

## CHAPTER 14

## MATHEMATICAL REASONING

## IMPROVEMENT 2018

1. a) Write the contra positive of the statement:  
"If the integer  $n$  is odd, then  $n^2$  is odd". (1)
- b) Prove by the method of contradiction  
" $\sqrt{7}$  is irrational". (3)

## MARCH 2018

2. a) Which one of the following sentences is a statement. (1)
  - i) 275 is a perfect square.
  - ii) Mathematics is difficult subject.
  - iii) Answer this question.
  - iv) Today is a rainy day.
- b) Verify by method of contradiction:  
" $\sqrt{2}$  is irrational". (3)

## IMPROVEMENT 2017

3. a) Write the negation of the statement " $\sqrt{2}$  is irrational". (1)
- b) Using the method of contradiction, prove that  
" $\sqrt{2}$  is irrational". (3)

## MARCH 2017

4. a) Write the contra positive of the statement  
"If a number is divisible by 9, then it is divisible by 3". (1)
- b) Prove by the method of contradiction, " $P\sqrt{5}$  is irrational". (3)

## IMPROVEMENT 2016

5. a) Write the negation of the statement:  
" $\sqrt{2}$  is not a complex number". (1)
- b) Prove by the method of contradiction,  
 $p : \sqrt{11}$  is irrational. (3)

## MARCH 2016

6. a) Write the negation of the statement: "Every

natural number is greater than zero". (1)

- b) Verify by the method of contradiction:  
" $p : \sqrt{13}$  is irrational". (3)

## IMPROVEMENT 2015

7. a) Which of the following is the contrapositive of the statement  $p \Rightarrow q$  ?
  - i)  $q \Rightarrow p$
  - ii)  $\sim p \Rightarrow \sim q$
  - iii)  $\sim q \Rightarrow \sim p$
  - iv)  $p \Rightarrow \sim q$  (1)
- b) Prove by contrapositive method, "If  $x$  is an integer and  $x^2$  is also even. (3)

## MARCH 2015

8. a) Write the negation of the statement  
" $\sqrt{7}$  is rational". (1)
- b) Prove that " $\sqrt{7}$  is rational" by the method of contradiction. (3)

## IMPROVEMENT 2014

9. a) Write the negation of the statement: "the sum of 3 and 4 is 7". (1)
- b) Write the component statements of  
"Chandigarh is the capital of Haryana and Uttar Pradesh". (1)
- c) Write the converse of the statement "if a number  $n$  is even, then  $n^2$  is even. (2)

## MARCH 2014

10. a) Write the negation of the statement:  
" $\sqrt{5}$  is not a complex number". (1)
- b) Verify by the method of contradiction:  
" $\sqrt{2}$  is rational". (3)

## IMPROVEMENT 2013

11. a) Write the contra positive of the statement:  
"If  $x$  is a prime number, then  $x$  is odd". (1)
- b) Verify by the method of contradiction:

$p : "\sqrt{5} \text{ is irrational}"$ . (3)

**MARCH 2013**

12. a) Write the negation of the following statement:  
 "All triangles are not equilateral triangle". (1)  
 b) Verify by the method of contradiction.

$p : "\sqrt{7} \text{ is irrational}"$ . (3)

**IMPROVEMENT 2012**

13. Verify by the method of contradiction:

$p : "\sqrt{2} \text{ is irrational}"$ . (4)

**MARCH 2012**

14. Consider the statement:

"If  $x$  is an integer and  $x^2$  is even, then  $x$  is also even".

- a) Write the converse of this statement. (1)  
 b) Prove the statement by the contra-positive method. (3)

**IMPROVEMENT 2011**

15. Consider the statement, "If  $n$  is an odd natural number, then  $n^2$  is an odd natural number".

- a) Write its contrapositive. (1)  
 b) Prove the contrapositive. (3)

**MARCH 2011**

16. a) Write the converse of the statement :  
 "If a number  $n$  is even, then  $n^2$  is even". (1)  
 b) Verify by the method of contradiction:  
 " $\sqrt{2}$  is irrational". (3)

**IMPROVEMENT 2010**

17. a) Write the converse of the statement:

$p$ : If  $a$  divides  $b$  then  $b$  is a multiple of  $a$ . (1)

- b) Consider the compound statement.

$p : 2+2$  is equal to 4 or 6 (1)

- c) Is the compound statement true? Why? (2)

**MARCH 2010**

18. i) Write the negation of the statement:

"Both the diagonals of a rectangle have the same length". (1)

- ii) Prove that the statement:

"Product of two odd integers is odd." by proving its contra-positive". (3)

**IMPROVEMENT 2009**

19. a) Write the contra-positive of the following statement:

"If a triangle is equilateral, it is isosceles". (1)

- b) Check whether the following statement is true or false by contra-positive method: "If  $x$  and  $y$  are odd integers, then  $xy$  is odd". (3)

**MARCH 2009**

14. a) Write the negation of the following statement:

"Both the diagonals of a rectangle have the same length". (1)

- b) Verify the method of contradiction that

$\sqrt{2}$  is irrational. (4)

