MATHS

NCERT - NCERT MATHEMATICS(BENGALI ENGLISH)

PROOFS IN MATHEMATICS

Example

1. Restate the following statements with appropriate conditions, so that they become true statements.

For every real number x, $3x > x$

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2. Restate the following statements with appropriate conditioins, so that they become true statements.

For every real number x, $x^2 \geq x$.

3. Restate the following statements with appropriate conditioins, so that they become true statements.

If you divide a number by two, you will always get half of that number.

4. Restate the following statements with appropriate conditioins, so that they become true statements.

The angle subtended by a chord of a circle at a point on the circle is $90°$

5. Restate the following statements with appropriate conditioins, so that they become true statements.

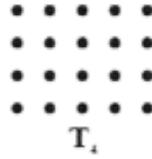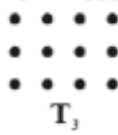If a quadrilateral has all its sides equal, then it is a square.

6. The following geometric arrays suggest a sequence of numbers.

(a) Find the next three terms .

(b) Find the 100th term .

(c) Find the nth term .

T_1 T_2 T_3 T_4

The dots here arranged in such a way that they form a rectangle. Here $T_1 = 2, T_2 = 6, T_3 = 12, T_4 = 20$ and so on. Cay you guess what T_5 is ? What about T_6 ? What about T_n ?

Make a conjecture about T_n .

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Exercise 15 1

1. State whether the following sentences are always true, always false or ambiguous. Justify your answer

There are 27 days in a month.

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2. State whether the following sentences are always true, always false or ambiguous. Justify your answer

There are 27 days in a month.

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3. State whether the following sentences are always true, always false or ambiguous. Justify your answer

The temperature in Hyderabad is $2°C$.

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4. State whether the following sentences are always true, always false or ambiguous. Justify your answer

The earth is the only planet where life exist.

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5. State whether the following sentences are always true, always false or ambiguous. Justify your answer

Dogs can fly.

6. State whether the following sentences are always true, always false or ambiguous. Justify your answer

February has only 28 days.

7. State whether the following statements are true or false. Give reasons for your answers.

The sum of the interior anlges of a quadrilateral is $350°$

8. State whether the following statements are true or false. Give reasons for your answers.

For any real number x, $x^2 \geq 0$.

9. State whether the following statements are true or false. Give reasons for your answers.

A rhombus is a parallelogram .

10. State whether the following statements are true or false. Give reasons for your answers.

The sum of two even number is even .

11. State whether the following statements are true or false. Give reasons for your answers.

Square number can be written as the sum of two odd numbers .

12. Restate the following statements with appropriate conditions, so that they become true statements.

All number can be represented as the product of prime factors.

13. Restate the following statements with appropriate conditions, so that they become true statements.

Two time a real number is always even.

14. Restate the following statements with appropriate conditions, so that they become true statements.

For any x, $3x + 1 > 4$.

15. Restate the following statements with appropriate conditions, so that they become true statements.

For any x, $x^3 \geq 0$.

16. Restate the following statements with appropriate conditions, so that they become true statements.

In every triangle, a median is also an angle bisector.

17. Disprove , by finding a suitable counter example , the statement $x^2 > y^2$ for all $x > y$.

Exercise 15 2

1. Use deductive reasoning to answer the following:

Human beings are mortal. Jeevan is a human being. Based on

these two statements, what can you conclude about Jeevan ?

2. Use deductive reasoning to answer the following:

All Telugu people are Indians. X is an Indian. Can you conclude that

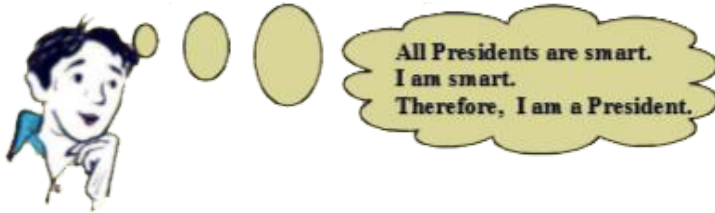X belongs to Telugu people.

3. Use deductive reasoning to answer the following:

Martians have red tongues. Gulag is a Martian. Based on these

two statements, what can you conclude about Gulag?

4. Use deductive reasoning to answer the following:

What is the fallacy in the Raju's reasoning in the cartoon below?

All Presidents are smart.
I am smart.
Therefore, I am a President.

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5. Once again you are given four cards. Each card has a number printed on one side and a letter on the other side. Which are the only two cards you need to turn over to check whether the following rule holds?

