

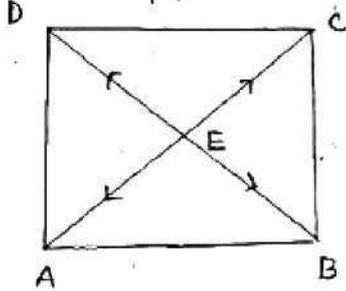
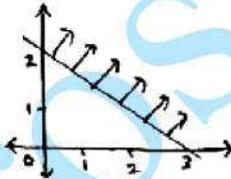
CBSE Class 12 Maths Question Paper 2020 Set 1 Solution

CLASS XII MATHS SET – I 65/5/1

S.N O	SOLUTION	MAR K
1	<p>(C) $A(\text{adj } A) = A I$</p> $\Rightarrow A I = 10I$ $\Rightarrow A = 10$ $ \text{adj } A = A ^{n-1} = 10^{3-1} = 10^2 = 100$	1
2	<p>(D) $KA = K^n \cdot A$</p> $ 3A = 3^3 \cdot A = 27 \times 8 = 216$	1
3	<p>(A)</p> $y = Ae^{5x} + Be^{-5x}$ $\frac{dy}{dx} = 5Ae^{5x} - 5Be^{-5x}$ $\frac{d^2y}{dx^2} = 25Ae^{5x} + 25Be^{-5x}$ $= 25(Ae^{5x} + Be^{-5x}) = 25y$	1
4	<p>(A) $\int x^2 \cdot e^{x^3} \cdot dx$</p> <p>Put $x^3 = t \Rightarrow 3x^2 \cdot dx = dt \Rightarrow x^2 \cdot dx = \frac{1}{3} dt$</p> $\int x^2 \cdot e^{x^3} \cdot dx = \frac{1}{3} \int e^t \cdot dt = \frac{1}{3} e^t + c = \frac{1}{3} e^{x^3} + c$	1
5	<p>(C) If two vectors are perpendicular then their scalar product is zero.</p> $\therefore \hat{i} \cdot \hat{k} = 0$	1
6	<p>(A) $\vec{EA} = \vec{EC}$</p> $\vec{EA} = -\vec{EC} \Rightarrow \vec{EA} + \vec{EC} = 0$ $\vec{EB} = -\vec{ED} \Rightarrow \vec{EB} + \vec{ED} = 0$ $\therefore \vec{EA} + \vec{EB} + \vec{EC} + \vec{ED} = 0 + 0$	1

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	$= 0$ 	
7	<p>(A) Given that the two lines are perpendicular. <i>i.e</i> $a_1a_2 + b_1b_2 + c_1c_2 = 0$</p> $\Rightarrow 1(K) + 1(2) + (-K)(-2) = 0 \Rightarrow 3K + 2 = 0 \Rightarrow K = \frac{-2}{3}$	1
8	<p>(B) $2x + 3y > 6$</p> $2(0) + 3(0) > 6 \Rightarrow 0 > 6$ 	1
9	<p>(C) E: Number of spade cards F: Number of Queen cards</p> $P(E/F) = \frac{P(E \cap F)}{P(F)} = \frac{1/52}{4/52} = \frac{1}{4}$	1
10	<p>(D) $A = \{4, 5, 6\}$ $B = \{1, 2, 3, 4\}$, $A \cap B = \{4\}$</p> $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $= \frac{3}{6} + \frac{4}{6} - \frac{1}{6} = \frac{6}{6} = 1$	1
11	Identity relation	1
12	$A + B = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \Rightarrow 2A + 2B = \begin{bmatrix} 2 & 0 \\ 2 & 2 \end{bmatrix} \rightarrow (i)$	1

