MATHS

BOOKS - VGS PUBLICATION-BRILLIANT

PROOFS IN MATHEMATICS

Exercise

1. Make 2 more sentences and check whether they are statements or not? Give reasons.

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2. “Product of two odd integers is even”. Consider 3 and 5 as the odd integers. Their product is 15, which is not even.

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3. Among the sentences there are some like " Humans are meant to rule the earth" or "Ramu is a good driver."

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4. Consider some of the other sentences like. The earth has one Moon. Bhaskara has written the book "Leelavathi". Think about how would you verify these to consider as statements?

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

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

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

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

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7. 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.

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8. 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°

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9. 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.

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10. 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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11. State whether the sentence are always true, always false or ambiguous. Justify Your answer: Makarasankranthi falls on Friday.

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

The temperature in Hyderabad is $2^{\circ}C$.

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

Dogs can fly.

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

February has only 28 days.

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16. 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°

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

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

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

A rhombus is a parallelogram .

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

The sum of two even number is even .

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20. 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 .

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21. Restate the statements with appropriate conditions, so that they become true statements: All numbers can be represented in prime factorization.

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

Two time a real number is always even.

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

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

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

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

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

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

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26. Disprove, by finding a suitable counter example, the statement.

$x^2 > y^2$ for all $x > y$

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27. 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 ?

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28. 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.

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29. 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?

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30. 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."

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31. Think of this puzzle What do you need to find a chosen number from this square? Four of the clues below are true but do nothing to help in finding the number. Four of the clues are necessary for finding it.

Here are eight clues to use:

a. The number is greater than 9.

b. The number is not a multiple of 10.

c. The number is a multiple of 7.

d. The number is odd.

e. The number is not a multiple of 11.

f. The number is less than 200.

g. Its ones digit is larger than its tens digit.

h. Its tens digit is odd.

What is the number?

Can you sort out the four clues that help and the four clues that do not help in finding it?

First follow the clues and strike off the number which comes out from it. Like - from the first clue we come to know that the number is not from 1 to 9. (strike off numbers from 1 to 9).

After completing the puzzle, see which clue is important and

which is not?

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

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32. Which of the following sentences are statements? Give reasons for your answer

The sum of all interior angles of a triangle is 180°.

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33. The product of two odd natural numbers is odd.

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34. The product of any two consecutive even natural numbers is divisible by 4.

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

for example

$1 \times 3 \times 5 = 15, 3 \times 5 \times 7 = 105, 5 \times 7 \times 9 - \ldots\ldots\ldots$

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36. 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?

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37. 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.

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38. Look at the following pattern. 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 factors i.e., 1,2,3,5,6,10,15 and 30 Find the pattern. [Hint: product of every prime base exponent + 1)

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39. 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 :

$111111^2 =$ ..... .

$1111111^2 = \ldots\ldots\ldots .$

Check if your conjecture is true .

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40. List five axioms (postulates) used in text book.

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

She has blue rays

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

$x + 7 = 18$

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

Today is not Sunday .

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

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

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

What time is it ?

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47. Find counter examples to disprove the following statements:

Every rectangle is a square.

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48. Find counter examples to disprove the following statements:

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

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49. Find counter examples to disprove the statements: If n is a whole number, then $2n^2 + 11$ is a prime.

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50. Find counter examples to disprove the statements: Two triangle are congruent if all their corresponding angles are equal.

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51. Find counter examples to disprove the statements: A quadrilateral with all sides are equal in a square.

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

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53. Prove that the product of two even numbers is an even numbers.

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

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55. 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.

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56. 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.

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57. Write any two mathematical statements.

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58. What is a mathematical proof called?

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59. State any two axioms (postulates).

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60. Define the following : An axiom

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61. Define the following : Theorem

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62. What is a conjecture ? Give an example for it.

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63. What is meant by 'Inductive reasoning'?

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64. What is deductive reasoning?

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65. Find counter examples to disprove the statements: If n is a whole number, then $2n^2 + 11$ is a prime.

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

Two time a real number is always even.

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

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

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68. Disprove, by finding a suitable counter example, the statement.