"If a card has a consonant on one side, then it has an odd number on the other side."

B   3   U   8

Exercise 15 3

1. Take any three consecutive odd numbers and find their product,

for   example

$1 \times 3 \times 5 = 15, 3 \times 5 \times 7 = 105, 5 \times 7 \times 9 - $ .... Is there

any pattern you can guess in these products? What can you

conjecture about them?

2. Take any three consecutive even numbers and add them , say ,

$2 + 4 + 6 = 12, 4 + 6 + 8 = 18, 6 + 8 + 10 = 24, 8 + 10 + 12 = 30$

and so on.

Is there any pattern can you guess in these sums? What can you conjecture about them?
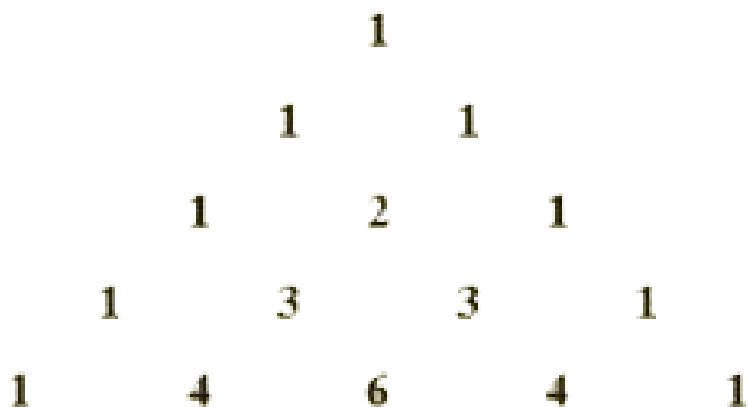
3. Go back to Pascal's triangle .

Line -1 : $1 = 11^0$

Line -2 : $11 = 11^1$

Line-3 : $121 = 11^2$

Make a conjecture about Line-4 and Line-5 .

Does your conjecture hold ? Does your conjecture hold for Line -6 too ?

4. Look at the following pattern :

(i) $28 = 2^2 \times 7^1$, Total number of factors (2+1) (1+1)=$3 \times 2 = 6$

28 is divisible by 6 factors i.e., 1,2,4,7,14,28

(ii) $30 = 2^1 \times 3^1 \times 5^1$, Total number of factors

$(1+1)(1+1)(1+1) = 2 \times 2 \times 2 = 8$

30 is divisible by 8 factor i.e., 1,2,3,5,6,10,15,30 find pattern

5. Look at the following pattern:

$1^2 = 1$

$11^2 = 121$

$111^2 = 12321$

$1111^2 = 1234321$

$11111^2 = 123454321$

Make a conjecture about about each of the following :

$111111^2 = $ ....

$1111111^2 = $ ....

Check if your conjecture is true .

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6. In a polynomial $p(x) = x^2 + x + 41$ put different value of x and find p (x). Can you conclude after putting different value of x that p(x) is prime for all. Is x an element of N ? Put x=41 in p(x). Now what do you find ?

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Exercise 15 4

1. State which of the following are mathematical statements and which are not? Give reason.

She has blue rays

2. State which of the following are mathematical statements and which are not? Give reason.

$x + 7 = 18$

3. State which of the following are mathematical statements and which are not? Give reason.

Today is not Sunday .

4. State which of the following are mathematical statements and which are not? Give reason.

For each counting number x, $x + 0 = x$

5. State which of the following are mathematical statements and which are not? Give reason.

What time is it ?

6. Find counter examples to disprove the following statements:

Every rectangle is a square.

7. Find counter examples to disprove the following statements:

For any integers x and y, $\sqrt{x^2 + y^2} = x + y$

8. Find counter examples to disprove the following statements:

If n is a whole number then $2n^2 + 11$ is a prime .

9. Find counter examples to disprove the following statements:

Two triangles are congruent if all their corresponding angles are equal.

10. Find counter examples to disprove the following statements:

A quadrilateral with all sides are equal is a square.

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11. Prove that the sum of two odd numbers is even.

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12. Prove that the product of two even numbers is an even number.

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13. Prove that if x is odd , then x^2 is also odd.

14. Examine why they work ?

Choose a number. Double it. Add nine. Add your original number. Divide by three. Add four. Subtract your original number. Your result is seven.

15. Write down any three-digit number (for example, 425). Examine why they work ?

Make a six-digit number by repeating these digits in the same order (425425). Your new number is divisible by 7, 11, and 13.