Foundations 20 Final Review: Chapter 1

Multiple Choice

____ 1. Justin gathered the following evidence.

17(22) = **3**7**4** 14(22) = **3**0**8** 36(22) = **7**4**2** 18(22) = **3**9**6**

Which conjecture, if any, is Justin most likely to make from this evidence?

a. When you multiply a two-digit number by 22, the last and first digits of the product are the digits of the original number.
b. When you multiply a two-digit number by 22, the first and last digits of the product are the digits of the original number.
c. When you multiply a two-digit number by 22, the first and last digits of the product form a number that is twice the original number.
d. None of the above conjectures can be made from this evidence.

____ 2. 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.

____ 3. 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

Which conjecture could Jason make, based solely on this evidence? Choose the best answer.

a. The sum of the digits of a multiple of 27 is equal to 9.
b. The sum of the digits of a multiple of 27 is an odd integer.
c. The sum of the digits of a multiple of 27 is divisible by 9.
d. Jason could make any of the above conjectures, based on this evidence.

____ 4. Janice created the following table.

Number	23	28	73
Sum of the Digits	5	10	10

Based on this evidence, which conjecture might Janice make? Is the conjecture valid?

a. A number whose digits sum to a multiple of 10 will be 2 less than a multiple of 5; no, this conjecture is not valid.
b. The sum of the digits of a number that is 2 less than a multiple of 5 is a multiple of 5; no, this conjecture is not valid.
c. The sum of the digits of a number that is 2 less than a multiple of 5 is a multiple of 5; yes, this conjecture is valid.
d. A number whose digits sum to a multiple of 10 will be 2 less than a multiple of 5; yes, this conjecture is valid.

____ 5. Athena made the following conjecture.

The sum of a multiple of 4 and a multiple of 8 must be a multiple of 8.

Is the following equation a counterexample to this conjecture? Explain.

12 + 24 = 36

a. Yes, it is a counterexample, because 36 is a multiple of 8
b. No, it is not a counterexample, because 36 is a multiple of 8.
c. No, it is not a counterexample, because 36 is not a multiple of 8.
d. Yes, it is a counterexample, because 36 is not a multiple of 8.

____ 6. All ostriches are birds. All birds have backbones. Birds are the only animals that have feathers. Floradora is an ostrich. What can be deduced about Floradora?

1. Floradora has a backbone.
2. Floradora has feathers.

a. Neither Choice 1 nor Choice 2
b. Choice 1 and Choice 2
c. Choice 2 only
d. Choice 1 only

____ 7. Which of the following choices, if any, uses deductive reasoning to show that the sum of two odd integers is even?

a. $3 + 5 = 8$ and $7 + 5 = 12$
b. $(2x + 1) + (2y + 1) = 2(x + y + 1)$
c. $2x + 2y + 1 = 2(x + y) + 1$
d. None of the above choices

____ 8. Which of the following choices, if any, uses inductive reasoning to show that the sum of two even numbers and one odd number is an odd number?

a. $6 + 6 + 7 = 19$ and $4 + 6 + 3 = 13$
b. $(2x + 1) + (2y + 1) + (2z + 1) = 2(x + y + z) + 3$
c. $2x + 2y + (2z + 1) = 2(x + y + z) + 1$
d. None of the above choices

____ 9. What type of error, if any, occurs in the following deduction?

All swimmers can swim one kilometre without stopping.
Joan is a swimmer.
Therefore, Joan can swim one kilometre without stopping.

a. a false assumption or generalization
b. an error in reasoning
c. an error in calculation
d. There is no error in the deduction.

____ 10. What type of error, if any, occurs in the following proof?

$$\begin{aligned} 2 &= 2 \\ 4(2) &= 4(1 + 1) \\ 4(2) + 3 &= 4(1 + 1) + 3 \\ 8 + 3 &= 6 + 3 \\ 11 &= 9 \end{aligned}$$

a. a false assumption or generalization
b. an error in reasoning
c. an error in calculation
d. There is no error in the proof.

