

Mr. Nolfi

Victim: Mr. Solutions

Get another exquisite performance Mr. S.!!

KU	APP	TIPS	COM
44/44	16/16	10/10	10/10

Modified True/False (5 KU)

State whether each statement is **true** or **false**. If false, **change** the underlined part to make the statement true.

1. T/F F $(a+b)^2 = a^2 + b^2$ $(a+b)(a+b) = a^2 + ab + ab + b^2$ Change: $a^2 + 2ab + b^2$ ✓
2. T/F F $-6p^2q^2 - 1p^2q^2 = 6p^4q^4$ operation is subtraction not multiplication Change: $-7p^2q^2$ ✓
3. T/F F $\frac{-5u^3}{v^{-2}}$ written **without** negative exponents is $\frac{-1}{5u^3v^2}$ Change: $-5u^3v^2$ ✓
4. T/F F Algebra is nothing more than arithmetic with unknowability. Change: unknowns ✓
5. T/F F $-3p^3q(-6p^3q) = -9p^3q$ operation is multiplication not subtraction Change: $18p^6q^2$ ✓

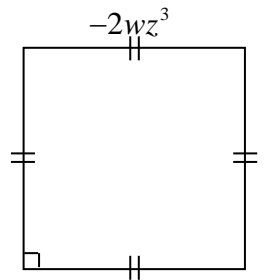
Multiple Choice (5 KU)

Identify the choice that best completes the statement or answers the question. Use the provided blank space to write the letter corresponding to your choice.

- 6.
- b
- ✓ Which expression represents the
- perimeter**
- of the square shown at the right?

(a) $8wz^3$ (b) $-8wz^3$ (c) $4w^2z^6$ (d) $-4w^2z^6$

- 7.
- c
- ✓ Which expression represents the
- area**
- of the square shown at the right?

(a) $8wz^3$ (b) $-8wz^3$ (c) $4w^2z^6$ (d) $-4w^2z^6$ 

- 8.
- c
- ✓ Which of the following expressions is equivalent to
- $1ab^2(+4ab)^2$
- ?

(a) $1ab^2 + (4ab)^2$ (b) $1(4)aabbbb$ (c) $1(4)(4)aaabbbb$ (d) $1+4+4+a+a+a+b+b+b+b$

- 9.
- c
- ✓ Which of the following expressions is equivalent to
- $11 - 3(x-7)(x+3)$
- ?

(a) $11(-3)(x-7)(x+3)$ (b) $8(x-7)(x+3)$ (c) $11 - (3x+9)(x-7)$ (d) $11 - 3x^2 - 12x - 63$

- 10.
- b
- ✓ A movie theatre charges the following prices for admission:
- Children
- : \$6
- Teens
- : \$9
- Adults
- : \$12. Which expression models the total earnings from movie ticket sales?

(a) $(6c)(+9t)(+12a)$ (b) $6c + 9t + 12a$ (c) $27abc$ (d) $6 + c + 9 + t + 12 + a$ K A T C
-0 -0 -0 -0

Full Solutions (Up to 10 COM marks can be deducted for communication errors)

11. Evaluate. (10 KU) Use BEDMAS, not the distributive property!!

✓✓ → substituting
✓✓✓ → evaluating

$$\begin{aligned} \text{(a)} \quad & -3(4^2 - 13^2) - 2(4 - 13)^2 \\ & = -3(16 - 169) - 2(-9)^2 \\ & = -3(-153) - 2(81) \\ & = 459 - 162 \\ & = 297 \end{aligned}$$

(4)

$$\begin{aligned} \text{(b)} \quad & -6ab^{-2} - 3a(2a - b)^2, \text{ if } a = \frac{-1}{4} \text{ and } b = 3 \\ & = -6\left(\frac{-1}{4}\right)(3)^{-2} - 3\left(\frac{-1}{4}\right)\left[2\left(\frac{-1}{4}\right) - 3\right]^2 \\ & = \frac{3}{2}\left(\frac{1}{3^2}\right) - \left(\frac{-3}{4}\right)\left(\frac{-1}{2} - 3\right)^2 \\ & = \frac{3}{2}\left(\frac{1}{9}\right) + \frac{3}{4}\left(\frac{-1}{2} - \frac{6}{2}\right)^2 \\ & = \frac{1}{6} + \frac{3}{4}\left(\frac{-7}{2}\right)^2 \\ & = \frac{1}{6} + \frac{3}{4}\left(\frac{49}{4}\right) \\ & = \frac{1}{6} + \frac{147}{16} \\ & = \frac{8}{48} + \frac{741}{48} \\ & = \frac{449}{48} \end{aligned}$$

12. Simplify fully. (24 KU)

$$\begin{aligned} \text{(a)} \quad & -4x^2y^3 - 9xy^3 + x^2y^3 - 5xy^3 \\ & = -4x^2y^3 + x^2y^3 - 9xy^3 - 5xy^3 \\ & = -3x^2y^3 - 14xy^3 \end{aligned}$$

