

Chapter 2 — Evaluating Algebraic Expressions

Teacher Guide

Teacher Chapter-at-a-Glance

Materials

Student text, worksheets, pencils, highlighters or coloured pencils, optional substitution mats that show the original expression, substitution line, and calculation line.

Pacing

Teach positive substitution first, then negative substitution with brackets, then exponents. Do not move into exponent-scope comparisons until students consistently use brackets for negative values.

Talk Prompt

“When a variable is replaced by a negative number, what must stay together, and why?”

If Ready-to-Learn Reveals a Gap

If students struggle with signed multiplication or exponent meaning, pause for a short numerical review. Do not treat a substitution error as an algebra-only error when the numerical prerequisite is the real gap.

Mastery Decision Guide

What a missed Tripwire item actually means, and what to do about it before moving on.

Missed Tripwire #1 → Confusing addition of like terms with multiplying powers (Mistake 5).

Student gives an exponent as the result of adding like terms. Review before the next chapter.

Missed Tripwire #2 → Confusing exponent scope (Mistake 4). *Student gives the same value for expressions whose exponents apply to different quantities. Review before the next chapter.*

Ready-to-Learn Check

Quick check before starting. A wrong answer below points to a specific gap worth closing first, not just a miss to shrug off.

1. BEDMAS with multiplication. Calculate: $9-2(4)$

Correct answer: 1

Likely wrong answer: 28

Misconception: The student may subtract first, then multiply, instead of multiplying before subtracting.

Next move: Review the order of operations with numerical expressions. Multiplication is completed before addition or subtraction unless brackets change the order.

2. Squaring a negative number in brackets. Calculate: $(-3)^2$

Correct answer: 9

Likely wrong answer: -9

Misconception: The student may square the 3 but leave the negative sign outside the exponent, even though the brackets show that the entire negative number is squared.

Next move: Read the brackets first. The exponent applies to everything inside the brackets.

3. A negative sign outside an exponent. Calculate: $-(3^2)$

Correct answer: -9

Likely wrong answer: 9

Misconception: The student may assume that every negative sign becomes positive when an exponent is present.

Next move: Compare the position of the negative sign with the brackets. In this expression, only 3 is squared. The negative remains outside.

4. Integer multiplication. Calculate: $(-5)(-2)$

Correct answer: 10

Likely wrong answer: -10

Misconception: The student may not yet apply the sign rule for two negative factors.

Next move: Review that two negative factors produce a positive product. This rule matters when negative values are substituted into an expression.

Common Mistakes

Students often run into the same kinds of trouble with this topic. Recognizing these patterns helps avoid them.

What Gets Squared?

Expression	What gets squared?	When $x = 2$
$3x^2$	only x	$3(2^2) = 12$
$(3x)^2$	the whole $3x$	$(3 \times 2)^2 = 36$

Brackets change the meaning.

$$3x^2 \neq (3x)^2$$

Mistake 1: Skipping the substitution line

What students do: Trying to calculate mentally and writing only the final answer.

Why this happens: The student sees the substitution line as extra writing rather than the step that preserves the expression's meaning.

What to do instead: Write the expression again with every variable replaced before calculating: $5x-2$, $x=-4$ becomes $5(-4)-2=-20-2=-22$.

Diagnostic trigger: A final answer appears with no substitution line, especially when a negative value is involved.

Mistake 2: Omitting brackets around a negative value

What students do: Evaluating x^2 when $x=-6$ by writing $-6^2=-36$

Why this happens: The student replaces x with -6 but does not treat the negative value as one complete quantity.

What to do instead: Use brackets for every negative substitution: $(-6)^2=36$.

Diagnostic trigger: Student writes -36 for x^2 when $x=-6$.

Mistake 3: Ignoring BEDMAS after substitution

What students do: Evaluating $3x+4$ when $x=5$ as $3(5+4)=27$

Why this happens: The student substitutes correctly but changes the original operation structure by adding before multiplying.

What to do instead: Keep the original operations in their original order: $3(5)+4=15+4=19$.

Diagnostic trigger: Student gives 27 for $3x+4$ when $x=5$.

