# National Council of Teachers of Mathematics Annual Meeting - Denver, CO <br> April 19, 2013 

## Session 534

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\begin{aligned}
& \text { Creating Opportunities for Students to Engage } \\
& \text { in Reasoning and Proof }
\end{aligned}
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## Task A

## Making Conjectures Complete the conjecture based on the pattern you observe in the specific cases.

29. Conjecture: The sum of any two odd numbers is $\qquad$ ?
$1+1=2$
$7+11=18$
$1+3=4$
$13+19=32$
$3+5=8$
$201+305=506$
30. Conjecture: The product of any two odd numbers is $\qquad$ ..
$1 \times 1=1$
$7 \times 11=77$
$1 \times 3=3$
$13 \times 19=247$
$3 \times 5=15$
$201 \times 305=61,305$

McDougal Littell (2004), Geometry, p. 7, \#29-30

## Task A'

For problems 29 and 30, complete the conjecture based on the pattern you observe in the examples. Then explain why the conjecture is always true or show a case in which it is not true.
29. Conjecture: The sum of any two odd numbers is $\qquad$ _.

$$
\begin{aligned}
& 1+1=2 \\
& 7+11=18 \\
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& 13+19=32 \\
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## Task B

Visual Reasoning Explain why the following method of drawing a parallelogram works. State a theorem to support your answer. See marga


McDougal Littell (2004), Geometry, p. 343, \#29

## Task B’

Consider the construction below.


Use the construction with a variety of starting segments.

1. Make a conjecture about the type of figure that the construction produces.
2. Using the properties that you know about that figure, create a mathematical argument that explains why that figure is produced each time by the construction.

## Task C

GEOMETRY For Exercises 45 and 46, use the diagram below that shows the perimeter of the pattern consisting of trapezoids.

45. Write a formula that can be used to find the perimeter of a pattern containing $n$ trapezoids.
46. What is the perimeter of the pattern containing 12 trapezoids?

Glencoe (2005), Algebra I, p. 237, \#45-46

## Task C'

Use the diagram below that shows a pattern consisting of trapezoids.


1. Make as many observations as you can about the trapezoid pattern.
2. Find the perimeter of the first four trapezoid patterns shown above.
3. Find the perimeter of the pattern that contains 12 trapezoids without drawing a picture.
4. Write a generalization that can be used to find the perimeter of a pattern containing any number of trapezoids.
5. Using words, numbers and/or connections to the visual diagram, prove that the generalization you created in part 4 will always work.

## TASK D

a. Simplify each expression.
$(-2)^{2}$
$(-2)^{3}$
$(-2)^{4}$
$(-2)^{5}$
$(-3)^{2} \quad(-3)^{3} \quad(-3)^{4} \quad(-3)^{5}$
b. Make a Conjecture Do you think a negative number raised to an even power will be positive or negative? Explain.
c. Do you think a negative number raised to an odd power will be positive or negative? Explain.

## TASK E

The measure of each interior angle of a regular $n$-side polygon is $180(n-2) / n$. For example, the interior angle measure of a regular (equilateral) triangle is $180(3-2) / 3=60^{\circ}$.

77. Find the interior angle measure of a square.
78. Find the interior angle measure of a regular pentagon.
79. Find the interior angle measure of a regular hexagon.
80. Does the interior angle measure of a regular n-sided polygon increase or decrease as the $n$ increase?

## Multiplying Monomials




Check for Understanding
Here is a suggested use of the Oral Exercises to check students' understanding as
you teach the lesson.
Oral Exs. 1~4: use after
Example 1
Oral Exs. 5-18: use after
Example 3.
Oral Exs. 19-20: use after
Example 5.
Guided Practice
Simplify.

1. $b^{4} \cdot b^{2} b^{5}$
2. $\left(m n^{2}\right)\left(m^{2} n\right) \quad m^{3} n^{3}$
3. $\left(-3 a^{2} b^{2}\right)\left(2 a b^{3}\right)-6 a^{3} b^{5}$
4. $\left(-3 x^{2} y^{3}\right)\left(2 x y^{2}\right)\left(-4 x^{3} y\right)$
5. $\left(\frac{3}{5} b^{2}\right)\left(15 b^{3}\right) \quad 9 b^{5}$
6. $\left(4 m^{3}\right)\left(\frac{1}{4} m^{2}\right)(-7 m)-7 m^{6}$
Summarizing the Lesson
Tell the students that they
have learned how to multi-
ply monomials using the
Rule of Exponents for Prod-
ucts of Powers. Ask them to
give examples of the rule.
Suggested Assignments
Suggested
Minimum
Day 1: 153/2-18 even
Day 1: $153 / 2-18$ even
Assign with Lesson 4-2.
Assign with Lesson 4-2
Day 2: $153 / 19-37$ odd
S 154/Mixed Review
R 151/Self-Test 1
Average
153/3-36 mult. of 3,
38, 41, 42
$S$ 154/Mixed Review
$R 151 /$ Self-Test 1
Maximum
$153 / 3-48$ mult. of 3
154/Mixed Review
R 151/Self-Test 1

Brown, R.G., Dolciani, M.P., Sorgenfrey, R.H., \& Cole, W.L. (2004). Algebra Structure and Method Book 1 Teacher's Edition (pp. 152-153). Boston, MA: McDougal Littell.

