



# MATHS

## BOOKS - MBD

### Appendix - A1

#### Example

1. State whether the following statements are always true, always false or ambiguous. Justify

your answer : All mathematics textbooks are interesting.



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2. State whether the following statements are always true, always false or ambiguous. Justify your answer : The distance from the Earth to the Sun is approximately  $1.5 \times 10^8$  km.



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3. State whether the following statements are always true, always false or ambiguous. Justify your answer : All human beings grow old.



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4. State whether the following statements are always true, always false or ambiguous. Justify your answer : The journey from Uttarkashi to Harsil is tiring.



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5. State whether the following statements are always true, always false or ambiguous. Justify your answer : The woman saw an elephant through a pair of binoculars.



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6. State whether the following statements are true or false. Justify your answer. : All hexagons are polygons.



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7. State whether the following statements are true or false. Justify your answer. : Some polygons are pentagons.



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8. State whether the following statements are true or false. Justify your answer. : Not all even numbers are divisible by 2.



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**9.** State whether the following statements are true or false. Justify your answer. : Some real numbers are irrational.



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**10.** State whether the following statements are true or false. Justify your answer. : Not all real numbers are rational.



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**11.** Let  $a$  and  $b$  be real numbers such that  $ab \neq 0$ . Then which of the following statements are true ? Justify your answer :

Both  $a$  and  $b$  must be zero.



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**12.** Let  $a$  and  $b$  be real numbers such that  $ab \neq 0$ . Then which of the following statements are true ? Justify your answer :

Both  $a$  and  $b$  must be non-zero.





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**13.** Let  $a$  and  $b$  be real numbers such that  $ab \neq 0$ . Then which of the following statements are true ? Justify your answer :  
Either  $a$  or  $b$  must be non-zero.



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**14.** Restate the following statements with appropriate conditions, so that they become true. : If  $a^2 > b^2$ , then  $a > b$ .





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**15.** Restate the following statements with appropriate conditions, so that they become true.: If  $x^2 = y^2$ , then  $x = y$ .



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**16.** Restate the following statements with appropriate conditions, so that they become true.: If  $(x + y)^2 = x^2 + y^2$ , then  $x = 0$ .



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## Exercise

1. Given that all women are mortal, and suppose that  $A$  is a woman, what can we conclude about  $A$ ?



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2. Given that the product of two rational numbers is rational, and suppose  $a$  and  $b$  are

rational numbers, what can you conclude about  $ab$ ?



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3. Given that the decimal expansion of irrational numbers is non-terminating, non-recurring, and  $\sqrt{17}$  is irrational, what can we conclude about the decimal expansion of  $\sqrt{17}$ ?



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4. Given that  $y = x^2 + 6$  and  $x = -1$ , what can we conclude about the value of  $y$ ?



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5. Given that ABCD is a parallelogram and  $\angle B = 80^\circ$ . What can you conclude about the other angles of the parallelogram ?



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6. Given that PQRS is a cyclic quadrilateral and also its diagonals bisect each other. What can you conclude about the quadrilateral ?



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7. Given that  $\sqrt{p}$  is irrational for all prime  $p$  and also suppose that 3721 is a prime. Can you conclude that  $\sqrt{3721}$  is an irrational number ? Is your conclusion correct ? Why or why not ?



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8. Prove that the sum of the two consecutive odd numbers is divisible by 4.



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9. Take two consecutive odd numbers. Find the sum of their squares, and then add 6 to the result. Prove that the new number is always divisible by 8.



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**10.** If  $p \geq 5$  is a prime number, show that  $p^2 + 2$  is a composite number.



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**11.** Let  $x$  and  $y$  be rational numbers. Show that  $xy$  is a rational number.



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**12.** If  $a$  and  $b$  are positive integers, then you know that  $a=bq+r$ , such that  $r$  is less than or equal to  $0$  and  $r$  is less than  $b$ , where  $q$  is a whole number. Prove that  $\text{HCF}(a,b) = \text{HCF}(b, r)$ .