Mistake 4: Confusing exponent scope

What students do: Treating $3x^2$, $(3x)^2$, $-x^2$, and $(-x)^2$ as though the exponent applies to the same quantity in every expression.

Why this happens: The expressions use similar symbols, so the student may not pause to identify what the exponent controls.

What to do instead: Circle or underline the base before substituting. The exponent applies only to the quantity inside its scope: $3x^2=3(x^2)$ but $(3x)^2=(3x)(3x)$.

Diagnostic trigger: Student gives the same value for expressions whose exponents apply to different quantities.

Mistake 5: Confusing addition of like terms with multiplying powers

What students do: $2x+3x$ turned into $5x^2$ instead of $5x$

Why this happens: The student correctly adds the coefficients, then mistakenly treats adding the variables as multiplying them, which is where an exponent would appear.

What to do instead: Adding like terms only combines coefficients; the variable part does not change: $2x+3x=5x$, not $5x^2$. An exponent only appears from repeated multiplication, such as $x \cdot x = x^2$.

Diagnostic trigger: Student gives an exponent as the result of adding like terms.

Practice

TEACHING NOTE

Practice items are grouped by skill (A-C) so a teacher can assign a subset for targeted review rather than the full set.

Teacher solutions follow this practice set.

1. A. Substitution and Order of Operations
2. Evaluate: $7x-5$ when $x=4$ (Hint: replace x with 4 before multiplying.)
3. Evaluate: $3n+8$ when $n=-2$ (Hint: keep -2 together when it replaces n .)
4. Evaluate: $4p^2-1$ when $p=3$ (Hint: evaluate the exponent before multiplying by 4.)

5. Evaluate: q^2+5q-6 when $q=-3$ (Hint: put brackets around the negative value before calculating.)
6. B. Two Variables and Exponent Scope
7. Evaluate: $2a-3b$ when $a=6$, $b=-4$ (Hint: replace both variables before calculating.)
8. Evaluate: r^2+2s when $r=-2$, $s=5$ (Hint: square the complete value of r .)
9. Evaluate: $5x^2$ when $x=-2$ (Hint: the exponent applies to x , not to 5.)
10. Evaluate: $(2y)^2$ when $y=3$ (Hint: calculate inside the brackets before squaring.)
11. C. Applications and Reasoning
12. A skating rink charges a \$4 entry fee and \$3 for each skate rental hour. The total cost is represented by $4+3h$. Find the cost when $h=5$. (Hint: substitute 5 for h , then write the final cost in dollars.)
13. The perimeter of a square is represented by $4s$ where s is the side length in centimetres. Find the perimeter when $s=8$. (Hint: the variable represents the side length.)
14. A student evaluates $2m^2+1$ when $m=-3$ and gets -17. Explain the error and write the correct value. (Hint: check whether the negative value was squared as one complete number.)
15. A student says that the expressions below are equal when $x=2$: $4x^2$ and $(4x)^2$. Is the student correct? Evaluate both expressions and explain. (Hint: identify what the exponent applies to in each expression.)

Practice Solutions

Use these concise solutions to check the method as well as the final answer.

2. Evaluate: $7x-5$ when $x=4$ (Hint: replace x with 4 before multiplying.)
Solution: Substitute $x = 4$: $7(4) - 5 = 28 - 5 = 23$.
3. Evaluate: $3n+8$ when $n=-2$ (Hint: keep -2 together when it replaces n .)
Solution: Substitute $n = -2$: $3(-2) + 8 = -6 + 8 = 2$.
4. Evaluate: $4p^2-1$ when $p=3$ (Hint: evaluate the exponent before multiplying by 4.)
Solution: Substitute $p = 3$ and square first: $4(3^2) - 1 = 36 - 1 = 35$.

5. Evaluate: q^2+5q-6 when $q=-3$ (Hint: put brackets around the negative value before calculating.)

Solution: Substitute $q = -3$: $(-3)^2 + 5(-3) - 6 = 9 - 15 - 6 = -12$.

7. Evaluate: $2a-3b$ when $a=6$, $b=-4$ (Hint: replace both variables before calculating.)

Solution: Substitute $a = 6$ and $b = -4$: $2(6) - 3(-4) = 12 + 12 = 24$.

