20. [Expressions]

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

MM4.2 **1 1** 2 2 3 3 4 4
MM5.1 **1** 1 2 2 3 3 4 4

- Add or subtract, as instructed, all like terms. (see Glossary, page 346)
- In your answer, write the coefficient (number) first follwed by the variable (letter)
  (see glossary, pages 330 and 375)
  Hint: In the term m, 1 is the coefficient: $m = 1 \times m$

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

A. $kl + kl + kl - \cancel{kl} + \cancel{kl}$ *cancel first*
$= \mathbf{3kl}$

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).

- 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. $7b - 2b + b$
$= 5b + b$
$= \mathbf{6b}$

coefficient first

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 Writing expressions to represent word problems (1).

- 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"* ⇒ *addition* ⇒ $+$
  "Difference, less than, change" ⇒ *subtraction* ⇒ $-$
  "Product, times, lots of" ⇒ *multiplication* ⇒ $\times$

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

A. *less than* ⇒ $-$
⇒ $c - 4$

a) Write as an expression:
The sum of n and 14

and ⇒ $+$ ⇒ $n + 14$

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

⇒

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

⇒

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

⇒

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

⇒

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

⇒

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

⇒

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

⇒

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

⇒

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

⇒

k) Write as an expression:
The product of nine and p

⇒

l) Write as an expression:
The product of seven and z

⇒

Skill 20.3 Writing expressions to represent word problems (2).

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

..... ⇒ cm

n) A tree grew 4 cm every year for b years. How much did it grow?

..... ⇒

o) There are a local and b imported products at the supermarket. How many products are there altogether?

..... ⇒

p) John earns a weekly wage of n dollars. How much money did he earn in three weeks?

..... ⇒

q) Elle read m pages from her 300 page novel. How many pages does she have left to read?

..... ⇒

r) In a store a \$70 shirt is discounted by w dollars. What is the sale price of the shirt?

..... ⇒

s) Isabelle handed x dollars to the checkout when she purchased a \$70 game. How much change did she receive?

..... ⇒

t) There are h hours left until the plane's departure from Perth. The trip from Perth to Sydney takes 5 hours. How many hours are left until the plane's arrival to Sydney?

..... ⇒

u) A shop makes \$15 profit for each school bag sold. Which expression shows the profit for x bags sold?

A) $15 + x$
B) $15 \times x$
C) $x - 15$

..... ⇒

v) To hire a taxi you pay a start fee of \$7 and then \$4.50 for each kilometre. If you travel for g km, which expression shows the total taxi fee?

A) $7 + 4.5 \times g$
B) $4.5 + 7 \times g$
C) $7 \times 4.5 + g$

..... ⇒

w) An adult aquarium entry ticket is \$40, and a child ticket is \$30. Which expression shows the total cost for c adults and d children?

A) $30 \times c + 40 \times d$
B) $40 \times c + 30 \times d$
C) $40 \times c + 40 \times d$

..... ⇒

x) Hannah is x years old, and Tegan is y years old. If Hannah is 2 years older than Tegan, which expression shows this?

A) $x + y = 2$
B) $x - y = 2$
C) $y - x = 2$

..... ⇒

Skill 20.4 Finding like terms.

- Look at the combination of letters in all terms.
- Find the **like terms**, which use the same combination of letters.
  Example: 4*c* and *c*
  gh and 3*gh* — *like terms*

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

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

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

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

4f, 2f

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Skill 20.5 Simplifying expressions by first grouping like terms.

- Group like terms. (see skill 20.3, page 177)
- 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*
$= \mathbf{3p + 2q}$

a) Simplify
$s + r + s$

$= s + s + r$ $=$ $2s + r$

b) Simplify
$d + e + d$

$=$ ..... $=$ ☐

c) Simplify
$h + i + h$

$=$ ..... $=$ ☐

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

$=$ ..... $=$ ☐

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

$=$ ..... $=$ ☐

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

$=$ ..... $=$ ☐

g) Simplify
$y + x + x + y + y$

$=$ ..... $=$ ☐

h) Simplify
$e + f + e + f + e$

$=$ ..... $=$ ☐

i) Simplify
$m + m + n - m + n$

$=$ ..... $=$ ☐

j) Simplify
$t + u + u - t + t$

$=$ ..... $=$ ☐

k) Simplify
$jk + jk + kl - jk + kl$

$=$ ..... $=$ ☐

l) Simplify
$rs - rs + qr + qr + rs$

$=$ ..... $=$ ☐

m) Simplify
$cd - de + de + de + cd$

$=$ ..... $=$ ☐

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

$=$ ..... $=$ ☐

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

$=$ ..... $=$ ☐

p) Simplify
$6g + 4 - 2g - 1$

$=$ ..... $=$ ☐

q) Simplify
$7l + 5 - 3l - 4$

$=$ ..... $=$ ☐

r) Simplify
$3v + 2w + 5w - v$

$=$ ..... $=$ ☐

s) Simplify
$4q + p + 2q + 4p$

$=$ ..... $=$ ☐

t) Simplify
$5z + 2y + y - 3z$

$=$ ..... $=$ ☐

u) Simplify
$j + 4k + 2j - 2k$

$=$ ..... $=$ ☐