



MATHS

BOOKS - PSEB

PROOFS IN MATHEMATICS



1. State whether the following statements are

always true, always false or ambigous. Justify

your answer : All mathematics textbooks are

interesting.



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

3. State whether the following statements are

always true, always false or ambigous. Justify

your answer : All human beings grow old.



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

5. State whether the following statements are always true, always false or ambigous. 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.

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.

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.

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 non-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.



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.



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



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





17. Restate the following statements with appropriate conditions, so that they become true. : The diagonals of a quadrilateral bisect each otther.



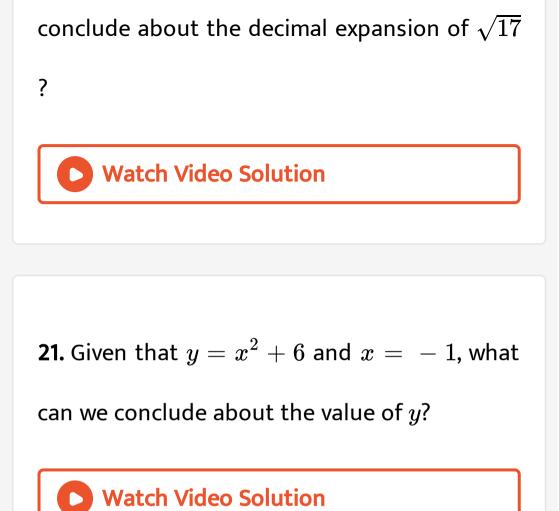
18. Given that all women are mortal, and suppose that A is a woman, what can we conclude about A ?



19. Given that the product of two rational numbers is rational, and suppose *a* and *b* are rationals, what can you conclude about *ab*?



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



22. Given that ABCD is a parallelogram and $\angle B = 80^{\circ}$. What can you conclude about the

other angles of the parallelorgam ?



23. 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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24. 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 ?



25. Prove that the sum of the two consecutive

odd numbers is divisible by 4.

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26. 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.



27. In the following question, we ask you to prove a statement. List the step in proof, and give the reason for step. If $p \ge 5$ is a prime number, show that $p^2 + 2$ is divisible by 3.

28. Let x and y be rational numbers. Show that

xy is a rational number.

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29. 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 HCF(a,b) = HCF(b, r).



30. 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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31. State the negations for the following statements : Man is mortal.

32. State the negations for the following statements : Line I is parallel of line m.

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33. State the negations for the following

statements : This chapter has many exerises.



34. State the negations for the following statements : All integers are rational numbers. **Watch Video Solution**

35. State the negations for the following

statements : Some prime numbers are odd.

36. State the negations for the following

statements : No student is lazy.

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37. State the negations for the following

statements : Some cats are not black.

38. Stale the negations for the following statement : There is no real number x, such that $\sqrt{x} = -1$



39. State the negations for the following statements : 2 divides the positive integer a.



40. State the negations for the following statements : Intergers a and b are coprime.

41. 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.



42. 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.



43. 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.



44. 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.



45. 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.



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



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



48. Write the converses of the following statements. : If Jaswant has scholarship, then

she can get a degree.



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



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



51. 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.



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



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

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54. Write the converses of the following statements. Also, devide in each case whether the converse is true or false. : If ABCD is a

parallelogram, then its dagonals bisect each

other.



55. Write the converses of the following statements. Also, devide in each case whether the converse is true or false. : If a and b are whole numbers, that

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

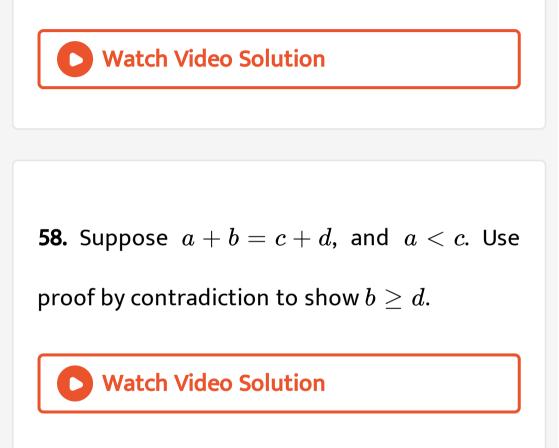
56. Write the converses of the following statements. Also, devide in each case whether the converse is true or false. : If x and y are two odd numbers, then their sum is an even number.

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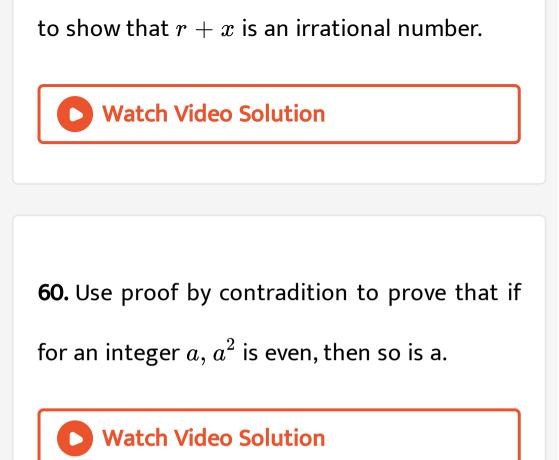
57. Write the converses of the following statements. Also, devide in each case whether the converse is true or false. : If vertices of a

parallorgam PQRS lie on a circle, then it is

rectangle.



