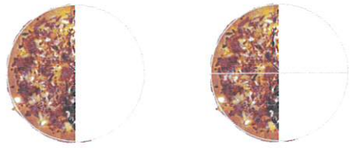
1.6 Fractions

Fractions

A fraction is part of a whole. A fraction is made up of a top number (numerator) and a bottom number (denominator). The denominator tells us how many parts the whole is divided into and the numerator identifies how many parts we have.

$\frac{3}{4}$ ← 3 numerator, 4 denominator

Equivalent Fractions are fractions that have the same value even though they have different numbers. Consider the pizzas below.



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

Equivalent fractions can be generated by multiplying or dividing the numerator and denominator by the same number.

Improper Fractions are fractions where the numerator is greater than or equal to the denominator.

For example $\frac{5}{3}$ and $\frac{9}{8}$ are improper fractions.

Mixed Numbers are numbers that are made up of a whole part and a fraction.

For example $3\frac{2}{5}$ and $1\frac{3}{7}$ are mixed numbers.

Mixed Numbers to Improper Fraction

We can convert a mixed number to an improper fraction by converting the whole number part into a fraction with the same denominator as the fractional part of the mixed number.

For example $2\frac{2}{3}$

$= \frac{2\text{x}3+2}{3}$

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

We have converted 2 into $\frac{6}{3}$ and then added $\frac{2}{3}$ to get $\frac{8}{3}$.

Extra Notes

On the TI-30XB Multiview we can convert a mixed number to an improper fraction by using the $\text{U}\frac{\text{n}}{\text{d}}$ button. To convert $2\frac{2}{3}$ to an improper fraction enter: :

2 | 2nd | $\frac{\text{n}}{\text{d}}$ | 2 | ▼ | 3 | enter

which gives $\frac{8}{3}$.

On the Casio fx-82MS we can convert a mixed number to an improper fraction by using the d/c button. To convert $2\frac{2}{3}$ to an improper fraction enter:

2 | ab/c | 2 | ab/c | 3 | =

SHIFT | d/c which gives $\frac{8}{3}$.

On the TI-30XB Multiview we can convert an improper fraction to a mixed number by using the $\frac{\text{n}}{\text{d}}\text{-U}\frac{\text{n}}{\text{d}}$ button. To convert $\frac{8}{3}$ to an improper fraction enter:

8 | $\frac{\text{n}}{\text{d}}$ | 3 | ▶ | 2nd | $\frac{\text{n}}{\text{d}}\text{-U}\frac{\text{n}}{\text{d}}$ | enter

which gives $2\frac{2}{3}$.

On the Casio fx-82MS we can convert an improper fraction to a mixed number. To convert $\frac{8}{3}$ to an improper fraction enter:

8 | ab/c | 3 | = which gives $2\frac{2}{3}$.

Improper Fraction to Mixed Number

We can convert an improper fraction to a mixed number by dividing the numerator by the denominator and writing the remainder as a fraction over the original denominator.

For example $\frac{8}{3}$

$= (8 \div 3)$

$= 2$ with a remainder of 2 over 3

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

Example

a) Find an equivalent fraction to $\frac{5}{8}$.

b) Convert $4\frac{3}{7}$ to an improper fraction.

c) Convert $\frac{29}{6}$ to a mixed number.

a) To find an equivalent fraction to $\frac{5}{8}$ we need to multiply the numerator and denominator by the same number. We can chose any number.

Possible solutions are: $\frac{10}{16}, \frac{15}{24}, \frac{20}{32}, \frac{25}{40}$ etc.

b) To convert $4\frac{3}{7}$ to an improper fraction we first convert the whole number 4 into sevenths, (by multiplying 4 by 7) and then add the three-sevenths.

So $\frac{28}{7}+\frac{3}{7}=\frac{31}{7}$.

c) To convert $\frac{29}{6}$ to an mixed number we divide 29 by 6 and put the remainder over the original denominator i.e. 6.

So $\frac{29}{6} = 29 \div 6$

$= 4\frac{5}{6}$

Achievement – Fill in the missing boxes to make the fractions equivalent.

261. $\frac{4}{11} = \frac{8}{\square}$

262. $\frac{2}{3} = \frac{6}{\square}$

263. $\frac{5}{9} = \frac{\square}{36}$

264. $\frac{11}{12} = \frac{77}{\square}$

265. $\frac{14}{24} = \frac{\square}{12}$

266. $\frac{35}{50} = \frac{7}{\square}$

267. $\frac{28}{20} = \frac{7}{\square}$

268. $\frac{60}{55} = \frac{\square}{11}$

269. $\frac{13}{14} = \frac{\square}{84}$

270. $\frac{19}{25} = \frac{133}{\square}$

271. Taylor earns $85 per week and pays $15 in tax.

a) What fraction of her earnings does Taylor pay in tax?

b) Give an equivalent simplified fraction for your answer in part a).

