

If the **current gear is 2**, the possible directions are :

| | | | | |
|---------|---------|--------|--------|---------|
| <-2, 2> | <-1, 2> | <0, 2> | <1, 2> | <2, 2> |
| <-2, 1> | | | | <2, 1> |
| <-2, 0> | | <0,0> | | <2, 0> |
| <-2,-1> | | | | <-2,-1> |
| <-2,-2> | <-1,-2> | <0,-2> | <1,-2> | <2,-2> |

If the **current gear is 3**, the possible directions are :

| | | | | | | |
|----------|---------|---------|--------|--------|--------|--------|
| <-3, 3> | <-2, 3> | <-1, 3> | <0, 3> | <1, 3> | <2, 3> | <3, 3> |
| <-3, 2> | | | | | | <3, 2> |
| <-3, 1> | | | | | | <3, 1> |
| <-3, 0> | | | <0,0> | | | <3, 0> |
| <-3,-1> | | | | | | <3,-1> |
| <-3, -2> | | | | | | <3,-2> |
| <-3,-3> | <-2,-3> | <-1,-3> | <0,-3> | <1,-3> | <2,-3> | <3,-3> |

If the **current gear is 4**, the possible options are :

| | | | | | | | | |
|----------|---------|---------|---------|--------|--------|--------|--------|--------|
| <-4, 4> | <-3, 4> | <-2, 4> | <-1, 4> | <0, 4> | <1, 4> | <2, 4> | <3, 4> | <4, 4> |
| <-4, 3> | | | | | | | | <4, 3> |
| <-4, 2> | | | | | | | | <4, 2> |
| <-4, 1> | | | | | | | | <4, 1> |
| <-4, 0> | | | | <0,0> | | | | <4, 0> |
| <-4,-1> | | | | | | | | <4,-1> |
| <-4, -2> | | | | | | | | <4,-2> |
| <-4, -3> | | | | | | | | <4,-3> |
| <-4,-4> | <-3,-4> | <-2,-4> | <-1,-4> | <0,-4> | <1,-4> | <2,-4> | <3,-4> | <4,-4> |

Note

The current gear is the absolute value of the x and y coordinates here. For example, with the direction $\langle -2, 3 \rangle$, the gear would be :

$$\max(\text{abs}(x), \text{abs}(y)) = \max(\text{abs}(-2), \text{abs}(3)) = 3$$

Same Gear

Now assuming the current direction to be $\langle -2, 3 \rangle$, the choices at the same gear will be:

$\langle -3, 3 \rangle$, $\langle -2, 3 \rangle$ and $\langle -1, 3 \rangle$

Shifting Gear Up

However, if the gear were to be increased from 3 to 4, and the current direction was still $\langle -2, 3 \rangle$, we would now determine the closest direction to $\langle -2, 3 \rangle$ in gear 4. Possible candidates appear to be $\langle -2, 4 \rangle$ and $\langle -3, 4 \rangle$

Choosing between the two possible candidates would be as follows :

$$\arctan(3/-2) = -56, \arctan(4/-2) = -63, \arctan(4/-3) = -53$$

Since difference in arctan values of $\langle -2, 3 \rangle$ and $\langle -3, 4 \rangle$ is the least, we would choose $\langle -3, 4 \rangle$ over $\langle -2, 4 \rangle$. Now with the updated direction, the possible directions would be:

$\langle -4, 4 \rangle$, $\langle -3, 4 \rangle$, $\langle -2, 4 \rangle$

Shifting Gear Down

With the current direction $\langle -2, 3 \rangle$, if we reduce the current gear to 2, the possible candidate directions with gear 2 would be $\langle -2, 2 \rangle$ and $\langle -1, 2 \rangle$

As shown above, choosing between the two possible candidates would be as follows :

$$\arctan(3/-2) = -56, \arctan(2/-2) = -45, \arctan(2/-1) = -63.4$$

Since difference in arctan values of $\langle -2, 3 \rangle$ and $\langle -1, 2 \rangle$ is the least we would choose $\langle -1, 2 \rangle$ over $\langle -2, 2 \rangle$ here. With this updated direction, possible directions to move would be:

$\langle -2, 2 \rangle$, $\langle -1, 2 \rangle$, $\langle 0, 2 \rangle$