2004

Question 4

4 (a) Divide $x^3 + x^2 - 12x$ by $x + 4$.

(b) (i) Factorise $9x^2 - 64y^2$

(ii) Factorise $3xy - 10x - 10b + 3by$

(iii) Factorise $6x^2 - 7x - 24$

(c) A youth club is organising an outing to a park. The total cost of entry for club members to the park is €42.

(i) Taking x to be the number of club members, write an expression in x to represent the cost of entry per member.

If two club members decide not to go on the outing, the total cost of entry to the park would be €35.

(ii) Write an expression in x to represent the cost of entry per member in this case.

The cost of entry per member, in this case, would be increased by €1

(iii) Write an equation in x to represent the above information.

(iv) Solve this equation to find the number of members in the club.

Solution

4(a) Divide $x^3 + x^2 - 12x$ by $x + 4$.

$$
\begin{array}{rl}
 & x^2 - 3x \\
x + 4 \overline{)} & x^3 + x^2 - 12x \\
 & \underline{x^3 + 4x^2} \qquad \text{change the sign} \\
 & \quad -3x^2 - 12x \\
 & \quad \underline{-3x^2 - 12x} \qquad \text{change the sign} \\
 & \qquad\quad 0
\end{array}
$$

(b) (i) Factorise $9x^2 - 64y^2$

(ii) Factorise $3xy - 10x - 10b + 3by$

(iii) Factorise $6x^2 - 7x - 24$

(i) $9x^2 - 64y^2$

$(3x)^2 - (8y)^2$

$(3x - 8y)(3x + 8y)$

(ii) $3xy - 10x - 10b + 3by$

$3xy - 10x - 10b + 3by$

$3xy - 10x + 3by - 10b$

$x(3y - 10) + b(3y - 10)$

$(3y - 10)(x + b)$

(iii) $6x^2 - 7x - 24$

$(2x - 6)(3x + 4)$ $\quad -18x + 8x = -10x$

$(2x - 4)(3x + 6)$ $\quad -12x + 12x = 0$

$(2x - 3)(3x + 8)$ $\quad -9x + 16x = 7x$

$(2x + 3)(3x - 8)$ $\quad 9x - 16x = -7x$

(c) A youth club is organising an outing to a park. The total cost of entry for club members to the park is €42.

(i) Taking x to be the number of club members, write an expression in x to represent the cost of entry per member.

If two club members decide not to go on the outing, the total cost of entry to the park would be €35.

(ii) Write an expression in x to represent the cost of entry per member in this case.

The cost of entry per member, in this case, would be increased by €1

(iii) Write an equation in x to represent the above information.

(iv) Solve this equation to find the number of members in the club.

x the number of club members.

The total cost of entry for club members to the park is €42.

How much is the cost of entry per member?

$$\frac{42}{x}$$

Two club members decide not to go on the outing so we now have $x-2$ members, the total cost of entry to the park would be €35

How much is the cost of entry per member?

$$\frac{35}{x-2}$$

The price per member will have to be increased by €1

$$\frac{35}{x-2}-\frac{42}{x}=\frac{1}{1}$$

$$\frac{35}{x-2}-\frac{42}{x}=\frac{1}{1}$$

$$\frac{35(x)-42(x-2)=x(x-2)}{x(x-2)}$$

$$35x-42x+84=x^2-2x$$

$$-7x+84-x^2+2x=0$$

$$x^2+5x-84=0$$

$$x^2-7x+12x-84=0$$

$$x(x-7)+12(x-7)=0$$

$$(x-7)(x+12)=0$$

$$x-7=0 \qquad x+12=0$$

$$x=7 \qquad x=-12$$

Answer is $x=7$