A.2a (a) Using laws of exponents to simplify monomial expressions and ratios of monomial expressions

1. Which expression is equivalent to $(5x^2)(4x^5)$?
   
   A $9x^7$
   B $9x^{10}$
   C $20x^7$
   D $20x^{10}$

2. Which expression is equivalent to $(12x^8)(-4x^2)$?
   
   A $-48x^{10}$
   B $-48x^{16}$
   C $8x^{10}$
   D $8x^{16}$

3. Which expression is equivalent to $(4x^2)^3$?
   
   A $12x^5$
   B $12x^6$
   C $64x^5$
   D $64x^6$
SOL Warm-Up
Graphing Calculator Active

**A.2a (b)** Using the laws of exponents to simplify monomial expressions and ratios of monomial expressions

1. Which expression is equivalent to \((- x^2)^3\) ?
   
   A. \(-x^5\)
   
   B. \(x^6\)
   
   C. \(-x^6\)
   
   D. \(-3x^5\)

2. Which expression is equivalent to \(-\frac{2n^2}{n}\) ?
   
   A. \(-\frac{2}{n}\)
   
   B. \(-2n\)
   
   C. \(-\frac{2n}{n}\)
   
   D. \(-\frac{2n}{n}\)

3. Which expression is equivalent to \(\frac{3x}{5x^3}\) ?
   
   A. \(\frac{3x^2}{5}\)
   
   B. \(\frac{3}{5x^2}\)
   
   C. \(\frac{3x}{5}\)
   
   D. \(\frac{3}{5x}\)
A.2a (c) Using the laws of exponents to simplify ratios of monomial expressions

1. Which expression is equivalent to $x^{12} \div x^3$?
   
   A $x^4$
   B $x^9$
   C $x^{15}$
   D $x^{36}$

2. Which expression is equivalent to $x^{15} \div x^{13}$?
   
   A $x$
   B $x^2$
   C $x^{28}$
   D $x^{195}$

3. Which expression is equivalent to $12x^{10} \div 3x$?
   
   A $9x^9$
   B $9x^{10}$
   C $4x^9$
   D $4x^{310}$

4. Which expression is equivalent to $36x^8 \div 9x^7$?
   
   A $4x$
   B $x^{15}$
   C $4$
   D $4x^{15}$
SN (a) Expressing numbers in scientific notation

1. Which expression represents 238.42 in scientific notation?
   A 2.3842 x 10^5
   B 2.3842 x 10^4
   C 2.3842 x 10^3
   D 2.3842 x 10^2

2. Which expression represents 0.000362 in scientific notation?
   A 3.62 x 10^-6
   B 3.62 x 10^-5
   C 3.62 x 10^-4
   D 3.62 x 10^-3

3. Which expression represents 0.783 in scientific notation?
   A 7.83 x 10^-2
   B 7.83 x 10^-1
   C 7.83 x 10^1
   D 7.83 x 10^2
SN (b) Expressing numbers in scientific notation and performing operations

1. Which expression represents 348,000 in scientific notation?
   A  $3.48 \times 10^4$
   B  $3.48 \times 10^5$
   C  $3.48 \times 10^6$
   D  $3.48 \times 10^7$

2. Which expression represents the product of 0.000008 and 3,500,000?
   A  $11.5 \times 10^3$
   B  $2.8 \times 10^1$
   C  $2.8 \times 10^4$
   D  $28 \times 10^4$

3. Which expression represents the product of $(4.63 \times 10^8)$ and 500?
   A  $2.315 \times 10^4$
   B  $2.315 \times 10^6$
   C  $2.315 \times 10^{11}$
   D  $2.315 \times 10^{16}$
A.2b (a) Finding the sum and difference of polynomials

1.   \((4x - 2y) + (-2x + 6y) = \) _____
   
   A  \(2x + 4y\)
   B  \(-2x + 10y\)
   C  \(-2x - 10y\)
   D  \(6x + 8y\)