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	$A - 2B = \begin{bmatrix} -1 & 1 \\ 0 & -1 \end{bmatrix} \rightarrow (ii)$ <p>Add (i) and (ii)</p> $3A = \begin{bmatrix} 1 & 1 \\ 2 & 1 \end{bmatrix} \Rightarrow A = \begin{bmatrix} 1/3 & 1/3 \\ 2/3 & 1/3 \end{bmatrix}$	
13	<p>$AM \geq GM$</p> $\frac{1}{2} \left(ax + \frac{b}{x} \right) \geq \sqrt{ax \cdot \frac{b}{x}}$ $ax + \frac{b}{x} \geq 2\sqrt{ab}$ <p>\therefore minimum value = $2\sqrt{ab}$</p>	1
14	$x \cdot \frac{dy}{dx} + 2y = x^2$ $\frac{dy}{dx} + \left(\frac{2}{x} \right) y = x$ $P = \frac{2}{x}, Q = x$ $I.F = e^{\int P \cdot dx} = e^{\int \frac{2}{x} \cdot dx} = e^{2 \log x} = x^2$	1
	<p>(OR) The degree of the differential equation $1 + \left(\frac{dy}{dx} \right)^2 = x$ is <u>2</u></p>	1
15	$\vec{a} = 3i + 4j - 7k$ $\vec{b} = i - j + 6k$ $\vec{r} = \vec{a} + \lambda(\vec{b} - \vec{a})$ $= (3i + 4j - 7k) + \lambda(i - j + 6k - 3i - 4j + 7k)$ $= (3i + 4j - 7k) + \lambda(-2i - 5j + 13k)$	1
	<p>(OR) The line of shortest distance between two skew lines is perpendicular (normal) to both the lines.</p>	1
16	$\sin^{-1} \left[\sin \left(\frac{-17\pi}{8} \right) \right] = -\sin^{-1} \left[\sin \left(\frac{17\pi}{8} \right) \right]$	$\frac{1}{2}$

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	$= -\sin^{-1} \left[\sin \left(2\pi + \frac{\pi}{8} \right) \right]$ $= -\frac{\pi}{8}$	1/2
17	$\det A = ad - bc = -3 + 4 = 1$ $A^{-1} = \frac{1}{ A } \begin{bmatrix} d & -b \\ -c & a \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ -1 & 3 \end{bmatrix}$	1/2
18	$f(3) = \lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3} \Rightarrow f(3) = \lim_{x \rightarrow 3} \frac{(x+3)(x-3)}{(x-3)}$ $K = 3 + 3$ $K = 6$	1/2
19	<p>We have $f(x) = x^4 - 10$</p> $f'(x) = 4x^3$ $f(x + \Delta x) = f(x) + \Delta x \cdot f'(x)$ $x = 2, \quad \Delta x = 0.1$ $f(2.1) = f(2) + (0.1)4(2)^3$ $= 6 + 3.2$ $= 9.2$	1/2
	<p>(OR) $y = 2 \cdot \sin^2(3x)$</p> $\frac{dy}{dx} = 2(2 \cdot \sin 3x)(\cos 3x)(3)$ $\text{At } x = \frac{\pi}{6}, \frac{dy}{dx} = 12 \cdot \sin \left(\frac{\pi}{2} \right) \cdot \cos \left(\frac{\pi}{2} \right) = 0$	1/2
20	$ x - a = x - a \text{ if } x \geq a$ $= -(x - a) \text{ if } x < a$ $ x - 5 = -(x - 5) \text{ if } x < 5$	1/2

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	$\int_1^4 x-5 .dx = -\int_1^4 (x-5).dx = -\left[\frac{x^2}{2} - 5x\right]_1^4 = \left[5x - \frac{x^2}{2}\right]_1^4$ $= (20-8) - \left(5 - \frac{1}{2}\right) = \frac{15}{2}$	$\frac{1}{2}$
21	$f \circ f(x) = f[f(x)]$ $= f\left(\frac{4x+3}{6x-4}\right) = \frac{4\left(\frac{4x+3}{6x-4}\right) + 3}{6\left(\frac{4x+3}{6x-4}\right) - 4} = \frac{16x+12+18x-12}{24x+18-24x+16}$ $= \frac{34x}{34} = x$ <p>Let $y = f(x) \Rightarrow y = \frac{4x+3}{6x-4}$</p> $\Rightarrow 6xy = 4y = 4x+3$ $\Rightarrow x = \frac{4y+3}{6y-4}$ $\Rightarrow f^{-1}(y) = \frac{4y+3}{6y-4} = f(y)$ <p>\therefore Inverse of $f = f$.</p>	1
	<p>(OR) (i) <u>Symmetric:</u></p> <p>Let $a, b \in R$ and $(a, b) \in R$</p> <p>Consider $a < b$ does not imply $b < a$</p> $\Rightarrow (a, b) \in R \text{ but } (b, a) \notin R$ <p>$\therefore R$ is not symmetric</p> <p>(ii) <u>Transitive:</u></p> <p>Let $a, b, c \in R$</p> <p>If $(a, b) \in R$ and $(b, c) \in R \Rightarrow a < b$ and $b < c$</p> $\Rightarrow a < c \Rightarrow (a, c) \in R$ <p>$\therefore R$ is Transitive.</p>	1
22	<p>Let $I = \int \frac{x}{x^2+3x+2}.dx$</p>	$\frac{1}{2}$

