Grade 8 – Book B

(Teacher's Guidelines)

(Revised CAPS edition)

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Chapter B1

Rational numbers – common fractions

B1.1 Number systems:

Complete:
Rational numbers: $\mathbb{Q} = \{ \frac{a}{b} \mid a, b \in \mathbb{Z} ; b \neq 0 \}$

Remember the properties of 1: (i) $a \times 1 = a$
(ii) $\frac{a}{1} = a$
(iii) $\frac{a}{a} = 1$

B1.2 Equivalent fractions:

E.g.1 Write two equivalent fractions for $\frac{1}{2}$*:*

$\frac{1 \times 3}{2 \times 3} = \frac{3}{6}$ *or* $\frac{1 \times 5}{2 \times 5} = \frac{5}{10}$ *[These are* ***possible*** *answers!]*

Exercise 1: Date: ____________________

(1) Write three equivalent fractions for each of the following rational numbers:
These are possible answers!

(a) $\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{10}{15}$ (b) $\frac{1}{4} = \frac{2}{8} = \frac{10}{40} = \frac{100}{400}$
(c) $\frac{-1}{3} = \frac{-2}{6} = \frac{-5}{15} = \frac{-4}{12}$ (d) $\frac{2}{5} = \frac{-4}{-10} = \frac{6}{15} = \frac{20}{50}$
(e) $\frac{2}{-7} = \frac{10}{-35} = \frac{-20}{70} = \frac{16}{-56}$ (f) $\frac{-4}{3} = \frac{-8}{6} = \frac{-12}{9} = \frac{-20}{15}$
(g) $\frac{1}{6} = \frac{2}{12} = \frac{3}{18} = \frac{11}{66}$ (h) $\frac{3}{2} = \frac{21}{14} = 1\frac{1}{2} = \frac{30}{20}$
(i) $\frac{10}{14} = \frac{5}{7} = \frac{20}{28} = \frac{-15}{-21}$ (j) $\frac{-36}{-9} = \frac{36}{9} = \frac{4}{1} = \frac{12}{3}$
(k) $2\frac{6}{11} = 2\frac{12}{22} = \frac{28}{11} = 2\frac{24}{44}$ (l) $3 = \frac{3}{1} = \frac{6}{2} = \frac{30}{10}$

(2) Are the following equivalent fractions or not? (Answer only yes or no.)

(a) $\frac{1}{2} = \frac{7}{14}$ Yes (b) $\frac{3}{7} = \frac{7}{3}$ No (c) $\frac{5}{-2} = \frac{10}{4}$ No
(d) $\frac{-3}{-5} = \frac{9}{15}$ Yes (e) $\frac{2}{3} = \frac{5}{6}$ No (f) $\frac{3}{1} = \frac{48}{16}$ Yes
(g) $\frac{4}{-3} = \frac{-12}{9}$ Yes (h) $\frac{25}{10} = \frac{5}{2}$ Yes (i) $\frac{5}{4} = \frac{25}{16}$ No

(3) Complete the following equivalent fractions:

(a) $\frac{3}{8}{}^{\times 3}_{\times 3} = \frac{9}{24}$ (b) $\frac{12}{14} = \frac{6 \times 2}{7 \times 2}$ (c) $\frac{3 \times -2}{3 \times 9} = \frac{-6}{27}$
(d) $\frac{5}{6} = \frac{35 \div 7}{42 \div 7}$ (e) $\frac{-3}{-4} = \frac{12 \div -4}{16 \div -4}$ (f) $\frac{4}{3}{}^{\times 3}_{\times 3} = 1\frac{1}{3} = \frac{12}{9}$
(g) $\frac{3 \div -6}{3 \div 33} = \frac{-4}{22}$ $\hookrightarrow \frac{-2}{11} \nearrow \frac{\times 2}{2}$ (h) $3\frac{2}{5} = \frac{-34}{-10}$ $\frac{17}{5} \times \frac{-2}{-2}$ (i) $\frac{6}{6} = \frac{11}{11} = 1$

B1.3 Arrange rational numbers:

E.g.2 (a) Arrange in ascending order : $\frac{1}{2}$; $\frac{3}{4}$ *and* $\frac{2}{3}$