272. In a box of 90 light bulbs 12 are found to be faulty.

a) What fraction of the light bulbs are faulty?

b) Give an equivalent simplified fraction for your answer in part a).

Achievement – Convert the following mixed numbers to improper fractions and any improper fractions to mixed numbers.

273. $\frac{95}{8}$

274. $\frac{23}{7}$

275. $\frac{13}{4}$

276. $\frac{49}{9}$

277. $\frac{53}{12}$

278. $\frac{26}{9}$

279. $\frac{88}{12}$

280. $\frac{19}{18}$

281. $\frac{45}{4}$

282. $\frac{111}{9}$

283. $\frac{68}{14}$

284. $\frac{112}{13}$

285. $3\frac{2}{7}$

286. $1\frac{1}{6}$

287. $10\frac{10}{13}$

288. $3\frac{1}{2}$

289. $2\frac{4}{5}$

290. $1\frac{1}{3}$

291. $2\frac{3}{8}$

292. $1\frac{11}{12}$

293. $4\frac{3}{4}$

294. $2\frac{11}{15}$

295. $3\frac{8}{13}$

296. $6\frac{9}{11}$

297. Seven pizzas are divided evenly among three friends. What fraction of pizza does each friend get? Write your answer as a mixed number.

298. 128 bars of chocolate are to be divided between 5 families. What fraction of the chocolate bars does each family get? Write your answer as a mixed number.

299. The first XI scored a total of 548 runs in three one day cricket matches. How many runs did they score on average for each match. Write your answer as a mixed number

300. A basketball team comprising five members scores 68 points in a game. On average how many points did each player score? Write your answer as a mixed numeral.

Fractions – Addition and Subtraction

Addition of Fractions using Written Methods

To add fractions using written methods we begin by converting any mixed numerals (whole numbers plus fractions) into improper fractions.

For the problem $2\frac{2}{3}+1\frac{3}{4}$ we rewrite each of the mixed numerals as improper fractions i.e $\frac{8}{3}+\frac{7}{4}$.

(Note $2\frac{2}{3}=\frac{2x3+2}{3}$ and $1\frac{3}{4}=\frac{1x4+3}{4}$)

To add fractions the denominators (bottom part of the fractions) must be the same. If they are not we must find a number that both the denominators divide into. The easiest way of doing this is to multiply the two denominators together. In this case 4 x 3 = 12, so 12 is our common denominator.

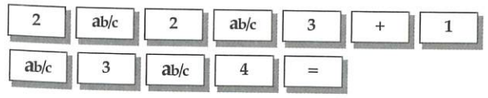
We now rewrite both improper fractions so that they have a denominator of 12. So $\frac{8}{3}=\frac{32}{12}$ and $\frac{7}{4}=\frac{21}{12}$. Once both denominators are the same we can add the two numerators together. In summary

$$2\frac{2}{3}+1\frac{3}{4}=\frac{8}{3}+\frac{7}{4}$$
$$=\frac{32}{12}+\frac{21}{12}$$
$$=\frac{53}{12}$$
$$=4\frac{5}{12}$$

Addition of Fractions using a Calculator

On the Casio fx-82MS we enter the problem from left to right just as it is written down using the fraction key.

For the problem $2\frac{2}{3}+1\frac{3}{4}$ we enter:



which gives $4\frac{5}{12}$.

Subtraction of Fractions using Written Methods

To subtract fractions using written methods we begin by converting any mixed numerals (whole numbers plus fractions) into improper fractions.

For the problem $2\frac{2}{3}-1\frac{3}{4}$ we rewrite each of the mixed numerals as improper fractions i.e $\frac{8}{3}-\frac{7}{4}$.

(Note $2\frac{2}{3}=\frac{2x3+2}{3}$ and $1\frac{3}{4}=\frac{1x4+3}{4}$)

To subtract fractions the denominators (bottom part of the fractions) must be the same. If they are not we must find a number that both the denominators divide into. The easiest way of doing this is to multiply the two denominators together. In this case 4 x 3 = 12, so 12 is our common denominator.

