SKILLSHEET *(continued)*

Try these

Factorise each of the following expressions by first finding the highest common factor (HCF).

1 $3x + 12$

HCF of $3x$ and 12 is .....

$3x + 12 = 3 \times$ ..... $+ 3 \times$ .....

$=$ 3(..... + ...)

2 $21x - 14$

HCF of $21x$ and -14 is .....

$21x - 14 =$ ..... $\times$ ..... + ... $\times -$ .....

$=$ ..... (..... $-$ .....)

3 $40 + 15a$

HCF of 40 and $15a$ is .....

$40 + 15a =$ ..... $\times$ ..... + ... $\times$ .....

$=$ ..... (..... + ...)

4 $33a - 18b$

HCF of $33a$ and $-18b$ is .....

$33a - 18b =$ ..... $\times$ ..... + ... $\times -$ .....

$=$ ..... (..... $-$ .....)

5 $6xy + 15x$

HCF of $6xy$ and $15x$ is .....

$6xy + 15x =$ .....

$=$ .....

6 $23p - 15pr$

HCF of $23p$ and $-15pr$ is .....

$23p - 15pr =$ .....

$=$ .....

7 $10ab + 25bc$

HCF of $10ab$ and $25bc$ is .....

$10ab + 25bc =$ .....

$=$ .....

8 $16wz - 20wx$

HCF of $16wz$ and $-20wx$ is .....

$16wz - 20wx =$ .....

$=$ .....

9 $4x^2 + 18x$

HCF of $4x^2$ and $18x$ is .....

$4x^2 + 18x =$ .....

$=$ .....

10 $27b^2 - 9b$

HCF of $27b^2$ and $-9b$ is .....

$27b^2 - 9b =$ .....

$=$ .....

11 $6y^2 + 12yz$

HCF of $6y^2$ and $12yz$ is .....

$6y^2 + 12yz =$ .....

$=$ .....

12 $15mn - 18m^2p$

HCF of $15mn$ and $-18m^2p$ is .....

$15mn - 18m^2p =$ .....

$=$ .....

SKILLSHEET

Finding a factor pair that adds to a given number

WORKED EXAMPLE

Find a factor pair of the first number that adds to the second number.
a 18, 11 **b** 12, –7 **c** –20, 1

THINK

a 1 Both the product and the sum of two numbers are positive, so the numbers must be positive. Write all factor pairs of 18 where both numbers are positive.

2 Select a pair that adds up to 11.

b 1 The product of the two numbers is positive and their sum is negative, which implies that both numbers must be negative. Write all factor pairs of 12 where both numbers are negative.

2 Select a pair that adds to –7.

c 1 The product of the two numbers is negative and their sum is positive. This means that the numbers must have opposite signs with the larger number being positive. Write all such factor pairs of –20.

2 Select a pair that adds to 1.

WRITE

a Factor pairs of 18: 1 and 18
2 and 9
3 and 6

Two numbers whose product is 18 and sum is 11 are 2 and 9.

b Factor pairs of 12: –1 and –12
–2 and –6
–3 and –4

Two numbers whose product is 12 and sum is –7 are –3 and –4.

c Factor pairs of 20: –1 and 20
–2 and 10
–4 and 5

Two numbers whose product is –20 and sum is 1 are –4 and 5.

Try these

For each of the following, find a factor pair of the first number that adds to the second number.

1 3, 4

Factor pairs of 3: .....

Two numbers whose product is ..... and sum is 4 are ..... and .....

2 11, 12

Factor pairs of 11: .....

Two numbers whose product is ..... and sum is ..... are ..... and .....

3 5, 6

Factor pairs of .....: .....

Two numbers whose product is ..... and sum is ..... are ..... and .....

4 7, –8

Factor pairs of .....: .....

Two numbers whose product is ..... and sum is ..... are ..... and .....

SKILLSHEET *(continued)*

5 6, –5

Factor pairs of ....: ....

Two numbers whose product is .... and sum is .... are .... and ....

6 12, –7

Factor pairs of ....: ....

Two numbers whose product is .... and sum is .... are .... and ....

7 –21, 4

Factor pairs of ....: ....

Two numbers whose product is .... and sum is .... are .... and ....

8 –10, 9

Factor pairs of ....: ....

Two numbers whose product is .... and sum is .... are .... and ....

9 –28, –3

Factor pairs of ....: ....

Two numbers whose product is .... and sum is .... are .... and ....

10 –27, –6

Factor pairs of ....: ....

Two numbers whose product is .... and sum is .... are .... and ....

SKILLSHEET

Substitution into quadratic equations

To substitute a given value for a pronumeral in a quadratic equation means to replace the pronumeral with that value.

When all pronumerals have been replaced with numbers, the expression can be evaluated. Order of operations must be observed at all times when evaluating.