$\frac{1}{2} = \frac{6}{12}$; $\frac{3}{4} = \frac{9}{12}$ *and* $\frac{2}{3} = \frac{8}{12}$

$\therefore \underline{\frac{1}{2} < \frac{2}{3} < \frac{3}{4}}$

(b) Write a rational number between $\frac{3}{4}$ *and* $\frac{1}{3}$:

$\frac{3}{4} = \frac{9}{12}$ *and* $\frac{1}{3} = \frac{4}{12}$

$\therefore \underline{\frac{1}{3} < \frac{5}{12} \text{ or } \frac{6}{12} \text{ or } \frac{7}{12} \text{ or } \frac{8}{12} < \frac{3}{4}}$

Exercise 2: Date: ____________________

(1) Arrange the following fractions in ascending order:

(a) $\frac{5}{6}$; $\frac{3}{4}$ and $\frac{4}{5}$

$\therefore \frac{5}{6} = \frac{50}{60}$; $\frac{3}{4} = \frac{45}{60}$; $\frac{4}{5} = \frac{48}{60}$

$\therefore \frac{3}{4} < \frac{4}{5} < \frac{5}{6}$

(b) $\frac{2}{3}$; $\frac{5}{7}$ and $\frac{4}{6}$

$\therefore \frac{2}{3} = \frac{28}{42}$; $\frac{5}{7} = \frac{30}{42}$; $\frac{4}{6} = \frac{28}{42}$

$\therefore \frac{2}{3} = \frac{4}{6} < \frac{5}{7}$

(c) $\frac{1}{2}$; $\frac{2}{3}$ and $\frac{5}{6}$

$\therefore \frac{1}{2} = \frac{3}{6}$; $\frac{2}{3} = \frac{4}{6}$; $\frac{5}{6} = \frac{5}{6}$

$\therefore \frac{1}{2} < \frac{2}{3} < \frac{5}{6}$

(d) $\frac{-3}{7}$; $\frac{-1}{3}$ and $\frac{-2}{5}$

$\therefore \frac{-3}{7} = \frac{-45}{105}$; $\frac{-1}{3} = \frac{-35}{105}$; $\frac{-2}{5} = \frac{-42}{105}$

$\therefore \frac{-3}{7} < \frac{-2}{5} < \frac{-1}{3}$

(2) Arrange the following fractions in descending order:

(a) $\frac{3}{8}$; $\frac{2}{3}$ and $\frac{5}{6}$

$\therefore \frac{3}{8} = \frac{9}{24}$; $\frac{2}{3} = \frac{16}{24}$; $\frac{5}{6} = \frac{20}{24}$

$\therefore \frac{5}{6} > \frac{2}{3} > \frac{3}{8}$

(b) $\frac{3}{5}$; $\frac{5}{7}$ and $\frac{6}{8}$

$\therefore \frac{3}{5} = \frac{84}{140}$; $\frac{5}{7} = \frac{100}{140}$; $\frac{6}{8} = \frac{3}{4} = \frac{105}{140}$

$\therefore \frac{6}{8} > \frac{5}{7} > \frac{3}{5}$

(c) $\frac{-1}{2}$; $\frac{-2}{3}$ and $\frac{-3}{5}$

$\frac{-1}{2} = \frac{-15}{30}$; $\frac{-2}{3} = \frac{-20}{30}$; $\frac{-3}{5} = \frac{-18}{30}$

$\frac{-1}{2} > \frac{-3}{5} > \frac{-2}{3}$

(d) $\frac{2}{4}$; $\frac{6}{12}$ and $\frac{-5}{-10}$

$\frac{2}{4} = \frac{30}{60}$; $\frac{6}{12} = \frac{30}{60}$; $\frac{-5}{-10} = \frac{30}{60}$

$\frac{2}{4} = \frac{6}{12} = \frac{-5}{-10}$

(3) Write one rational number between the following fractions:

(a) $\frac{5}{6}$ and $\frac{3}{4}$

$\frac{5}{6} = \frac{20}{24}$ and $\frac{3}{4} = \frac{18}{24}$

$\therefore \frac{3}{4} < \frac{19}{24} < \frac{5}{6}$

(b) $\frac{-1}{3}$ and $\frac{-3}{5}$

$\frac{-1}{3} = \frac{-5}{15}$ and $\frac{-3}{5} = \frac{-9}{15}$

$\frac{-1}{3} > \frac{-7}{15} > \frac{-3}{5}$

Can also be $\frac{-6}{15}$ or $\frac{-8}{15}$

(c) $\frac{1}{2}$ and $\frac{3}{8}$

$\frac{1}{2} = \frac{4}{8} \quad \frac{8}{16}$ and $\frac{3}{8} = \frac{6}{16}$

$\therefore \frac{3}{8} < \frac{7}{16} < \frac{1}{2}$

(d) $\frac{6}{7}$ and $\frac{7}{10}$

$\frac{6}{7} = \frac{60}{70}$ and $\frac{7}{10} = \frac{49}{70}$

$\therefore \frac{7}{10} < \frac{55}{70} < \frac{6}{7}$

Can also be $\frac{50}{70}$, ---- $\frac{59}{70}$

(e) $\frac{-3}{9}$ and $\frac{-5}{12}$

$\frac{-3}{9} = \frac{-12}{36}$ and $\frac{-5}{12} = \frac{-15}{36}$

$\frac{-5}{12} < \frac{-13}{36} < \frac{-3}{9}$

Can also be: $\frac{-14}{36}$

(f) $\frac{5}{2}$ and 3

$\frac{5}{2} = \frac{10}{4}$ and $\frac{3}{1} = \frac{6}{2} = \frac{12}{4}$

$\frac{5}{2} < \frac{11}{4} < \frac{3}{1}$

☺ **There are four cakes of the same size. Dean eats $\frac{3}{8}$ of the first cake. Phillip eats $\frac{4}{9}$ of the second cake. André eats $\frac{1}{2}$ of the third cake and Mark eats $\frac{4}{6}$ of the last cake. Whose cake had the most left over?**

$\frac{3}{8} = \frac{27}{72}$ → Dean eats → $\therefore \frac{45}{72}$ left over.

$\frac{4}{9} = \frac{32}{72}$ → Phillip eats → $\therefore \frac{40}{72}$ leftover

$\frac{1}{2} = \frac{36}{72}$ → André eats → $\therefore \frac{36}{72}$ left over.

$\frac{4}{6} = \frac{48}{72}$ → Mark eats → $\therefore \frac{24}{72}$ left over.

∴ Most left over by Dean.

B1.4 Addition and subtraction of fractions:

E.g.3 Simplify:

(a)
$$\frac{1}{2} + \frac{4}{3} - \frac{3}{4}$$
$$= \frac{1}{2}\times\frac{6}{6} + \frac{4}{3}\times\frac{4}{4} - \frac{3}{4}\times\frac{3}{3}$$
$$= \frac{6}{12} + \frac{16}{12} - \frac{9}{12}$$
$$= \frac{6 + 16 - 9}{12}$$
$$= \frac{13}{12}$$
$$= \underline{1\frac{1}{12}}$$

(b)
$$3x + \frac{2}{3}y - \frac{3}{5}x + 1\frac{3}{4}y$$
$$= \frac{3}{1}x - \frac{3}{5}x + \frac{2}{3}y + \frac{7}{4}y$$
$$= \frac{5}{5}\times\frac{3}{1}x - \frac{3}{5}x + \frac{4}{4}\times\frac{2}{3}y + \frac{3}{3}\times\frac{7}{4}y$$
$$= \frac{15}{5}x - \frac{3}{5}x + \frac{8}{12}y + \frac{21}{12}y$$
$$= \frac{15x - 3x}{5} + \frac{8y + 21y}{12}$$
$$= \frac{12x}{5} + \frac{29y}{12} = \underline{2\frac{2}{5}x + 2\frac{5}{12}y}$$

Exercise 3: Date: ____________

Simplify:

(1) $\frac{5}{5}\times\frac{1}{3}+\frac{4}{5}\times\frac{3}{3}$

$=\frac{5}{15}+\frac{12}{15}$

$=\frac{17}{15}$

$=1\frac{2}{15}$

(2) $\frac{5}{5}\times\frac{3}{7}-\frac{3}{5}\times\frac{7}{7}$

$=\frac{15}{35}-\frac{21}{35}$

$=\frac{-6}{35}$

(3) $\frac{1}{4}+1\frac{1}{2}-\frac{5}{8}$

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

$=\frac{2}{8}+\frac{12}{8}-\frac{5}{8}$

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

(4) $2\frac{7}{10}+3\frac{9}{10}$

$=\frac{27}{10}+\frac{39}{10}$

$=\frac{66}{10}$

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

$=6\frac{3}{5}$

(5) $2\frac{1}{3}-3$

$=\frac{7}{3}-\frac{3}{1}\times\frac{3}{3}$

$=\frac{7}{3}-\frac{9}{3}$

$=\frac{-2}{3}$

(6) $-1\frac{2}{5}+2\frac{1}{10}$

$=\frac{-7}{5}+\frac{21}{10}$

$=\frac{-14}{10}+\frac{21}{10}$

$=\frac{-14+21}{10}$

$=\frac{7}{10}$

(7) $\frac{5}{8}+\frac{7}{12}$

$=\frac{15}{24}+\frac{14}{24}$

$=\frac{15+14}{24}$

$=\frac{29}{24}$

$=1\frac{5}{24}$

(8) $\frac{1}{5}-2\frac{2}{3}-\frac{5}{6}$

$=\frac{1}{5}-\frac{8}{3}-\frac{5}{6}$

$=\frac{6}{30}-\frac{80}{30}-\frac{25}{30}$

$=\frac{-99}{30}$

$=-3\frac{9}{30}=-3\frac{3}{10}$

(9) $4\frac{4}{5}-3\frac{7}{10}$

$=\frac{24}{5}-\frac{37}{10}$

$=\frac{48}{10}-\frac{37}{10}$

$=\frac{11}{10}$

$=1\frac{1}{10}$

(10) $\frac{3}{4}+\frac{2}{3}$

$=\frac{9}{12}+\frac{8}{12}$

$=\frac{17}{12}$

$=1\frac{5}{12}$

(11) $4\frac{1}{2}-\frac{2}{5}+\frac{5}{6}$

$=\frac{9}{2}-\frac{2}{5}+\frac{5}{6}$

$=\frac{135}{30}-\frac{12}{30}+\frac{25}{30}$

$=\frac{148}{30}$

$=4\frac{28}{30}=4\frac{14}{15}$

(12) $\left(\frac{3}{7}-\frac{2}{6}\right)-\left(\frac{1}{3}+\frac{1}{7}\right)$

$=\left(\frac{18}{42}-\frac{14}{42}\right)-\left(\frac{7}{21}+\frac{3}{21}\right)$

$=\frac{4}{42}-\frac{10}{21}$

$=\frac{4}{42}-\frac{20}{42}$

$=\frac{-16}{42}=-\frac{8}{21}$

(13) $\frac{3}{8}p-\frac{3}{4}p$

$=\frac{3p}{8}-\frac{3p}{4}$

$=\frac{3p}{8}-\frac{6p}{8}$

$=\frac{-3p}{8}$

(14) $\frac{1}{6}-\frac{1}{3}-\frac{1}{4}$

$=\frac{2}{12}-\frac{4}{12}-\frac{3}{12}$

$=\frac{-5}{12}$

(15) $\left(6 - \frac{1}{4}\right) + \left(\frac{1}{5} - 1\right)$

$= \left(\frac{24}{4} - \frac{1}{4}\right) + \left(\frac{1}{5} - \frac{5}{5}\right)$

