SOLUTIONS ⇒ Chapter 1 - Chapter Test

Multiple Choice

1. Which conjecture about the product of three odd integers seems most reasonable?

   Option ⇒ "B"   It will be an odd integer.

2. Which conjecture about the interior angles in a hexagon seems most reasonable?

   Option ⇒ "C"   Their sum is always 720°.

3. Rainfeather noticed the following:

$$\frac{432\,432}{7} = 61\,776, \quad \frac{432\,432}{11} = 39\,312, \quad \frac{432\,432}{13} = 33\,264$$

and

$$\frac{172\,172}{7} = 24\,596, \quad \frac{172\,172}{11} = 15\,652, \quad \frac{172\,172}{13} = 13\,244$$

Which conjecture might Rainfeather make from this evidence? Is this reasonable?

Option => " A "   Any six-digit number composed of three repeating digits is divisible by 7, 11, and 13; yes, this is reasonable.

4. Which figure is a counterexample to the conjecture "All polygons with eight equal sides are regular octagons"?

Option => " B "   Figure II Only.

5. Which choice provides a counterexample to the conjecture "When you divide one whole number by another whole number, the quotient will be greater than the divisor and less than the dividend"?

Option => " B "

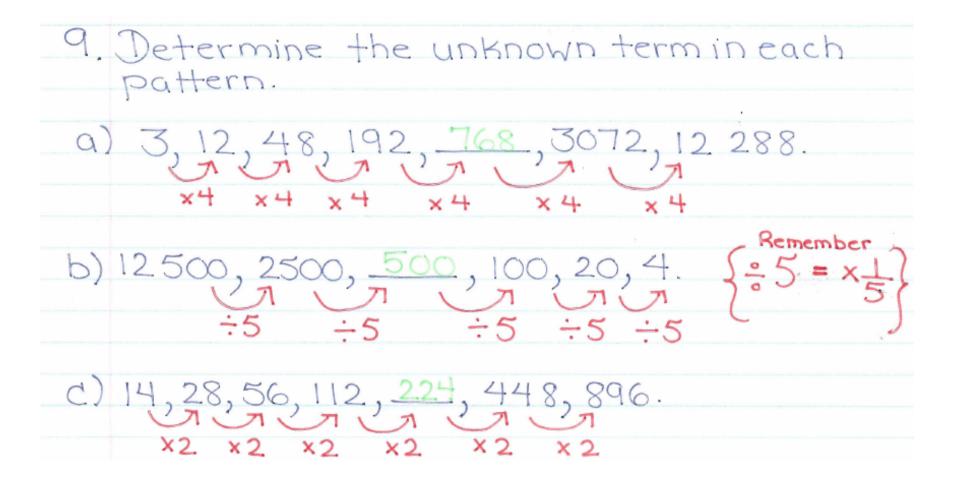$$\frac{6}{8} = 0.75 \text{ but not } \frac{14}{2} = 7$$

dividend → 6

quotient ↑

divisor ↖ 8

6. All Kangaroos are marsupials. All marsupials are mammals. All mammals are warm-blooded. Ginger Jack is a Kangaroo. What can be deduced about Ginger Jack?

Option => "C" Ginger Jack is warm-blooded and a mammal.

7. What type of error, if any, occurs in the following deduction?

"All people who work do so from 9 a.m. to 5 p.m., with one hour for lunch. Bill works, so he works from 9 a.m. to 5 p.m."

Option => "A" A false assumption or generalization.

8. What type of error, if any, occurs in the following proof?

Suppose that: $a + b = c$

Then: $(4a - 3a) + (4b - 3b) = (4c - 3c)$

Reorganize: $4a + 4b - 4c = 3a + 3b - 3c$

Using Distribution: $4(a + b - c) = 3(a + b - c)$

$$4 = 3$$

Option $\Rightarrow$ "B"   An error in reasoning.
(division by 0)

9. Determine the unknown term in each pattern.

a) 3, 12, 48, 192, _768_, 3072, 12 288.

    x4   x4   x4   x4   x4   x4

b) 12 500, 2500, _500_, 100, 20, 4.

    ÷5   ÷5   ÷5 ÷5 ÷5

Remember

$$\div 5 = \times \frac{1}{5}$$

c) 14, 28, 56, 112, _224_, 448, 896.

  x2 x2 x2 x2 x2 x2

10. Which number should go in each square of this sudoku puzzle?

a) square A = 1
b) square B = 5
c) square C = 6
d) square D = 2

2	A	6		4		3	7	
8		4			9		5	
		B	1		C			
	2							3
		8	6		7	9		
5	6						1	
		D		4				
	5		3			8		2
	7	3		6		5		1

Do you agree or disagree with the following conjectures? Justify your decisions with a counterexample if possible.

11.

a) The sum of a multiple of 5 and a multiple of 15 will be an odd number.

I disagree with this conjecture.
Counterexample: $10 + 30 = 40$

multiple   multiple   EVEN
of 5   of 15   #

b) The sum of a multiple of 5 and a multiple of 15 will be an even number.

I disagree with this conjecture.
Counterexample: $15 + 60 = 75$

multiple   multiple   ODD
of 5   of 15   #

12. In this equation, x is an integer. What does the equation prove? Support your answer with a specific example.

$$x + (x+1) + (x+2) + (x+3) + (x+4) + (x+5) + (x+6) = 7x + 21$$
$$\div 7 \quad \div 7$$

If x represents any whole number then this equation proves that the sum of seven consecutive numbers is divisible by 7.

Example: $1 + 2 + 3 + 4 + 5 + 6 + 7 = 28$

$$28 \div 7 = 4$$

13. Do you agree or disagree with the following conjecture? Justify your decision with a counterexample if possible.

"Forensic scientists will always discover enough evidence to convict the guilty person, because that is what happens on television."

I disagree with this conjecture.
Counterexample: Television shows are not always realistic. At a real-life crime scene, there might not be enough evidence to prove that someone is guilty.

14. Form a conclusion based on the following statement. Explain whether your reasoning was inductive or deductive.

"All marsupials have pouches."
"Kangaroos are marsupials."

Conclusion: Kangaroos have pouches.

Deductive Reasoning

15. Continue the sequence 5, 14, 23, 32, 41, ... by two terms. Explain whether your reasoning was inductive or deductive.

5, 14, 23, 32, 41, 50, 59 ... ⟹ Inductive Reasoning
+9 +9 +9 +9   +9   +9