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	$\frac{x}{x^2 + 3x + 2} = \frac{x}{(x+1)(x+2)} = \frac{A}{x+1} + \frac{B}{x+2}$ $x = A(x+2) + B(x+1)$ <p>Put $x = -1 \Rightarrow A = -1$ Put $x = -2 \Rightarrow B = 2$</p> $\int \frac{x}{x^2 + 3x + 2} = \int \frac{-1}{x+1} \cdot dx + \int \frac{2}{x+2} \cdot dx$ $= -\log(x+1) + 2\log(x+2) + C$	<p>$\frac{1}{2}$</p> <p>1</p>
23	$x = a \cos \theta \Rightarrow \frac{dx}{d\theta} = -a \sin \theta$ $y = b \sin \theta \Rightarrow \frac{dy}{d\theta} = b \cos \theta$ $\frac{dy}{dx} = \frac{dy/d\theta}{dx/d\theta} = \frac{b \cos \theta}{-a \sin \theta} = \frac{-b}{a} \cdot \cot \theta$ $\frac{d^2y}{dx^2} = \frac{-b}{a} \cdot (\cos \text{ec}^2 \theta) \cdot \frac{d\theta}{dx}$ $= \frac{-b}{a} \cdot \cos \text{ec}^2 \theta \cdot \frac{-1}{a \sin \theta} = \frac{-b}{a^2} \cos \text{ec}^3 \theta$	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p>
	<p>(OR) $U = \sin^2 x \Rightarrow \frac{du}{dx} = 2 \cdot \sin x \cdot \cos x$</p> $V = e^{\cos x} \Rightarrow \frac{dv}{dx} = e^{\cos x} \cdot (-\sin x)$ $\frac{du}{dv} = \frac{2 \sin x \cdot \cos x}{e^{\cos x} \cdot (-\sin x)} = -2 \cos \text{ec} \cdot e^{-\cos x}$	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p>
24	<p>Put $2x = t \Rightarrow 2dx = dt$</p> <p>If $x = 1 \Rightarrow t = 2$ $x = 2 \Rightarrow t = 4$</p> $I = \frac{1}{2} \int_2^4 e^t \left(\frac{2}{t} - \frac{2}{t^2} \right) dt$ $= \int_2^4 \left(\frac{1}{t} - \frac{1}{t^2} \right) e^t \cdot dt$	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>