$= \frac{23}{4} + \frac{-4}{5}$

$= \frac{115}{20} - \frac{16}{20}$

$= \frac{99}{20} = 4\frac{19}{20}$

(16) $\frac{4}{3} + \frac{6}{5} - \frac{5}{4}$

$= \frac{80}{60} + \frac{72}{60} - \frac{75}{60}$

$= \frac{77}{60}$

$= 1\frac{17}{60}$

(17) $\frac{1}{12} - 15\frac{3}{8} + 1$

$= \frac{1}{12} - \frac{123}{8} + \frac{1}{1}$

$= \frac{2}{24} - \frac{369}{24} + \frac{24}{24}$

$= \frac{-343}{24}$

$= -14\frac{7}{24}$

(18) $\frac{3}{5} - \left(3\frac{1}{3} + \frac{1}{2}\right) - \frac{4}{6}$

$= \frac{3}{5} - \left(\frac{10}{3} + \frac{1}{2}\right) - \frac{4}{6}$

$= \frac{3}{5} - \left(\frac{20}{6} + \frac{3}{6}\right) - \frac{4}{6}$

$= \frac{18}{30} - \frac{115}{30} - \frac{20}{30}$

$= \frac{-117}{30} = -3\frac{27}{30} = -3\frac{9}{10}$

(19) $8 - 2\frac{1}{9} + \frac{7}{3}$

$= \frac{8}{1} - \frac{19}{9} + \frac{7}{3}$

$= \frac{72}{9} - \frac{19}{9} + \frac{21}{9}$

$= \frac{74}{9}$

$= 8\frac{2}{9}$

(20) $\frac{2}{3}x + \frac{1}{6}x$

$= \frac{2x}{3} + \frac{1x}{6}$

$= \frac{4x}{6} + \frac{1x}{6}$

$= \frac{4x + 1x}{6}$

$= \frac{5x}{6}$

(21) $\frac{1}{2}p - 3q + 7\frac{1}{4}p - \frac{1}{3}q$

$= \frac{1p}{2} - \frac{3q}{1} + \frac{29p}{4} - \frac{1q}{3}$

$= \frac{6p}{12} - \frac{36q}{12} + \frac{87p}{12} - \frac{4q}{12}$

$= \frac{6p - 36q + 87p - 4q}{12}$

$= \frac{93p - 40q}{12}$

(22) $-3\frac{1}{5} - \left(-\frac{7}{10}\right)$

$= \frac{-16}{5} + \frac{7}{10}$

$= \frac{-32}{10} + \frac{7}{10}$

$= \frac{-25}{10}$

$= -2\frac{5}{10} = -2\frac{1}{2}$

(23) $1\frac{1}{2} + 2\frac{2}{3} + 3\frac{1}{6}$

$= \frac{3}{2} + \frac{8}{3} + \frac{19}{6}$

$= \frac{9}{6} + \frac{16}{6} + \frac{19}{6}$

$= \frac{44}{6}$

$= 7\frac{2}{6} = 7\frac{1}{3}$

(24) $4\frac{1}{2}y + 3\frac{1}{4}y - 2\frac{2}{3}y$

$= \frac{9}{2}y + \frac{13}{4}y - \frac{8}{3}y$

$= \frac{54}{12}y + \frac{39}{12}y - \frac{32}{12}y$

$= \frac{61y}{12}$

$= 5\frac{1}{12}y$

(25) $\frac{3}{5}m + \frac{4}{6}m$

$= \frac{3m}{5} + \frac{4m}{6}$

$= \frac{18m}{30} + \frac{20m}{30}$

$= \frac{38m}{30}$

$= 1\frac{8}{30}m = 1\frac{4}{15}m$

(26) $6\frac{3}{4} - \left(2\frac{1}{3} - 1\frac{1}{3}\right)$

$= \frac{27}{4} - \left(\frac{7}{3} - \frac{4}{3}\right)$

$= \frac{27}{4} - \frac{3}{3}$

$= 6\frac{3}{4} - 1$

$= 5\frac{3}{4}$

(27) $\frac{-10}{11}xy + \frac{1}{2}x + \frac{1}{2}xy$

$= \frac{-10xy}{11} + \frac{1x}{2} + \frac{1xy}{2}$

$= \frac{-20xy}{22} + \frac{11x}{22} + \frac{11xy}{22}$

$= \frac{-20xy + 11x + 11xy}{22}$

$= \frac{-9xy + 11x}{22}$

(28) $25\frac{3}{20} - 33\frac{3}{20}$

