



## MATHS

# BOOKS - GURUKUL BOOKS & PACKAGING MATHS (HINGLISH)

## **JULY 2018**



**1.** If the sum of the slopes of the lines represented by  $x^2 + kxy - 3y^2 = 0$  is twice their product, thent the vlaue of 'k' is

A. 2

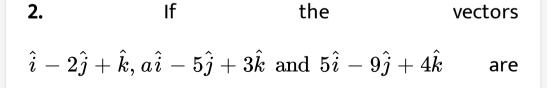
B. 1

 $\mathsf{C}.-1$ 

D.-2

#### Answer: D





coplanar, then the value of a is .....

 $\mathsf{B.}-3$ 

C. 2

 $\mathsf{D.}-2$ 

### Answer: C



3. The acute angle between the line 
$$\frac{x+1}{2} = \frac{y}{3} = \frac{z-3}{6}$$
 and the plane  $10x + 2y - 11z = 8$  is

$$A.\sin^{-1}\left(\frac{8}{21}\right)$$
$$B.\cos^{-1}\left(\frac{8}{21}\right)$$

$$\mathsf{C.} \sin^{-1} \left( \frac{1}{8} \right)$$
$$\mathsf{D.} \cos^{-1} \left( \frac{1}{8} \right)$$

### Answer: A



## 4. Wirte the dual of each of the following statements

(a) ~
$$p \wedge (q \lor c)$$

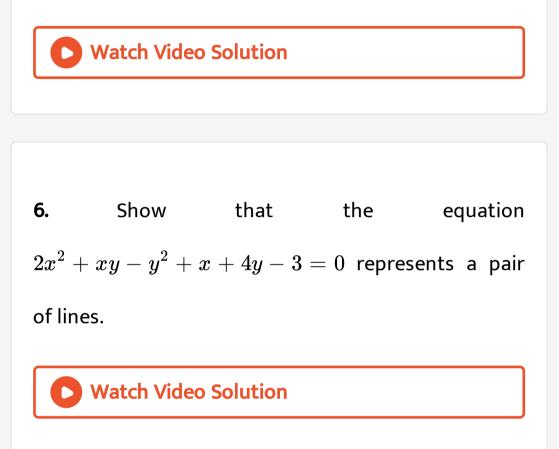
:

(b) Shweta is a doctor or Seema is a teacher.

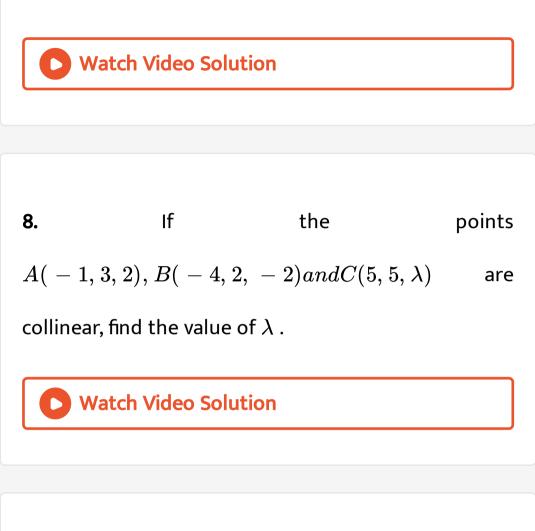


**5.** In any  $\Delta ABC$ , prove that

$$ac\cos B - bc\cos A = \left(a^2 - b^2
ight)$$



7. If  $\overrightarrow{a}$ ,  $\overrightarrow{b}$ ,  $\overrightarrow{c}$  are the position vectors of the points A, B, C respectively such that  $3\overrightarrow{a} + 5\overrightarrow{b} = 8\overrightarrow{c}$  then find the ratio in which C divides AB.



9. Show that  $[(p \lor q) \lor r] \leftrightarrow [p \lor (q \lor r)]$  is a

tautology

**10.** Find the inverse of 
$$\begin{pmatrix} 3 & 2 & 6 \\ 1 & 1 & 2 \\ 2 & 2 & 5 \end{pmatrix}$$
 by the adjoint

method .