8. Evaluate: r^2+2s when $r=-2$, $s=5$ (Hint: square the complete value of r .)

Solution: Substitute $r = -2$ and $s = 5$: $(-2)^2 + 2(5) = 4 + 10 = 14$.

9. Evaluate: $5x^2$ when $x=-2$ (Hint: the exponent applies to x , not to 5.)

Solution: The exponent applies to x : $5(-2)^2 = 5(4) = 20$.

10. Evaluate: $(2y)^2$ when $y=3$ (Hint: calculate inside the brackets before squaring.)

Solution: The brackets make $2y$ the base: $(2 \cdot 3)^2 = 6^2 = 36$.

12. A skating rink charges a \$4 entry fee and \$3 for each skate rental hour. The total cost is represented by $4+3h$. Find the cost when $h=5$. (Hint: substitute 5 for h , then write the final cost in dollars.)

Solution: Substitute $h = 5$: $4 + 3(5) = 19$, so the cost is \$19.

13. The perimeter of a square is represented by $4s$ where s is the side length in centimetres. Find the perimeter when $s=8$. (Hint: the variable represents the side length.)

Solution: Substitute $s = 8$: $4s = 4(8) = 32$ cm.

14. A student evaluates $2m^2+1$ when $m=-3$ and gets -17. Explain the error and write the correct value. (Hint: check whether the negative value was squared as one complete number.)

Solution: The negative value must be squared as one number: $2(-3)^2 + 1 = 18 + 1 = 19$.

15. A student says that the expressions below are equal when $x=2$: $4x^2$ and $(4x)^2$. Is the student correct? Evaluate both expressions and explain. (Hint: identify what the exponent applies to in each expression.)

Solution: At $x = 2$, $4x^2 = 4(2^2) = 16$, while $(4x)^2 = 8^2 = 64$. They are not equal.

Tripwire Check

These questions test whether the thinking is solid — not just whether the procedure was memorized. Each wrong answer below points to a specific misconception, not just "try again."

1. Does an Exponent Change When Terms Are Added? A student evaluates the expression below when $x=3$: $2x+3x$. The student writes: $2(3)+3(3)=5(3)^2=45$. Is the student correct? Explain the exact point where the meaning of the expression changed.

Correct answer: The student is not correct. $2(3)+3(3)=6+9=15$. The student correctly added the coefficients $2+3$, but then incorrectly changed $x+x$ into x^2 . Adding like terms gives $2x+3x=5x$, not $5x^2$. When $x=3$: $5x=5(3)=15$.

Likely wrong answer: 45

Misconception: The student is confusing addition of like terms with multiplication of powers.

Next move: Review the difference between addition and multiplication with variables. Exponents are added when powers are multiplied, not when like terms are added.

2. What Exactly Is Squared? Evaluate both expressions when $x=-2$: $-3x^2$ and $(-3x)^2$. Explain why the answers are different.

Correct answer: For the first expression, only x is squared: $-3x^2=-3(-2)^2=-3(4)=-12$. For the second expression, the entire product $-3x$ is squared: $(-3x)^2=(-3 \cdot -2)^2=6^2=36$. The answers differ because the brackets change what the exponent applies to.

Likely wrong answer: Both expressions equal 36.

Misconception: The student may place the coefficient inside the exponent even when brackets do not include it.

Next move: Circle the quantity directly controlled by the exponent before substituting. In $-3x^2$, only x is squared. In $(-3x)^2$, the full product is squared.

Answer Key — Worksheets (Full Diagnostic)

Worksheet A: Guided Practice

1. Evaluate: x^2+1 when $x=4$

1. $(4)^2+1=17$ Likely wrong answer: $4^2+1=17$ read as $4 \times 2+1=9$ (multiplies base by exponent instead of squaring). Misconception: The exponent is treated as a multiplier on the base rather than repeated multiplication.

2. Evaluate: $2x+6$ when $x=5$

2. $2(5)+6=16$ Likely wrong answer: $2(5+6)=22$ (adds before multiplying). Misconception: Substitution is followed by the wrong order of operations, adding before multiplying.

