Name:_____

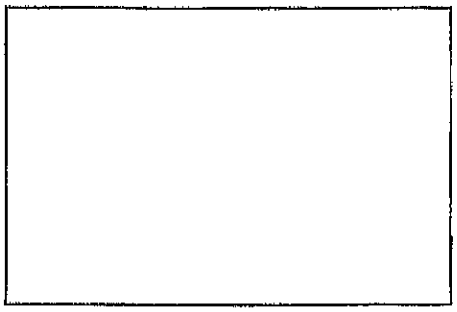
Test 2: Unit 3
Constructed Response

ASSESSMENT ANCHOR
A1.1.1 Operations with Real Numbers and Expressions

Sample Exam Questions

Standard A1.1.1

Keng creates a painting on a rectangular canvas with a width that is four inches longer than the height, as shown in the diagram below.



A. Write a polynomial expression, in simplified form, that represents the area of the canvas.

Keng adds a 3-inch-wide frame around all sides of his canvas.

B. Write a polynomial expression, in simplified form, that represents the **total area** of the canvas and the frame.

Continued next page

Continued. Please refer to the previous page for task explanation.

Keng is unhappy with his 3-inch-wide frame, so he decides to put a frame with a different width around his canvas. The total area of the canvas and the new frame is given by the polynomial $h^2 + 8h + 12$, where h represents the height of the canvas.

C. Determine the width of the new frame. Show all your work. Explain why you did each step.

16. A polynomial is shown below.

$$x^2 + 2x + (^-24)$$

A. Factor the polynomial.

B. Explain why the polynomial is **not** the difference of squares.

C. Use one of your factors from **Part A** to write a polynomial that is the difference of squares.

25. Complete these problems to show your knowledge of operations with polynomials and of simplifying algebraic expressions.

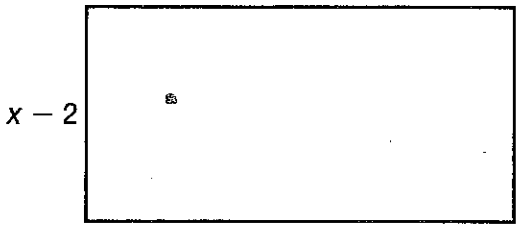
A. Add and simplify: $(6x^2 - x + 8) + (3x - 4)$

B. Subtract and simplify: $3x(5x + 2) - 2(x^2 + x - 1)$

C. Multiply and simplify: $(x - 2)(4x^2 + 3x - 2)$

D. Simplify: $\frac{4(9x^4 - 4x^3)}{2x^2}$

24. This rectangle is a diagram of Jed's garden. The width is represented by $x - 2$, and the length is represented by $2x + 14$.



A. Write a polynomial expression, in simplified form, that represents the **total area** of Jed's garden.

area = _____

B. Write a polynomial expression, in simplified form, that represents the perimeter of the garden.

perimeter = _____

C. Jed decides to double the width of the garden. What will be the new area of the garden? Show all your work.

new area = _____

Constructed Response

A. Add and simplify: $(6x^2 - x + 8) + (3x - 4)$

B. Multiply and simplify: $(x - 2)(4x^2 + 3x - 2)$. Show your work and write your answer in descending order.

C. Error Analysis: Describe and correct the error made in factoring the equation below.

$175x^2 - 28 = 7(25x^2 - 4)$

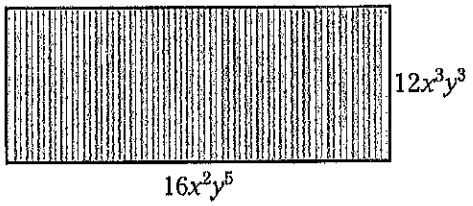
$7(5x - 2)(5x - 2)$

$7(5x - 2)^2$

What was incorrect? Why was it incorrect? How do you correct it?

Read the problem. Write your answer for each part.

4. An engineer is designing a solar panel in the shape of a rectangle. The length and width are described by monomials, as shown in the diagram.



A Write an expression in simplest terms for the area of the rectangle.

