

**Learner
Profile
Mathematics
Level 6
(Book 4)**

L6 formulate and solve a variety of linear equations,

Including unknowns on both sides,
fractions (linked to equivalent fractions
and adding/subtracting fractions)

MATHEMATICS
HOMEWORK BOOK
ALGEBRA 2 (I*)

L5 Identify + obtain information
to solve problems.

Describe situations mathematically
using symbols, by forming an
equation and then solving it (#L6)

1. Round 349.5367 to 2 decimal places. 349.54 ✓

2. Round 134.6912 to 1 decimal place. 134.7 ✓

3. Round 5321 to 1 significant figure. 5000 ✓

4. Round 23.67 to 1 significant figure. 20 ✓

5. Round 0.005678 to 2 significant figures. 0.0057 ✓

Solving Equations

1. Solve the following equations.

a. $x + 3 = 12$ $x = 12 - 3$ $x = 9$ ✓

b. $e - 9 = 32$ $e = 32 + 9$ $e = 41$ ✓

c. $5x = 55$ $x = \frac{55}{5}$ $x = 11$ ✓

d. $\frac{n}{15} = 2$ $n = 2 \times 15$ $n = 30$ ✓

e. $\frac{32}{x} = -8$ $32 = -8x$ $\frac{32}{-8} = -x$ $4 = -x$ $x = -4$ ✓

f. $x + 5x = 48$ $6x = 48$ $x = \frac{48}{6}$ $x = 8$ ✓

g. $2x + 5 = 9$ $2x = 9 - 5$ $2x = 4$ $x = 2$ ✓

h. $2p - 1 = 13$ $2p = 13 + 1$ $2p = 14$ $p = 7$ ✓

i. $3y - 8 = 22$ $3y = 22 + 8$ $3y = 30$ $y = 10$ ✓

j. $6 + 5y = 16$ $5y = 16 - 6$ $5y = 10$ $y = 2$ ✓

k. $\frac{k}{7} + 2 = 9$ $\frac{k}{7} = 9 - 2$ $\frac{k}{7} = 7$ $k = 7 \times 7$ $k = 49$ ✓

$$l. \quad \frac{m}{3} - 5 = 1 \quad \frac{m}{3} = 1 + 5 \quad \frac{m}{3} = 6 \quad m = 6 \times 3$$

$$m = 18$$

$$m. \quad 7 + \frac{a}{2} = 10 \quad \frac{a}{2} = 10 - 7 \quad \frac{a}{2} = 3 \quad a = 3 \times 2$$

$$a = 6$$

$$n. \quad \frac{24}{c} + 9 = 13 \quad \frac{24}{c} = 13 - 9 \quad \frac{24}{c} = 4 \quad 24 = 4c$$

$$c = \frac{24}{4} \quad c = 6$$

$$o. \quad 6x + 2 = 5 \quad 6x = 5 - 2$$

$$6x = 3 \quad x = \frac{3}{6} \quad x = 0.5$$

Remember, to expand a single bracket you need to multiply the part outside the bracket by every term inside the bracket.

$$3(x + 4) = 3x + 12$$

$$p. \quad 7 + 4m = -1 \quad 4m = -1 - 7$$

$$4m = -8 \quad m = \frac{-8}{4} \quad m = -2$$

$$q. \quad 3(a + 5) = 33 \quad 3a + 15 = 33 \quad 3a = 33 - 15$$

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

$$r. \quad 4(6y - 9) = -12 \quad 24y - 36 = -12$$

$$24y = -12 + 36 \quad 24y = 24$$

$$\frac{y = 24}{24} \quad y = 1$$

$$s. \quad 20 = -4(n - 3) \quad 20 = -4n + 12$$

$$20 - 12 = -4n \quad 8 = -4n \quad 4n = -8$$

$$n = \frac{-8}{4} \quad n = -2$$

$$1. \frac{1}{2} - \frac{1}{4} = \frac{2}{4} - \frac{1}{4} = \frac{1}{4} \quad / \quad 2. \frac{3}{5} - \frac{1}{7} = \frac{21}{35} - \frac{5}{35} = \frac{16}{35} \quad / \quad 3. \frac{2}{9} + \frac{1}{4} = \frac{8}{36} + \frac{9}{36} = \frac{17}{36} \quad / \quad 4. \frac{3}{4} + \frac{2}{3} = \frac{9}{12} + \frac{8}{12} = \frac{17}{12}$$

