

IGCSE higher

Week 6 homework

1 Work out the following fractions without a calculator!

- a) $\frac{2}{3} + \frac{5}{7}$ b) $\frac{5}{6} - \frac{2}{11}$ c) $1\frac{8}{9} + 3\frac{1}{2}$ d) $4\frac{1}{5} - 2\frac{3}{4}$
 e) $\frac{7}{9} \times \frac{3}{4}$ f) $\frac{3}{5} \div \frac{6}{7}$ g) $1\frac{2}{11} \times 3\frac{1}{7}$ h) $2\frac{5}{6} \div 1\frac{7}{12}$

2 Factorise be careful some factorise into one bracket, some into two brackets

- a) $9x + 12$ b) $2y + y^2$ c) $x^2 + 9x + 20$ d) $9x - 3x^2$
 e) $x^2 - 25$ f) $27ab^2 + 36ab$ g) $x^2 - 15x + 36$ h) $2x^2 - 72$

3 Simplify these fractions REMEMBER factorise where you can

- a) $\frac{2x + 2y}{2}$ b) $\frac{4a - 4b}{a - b}$ c) $\frac{5x + 5y}{2x + 2y}$ d) $\frac{x^2 + xy}{xy}$ e) $\frac{ab + 4a}{a}$
 f) $\frac{2x + 4y}{3x + 6y}$ g) $\frac{x - xy}{z - zy}$ h) $\frac{ab - ac}{db - dc}$ i) $\frac{10x^2 + 5xy}{5x}$ j) $\frac{6a^2 + 9a^3}{3a^2}$
 k) $\frac{4x^3y - 10x^2y^3}{2x^3z - 8x^2z}$ l) $\frac{16ab + 18ac}{24ab + 27ac}$ m) $\frac{3r^2s - 15rs^3}{4r^2s - 20rs^3}$ n) $\frac{x^2 - 100}{x - 10}$
 o) $\frac{x^2 + 8x + 12}{x + 2}$ p) $\frac{x - 5}{x^2 - 6x + 5}$ q) $\frac{2x^2 + 7x + 3}{x^2 - 9}$ r) $\frac{x^2 - 25}{x^2 - x - 20}$

4 Express as a single fraction REMEMBER common denominator

- a) $\frac{x}{3} + \frac{x+1}{2}$ b) $\frac{x}{2} + \frac{2x+3}{4}$ c) $\frac{x+1}{3} + \frac{x-1}{5}$ d) $\frac{x+1}{3} - \frac{x}{2}$
 e) $\frac{x}{2} - \frac{x+1}{6}$ f) $\frac{x-1}{4} - \frac{x+2}{5}$ g) $\frac{3x-1}{5} + \frac{1-3x}{7}$ h) $\frac{4x-3}{3} - \frac{2x+3}{4}$
 i) $\frac{x}{5} + \frac{x+2}{2} - \frac{x+1}{4}$

5 Again express as single fractions

- a) $\frac{1}{x} + \frac{1}{2x}$ b) $\frac{2}{3x} - \frac{5}{x}$ c) $\frac{4}{2x} + \frac{3}{4x}$ d) $\frac{5}{x^2} + \frac{7}{x}$
 e) $\frac{5}{x^2} - \frac{2}{xy}$ f) $\frac{3}{x+1} + \frac{5}{x}$ g) $\frac{3}{x+1} - \frac{2}{x-1}$ h) $\frac{1}{x-3} - \frac{2}{x+4}$
 i) $\frac{1}{x+1} + \frac{1}{x^2 + 3x + 2}$ j) $\frac{1}{x+4} + \frac{2x}{x^2 + 2x - 8}$ k) $\frac{x+3}{x+4} - \frac{x-3}{x-4}$
 l) $1 + \frac{5}{x+3}$ m) $3 - \frac{1}{x+1}$

6 Now for some multiplying and dividing

remember your fraction rules

a) $\frac{x}{2} \times \frac{2x}{5}$

b) $\frac{x+1}{3} \times \frac{9}{x}$

c) $\frac{x-5}{x^2} \times \frac{x+7}{x-5}$

d) $\frac{x-3}{6} \div \frac{x-3}{x+1}$

e) $\frac{2x+1}{2x-6} \div \frac{x-4}{x-3}$

f) $\frac{2x+3}{x-7} \times \frac{x-6}{10x+15}$

g) $\frac{4x+4}{x-3} \times \frac{x^2-3x}{2x+2}$

h) $\frac{x+2}{x+4} \div \frac{x^2-2x-8}{2x^2+32}$

7 Solving with fractions

a) $\frac{x}{3} = 7$

b) $x = \frac{x+6}{3}$

c) $\frac{x-6}{4} = \frac{x+3}{5}$

d) $\frac{2-3x}{6} = \frac{4}{3}$

e) $\frac{2x-3}{6} + \frac{x+2}{3} = \frac{5}{2}$

f) $\frac{3x-6}{5} + 2x = 4$

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

8 Now solving with x as a denominator

a) $\frac{12}{x} = 4$

b) $\frac{14}{x} = x+5$

c) $\frac{4}{x} = \frac{3x-7}{5}$

d) $\frac{x}{x+2} - \frac{1}{x} = 1$

e) $\frac{x-2}{x-1} = \frac{x+4}{2x+4}$

f) $\frac{7}{x-1} - \frac{4}{x+4} = 1$

h) $\frac{1}{2} + \frac{x}{x+7} = \frac{4}{5}$

The following are examples of exam questions, use the skills above to solve/simplify

9

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

10

Work out $\frac{z+2}{z-1} - \frac{z}{z+5}$ and write your answer in its simplest form.

11

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.

12

Solve the equation

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

13

Write $\frac{5}{x-3} - \frac{4}{x+3}$ as a single fraction in its simplest form.

14 Write

$$4 - \left[(x+3) \div \frac{x^2+5x+6}{x-2} \right]$$

as a single fraction in its simplest form.
You must show your working.