3. Evaluate: y^2-2 when $y=-3$

3. $(-3)^2 - 2 = 7$ Likely wrong answer: $-3^2 - 2 = -11$ (squares without bracketing the negative).
Misconception: The negative sign is left outside the square instead of being included in the substituted value.

4. Evaluate: $7n - 3$ when $n = 2$

4. $7(2) - 3 = 11$ Likely wrong answer: $7(2 - 3) = -7$ (subtracts before multiplying).
Misconception: The constant is combined with the substituted value before the multiplication is done.

5. Evaluate: $3r^2$ when $r = 2$

5. $3(2)^2 = 12$ Likely wrong answer: $3(2) = 6$, then squared $= 36$ (multiplies before squaring).
Misconception: The order of the exponent and the multiplication is reversed.

6. Evaluate: $4a - b$ when $a = 3$, $b = 5$

6. $4(3) - 5 = 7$ Likely wrong answer: $4(3 - 5) = -8$ (subtracts the two substituted values before multiplying). Misconception: Both variables are combined before the multiplication by the first coefficient is applied.

7. Evaluate: $(3s)^2$ when $s = 2$

7. $(3 \cdot 2)^2 = 36$ Likely wrong answer: $3(2^2) = 12$ (squares only the 2, not the full product $3s$).
Misconception: Only part of the bracket's contents is squared instead of the whole product.

8. A bike rental shop charges a \$5 starting fee and \$4 for each hour. The cost is represented by $5 + 4h$. Find the cost when $h = 3$.

8. $5 + 4(3) = 17$; \$17 Likely wrong answer: 17 with no units. Misconception: The numeric result is reported without reconnecting it to what it represents.

9. Evaluate: $3m + 4$ when $m = -2$

9. $3(-2) + 4 = -2$ Likely wrong answer: $3(-2) + 4 = 10$ (drops the negative sign on -2).
Misconception: A negative substituted value loses its sign when multiplied.

10. Evaluate: $2k^2 - 3k$ when $k = -2$

10. $2(-2)^2 - 3(-2) = 14$ Likely wrong answer: $2(-2)^2 - 3(-2) = 2$ (mishandles one of the two substitutions). Misconception: One of two substitutions in a multi-term expression is done correctly while the other is not.

11. Evaluate: $2p + 3q$ when $p = -1$, $q = 4$

11. $2(-1) + 3(4) = 10$ Likely wrong answer: $2(-1) + 3(4) = 14$ (drops the negative sign on p). Misconception: A negative substituted value loses its sign partway through a multi-term calculation.

12. Evaluate: $(-u)^2$ when $u = 4$

12. $(-4)^2 = 16$ Likely wrong answer: -16 (squares 4 then applies the negative outside). Misconception: The bracket around $-u$ is ignored, so the negative is applied after squaring instead of before.

13. Evaluate: $-t^2$ when $t = 4$

13. $-(4)^2 = -16$ Likely wrong answer: 16 (brackets the negative when none were given). Misconception: The negative sign is assumed to be part of what's squared even though no bracket encloses it.

14. The area of a square is represented by s^2 . Find the area when $s = 6$.

14. $(6)^2 = 36$ square units Likely wrong answer: 12 square units (multiplies 6 by 2 instead of squaring). Misconception: The exponent is read as 'times 2' rather than 'multiply by itself'.

15. Evaluate: $4(2w + 1)$ when $w = 3$

15. $4(2(3) + 1) = 28$ Likely wrong answer: $4(2(3)) + 1 = 25$ (forgets the $+1$ inside the bracket before multiplying by 4). Misconception: Only part of the bracket's contents is carried through the substitution.

Worksheet B: Independent Practice

1. A taxi charges a \$4.50 starting fee and \$1.25 per kilometre. The fare is represented by $4.50 + 1.25k$. Find the fare for $k = 8$.

1. $4.50 + 1.25(8) = 14.50$; \$14.50 Likely wrong answer: $4.50 + 1.25 + 8 = 13.75$ (adds the rate instead of multiplying by kilometres). Misconception: The per-unit rate is added once instead of multiplied by the number of units.