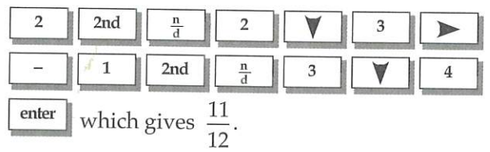
We now rewrite both improper fractions so that they have a denominator of 12. So $\frac{8}{3}=\frac{32}{12}$ and $\frac{7}{4}=\frac{21}{12}$. Once both denominators are the same we can subtract the two numerators together. In summary

$$2\frac{2}{3}-1\frac{3}{4}=\frac{8}{3}-\frac{7}{4}$$
$$=\frac{32}{12}-\frac{21}{12}$$
$$=\frac{11}{12}$$

Subtraction of Fractions using a Calculator

On the TI-30XB Multiview we enter the problem from left to right just as it is written down using the fraction key.

For the problem $2\frac{2}{3}-1\frac{3}{4}$ we enter:



which gives $\frac{11}{12}$.

When using a calculator it is a good idea to do the problem twice, ensuring you get the same answer both times. This reduces the likelihood of 'key in' error.

Example

Evaluate the following using written methods.

a) $3\frac{2}{5}+1\frac{3}{7}$

b) $4\frac{5}{8}-2\frac{4}{5}$

We begin by changing any mixed numerals to improper fractions.

a) $3\frac{2}{5}+1\frac{3}{7} = \frac{17}{5}+\frac{10}{7}$

$= \frac{119}{35}+\frac{50}{35}$

$= \frac{169}{35}$

$= 4\frac{29}{35}$

b) $4\frac{5}{8}-2\frac{4}{5} = \frac{37}{8}-\frac{14}{5}$

$= \frac{185}{40}-\frac{112}{40}$

$= \frac{73}{40}$

$= 1\frac{33}{40}$

Example

Evaluate the following using your calculator.

a) $3\frac{2}{5}+1\frac{3}{7}$

b) $4\frac{5}{8}-2\frac{4}{5}$

We enter the problem from left to right just as it is written down.

a)

3	ab/c	2	ab/c	5	+
1	ab/c	3	ab/c	7	=

which gives $4\frac{29}{35}$.

b)

4	2nd	n/d	5	▼	8
►	–	2	2nd	n/d	4
▼	5	enter			

which gives $\frac{73}{40}$. This can be displayed as the mixed number $1\frac{33}{40}$ by pressing

2nd	$\frac{n}{d}$◄► U $\frac{n}{d}$

Achievement – Evaluate the following using your calculator. Do each problem twice, as a check, to reduce the likelihood of 'key in' error.

301. $\frac{4}{7}+\frac{3}{5}=$

302. $\frac{2}{9}+\frac{1}{4}=$

303. $\frac{9}{10}-\frac{3}{7}=$

304. $\frac{6}{7}-\frac{3}{8}=$

305. $1\frac{1}{2}+\frac{4}{9}=$

306. $\frac{4}{5}+2\frac{3}{4}=$

307. $4\frac{3}{8}-\frac{3}{7}=$

308. $2\frac{1}{4}-1\frac{3}{5}=$

309. $5\frac{3}{10}-3\frac{2}{3}=$

310. $8\frac{3}{4}-5\frac{5}{8}=$

Achievement – Evaluate the following using your calculator. Do each problem twice, as a check, to reduce the likelihood of 'key in' error.

311. $\frac{1}{4}+\frac{3}{5}+\frac{4}{7}=$

312. $1\frac{1}{2}+2\frac{3}{7}+1\frac{4}{5}=$

313. $\frac{7}{8}-\frac{1}{4}-\frac{1}{2}=$

314. $3\frac{5}{9}-1\frac{1}{3}-1\frac{3}{5}=$

315. $2\frac{3}{4}+1\frac{1}{5}+3\frac{2}{3}=$

316. $4\frac{5}{6}-1\frac{1}{5}-2\frac{2}{3}=$

Merit – Answer the following application problems, showing a line of working to indicate the calculation you are doing.

317. A recipe calls for $\frac{1}{3}$ of a cup of white flour and $2\frac{2}{5}$ cups of brown flour. How much flour is used in total in the recipe?

318. If you drink $5\frac{3}{4}$ glasses of water and $3\frac{2}{3}$ glasses of juice in one day how many glasses have you had in total?

319. A painter uses $5\frac{3}{8}$ litres of paint on one wall and $6\frac{2}{5}$ litres on another wall. How much more paint did he use on the larger wall?

320. In a European country one-eighth speak French and two-thirds speak German. The rest speak English. What fraction speak English?

321. Maria practices $1\frac{1}{3}$ hours of soccer on Friday, $\frac{7}{9}$ hour of soccer on Saturday, and $\frac{3}{8}$ hour of soccer on Sunday. How many hours of soccer did she practice altogether?