$= -8$

(29) $\left(3\frac{1}{4} - 2\frac{1}{5}\right) - 2\frac{1}{4}$

$= \left(\frac{13}{4} - \frac{11}{5}\right) - \frac{9}{4}$

$= \left(\frac{65}{20} - \frac{44}{20}\right) - \frac{9}{4}$

$= \frac{21}{20} - \frac{45}{20}$

$= \frac{-24}{20} = -1\frac{4}{20} = -1\frac{1}{5}$

(30) $\frac{3}{4}m - \frac{1}{2}k + \frac{1}{2}k + \frac{3}{4}m$

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

$= \frac{3m}{4} - \frac{2k}{4} + \frac{2k}{4} + \frac{3m}{4}$

$= \frac{3m - 2k + 2k + 3m}{4}$

$= \frac{6m}{4} = \frac{3m}{2}$

E.g.4 Simplify :

(a) $\frac{2}{3x} + \frac{6}{x}$

$= \frac{2}{3x} + \frac{6}{x} \times \frac{3}{3}$

$= \frac{2 + 18}{3x} = \underline{\frac{20}{3x}}$

(b) $\frac{y}{2} - \frac{y^2}{5}$

$= \frac{y}{2} \times \frac{5}{5} - \frac{y^2}{5} \times \frac{2}{2}$

$= \frac{5y - 2y^2}{10}$

<u>Exercise 4</u>:

Date: ____________________

Simplify:

(1) $\frac{m}{2} + \frac{2m}{3}$

$= \frac{3m}{6} + \frac{4m}{6}$

$= \frac{7m}{6}$

$= 1\frac{1}{6}m$

(2) $\frac{5}{x} - \frac{3}{x^2}$

$= \frac{5x}{x^2} - \frac{3}{x^2}$

$= \frac{5x - 3}{x^2}$

(3) $\frac{2y}{5} - \frac{y^2}{3} - \frac{1}{2}$

$= \frac{12y}{30} - \frac{10y^2}{30} - \frac{15}{30}$

$= \frac{12y - 10y^2 - 15}{30}$

(4) $-\frac{1}{4}q + \frac{2}{3}q$

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

$= \frac{-3q}{12} + \frac{8q}{12}$

$= \frac{5q}{12}$

(5) $k - 4 - \frac{2}{k^2}$

$= \frac{k^3}{k^2} - \frac{4k^2}{k^2} - \frac{2}{k^2}$

$= \frac{k^3 - 4k^2 - 2}{k^2}$

(6) $\frac{2}{2} \times \frac{2}{x} + \frac{x}{2} \times \frac{x}{x}$

$= \frac{4}{2x} + \frac{x^2}{2x}$

$= \frac{4 + x^2}{2x}$

(7) $\frac{3}{a} - \frac{2}{c} + 1$

$= \frac{3c}{ac} - \frac{2a}{ac} + \frac{ac}{ac}$

$= \frac{3c - 2a + ac}{ac}$

(8) $\frac{-x^2}{5} + \frac{x}{4} - \frac{1}{2}$

$= \frac{-4x^2}{20} + \frac{5x}{20} - \frac{10}{20}$

$= \frac{-4x^2 + 5x - 10}{20}$

(9) $c + \frac{3c}{7} - 2$

$= \frac{c}{1} + \frac{3c}{7} - \frac{2}{1}$

$= \frac{7c}{7} + \frac{3c}{7} - \frac{14}{7}$

$= \frac{7c + 3c - 14}{7}$

$= \frac{10c - 14}{7}$

(10) $\frac{5}{x} - \frac{3}{xy}$

$= \frac{5y}{xy} - \frac{3}{xy}$

$= \frac{5y - 3}{xy}$

(11) $\frac{-2}{3p} + \frac{5}{2p}$

$= \frac{-4}{6p} + \frac{15}{6p}$

$= \frac{-4 + 15}{6p}$

$= \frac{11}{6p}$

(12) $\frac{4k}{7} - k$

$= \frac{4k}{7} - \frac{k}{1}$

$= \frac{4k}{7} - \frac{7k}{7}$

$= \frac{-3k}{7}$

☺ **Complete the next three terms in the sequence:** $1\frac{3}{4}$; $2\frac{1}{4}$; $2\frac{3}{4}$; $3\frac{1}{4}$; $3\frac{3}{4}$; $4\frac{1}{4}$

