

20. [Expressions]

Skill 20.1 Simplifying expressions by adding and subtracting like terms (coefficient = 1).

MM7 11 22 33 44
MM8 11 22 33 44

- Add or subtract, as instructed, all like terms. (see Glossary, page 332)
- In your answer, write the coefficient (number) first followed by the variable (letter) (see glossary, pages 316 and 361)

Hint: In the term m , 1 is the coefficient: $m = 1 \times m$

Q. Simplify
 $kl + kl + kl - kl + kl$

A. $kl + kl + kl \rightarrow \cancel{kl} + \cancel{kl}$ cancel first
 $= 3kl$

coefficient first

a) Simplify
 $n + n + n + n$

$4n$

b) Simplify
 $a + a$

c) Simplify
 $u + u$

d) Simplify
 $t + t + t$

e) Simplify
 $w + w + w + w$

f) Simplify
 $z + z + z + z + z$

g) Simplify
 $x - x + x$

h) Simplify
 $b + b + b - b$

i) Simplify
 $e + e - e + e$

j) Simplify
 $k + k + k + k - k - k$

k) Simplify
 $p + p - p - p + p$

l) Simplify
 $c - c + c - c + c + c$

m) Simplify
 $ab + ab$

n) Simplify
 $hi + hi + hi$

o) Simplify
 $fg + fg + fg + fg$

p) Simplify
 $op + op + op + op$

q) Simplify
 $tu + tu + tu + tu + tu$

r) Simplify
 $uv + uv - uv + uv$

s) Simplify
 $ab - ab + ab + ab - ab$

t) Simplify
 $wx + wx - wx + wx + wx$

u) Simplify
 $de + de - de + de - de + de$

Skill 20.2 Simplifying expressions by adding and subtracting like terms
(coefficient ≥ 1).

MM7 11 22 33 44
MM8 11 22 33 44

- Add or subtract the coefficients (numbers) first.
 - Write the variable (letters) next.
- Hint: In the term m , 1 is the coefficient: $m = 1 \times m$

Q. Simplify $7b - 2b + b$

A. $7b - 2b + b$
 $= 5b + b$
 $= 6b$

a) Simplify $3m + 2m$ 5m b) Simplify $2h + 4h$ c) Simplify $3g + 4g$

d) Simplify $3j + j$ e) Simplify $z + 5z$ f) Simplify $7e - 2e$

g) Simplify $5q - q$ h) Simplify $5a - 4a$ i) Simplify $3k - k$

j) Simplify $r + 2r + r$
 $= 3r + r$ k) Simplify $f + 2f + 4f$
 $=$ l) Simplify $3a + a + 2a$
 $=$

m) Simplify $y + y + 5y$
 $=$ n) Simplify $4m + 2m + m$
 $=$ o) Simplify $h + 5h + 3h$
 $=$

p) Simplify $j - j + 5j$
 $=$ q) Simplify $2c + 2c - c$
 $=$ r) Simplify $k + 5k - k$
 $=$

s) Simplify $op + 5op$
 $=$ t) Simplify $4ab - 2ab$
 $=$ u) Simplify $7kl - kl$
 $=$

v) Simplify $5mn + 2mn$
 $=$ w) Simplify $2ij - ij$
 $=$ x) Simplify $5de - 3de$
 $=$

Skill 20.3 Finding like terms.

MM7 1 1 2 2 3 3 4 4
MM8 1 1 2 2 3 3 4 4

- Look at the combination of letters in all terms.

EITHER

- Find the **like terms**, which use the same combination of letters.

Example: $4c$ and c
 gh and $3gh$

like terms

OR

- Find the **unlike terms**, which do not use the same combination of letters.

Example: $2k$ and $2w$
 $5uv$ and vw

unlike terms

Hint: The order of the letters in a term does not matter.

$$gh = hg$$

- Q.** Choose the like terms:
 $3y, z, 2z$

- A.** $3y$ and z - are terms using different letters
 z and $2z$ - are terms using the same combination of letters
 $\Rightarrow z, 2z$