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	$= \left[e^t \cdot \frac{1}{t} \right]_2^4 \quad \left[\because \int [f(x) + f'(x)] e^x = e^x \cdot f(x) + c \right]$ $= \frac{e^4}{4} - \frac{e^2}{2} = \frac{e^2(e^2 - 2)}{4}$	$\frac{1}{2}$
25	<p>Let $I = \int_0^1 x(1-x)^n \cdot dx$</p> $I = \int_0^1 (1-x)[1-(1-x)]^n \cdot dx \quad \left[\because \int_0^a f(x) dx = \int_0^a f(a-x) dx \right]$ $= \int_0^1 (1-x) \cdot x^n \cdot dx$ $= \int_0^1 (x^n - x^{n+1}) dx = \left[\frac{x^{n+1}}{n+1} - \frac{x^{n+2}}{n+2} \right]_0^1$ $= \left(\frac{1}{n+1} - \frac{1}{n+2} \right) - (0-0) = \frac{1}{(n+1)(n+2)}$	1 $\frac{1}{2}$ $\frac{1}{2}$
26	$P(A) = 0.3$ $P(B) = 0.6$ $P(A' \cap B') = P(A \cup B)'$ $= 1 - P(A \cup B)$ $= 1 - [P(A) + P(B) - P(A) \cdot P(B)]$ $= 1 - [0.3 + 0.6 - (0.3)(0.6)]$ $= 1 - 0.72 = 0.28$	1 1
27	$\sin^{-1}(1-x) - 2 \sin^{-1} x = \frac{\pi}{2}$ $\Rightarrow \sin^{-1}(1-x) = \frac{\pi}{2} + 2 \sin^{-1} x$ $\Rightarrow 1-x = \cos \left[\cos^{-1}(1-2x^2) \right]$ $\Rightarrow 1-x = 1-2x^2 \quad \Rightarrow 2x^2 - x = 0$ $\Rightarrow x = 0, \frac{1}{2}$	1 1 1

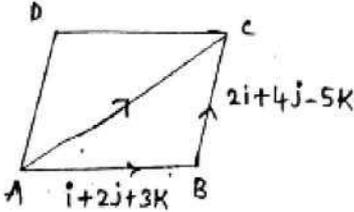
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	<p>But $\Rightarrow x = \frac{1}{2}$ does not satisfy the equation</p> <p>So $x = 0$</p>	1
28	<p>$y = (\log x)^x + x^{\log x}$</p> <p>Let $u = (\log x)^x$ and $v = x^{\log x}$</p> <p>Differentiating the above w.r.t. x, we get</p> $\frac{dy}{dx} = \frac{du}{dx} + \frac{dv}{dx} \longrightarrow (i)$ <p>Now, $u = (\log x)^x$</p> $\log u = x \cdot \log(\log x) \Rightarrow \frac{1}{u} \cdot \frac{du}{dx} = \frac{1}{\log x} + \log(\log x)$ $\frac{du}{dx} = (\log x)^x \left[\frac{1}{\log x} + \log(\log x) \right] \longrightarrow (ii)$ <p>$v = x^{\log x}$</p> $\log v = (\log x)^2$ $\frac{1}{v} \cdot \frac{dv}{dx} = 2 \log x \cdot \frac{1}{x}$ $\frac{dv}{dx} = x^{\log x} \left[\frac{2 \log x}{x} \right] \longrightarrow (3)$ $\frac{dy}{dx} = (\log x)^x \left[\frac{1}{\log x} + \log(\log x) \right] + x^{\log x} \left[\frac{2 \log x}{x} \right]$	1 1 1
29	$\frac{dy}{dx} = \frac{y \sin\left(\frac{y}{x}\right) - x}{x \cdot \sin(y/x)} \longrightarrow (i)$ <p>Given differential equation is Homogeneous differential equation.</p> <p>Let $y = vx \Rightarrow \frac{dy}{dx} = v + x \cdot \frac{dv}{dx} \longrightarrow (ii)$</p> <p>Substitute (ii) in (i)</p> $v + x \cdot \frac{dv}{dx} = \frac{vx \cdot \sin v - x}{x \cdot \sin v}$ $x \cdot \frac{dv}{dx} = \frac{v \sin v - 1}{\sin v} - v$	1 1

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	$x \cdot \frac{dv}{dx} = \frac{-1}{\sin v} - v$ $x \cdot \frac{dv}{dx} = \frac{-1}{\sin v}$ $-\int \sin v \cdot dv = + \int \frac{dx}{x}$ $+ \cos v = + \log x + \log c$ $\cos \frac{y}{x} = \log cx $ $x = 1 \text{ when } y = \frac{\pi}{2} \Rightarrow \cos \pi/2 = \log c \Rightarrow c = 1$ $\cos \left(\frac{y}{x} \right) = \log x $	1
30	<p>Let $\overline{AB} = i + 2j + 3k$</p> <p>And $\overline{BC} = 2i + 4j - 5k$</p> $\overline{AC} = \overline{AB} + \overline{BC}$ $= (i + 2j + 3k) + (2i + 4j - 5k)$ $= 3i + 6j - 2k$ <p>Unit vector parallel to AC</p> $= \frac{3i + 6j - 2k}{\sqrt{9 + 36 + 4}} = \frac{1}{7}(3i + 6j - 2k)$ <p>Unit vector parallel to $BD = \frac{AB - BC}{ AB - BC } = \frac{-i - 2j + 8k}{\sqrt{1 + 4 + 64}}$</p> $= \frac{1}{\sqrt{69}}(-i - 2j + 8k)$ 	1 1 1 1
	<p>(OR) $\overline{AB} = (2-1)i + (-1-2)j + (4-3)k = i - 3j + k$</p> $\overline{AC} = (4-1)i + (5-2)j + (-1-3)k = 3i + 3j + 4k$	1/2 1/2