322. Miguel has to use $2\frac{1}{6}$ teaspoons of salt and $3\frac{5}{8}$ teaspoons of vanilla extract for a recipe. How much more vanilla extract does he have to use than salt?

323. A salesman travelled $\frac{2}{5}$ of his journey before lunch and $\frac{3}{8}$ after lunch. What fraction of his journey has he still to complete?

324. $\frac{2}{7}$ of the runs in a cricket game were scored by the opening batsmen and $\frac{3}{5}$ by the wicket keeper. What fraction of the runs did the rest of the team score?

Calculate the following addition and subtraction problems using written methods. Find your answers in the code at the bottom of the page and then enter the corresponding letter of the question to answer the riddle.

I	$\frac{3}{7}+\frac{2}{5}$	H	$\frac{7}{9}-\frac{3}{4}$	G	$1\frac{2}{3}+\frac{1}{2}$
A	$2\frac{3}{4}-\frac{7}{8}$	N	$2\frac{3}{5}+1\frac{2}{9}$	S	$4\frac{3}{7}-2\frac{2}{5}$
C	$3\frac{1}{10}+4\frac{1}{8}$	E	$4\frac{5}{6}-2\frac{3}{4}$	T	$5\frac{3}{11}-2\frac{4}{5}$
A	$\frac{2}{5}+\frac{3}{7}+\frac{1}{3}$	O	$\frac{19}{20}-\frac{1}{3}-\frac{2}{5}$	N	$1\frac{2}{5}+2\frac{1}{4}+\frac{1}{10}$
E	$3\frac{4}{5}-\frac{7}{8}-1\frac{1}{2}$	L	$2\frac{5}{9}+1\frac{2}{3}+3\frac{1}{2}$	O	$\frac{25}{3}-\frac{17}{5}$

Why did the golfer have a spare pair of pants?

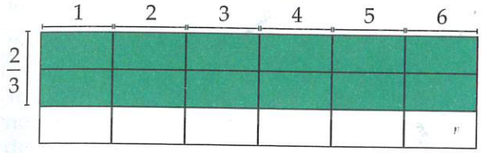
$\frac{29}{35}$	$3\frac{37}{45}$		$7\frac{9}{40}$	$1\frac{17}{105}$	$2\frac{1}{35}$	$2\frac{1}{12}$		$\frac{1}{36}$	$1\frac{17}{40}$
$2\frac{1}{6}$	$4\frac{14}{15}$	$2\frac{26}{55}$		$1\frac{7}{8}$		$\frac{1}{36}$	$\frac{13}{60}$	$7\frac{13}{18}$	$1\frac{17}{40}$
			$\frac{29}{35}$	$3\frac{3}{4}$		$4\frac{14}{15}$	$3\frac{37}{45}$	$1\frac{17}{40}$	

Fractions of a Quantity

Fractions of an Amount

To find a fraction of an amount or quantity you multiply the amount by the fraction,

i.e. $\frac{2}{3}$ of 6 means $\frac{2}{3}$ x 6



The diagram above shows $\frac{2}{3}$ of each of six units shaded, giving twelve $\frac{1}{3}$s in total, which equals 4.

Alternatively to find $\frac{2}{3}$ of 6 we first find $\frac{1}{3}$ of 6 by dividing by 3, i.e. 6 ÷ 3 = 2 and then multiply the answer by 2 (i.e 2 x 2) to find $\frac{2}{3}$s, which equals 4.

Example

Find the following.

a) $\frac{2}{5}$ of 30

b) $\frac{\square}{8}$ of 24 = 15

c) $\frac{4}{7}$ of $\square$ = 8

d) $\frac{3}{\square}$ of 20 = 15

a) $\frac{1}{5}$ of 30 = 30 ÷ 5 = 6

so $\frac{2}{5}$ of 30 = 2 x 6 = 12

b) $\frac{\square}{8}$ of 24 = 15

so $\frac{1}{8}$ of 24 = 24 ÷ 8 = 3

therefore $\square$ x 3 = 15

$\square$ = 5

c) $\frac{4}{7}$ of $\square$ = 8

so $\frac{1}{7}$ of $\square$ = 2 because 8 ÷ 4 = 2

therefore $\square$ = 2 x 7

= 14

d) $\frac{3}{\square}$ of 20 = 15

$\frac{1}{\square}$ of 20 = 5 because 15 ÷ 3 = 5

therefore 5 x $\square$ = 20

so $\square$ = 4

Achievement – Evaluate the following.