2. Evaluate: $2m^2-3m+1$ when $m=4$

2. $2(4)^2-3(4)+1=21$ Likely wrong answer: $2(4)^2-3(4)+1$ computed as 8^2-12+1 (squares 2×4 instead of just 4). Misconception: The coefficient is folded into the base before the exponent is applied.

3. Evaluate: $(2q)^2-3$ when $q=4$

3. $(2 \cdot 4)^2-3=61$ Likely wrong answer: $(2(4))^2-3=61$ miscomputed as $2(4)^2-3=29$ (drops the outer brackets around $2q$). Misconception: The bracket enclosing the whole product is ignored, so only q is squared instead of $2q$.

4. A rectangle has length $2x+3$ and width $x-1$. The perimeter is represented by $2(2x+3)+2(x-1)$. Find the perimeter when $x=5$.

4. $2(2(5)+3)+2(5-1)=34$ cm Likely wrong answer: $2(2(5)+3)+(5-1)=30$ (doubles only one of the two sides). Misconception: Perimeter is built by doubling one side and not the other.

5. Evaluate: n^2+4n-5 when $n=-3$

5. $(-3)^2+4(-3)-5=-8$ Likely wrong answer: $(-3)^2+4(-3)-5$ computed with -9 instead of 9 for the square. Misconception: A negative base squared is kept negative instead of becoming positive.

6. Evaluate: $(-s)^2+2s$ when $s=-4$

6. $(-(-4))^2+2(-4)=8$ Likely wrong answer: $(-(-4))^2+2(-4)$ computed as $-16-8=-24$ (treats the double negative as staying negative). Misconception: Two negative signs in a row are not resolved to a positive before squaring.

7. The temperature in Fahrenheit is represented by $F=1.8C+32$. Find the Fahrenheit temperature when $C=-10$.

7. $1.8(-10)+32=14^\circ\text{F}$ Likely wrong answer: $1.8(-10)+32$ computed as $1.8(22)=39.6$ (adds 32 to -10 before multiplying). Misconception: The constant is combined with the substituted value before the multiplication is done.

8. Evaluate: $2a^2-3ab+b^2$ when $a=3$, $b=-2$

8. $2(3)^2-3(3)(-2)+(-2)^2=40$ Likely wrong answer: $2(3)^2-3(3)(-2)+(-2)^2$ computed with the middle term as $+3(3)(-2)$ losing its intended sign role. Misconception: A three-term expression's middle sign is mismanaged when two negative values are both substituted.

9. A student evaluates $4x^2-1$ when $x=-2$ and gets -17. Identify the error and write the correct value.

9. The negative value was not squared as a complete quantity. $4(-2)^2-1=15$. Likely wrong answer: (already given) -17, from squaring -2 without brackets. Misconception: The negative substituted value is not enclosed before squaring, so only 2 is squared and the negative is applied after.

10. Evaluate: $6x-1$ when $x=2$

10. $6(2)-1=11$ Likely wrong answer: $6(2)-1=13$ (adds instead of subtracting the 1). Misconception: The final subtraction is treated as addition after the multiplication is done.

11. Evaluate: $5a+2b$ when $a=3$, $b=-4$

11. $5(3)+2(-4)=7$ Likely wrong answer: $5(3)+2(-4)=23$ (drops the negative sign on b). Misconception: A negative substituted value loses its sign during multiplication.

12. Evaluate: $3p^2-2p$ when $p=-2$

12. $3(-2)^2-2(-2)=16$ Likely wrong answer: $3(-2)^2-2(-2)$ computed with the square as -4 instead of 4. Misconception: A negative base squared is kept negative instead of becoming positive.

13. Evaluate: $3(u-1)^2$ when $u=5$

13. $3(5-1)^2=48$ Likely wrong answer: $3(5-1)^2$ computed as $(3(5-1))^2=192$ (cubes the multiplier into the bracket before squaring). Misconception: The coefficient outside the bracket is combined into the squared quantity instead of applied after.

14. Evaluate: $-r^2+5r$ when $r=-3$

14. $-(-3)^2+5(-3)=-24$ Likely wrong answer: $-(-3)^2+5(-3)$ computed with the square as -9 instead of 9. Misconception: The negative sign in front of the squared term is treated as part of the base being squared.