WORKED EXAMPLE

Substitute 5 for x in each of the following rules and find the value of y.

a $y = x^2 + 2x + 7$ **b** $y = -x^2 - 4x - 3$

THINK	WRITE
a 1 Replace x with the given value (5), remembering that in algebra $2x$ means $2 \times x$.	**a** $y = 5^2 + 2 \times 5 + 7$
2 To find the value of y, first square the 5 and then perform multiplication followed by addition.	$= 25 + 2 \times 5 + 7$ $= 25 + 10 + 7$ $= 42$
b 1 Substitute 5 for x. Note that the negative sign in front of the first term refers to x^2 rather that x, which implies that the number (in this case, 5) needs to be squared first and then made negative.	**b** $y = -(5)^2 - 4 \times 5 - 3$
2 To find the value of y, first square the 5 and then perform multiplication followed by subtraction.	$= -25 - 4 \times 5 - 3$ $= -25 - 20 - 3$ $= -48$

Try these

1 Substitute 5 for x in each of the following rules and find the value of y.

a $y = x^2 + 8x + 2$

$= 5^2 + 8 \times$ ..... $+ 2$

$=$ ..... $+$ ..... $+$ .....

$=$ .....

b $y = x^2 + 3x + 1$

$=$ ..... $+ 3 \times$ ..... $+$ .....

$=$ ..... $+$ ..... $+$ .....

$=$ .....

c $y = x^2 + 5x$

$=$ .....

$=$ .....

$=$ .....

d $y = x^2 - 4x$

$=$ .....

$=$ .....

$=$ .....

e $y = x^2 - 3$

$=$ .....

$=$ .....

$=$ .....

f $y = x^2 - 2x + 7$

$=$ .....

$=$ .....

$=$ .....

g $y = x^2 - x - 1$

$=$ .....

$=$ .....

$=$ .....

h $y = 2x^2 + 2x + 1$

$=$ .....

$=$ .....

$=$ .....

SKILLSHEET *(continued)*

i $y = -x^2 + 4x + 4$

$= \ldots\ldots$

$= \ldots\ldots$

$= \ldots\ldots$

j $y = -x^2 - 2x - 2$

$= \ldots\ldots$

$= \ldots\ldots$

$= \ldots\ldots$

2 Substitute -3 for x in each of the rules in question **1** and hence find the value of y.

a $y = x^2 + 8x + 2$

$= (-3)^2 + 8 \times \ldots\ldots + 2$

$= \ldots\ldots + \ldots\ldots + \ldots\ldots$

$= \ldots\ldots$

b $y = x^2 + 3x + 1$

$= \ldots\ldots + 3 \times \ldots\ldots + \ldots\ldots$

$= \ldots\ldots + \ldots\ldots + \ldots\ldots$

$= \ldots\ldots$

c $y = x^2 + 5x$

$= \ldots\ldots$

$= \ldots\ldots$

$= \ldots\ldots$

d $y = x^2 - 4x$

$= \ldots\ldots$

$= \ldots\ldots$

$= \ldots\ldots$

e $y = x^2 - 3$

$= \ldots\ldots$

$= \ldots\ldots$

$= \ldots\ldots$

f $y = x^2 - 2x + 7$

$= \ldots\ldots$

$= \ldots\ldots$

$= \ldots\ldots$

g $y = x^2 - x - 1$

$= \ldots\ldots$

$= \ldots\ldots$

$= \ldots\ldots$

h $y = 2x^2 + 2x + 1$

$= \ldots\ldots$

$= \ldots\ldots$

$= \ldots\ldots$

i $y = -x^2 + 4x + 4$

$= \ldots\ldots$

$= \ldots\ldots$

$= \ldots\ldots$

j $y = -x^2 - 2x - 2$

$= \ldots\ldots$

$= \ldots\ldots$

$= \ldots\ldots$

SKILLSHEET

Expanding brackets

To expand (multiply out) brackets, multiply each term in the brackets by the coefficient in front of the brackets.

WORKED EXAMPLE

Expand each of the following.
a $3(2x - 4)$ **b** $-2(4x + 7)$

THINK	WRITE
a 1 Write the question.	**a** $3(2x - 4)$
2 Multiply 3 by $2x$ and then 3 by -4.	$= 3 \times 2x + 3 \times -4$
3 Simplify.	$= 6x - 12$
b 1 Write the question.	**b** $-2(4x + 7)$
2 Multiply -2 by $4x$ and then -2 by 7.	$= -2 \times 4x + -2 \times 7$
3 Simplify.	$= -8x - 14$

Try these

Expand each of the following.

1 $3(2x + 1)$

$= 3 \times$ ..... $+ 3 \times$ .....

$=$ ..... $+$ .....

2 $2(4x + 2)$

$= 2 \times$ ..... $+$ ..... $\times$ .....

$=$ ..... $+$ .....

3 $7(x - 5)$

$=$ ..... $\times$ ..... $+$ ..... $\times$ .....

$=$ ..... $-$ .....

4 $6(5x - 4)$

$=$ .....

$=$ .....

5 $4(3x - 1)$

$=$ .....

$=$ .....

6 $-2(2x + 3)$

$=$ .....

$=$ .....

7 $-3(3x + 4)$

$=$ .....

$=$ .....

8 $-4(2x - 2)$

$=$ .....

$=$ .....

9 $-5(x - 2)$

$=$ .....

$=$ .....

10 $-6(x - 1)$

$=$ .....

$=$ .....