الأزهر الشريف

قطاع المعاهد الأزهرية

# نموذج رقم ( ١ )

# نموذج إجابة لامتحان الشهادة الثانوية الأزهرية

## للعام الدراسي ١٤٤٠هـ - ٢٠١٨ / ٢٠١٩م

## الدور الثاني

## القسم : العلمي(نظام حديث)

## مادة : الجبر و الهندسة الفراغية (مترجم)

## عدد الأسئلة ( ٥ )

علما بأن النموذج استرشاديا

# نموذج إجابة استرشادي



Q1 (3 marks)

| | Solution | mark |
|---|---|---|
| 1 | $120$ | $\frac{1}{2}$ |
| 2 | $10$ | $\frac{1}{2}$ |
| 3 | $100$ | $\frac{1}{2}$ |
| 4 | $\{1 ، -\frac{13}{5}\}$ | $\frac{1}{2}$ |
| 5 | $20+10\omega^2$ | $\frac{1}{2}$ |
| 6 | $-1$ | $\frac{1}{2}$ |

Question (2) [2 marks]

(a) $\because T_{r+1} = {}^9C_r \left(\frac{-1}{2x^2}\right)^r (2x)^{9-r}$

$= {}^9C_r \left(\frac{-1}{2}\right)^r (2)^{9-r} (x)^{9-3r}$ $\frac{1}{2}$

Let $9-3r = 3$ $\therefore r = 2$

$\therefore$ Coefficient of $x^3$ = Coefficient of $T_3$

$= {}^9C_2 \left(\frac{-1}{2}\right)^2 (2)^7 = 1152$ $\frac{1}{2}$

$\because$ The order of the two middle terms are 5, 6 $\frac{1}{2}$

$\because \frac{T_6}{T_5} = 1$ $\therefore \frac{9-5+1}{5} \times \frac{-1}{2x^2} \times \frac{1}{2x} = 1$

$\therefore x = \sqrt[3]{\frac{-1}{4}}$ $\frac{1}{2}$

(b) $\overrightarrow{A} \times \overrightarrow{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -3 & 1 & 2 \\ 3 & 4 & -1 \end{vmatrix}$ [2 marks] $\frac{1}{2}$

$= -9\hat{i} + 3\hat{j} - 15\hat{k}$ $\frac{1}{2}$

$\therefore \|\overrightarrow{A} \times \overrightarrow{B}\| = \sqrt{(-9)^2 + (3)^2 + (-15)^2} = 3\sqrt{35}$ $\frac{1}{2}$

$\therefore$ area of parallelogram $= \|\overrightarrow{A} \times \overrightarrow{B}\|$

$= 3\sqrt{35}$ Unit of area $\frac{1}{2}$

Question ( 3 ) [2 marks]

(a) $\because x - 1 = 0 \quad \therefore x = 1$ $\frac{1}{2}$

$$\because \begin{vmatrix} 1 & 2 & 2 \\ 1 & 1 & 1 \\ 3 & 4 & K \end{vmatrix} = \text{Zero} \quad \frac{1}{2}$$

$\therefore (K-4) - 2(K-3) + 2(4-3) = \text{Zero}$ $\frac{1}{2}$

$\therefore \boxed{K = 4}$ $\frac{1}{2}$

(2 marks)

(b) $\vec{d_1} = \vec{BC} = \vec{C} - \vec{B} = (5, -1, -1)$ $\frac{1}{2}$

$\because$ The two straight lines are parallel

$\therefore \vec{d} = \vec{d_1} = (5, -1, -1)$

The vector equation $\vec{r} = (1, -1, 0) + t(5, -1, -1)$ $\frac{1}{2}$

$\therefore x = 1 + 5t, \quad y = -1 - t, \quad z = -t$ Parametric eq$^n$

$\frac{x-1}{5} = \frac{y+1}{-1} = \frac{z}{-1}$ Cartesian eq$^n$ $\frac{1}{2}$

$\because \frac{-14-1}{5} = \frac{2+1}{-1} = \frac{3}{-1}$

$\therefore$ The point $(-14, 2, 3)$ lies on the st. line

$\frac{1}{2}$

Question (4) [2 marks]

(a) $\because Z^4 = 1 \quad \therefore Z^4 = \cos 0^\circ + i \sin 0^\circ$ $\frac{1}{2}$

$\therefore Z = \cos\left(\frac{0 + 2\pi r}{4}\right) + i \sin\left(\frac{0^\circ + 2\pi r}{4}\right)$ $\frac{1}{2}$

$, r = 0, 1, -1, 2$

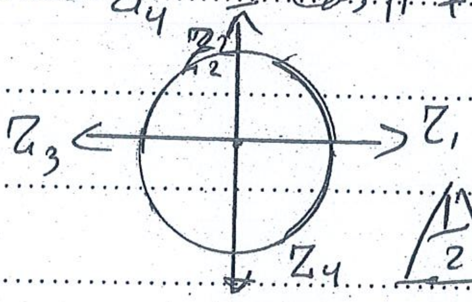
at $r = 0 \quad \therefore Z_1 = \cos 0^\circ + i \sin 0^\circ$

at $r = 1 \quad \therefore Z_2 = \cos \frac{\pi}{2} + i \sin \frac{\pi}{2}$

at $r = -1 \quad \therefore Z_3 = \cos \frac{-\pi}{2} + i \sin \frac{-\pi}{2}$

at $r = 2 \quad \therefore Z_4 = \cos \pi + i \sin \pi$

$\frac{1}{2}$




$\frac{1}{2}$

(b) $\because \theta_x = \theta_y = \theta_z$ [2 marks]

$\therefore \cos^2\theta_x + \cos^2\theta_y + \cos^2\theta_z = 1$ $\frac{1}{2}$

$\therefore 3\cos^2\theta_x = 1 \quad \therefore \cos\theta_x = \pm \frac{1}{\sqrt{3}}$ $\frac{1}{2}$

$\therefore \overrightarrow{A} = 7\sqrt{3}\left(\pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}\right)$ $\frac{1}{2}$

$\therefore \overrightarrow{A} = \pm 7(\hat{i} + \hat{j} + \hat{k})$ $\frac{1}{2}$

Question (5) [2 marks]

(a) $R.H.S = \frac{1}{abc}\begin{vmatrix} a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \\ abc & bca & abc \end{vmatrix}$ $\frac{1}{2}$

$= \frac{abc}{abc}\begin{vmatrix} a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \\ 1 & 1 & 1 \end{vmatrix}$ $1$

$= \begin{vmatrix} a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \\ 1 & 1 & 1 \end{vmatrix} = L.H.S$ $\frac{1}{2}$

[2 marks]

(b) $\because \cos\theta = \frac{|\vec{d_1} \cdot \vec{d_2}|}{\|\vec{d_1}\| \, \|\vec{d_2}\|}$ $\frac{1}{2}$

$\therefore \cos\theta = \frac{6}{\sqrt{6} \times \sqrt{24}}$ $\frac{1}{2}$

$= \frac{1}{2}$ $\frac{1}{2}$

$\therefore \theta = 60^\circ$ $\frac{1}{2}$