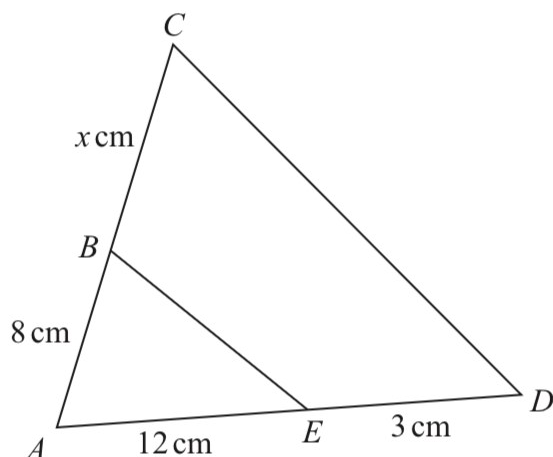**Question 1 (3 Marks)**

Given that $9^{-\frac{1}{2}} = 27^{\frac{1}{4}} \div 3^{x+1}$

find the exact value of x.

$x =$ ....

Question 2 (5 Marks)

The two triangles in the diagram are similar.

There are two possible values of x.

Work out each of these values.
State any assumptions you make in your working.

Question 3 (4 Marks)

For all values of x

$$f(x) = (x + 1)^2 \quad \text{and} \quad g(x) = 2(x - 1)$$

(a) Show that $gf(x) = 2x(x + 2)$

(2)

(b) Find $g^{-1}(7)$

(2)

Question 4 (3 Marks)

There are four types of cards in a game.

Each card has a black circle or a white circle or a black triangle or a white triangle.

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$$\text{number of cards with a black shape} : \text{number of cards with a white shape} = 3:5$$

$$\text{number of cards with a circle} : \text{number of cards with a triangle} = 2:7$$

Express the total number of cards with a black shape as a fraction of the total number of cards with a triangle.

(Total 15 Marks)