Solving Equations with Unknown on Both Sides

1. Solve the following equations.

a. $5x + 3 = 4x + 5$
 $5x - 4x = 5 - 3$
 $x = 2$

b. $7n + 2 = n + 8$
 $7n - n = 8 - 2$
 $6n = 6$
 $n = 1$

c. $4y - 2 = y + 10$
 $4y - y = 10 + 2$
 $3y = 12$
 $y = 4$

Progress Point Check.

Teacher ☐ Self ☐ Peer ☐

Date 23/06/15

Effort Grade

★ What Went Well

Used good
accurate method
to solve Equations.

★ What Went Well

Worked
questions
were solved
well

Next Step Target

Fractions with
~~Decimals~~ algebraic
Equations

4

Now try this...

$$\frac{3}{10} + \frac{2+x}{5} = 7 \quad \frac{3}{10} + \frac{4+2x}{10} = \frac{70}{10}$$

$$\frac{7}{10} + \frac{2x}{10} = \frac{70}{10} = \frac{2x}{10} = \frac{63}{10}$$

$x = 31.5$

Student Comment

Teacher Comment

Complete the following table.

Fraction	Decimal	Percent
$\frac{7}{10}$	0.7	70%
$\frac{5}{10}$	0.5	50%
$\frac{3}{10}$	0.3	30%
$\frac{7}{100}$	0.07	7%
$\frac{3}{5}$	0.6	60%

Solving Inequalities

Solve the following inequalities and complete the sentences.

a. $3a \leq 21$
 $a \leq \frac{21}{3}$ $a \leq 7$

If a is an integer, the greatest value of a is 7

5

b. $3t + 4 > 25$
 $3t > 25 - 4$
 $3t > 21$
 $t > \frac{21}{3}$ $t > 7$

If t is an integer, the least value of t is 8

c. $4m - 3 < 17$
 $4m < 17 + 3$
 $4m < 20$
 $m < 5$

If m is an integer, the greatest value of m is 4

d. $2q + 5 \geq 8$
 $2q \geq 8 - 5$
 $2q \geq 3$
 $q \geq 1.5$

If q is a prime number, the least value of q is 2

d. $3a - 2 = 5a - 20$
 $-2 + 20 = 5a - 3a$
 $18 = 2a$
 $a = 9$

e. $2q + 17 = 5q - 4$
 $17 + 4 = 5q - 2q$
 $21 = 3q$
 $q = 7$

f. $2e + 7 = 16 - 4e$
 $2e + 4e = 16 - 7$
 $6e = 9$
 $e = 1.5$

g. $20m - 15 = 18m - 7$
 $20m - 18m = -7 + 15$
 $2m = 8$
 $m = 4$

h. $4v + 3 = 2v + 10$
 $4v - 2v = 10 - 3$
 $2v = 7$
 $v = 3.5$

i. $7 - 3k = 2(k + 1)$
 $7 - 3k = 2k + 2$
 $7 - 2 = 2k + 3k$
 $5 = 5k$
 $k = 1$

j. $5(x + 3) = 2(x + 6)$
 $5x + 15 = 2x + 12$
 $5x - 2x = 12 - 15$
 $3x = -3$
 $x = -1$

- b. Bicycles normally cost x pounds. However in a sale they are reduced by £20. If 3 bikes cost £75 in the sale, what is the normal cost of one bike?

