Question 1

You have seven cards, numbered as shown:

1	8	4	6	1	8	4

You pick two of the cards at random and multiply their numbers.

What is the probability that this product is an **odd** number?

Question 2

Find the exact coordinates of the two points of intersection of the line $y = 3x$ and the circle $x^2 + y^2 = 120$.

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What is the probability that this product is an **odd** number?

The only way to get an odd product is to pick two odd cards.
Therfore the probability of getting an odd product is

$$\frac{2}{7} \times \frac{1}{6} = \frac{2}{42} = \frac{1}{21}$$

Question 2

Find the exact coordinates of the two points of intersection of the line $y = 3x$ and the circle $x^2 + y^2 = 120$.

Substituting $y = 3x$ into $x^2 + y^2 = 120$, we get:

$$x^2 + (3x)^2 = 120$$

$$\implies 10x^2 = 120$$
$$\implies x^2 = 12$$
$$\implies x = \pm\sqrt{12}$$

Therefore, $x = 2\sqrt{3}, x = -2\sqrt{3}$

Since $y = 3x$, the points of intersection are
$(2\sqrt{3}, 6\sqrt{3})$ and $(-2\sqrt{3}, -6\sqrt{3})$