LR1 Quiz Review: Sec 1.1, 1.3 & 1.4

Multiple Choice: *Identify the choice that best completes the statement or answers the question.*

- 1. Which conjecture, if any, could you make about the sum of three odd integers?
 - a. The sum will be an even integer.
 - b. The sum will be an odd integer.
 - c. The sum will be negative.
 - d. It is not possible to make a conjecture.
- 2. Which conjecture, if any, could you make about the sum of two even integers and one odd integer?
 - a. The sum will be an odd integer.
 - b. The sum will be an even integer.
 - c. The sum will be negative.
 - d. It is not possible to make a conjecture.
 - 3. Which conjecture, if any, could you make about the sum of two odd integers and one even integer?
 - a. The sum will be an even integer.
 - b. The sum will be an odd integer.
 - c. The sum will be negative.
 - d. It is not possible to make a conjecture.

Short Answer

- 4. Star claims that whenever you add an odd integer to the square of an odd integer, the result is an odd number. Is her conjecture reasonable? If not, provide a counter example. Prove deductively.
- 5. Jason created the following table to show a pattern.

Multiples of 27	54	81	108	135	162
Sum of the Digits	9	9	9	9	9

Based on this evidence, Jason made the following conjecture:

The sum of the digits of a multiple of 27 is equal to 9.

Try more examples. Is this conjecture reasonable? If not, provide a counterexample. Briefly justify your decision.

- 6. Prove, using deductive reasoning, that the product of an even integer and an even integer is always even.
- 7. Try the following calculator trick with different numbers. Make a conjecture about the trick.
 - Start with your age.
 - Multiply it by 3.
 - Multiply it by 7.
 - Multiply it by 37.
 - Multiply it by 13.

Name:_____

- 8. Alison created a number trick in which she always ended with the original number. When Alison tried to prove her trick, however, it did not work. In which step does the calculation error occur? What is the error?
 - n Use n to represent any number. n+4 Add 4.
 - 2n + 4 Multiply by 2.
 - 2n+8 Add 4.
 - n+4 Divide by 2.
 - n-1 Subtract 5.
- 9. Draw the next figure in this sequence.



10. What number should appear in the centre of Figure 4?



Problem

- The square of an even integer is added to the square of an odd integer. Develop a conjecture about whether the sum is odd or even. Provide evidence to support your conjecture.
- 12. Alison discovered a number trick in a book she was reading:

Choose a number. Add 3. Multiply by 2. Add 4. Divide by 2. Subtract 5.

Try the trick several times. Make a conjecture about the relation between the number picked and the final result. Can you find a counterexample to your conjecture? What does this imply?

Answer Section

MULTIPLE CHOICE

- 1. ANS: B
- 2. ANS: A
- 3. ANS: A

SHORT ANSWER

4. ANS:

No, it is not reasonable, because, for example, $3 + 3^2 = 3 + 9$ or 12, and 12 is even, not odd.

 $\begin{array}{l} Odd + (Odd)^2 \\ 2x{+}1 + (2x+1)(2x+1) \\ 2x+1 + 4x^2 + 4x + 1 \\ 4x^2 + 6x + 2 \end{array}$

5. ANS:

No, the conjecture is not reasonable, because 27(11) = 297 is a multiple of 27, and the sum of its digits is 18, not 9.

6. ANS:

For example: (2x)(2y) = 4xy

The final product is a multiple of 4, so it is even.

7. ANS:

For example, the answer is always your age repeated three times.

- 8. ANS: In step 2, the "4" in "n + 4" was not multiplied by 2. In step 3, the expression on the left should be 2n + 8.
- 9. ANS:



10. ANS: 16

PROBLEM

11. ANS:

The sum of the square of an even integer and the square of an odd integer is odd. For example, I began with different possibilities to see if there was a pattern.

 $4^2 + 5^2 = 16 + 25$ or 41, which is odd. $6^2 + 3^2 = 36 + 9$ or 45, which is odd. $8^2 + 7^2 = 64 + 49$ or 113, which is odd.

In each case, the sum is odd, so I developed the conjecture that the sum will always be odd. I used reasoning to look for support for this conjecture.

I know that the product of two equal numbers is always even, so the square of an even number will always be even.

even number(even number) = even number

I know that the product of two odd numbers is always odd, so the square of an odd number will always be odd. odd number(odd number) = odd number

So, the square of an even number and the square of an odd number must add to an odd number.

even number + odd number = odd number

This evidence supports my conjecture.

12. ANS:

For example, I chose to start with 8.

Choose a number:	8
Add 3:	8 + 3 = 11
Multiply by 2:	2(11) = 22
Add 4:	22 + 4 = 26
Divide by 2:	$\frac{26}{2} = 13$
Subtract 5:	13 - 5 = 8

The final result is the same as the number I chose, so I made the conjecture that the final result will always be the same as the starting number. I tried this several times and could not find a counterexample, which implies that my conjecture is valid.