$$\begin{aligned} 3(x - 20) &= 75 \\ 3x - 60 &= 75 \\ 3x &= 75 + 60 \\ 3x &= 135 \\ x &= 45 \end{aligned}$$

Remember
£

- c. John is a years old. His brother is 6 years younger. His sister is 9 years older than John. If the sum of their ages is 48, find out old each of them are.

$$\begin{aligned} a + (a - 6) + (a + 9) &= 48 \\ 3a - 6 + 9 &= 48 \\ 3a - 6 &= 39 \\ 3a &= 45 \\ a &= 15 \end{aligned}$$

- d. A pint of milk costs x pence. The cost of a carton of fruit juice is 10 pence more than the cost of a pint of milk. Sam pays £1.70 for three pints of milk and two cartons of fruit juice. Write down an equation and solve to find the cost of a carton of fruit juice.

$$\begin{aligned} 3x + 2(x + 0.1) &= 1.70 \\ 3x + 2x + 0.2 &= 1.70 \\ 5x + 0.2 &= 1.70 \\ 5x &= 1.50 \\ x &= 0.30 \end{aligned}$$

Milk costs 30p
 Juice = $x + 10$
 $= 30 + 10$
 $= 40p$

- Find 50% of £90. $\pounds 45$
- Find 25% of £36. $\pounds 9$
- Find 10% of £7. $70p$
- Find 10% of £92. $\pounds 9.20$
- A pair of trainers cost £45 in a shop. The shop is offering a 10% sale. What is the sale price of the trainers? $\pounds 40.50$

Forming Equations

- Letting the unknown number be x , write each of the following as an equation and then find the value of the number.

- If I add 7 to twice a certain number and the result is 11, what is the number?

$$\begin{aligned} 2x + 7 &= 11 \\ 2x &= 4 \\ x &= 2 \end{aligned}$$

- I add seven to a number then multiply the result by 6. If I end with 51, what was the number I started with?

$$\begin{aligned} (x + 7) \times 6 &= 51 \\ 42 + 6x &= 51 \\ 6x &= 9 \\ x &= 1.5 \end{aligned}$$

- Write an algebraic equation and solve the equation for parts a, b, c and d.

- One number is three times another. If the sum of the numbers is 16, work out the numbers.

$$\begin{aligned} x + 3x &= 16 \\ 4x &= 16 \\ x &= 4 \end{aligned} \quad \text{and } 12$$

$$1. 240 \div \dots 2 \dots = 40$$

$$2. \dots 93 \dots \div 3 = 31$$

$$3. 64 \times \dots 0.1 \dots = 6.4$$

$$4. 4 \times \dots 0.5 \dots = 2$$

$$5. \dots 42 \dots \div 7 = 41$$

$$6. 213 \times \dots 0.01 \dots = 2.13$$

$$7. \dots 0.5 \dots \times 30 = 15$$

$$8. 9 \times \dots 0.2 \dots = 1.8$$

OPTIONAL

Solving Equations Involving Algebraic Fractions

Think about how you would add and subtract proper fractions.

- Solve the following equations.

