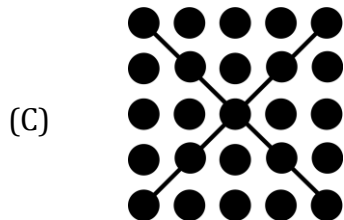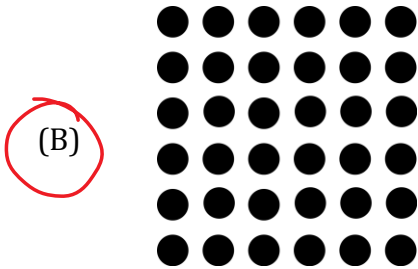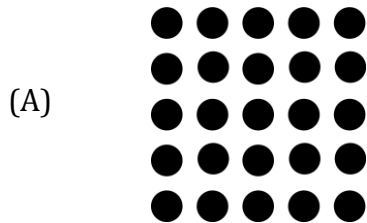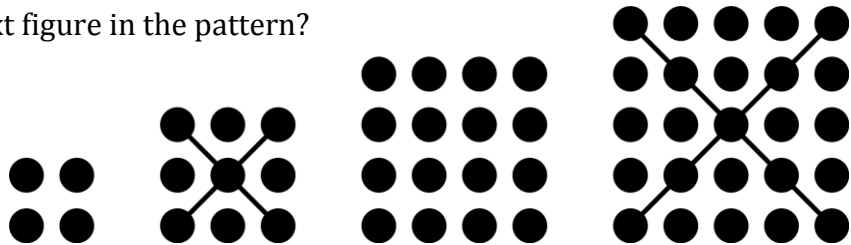10   **Part I:**   **Multiple Choice. Place the correct answer in the corresponding blank at the end of this section.**

1. What is the next figure in the pattern?

(A)

(B)

(C)

(D)
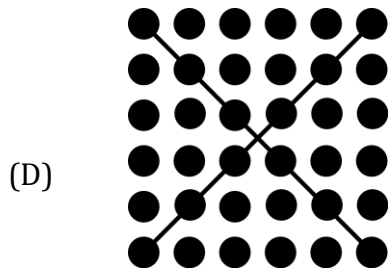
2. Beth created a math trick in which she always ended with 5. However, when she tried to prove her trick it did not work. In which step of her proof did the error occur?

Step		
Step 1	$3n$	Multiply a number by 3
Step 2	$3n + 15$	Add 15
Step 3	$n + 15$	Divide by 3
Step 4	15	Subtract original number

(A) Step 1

(B) Step 2

(C) Step 3

(D) Step 4

3. Which is a counterexample to this conjecture? "If a number is divisible by 3, then it is also divisible by 6".

(A) 6

(B) 9

(C) 12

(D) 18

4. What is a statement that is believed to be true but not yet proven?

(A)   Conjecture

(B)   Counterexample

(C)   Deductive Reasoning

(D)   Inductive Reasoning

5. What is the **6th** term in the sequence $\{5, 9, 13, ...\}$? 17, 21, 25

    (A)   21

    (B)   25

    (C)   29

    (D)   37

6. Which statement demonstrates using inductive reasoning to show that the product of Two odd numbers is an odd number?

    (A) $(5)(7) = 35$ and $(9)(7) = 63$

    (B) $(6)(8) = 48$ and $(4)(6) = 24$

    (C) $(2x)(2y) = 4xy$

    (D) $(2x + 1)(2y + 1) = 4xy + 2x + 2y + 1 = 2(2xy + x + y) + 1$

7. Which statement is correct regarding the conjecture that could be made, based on the table below?

Multiples of 5	15	35	40	60
Sum of Digits	6	8	4	6

    (A)   The sum of the digits of a multiple of 5 is odd. This conjecture is valid.

    (B)   The sum of the digits of a multiple of 5 is odd. This conjecture is not valid.

    (C)   The sum of the digits of a multiple of 5 is even. This conjecture is valid.

    (D)   The sum of the digits of a multiple of 5 is even. This conjecture is not valid.

8. Brad, Lucy, Michelle and Patrick ran a race. Michelle and Brad finished before Lucy. Bradfinished after Michelle. Brad and Lucy finished before Patrick. Who took second place?

Michelle → Brad

Lucy

Patrick

    (A)   Brad

    (B)   Lucy

    (C)   Michelle

    (D)   Patrick

9. Lisa draws four parallelograms and measures all sides. She writes the statement *"The opposite sides of a parallelogram are equal"* in her notebook. Which term best describes her statement?

   (A)   conjecture

   (B)   counterexample

   (C)   deductive reasoning

   (D)   inductive reasoning

10. What is the missing seventh term in the given sequence? $\{1,\ 1,\ 2,\ 3,\ 5,\ 8,\ \underline{?},\ 21\}$

   (A)   11

   (B)   12

   (C)   13

   (D)   14

Answers to multiple choice.

1.___   2.___   3.___   4.___   5.___

6.___   7.___   8.___   9.___   10.___

15   **Part II: Constructed Response. Answer each question in the space provided. Show all workings.**

5   11.   Prove deductively the sum of four consecutive odd integers is even.

$$2n+1, 2n+3, 2n+5, 2n+7$$

$$2n+1+2n+3+2n+5+2n+7$$

$$= 8n+16$$

$$= 2(4n+8)$$

5   12.   Use **both** inductive and deductive reasoning to show that the sum of two odd integers is an even number.

<u>Inductive Reasoning</u>   <u>Deductive Reasoning</u>

$$3+7=10$$

$$5+9=14$$

$$11+13=24$$

$$2n+1, 2m+1$$

$$2n+1+2m+1$$

$$= 2n+2m+2$$

$$= 2(n+m+1)$$

13. Use **both** inductive and deductive reasoning to show that the result for the given number trick will always be the original number.

NUMBER TRICK	<u>Inductive Reasoning</u>	<u>Deductive Reasoning</u>
Choose a number.	4	n
Double it.	8	$2n$
Add 6.	14	$2n+6$
Double it	28	$4n+12$
Subtract 4.	24	$4n+8$
Divide by 4.	6	$n+2$
Subtract 2.	4	n

or

$$\frac{2(2n+6)-4}{4}-2$$

$$=\frac{4n+12-4}{4}-2$$

$$=\frac{4n+8}{4}-2$$

$$=n+2-2$$

$$=n$$