15. Evaluate: $4t^2-2(t+3)$ when $t=2$

15. $4(2)^2-2(2+3)=6$ Likely wrong answer: $4(2)^2-2(2+3)=4(4)-2(5)=6$ miscomputed as $4(2)^2-2(5)=-2$. Misconception: One of two separate operations in a multi-step expression is dropped partway through.

16. A company's profit is represented by $45n-120$ where n is the number of items sold. Find the profit when $n=7$.

16. $45(7)-120=195$; \$195 Likely wrong answer: $45(7-120)=-5085$ (subtracts before multiplying). Misconception: The constant is combined with the substituted value before the multiplication is done.

17. Evaluate: $5x^2+2y^2$ when $x=-1$, $y=3$

17. $5(-1)^2+2(3)^2=23$ Likely wrong answer: $5(-1)^2+2(3)^2$ computed with the first square as -1 instead of 1. Misconception: A negative base squared is kept negative instead of becoming positive.

18. Compare the values of the following expressions when $m=3$: $2m^2$ and $(2m)^2$

18. $2(3)^2=18$; $(2\cdot3)^2=36$; not equal Likely wrong answer: both treated as equal since they 'use the same numbers'. Misconception: Two expressions that look similar are assumed equal without actually evaluating both.

19. A student evaluates $3p+2q$ when $p=-2$, $q=-5$ and writes: $-6+10=4$. Identify the sign error and write the correct value.

19. $2(-5)=-10$, not 10. The correct value is -16. Likely wrong answer: (already given) $-6+10=4$. Misconception: A negative substituted value's sign is dropped during one of the two multiplications, changing the sign of that term's contribution.

20. Explain why brackets are necessary when evaluating x^2 when $x=-7$

20. Brackets show that the entire value -7 replaces x : $(-7)^2=49$. Without brackets, $-7^2=-(7^2)=-49$. Likely wrong answer: (already given, explanatory item). Misconception: Without brackets, the exponent applies to the digit only, not the full negative value, changing the sign of the result.

Worksheet C: Mixed Application

1. A streaming service charges a \$12 monthly fee and \$1.50 for each movie rental. The monthly cost is represented by $12+1.50r$. Find the cost when $r=6$.

1. $12+1.50(6)=21.00$; \$21.00 Likely wrong answer: $12+1.50+6=19.50$ (adds the rate instead of multiplying by rentals). Misconception: The per-unit rate is added once instead of multiplied by the number of units.

2. A rectangle has length $3w+2$ and width w . The area is represented by $w(3w+2)$. Find the area when $w=4$.

2. $4(3(4)+2)=56$ square units Likely wrong answer: $4(3(4)+2)=16(14)=224$ (multiplies the whole bracket result by 4 twice). Misconception: The substituted value for w outside the bracket is reapplied a second time.

3. Evaluate: y^2-4y+6 when $y=-1$

3. $(-1)^2-4(-1)+6=11$ Likely wrong answer: $(-1)^2-4(-1)+6$ computed with the square as -1 instead of 1. Misconception: A negative base squared is kept negative instead of becoming positive.

4. Evaluate: $(4m)^2$ when $m=2$

4. $(4\cdot 2)^2=64$ Likely wrong answer: $(4(2))^2$ computed as $4(2)^2=16$ (multiplies 4 by the square of 2 instead of squaring the full product). Misconception: The bracket enclosing the whole product is ignored, so only the substituted value is squared.

5. The total amount saved is represented by $15w+40$ where w is the number of weeks. Find the total amount saved after $w=12$.

5. $15(12)+40=220$; \$220 Likely wrong answer: $15+40(12)=495$ (multiplies the constant by w instead of the coefficient). Misconception: The wrong number in the expression is treated as the one being multiplied by the substituted value.

6. Evaluate: $8x+3$ when $x=-2$

6. $8(-2)+3=-13$ Likely wrong answer: $8(-2)+3=-19$ (drops the negative sign on the substituted value). Misconception: A negative substituted value loses its sign during multiplication.

