

2(a)	Shear, [x -axis fixed]
	With $(0,1)$ mapped to $(\frac{3}{2},1)$.
2(b)	Shear, [y -axis fixed],
	with $(1,0)$ mapped to $(1,\frac{3}{2})$.
2(c)	$\mathbf{AB} = \begin{pmatrix} \frac{13}{4} & \frac{3}{2} \\ \frac{3}{2} & 1 \end{pmatrix}$ or $\det \mathbf{AB} = \det \mathbf{A} \det \mathbf{B}$
	$\det \mathbf{AB} = 1$
2(d)	$\begin{pmatrix} \frac{13}{4} & \frac{3}{2} \\ \frac{3}{2} & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{13}{4}x + \frac{3}{2}y \\ \frac{3}{2}x + y \end{pmatrix}$
	$\frac{3}{2}x + mx = m\left(\frac{13}{4}x + \frac{3}{2}mx\right)$
	$\frac{3}{2} + m = \frac{13}{4}m + \frac{3}{2}m^2 \Rightarrow m^2 + \frac{3}{2}m - 1 = 0$
	$y = -2x$ and $y = \frac{1}{2}x$.

4(a)(i)	Stretch
	parallel to the x -axis, scale factor k .

4(a)(ii)	Enlargement,
	centre the origin, scale factor k .
4(b)	$\begin{pmatrix} 0 & 1 \\ -1 & 1 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} k & 0 \\ 0 & m \end{pmatrix} \begin{pmatrix} 2 & -1 & 1 \\ 1 & 1 & 2 \end{pmatrix} = \begin{pmatrix} 0 & m \\ -k & m \\ k & m \end{pmatrix} \begin{pmatrix} 2 & -1 & 1 \\ 1 & 1 & 2 \end{pmatrix}$
	$\begin{pmatrix} m & m & 2m \\ -2k+m & k+m & -k+2m \\ 2k+m & -k+m & k+2m \end{pmatrix}$
	$m \begin{vmatrix} k+m & -k+2m \\ -k+m & k+2m \end{vmatrix} - m \begin{vmatrix} -2k+m & -k+2m \\ 2k+m & k+2m \end{vmatrix} + 2m \begin{vmatrix} -2k+m & k+m \\ 2k+m & -k+m \end{vmatrix}$
	$= m(k+m)(k+2m) - m(-k+m)(-k+2m) - m(-2k+m)(k+2m) \\ + m(2k+m)(-k+2m) + 2m(-2k+m)(-k+m) - 2m(2k+m)(k+m) \\ = 6m^2k + 6m^2k - 12m^2k = 0$

4(a)	A rotation, followed by a shear.

4(b)	$\mathbf{M} = \begin{pmatrix} \cos \theta + 2 \sin \theta & 2 \cos \theta - \sin \theta \\ \sin \theta & \cos \theta \end{pmatrix}$
	$\begin{pmatrix} \cos \theta + 2 \sin \theta & 2 \cos \theta - \sin \theta \\ \sin \theta & \cos \theta \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x \cos \theta + 2x \sin \theta - y \sin \theta + 2y \cos \theta \\ x \sin \theta + y \cos \theta \end{pmatrix}$
	$x \sin \theta + y \cos \theta = y \quad \text{AND} \quad x \cos \theta + 2x \sin \theta - y \sin \theta + 2y \cos \theta = x$ $\Rightarrow x \cos \theta + 2x \sin \theta + \frac{x \sin \theta}{1 - \cos \theta} (2 \cos \theta - \sin \theta) = x$
	$(\cos \theta + 2 \sin \theta)(1 - \cos \theta) + 2 \sin \theta \cos \theta - \sin^2 \theta = 1 - \cos \theta$ $\cos \theta - \cos^2 \theta + 2 \sin \theta - \sin^2 \theta = 1 - \cos \theta \Rightarrow \sin \theta + \cos \theta = 1$
	$\theta = \frac{1}{2} \pi$

1(a)	$\begin{pmatrix} 14 & 0 \\ 0 & 1 \end{pmatrix}$
	$\begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}$
	$\mathbf{M} = \begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix} \begin{pmatrix} 14 & 0 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 7 & -\frac{\sqrt{3}}{2} \\ 7\sqrt{3} & \frac{1}{2} \end{pmatrix}$
	$2\mathbf{M} = \begin{pmatrix} 14 & -\sqrt{3} \\ 14\sqrt{3} & 1 \end{pmatrix}.$

1(b)	$\begin{pmatrix} 7 & -\frac{\sqrt{3}}{2} \\ 7\sqrt{3} & \frac{1}{2} \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 7x - \frac{\sqrt{3}}{2}y \\ 7\sqrt{3}x + \frac{1}{2}y \end{pmatrix}$
	$7\sqrt{3}x + \frac{1}{2}mx = m\left(7x - \frac{\sqrt{3}}{2}mx\right)$ $7\sqrt{3} + \frac{1}{2}m = 7m - \frac{\sqrt{3}}{2}m^2$
	$\sqrt{3}m^2 - 13m + 14\sqrt{3} = 0$
	$m = 2\sqrt{3} \quad m = \frac{7}{\sqrt{3}}$
	$y = 2\sqrt{3}x \quad y = \frac{7}{\sqrt{3}}x$
1(c)	$\mathbf{M}^{-1} = \frac{1}{14} \begin{pmatrix} \frac{1}{2} & \frac{\sqrt{3}}{2} \\ -7\sqrt{3} & 7 \end{pmatrix} = \frac{1}{2} \begin{pmatrix} \frac{1}{14} & \frac{\sqrt{3}}{14} \\ -\sqrt{3} & 1 \end{pmatrix}$