EXAM PAPERS PRACTICE

GCSE OCR Math J560

Algebric fraction

Answers

"We will help you to achieve A Star "

Answer 1

Simplify $\dfrac{3(x+1)}{(x+1)^2}$

$= \dfrac{3(x+1)}{(x+1)(x+1)}$

$= \dfrac{3}{x+1}$

Answer 2

Show that $\frac{a}{b+1} - \frac{a}{(b+1)^2}$ can be written as $\frac{ab}{(b+1)^2}$

$$\frac{(b+1)}{(b+1)} \times \frac{a}{(b+1)} - \frac{a}{(b+1)^2}$$

$$= \frac{a(b+1)}{(b+1)^2} - \frac{a}{(b+1)^2}$$

$$= \frac{a(b+1) - a}{(b+1)^2}$$

$$= \frac{ab + a - a}{(b+1)^2}$$

$$= \frac{ab}{(b+1)^2}$$

Answer 3

(a) Simplify fully $\dfrac{x^2 + 3x - 4}{2x^2 - 5x + 3}$

$= \dfrac{(x+4)(x-1)}{(2x-3)(x-1)}$

$= \dfrac{x+4}{2x-3}$

ALGEBRAIC FRACTIONS

FACTORISE TOP AND BOTTOM AND CANCEL

Answer 4

Simplify $\dfrac{x+1}{2} + \dfrac{x+3}{3}$

$= \dfrac{3(x+1)}{2\times 3} + \dfrac{2(x+3)}{2\times 3}$

$= \dfrac{3x+3+2x+6}{6}$

$= \dfrac{5x+9}{6}$

ALGEBRAIC FRACTIONS

- LOOK FOR (LOWEST) COMMON DENOMINATOR
- TREAT LIKE NORMAL FRACTIONS

eg. $\dfrac{1}{2} + \dfrac{2}{3}$

$= \dfrac{1\times 3}{2\times 3} + \dfrac{2\times 2}{2\times 3}$

$= \dfrac{3}{6} + \dfrac{4}{6}$

$= \dfrac{7}{6}$

Answer 5

(b) Write $\frac{4}{x+2}+\frac{3}{x-2}$ as a single fraction in its simplest form.

$= \frac{4(x-2)}{(x+2)(x-2)} + \frac{3(x+2)}{(x+2)(x-2)}$

$= \frac{4x-8+3x+6}{(x+2)(x-2)}$

$= \frac{7x-2}{(x+2)(x-2)}$

$\left(= \frac{7x-2}{x^2-4}\right)$

$\frac{4}{5} + \frac{3}{7}$

$= \frac{4\times7}{5\times7} + \frac{5\times3}{5\times7}$

etc.

Answer 6

Simplify $\frac{4(x+5)}{x^2+2x-15}$

$= \frac{4\cancel{(x+5)}}{\cancel{(x+5)}(x-3)}$

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

$x^2 + 2x - 15$

$= (x+5)(x-3)$

SIGNS DIFFERENT

BIGGER NUMBER POSITIVE

$\frac{-15}{15\times-1}$

5×-3

Answer 7

Simplify $\dfrac{x^2 - 9}{2x^2 + 5x - 3}$

DOTS

$a^2 - b^2 = (a+b)(a-b)$

TOP: $x^2 - 9 = x^2 - 3^2$

$= (x+3)(x-3)$

BOTTOM: $2x^2 + 5x - 3 = (x + 3)(2x - 1)$

(+ and − signs)

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

$$= \frac{x-3}{2x-1}$$

Answer 8

Write as a single fraction in its simplest form

$$\frac{2}{y+3} - \frac{1}{y-6}$$

$$\frac{2}{y+3} - \frac{1}{y-6}$$

$$= \frac{2(y-6)}{(y+3)(y-6)} - \frac{1(y+3)}{(y+3)(y-6)}$$

$$= \frac{2(y-6) - 1(y+3)}{(y+3)(y-6)}$$

$$= \frac{2y - 12 - y - 3}{(y+3)(y-6)}$$

$$= \frac{y - 15}{(y+3)(y-6)}$$

EG

$$\frac{2}{3} - \frac{1}{5}$$

$$= \frac{2\times5}{3\times5} - \frac{3\times1}{3\times5}$$

$$= \frac{10}{15} - \frac{3}{15}$$

$$= \frac{7}{15}$$

Answer 9

Simplify fully $\dfrac{2x^2 - 5x + 3}{x^2 + 5x - 6}$

ALGEBRAIC FRACTION

FACTORISE TOP AND BOTTOM AND CANCEL.