7. Evaluate: $-4m^2$ when $m=2$

7. $-4(2)^2=-16$ Likely wrong answer: $-4(2)^2$ computed as $(-4(2))^2=64$ (brackets the coefficient and base together before squaring). Misconception: The negative coefficient is treated as part of what gets squared, though no bracket encloses it with the base.

8. Evaluate: $2a^2+5b$ when $a=-3$, $b=4$

8. $2(-3)^2+5(4)=38$ Likely wrong answer: $2(-3)^2+5(4)$ computed with the square as -9 instead of 9. Misconception: A negative base squared is kept negative instead of becoming positive.

9. Evaluate: $2(p-4)^2+p$ when $p=6$

9. $2(6-4)^2+6=14$ Likely wrong answer: $2(6-4)^2+6$ computed as $2(6)-4^2+6$ (breaks the bracket apart before subtracting). Misconception: The subtraction inside the bracket is not completed before the result is squared.

10. Evaluate: $3(n+2)^2-1$ when $n=1$

10. $3(1+2)^2-1=26$ Likely wrong answer: $3(1+2)^2-1$ computed as $3(1)+2^2-1$ (distributes into the bracket before adding). Misconception: The addition inside the bracket is not completed before the multiplier and exponent are applied.

11. A square has side length $x+3$. The area is represented by $(x+3)^2$. Find the area when $x=5$.

11. $(5+3)^2=64$ square units Likely wrong answer: $(5+3)^2$ computed as $5^2+3^2=34$ (squares each term separately). Misconception: A binomial sum is squared term-by-term instead of squaring the whole sum.

12. A student evaluates $2x^2+4x$ when $x=-3$ and writes: $2(-9)-12=-30$. Identify the error and write the correct value.

12. The student wrote $(-3)^2$ as -9. The correct value is $2(9)+4(-3)=6$. Likely wrong answer: (already given) $2(-9)-12=-30$. Misconception: A negative base squared is recorded as negative instead of positive, changing the sign of the whole first term.

13. A student evaluates $(3y)^2$ when $y=-2$ and writes: $3(-2)^2=12$. Explain why the student's method does not match the original expression. Then calculate the correct value.

13. The whole product $3y$ must be squared. $(3(-2))^2=36$. Likely wrong answer: (already given) $3(-2)^2=12$. Misconception: The coefficient outside the bracket is applied to the base alone instead of to the entire product being squared.

14. Non-Routine: A company charges a fixed fee of \$25 plus \$4 for each item ordered. The total cost is represented by $25+4n$. A customer says that ordering 6

items will cost \$841 because $25+4(6)=29^2=841$. Is the customer correct? Identify every change to the original expression and calculate the correct cost.

14. Correct answer: The customer is not correct. $25+4(6)=25+24=49$. The correct cost is \$49. The customer changed the expression by adding 25 and 4 before multiplying by 6, then squared a result that was never part of the original expression. Likely wrong answer: \$841 Misconception: The student may be changing the order and structure of the original expression instead of evaluating it as written. Next move: Keep the original operation signs and grouping visible. Substitute only for the variable. Do not add brackets or exponents that were not in the original expression.

15. Non-Routine: A student evaluates the expression $3(x-2)^2+4$ when $x=-1$. The student writes: $3(-1-2)^2+4=3(-3)^2+4=-27+4=-23$. Is the student correct? Identify the exact wrong move and find the correct value.

15. Correct answer: The student is not correct. The substitution and bracket work are correct: $3(-1-2)^2+4=3(-3)^2+4$. The wrong move occurs when the student evaluates $(-3)^2$ as -9. A negative number inside brackets is squared as a complete quantity: $(-3)^2=9$. Continuing: $3(9)+4=27+4=31$. Correct value: 31. Likely wrong answer: -23 Misconception: The student may substitute correctly and recognize the exponent, but may not understand that a negative value inside brackets becomes positive when squared. Next move: Rewrite $(-3)^2$ as $(-3)(-3)$, then connect the positive product to the bracketed negative quantity.

Answer Key — Exit Ticket

1. $5(-2)-9=-19$
2. $(-3)^2+2(4)=17$
3. $2(2)^2=8$; $(2\cdot 2)^2=16$. The exponent applies only to n in the first expression and to $2n$ in the second.