(3)

$$\begin{aligned} \text{(b)} \quad & (-4x^2y^3)(-9xy^3)(+x^2y^3)(-5xy^3) \\ & = -4(-9)(1)(-5)x^2x^2x^2y^3y^3y^3y^3 \\ & = -180x^6y^{12} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad & -4x^2y^3 - 9xy^3(+x^2y^3 - 5xy^3) \\ & = -4x^2y^3 - 9x^3y^6 + 45x^2y^6 \end{aligned}$$

Equivalent Forms:

$$\begin{aligned} & 45x^2y^6 - 9x^3y^6 - 4x^2y^3 \\ & -9x^3y^6 + 45x^2y^6 - 4x^2y^3 \end{aligned}$$

(descending order of degree)

$$\begin{aligned} \text{(d)} \quad & -1(5p - 6p^2) - 1(7p - 5p^2) \\ & = -5p + 6p^2 - 7p + 5p^2 \\ & = 6p^2 + 5p^2 - 5p - 7p \\ & = 11p^2 - 12p \end{aligned}$$

Equivalent Form:

$$-12p + 11p^2$$

$$\begin{aligned} \text{(e)} \quad & (4q - 3)(3q - 1) - 3(-q^2 - 3q + 1) \\ & = 12q^2 - 4q - 9q + 3 + 3q^2 + 9q - 3 \\ & = 12q^2 + 3q^2 - 4q - 9q + 9q + 3 - 3 \\ & = 15q^2 - 4q \end{aligned}$$

Equivalent Form:

$$-4q + 15q^2$$

$$\begin{aligned} \text{(f)} \quad & \frac{343b^{16}d^4(-b^{-1}d^4)^3}{-3^4(3b^2d)^{-3}} \\ & = \frac{343b^{16}d^4[(-1)^3(b^{-1})^3(d^4)^3]}{-81[3^{-3}(b^2)^{-3}d^{-3}]} \\ & = \frac{343b^{16}d^4(-1)b^{-3}d^{12}}{-81\left(\frac{1}{3^3}\right)b^{-6}d^{-3}} \\ & = \left[\frac{(-1)(343)}{-81\left(\frac{1}{27}\right)}\right]\left[\frac{b^{16}b^{-3}}{b^{-6}}\right]\left[\frac{d^4d^{12}}{d^{-3}}\right] \\ & = \left(\frac{-343}{-3}\right)\left(\frac{b^{13}}{b^{-6}}\right)\left(\frac{d^{16}}{d^{-3}}\right) \\ & = \frac{343}{3}b^{19}d^{19} \end{aligned}$$

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Equivalent Form:

$$\frac{343b^{19}d^{19}}{3}$$

13. Write *fully simplified* expressions for the *perimeter* and *area* of the shape shown at the right. (10 APP)

Perimeter

$$P = 2(9a+3) + 2(4b) + 2(2b+9)$$

$$= 18a + 6 + 8b + 4b + 18$$

$$= 18a + 12b + 24 \text{ units}$$

(5)

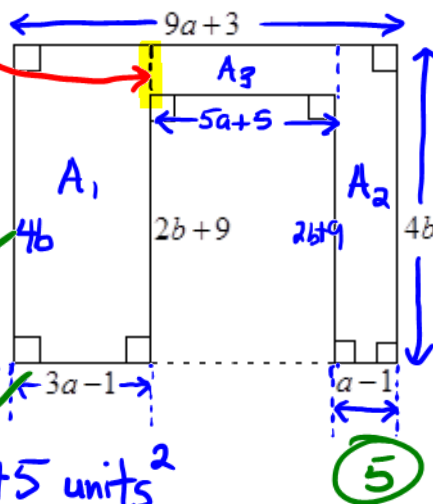
Area

$$A = A_1 + A_2 + A_3$$

$$= 4b(3a-1) + 4b(a-1) + (5a+5)(2b-9)$$

$$= 12ab - 4b + 4ab - 4b + 10ab - 45a + 10b - 45$$

$$= 26ab - 45a + 2b - 45 \text{ units}^2$$



14. Write a *fully simplified* algebraic expression for the *surface area* of the triangular prism shown at the right. (6 APP)

Hint: You need to use the Pythagorean Theorem.

By the Pythagorean Theorem,

$$h^2 + (3x)^2 = (5x)^2$$

$$\therefore h^2 + 9x^2 = 25x^2$$

$$\therefore h^2 = 16x^2$$

$$\therefore h = 4x$$

Surface Area

$$= 2A_{\text{base}} + A_{\text{lateral surface}}$$

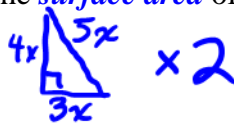
$$= 2\left(\frac{3x(4x)}{2}\right) + (3x+4x+5x)(2y^3-7)$$