Answer: _____

B If $x = 2$ and $y = \frac{1}{2}$, what is the area of the rectangle? Show all your work.

Answer: _____

C The solar panel will be divided into small squares. What is the side length of the largest possible square into which the rectangle can be divided? (Assume that $x \geq 1$ and $y \geq 1$.)

Answer: _____.

D Explain how you found your answer to **part C.**

Read the problem. Write your answer for each part.

5. The following expressions all use the same values for n, p, and q.
   - $3^2 \cdot 3^n$ simplifies to 3^{20}.
   - $\frac{7^n}{7^5}$ simplifies to 7^p.
   - $(4^p \cdot 4^1)^3$ simplifies to 4^q.

   A What is the value of the exponent n?

   Answer: _____

   B What is the value of the exponent p?

   Answer: _____

   C What is the value of the exponent q?

   Answer: _____

   D Explain how you found your answers.

Unit 2 Constructed-Response Review

Read the problem. Write your answer for each part.

1. Jonah and Grace are working on a homework problem together. They are factoring the expression shown below.

$$4x^3 - 12x^2 - 9x + 27$$

A Jonah used factoring by grouping to write the expression as a product of two binomials. What was Jonah's answer? Show your work.

Answer: _____

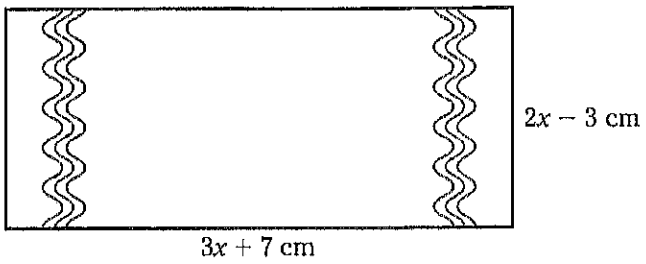
B Grace continued Jonah's work, factoring the expression completely. What was Grace's answer?

Answer: _____

C Explain how you found the answer to **part B.**

Read the problem. Write your answer for each part.

3. A manufacturer makes rectangular blankets in several styles and sizes. The outline of a popular blanket in size A is shown below.



A Write a polynomial expression, in simplified form, that represents the perimeter of the blanket.

Answer: _____

B Write a polynomial expression, in simplified form, that represents the area of the blanket.

Answer: _____

C The same style blanket in size B has width $2x + 10$ and length $4x - 10$.

Write a polynomial expression, in simplified form, that expresses the difference in area of the blankets A and B. Show all your work.

Answer: _____

Read the problem. Write your answer for each part.

4. A physicist needs to know the values of x for which the trinomial below equals zero. Her first step is to factor the trinomial.

$$x^2 + 10x + 24$$

A Factor the trinomial.

Answer: _____

B Explain how you found your answer to **part A.**

C The physicist also needs to factor the trinomial below.

$$x^2 - 10x + 24$$

What is the factored form of the trinomial?

Answer: _____

D The physicist must factor several trinomials that are all of the form $x^2 - mx + n$, where m and n are whole numbers greater than zero. She wonders if any of these trinomials factor as $(x + a)(x + b)$, where $a > 0$ and $b < 0$. Is that possible? Explain why or why not.

Read the problem. Write your answer for each part.

5. A manufacturing company uses the expressions below to estimate revenue and expenses based on the production of n units.

Revenue: $20n^2 - 180$

Expenses: $4n^2 + 36n + 72$

The ratio of revenue to expenses is given by the rational expression below.

$$\frac{20n^2 - 180}{4n^2 + 36n + 72}$$

A Factor the numerator and denominator of the rational expression, and simplify if possible. Show your work.

Answer: _____

B The rational expression $\frac{20n^2 - 180}{4n^2 + 36n + 72}$ is not defined for any values of n for which the denominator equals zero. Find the values of n for which the denominator equals zero.

Answer: _____

C The company accountant says that the rational expression $\frac{20n^2 - 180}{4n^2 + 36n + 72}$ will never have a zero denominator because n, the number of units, is always a whole number. Explain why the accountant is correct.