



# MATHS

# **BOOKS - UNITED BOOK HOUSE**

# HARE SCHOOL

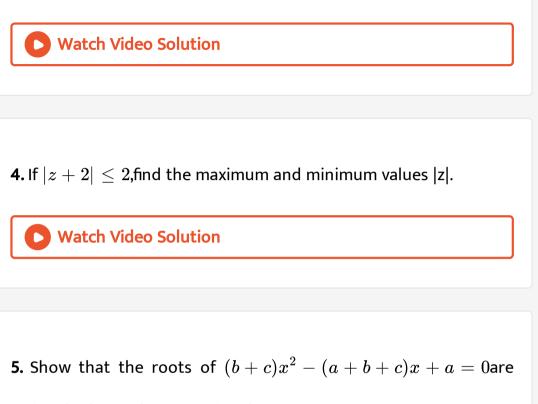


1. Find the minimum value of  $\cos^2 heta + \sec^2 heta$ 



**2.** If  $heta+\phi=60^\circ$  ,then show that  $\sin(120^\circ- heta)=\cos(30^\circ-\phi)$ 

3. Prove that  $an 62^\circ\,=\,2 an 34^\circ\,+\, an 28^\circ$ 



rational .where a,b,c are rational.



**6.** The sum of n terms of an A.P is  $n^2$ .Find the common difference.

7. If three equal positive numbes a,b,c are in G.P,then show that a+c>2b

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8. For what value(S)of K the point (1,-1),(2,1) and (K,5) lie on the

same line?

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**9.**  $(at^2, 2at)$  is a point on the line 2x-5y+12a=0,from this find the co-

oridnates of two points on the line.

10. Find the angle between the two lines  $x-\sqrt{3}y=3$  and  $\sqrt{3}x-y+1=0$ 

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11. Evaluate: 
$$\lim_{x o 0} rac{3^x-1}{(4+x)^{rac{1}{2}}-2}$$

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12. What is the probability of obtaining 7 points with the rolling of

two dice.



**13.** Show that the equation of straight line  $x \cos \alpha + y \sin \alpha = p$ 

can be expressed in the following form :  $\frac{x - p \cos \alpha}{-\sin \alpha} = \frac{y - p \sin \alpha}{\cos \alpha} = r$ 

14. If G is the G.M between two positive numbers a and b.show that

$$\frac{1}{G^2 - a^2} + \frac{1}{G^2 - b^2} = \frac{1}{G^2}$$

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**15.** Three positive numbers a,b,c are in A.P prove that  $\frac{1}{\sqrt{b} + \sqrt{c}}$ ,  $\frac{1}{\sqrt{c} + \sqrt{a}}$  and  $\frac{1}{\sqrt{a} + \sqrt{b}}$  are aslo in A.P

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16. If 
$$a_1, a_2, a_3, ..., a_a$$
 in A.P then show that  

$$\frac{1}{a_1a_2} + \frac{1}{a_2a_3} + \frac{1}{a_3a_4} + ... + \frac{1}{a_{n-1}} = \frac{n-1}{a_1a_n}$$
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17. If the roots of the equation  
 $p(q-r)x^2 + q(r-p)x + r(p-q) = 0$  be equal ,show that  
 $1/p+1/r=2/q$ 

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**18.** Solve : $ar{z}=iz^2$ (z being a complex number)

**19.** if  $\alpha,\beta,\gamma$  are in A>P show that cot=(sinalphasingamma)/(cosgammacosalpha)` Watch Video Solution **20.** Prove that  $\frac{1}{2\sin 10^{\circ}} - 2\sin 70^{\circ} = 1.$ Watch Video Solution **21.** Prove that  $0 \leq 3\cos heta + 4\sin heta + 5 \leq 10$ Watch Video Solution

**22.** Show that  $4\left(\cos^{3}10^{\circ} + \sin^{3}20^{\circ}\right) = 3(\cos10^{\circ} + \sin20^{\circ})$ 

23. If the equation  $x^2 - cx + d = 0$  and  $x^2 - ax + b = 0$  have a common root, and the roots of the second equations are equal ,then prove that 2(b+d)=ac

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24. If lpha and eta are roots of the equation  $qx^2 + px + p = 0$ ,show

that 
$$\sqrt{rac{lpha}{eta}} + \sqrt{rac{eta}{lpha}} + \sqrt{rac{p}{q}} = 0$$

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25. If  $z_1$  and  $z_2$  be two complex numbers show that  $Re(\bar{z}_1z_2)=rac{1}{2}(z_1ar{z}_2+ar{z}_1z_2)$  where Re(z) is the real part if z.

