IM-005 · Fractions, decimals and percentages: converting, ordering and recurring decimals

IGCSE Mathematics (0580) · HomiLabs: Maths · Ep 005

All questions are Core (C) unless tagged (E). No calculator anywhere on this sheet.

Set A · Fluency

1. Write each fraction as a decimal and as a percentage: (a) $\frac{3}{5}$ (b) $\frac{7}{8}$

2. Write $\frac{11}{20}$ as a decimal and as a percentage.

3. Write each as a fraction in its simplest form: (a) 0.32 (b) 65% (c) 2.5%

4. Write 1.6 as a percentage and as a mixed number.

5. Write in order, smallest first: $0.6,\ \frac{5}{8},\ 59\%,\ \frac{3}{5}$ (two of them are equal).

6. Which of these fractions give terminating decimals? Write those decimals down. $\frac{3}{16},\ \frac{7}{30},\ \frac{21}{28},\ \frac{1}{45}$

7. (E) Write in dot notation: (a) 0.454545… (b) 0.38888… (c) 0.207207207…

8. (E) Write as fractions in their simplest form: (a) $0.\dot{7}$ (b) $0.\dot{0}\dot{9}$

Set B · Exam style

1. (Paper 1/2 · no calculator) (C) Write these numbers in order, largest first: $0.3,\ \frac{7}{25},\ 31\%,\ 0.29$ [2]

2. (Paper 1/2 · no calculator) (C) In a class of 40 students, $\frac{3}{8}$ walk to school and 45% come by bus. The rest come by car. (a) What percentage of the class come by car? (b) How many students come by car? [3]

3. (Paper 1/2 · no calculator) (E) Show that $0.\dot{4}\dot{8} = \frac{16}{33}$. [3]

4. (Paper 1/2 · no calculator) (E) Write $0.3\dot{1}\dot{8}$ as a fraction in its simplest form. [3]

Challenge

(E) (a) Without dividing, decide which of $\frac{7}{56},\ \frac{7}{35},\ \frac{7}{42}$ give terminating decimals. Explain using prime factors (Ep 2).
(b) Write $0.1\dot{6} + 0.\dot{3}$ as a single fraction in its simplest form (Ep 4).

Answers

Set A

1. (a) 0.6, 60% (b) 0.875, 87.5%

2. 0.55, 55%

3. (a) $\frac{32}{100} = \frac{8}{25}$ (b) $\frac{65}{100} = \frac{13}{20}$ (c) $\frac{2.5}{100} = \frac{25}{1000} = \frac{1}{40}$

4. 160%, $1\frac{3}{5}$

5. 59%, 0.6, $\frac{3}{5}$, $\frac{5}{8}$ (0.6 and $\frac{3}{5}$ are equal; $\frac{5}{8} = 0.625$)

6. $\frac{3}{16} = 0.1875$ ($16 = 2^4$) and $\frac{21}{28} = \frac{3}{4} = 0.75$. $\frac{7}{30}$ ($30 = 2 \times 3 \times 5$) and $\frac{1}{45}$ ($45 = 3^2 \times 5$) recur.

7. (a) $0.\dot{4}\dot{5}$ (b) $0.3\dot{8}$ (c) $0.\dot{2}0\dot{7}$

8. (a) $\frac{7}{9}$ (b) $\frac{9}{99} = \frac{1}{11}$

Set B

1. 0.3, 0.28, 0.31, 0.29 seen M1; $31\%,\ 0.3,\ 0.29,\ \frac{7}{25}$ A1.

2. (a) $\frac{3}{8} = 37.5\%$ M1; $100 - 37.5 - 45 = 17.5\%$ A1. (b) $0.175 \times 40 = 7$ B1 (or 40 − 15 − 18 = 7).

3. $x = 0.4848\ldots$, $100x = 48.4848\ldots$ M1; $99x = 48$ A1; $x = \frac{48}{99} = \frac{16}{33}$ A1.

4. $10x = 3.1818\ldots$ and $1000x = 318.1818\ldots$ M1; $990x = 315$ A1; $x = \frac{315}{990} = \frac{7}{22}$ A1.

Challenge

(a) $\frac{7}{56} = \frac{1}{8}$ ($8 = 2^3$): terminates (0.125). $\frac{7}{35} = \frac{1}{5}$: terminates (0.2). $\frac{7}{42} = \frac{1}{6}$ ($6 = 2 \times 3$): recurs. Simplify first.
(b) $0.1\dot{6} = \frac{1}{6}$ and $0.\dot{3} = \frac{1}{3}$, so the sum is $\frac{1}{6} + \frac{2}{6} = \frac{1}{2}$.