59. Let r be a rational number and x be an irrational number. Use proof by contradiction



61. Use proof by contradition to prove that if for an integer a, a^2 is divisible by 3, then a is divisible by 3.



62. Use proof by contradition to show that there is no value of n for which 6^n ends with the digit zero.



63. Prove by contradition that two lines in a

plane cannot intersect in more than one point.





 State whether the following statement is always true, always false or ambiguous. Justify your answer. The Sun orbits the Earth.



2. State whether the following statement is always true, always false or ambiguous. Justify your answer. Vehicles have four wheels.



3. State whether the following statement is always true, always false or ambiguous. Justify your answer. The speed of light is approximately 3×10^5 km/s.

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4. State whether the following statement is always true, always false or ambiguous. Justify

your answer. The Sun orbits the Earth.



5. State whether the following statement is always true, always false or ambiguous. Justify your answer. All humans are mortal.

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6. State whether the following statement is true or false, and justify your answers. All

equilateral triangles are isosceles.



7. State whether the following statement is true or false, and justify your answers. Some isosceles triangles are equilateral.

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8. State whether the following statement is true or false, and justify your answers. All

isosceles triangles are equilateral.



9. State whether the following statement is true or false, and justify your answers. Some rational numbers are integers.

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10. State whether the following statement is true or false, and justify your answers. Some

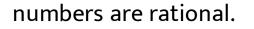
rational numbers are not integers.



11. State whether the following statement is true or false, and justify your answers. Not all integers are rational.

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12. State whether the following statements are true or false. Justify your answer. : Not all real





13. If x < 4, which of the following statements

are true? Justify your answers.:- 2x >8

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14. If x < 4, which of the following statements

are true? Justify your answers.:- 2x < 6



15. If x < 4, which of the following statements

are true? Justify your answers.:- 2x < 8



16. Restate the following statement with appropriate conditions, so that they become true statement: If the diagonals of a quadrilateral are equal, then it is a rectangle.



17. Restate the following statement with appropriate conditions, so that they become true statement: A line joining two mid-points on two sides of a triangle is parallel to the third side.

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18. Restate the following statement with appropriate conditions, so that they become

true statement: All quadratic equations have

two real roots.



19. Given that Bijapur is in the state of Karnataka, and suppose Shabana lives in Bijapur. In which state does Shabana live?



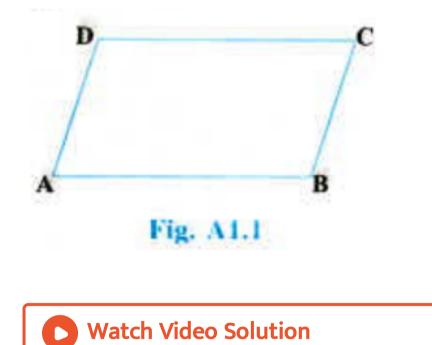
20. Given that all mathematics textbooks are interesting, and suppose you are reading a mathematics textbook. What can we conclude about the textbook you are reading?

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21. Given that y = -6x + 5 and suppose x=

3. What is y?

22. Given that ABCD is a parallelogram, and suppose AD = 5 cm, AB = 7 cm (see Fig. A1.1). What can you conclude about the lengths of DC and BC?



23. Given that \sqrt{p} is irrational for all primes p,and suppose that 19423 is a prime. What can you conclude about $\sqrt{19423}$?



24. The sum of two rational numbers is a rational number.

25. Every prime number greater than 3 is of the fom 6k + 1 or 6k + 5, where k is some integer.



26. State the negations for the following statement:- Mike's dog does not have a black tail.



27. State the negations for the following statement:-All irrational numbers are real numbers.



28. State the negations for the following statement:- $\sqrt{2}$ is irrational.

29. State the negations for the following statement:- Some rational numbers are integers.



30. State the negations for the following

statement:- Not all teachers are males.



31. State the negations for the following statement:- Some horses are not brown.

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

33. Write the converses of the following statement : If Jamila is riding a bicycle, then 17 August falls on a Sunday.



34. Write the converses of the following statement : If 17 August is a Sunday, then

Jamila is riding a bicycle.

35. Write the converses of the following statement : If Pauline is angry, then her face turns red.

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36. Write the converses of the following statement : If a person has a degree in education, then she is allowed to teach.

37. Write the converses of the following statement : If a person has a viral infection, then he runs a high temperature.

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38. Write the converses of the following statement : If Ahmad is in Mumbai, then he is in India.

39. Write the converses of the following statement : If triangle ABC is equilateral, then all its interior angles are equal.



40. Write the converses of the following statement : If x is an irrational number, then the decimal expansion of x is non-terminating non-recurring.



41. Write the converses of the following statement : If x - a is a factor of the polynomial p(x), then p(a) = 0.



42. State the converses of the following statement. In each case, also decide whether the converse is true or false.:- If n is an even integer, then 2n + 1 is an odd integer.



43. State the converses of the following statement. In each case, also decide whether the converse is true or false.:- If the decimal expansion of a real number is terminating, then the number is rational.

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44. State the converses of the following statement. In each case, also decide whether

the converse is true or false .:- If a transversal

intersects two parallel lines, then each pair of

corresponding angles is equal.

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45. State the converses of the following statement. In each case, also decide whether the converse is true or false.:- If each pair of opposite sides of a quadrilateral is equal, then the quadrilateral is a parallelogram.



46. State the converses of the following statement. In each case, also decide whether the converse is true or false.:- If two triangles are congruent, then their corresponding angles are equal.

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47. The product of a non-zero rational number

and an irrational number is irrational.

