Advanced Algebraic Fractions

Practice Worksheet (Edexcel GCSE 1MA1 Nov 2023 2H Style)

I DO

Write

$$\frac{14}{3x - 21} + [\,(x + 4) \div \frac{2x^2 - 6x - 56}{2x + 3}\,]$$

in the form $\frac{ax + b}{cx + d}$ where a, b, c and d are integers.

WE DO

Write

$$\frac{10}{4x - 20} + [\,(x + 3) \div \frac{2x^2 - 4x - 30}{2x - 1}\,]$$

in the form $\frac{ax + b}{cx + d}$ where a, b, c and d are integers.

YOU DO 1

Write

$$\frac{9}{2x - 12} + [\,(x + 5) \div \frac{2x^2 - 2x - 60}{3x + 2}\,]$$

in the form $\frac{ax + b}{cx + d}$ where a, b, c and d are integers.

YOU DO 2

Write

$$\frac{15}{3x - 15} + [\,(x + 2) \div \frac{4x^2 - 12x - 40}{3x - 1}\,]$$

in the form $\frac{ax + b}{cx + d}$ where a, b, c and d are integers.

CHALLENGE

Solve the equation:

$$\frac{8}{2x-6} - [\,(x-1) \div \frac{3x^2 - 12x + 9}{2x+5}\,] = 1$$

You must show all your working.

ANSWERS & WORKED SOLUTIONS

I Do

Step 1: Factorise the quadratic: $2x^2 - 6x - 56 = 2(x^2 - 3x - 28) = 2(x - 7)(x + 4)$.

Step 2: Invert and multiply: $(x + 4) \times (2x + 3) / [2(x - 7)(x + 4)] = (2x + 3) / 2(x - 7)$.

Step 3: Add the first fraction. Common denominator for 14/3(x-7) and (2x+3)/2(x-7) is 6(x-7).

Step 4: $[28 + 3(2x + 3)] / 6(x - 7) = (6x + 37) / (6x - 42)$. **Answer: (6x + 37) / (6x - 42)**

We Do

Step 1: Factorise the quadratic: $2x^2 - 4x - 30 = 2(x - 5)(x + 3)$.

Step 2: Invert and multiply: $(x + 3) \times (2x - 1) / [2(x - 5)(x + 3)] = (2x - 1) / 2(x - 5)$.

Step 3: The first fraction is $10/4(x-5) = 5/2(x-5)$. Add them together.

Step 4: $[5 + 2x - 1] / 2(x - 5) = (2x + 4) / (2x - 10)$. **Answer: (2x + 4) / (2x - 10)**

ANSWERS & WORKED SOLUTIONS (CONTINUED)

You Do 1

Step 1: Factorise the quadratic: $2x^2 - 2x - 60 = 2(x - 6)(x + 5)$.

Step 2: Invert and multiply: $(x + 5) \times (3x + 2) / [2(x - 6)(x + 5)] = (3x + 2) / 2(x - 6)$.

Step 3: Add the first fraction: $9/2(x-6) + (3x+2)/2(x-6)$.

Step 4: $(9 + 3x + 2) / 2(x - 6) = (3x + 11) / (2x - 12)$. **Answer: (3x + 11) / (2x - 12)**

You Do 2

Step 1: Factorise the quadratic: $4x^2 - 12x - 40 = 4(x - 5)(x + 2)$.

Step 2: Invert and multiply: $(x + 2) \times (3x - 1) / [4(x - 5)(x + 2)] = (3x - 1) / 4(x - 5)$.

Step 3: Simplify first fraction: $15/3(x-5) = 5/(x-5) = 20/4(x-5)$. Add them together.

Step 4: $[20 + 3x - 1] / 4(x - 5) = (3x + 19) / (4x - 20)$. **Answer: (3x + 19) / (4x - 20)**

ANSWERS & WORKED SOLUTIONS (CONTINUED)

Challenge

Step 1: Factorise the quadratic: $3x^2 - 12x + 9 = 3(x - 3)(x - 1)$.

Step 2: Invert and multiply: $(x - 1) \times (2x + 5) / [3(x - 3)(x - 1)] = (2x + 5) / 3(x - 3)$.

Step 3: Simplify first fraction: $8/2(x-3) = 4/(x-3) = 12/3(x-3)$. Subtract the second fraction.

Step 4: $[12 - (2x + 5)] / 3(x - 3) = (7 - 2x) / (3x - 9)$.

Step 5: Set to 1: $(7 - 2x) / (3x - 9) = 1 \rightarrow 7 - 2x = 3x - 9 \rightarrow 5x = 16 \rightarrow x = 3.2$. **Answer: x = 3.2**