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11. If the angle between the lines represented by  $ax^2 + 2hxy + by^2 = 0$  is equal to the angle between the lines  $2x^2 - 5xy + 3y^2 = 0$ , then show that  $100(h^2 - ab) = (a + b)^2$ .

**12.** Prove that three vectors  $\overrightarrow{a}$ ,  $\overrightarrow{b}$  and  $\overrightarrow{c}$  are coplanar if and only if there exists non-zero linear combination  $x\overrightarrow{a} + y\overrightarrow{b} + z\overrightarrow{c} = \overrightarrow{0}$ .

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**13.** Maximize z=6x+4y subject to constraints,

 $x\leq 2, x+y\leq 3, \ -2x+y\leq 1, xy\geq 0$ 

Also find the maximum value of 'z'.

**14.** Find the general solution of the equation  $\sin 2x + \sin 4x + \sin 6x = 0.$ 



**15.** Write the following statements in symbolic form and write their negatins :

(1) Mangoes are delicious, but expensive.

(2) A person is rich if and only if he is a software engineer.

(3) If diagonals of a parallelogram are perpendicular,

then it is a rhombus. solution :



**16.** Express the following equations in matrix form and solve them by the method of reduction :

x + y + z = 6, 3x - y + 3z = 6 and 5x + 5y - 4z = 3



**17.** The vector equation of the line passing through the point (-1, -1 ,2) and parallel to the line 2x - 2 = 3y + 1= 6z -2 is



**18.** A plane meets the coordinate axes in A, B, Csuch that eh centroid of triangle ABC is the point (p, q, r). Show that the equation of the plane is  $\frac{x}{p} + \frac{y}{q} + \frac{z}{r} = 3.$ 

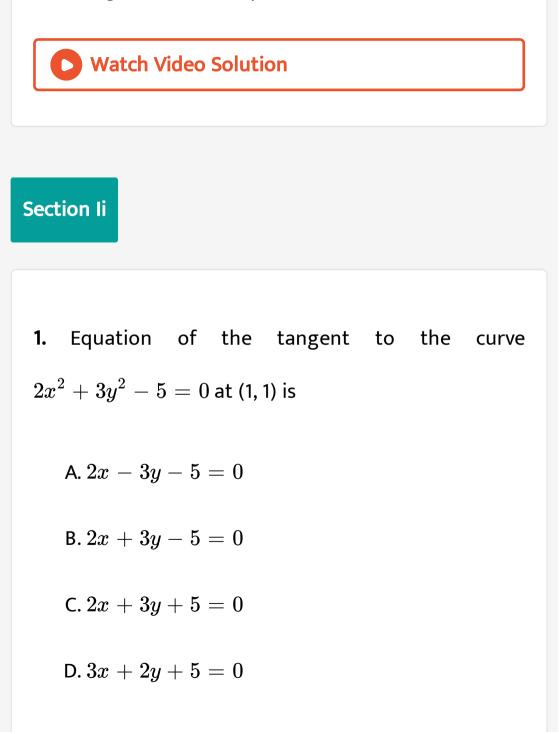


**19.** If  $\alpha, \beta, \gamma$  are direction angles of a line l, then prove that

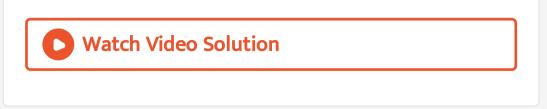
 $\cos^2 lpha + \cos^2 eta + \cos^2 \gamma = 1.$ 

Hence, deduce that  $\sin^2 lpha + \sin^2 eta + \sin^2 \gamma = 2.$ 

**20.** Using the sine rule , prove the cosine rule.



### Answer: B



2. The order and degree of the differential equation

$$\left(rac{d^3y}{dx^3}
ight)^rac{1}{6} - \left(rac{dy}{dx}
ight)^rac{1}{3} = 0$$
 are respectively .