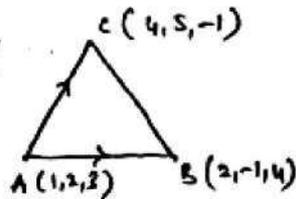
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$$\begin{aligned} \text{Now } \vec{AB} \times \vec{AC} &= \begin{vmatrix} i & j & k \\ 1 & -3 & 1 \\ 3 & 3 & -4 \end{vmatrix} \\ &= i(12-3) - j(-4-3) + k(3+9) \\ &= 9i + 7j + 12k \end{aligned}$$

$$|\vec{AB} \times \vec{AC}| = \sqrt{9^2 + 7^2 + 12^2} = \sqrt{274}$$

$$\text{Area of } \triangle ABC = \frac{1}{2} |\vec{AB} \times \vec{AC}| = \frac{1}{2} \sqrt{274} \text{ sq. units.}$$



1

1

1

31

Let the company manufacture x souvenirs of type A and y souvenirs of type B, clearly $x \geq 0, y \geq 0$. We make the following table from the given data.

	Novelty Souvenirs		Requirement (in mins)
	Type A (x)	Type B (y)	
Cutting	5	8	200
Assembling	10	8	240
Profit in Rs	100	120	

Since the time available for cutting is 3 hours 20 minutes and for assembling is 4 hours, we have the constraints

$$5x + 8y \leq 200$$

$$10x + 8y \leq 240$$

Total profit (z) earned is $z = 100x + 120y$

Hence the mathematical formulation of the problem is maximize

$$z = 100x + 120y \longrightarrow (i)$$

Subject to the constraints

$$5x + 8y \leq 200 \longrightarrow (ii)$$

1

1

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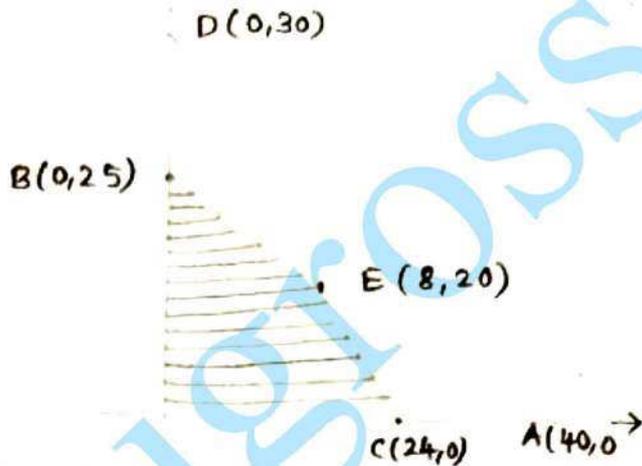
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$$5x + 4y \leq 120 \longrightarrow (iii)$$

$$x, y \geq 0$$

Let us evaluate z at the corner points $O(0,0), C(24,0), E(8,20)$ and $B(0,25)$

Corner Point	$z = 100x + 120y$
$(0,0)$	0
$(24,0)$	2400
$(8,20)$	3200
$(0,25)$	3000



We find that the maximum value of z is 3200 at $E(8,20)$ Hence the company should manufacture 25 souvenirs of type B to realize maximum profit and maximum profit is Rs.3200.