2.   \((3m - 6n) + (2m + n) = \) _____
   
   A  \(5m - 5n\)
   B  \(-4m + n\)
   C  \(m - 7n\)
   D  \(2m - 5n\)

3.   \((7x^2 + 8x - 4) - (6x^2 + 8x - 6) = \) _____
   
   A  \(x^2 - 10\)
   B  \(x^2 + 2\)
   C  \(13x^2 + 16x - 10\)
   D  \(13x^2 + 2\)

4.   \((15m + 11 - 6m^2) - (18 - 6m^2 + m) = \) _____
   
   A  \(7 + 21m - 7m^2\)
   B  \(12m^2 + 16m - 7\)
   C  \(14m - 7\)
   D  \(14m + 29\)
A.2b (b) Using polynomial operations to solve problems

1. A local fast food chain had revenue represented by the polynomial $6x^2 + 5x - 8$ for one fiscal year and expenses for that same fiscal year represented by the polynomial $4x^2 - 3x + 7$. What was the company’s profit for the fiscal year?

   A) $10x^2 + 2x - 1$
   B) $2x^2 + 8x - 15$
   C) $2x^2 + 2x - 1$
   D) $2x^2 - 8x + 15$

2. Sherry owned a card shop and an art store. The card shop profits for 1998 are represented by the polynomial $3x^2 + 5x + 8$. The art shop however had losses for 1998 represented by the polynomial $2x^2 - 8$. Which polynomial represents the total amount Sherry made in 1998?

   A) $5x^2 + 5x$
   B) $x^2 + 5x$
   C) $x^2 + 5x + 16$
   D) $x^2 - 5x - 16$
A.2b (c) Multiplying polynomials by a monomial

1. What is the product $2a(4a^2 + 6)$?

A $8a^3 + 8a$
B $8a^3 + 12$
C $8a^3 + 6$
D $8a^3 + 12a$

2. What is the product $2m^2 (5m^2 - 6m + 2)$?

A $10m^4 - 6m + 2$
B $10m^4 - 12m^3 + 4m^2$
C $10m^4 - 12m^3 + 4m^2$
D $10m^4 - 12m^3 + 2$

3. What is the product $-3xy(3x^2y + 2xy^2 - 7y^3)$?

A $-9x^3y^2 - 6x^2y^3 + 21xy^4$
B $-9x^3y^2 + 2xy^2 - 7y^3$
C $-9x^3y^2 - 6x^2y^3 - 7y^3$
D $-9x^2y + 6x^2y^3 - 21xy^4$

4. A triangle has a height of $4x$ and a base of $3x + 1$. What is the area of the triangle? $A = \frac{1}{2}bh$

A $12x^2 + 4x$
B $6x^2 + 2x$
C $7x + 1$
D $5x + 1$
A.2b (d) Multiplying binomials by binomials

1. What is the product \((4x - 3)(x + 4)\)?

   A. \(4x^2 + 8x - 12\)
   B. \(4x^2 + 13x - 12\)
   C. \(4x^2 + 16x - 12\)
   D. \(4x^2 + 13x + 12\)

2. What is the product \((x + 3)(5x - 2)\)?

   A. \(5x^2 + 13x - 6\)
   B. \(5x^2 + 15x - 6\)
   C. \(5x^2 + 17x - 6\)
   D. \(5x^2 + 15x + 1\)

3. What is the product \((3x - 2)^2\)?

   A. \(9x^2 - 4\)
   B. \(9x^2 + 4\)
   C. \(9x^2 - 12x - 4\)
   D. \(9x^2 - 12x + 4\)

4. The trinomial \(3x^2 + 7x + 2\) is depicted below using algebra tiles. What are the factors of the trinomial?

   A. \((x + 1)(3x + 2)\)
   B. \((x + 2)(3x + 1)\)
   C. \((2x + 1)(x + 3)\)
   D. \((x - 1)(3x - 2)\)
A.2b (e) Using polynomial operations to solve problems

1. What is the area of a square with a side of length $3x - 1$?
   
   A $6x^2 - 1$
   B $9x^2 - 1$
   C $9x^2 + 1$
   D $9x^2 - 6x + 1$

2. A rectangle’s length is $5x - 2$ and width $2x - 1$. What is the area of the rectangle?
   
   A $7x^2 - 3$
   B $10x^2 - 7x + 2$
   C $10x^2 + 7x - 2$
   D $10x^2 - 9x + 2$

3. A rectangle with area $x^2 + 4x + 3$ is depicted below using algebra tiles. What are the dimensions of the rectangle in terms of $x$?
   
