1 Simplify $\frac{3}{x} + \frac{4}{x}$

Circle your answer.

[1 mark]

$\frac{7}{x}$ (1) $\frac{7}{2x}$ $\frac{12}{x}$ $\frac{12}{x^2}$

2 $d = 2f$

$$\frac{e-f}{d-e} = \frac{1}{4}$$

Work out the ratio $e : f$

[3 marks]

$\frac{e-f}{2f-e} = \frac{1}{4}$

$4e - 4f = 2f - e$ (1)

$5e = 6f$ (1)

$\frac{e}{f} = \frac{6}{5}$

Answer 6 : 5 (1)

3 The flight of a plane was in two stages.

The table shows information about the flight.

	Distance (miles)	Speed (mph)	Time (hours)
1st stage	731	x	$\frac{731}{x}$
2nd stage	287	$x - 24$	$\frac{287}{x-24}$

In total, the flight lasted 2 hours.

Work out the value of x.

[5 marks]

$\frac{731}{x} + \frac{287}{x-24} = 2$ (1)

$731(x-24) + 287x = 2(x)(x-24)$ (1)

$731x - 17544 + 287x = 2x^2 - 48x$

$2x^2 - 1066x + 17544 = 0$

$x^2 - 533x + 8772 = 0$ (1)

$x = \frac{533 \pm \sqrt{(-533)^2 - 4(1)(8772)}}{2}$ (1)

$= \frac{533 \pm \sqrt{284089 - 35088}}{2}$

$= \frac{533 \pm 499}{2}$ time cannot be negative

$= \frac{34}{2}$ or $\frac{1032}{2}$ $= 17$ or 516

Answer 516 (1)

4 (a) Simplify fully $\frac{6}{a} - \frac{11}{4a}$

[2 marks]

$\frac{6}{a} \times \frac{4}{4} = \frac{24}{4a}$ (1)

$\frac{24}{4a} - \frac{11}{4a} = \frac{13}{4a}$

Answer $\frac{13}{4a}$ (1)

4 (b) Simplify fully $(y^2 - 3y) \times \frac{y^2 + 10y + 21}{y^2 - 9}$

[4 marks]

$y^2 - 3y = y(y-3)$ (1)

$y^2 + 10y + 21 = (y+7)(y+3)$ (1)

$y^2 - 9 = (y+3)(y-3)$ (1)

$\frac{y(y-3) \times (y+7)(y+3)}{(y+3)(y-3)}$

$= y(y+7)$ (1)

Answer $y(y+7)$

5 Show that $\frac{x-5}{x-2} + \frac{x+5}{x+2}$

simplifies to $\frac{ax^2-b}{x^2-4}$ where a and b are integers.

[3 marks]

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

$= \frac{x^2-3x-10}{x^2-4} + \frac{x^2+3x-10}{x^2-4}$

$= \frac{x^2+x^2-3x+3x-10-10}{x^2-4}$ (1)

$= \frac{2x^2-20}{x^2-4}$ (1)

6 Simplify fully $\frac{2}{x+1} + \frac{7-5x}{3} + 4x$

Give your answer as a single fraction.

[4 marks]

① Solving numerator part (1)

$2(3) + (7-5x)(x+1) + 4x(x+1)(3)$ (1)

$= 6 + 7x + 7 - 5x^2 - 5x + 12x^2 + 12x$ (1)

$= -5x^2 + 12x^2 + 7x - 5x + 12x + 6 + 7$

$= 7x^2 + 14x + 13$

② Add solved numerator to the denominator $\frac{7x^2 + 14x + 13}{3(x+1)}$ (1)

Answer $\frac{7x^2 + 14x + 13}{3(x+1)}$