$$a. \frac{2}{5} + \frac{x+1}{5} = 1$$

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

$$\frac{3}{5} + \frac{x}{5} = 1$$

$$\frac{x}{5} = 1 - \frac{3}{5}$$

$$\frac{x}{5} = \frac{2}{5}$$

$$x = 2$$

$$b. \frac{x}{3} + \frac{4x}{3} = 10$$

$$\frac{5x}{3} = 10$$

$$5x = 10 \times 3$$

$$5x = 30$$

$$x = 6$$

$$c. \frac{2}{3} + \frac{x+1}{9} = \frac{7}{9}$$

$$\frac{6}{9} + \frac{x+1}{9} = \frac{7}{9}$$

$$\frac{7}{9} + \frac{x}{9} = \frac{7}{9}$$

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

$$\frac{x}{9} = 0$$

$$x = 0$$

$$d. \frac{3}{4} + \frac{x+2}{8} = 2$$

$$\frac{6}{8} + \frac{x+2}{8} = 2$$

$$\frac{8}{8} + \frac{x}{8} = 2$$

$$\frac{x}{8} = 2 - 1$$

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

$$x = 1 \times 8$$

$$x = 8$$

$$e. \frac{7}{10} - \frac{4+x}{5} = 3$$

$$\frac{7}{10} - \frac{8+2x}{10} = \frac{30}{10}$$

$$7 - 8 - 2x = 30$$

$$2x = -30 - 8 + 7$$

$$2x = -31$$

$$x = -15.5$$

$$f. \frac{x}{3} + \frac{x-2}{4} = 3$$

$$\frac{4x}{12} + \frac{3x-6}{12} = \frac{36}{12}$$

$$4x + 3x - 6 = 36$$

$$7x = 36 + 6$$

$$7x = 42$$

$$x = 6$$

$$g. \frac{1}{4} - \frac{3x+2}{7} = 5$$

$$\frac{7}{28} - \frac{(12x+8)}{28} = \frac{140}{28}$$

$$7 - 12x - 8 = 140$$

$$7 - 8 - 140 = 12x$$

$$12x = -141$$

$$x = \frac{-141}{12}$$

$$h. \frac{x}{7} + \frac{2x}{3} = -4 \quad x = -11.75 \quad -12$$

$$\frac{3x}{21} + \frac{14x}{21} = \frac{-84}{21}$$

$$17x = -84$$

$$x = \frac{-84}{17}$$

$$x = -4\frac{16}{17} = -4.941176470588235 \quad \infty$$

$$i. \frac{x}{4} + \frac{x-1}{6} = -3$$

$$\frac{3x}{12} + \frac{(2x-2)}{12} = \frac{-36}{12}$$

$$3x + 2x - 2 = -36$$

$$5x = -36 + 2$$

$$5x = -34$$

$$x = \frac{-34}{5}$$

$$x = -6.8 \quad 9.6$$

$$j. \frac{4x+19}{12} - \frac{1-x}{8} = \frac{13}{24}$$

$$\frac{8x+38}{24} - \frac{(3-3x)}{24} = \frac{13}{24}$$

$$8x + 38 - 3 + 3x = 13$$

$$8x + 3x = 13 - 38 + 3$$

$$11x = -22$$

$$x = -2$$

Progress Point Check.

Teacher ☐ Self ☐ Peer ☒ L.T

Date 26th February

Effort Grade



What Went Well

You done good
writing fractions
in order



What Went Well

You had good
multiplication and
division of
fractions

Next Step Target

adding and subtracting fractions

Now try this...

$$\frac{3}{4} + \frac{5}{12} = \frac{9}{12} + \frac{5}{12} = \frac{14}{12} = 1\frac{1}{6}$$

$$2\frac{1}{3} + 1\frac{3}{4} = 2\frac{4}{12} + 1\frac{9}{12} = 3\frac{13}{12} = 4\frac{1}{12}$$

Student Comment

I need to work on
doing harder worded
questions.

Teacher Comment

Try to correct number
6 on the worded + and -
questions.

HOMWORK BOOK

FRACTIONS (H)

Implied at L6. +/ - x / % fractions
including mixed numbers.

