IES MURILLO

Maths 3rd ESO

EXAM UNIT 5 (EQUATIONS)

Name:.....

1) Solve the following equations: (5 points)

a. $2x-3(x+7)+2x-1=2(x-3)-x$

b. $\frac{x-5}{2}+\frac{x+1}{3}-1=\frac{x+4}{3}-\frac{x-1}{2}$

c. $(2x-1)^2-3x+1=(2x-3)(2x+3)-3$

d. $\frac{3x+2}{5}-\frac{4x-1}{10}+\frac{5x-2}{8}=\frac{x+1}{4}$

e. $\frac{3x+1}{2}=2x-\frac{x-1}{2}$

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2) Solve the following equations: (4 points)

a. $9x^2 - 12x + 4 = 0$

b. $4x^2 - 9 = 0$

c. $(x+4)^2 - (2x-1)^2 = 8x$

d. $\frac{(5x-4)(5x+4)}{4} = \frac{(3x-1)^2 - 9}{2}$

3) Translate into an equation: (1 point)

a. Ten subtracted from five times a number is equal to twenty.

b. One third of a number minus four is equal to seventeen.

c. A number plus three, all multiplied by eight is equal to forty-eight.

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SOLUTION

1) Solve the following equations:

a. $2x-3(x+7)+2x-1=2(x-3)-x$

$2x-3x-21+2x-1=2x-6-x \rightarrow 2x-3x+2x-2x+x=-6+21+1$

$0x=16 \rightarrow$ No solution

b. $\frac{x-5}{2}+\frac{x+1}{3}-1=\frac{x+4}{3}-\frac{x-1}{2} \rightarrow \frac{3(x-5)}{6}+\frac{2(x+1)}{6}-\frac{6}{6}=\frac{2(x+4)}{6}-\frac{3(x-1)}{6}$

$3x-15+2x+2-6=2x+8-3x+3 \rightarrow 3x+2x-2x+3x=8+3+6-2+15$

$6x=8+3+6-2+15 \rightarrow 6x=30 \rightarrow x=\frac{30}{6}=5$ Solution: x = 5

c. $(2x-1)^2-3x+1=(2x-3)(2x+3)-3 \rightarrow 4x^2-4x+1-3x+1=4x^2-9-3$

$-4x-3x=-9-3-2 \rightarrow -7x=-14 \rightarrow x=\frac{14}{7}=2$ Solution: x = 2

d. $\frac{3x+2}{5}-\frac{4x-1}{10}+\frac{5x-2}{8}=\frac{x+1}{4} \rightarrow \frac{8(3x+2)}{40}-\frac{4(4x-1)}{40}+\frac{5(5x-2)}{40}=\frac{10(x+1)}{40}$

$24x+16-16x+4+25x-10=10x+10 \rightarrow 24x-16x+25x-10x=10+10-4-16$

$23x=0 \rightarrow x=\frac{0}{23}=0$ Solution x = 0

e. $\frac{3x+1}{2}=2x-\frac{x-1}{2} \rightarrow \frac{3x+1}{2}=\frac{4x}{2}-\frac{x-1}{2} \rightarrow 3x+1=4x-x+1$

$3x-4x+x=1-1 \rightarrow 0x=0$ It is an identity Solution: all numbers

2) Solve the following equations:

a. $9x^2-12x+4=0$

$x=\frac{12\pm\sqrt{(-12)^2-4\cdot 9\cdot 4}}{2\cdot 9}=\frac{12\pm\sqrt{144-144}}{18}=\frac{12}{18}=\frac{2}{3}$ Solution: $\frac{2}{3}$ (just one)

b. $4x^2-9=0 \rightarrow 4x^2=9 \rightarrow x^2=\frac{9}{4} \rightarrow x=\pm\sqrt{\frac{9}{4}} \rightarrow x=\pm\frac{3}{2}$ Solution: $\pm\frac{3}{2}$

c. $(x+4)^2-(2x-1)^2=8x \rightarrow (x^2+8x+16)-(4x^2-4x+1)=8x$

$x^2+8x+16-4x^2+4x-1=8x \rightarrow -3x^2+4x+15=0$

$x=\frac{-4\pm\sqrt{4^2-4\cdot(-3)\cdot 15}}{2\cdot(-3)}=\frac{-4\pm\sqrt{16+180}}{-6}=\frac{-4\pm\sqrt{196}}{-6}=\frac{-4\pm 14}{-6}=\begin{cases}3\\ \frac{10}{-6}=-\frac{5}{3}\end{cases}$

Solution: 3 and $-\frac{5}{3}$

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d. $\dfrac{(5x-4)(5x+4)}{4}=\dfrac{(3x-1)^2-9}{2}$

$$\frac{25x^2-16}{4}=\frac{9x^2-6x+1-9}{2}\rightarrow 25x^2-16=18x^2-12x-16\rightarrow 7x^2+12x=0$$

$$x(7x+12)=0\begin{cases}x=0\\7x+12=0\rightarrow x=-\dfrac{12}{7}\end{cases}$$

Solution: 0 and $-\dfrac{12}{7}$

3) Translate into an equation:

d. Ten subtracted from five times a number is equal to twenty.

$$5x-10=20$$

e. One third of a number minus four is equal to seventeen.

$$\frac{x}{3}-4=17$$

f. A number plus three, all multiplied by eight is equal to forty-eight.

$$8(x+3)=48$$

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