$$= 12x^2 + 12x(2y^3-7)$$

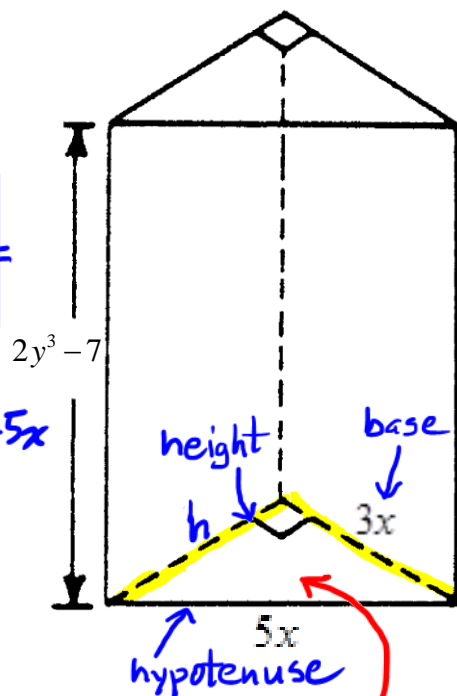
$$= 12x^2 + 24xy^3 - 84x \text{ units}^2$$

Form with terms in descending order of degree:

$$24xy^3 + 12x^2 - 84x$$



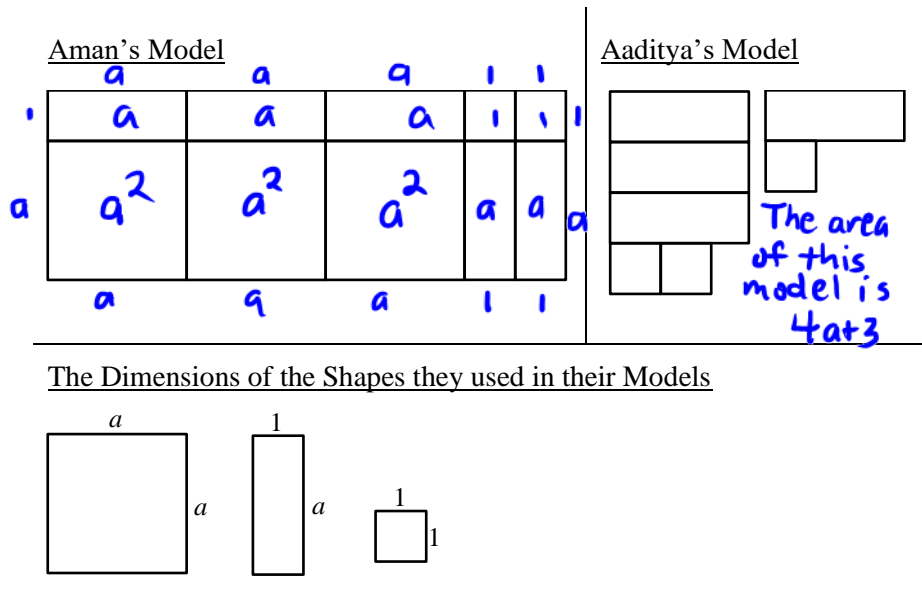
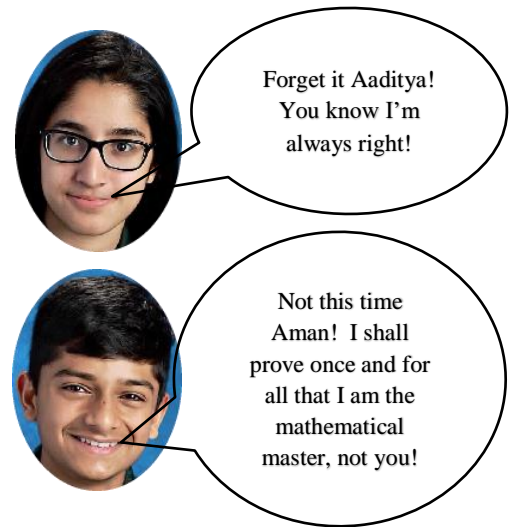
Put them together and length is $3x+4x+5x$



Think of the famous 3-4-5 right triangle

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15. Aman and Aaditya are arguing over a math problem. Each creates a geometric model to attempt to demonstrate how to expand the product of binomials $(3a+2)(a+1)$. Their geometric models are shown below. (10 TIPS)



Which model correctly demonstrates how $(3a+2)(a+1)$ should be expanded? *Justify* your answer. (In other words, explain in detail why the model that you have chosen is correct.)

Aman's model is correct. In her model,

$$A_{\text{large rectangle}} = \text{length}(\text{width})$$

$$= (3a+2)(a+1)$$

But $A_{\text{large rectangle}}$ can also be found by summing the areas of the smaller squares and rectangles within the large rectangle.

$$\therefore A_{\text{large rectangle}} = 3a^2 + 5a + 2$$

$$\therefore (3a+2)(a+1) = 3a^2 + 5a + 2$$

9, 10 → level 4
7, 8 → level 3
6 → level 2
5 → level 1
0 → 4 → level R

This argument uses the following logic:
If $a=b$ and $a=c$
then $b=c$.

Bonus Question: You are not required to attempt this question. Extra credit will be given for good responses.

Simplify the algebraic expression given below. In your answer, arrange the variables in alphabetical order.

kugavarajharajah

$$a^6gh^2jkr^2tuv + 18$$

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