$x^2 + 5x - 6 = (x + 6)(x - 1)$

NEGATIVE SO SIGNS DIFFERENT

POSITIVE

SO BIGGER NUMBER WILL BE POSITIVE

-6

$6x - 1$

$3x - 2$

$2x^2 - 5x + 3 = (x - 1)(2x - 3)$

$$\frac{2x^2 - 5x + 3}{x^2 + 5x - 6} = \frac{(x-1)(2x-3)}{(x+6)(x-1)} = \frac{2x-3}{x+6}$$

Answer 10

Write as a single fraction in its simplest form $\frac{5}{2-x} - \frac{4}{x}$

$$\frac{5}{2-x} - \frac{4}{x} = \frac{5x}{(2-x)x} - \frac{4(2-x)}{(2-x)x}$$

$$= \frac{5x - 4(2-x)}{(2-x)x}$$

$$= \frac{5x - 8 + 4x}{(2-x)x}$$

$$= \frac{9x - 8}{(2-x)x}$$

eg.

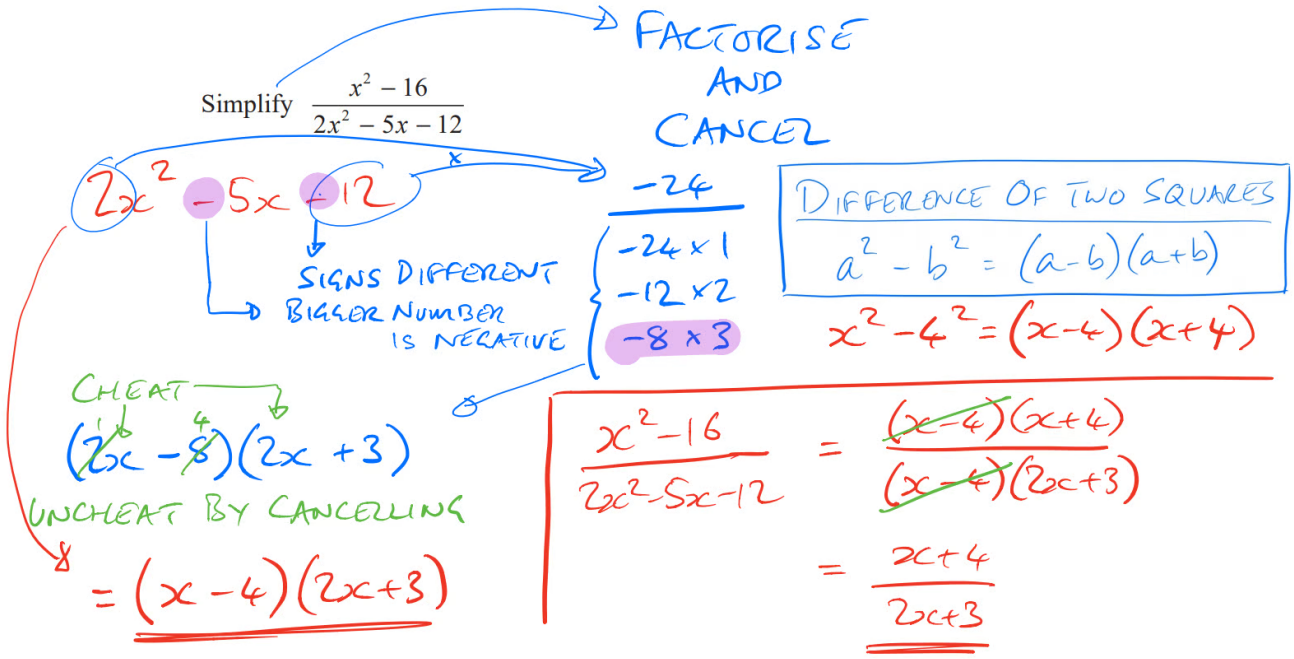
$$\frac{5}{9} - \frac{4}{7}$$

$$= \frac{5\times 7}{9\times 7} - \frac{4\times 9}{9\times 7}$$

$$= \frac{5\times 7 - 4\times 9}{9\times 7}$$

$$= \ldots$$

Answer 11


Simplify $\frac{x^2-16}{2x^2-5x-12}$
FACTORISE AND CANCEL
$2x^2-5x-12$
-24
-24×1
-12×2
-8×3
SIGNS DIFFERENT
BIGGER NUMBER IS NEGATIVE
CHEAT
$(2x-8)(2x+3)$
UNCHEAT BY CANCELLING
$=(x-4)(2x+3)$
DIFFERENCE OF TWO SQUARES
$a^2-b^2=(a-b)(a+b)$
$x^2-4^2=(x-4)(x+4)$
$\frac{x^2-16}{2x^2-5x-12}=\frac{(x-4)(x+4)}{(x-4)(2x+3)}$
$=\frac{x+4}{2x+3}$

Answer 12

$2 - \frac{x+2}{x-3} - \frac{x-6}{x+3}$ can be written as a single fraction in the form $\frac{ax+b}{x^2-9}$ where a and b are integers. → WHOLE NUMBERS

Work out the value of a and the value of b.