$x^2 > y^2$ for all $x > y$

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69. The statement "the sum of two odd numbers is odd" is

A. Always true

B. Always false

C. Ambiguous

D. None

Answer:

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70. The statement "every composite number can be expressed as product of primes" is

A. Always true

B. Always false

C. Sometimes true

D. Ambiguous

Answer:

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71. A statement or an idea which gives an explanation to a series of observations is called

A. Conclusion

B. Open sentence

C. Hypothesis

D. Result

Answer:

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72. The mathematics is mainly based on ..... reasoning.

A. Inductive

B. Deductive

C. Both

D. None

Answer:

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73. Counter example to "product of two odd integers is even" is

A. $7X5 = 35$

B. $3X4 = 12$

C. $2X6 = 12$

D. Not possible

Answer:

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74. God is immortal. Rama is a God, the conclusion based on these two statements

A. Rama is mortal

B. Rama is a God

C. God is Rama

D. Rama is immortal

Answer:

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75. A mathematical statement whose truth has been established is called

A. Axiom

B. Conjecture

C. Theorem

D. Postulate

Answer:

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76. The mathematical statement which we believe to be true is called

A. statements

B. Conjecture

C. Axiom

D. Theorem

Answer:

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77. Conjecture are made based on

A. Inductive reasoning

B. Deductive reasoning

C. Proofs

D. None

Answer:

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78. The conjecture "If the perimeter of a rectangle increases then its area also increases" is

A. true

B. False

C. Neither true or false

D. None

Answer:

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79. A counter example to the statement "In any right triangle the square of the smallest side equals to sum of the other sides" is

A. (3, 4, 5)

B. (5, 12, 13)

C. (6, 8, 10)

D. (7, 24, 25)

Answer:

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80. "A circle may be drawn with any centre and radius" is

A. Axiom

B. Conjecture

C. Theorem

D. Open sentence

Answer:

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81. A false axiom results into a.....

A. theorem

B. True statement

C. Contradiction

D. None

Answer:

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82. If in a collection of axioms, one axiom can be used to prove other axiom, then they are said to be

A. consistent

B. Inconsistent

C.

D. 1

Answer:

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83. If a statement and its negation both are true, then it is a

A. impossible

B. Contradiction

C. conjecture

D. Postulate

Answer:

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84. A process which can establish the truth of a mathematical statement based on logic is called

A. Mathematical proof

B. Disproof

C. Counter example

D. None

Answer:

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85. The product of any two consecutive even natural numbers is divisible by 4.

A. 3

B. 5

C. 4

D. 8

Answer:

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86. Counter example to "$2n^2 + 11$ is a prime" is

A. 3

B. 4

C. 5

D. 11

Answer:

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87. Find counter examples to disprove the statements: A quadrilateral with all sides are equal in a square.

A. Rectangle

B. Rhombus

C. Trapezium

D. Parallelogram

Answer:

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88. We prove the statement "sum of interior angles of a triangle is 180°" by

A. Counter example

B. Inductive reasoning

C. Deductive reasoning

D. None

Answer:

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89. Statement which are assumed to be true without proof are

A. Axioms

B. Counter examples

C. Conjectures

D. Open sentences

Answer:

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90. If x is odd, then 'x^2' is _____

A. Even

B. Prime

C. Odd

D. None of these

Answer:

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91. A sentence which is clearly true or false but not both is called a

A. Axiom

B. Theorem

C. Conjecture

D. Statement

Answer:

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92. Which of the following is not a mathematical statements?

A. She have blue eyes

B. $x + 7 = 18$

C. Today is not Sunday

D. all the above

Answer:

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93. A statement of idea which gives an explanation to a sense of observation is

A. Hypothesis

B. Proof

C. Analysis

D. Conclusion

Answer:

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94. The great Indian mathematician is

A. Euclid

B. Pythagoras

C. Srinivasa Ramanujan

D. Gold Bach

Answer:

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95. Which of the following subjects is based on inductive reasoning?

A. Mathematics

B. Social studies

C. Science

D. English

Answer:

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96. Which of the following statement is always false?

A. February has only 28 days

B. Dogs fly

C. A rhombus is a parallelogram

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

Answer:

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97. The very helpful technique for marking conjecture is

A. Inductive reasoning

B. Deductive reasoning

C. Experimental evidence

D. Observation

Answer:

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98. Which of the following is a theorem?

A. A rhombus is a parallelogram.

B. Humans are meant to rule the earth

C. The product of two odd natural numbers is odd

D. A straight line may be drawn from any point to any other point

Answer:

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