The Maths Society

4/6

8/12

Fraction

4/4 (1)

3/4

2/4

1/4

1/2 1/2

1/4 1/4 1/4 1/4

Question 1

Without using a calculator, work out $\frac{5}{6} - \frac{1}{2}$

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Show all the steps of your working and give your answer as a fraction in its simplest form. [2]

$$\frac{5}{6} - \frac{1}{2} \times \frac{3}{3} = \frac{5}{6} - \frac{3}{6} = \frac{2}{6} = \frac{1}{3}$$

Question 2

Work out $\frac{2}{3} - \frac{1}{4}$, giving your answer as a fraction in its lowest terms.

Do not use a calculator and show all the steps of your working. [2]

$$\frac{2}{3} \times \frac{4}{4} - \frac{1}{4} \times \frac{3}{3} = \frac{8}{12} - \frac{3}{12} = \frac{5}{12}$$

Question 3

Without using your calculator, work out $\frac{3}{4} + \frac{2}{3} - \frac{1}{8}$.

You must show all your working and give your answer as a mixed number in its simplest form. [4]

$$\frac{3 \times 6}{4 \times 6} + \frac{2 \times 8}{3 \times 8} - \frac{1 \times 3}{8 \times 3} = \frac{18}{24} + \frac{16}{24} - \frac{3}{24} = \frac{31}{24} = 1\frac{7}{24}$$

Question 4

Without using a calculator, work out $\frac{3}{5} + \frac{1}{6}$.

[2]

Write down all the steps of your working and give your answer as a fraction in its simplest form.

$$\frac{3 \times 6}{5 \times 6} + \frac{1 \times 5}{6 \times 5} = \frac{18}{30} + \frac{5}{30} = \frac{23}{30}$$

Question 5

Without using a calculator, work out $2\frac{5}{8} \times \frac{3}{7}$.

Show all your working and give your answer as a mixed number in its lowest terms. [3]

$\frac{21}{8} \times \frac{3}{7} = \frac{9}{8} = 1\frac{1}{8}$

Question 6

Without using a calculator, work out $\frac{1}{12} \times 1\frac{1}{5}$.

Show all your working and give your answer as a fraction in its lowest terms. [2]

$\frac{1}{12} \times \frac{6}{5} = \frac{1}{10}$

Question 7

Without using your calculator, work out $1\frac{7}{12} + \frac{13}{20}$.

You must show all your working and give your answer as a mixed number in its simplest form. [3]

$\frac{19 \times 5}{12 \times 5} + \frac{13 \times 3}{20 \times 3} = \frac{95}{60} + \frac{39}{60} = \frac{134}{60} = \frac{67}{30} = 2\frac{7}{30}$

Question 8

Without using your calculator, work out $2\frac{1}{4} - \frac{11}{12}$.

You must show all your working and give your answer as a fraction in its lowest terms. [3]

$\frac{9}{4} \overset{\times 3}{\underset{\times 3}{}} - \frac{11}{12} = \frac{27}{12} - \frac{11}{12} = \frac{16}{12} = \frac{4}{3} = 1\frac{1}{3}$

Question 9

Calculate $\frac{2.07 - 1.89}{5.71 - 3.92}$. [1]

$\frac{0.18 \times 100}{1.79 \times 100} = \frac{18}{179}$

Question 10

Write the following as single fractions.

(a) $x + \frac{x}{2}$ [1]

$\frac{3x}{2}$

(b) $x + \frac{2}{x}$ [1]

$\frac{x^2 + 2}{x}$

Question 11

Work out $\frac{2}{3} + \frac{1}{6} - \frac{1}{4}$, giving your answer as a fraction in its lowest terms.

[3]

Do not use a calculator and show all the steps of your working.

