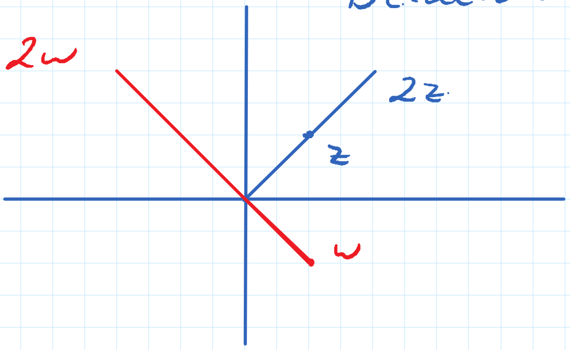
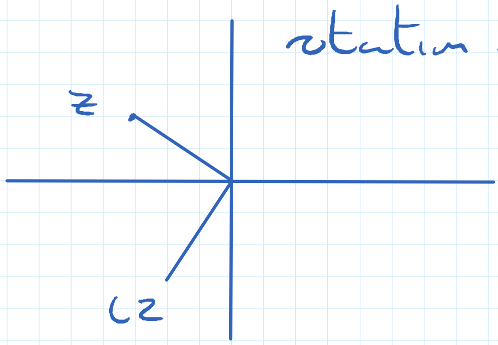
Diagrams

Dilation.

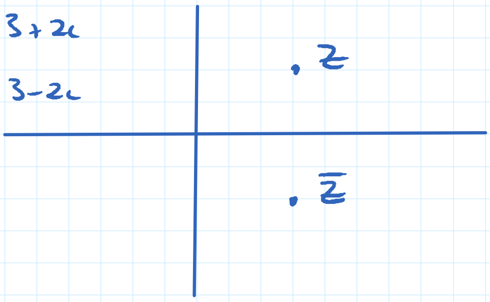


iz = 90° anticlockwise rotation.



$z = 3+2i$

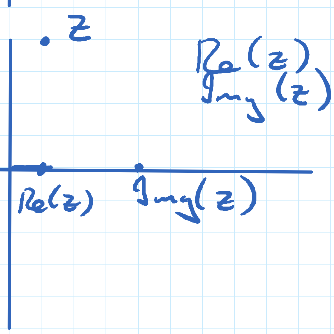
$\bar{z} = 3-2i$



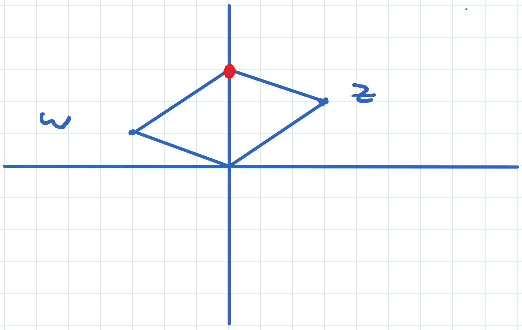
$z = 1+4i$

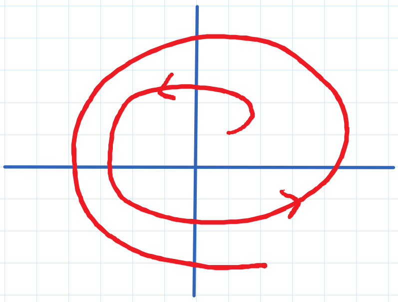
$Re(z) = 1$

$Img(z) = 4$

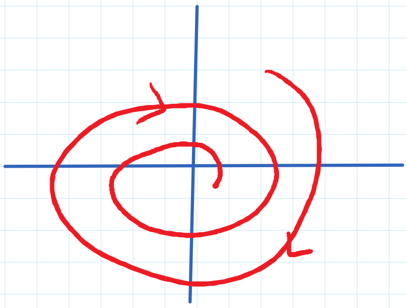


$z+w$

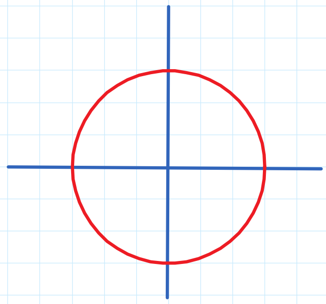




$|r| > 1$



$|r| < 1$



$r = 1$

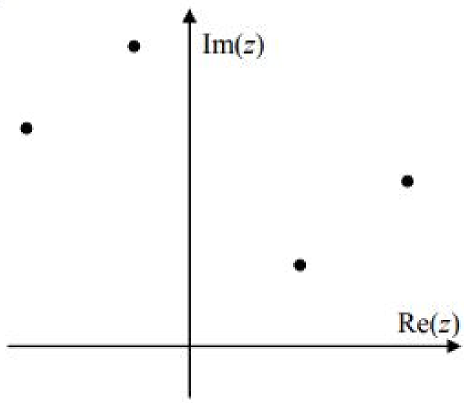
Four complex numbers z_1, z_2, z_3 and z_4 are shown on the Argand diagram. They satisfy the following conditions:

$z_2 = iz_1$

$z_3 = kz_1$, where $k \in \mathbb{R}$

$z_4 = z_2 + z_3$.