   A $(x + 3)$ by $(x + 1)$
   B $(3x + 1)$ by $(x + 1)$
   C $(x + 3)$ by $(x + 3)$
   D $(3x + 1)$ by $(3x + 1)$
A.2b (f) Using polynomial operations to solve problems

1. Which polynomial describes the area of the rectangle shown below?
   
   A  $18x^2$  
   B  $2x + 9$  
   C  $x^2 + 9x + 18$  
   D  $x^2 + 3x + 18$

2. The side of a square is represented by the binomial $2x + 5$. Which polynomial represents the area of the square?

   A  $4x^2 - 3$  
   B  $4x + 10$  
   C  $4x^2 + 20x + 25$  
   D  $4x^2 + 10$
A.2b (g) Using operations with polynomials to solve problems

1. The formula for the area of the trapezoid is \( A = \frac{1}{2} h(b_1 + b_2) \).
   If \( h = 4x \), \( b_1 = x^2 + 2 \) and \( b_2 = 3x^2 + 2x - 4 \), which polynomial represents the area of the trapezoid?

   A. \( 16x^3 + 8x^2 - 8x \)
   B. \( 8x^3 + 8x^2 - 6x \)
   C. \( 8x^3 + 4x^2 - 4x \)
   D. \( 6x^5 + 4x^4 + 4x^3 + 8x^2 - 16x \)

2. The formula for the volume of the rectangular solid is \( A = lwh \).
   Assume the following rectangular solid shown below has a square base. The side of the base is represented by the polynomial \((x + 2)\) and the height of the solid is represented by the polynomial \((3x)\). Which polynomial represents the volume?

   A. \( 3x^2 + 6x \)
   B. \( 3x^3 + 12x^2 + 12x \)
   C. \( 3x^3 + 12x \)
   D. \( 6x^2 + 12x \)

3. The diagram below shows a swimming pool surrounded by a wooden deck. Which polynomial represents the area of the deck?

   A. \( 25x^2 + 20x \)
   B. \( 6x^3 - 24x \)
   C. \( 19x^2 - 4x \)
   D. \( 19x^2 + 44x \)
A.2b (h) Using laws of exponents to find the quotient of polynomials

1. What is the quotient \((15x^4 - 9x^2) \div 3x\) ?

   A. \(12x^3 - 6x\)
   B. \(5x^3 - 6x\)
   C. \(5x^3 - 3x^2\)
   D. \(5x^3 - 3x\)

2. What is the quotient \((28x^5 + 20x^3 - 8x) \div 2x\) ?

   A. \(26x^4 + 18x^2 - 6\)
   B. \(14x^4 + 10x^2 - 4\)
   C. \(26x^4 + 18x^2 - 6x\)
   D. \(14x^4 + 10x^2 - 4x\)

3. What is the quotient \((30x^6 + 20x^4 + 10x^2) \div 10x^2\) ?

   A. \(20x^8 + 10x^6 + x^4\)
   B. \(20x^4 + 10x^2 + 10\)
   C. \(3x^8 + 2x^6 + x^4\)
   D. \(3x^4 + 2x^2 + 1\)

4. What is the quotient \((45x^8 - 27x^6 + 18x^4) \div 9x^2\) ?

   A. \(5x^6 - 3x^4 + 2x^2\)
   B. \(5x^{10} - 3x^8 + 2x^6\)
   C. \(36x^6 - 18x^4 + 9x^2\)
   D. \(36x^{10} - 18x^8 + 9x^6\)