325. $\frac{2}{3}$ of 21

326. $\frac{6}{7}$ of 14

327. $\frac{2}{9}$ of 72

328. $\frac{5}{8}$ of 32

329. $\frac{7}{10}$ of 100

330. $\frac{5}{6}$ of 96

331. $\frac{\square}{7}$ of $35 = 10$

332. $\frac{2}{\square}$ of $40 = 16$

333. $\frac{3}{8}$ of $\square = 15$

334. $\frac{\square}{5}$ of $60 = 48$

335. $\frac{4}{\square}$ of $36 = 16$

336. $\frac{5}{11}$ of $\square = 30$

Merit – Evaluate the following, showing a line of working to indicate the calculation you are doing.

337. When a box of eggs is dropped two-thirds of them are broken. If the box holds 18 eggs, how many are broken?

338. One hundred and fifty people take part in a survey. Three-fifths of them are female. How many females are there?

339. Taylor spends ninety-five minutes on his homework. Three-fifths of this time he spent on maths. How long did Taylor spend on maths?

340. A box contains forty-eight glasses, one sixth of which have a manufacturing flaw. How many glasses are flawed?

341. The ingredients for an apple crumble for four people is given in the table below. Complete the table to find the quantity of ingredients for the same recipe for three and five people.

Ingredients for four people	Ingredients for three people	Ingredients for five people
320 g of apple		
56 g of margarine		
112 g of flour		
56 g of sugar		
20 g of fruit juice		
4 g of cinnamon		

Fractions – Multiplication and Division

Multiplication of Fractions using Written Methods

To multiply fractions using written methods we begin by converting any mixed numerals (whole numbers plus fractions) into improper fractions.

For the problem $2\frac{2}{3} \times 1\frac{3}{4}$ we rewrite each of the mixed numerals as improper fractions i.e $\frac{8}{3} \times \frac{7}{4}$.

(Note $2\frac{2}{3} = \frac{2\times3+2}{3}$ and $1\frac{3}{4} = \frac{1\times4+3}{4}$)

To multiply two fractions we multiply the two numerators together (top numbers) and the two denominators together (bottom numbers).

In summary

$$2\frac{2}{3} \times 1\frac{3}{4} = \frac{8}{3} \times \frac{7}{4}$$
$$= \frac{56}{12}$$
$$= 4\frac{8}{12} \quad \left(4\frac{2}{3}\right)$$

Multiplication of Fractions using a Calculator

On the Casio fx-82MS we enter the problem from left to right just as it is written down using the fraction key.

For the problem $2\frac{2}{3} \times 1\frac{3}{4}$ we enter:

2	ab/c	2	ab/c	3	x	1
ab/c	3	ab/c	4	=		

which gives $4\frac{2}{3}$.

When using a calculator it is a good idea to do the problem twice, ensuring you get the same answer both times. This reduces the likelihood of 'key in' error.

Division of Fractions using Written Methods

To divide fractions using written methods we begin by converting any mixed numerals (whole numbers plus fractions) into improper fractions.

For the problem $2\frac{2}{3} \div 1\frac{3}{4}$ we rewrite each of the mixed numerals as improper fractions i.e $\frac{8}{3} \div \frac{7}{4}$.

(Note $2\frac{2}{3} = \frac{2\times3+2}{3}$ and $1\frac{3}{4} = \frac{1\times4+3}{4}$)

To divide fractions we multiply by the reciprocal. The reciprocal of a fraction is where the numerator becomes the denominator and vice versa. The reciprocal of $\frac{7}{4}$ is $\frac{4}{7}$. To divide fractions the first fraction remains the same, the division sign becomes a multiplication sign and the second fraction is changed to the reciprocal.

In summary

$$2\frac{2}{3} \div 1\frac{3}{4} = \frac{8}{3} \div \frac{7}{4}$$
$$= \frac{8}{3} \times \frac{4}{7}$$
$$= \frac{32}{21}$$
$$= 1\frac{11}{21}$$

Division of Fractions using a Calculator

On the TI-30XB Multiview we enter the problem from left to right just as it is written down using the fraction key.

For the problem $2\frac{2}{3} \div 1\frac{3}{4}$ we enter:

2	2nd	$\frac{n}{d}$	2	▼	3	►
÷	1	2nd	$\frac{n}{d}$	3	▼	4
enter						

which gives $\frac{32}{21} = 1\frac{11}{21}$.