Can you predict the hundredth term? Write it down. $51\frac{1}{4}$

B1.5 Multiplication and division:

E.g.5 Simplify

(a) $\frac{2}{3} \times \frac{8}{12}$

$= \frac{\cancel{2}^{1}}{3} \times \frac{8}{\cancel{12}^{6}}$

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

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

(b) $1\frac{1}{3} \div \frac{4}{15}$

$= \frac{4}{3} \times \frac{15}{4}$

$= \frac{\cancel{4}^{1}}{\cancel{3}^{1}} \times \frac{\cancel{15}^{5}}{\cancel{4}^{1}}$

$= \underline{5}$

Exercise 5:

Date: ____________________

Simplify:

(1) $\frac{\cancel{2}}{\cancel{3}} \times \frac{\cancel{3}^{1}}{4_{2}}$

$= \frac{1}{2}$

(2) $\frac{\cancel{4}^{2}}{5} \times \frac{7}{\cancel{2}_{1}}$

$= \frac{14}{5} = 2\frac{4}{5}$

(3) $\frac{5}{\cancel{3}_{1}} \times \frac{\cancel{9}^{3}}{2}$

$= \frac{15}{2} = 7\frac{1}{2}$

(4) $\frac{4}{7} \times \frac{5}{9}$

$= \frac{20}{63}$

(5) $\frac{\cancel{18}^{3}}{{}_{5}\cancel{25}} \times \frac{\cancel{15}^{3}}{\cancel{16}_{4}}$

$= \frac{9}{20}$

(6) $\frac{18}{\cancel{7}_{1}} \times \frac{\cancel{14}^{2}}{1}$

$= 36$

(7) $\frac{4}{5} \div \frac{3}{5}$

$= \frac{4}{\cancel{5}} \times \frac{\cancel{5}}{3}$

$= \frac{4}{3} = 1\frac{1}{3}$

(8) $1\frac{6}{7}$ of $4\frac{2}{3}$

$= \frac{13}{\cancel{7}_{1}} \times \frac{\cancel{14}^{2}}{3}$

$= \frac{26}{3} = 8\frac{2}{3}$

(9) $2 \div \frac{3}{4}$

$= \frac{2}{1} \times \frac{4}{3}$

$= \frac{8}{3} = 2\frac{2}{3}$

(10) $2\frac{4}{5} \div 4\frac{1}{5}$

$= \frac{14}{5} \div \frac{21}{5}$

$= \frac{\cancel{14}^{2}}{\cancel{5}_{1}} \times \frac{\cancel{5}^{1}}{\cancel{21}_{3}}$

$= \frac{2}{3}$

(11) $6 \div 2\frac{1}{4}$

$= \frac{6}{1} \div \frac{9}{4}$

$= \frac{\cancel{6}^{2}}{1} \times \frac{4}{\cancel{9}_{3}}$

$= \frac{8}{3} = 2\frac{2}{3}$

(12) $2\frac{2}{3} \times 1\frac{1}{5} \times 3\frac{3}{4}$

$= \frac{\cancel{8}^{2}}{\cancel{3}_{1}} \times \frac{\cancel{6}^{2}}{\cancel{5}} \times \frac{\cancel{15}^{3}}{\cancel{4}_{1}}$

$= 12$

(13) $6\frac{7}{8} \div 5$

$= \frac{55}{8} \div \frac{5}{1}$

$= \frac{\cancel{55}^{11}}{8} \times \frac{1}{\cancel{5}_{1}}$

$= \frac{11}{8}$

$= 1\frac{3}{8}$

(14) $\frac{-3}{9} \times 2\frac{1}{4}$

$= \frac{-3}{\cancel{9}} \times \frac{\cancel{9}}{4}$

$= \frac{-3}{4}$

(15) $-2\frac{2}{3} \div 4\frac{1}{2}$

$= \frac{-8}{3} \div \frac{9}{2}$

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

$= \frac{-16}{27}$

(16) $5\frac{1}{7}$ of $\left(-2\frac{3}{4}\right) \div \frac{-5}{14}$

$= \frac{36}{7} \times \frac{-11}{4} \div \frac{-5}{14}$

$= \frac{\cancel{36}\,9}{\cancel{7}\,1} \times \frac{-11}{\cancel{4}\,1} \times \frac{\cancel{14}\,2}{-5}$