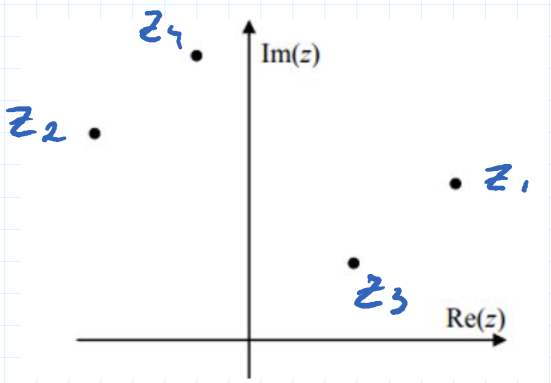
The same scale is used on both axes.



(i) Identify which number is which, by labelling the points on the diagram.

(ii) Write down the approximate value of k.

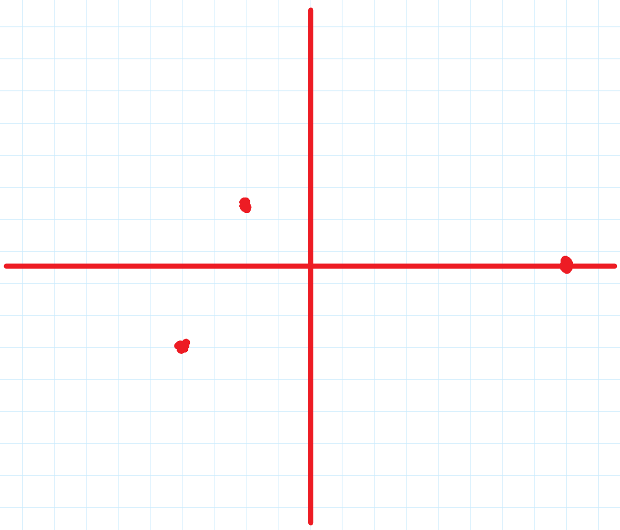
Answer: ______________



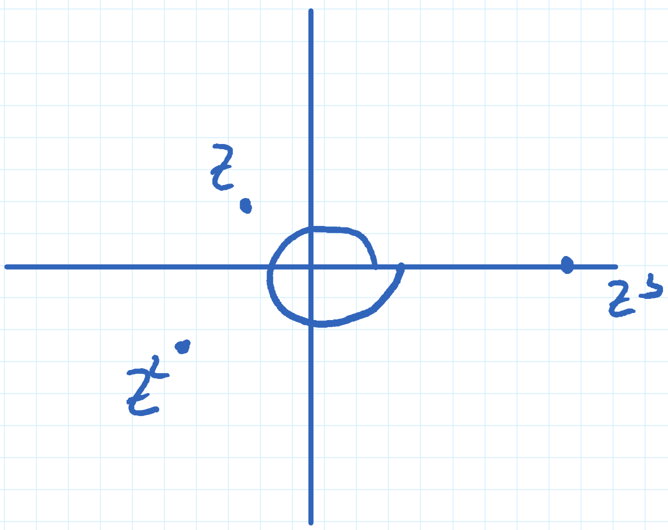
$z_2 = iz_1 \Rightarrow$ any z at 90° and same distance to origin

$z_3 = kz_1$ on same straight line to origin.

$z_4 = z_2 + z_1$ should form a parallelogram



The Argand diagram shows z, z^2 and z^3. Given $|z|=3$ find z, z^2 and z^3 in form $a+bi$



Since $|z|>1$ then closest to origin is z next closest is z^2 and z^3 further from origin.

z^3 is on x-axis so argument is $360°$

$z = \cos\theta + i\sin\theta$

$z^3 = \cos 3\theta + i\sin 3\theta \Rightarrow 3\theta = 360$

$\theta = 120°$

$z = 3(\cos 120 + i\sin 120)$

$= 3\left(-\frac{1}{2} + \frac{\sqrt{3}}{2}i\right) = -\frac{3}{2} + \frac{3\sqrt{3}}{2}i$

$z^2 = 3^2(\cos 240 + i\sin 240)$

$= 9\left(-\frac{1}{2} - \frac{\sqrt{3}}{2}i\right) = -\frac{9}{2} - \frac{9\sqrt{3}}{2}i$

$z^3 = 3^3(\cos 360 + i\sin 360)$

$= 27 + 0i$.