Worksheet 1: Guided Practice

1. $(4)^2+1=17$
2. $2(5)+6=16$
3. $(-3)^2-2=7$
4. $7(2)-3=11$
5. $3(2)^2=12$
6. $4(3)-5=7$

7. $(3 \cdot 2)^2 = 36$
8. $5 + 4(3) = 17$; \$17
9. $3(-2) + 4 = -2$
10. $2(-2)^2 - 3(-2) = 14$
11. $2(-1) + 3(4) = 10$
12. $(-4)^2 = 16$
13. $-(4)^2 = -16$
14. $(6)^2 = 36$ square units
15. $4(2(3) + 1) = 28$

Worksheet 2: Independent Practice

1. $4.50 + 1.25(8) = 14.50$; \$14.50
2. $2(4)^2 - 3(4) + 1 = 21$
3. $(2 \cdot 4)^2 - 3 = 61$
4. $2(2(5) + 3) + 2(5 - 1) = 34$ cm
5. $(-3)^2 + 4(-3) - 5 = -8$
6. $(-(-4))^2 + 2(-4) = 8$
7. $1.8(-10) + 32 = 14^\circ\text{F}$
8. $2(3)^2 - 3(3)(-2) + (-2)^2 = 40$
9. The negative value was not squared as a complete quantity. $4(-2)^2 - 1 = 15$.
10. $6(2) - 1 = 11$
11. $5(3) + 2(-4) = 7$
12. $3(-2)^2 - 2(-2) = 16$
13. $3(5 - 1)^2 = 48$
14. $-(-3)^2 + 5(-3) = -24$
15. $4(2)^2 - 2(2 + 3) = 6$
16. $45(7) - 120 = 195$; \$195
17. $5(-1)^2 + 2(3)^2 = 23$
18. $2(3)^2 = 18$; $(2 \cdot 3)^2 = 36$; not equal
19. $2(-5) = -10$, not 10. The correct value is -16 .
20. Brackets show that the entire value -7 replaces x : $(-7)^2 = 49$. Without brackets, $-7^2 = -(7^2) = -49$.

Worksheet 3: Mixed Practice & Application

Item 14 (Non-Routine)

Correct answer: The customer is not correct. $25+4(6)=25+24=49$. The correct cost is \$49. The customer changed the expression by adding 25 and 4 before multiplying by 6, then squared a result that was never part of the original expression.

Likely wrong answer: \$841

Misconception: The student may be changing the order and structure of the original expression instead of evaluating it as written.

Next move: Keep the original operation signs and grouping visible. Substitute only for the variable. Do not add brackets or exponents that were not in the original expression.

Item 15 (Non-Routine)

Correct answer: The student is not correct. The substitution and bracket work are correct:

$3(-1-2)^2+4=3(-3)^2+4$. The wrong move occurs when the student evaluates $(-3)^2$ as -9. A negative number inside brackets is squared as a complete quantity: $(-3)^2=9$. Continuing: $3(9)+4=27+4=31$. Correct value: 31.

Likely wrong answer: -23

Misconception: The student may substitute correctly and recognize the exponent, but may not understand that a negative value inside brackets becomes positive when squared.

Next move: Rewrite $(-3)^2$ as $(-3)(-3)$, then connect the positive product to the bracketed negative quantity.

1. $12+1.50(6)=21.00$; \$21.00
2. $4(3(4)+2)=56$ square units
3. $(-1)^2-4(-1)+6=11$
4. $(4\cdot2)^2=64$
5. $15(12)+40=220$; \$220
6. $8(-2)+3=-13$
7. $-4(2)^2=-16$
8. $2(-3)^2+5(4)=38$
9. $2(6-4)^2+6=14$
10. $3(1+2)^2-1=26$
11. $(5+3)^2=64$ square units
12. The student wrote $(-3)^2$ as -9. The correct value is $2(9)+4(-3)=6$.
13. The whole product $3y$ must be squared. $(3(-2))^2=36$.
14. (see diagnostic above)
15. (see diagnostic above)