32

Rotten apples = 3
 Good apples = 7
 Total apples = 10

$$\text{Probability of rotten apples} = \frac{3}{10} = 0.3$$

$$\text{Probability of good apple} = \frac{7}{10} = 0.7$$

Three apples are chosen.

$$0 \text{ rotten apples} = {}^3C_0 (0.3)^0 (0.7)^3 = 0.343$$

$$1 \text{ rotten apples} = {}^3C_1 (0.3)^1 (0.7)^2 = 3(0.147) = 0.441$$

1

1

1

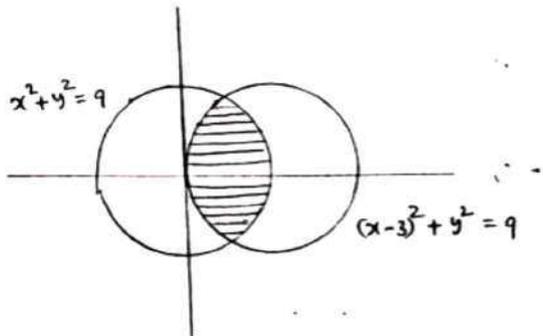
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	<p>2 rotten apples = ${}^3C_2 (0.3)^2 (0.7)^1 = 0.189$ 3 rotten apples = ${}^3C_3 (0.3)^3 (0.7)^0 = 0.027$ Mean = $0 \times (0.343) + 1(1.47) + 2(0.189) + 3(0.027)$ $= 0 + 1.47 + 0.378 + 0.081$ $= 1.929$</p>	2 1
33	<p>Required line is passing through (1, 1, 1) i.e $\frac{x-1}{a} = \frac{y-1}{b} = \frac{z-1}{c} \rightarrow 1$ Given lines $\frac{x+2}{1} = \frac{y-3}{2} = \frac{z+1}{4} \rightarrow 2$ and $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4} \rightarrow 3$ $\vec{b}_1 = a_i + bj + ck$ $\vec{b}_2 = i + 2j + 4k$ $\vec{b}_3 = 2i + 3j + 4k$ $b_1 b_2 = 0$ and $b_1 b_3 = 0$ $\rightarrow a + 2b + 4c = 0 \dots\dots 4$ And $2a + 3b + 4c = 0 \dots\dots 5$ $\frac{a}{8-12} = \frac{b}{8-4} = \frac{c}{3-4}$ $\frac{a}{-4} = \frac{b}{4} = \frac{c}{-1} = \lambda$ $a = -4\lambda, b = 4\lambda, c = -\lambda$ put the values of a, b, c in equation 1 $\frac{x-1}{-4\lambda} = \frac{y-1}{4\lambda} = \frac{z-1}{-\lambda} \rightarrow \frac{x-1}{-4} = \frac{y-1}{4} = \frac{z-1}{-1}$ $\vec{r} = (i + j + k) + \lambda(-4i + 4j - k)$ Given two lines are $(-2i + 3j - k) + \lambda(i + 2j + 4k)$ and $(i + 2j + 3k) + 4(2i + 3j + 4k)$ Angle between them is $\cos \theta = \frac{ b_1 \cdot b_2 }{ b_1 \cdot b_2 }$ $\cos \theta = \frac{(i + 2j + 4k) \cdot (2i + 3j + 4k)}{\sqrt{21} \cdot \sqrt{29}}$ $\cos \theta = \frac{ 2 + 6 + 16 }{\sqrt{21} \cdot \sqrt{29}} = \frac{24}{\sqrt{21} \cdot \sqrt{29}}$ $\theta = \cos^{-1}\left(\frac{24}{\sqrt{609}}\right)$</p>	1 1 1 1
34	<p>The two circles are $x^2 + y^2 = 9 \rightarrow y^2 = 9 - x^2$ And $(x-3)^2 + y^2 = 9 \rightarrow y^2 = 9 - (x-3)^2$ $\rightarrow 9 - x^2 = 9 - (x-3)^2$ $9 - x^2 = 9 - x^2 + 6x - 9$</p>	1