- a)** Choose the like terms:
 $4f, e, 2f$

$4f, 2f$

- b)** Choose the like terms:
 $c, 3, 3c$

- c)** Choose the like terms:
 $h, 2i, 3h$

- d)** Choose the like terms:
 $b, 3d, 3b$

- e)** Choose the like terms:
 $f, 3e, 3f$

- f)** Choose the like terms:
 $m, n, 4n$

- g)** Choose the like terms:
 $r, 5r, 2s$

- h)** Choose the like terms:
 $l, 2m, 3m$

- i)** Choose the like terms:
 $2w, 2x, 4x$

- j)** Choose the like terms:
 $k, 2jk, 2j, jk$

- k)** Choose the like terms:
 $ab, 2ab, 3b, 2a$

- l)** Choose the like terms:
 $2w, 2x, 4x, wx$

- m)** Choose the like terms:
 $h, 2hi, 4i, hi$

- n)** Choose the like terms:
 $d, 3de, 3d, 3e$

- o)** Choose the like terms:
 $5uv, v, 5v, u$

- p)** Choose the like terms:
 $n, 3o, 2no, no$

- q)** Choose the like terms:
 $a, 2b, 2ab, 2a$

- r)** Choose the like terms:
 $3st, s, 4t, st$

Skill 20.4 Simplifying expressions by first grouping like terms.

MM7 11 22 33 44
MM8 11 22 33 44

- Group like terms. (see skill 20.3, page 167)
 - Read the sign in front of each term.
 - Add and/or subtract only the like terms.
- Hint: Unlike terms cannot be added or subtracted.*

Q. Simplify
 $p + p + q + p + q$

A. $p + p + q + p + q$
 $= p + p + p + q + q$ *group like terms*
 $= 3p + 2q$

a) Simplify
 $s + r + s$

$= s + s + r = \boxed{2s + r}$

b) Simplify
 $d + e + d$

$= \dots = \boxed{}$

c) Simplify
 $h + i + h$

$= \dots = \boxed{}$

d) Simplify
 $a + b + b + a$

$= \dots = \boxed{}$

e) Simplify
 $l + m + l + m$

$= \dots = \boxed{}$

f) Simplify
 $r + r + r + s$

$= \dots = \boxed{}$

g) Simplify
 $p + p + q + p$

$= \dots = \boxed{}$

h) Simplify
 $d + e + e + d$

$= \dots = \boxed{}$

i) Simplify
 $y + z + y + z$

$= \dots = \boxed{}$

j) Simplify
 $y + x + x + y + y$

$= \dots = \boxed{}$

k) Simplify
 $e + f + e + f + e$

$= \dots = \boxed{}$

l) Simplify
 $m + m + n - m + n$

$= \dots = \boxed{}$

m) Simplify
 $t + u + u - t + t$

$= \dots = \boxed{}$

n) Simplify
 $j + k - j - k + k$

$= \dots = \boxed{}$

o) Simplify
 $rs - rs + qr + qr + rs$

$= \dots = \boxed{}$

p) Simplify
 $cd - de + de + de + cd$

$= \dots = \boxed{}$

q) Simplify
 $4h - 2i + h + 3i$

$= \dots = \boxed{}$

r) Simplify
 $5j + 3k - 2j + 2k$

$= \dots = \boxed{}$

Skill 20.5 Writing expressions to represent word problems.

- Write the expression using the variables and/or the numbers mentioned in the word problem.
- Decide about the operation or operations needed in the expression.

Example: $a + b$ (sum of a and b), $4n$ (product of 4 and n), $m - 20$ (20 less than m)

Hint: "Sum, altogether, in total, more than" \Rightarrow addition $\Rightarrow +$
 "Difference, less than, change" \Rightarrow subtraction $\Rightarrow -$
 "Product, times, lots of" \Rightarrow multiplication $\Rightarrow \times$
 "A fraction (half, third, quarter) of" \Rightarrow division $\Rightarrow \div$

Q. Write as an expression:
A number that is equal to
4 less than c

A. less than $\Rightarrow -$
 $\Rightarrow c - 4$

a) Write as an expression:
The sum of n and n

and $\Rightarrow +$ \Rightarrow

b) Write as an expression:
The sum of b and b

\Rightarrow

c) Write as an expression:
The sum of e and f

\Rightarrow

d) Write as an expression:
A number that is equal to 4 more than j

\Rightarrow

e) Write as an expression:
A number that is equal to 3 less than z

\Rightarrow

f) Write as an expression:
A number that is equal to 5 less than v

\Rightarrow

g) Write as an expression:
A number that is equal to 3 times m

\Rightarrow

h) Write as an expression:
A number that is equal to 2 times d

\Rightarrow

i) Write as an expression:
A number that is equal to twice as much
as h

\Rightarrow

j) Write as an expression:
A number that is equal to three times as
much as m

\Rightarrow

k) A person grows 2 cm every year for
 y years. How much did he grow?

\Rightarrow

l) Write as an expression:
A number that is equal to seven lots of z

\Rightarrow