$= \frac{-198}{-5} = 39\frac{3}{5}$

(17) $6\frac{1}{4} \times \left(3\frac{3}{5} \div 3\frac{3}{4}\right)$

$= \frac{25}{4} \times \left(\frac{18}{5} \div \frac{15}{4}\right)$

$= \frac{\cancel{25}\,\cancel{5}\,1}{\cancel{4}} \times \frac{18}{\cancel{5}\,1} \times \frac{\cancel{4}}{\cancel{15}\,3}$

$= \frac{18}{3} = 6$

(18) $\frac{1}{3} \div \left(\frac{\cancel{2}}{3} \times \frac{1}{\cancel{2}}\right) \div 2$

$= \frac{1}{3} \div \frac{1}{3} \div \frac{2}{1}$

$= \frac{1}{\cancel{3}} \times \frac{\cancel{3}}{1} \times \frac{1}{2}$

$= \frac{1}{2}$

(19) $\frac{1}{3} \div \frac{-1}{6} \div 1\frac{3}{5}$

$= \frac{1}{3} \times \frac{6}{-1} \div \frac{8}{5}$

$= \frac{1}{\cancel{3}\,1} \times \frac{\cancel{6}\,\cancel{2}\,1}{-1} \times \frac{5}{\cancel{8}\,4}$

$= \frac{5}{-4}$

$= -1\frac{1}{4}$

E.g.6 Simplify

(a) $\frac{4b}{12a} \times \frac{24a}{8b}$

$= \frac{{}^{1}\cancel{4b}}{{}^{1}\cancel{12a}} \times \frac{{}^{2}\cancel{24a}}{{}^{3}\cancel{8b}}$

$= \frac{2}{2}$

$= \underline{1}$

(b) $\frac{4y^2}{3} \div \frac{2y}{x}$

$= \frac{4y^2}{3} \times \frac{x}{2y}$

$= \frac{{}^{2}\cancel{4}\,y.\cancel{y}}{3} \times \frac{x}{\cancel{2}\cancel{y}}$

$= \underline{\frac{2xy}{3}}$

Exercise 6: Date: ____________________

Simplify:

(1) $\frac{\overset{2}{\cancel{6}}}{1} \times \frac{m}{\cancel{9}\,3}$

$= \frac{2m}{3}$

(2) $\frac{\overset{1}{\cancel{4}}p^{\cancel{2}}}{\cancel{3}\,1} \times \frac{\cancel{6}\,2}{{}_{2}\cancel{8}\cancel{p}}$

$= \frac{2p}{2}$

$= p$

(3) $\frac{gh}{k} \div \frac{h}{gk}$

$= \frac{g\cancel{h}}{\cancel{k}} \times \frac{g\cancel{k}}{\cancel{h}}$

$= g^2$

(4) $\frac{-5x^2\cancel{y}}{\cancel{3}\,1} \times \frac{\overset{5}{\cancel{15}}y}{x\cancel{y}}$

$= \frac{-25x^2y}{\cancel{x}}$

$= -25xy$

(5) $\frac{3p}{4q} \div \frac{-27}{2q}$

$= \frac{{}^{1}\cancel{3}p}{{}_{2}\cancel{4}\cancel{q}} \times \frac{\overset{1}{\cancel{2}}\cancel{q}}{-\cancel{27}\,9}$

$= \frac{p}{-18}$

(6) $\frac{7m}{12n} \div \frac{14mn}{3}$

$= \frac{\overset{1}{\cancel{7m}}}{{}_{4}\cancel{12}n} \times \frac{\cancel{3}\,{}^{1}}{\cancel{14}\cancel{m}n\,{}_{2}}$

$= \frac{1}{8n^2}$