, and covers a distance s m, then its final speed v m/s follows the rule $v^2 = u^2 + 2as$. Calculate the distance travelled by a car whose speed increases from 11 m/s to 28 m/s with an acceleration of 3 m/s^2.

Exercise 2.05

9 According to one theory, the formula that links the surrounding air temperature, T°C, to the number of chirps per minute, C, made by a cricket at night during summer is $T = \frac{C}{8} + 3$. How many chirps per minute are made by the cricket when the temperature is 13°C?

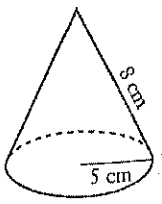
Exercise 2.05

10 The average blood pressure, P, of a person aged y years, measured in millimetres of mercury (mmHg), is given by the formula $P = 110 + \frac{y}{2}$. Make y the subject of this formula and use it to find the age of a person whose blood pressure is 124 mmHg.

Exercise 2.06

Chapter quiz

$\sqrt{p(r-q)}$



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Solutions

Test yourself 2

1 **a** $t^2 + 9ut$ **b** $15k^3$ **c** $-6d^2$ **d** $32p^5$

e $-6h + 7$ **f** $8r^2$ **g** $-27d^6$ **h** $\frac{3}{5}$

i $\frac{-vw}{7}$ **j** $8x^2 + 8x$

k $\frac{3c}{b}$ or $3cb^{-1}$ **l** $\frac{-1}{a^2}$ or $-a^{-2}$

m 2 **n** $\frac{2vy}{3}$ **o** $\frac{x}{12}$ **p** $\frac{5}{3a}$

2 **a** $10x - 20$ **b** $-3a - 21$ **c** $48t - 4y$

d $-9r^2 - 18w$ **e** $8m^2n - 8mn^2$ **f** $-8d^2 + 2d^3$

3 **a** $14x - 1$ **b** $2n^2 - n - 1$ **c** $24 - 10d$

d $-4p$ **e** $11u + 8$ **f** $8h^2 + 26h$

4 **a** 128 **b** −28 **c** −400 **d** 10

5 204.20 cm^2 **6** $700

7 **a** $p = 5$ **b** $a = -1$ **c** $b = -9$

d $r = \frac{1}{2}$ **e** $n = \frac{55}{4}$ **f** $r = -18$

g $n = -2$ **h** $t = -12\frac{1}{2}$ **i** $g = -1$

8 110.5 m **9** 80

10 $y = 2(P - 110)$ or $y = 2P - 220$, 28 years