$\frac{2}{3} \times \frac{4}{4} + \frac{1}{6} \times \frac{2}{2} - \frac{1}{4} \times \frac{3}{3} = \frac{8}{12} + \frac{2}{12} - \frac{3}{12} = \frac{7}{12}$

Question 12

Without using a calculator, work out $1\frac{4}{5} \div \frac{3}{7}$.

[3]

Show all your working and give your answer as a fraction in its lowest terms.

$\frac{9}{5} \div \frac{3}{7} = \frac{9}{5} \times \frac{7}{3} = \frac{21}{5} = 4\frac{1}{5}$

Question 13

Without using a calculator, work out $\frac{4}{5} \div 2\frac{2}{3}$

Write down all the steps of your working and give your answer as a fraction in its simplest form.

$\frac{4}{5} \div \frac{8}{3} = \frac{4}{5} \times \frac{3}{8} = \frac{3}{10}$

[3]

Question 1

Without using a calculator, work out $1\frac{7}{8} \div \frac{5}{9}$

Show all your working and give your answer as a fraction in its lowest terms. [3]

$\frac{15}{8} \div \frac{5}{9} = \frac{\cancel{15}^{3}}{8} \times \frac{9}{\cancel{5}_{1}} = \frac{27}{8} = 3\frac{3}{8}$

Question 2

Without using your calculator, work out $2\frac{7}{9} \div \frac{5}{6}$. [4]

Give your answer as a fraction in its lowest terms.
You must show each step of your working.

$\frac{25}{9} \div \frac{5}{6} = \frac{\cancel{25}^{5}}{\cancel{9}_{3}} \times \frac{\cancel{6}^{2}}{\cancel{5}_{1}} = \frac{10}{3} = 3\frac{1}{3}$

Question 3

Without using a calculator, work out $\frac{1}{4} + \frac{1}{6}$.

Write down all the steps in your working and give your answer as a fraction in its simplest form. [2]

$\frac{1 \times 3}{4 \times 3} + \frac{1 \times 2}{6 \times 2} = \frac{3}{12} + \frac{2}{12} = \frac{5}{12}$

Question 4

Without using a calculator, work out $1\frac{1}{6} \div \frac{7}{8}$. [3]

Show all your working and give your answer as a fraction in its lowest terms.

$\frac{7}{6} \div \frac{7}{8} = \frac{\cancel{7}^{1}}{\cancel{6}_{3}} \times \frac{\cancel{8}^{4}}{\cancel{7}_{1}} = \frac{4}{3}$

Question 5

Without using your calculator, work out $\frac{5}{6} - \left(\frac{1}{2} \times 1\frac{1}{2}\right)$.

Write down all the steps of your working. [3]

$\frac{5}{6} - \left(\frac{1}{2} \times \frac{3}{2}\right) = \frac{5^{\times 2}}{6_{\times 2}} - \frac{3^{\times 3}}{4_{\times 3}} = \frac{10}{12} - \frac{9}{12} = \frac{1}{12}$

Question 6

Without using a calculator, work out $1\frac{1}{4} - \frac{7}{9}$. [3]

Write down all the steps in your working.

$\frac{5^{\times 9}}{4_{\times 9}} - \frac{7^{\times 4}}{9_{\times 4}} = \frac{45}{36} - \frac{28}{36} = \frac{17}{36}$

Question 7

Show that $1\frac{1}{2} \div \frac{3}{16} = 8$. [2]

Do not use a calculator and show all the steps of your working.

$\frac{3}{2} \div \frac{3}{16} = \frac{\cancel{3}^{1}}{\cancel{2}_{1}} \times \frac{\cancel{16}^{8}}{\cancel{3}_{1}} = 8$

Question 8

Do not use a calculator in this question and show all the steps of your working.

Give each answer as a fraction in its lowest terms.

Work out.

(a) $\frac{3}{4} - \frac{1}{12}$ [2]

$\frac{3}{4} \times \frac{3}{3} - \frac{1}{12} = \frac{9}{12} - \frac{1}{12} = \frac{8}{12} = \frac{2}{3}$

(b) $2\frac{1}{2} \times \frac{4}{25}$ [2]

$\frac{5}{2} \times \frac{4}{25} = \frac{2}{5}$

Question 9

Without using a calculator, work out $\frac{6}{7} \div 1\frac{2}{3}$.

Write down all the steps in your working. [3]

$\frac{6}{7} \div \frac{5}{3} = \frac{6}{7} \times \frac{3}{5} = \frac{18}{35}$

Question 10

Write down all your working to show that the following statement is correct. [2]

$$\frac{1+\frac{8}{9}}{2+\frac{1}{2}} = \frac{34}{45}$$

$1 + \frac{8}{9} = \frac{9}{9} + \frac{8}{9} = \frac{17}{9}$

$2 + \frac{1}{2} = \frac{4}{2} + \frac{1}{2} = \frac{5}{2}$

$\frac{\frac{17}{9}}{\frac{5}{2}} = \frac{17}{9} \times \frac{2}{5} = \frac{34}{45}$

Question 11

Show that $\left(\frac{1}{10}\right)^2 + \left(\frac{2}{5}\right)^2 = 0.17.$

[2]

Write down all the steps in your working.

$\frac{1}{100} + \frac{4}{25} = 0.01 + 0.16 = 0.17$

Question 12

Without using your calculator, work out $1\frac{5}{6} + \frac{9}{10}$

You must show your working and give your answer as a mixed number in its simplest form. [3]

$\frac{11 \times 5}{6 \times 5} + \frac{9 \times 3}{10 \times 3} = \frac{55}{30} + \frac{27}{30} = \frac{82}{30} = \frac{41}{15}$

$= 2\frac{11}{15}$

Question 13

$1\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{p}{12}$

Work out the value of p.

Show all your working. [2]

$\frac{3 \times 6}{2 \times 6} + \frac{1 \times 4}{3 \times 4} + \frac{1 \times 3}{4 \times 3} = \frac{18}{12} + \frac{4}{12} + \frac{3}{12} = \frac{25}{12} = \frac{p}{12}$

$\therefore p = 25$

Question 1

Without using your calculator, work out the following.
Show all the steps of your working and give each answer as a fraction in its simplest form.

(a) $\frac{11}{12} - \frac{1}{3}$ [2]

$\frac{11}{12} - \frac{1}{3}^{\times 4} = \frac{11}{12} - \frac{4}{12} = \frac{7}{12}$

(b) $\frac{1}{4} \div \frac{11}{13}$ [2]

$\frac{1}{4} \times \frac{13}{11} = \frac{13}{44}$

Question 2

Write down all the working to show that $\dfrac{\frac{3}{5}+\frac{2}{3}}{\frac{3}{5}\times\frac{2}{3}} = 3\frac{1}{6}$ [3]

$\frac{3}{5}^{\times 3} + \frac{2}{3}^{\times 5} = \frac{9}{15} + \frac{10}{15} = \frac{19}{15}$

$\frac{3}{5} \times \frac{2}{3} = \frac{2}{5}$

$\frac{19}{15} \div \frac{2}{5} = \frac{19}{15_3} \times \frac{1}{2} = \frac{19}{6} = 3\frac{1}{6}$

Question 3

Jiwan incorrectly wrote $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} = 1\frac{3}{9}$. [3]

Show the correct working and write down the answer as a mixed number.

$\frac{1}{1}^{\times 12} + \frac{1}{2}^{\times 6} + \frac{1}{3}^{\times 4} + \frac{1}{4}^{\times 3} = \frac{12}{12} + \frac{6}{12} + \frac{4}{12} + \frac{3}{12} = \frac{25}{12} = 2\frac{1}{12}$

Question 4

Show that $3^{-2} + 2^{-2} = \frac{13}{36}$. [2]

Write down all the steps of your working.

$\frac{1}{3^2} + \frac{1}{2^2} = \frac{1}{9} \overset{\times 4}{} + \frac{1}{4} \overset{\times 9}{} = \frac{4}{36} + \frac{9}{36} = \frac{13}{36}$

Question 5

Show that $1\frac{5}{9} \div 1\frac{7}{9} = \frac{7}{8}$. [2]

Write down all the steps in your working.

$\frac{14}{9} \div \frac{16}{9} = \frac{\cancel{14}^{7}}{\cancel{9}_{1}} \times \frac{\cancel{9}^{1}}{\cancel{16}_{8}} = \frac{7}{8}$

Question 6

(a) Find the value of x when $\frac{18}{24} = \frac{27}{x}$. [1]

$\frac{\cancel{18}^{3}}{\cancel{24}_{4}} = \frac{\cancel{27}^{3}}{x}$

$x = 36$

(b) Show that $\frac{2}{3} \div 1\frac{1}{6} = \frac{4}{7}$. [2]

Write down all the steps in your working.

$\frac{2}{3} \div \frac{7}{6} = \frac{2}{\cancel{3}_{1}} \times \frac{\cancel{6}^{2}}{7} = \frac{4}{7}$

Question 7

Show that $\frac{7}{27} + 1\frac{7}{9} = 2\frac{1}{27}$. [2]

Write down all the steps in your working.

$\frac{7}{27} + \frac{16 \times 3}{9 \times 3} = \frac{7}{27} + \frac{48}{27} = \frac{55}{27} = 2\frac{1}{27}$

Question 8

Write down the number which is 3.6 less than – 4.7 . [1]

$-4.7 - 3.6 = -8.3$

Question 9

Show that $3\frac{3}{4} + 1\frac{1}{3} = 5\frac{1}{12}$ [2]

Write down all the steps in your working.

$\frac{15^{\times 3}}{4_{\times 3}} + \frac{4^{\times 4}}{3_{\times 4}} = \frac{45}{12} + \frac{16}{12} = \frac{61}{12} = 5\frac{1}{12}$

Question 10

Write as a single fraction $\frac{3a}{8} + \frac{4}{5}$. [2]

$$\frac{3a}{8} \times \frac{5}{5} + \frac{4}{5} \times \frac{8}{8} = \frac{15a}{40} + \frac{32}{40} = \frac{15a+32}{40}$$

Question 11

(a) $\frac{2}{3} + \frac{5}{6} = \frac{x}{2}$. [1]

Find the value of x.

$$\frac{2}{3} \times \frac{4}{4} + \frac{5}{6} \times \frac{2}{2} = \frac{8}{12} + \frac{10}{12} = \frac{18}{12} = \frac{3}{2} = \frac{x}{2}$$

$$x = 3$$

(b) $\frac{5}{3} \div \frac{3}{y} = \frac{40}{9}$. [1]

Find the value of y.

$$\frac{5}{3} \times \frac{y}{3} = \frac{5y}{9} = \frac{40}{9}$$

$$5y = 40$$

$$y = 8$$

Question 12

Work out the value of $\dfrac{-\frac{1}{2} - \frac{3}{8}}{-\frac{1}{2} + \frac{3}{8}}$. [2]

$$-\frac{1}{2} \times \frac{4}{4} - \frac{3}{8} = -\frac{4}{8} - \frac{3}{8} = -\frac{7}{8}$$

$$-\frac{1}{2} \times \frac{4}{4} + \frac{3}{8} = -\frac{4}{8} + \frac{3}{8} = -\frac{1}{8}$$

$$-\frac{7}{8} \div \left(-\frac{1}{8}\right)$$

$$= -\frac{7}{8} \times (-8) = 7$$

Question 1

Without using a calculator, work out $1\frac{2}{3} - \frac{11}{15}$.
Write down all the steps of your working and give your answer as a fraction in its lowest terms. [3]