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**13.** A line parallel to  $BC$  of a triangle  $ABC$ , intersects  $AB$  and  $AC$  at  $D$  and  $E$  respectively. Prove that  $(AD / DB) = (AE / EC)$ .



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**14.** State the negations for the following statements : Man is mortal.



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**15.** State the negations for the following statements : Line  $l$  is parallel of line  $m$ .



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**16.** State the negations for the following statements : This chapter has many exercises.



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**17.** State the negations for the following statements : All integers are rational numbers.



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**18.** State the negations for the following statements : Some prime numbers are odd.



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**19.** State the negations for the following statements : No student is lazy.



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**20.** State the negations for the following statements : Some cats are not black.



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**21.** State the negations for the following statements : There is no real number  $x$ , such that  $x^2 = -1$ .



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**22.** State the negations for the following statements : 2 divides the positive integer  $a$ .



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**23.** State the negations for the following statements : Integers  $a$  and  $b$  are coprime.



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**24.** In each of the following questions, there are two statements. State if the second is the negation of the first or not. : Mumtaz is hungry. Mumtaz is not hungry.



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**25.** In each of the following questions, there are two statements. State if the second is the negation of the first or not. : Some cats are black. Some cats are brown.





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**26.** In each of the following questions, there are two statements. State if the second is the negation of the first or not. : All elephants are huge. One elephant is not huge.



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**27.** In each of the following questions, there are two statements. State if the second is the

negation of the first or not. : All fire engine are red. All fire engines are not red.



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**28.** In each of the following questions, there are two statements. State if the second is the negation of the first or not. : No man is a cow. Some men are cows.



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**29.** Write the converses of the following statements. : If it is hot in Tokyo, then Sharan sweats a lot.



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**30.** Write the converses of the following statements. : If Shalini is hungry, then her stomach grumbles.



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**31.** Write the converses of the following statements. : If Jaswant has scholarship, then she can get a degree.



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**32.** Write the converses of the following statements. : If a plant has flowers, then it is alive.



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**33.** Write the converses of the following statements. : If an animal is a cat, then it has a tail.



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**34.** Write the converses of the following statements. Also, decide in each case whether the converse is true or false. : If triangle ABC is isosceles, then its base angles are equal.



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**35.** Write the converses of the following statements. Also, decide in each case whether the converse is true or false. : If an integer is odd, then its square is an odd integer.



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**36.** Write the converses of the following statements. Also, decide in each case whether the converse is true or false. : If  $x^2 = 1$ , then  $x = 1$ .



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**37.** Write the converses of the following statements. Also, decide in each case whether the converse is true or false. : If ABCD is a parallelogram, then its diagonals bisect each other.



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**38.** Write the converses of the following statements. Also, decide in each case whether

the converse is true or false. : If a and b are whole numbers, that

$$a + (b + c) = (a + b) + c.$$



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**39.** Write the converses of the following statements. Also, decide in each case whether the converse is true or false. : If x and y are two odd numbers, then their sum is an even number.



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**40.** Write the converses of the following statements. Also, decide in each case whether the converse is true or false. : If vertices of a parallorgam PQRS lie on a circle, then it is rectangle.



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**41.** Suppose  $a + b = c + d$ , and  $a < c$ . Use proof by contradiction to show  $b \geq d$ .



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**42.** Let  $r$  be a rational number and  $x$  be an irrational number. Use proof by contradiction to show that  $r + x$  is an irrational number.



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**43.** Use proof by contradiction to prove that if for an integer  $a$ ,  $a^2$  is even, then so is  $a$ .



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**44.** Use proof by contradiction to prove that if for an integer  $a$ ,  $a^2$  is divisible by 3, then  $a$  is divisible by 3.



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**45.** Use proof by contradiction to show that there is no value of  $n$  for which  $6^n$  ends with the digit zero.



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**46.** Prove by contradiction that two lines in a plane cannot intersect in more than one point.



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