**26.** Find the sum up to n terms  $:1 + \frac{2}{3} + \frac{3}{3^2} + \frac{4}{3^3} + ...$ 

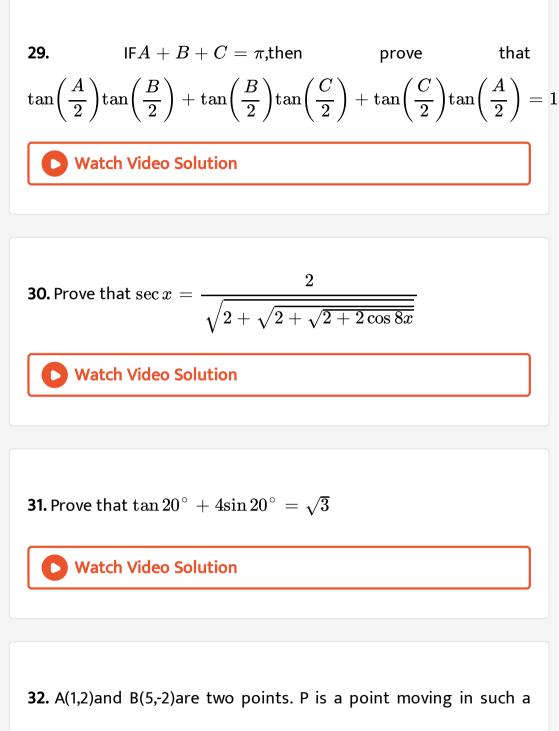
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27. If  $x^{rac{1}{a}}=y^{rac{1}{b}}=z^{rac{1}{c}}$  where a,b,c are in A.P,,than show that x,y,z are

in G.P.



28. If 
$$\frac{a\cos\theta\sec\phi-x}{a\sin(\theta+\phi)} = \frac{y-b\sin\theta\sec\phi}{b\cos(\theta+\phi)} = \tan\phi$$
 show that  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ 



way that the area of the  $\ riangle ABP$  is 12 sq.units.Find the locus of P.

**33.** A variable straight line passes through the point of intersection of the staright lines x/a+y/b=1 and x/b+y/a=1 and intersects the axes at P and Q.Find the locus of mid-point of Pq.

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**34.** For three mutually exclusive events X,Yand Zit is given that  $P(x)=2P(Y)=3P(Z)X \cup Y \cup Z = S$ ,where S denote sure event.Find the value of P(x).

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**35.** In how many different ways can 5 boys and 10 girls sit in a row

on 15 seats, so that no two boys may sit side by side?



**36.** The Indian cricket eleven is to be selected out of 15 players. 6 of them bowlers and 9 of them batsman. In how many ways the team can be selected so that the team contains at least 3 bowlers.



**37.** Show that, if n be any positive integer greater than 1, then  $(2^{3n} - 7n - 1)$  is divisible by 49.

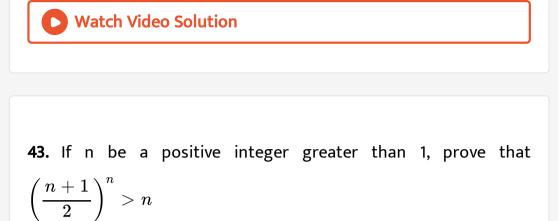
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**38.** If  $x = \log_{2a}^{a}$ ,  $y = \log_{3a}^{2a}$  and  $z = \log_{4a}^{3a}$  show that xyz = 2yz - 1.