- What number is three quarters of a million? $750,000$ ✓
- What number is twenty less than ten thousand? $9,980$ ✓
- Round 349.6262 to 2 decimal places. 349.63 ✓
- Write in order: 0.2 $\frac{1}{4}$ 23% 0.02 $0.02, 0.2, 23\%, \frac{1}{4}$ ✓
- $20 - (12 \div 4) \times 2$ 34×14

Improper Fractions and Mixed Numbers

- Convert these improper fractions to mixed numbers.

a. $\frac{9}{2}$ $4\frac{1}{2}$ ✓

b. $\frac{4}{3}$ $1\frac{1}{3}$ ✓

c. $\frac{9}{7}$ $1\frac{2}{7}$ ✓

d. $\frac{20}{9}$ $2\frac{2}{9}$ ✓

e. $\frac{8}{5}$ $1\frac{3}{5}$ ✓

f. $\frac{9}{4}$ $2\frac{1}{4}$ ✓

g. $\frac{12}{5}$ $2\frac{2}{5}$ ✓

h. $\frac{80}{9}$ $8\frac{8}{9}$ ✓

- Covert these mixed numbers to improper fractions.

a. $1\frac{3}{5}$ $\frac{8}{5}$ ✓

b. $4\frac{1}{2}$ $\frac{9}{2}$ ✓

c. $1\frac{2}{5}$ $\frac{7}{5}$ ✓

d. $4\frac{7}{8}$ $\frac{39}{8}$ ✓

e. $2\frac{1}{4}$ $\frac{9}{4}$ ✓

f. $2\frac{2}{3}$ $\frac{8}{3}$ ✓

g. $2\frac{4}{5}$ $\frac{14}{5}$ ✓

h. $7\frac{3}{7}$ $\frac{52}{7}$ ✓

g. $6 \div \frac{2}{3}$ 9 ✓

h. $3\frac{2}{7} \div 1\frac{1}{2}$ $2\frac{5}{7}$ ✓

- You have to walk $1\frac{3}{4}$ km to school. How far have you walked when you are halfway?

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

- A recipe for 6 buns requires $1\frac{1}{2}$ kg of sugar. How much sugar is needed for 1 bun?

$$1\frac{1}{2} \div 6 = \frac{3}{2} \div 6 = \frac{1}{4} \text{ kg}$$

- Jenny bought 5 m of ribbon and cut the ribbon equally into smaller pieces. Each ribbon was $\frac{5}{7}$ m long. How many pieces were there?

$$5 \div \frac{5}{7} = \frac{5}{1} \times \frac{7}{5} = 7$$

- To find the area of a rectangle we need to multiply the length of the rectangle by its width.

Find the area of a rectangle that has a length of $1\frac{3}{5}$ m and a width of $3\frac{7}{9}$ m.

$$\frac{8}{5} \times \frac{34}{9} = \frac{272}{45} = 6\frac{2}{45}$$

- $\frac{5}{8}$ of the people at a concert are female. $\frac{2}{7}$ of the females are children. What fraction of the total number of people at the concert are girls?

$$\frac{5}{8} \times \frac{2}{7} = \frac{10}{56} = \frac{5}{28}$$

- Megan buys juice and biscuits. The juice costs £1.35, the biscuits cost £1.79. She pays with a £5 note. $\pounds 1.86$ ✓
How much change should she get?
- An apple costs 62 p. The local grocer is offering a sale of 3 for 2 on all fruit and veg.
What is the cost of 12 apples? $\pounds 4.96$ ✓
- Thomas Cook is offering an exchange rate of £1 = 1.12 euros.
How many euros would I get for £6? 6.72 ✓

Multiplication and Division of Fractions

- Evaluate the following, expressing your answer in the simplest form.

a. $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ ✓

b. $\frac{1}{2} \times \frac{2}{7} = \frac{1}{7}$ ✓

c. $\frac{5}{9} \times \frac{3}{4} = \frac{5}{12}$ ✓

d. $\frac{9}{10} \times \frac{2}{3} = \frac{3}{5}$ ✓

e. $\frac{2}{3} \div \frac{1}{3} = 2$ ✓

f. $\frac{5}{7} \div \frac{5}{14} = 2$ ✓

11

g. $\frac{2}{3} \div \frac{7}{12} = 1\frac{1}{7}$ ✓

h. $\frac{7}{12} \div \frac{4}{9} = 1\frac{5}{16}$ ✓

- Evaluate the following, expressing your answer in its simplest form.