____ 11. Which type of reasoning does the following statement demonstrate?

Every multiple of 9 has a factor of 3.
27 is a multiple of 9.
Therefore, 27 has a factor of 3.

a. inductive reasoning
b. deductive reasoning
c. neither inductive nor deductive reasoning

____ 12. Determine the unknown term in this pattern.

2, 6, 18, 54, ____, 486, 1458

a. 108
b. 162
c. 216
d. 196

____ 13. Determine the unknown term in this pattern.

8, 17, 14, 23, ____, 29, 26, 35

a. 21
b. 22
c. 20
d. 25

____ 14. Which number should appear in the centre of Figure 4?

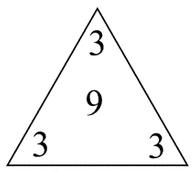


Figure 1

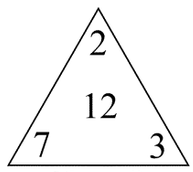


Figure 2

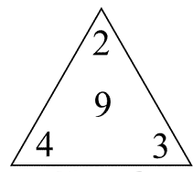


Figure 3

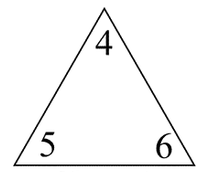


Figure 4

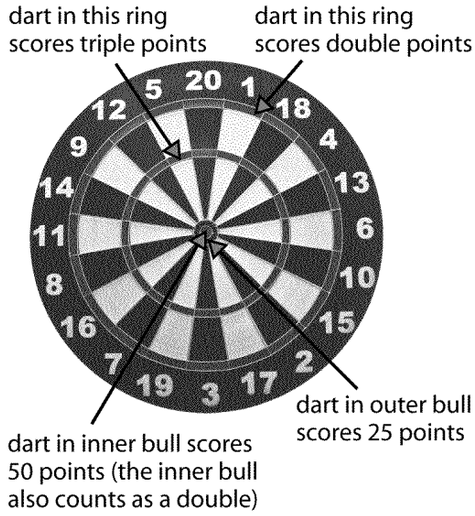
a. 15
b. 240
c. 120
d. 6

____ 15. Which number should go in the grey square in this Sudoku puzzle?

1		5		3		2	6	
7		3			8		4	
			9					
	1							2
		7	5		6	8		
4							9	
					3			
	4		2			7		1
	6	2		5		4		9

a. 2
b. 8
c. 4
d. 6

____ 16. Andrew and Deirdre are playing darts. Andrew has a score of 31. To win, he must reduce his score to zero and have his last counting dart be a double. Which of the following scores on the dart board, in order, would give him the win?



a. 2, 4, 27
b. double 6, double 6, 7
c. 7, 12, double 6
d. triple 6, 12, 1

Short Answer

17. What conjecture could you make about the product of two odd integers and one even integer?

18. 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?
Briefly justify your decision.

19. Anna's little sister, Joyce, made the following conjecture:

All girls' names either begin or end with a vowel.

Use a counterexample to show Joyce her conjecture is not valid.

20. Kendra made the following conjecture:

The sum of any three integers is greater than each integer.

Do you agree or disagree? Briefly justify your decision with a counterexample if possible.

21. Try the following number trick with different numbers. Make a conjecture about the trick.

- Choose a number.
- Multiply by 3.
- Add 5.
- Multiply by 2.
- Subtract 10.
- Divide by 6.

22. What type of error occurs in the following proof?
Briefly justify your answer.

$$\begin{aligned} 2 &= 2 \\ 4(2) &= 4(1 + 1) \\ 4(2) + 3 &= 4(1 + 1) + 3 \\ 8 + 3 &= 6 + 3 \\ 11 &= 9 \end{aligned}$$

23. Does the following statement demonstrate inductive reasoning or deductive reasoning?

For the pattern 4, 13, 22, 31, 40, the next term is 49.

24. Does the following statement demonstrate inductive reasoning or deductive reasoning?

Every high school student in western Canada has to take math.
You are a high school student in western Canada, therefore you have to take math.

25. Determine the unknown term in this pattern.

2, 10, 50, 250, ____, 6250, 31 250

26. Draw the next figure in this sequence.

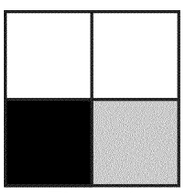


Figure 1

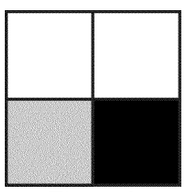


Figure 2

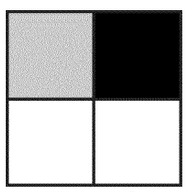
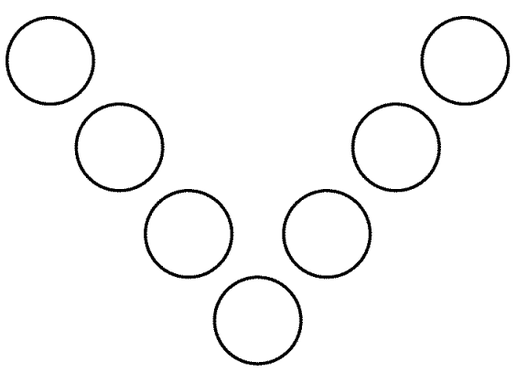