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	<p style="text-align: center;">$x = 3/2$</p>  <p style="text-align: center;">Area of shaded region = $2 \left[\int_0^{3/2} \sqrt{9-(x-3)^2} \cdot dx + \int_{3/2}^3 \sqrt{9-x^2} \cdot dx \right]$</p> <p style="text-align: center;">$= 2 \left[\frac{x-3}{2} \sqrt{9-(x-3)^2} + \frac{9}{2} \sin^{-1} \frac{x-3}{3} \right]_0^{3/2} + 2 \left[\frac{x}{2} \sqrt{9-x^2} + \frac{9}{2} \sin^{-1} \frac{x}{3} \right]_{3/2}^3$</p> <p style="text-align: center;">$= 2 \left[\frac{-9\sqrt{3}}{4} - \frac{6\pi}{4} + \frac{18\pi}{4} \right]$</p> <p style="text-align: center;">$= 6\pi - \frac{9\sqrt{3}}{2}$ sq.units</p>	<p style="text-align: center;">1</p> <p style="text-align: center;">2</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>									
<p style="text-align: center;">35</p>	<p style="text-align: center;">$P = ax + by$</p> <p style="text-align: center;">$P = ax + b \frac{c^2}{x} \quad [\because xy = c^2]$</p> <p style="text-align: center;">$\frac{dP}{dx} = a + \frac{bc^2}{-x^2}$</p> <p style="text-align: center;">$a + \frac{bc^2}{-x^2} = 0 \Rightarrow x = \sqrt{\frac{b}{a}} \cdot c$</p> <p style="text-align: center;">$\frac{d^2P}{dx^2} = 0 + \frac{2bc^2}{x^3} = \frac{2bc^2}{(c\sqrt{b/a})^3} = +ve$</p> <p style="text-align: center;">$P_{\min} = a \sqrt{\frac{b}{a}} \cdot c + \frac{bc^2}{c} \cdot \sqrt{\frac{a}{b}}$</p> <p style="text-align: center;">$= c\sqrt{ab} + c\sqrt{ab} = 2c\sqrt{ab}$</p>	<p style="text-align: center;">1</p>									
<p style="text-align: center;">36</p>	<p style="text-align: center;">$t_p = a = A.R^{p-1}$ $t_q = b = A.R^{q-1}$ $t_r = c = A.R^{r-1}$</p> <p style="text-align: center;">$\rightarrow \log a = \log A + (p-1) \log R$ $\log b = \log A + (q-1) \log R$ $\log c = \log A + (r-1) \log R$</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">$\log A + (P-1) \log R$</td> <td style="padding-right: 5px;">p</td> <td style="padding-right: 5px;">1</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">$\log A + (q-1) \log R$</td> <td style="padding-right: 5px;">q</td> <td style="padding-right: 5px;">1</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">$\log a + (r-1) \log R$</td> <td style="padding-right: 5px;">r</td> <td style="padding-right: 5px;">1</td> </tr> </table>	$\log A + (P-1) \log R$	p	1	$\log A + (q-1) \log R$	q	1	$\log a + (r-1) \log R$	r	1	<p style="text-align: center;">$A = \text{First term}$ $R = \text{common ratio}$</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>
$\log A + (P-1) \log R$	p	1									
$\log A + (q-1) \log R$	q	1									
$\log a + (r-1) \log R$	r	1									

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$= \begin{vmatrix} \log A & p & 1 \\ \log A & q & 1 \\ \log A & r & 1 \end{vmatrix} + \begin{vmatrix} p-1 & p & 1 \\ q-1 & q & 1 \\ r-1 & r & 1 \end{vmatrix}$	1
$= \log A \begin{vmatrix} 1 & p & 1 \\ 1 & q & 1 \\ 1 & r & 1 \end{vmatrix} + \log r \begin{vmatrix} p-1 & p & 1 \\ q-1 & q & 1 \\ r-1 & r & 1 \end{vmatrix}$	1
$= 0 + \log R \begin{vmatrix} p-1 & p & 1 \\ q-1 & q & 1 \\ r-1 & r & 1 \end{vmatrix}$	1
$c_1 \rightarrow c_1 + c_3$ $= \log R \begin{vmatrix} p & p & 1 \\ q & q & 1 \\ r & r & 1 \end{vmatrix} = \log R(0) = 0$	