4) X = sendor Y = Reciever Z = eavsdropper
(knows cryptosystem)
(not Key)

plaintext = a a a a a ..... a

shift cypher

Z will be able to recognize nearly instantly that the plaintext is one repeated letter. However, Z cannot find the key or deduce the letter because they have nothing to indicate which of the letters it could be. So they will have to guess of which letter it actually is. They have a 3.846% chance of guessing correctly as the shift could (1/26) have been anything. If Z knows the shift they know the plaintext

Affine Cypher

Z will also be able to tell the plaintext is one repeated letter. With the Affine Cypher every letter is mapped to a new one using multiplication & addition. So while Z knows the text is repeated it is still a 3.846% chance they will guess the correct letter. However Given further messages due to the more complex nature of the Affine it will be harder to decode

Hill Cypher

Z will also be able to tell the plaintext is one repeated letter but will also know the plaintext, but NOT the key. This is because the letter a corresponds w/ the 0 position So because the message is a, a, a, ... a $\approx$ 0, 0, 0, ... 0 So no matter the Key i.e. $k = \begin{bmatrix} \vdots & \vdots \end{bmatrix}$ the cipher text will: a, a .... a

$$\begin{bmatrix} 0 & 0 \end{bmatrix} \begin{bmatrix} \vdots & \vdots \end{bmatrix} = \begin{bmatrix} 0 & 0 \end{bmatrix}$$

However the Key will remain unknown so further messages will not be able to be decrypted

Vignère Cypher

Z will not know (immediately) that the text is one repeated letter. take for example the Key = APPLE But the plaintext a, a, a, a, a, a, a, ... a will show as cypher text a p p l e apple apple app.... apple So Z Should be able to deduce that the plaintext is one letter, should be able to guess the Key is APPLE and the plaintext is all a's