Example

Evaluate the following using written methods.

a) $3\frac{2}{5} \times 1\frac{3}{7}$

b) $4\frac{5}{8} \div 2\frac{4}{5}$

We begin by changing any mixed numerals to improper fractions.

a) $3\frac{2}{5} \times 1\frac{3}{7} = \frac{17}{5} \times \frac{10}{7}$

$= \frac{170}{35}$

$= 4\frac{6}{7}$

b) $4\frac{5}{8} \div 2\frac{4}{5} = \frac{37}{8} \div \frac{14}{5}$

$= \frac{37}{8} \times \frac{5}{14}$

$= \frac{185}{112}$

$= 1\frac{73}{112}$

Example

Evaluate the following using your calculator.

a) $3\frac{2}{5} \times 1\frac{3}{7}$

b) $4\frac{5}{8} \div 2\frac{4}{5}$

We enter the problem from left to right just as it is written down.

a)

3	ab/c	2	ab/c	5	x
1	ab/c	3	ab/c	7	=

which gives $4\frac{6}{7}$.

b)

4	2nd	n/d	5	▼	8
►	÷	2	2nd	n/d	4
▼	5	enter			

which gives $\frac{185}{112}$. This can be displayed as the mixed numeral $1\frac{73}{112}$ by pressing

2nd	n/d ◄► U n/d

Achievement – Evaluate the following using your calculator. Do each problem twice, as a check, to reduce the likelihood of 'key in' error.

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

343. $\frac{5}{6} \times \frac{8}{9} =$

344. $\frac{3}{4} \div \frac{2}{9} =$

345. $\frac{5}{11} \div \frac{4}{7} =$

346. $1\frac{3}{4} \times \frac{7}{8} =$

347. $\frac{5}{6} \times 2\frac{2}{3} =$

348. $3\frac{1}{2} \div \frac{5}{8} =$

349. $\frac{5}{9} \div 2\frac{10}{11} =$

350. $4\frac{1}{5} \times 4\frac{2}{3} =$

351. $3\frac{2}{9} \times 2\frac{1}{3} =$

Achievement – Evaluate the following using your calculator. Do each problem twice, as a check, to reduce the likelihood of 'key in' error.

352. $\frac{2}{5} \div \frac{1}{4} \div \frac{2}{3} =$

353. $1\frac{1}{7} \div 2\frac{1}{3} \div 1\frac{3}{4} =$

354. $\frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} =$

355. $1\frac{1}{3} \times 2\frac{1}{5} \times 2\frac{2}{7} =$

356. $2\frac{2}{3} \div 1\frac{1}{4} \div 2\frac{5}{7} =$

357. $2\frac{1}{8} \times 1\frac{1}{2} \times 1\frac{2}{3} =$

Merit – Answer the following application problems, showing a line of working to indicate the calculation you are doing.

358. A recipe calls for $\frac{1}{3}$ of a cup of white flour. If a person wishes to halve the recipe how much flour will they now require?

359. If $\frac{4}{7}$ of Year 11 girls at a school play netball and $\frac{2}{5}$ of these also play hockey, what fraction play hockey?

360. A painter uses $15\frac{1}{2}$ litres of paint on four walls of a shed. What fraction of the paint, in litres, is used on a single wall?

361. $1\frac{1}{2}$ m lengths of wire are cut from a roll comprising $35\frac{3}{4}$ m. How many lengths can be cut and what amount is left over?

362. Tessa buys $12\frac{3}{8}$ m of fabric for costumes for a school concert. Each costume requires $2\frac{1}{5}$ m. How much fabric will she have left over?

363. A farmer uses $\frac{2}{7}$ of his land for growing corn and $\frac{4}{5}$ of the remaining area to grow potatoes. What area of his farm is used to grow potatoes?

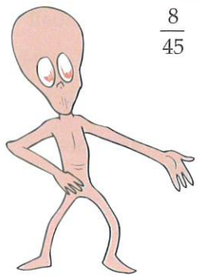
364. Jane was left $\frac{3}{8}$ of an estate, while her brother received $1\frac{1}{4}$ more than the Jane. What fraction did the brother receive and what fraction of the estate remained undivided?

365. Chang was the leading scorer in his basketball team, scoring $\frac{4}{7}$ of the season's points. His friend scored $\frac{3}{5}$ of what Chang scored. If during the season the team scored 455 points how many did the friend score?

Calculate the following multiplication and divison problems using written methods. Find your answers in the code at the bottom of the page and then enter the corresponding letter of the question to answer the riddle.