**39.** If 
$$x = \log_a^{bc}$$
,  $y = \log_b^{ca}$  and  $z = \log_c^{ab}$  then show that  
 $\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1} = 1$ ,  $[abc \neq 1]$   
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**40.** If none of the figures, 3, 4, 5, 6, 7 be repeated, how many  
different numbers of 4 digists (> 5000) can be formed with them?  
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**41.** State and prove that Cauchy-Schwarz inequality.  
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42. If a, b, c be three unequal sides of a triangle show that

$$rac{1}{b+c-a}+rac{1}{c+a-b}+rac{1}{a+b-c}>rac{9}{a+b+c}$$



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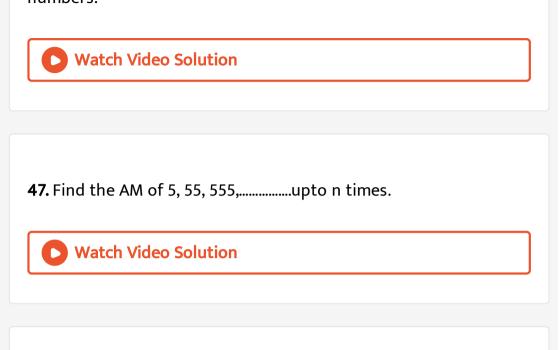
**44.** If a, b, c one positive numbers satisfying 4ab + 6bc + 8ca = 9

find the greatest value of (abc).

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**45.** Distinguish between attribute and variable.

**46.** Find the arithmetic mean and median for first n natural numbers.



**48.** If P(A) = 1/2, P(B) = 2/3 then prove that 
$$rac{1}{6} \leq P(A \cap B) \leq rac{1}{2}$$

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49. If 9 biscuits of different types be distributed among 3 children,

find the probability that particular child will get 4 biscuits.

50. Show that 
$$\sum_{i=1}^n \left(x_i - A
ight)^2$$
 is minimum when  $A = ar{x}$ .

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51. If 
$$y = \frac{x-a}{b}$$
, then prove that  $Sy = \frac{Sx}{|b|}$ 

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52. Prove that  $P(A\cup B)=P(A)+P(B)-P(A\cap B)$ 

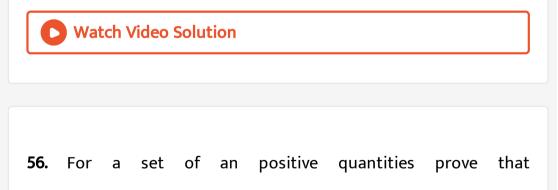
**53.** The variance of 1, 2,....n is 24. Find n.



**54.** For 10 values of X, it is given that  $\sum u = 4$  and  $\sum u^2 = 144$ , where  $u = \frac{x - 10}{5}$ , find  $\sum x^2$ 

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**55.** Two groups of 15 and 22 values have variances 9 and 16 respectively. If the group means differ by 8.2, then find the standard deviation of the combined group of values.



 $AM \ge GM \ge HM.$ 

57. Prove that  $\frac{1}{n}\sum_{E_1}^n |x_i-A|$  attains, minimum when A = Median.

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**58.** Let x be a variable assuming the values 1, 2,.....k and let  $F_1 = n, F_2,...,F_k$  be the corresponding cumulative frequencies of the greater than type show that  $\bar{x} = \frac{1}{n} \sum_{i=1}^k F_i$ .

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**59.** 
$$|x-2| \leq 6$$
 implies that

A. 
$$(-)3 \leq x \leq 7$$

B.  $3 \leq x \leq 5$ 

C. 
$$(-)7 \leq x \leq 7$$

D. none of these

#### Answer:



**60.** When it comes to comparing different segments among themselves and also their relation to the whole we use

A. pie chart

B. divided bar chart

C. either a or b

D. none of these

#### Answer:

61. Mode of a distribution can be obtained from

A. Frequency polygon

B. Histogram

C. ogives

D. none of these

## Answer:



62. Frequency curve is the limiting form of

A. a frequency polygon

B. a histogram

C. either a or b

D. none of these

#### Answer:



**63.** If the AM and HM of two numbers are 16 and 4 respectively, then the GM would be

A. 10

B. 8

C. 9

D. none of these

#### Answer:

**64.** If the median and mode for a moderate asymmetrical distribution are 8 and 5 respectively, then the value of mean is

A. 6.5

B. 10

C. 9.5

D. none of these

### Answer:

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**65.** If 2x + 3y = 6 and S.D. of X = 6, the S.D. of y is -

A. (-)4

C. 9

D. none of these

Answer:

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**66.** If the C.V. is 40 and  $SX^2=400$ , then  $ar{x}$  is

A. 50

B. 1.25

C. 100

D. none of these

## Answer:

**67.** If 3x - 2y + 6 = 0, R(x) = 4, then R(y) is

A. 6

B. 4

C. 8

D. none of these

## Answer:

