

# FRACTIONS (THE FOUR RULES)

DATE OF SOLUTIONS: 15/05/2018

MAXIMUM MARK: 59

# SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1. [Edexcel, 2016]

Fractions (The Four Rules) [2 Marks]

Show that  $\frac{3}{4} + \frac{4}{5} = 1\frac{11}{20}$

ADD [COMMON DENOMINATORS]

$$\begin{aligned}\frac{3}{4} + \frac{4}{5} &= \frac{15}{20} + \frac{16}{20} \quad \text{(B1) [COMMON DENOMINATORS]} \\ &= \frac{31}{20} \quad \text{(B1)} \\ &= 1\frac{11}{20} \quad \underline{\underline{\text{QED!}}}\end{aligned}$$

Show that  $\frac{4}{9} - \frac{1}{6} = \frac{5}{18}$

$$\begin{array}{l} \frac{4}{9} - \frac{1}{6} = \frac{8}{18} - \frac{3}{18} \leftarrow \textcircled{\text{BI}} \text{ (ACCEPT 36)} \\ \uparrow \quad \nearrow \\ \text{LCM} = 18 \\ = \frac{5}{18} \quad \underline{\underline{\text{QED!}}} \end{array}$$

Show that  $\frac{3}{8} \div \frac{7}{12} = \frac{9}{14}$

$$\frac{3}{8} \div \frac{7}{12} = \frac{3}{8} \times \frac{12}{7} \quad (B1)$$

$$= \frac{36}{56} \quad (B1)$$

$$= \frac{9}{14}$$

(a) Show that  $\frac{7}{8} - \frac{5}{6} = \frac{1}{24}$

$$\frac{7}{8} - \frac{5}{6} = \frac{42}{48} - \frac{40}{48} \quad \text{(BI) [COMMON DENOMINATOR]}$$

$$= \frac{2}{48} \quad \text{(BI)} = \underline{\underline{\frac{1}{24}}}$$

(b) Show that  $\frac{5}{8} \div \frac{7}{12} = 1\frac{1}{14}$

$$\frac{5}{8} \div \frac{7}{12} = \frac{5}{\cancel{2}8} \times \frac{12}{7} \quad \text{(MI) [FOR } \times \frac{12}{7}]$$

$$= \frac{5}{2} \times \frac{3}{7}$$

$$= \frac{15}{14} \quad \text{(BI)}$$

$$= \underline{\underline{1\frac{1}{14}}}$$

Show that  $1\frac{2}{3} \div \frac{3}{4} = 2\frac{2}{9}$ .

$$\begin{aligned} 1\frac{2}{3} \div \frac{3}{4} &= \frac{5}{3} \div \frac{3}{4} && \textcircled{B1} \\ &= \frac{5}{3} \times \frac{4}{3} && \textcircled{B1} \text{ [CHANGE TO MULTIPLY]} \\ &= \frac{20}{9} && \textcircled{B1} \\ &= \underline{\underline{2\frac{2}{9}}} \text{ QED!} \end{aligned}$$

(a) Show that  $\frac{4}{5} + \frac{2}{3} = 1\frac{7}{15}$

$$\begin{aligned} \frac{4}{5} + \frac{2}{3} &= \frac{12}{15} + \frac{10}{15} \quad (B1) \\ &= \frac{22}{15} \quad (B1) = 1\frac{7}{15} \end{aligned}$$

(2)

(b) Show that  $2\frac{1}{4} \div 3\frac{1}{2} = \frac{9}{14}$

$$\begin{aligned} &= \frac{9}{4} \div \frac{7}{2} \quad (B1) \\ &= \frac{9}{4} \times \frac{2}{7} \quad (B1) \\ &= \frac{18}{28} \quad (B1) \end{aligned} \quad \begin{array}{l} \nearrow \\ \nearrow \\ \nearrow \end{array} \quad = \frac{9}{14}$$

(3)

(a) Show that  $\frac{6}{7} \div 4 = \frac{3}{14}$

$$\begin{aligned} \frac{6}{7} \div 4 &= \frac{6}{7} \times \frac{1}{4} \quad \text{(mi) CHANGING TO 'X'} \\ &= \frac{6}{28} \quad \text{(mi)} \\ &= \frac{3}{14} \quad \text{QED!} \end{aligned}$$

(2)

(b) Show that  $3\frac{2}{5} - 1\frac{2}{3} = 1\frac{11}{15}$

$$\begin{aligned} &3\frac{2}{5} - 1\frac{2}{3} \\ &\swarrow \quad \searrow \\ &3 - 1 = 2 \quad \text{(mi)} \quad \quad \quad \frac{2}{5} - \frac{2}{3} = \frac{6}{15} - \frac{10}{15} \quad \text{(mi) COMMON DENOMINATOR} \\ &\quad \quad \quad = -\frac{4}{15} \\ &\searrow \quad \swarrow \\ &2 - \frac{4}{15} = 1\frac{11}{15} \quad \text{QED!} \\ &\quad \quad \quad \text{(mi)} \end{aligned}$$

NOTE: YOU COULD CONVERT TO IMPROPER FRACTIONS, THEN SUBTRACT AND CHANGE BACK TO MIXED NUMBER,

(3)

(a) Show that  $1\frac{1}{5} \times 2\frac{1}{3} = 2\frac{4}{5}$

$$\begin{aligned}
 1\frac{1}{5} \times 2\frac{1}{3} &= \frac{6}{5} \times \frac{7}{3} && \text{(mi) [IMPROPER FRACTIONS]} \\
 &= \frac{42}{15} && \text{(mi) [MULTIPLYING]} \\
 &= \frac{14}{5} && \text{(mi) [CANCELLING]} \\
 &= \underline{\underline{2\frac{4}{5}}}
 \end{aligned}$$

(3)

(b) Write the numbers 3, 4, 5 and 6 in the boxes to give the greatest possible total.  
You may write each number only once.

$$\boxed{6} \frac{1}{\boxed{3}} + 2 \frac{\boxed{4}}{\boxed{5}}$$

(A)

$$6\frac{1}{4} + 2\frac{5}{3} \text{ IS NOT ACCEPTABLE!}$$

(1)

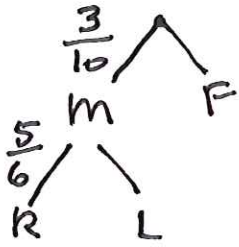
YOU CAN'T HAVE A  
MIXED NUMBER WITH AN  
IMPROPER FRACTION!



(a)  $\frac{3}{10}$  of the members of a tennis club are men.

$\frac{5}{6}$  of these men are right-handed.

Work out the fraction of the members of the tennis club who are right-handed men.



$$\frac{3}{10} \times \frac{5}{6} = \frac{15}{60} \rightarrow \frac{1}{4} \quad \text{(A1)}$$

(2)

(b)  $\frac{7}{12}$  of the members of a badminton club are women.

$\frac{3}{8}$  of the members of the badminton club wear glasses.

MUST BE A MULTIPLE OF 12

Work out the smallest possible number of members of the badminton club.

MUST BE A MULTIPLE OF 8

LCM OF 12 AND 8

24  
.....  
(2)

[GIVE (A1) FOR AN ANSWER OF 48]

- (a) Nikos drinks  $\frac{2}{3}$  of a litre of orange juice each day.  
How many litres does Nikos drink in 5 days?  
Give your answer as a mixed number.

$$\frac{2}{3} \times 5 = \frac{10}{3} \quad (A1)$$

$$= \underline{\underline{3\frac{1}{3}}}$$

$$\underline{\underline{3\frac{1}{3}}} \quad (A1)$$

(2)

- (b) (i) Find the lowest common multiple of 4 and 6.

$$4 \rightarrow 4, 8, \underline{12}, 16, \dots \quad 6 \rightarrow 6, \underline{12}, 18, \dots \quad \dots \underline{\underline{12}} \quad (A1)$$

- (ii) Work out  $3\frac{3}{4} + 2\frac{5}{6}$ .

Give your answer as a mixed number.

You must show all your working.

$$3\frac{3}{4} + 2\frac{5}{6}$$

$$3+2 = \underline{\underline{5}}$$

$$\frac{3}{4} + \frac{5}{6} = \frac{9}{12} + \frac{10}{12} \quad (B1)$$

$$= \frac{19}{12}$$

$$= 1\frac{7}{12}$$

ADD IN!

$$= \underline{\underline{6\frac{7}{12}}}$$

$$\underline{\underline{6\frac{7}{12}}} \quad (A1)$$

(3)

Lethna worked out  $\frac{2}{5} + \frac{1}{2}$

She wrote:

$$\frac{2}{5} + \frac{1}{2} = \frac{2}{10} + \frac{1}{10} = \frac{3}{10}$$

The answer of  $\frac{3}{10}$  is wrong.

(a) Describe one mistake that Lethna made.

WHEN CHANGING TO COMMON DENOMINATORS,  
LETHNA DID NOT CHANGE THE NUMERATORS (B1)

(1)

Dave worked out  $1\frac{1}{2} \times 5\frac{1}{3}$

He wrote:

$$1 \times 5 = 5 \quad \text{and} \quad \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$$

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

The answer of  $5\frac{1}{6}$  is wrong.

(b) Describe one mistake that Dave made.

HE DID NOT CHANGE THE MIXED NUMBERS  
INTO IMPROPER FRACTIONS (B1)

(1)

↑  
ACCEPT ANY OTHER WAY OF  
SAYING THIS.

(a) Show that  $\frac{3}{10} + \frac{2}{15} = \frac{13}{30}$

$$\begin{aligned} \frac{3}{10} + \frac{2}{15} &= \frac{9}{30} + \frac{4}{30} \\ &= \frac{13}{30} \end{aligned}$$

(mi) [COMMON DENOMINATORS]

(mi) [FRACTIONS CORRECT]

(2)

(b) Show that  $2\frac{5}{8} \div 1\frac{1}{6} = 2\frac{1}{4}$

$$2\frac{5}{8} \div 1\frac{1}{6} = \frac{21}{8} \div \frac{7}{6}$$

(mi) [IMPROPER FRACTIONS]

$$= \frac{21}{8} \times \frac{6}{7}$$

(mi) [MULTIPLY AND FLIP]

$$= \frac{126}{56}$$

(mi) [EITHER]

$$= \frac{9}{4}$$

$$= \underline{\underline{2\frac{1}{4}}}$$

(3)

Show that  $2\frac{1}{4} \times 2\frac{2}{3} = 6$

$$2\frac{1}{4} \times 2\frac{2}{3} = \frac{9}{4} \times \frac{8}{3} \quad \text{(M1) [IMPROPER FRACTIONS]}$$

$$= \frac{72}{12} \quad \text{(M2) [MULTIPLYING]}$$

$$= \underline{\underline{6}} \quad \text{(M3) [CANCELLING]}$$

Show that  $7\frac{1}{2} - 4\frac{2}{3} = 2\frac{5}{6}$

$$\begin{aligned}7\frac{1}{2} - 4\frac{2}{3} &= \frac{15}{2} - \frac{14}{3} \quad (m1) \\ &= \frac{45}{6} - \frac{28}{6} \quad (m1) \\ &= \frac{17}{6} \quad (m1) \\ &= \underline{\underline{2\frac{5}{6}}} \quad \text{Q.E.D.}\end{aligned}$$

Show that  $1\frac{1}{2} \div 1\frac{1}{4} = 1\frac{1}{5}$

$$1\frac{1}{2} \div 1\frac{1}{4} = \frac{3}{2} \div \frac{5}{4} \quad (B) \text{ [IMPROPER FRACTIONS]}$$

$$= \frac{3}{2} \times \frac{4}{5} \quad (M) \text{ [CHANGE TO MULTIPLY]}$$

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

} (M) [EITHER]

$$= 1\frac{1}{5}$$

$$\text{Find } \frac{1}{3} - \left(\frac{1}{3} \times \frac{1}{3}\right) + \left(\frac{1}{3} \div \frac{1}{3}\right)$$

Show clear working out.

$$\frac{1}{3} - \left(\frac{1}{3} \times \frac{1}{3}\right) + \left(\frac{1}{3} \div \frac{1}{3}\right) = \frac{1}{3} - \frac{1}{9} + \left(\frac{1}{3} \times \frac{3}{1}\right)$$

$$= \frac{1}{3} - \frac{1}{9} + 1$$

$$= \frac{3}{9} - \frac{1}{9} + 1$$

$$= \frac{2}{9} + 1$$

$$1 \frac{2}{9} \quad \text{(AI)} \quad \left[ \text{OR } \frac{11}{9} \right]$$

(3)



Show that  $\left(3\frac{3}{4} - 2\frac{2}{3}\right) \times 1\frac{1}{2} = 1\frac{5}{8}$

$$3\frac{3}{4} - 2\frac{2}{3} = \frac{15}{4} - \frac{8}{3}$$

$$= \frac{45 - 32}{12} \quad \text{(mi) [COMMON DENOMINATOR]}$$

$$= \frac{13}{12} \quad \text{(A1)}$$

STEP 2

$$\frac{13}{12} \times 1\frac{1}{2} = \frac{13}{12} \times \frac{3}{2} \quad \text{(mi) [IMPROPER FRACTIONS]}$$

$$= \frac{39}{24}$$

$$= \frac{13}{8}$$

$$= 1\frac{5}{8}$$

(mi) [MULTIPLYING AND CANCELLING - EITHER!]

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B1 - This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of ‘follow through’).

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Note that some questions contain the words ‘show that’, ‘show your working out’, or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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