T	$\frac{4}{5} \times \frac{2}{9}$	Y	$\frac{3}{7} \div \frac{2}{5}$	R	$1\frac{1}{2} \times \frac{4}{7}$
M	$2\frac{2}{3} \div \frac{3}{4}$	R	$1\frac{1}{3} \times 2\frac{1}{4}$	T	$2\frac{5}{6} \div 1\frac{3}{7}$
D	$1\frac{4}{9} \times 3\frac{1}{2}$	O	$3\frac{1}{4} \div 2\frac{3}{4}$	K	$2\frac{3}{7} \times 1\frac{1}{3}$
E	$\frac{3}{5} \times \frac{2}{7} \times \frac{1}{2}$	U	$\frac{1}{4} \div \frac{2}{5} \div \frac{1}{3}$	A	$\frac{13}{4} \times 1\frac{2}{5}$
E	$\frac{9}{4} \div 2\frac{3}{8}$	W	$3 \div 1\frac{2}{5}$	E	$4 \times 1\frac{3}{8}$

What did the alien say to the gardener?



$\frac{8}{45}$	$4\frac{11}{20}$	$3\frac{5}{21}$	$\frac{18}{19}$		$3\frac{5}{9}$	$\frac{3}{35}$		$1\frac{59}{60}$	$1\frac{2}{11}$		
			$1\frac{1}{14}$	$1\frac{2}{11}$	$1\frac{7}{8}$	$\frac{6}{7}$					
		$2\frac{1}{7}$	$5\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{1}{18}$	$5\frac{1}{2}$	3				

Merit/Excellence – Answer the following mixed fraction problems.

366. $\frac{4}{7} \times \square = 24$

367. $\frac{3}{8} \times \square = 36$

368. $\square \times \frac{5}{8} = 40$

369. $\square \times \frac{2}{9} = 16$

370. Each barbecue a family has they use $\frac{2}{9}$ of a bottle of gas. How many barbecues can the family get out of a full gas bottle?

371. A person takes a journey. They travel $\frac{1}{6}$ of the distance by bus, $\frac{4}{5}$ by train and the rest by walking.
a) What fraction of the journey does the person walk?
b) If the journey's total distance is 45 km, how far does the person walk?

372. If you read $\frac{11}{15}$ of a book of 405 pages, how many pages have you still to read?

373. 14 is $\frac{2}{3}$ of what amount?

374. 45 is $\frac{3}{8}$ of what amount?

375. What fraction goes three and a half times into three?

376. By how much is the product of three and two-thirds and four and four-fifths less than 20?

377. How many pieces of tape eight and two-fifths centimetres in length can be cut from a roll of tape one hundred and forty centimetres in length?

378. A farmer uses $\frac{1}{3}$ of his land for dry stock, $\frac{3}{8}$ for sheep and $\frac{1}{6}$ for crops and the remaining 23 hectares for forestry. Find the total area of the farmer's land

379. Four children share a sum of money. The first gets one half of it, the second gets one-fifth of it and the third one-tenth. If the fourth child receives $120, what was the original sum of money?

Converting Between Fractions and Decimals

Converting between Fractions and Decimals using Written Methods

Fraction to Decimal

To convert a fraction to a decimal we divide the bottom number of the fraction (denominator) into the top number (numerator).

The fraction $\frac{3}{4}$ written as a decimal is 0.75 because 3 divided by 4 is

$$4\overline{)3.30^{2}20} \quad 0.75$$

If the fraction is a mixed numeral, for example $1\frac{3}{4}$ then the fraction part is first converted to a decimal, i.e. $\frac{3}{4} = 0.75$ and then 1 is added to it giving 1.75.

Decimal to Fraction

To convert a decimal to a fraction we begin by writing the decimal as a fraction over 1. The decimal 0.45 is written as $\frac{0.45}{1}$ then we multiply the top and bottom of the fraction by an appropriate power of 10 (i.e. 10 or 100 or 1000 etc.) to remove the decimal point (in this case 100 since there are two figures after the decimal point in the numerator). We then look to simplify the fraction by dividing top and bottom by the largest common factor (5 in this case).

So $\frac{0.45}{1} = \frac{0.45 \times 100}{1 \times 100} = \frac{45}{100}$ which simplifies to $\frac{9}{20}$.

When using a calculator it is a good idea to do the problem twice, ensuring you get the same answer both times. This reduces the likelihood of 'key in' error.

Converting between Fractions and Decimals using a Calculator

To convert a fraction to a decimal using your calculator is straightforward.

On the Casio fx-82MS to convert a fraction to a decimal we enter the fraction and then press = and then press the fraction button.

3	ab/c	4	=	ab/c

which gives 0.75

On the TI-30XB Multiview to convert a fraction to a decimal we enter the fraction and then press the right arrow followed by the f◄►d button.

3	n/d	4	►	2nd	f◄►d	enter

which gives 0.75

To convert a decimal to a fraction using your calculator, you do the following.

On the Casio fx-82MS to convert a decimal to a fraction enter the decimal and then press the fraction button.