$\frac{5}{3} \times 5 - \frac{11}{15} = \frac{25}{15} - \frac{11}{15} = \frac{14}{15}$

Question 2

(a) Write $\frac{11}{3}$ as a mixed number. [1]

$3\frac{2}{3}$

(b) **Without using a calculator**, work out $\frac{1}{4} + \frac{5}{12}$.
Show all the steps of your working and give your answer as a fraction in its lowest terms. [2]

$\frac{1}{4} \times 3 + \frac{5}{12} = \frac{3}{12} + \frac{5}{12} = \frac{8}{12} = \frac{2}{3}$

Question 3

Without using a calculator, work out $1\frac{2}{3} + \frac{5}{7}$. [3]

Write down all the steps of your working and give your answer as a mixed number in its simplest form.

$\frac{5}{3} \times 7 + \frac{5}{7} \times 3 = \frac{35}{21} + \frac{15}{21} = \frac{50}{21} = 2\frac{8}{21}$

Question 4

Without using your calculator, work out $\frac{11}{12} - \left(\frac{3}{4} - \frac{2}{3}\right)$. [4]

You must show all your working and give your answer as a fraction in its simplest form.

$\frac{3}{4} \times 3 \quad \frac{2}{3} \times 4$

$\times 3 \quad \times 4$

$= \frac{9}{12} - \frac{8}{12} = \frac{1}{12}$

$\frac{11}{12} - \frac{1}{12} = \frac{10}{12} = \frac{5}{6}$

Question 5

Without using your calculator, work out $3\frac{1}{3} \div 2\frac{1}{2}$.

You must show all your working and give your answer as a mixed number in its simplest form. [3]

$\frac{10}{3} \div \frac{5}{2} = \frac{10^{2}}{3} \times \frac{2}{5_{1}} = \frac{4}{3} = 1\frac{1}{3}$

Question 6

Without using a calculator, work out $\frac{6}{7} \div 1\frac{2}{3}$.

Show all your working and give your answer as a fraction in its lowest terms. [3]

$\frac{6}{7} \div \frac{5}{3} = \frac{6}{7} \times \frac{3}{5} = \frac{18}{35}$

Question 7

Without using a calculator, show that $\left(\frac{49}{16}\right)^{-\frac{3}{2}} = \frac{64}{343}$.

[2]

Write down all the steps in your working.

$\left(\frac{16}{49}\right)^{3/2} = \left(\frac{4^2}{7^2}\right)^{3/2} = \left(\frac{4}{7}\right)^3 = \frac{64}{343}$

Question 8

Write $\frac{1}{c} + \frac{1}{d} - \frac{c-d}{cd}$ as a single fraction in its simplest form.

[3]

$\frac{1\times d}{c\times d} + \frac{1\times c}{d\times c} - \frac{c-d}{cd} = \frac{d}{cd} + \frac{c}{cd} - \frac{c-d}{cd} = \frac{d+c-c+d}{cd}$

$= \frac{2d}{cd} = \frac{2}{c}$

Question 9

Work out the value of $1 + \frac{2}{3+\frac{4}{5+6}}$.

[2]

$\frac{4}{5+6} = \frac{4}{11}$ $\quad 3 + \frac{4}{11} = \frac{33}{11} + \frac{4}{11} = \frac{37}{11}$

$2 \div \frac{37}{11} = 2 \times \frac{11}{37} = \frac{22}{37}$ $\quad 1 + \frac{22}{37} = \frac{37}{37} + \frac{22}{37} = \frac{59}{37}$

$= 1\frac{22}{37}$

Question 10

$\frac{4c}{5} - \frac{3c}{35} = \frac{10}{7}$. Find c.

[2]

$\frac{4c^{\times 7}}{5_{\times 7}} - \frac{3c}{35} = \frac{28c}{35} - \frac{3c}{35} = \frac{25c}{35} = \frac{5c}{7} = \frac{10}{7}$

$5c = 10$

$c = 2$