COMMON DENOMINATOR = $(x-3)(x+3)$

$$\frac{2(x-3)(x+3)}{(x-3)(x+3)} - \frac{(x+2)(x+3)}{(x-3)(x+3)} - \frac{(x-6)(x-3)}{(x+3)(x-3)}$$

$$= \frac{2[x^2+3x-3x-9] - [x^2+3x+2x+6] - [x^2-3x-6x+18]}{(x-3)(x+3)}$$

(F O I L) (F O I L)

$$= \frac{2(x^2-9) - (x^2+5x+6) - (x^2-9x+18)}{x^2-9}$$

$$= \frac{2x^2-18-x^2-5x-6-x^2+9x-18}{x^2-9}$$

$$= \frac{4x-42}{x^2-9}$$

$a = 4$, $b = -42$

Answer 13

Simplify fully $\frac{3x^2 - 8x - 3}{2x^2 - 6x}$ → FACTORISE THE TOP AND BOTTOM, THEN CANCEL...

TOP: $3x^2 - 8x - 3$

-9

-9×1

CHEAT

$(3x - 9)(3x + 1)$

UNCHEAT BY CANCELLING

$= (x - 3)(3x + 1)$

BOTTOM: $2x^2 - 6x = 2x \times x - 2x \times 3$

$= 2x(x - 3)$

WHOLE THING:

$$\frac{3x^2 - 8x - 3}{2x^2 - 6x} = \frac{(x-3)(3x+1)}{2x(x-3)}$$

$$= \frac{3x+1}{2x}$$

Answer 14

Show that $\frac{2x^2 - 3x - 5}{x^2 + 6x + 5}$ can be written in the form $\frac{ax + b}{cx + d}$ where a, b, c and d are integers.

TOP: $2x^2 - 3x - 5$

$\times$

→ SIGNS DIFFERENT

→ BIGGER NO NEGATIVE

-10

-10×1

-5×2

CHEAT:

$(2x - 5)(2x + 2)$

UNCHEAT BY CANCELLING COMMON FACTORS

$= \underline{(2x - 5)(x + 1)}$

BOTTOM: $x^2 + 6x + 5$

$+5$

5×1

$= \underline{(x + 5)(x + 1)}$

WHOLE FRACTION:

$$\frac{2x^2 - 3x - 5}{x^2 + 6x + 5} = \frac{(2x - 5)(x + 1)}{(x + 5)(x + 1)}$$

$$= \frac{2x - 5}{x + 5}$$