0	.	4	5	=	ab/c

which gives $\frac{9}{20}$.

On the TI-30XB Multiview to convert a decimal to a fraction enter the decimal and then press the f◄►d button.

0	.	4	5	2nd	f◄►d	enter

which gives $\frac{9}{20}$.

Example

Convert

a) $\frac{5}{8}$ to a decimal.

b) 0.365 to a simplified fraction.

a) Dividing 8 into 5

$$8\overline{)5.50^{2}40} \quad 0.625$$

b) Write 0.365 as a fraction over 1 and multiply top and bottom by 1000 to remove the decimal point and then simplify by dividing top and bottom by 5.

$$\frac{0.365}{1} = \frac{0.365 \times 1000}{1 \times 1000} = \frac{365}{1000} = \frac{73}{200}$$

Example

Convert using your calculator

a) $\frac{5}{8}$ to a decimal.

b) 0.365 to a simplified fraction.

a)

5	ab/c	8	=	ab/c

which gives 0.625

b)

0	.	3	6	5	2nd
f◄►d	enter				

which gives $\frac{73}{200}$.

Achievement – Using your calculator convert the following fractions to decimals. Do each problem twice, as a check, to reduce the likelihood of 'key in' error.

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

381. $\frac{3}{20} =$

382. $\frac{9}{40} =$

383. $\frac{7}{8} =$

384. $\frac{19}{20} =$

385. $\frac{13}{25} =$

386. $\frac{265}{1000} =$

387. $\frac{93}{100} =$

388. $2\frac{1}{25} =$

389. $\frac{203}{50} =$

390. $\frac{73}{20} =$

391. $4\frac{17}{20} =$

392. $\frac{3}{1000} =$

393. $\frac{37}{5} =$

Achievement – Using your calculator convert the following decimals to simplified fractions. Do each problem twice, as a check, to reduce the likelihood of 'key in' error.

394. 0.8

395. 0.75

396. 0.05

397. 0.4

398. 0.65

399. 0.072

400. 0.185

401. 0.08

402. 0.12

403. 1.8

404. 2.55

405. 4.45

Merit – Answer the following application problems.

406. Taylor banks $\frac{1}{8}$ of his monthly pay. What is this fraction as a decimal?

407. Tina estimates that 0.35 of her class have access to broadband internet. What is this as a simplified fraction?

408. Raj has used $\frac{13}{16}$ of his available hard drive space. What is this fraction as a decimal?

409. Tama has completed 0.48 of his maths assignment. What fraction of his maths assignment has he yet to do?

410. Mako spends $\frac{17}{40}$ of her yearly salary on mortgage repayments. What amount of her salary does she have left? Write your answer as a decimal.

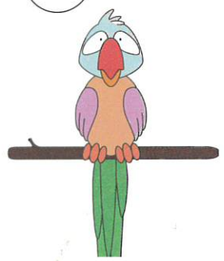
411. Natalie scored $\frac{37}{40}$ in a recent maths test. What proportion of the test did she get wrong? Write your answer as a decimal.

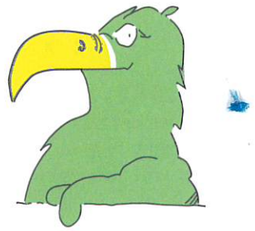
Fun Spot

Match the question on the left with the answer on the right. Use written methods rather than your calculator for this exercise. Each line will pass through a letter. Enter the letter in the appropriate spot at the bottom of the page to answer the riddle.

Convert 2.3 to a simplified fraction	$\frac{33}{200}$
Convert $\frac{17}{20}$ to a decimal	$\frac{203}{100}$
Convert 0.085 to a simplified fraction	0.1875
Convert $\frac{48}{15}$ to a decimal	$\frac{23}{10}$
Convert 0.165 to a simplified fraction	0.32
Convert $\frac{208}{650}$ to a decimal	0.85
Convert 2.03 to a simplified fraction	3.64
Convert $\frac{15}{80}$ to a decimal	$\frac{17}{200}$
Convert 1.495 to a simplified fraction	$\frac{151}{50}$
Convert $3\frac{16}{25}$ to a decimal	$\frac{299}{200}$
Convert 3.02 to a simplified fraction	3.2

P O D T U A L N R S Y





Why did the parrot wear a raincoat?

SO HE COULD BE

														E
$\frac{23}{10}$	$\frac{33}{200}$	0.1875	$\frac{151}{50}$	$\frac{17}{200}$	3.2	$\frac{299}{200}$	0.32	$\frac{203}{100}$	$\frac{17}{200}$	3.64	0.32	$\frac{203}{100}$		0.85