Figure 3

27. Place the numbers 2 to 8 in a V-shape, as shown, so the two arms of the V have the same total.



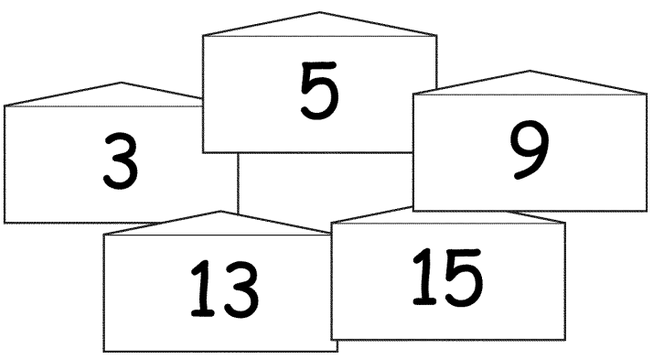
Problem

28. Alexandra discovered a number trick in a book she was reading:

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

    Prove deductively that any number you choose will be the final result.

29. A set of 10 cards, each showing one of the digits from 0 to 9, is divided between five envelopes so that there are two cards in each envelope. The sum of the cards inside each envelope is written on the envelope:



    What are the only two possible pairs of cards in the envelopes marked 5 and 13? Explain.

30. In a magic square, the columns, rows, and diagonals all add up to the same total. Use the natural numbers from 1 to 25 to complete this magic square. Use each number only once.

17		1		15
	5		14	
		13		22
	12	19		
11		25		9

Foundations 20 Final Review: Chapter 1
Answer Section

MULTIPLE CHOICE

1.	D	2.	A	3.	D	4.	B
5.	D	6.	B	7.	B	8.	A
9.	A	10.	C	11.	B	12.	B
13.	C	14.	A	15.	A	16.	C

SHORT ANSWER

17. Conjecture: the product will be an even integer.

18. 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.

19. For example, Hannah and Jan are girls' names, and they do not begin or end with a vowel.

20. For example, disagree: $–3 + (–4) + 2 = –5$, and $–5$ is less than each integer.

21. The answer is always the original number.

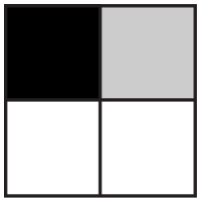
22. There is an error in calculation in the 4th step: $4(1 + 1) = 8$, not 6.

23. inductive reasoning

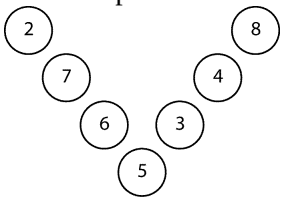
24. deductive reasoning

25. 1250

26. ANS:



27. For example:



PROBLEM

28.

n	n
+ 2	$n + 2$
× 4	$4n + 8$
+ 4	$4n + 12$
÷ 4	$n + 3$
– 3	n

29. Make a list of possible pairs in each envelope:
3: (0, 3), (1, 2)
5: (0, 5), (1, 4), (2, 3)
9: (0, 9), (1, 8), (2, 7), (3, 6), (4, 5)
13: (4, 9), (5, 8), (6, 7)
15: (7, 8), (6, 9)
Since the envelope marked 3 will contain either the 2 or the 3,
(2, 3) is not a possible option for the envelope marked 5.
Since the envelope marked 15 will contain either the 6 or the 7,
(6, 7) is not a possible option for the envelope marked 13.
The only two possible pairs of cards in the envelope marked 5 are
(0, 5) and (1, 4).
The only two possible pairs of cards in the envelope marked 13 are
(4, 9) and (5, 8).

30.

17	24	1	8	15
23	5	7	14	16
4	6	13	20	22
10	12	19	21	3
11	18	25	2	9