LESSON MAKER PRO

Expression Zoom Lens

See a long expression as one useful part.

HIGH SCHOOL · HSA-SSE.A.1b

CCSS.Math.Content.HSA-SSE.A.1b "Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r) n as the product of P and a factor not depending on P."

NAME _____ DATE _____

GROUP IT FIRST

When the same group of terms appears more than once, treat the entire group as one temporary variable. This can reveal factors, powers, or a simpler polynomial. Keep the group unchanged when you replace it.

WORKED EXAMPLE

Let $u = x + y$. Rewrite $A(x + y)^k - B(x + y)$ in terms of u.

1. Set $u = x + y$.
2. Replace each $x + y$ with u.
3. Write the expression as $Au^k - Bu$.

Answer: $Au^k - Bu$

PRACTICE 6 problems

1 In $9(y - 4)^3$, name the two factors being multiplied.

ANSWER _____

2 Let $u = x + 1$. Rewrite $12(x + 1)^7 - 5(x + 1)$ in terms of u.

ANSWER _____

3 In $10q(3r - 1)^2$, regard q as the variable of interest. What factor is multiplied by q?

ANSWER _____

4 Let $v = 2a - 9$. Rewrite $7(2a - 9)^3 + 4(2a - 9)$ in terms of v.

ANSWER _____

5 Let $w = m + n$. Rewrite $(m + n)^2 - 13(m + n) + 30$ in terms of w.

ANSWER _____

6 Let $z = t^2 + 4t$. Rewrite $(t^2 + 4t)^3 / 9$ in terms of z.

ANSWER _____

APPLY IT Show your work

1 A student deposits P dollars into a savings account. The account has annual growth rate r, compounded once each year for t years, so the balance is $P(1 + r)^t$. Name the factor multiplied by P that does not depend on P, and tell what it represents.

WORK SPACE

ANSWER _____

2 A video creator posts n videos. Each video earns $4(x + 3)$ points, where x is the number of extra viewer interactions per video. The total is $4n(x + 3)$. Identify the factor multiplied by n, then find the total when $x = 4$ and $n = 3$.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Let $v = (3x - 2)^2 + 5$. Rewrite $4[(3x - 2)^2 + 5]^3 - 9[(3x - 2)^2 + 5]$ in terms of v, then factor completely.

WORK SPACE AND ANSWER

ANSWER KEY

Expression Zoom Lens

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	In $9(y - 4)^3$, name the two factors being multiplied.	**9 and $(y - 4)^3$**
2	Let $u = x + 1$. Rewrite $12(x + 1)^7 - 5(x + 1)$ in terms of u.	**$12u^7 - 5u$**
3	In $10q(3r - 1)^2$, regard q as the variable of interest. What factor is multiplied by q?	**$10(3r - 1)^2$**
4	Let $v = 2a - 9$. Rewrite $7(2a - 9)^3 + 4(2a - 9)$ in terms of v.	**$7v^3 + 4v$**
5	Let $w = m + n$. Rewrite $(m + n)^2 - 13(m + n) + 30$ in terms of w.	**$w^2 - 13w + 30$**
6	Let $z = t^2 + 4t$. Rewrite $(t^2 + 4t)^3 / 9$ in terms of z.	**$z^3 / 9$**

PART 2 · APPLY IT

1. **$(1 + r)^t$; it is the account's growth factor over t years.** View $P(1 + r)^t$ as P times another factor. The factor $(1 + r)^t$ changes the starting deposit by the accumulated annual growth.
2. **$4(x + 3)$; 84 points** Treat n as one factor in $4n(x + 3)$, so the other factor is $4(x + 3)$. Substitute $x = 4$ and $n = 3$ to get $4(3)(4 + 3) = 84$.

CHALLENGE

$4v^3 - 9v = v(2v - 3)(2v + 3)$

Accept equivalent forms with factors in a different order. For the challenge, accept $v(4v^2 - 9)$ as correctly factored once, but complete factoring is $v(2v - 3)(2v + 3)$.