- A. 3, 2
- B. 2, 3
- C. 6, 3
- D. 3, 1

#### Answer: D





## **3.** Given $X \sim B(n, p)$ if p =0.6 E(X) =6, then the value of

Var (X) is

 $\mathsf{A.}\,2.4$ 

 $\mathsf{B.}\,2.6$ 

 $\mathsf{C.}\,2.5$ 

 $\mathsf{D}.\,2.3$ 

Answer: A



**4.** The displacement s of a particle at a time t is given  $bvs = t^3 - 4t^2 - 5t$ . Find its velocity and acceleration at t = 2. Watch Video Solution 5. If  $y = \cos^{-1} \bigl( 1 - 2 \sin^2 x \bigr), \quad ext{find} \quad rac{dy}{dx}$ Watch Video Solution

**6.** Evaluate : 
$$\int \frac{1}{\sin x \cdot \cos^2 x} dx$$

7. Solve the following differential equation:  

$$\frac{x^2 dy}{dx} = x^2 + xy + y^2$$
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8. Obtain the probobility distribution of the number

of sixes in two tosses of a fair die.

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$$1 - \sqrt{3} \tan x$$
 ,  $\pi$  ,  $\pi$ 

9. If 
$$(x) = \frac{1 - \sqrt{3} \tan x}{\pi - 6x}$$
, for  $x \neq \frac{\pi}{6}$  is continous at  $x = \frac{\pi}{6}$ , find  $f\left(\frac{\pi}{6}\right)$ .

10. If 
$$\sec^{-1}\left(\frac{x+y}{x-y}\right) = a^2$$
, show that  $\frac{dy}{dx} = \frac{y}{x}$ .

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11. Evaluate: 
$$\int \! rac{e^x}{(1+e^x)(2+e^x)} \, dx$$

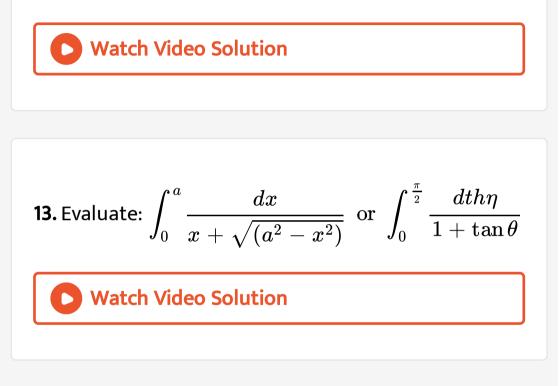
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**12.** A stone is dropped into a pand. Waves in the form of circles are generated and the radius of the outermost ripple increases at the rate of 2 inch/sec.

How fast will the area of the wave increase ?

(a) when the radius is 5 inch?

(b) after 5 seconds ?



**14.** The rate o growth of bacteria is proportional to the number present . IT intially, there were 1000 bacteria and the number doubles in 1 hours. Find the

number of bacteria after 
$$2\frac{1}{2}$$
 hours . [ take  $\sqrt{2} = 1.414$ ]  
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its domain, where

$$f(x)=x^2-4, {
m for} 0\leq x\leq 2$$

$$x=2x+3, {
m for} 2 < x \leq 4$$

$$= x^2 - 05, {
m for} 4 < x \leq 6.$$

**16.** If y =f(u) is differentiable function of u, and u=g(x) is a differentiable function of x, then prove that y= f [g(x)] is a differentiable function of x and  $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$ .



17. Supose that 80 % of all families own a elevision

set. If 10 families are interviewed at random, find the

probability that seven famileis own a television set .



**18.** If u and v are integrable function of x, then, show

that 
$$\int u. v. dx = u \int v dx - \int \left[ \frac{du}{dx} \int v dx \right] dx$$
. Hence evaluate  $\int \log x dx$ .

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19. Property 6: If f(x) is a continuous function defined

on 
$$[0;2a]$$
 then $\int_0^2 a = \int_0^a f(x) dx + \int_0^a f(2a-x) dx$ 

**20.** Find k if the function f(x) is defined by

f(x)=kx(1-x), for 0< x<1=0 , otherwise, is the probability density function (p.d.f.) of a random varible (r.v) X. Also find P $\left(X<rac{1}{2}
ight)$