a. $5 \times \frac{9}{10} = 4\frac{1}{2}$ ✓

b. $\frac{2}{9} \times 3 = \frac{2}{3}$ ✓

c. $1\frac{1}{2} \times \frac{6}{7} = 1\frac{2}{7}$ ✓

d. $2\frac{4}{9} \times 4 = 9\frac{7}{9}$ ✓

e. $\frac{4}{5} \div 2 = \frac{2}{5}$ ✓

f. $\frac{5}{7} \div \frac{10}{11} = \frac{11}{14}$ ✓

- Write down the answer to $102 \div 8$ as a mixed number, giving your answer in its simplest form.

$$12\frac{6}{8} = 12\frac{3}{4} \quad \checkmark$$

- Write these fractions in ascending order.

$$6\frac{1}{2}, \frac{18}{5}, 3\frac{1}{4}, 5\frac{1}{3}, \frac{17}{3}$$

$$3\frac{1}{4} (6\frac{1}{2}), \frac{18}{5}, \frac{5}{3}, 5\frac{1}{3}, \frac{17}{3}, 6\frac{1}{2} \quad \checkmark$$

- Choose the correct symbol, <, > or = and write it in the \bigcirc to complete the following.

$$4\frac{1}{4} \bigcirc \frac{19}{4} \quad \checkmark$$

$$2\frac{3}{5} \bigcirc \frac{13}{5} \quad \checkmark$$

$$3\frac{7}{8} \bigcirc 30 \div 8 \quad \checkmark$$

1. Add or subtract mentally

a. $456 + 251$ 707 / b. $246 + 199$ 445 / c. $324 - 89$ 235 / d. $567 - 99$ 468 /

2. Multiply or divide mentally

a. 6×99 594 / b. 90×12 1080 / c. $400 \div 5$ 80 / d. $420 \div 6$ 70 /

3. What number is half of a million?

500,000 /

4. What number is one hundred less than twenty thousand?

19,900 /

Addition and Subtraction of Fractions

1. Evaluate the following, expressing your answer in the simplest form.

a. $\frac{1}{9} + \frac{5}{9}$ $\frac{2}{3}$ /

b. $\frac{7}{12} + \frac{11}{12}$ $1\frac{1}{2}$ X $1\frac{1}{2}$ ✓

c. $\frac{5}{8} - \frac{3}{8}$ $\frac{1}{4}$ X $\frac{2}{8}$ ✓

d. $\frac{3}{4} + \frac{5}{12}$ $1\frac{1}{6}$ X

e. $\frac{1}{8} + \frac{1}{6}$ $\frac{7}{24}$ /

f. $\frac{7}{8} - \frac{5}{6}$ $\frac{1}{24}$ ✓

g. $6\frac{2}{3} + 5\frac{7}{12}$ $12\frac{1}{4}$ ✓

h. $5\frac{7}{12} - 3\frac{4}{9}$ $2\frac{5}{36}$ /

2. Jane used $\frac{1}{2}$ of a piece of ribbon and her sister used $\frac{1}{3}$ of it. What fraction of the ribbon was used?

$\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$ X $\frac{4}{6}$ ✓

3. Joe painted $\frac{2}{5}$ of a fence and Bill painted $\frac{1}{3}$ of it. What fraction of the fence did the boys paint?

$\frac{2}{5} + \frac{1}{3} = \frac{6}{15} + \frac{5}{15} = \frac{11}{15}$ /

4. Mr Smith had $15\frac{3}{4}$ m of wire. He cut off a piece of wire $2\frac{4}{7}$ m long. How many metres of wire did he have left?

$63 - 18 = 44$ / $\frac{18}{7} = \frac{72}{28}$ / $\frac{44}{28} - \frac{72}{28} = \frac{513}{28}$ / $\frac{369}{28} = 13\frac{5}{28}$ /

5. John spent $\frac{1}{4}$ of his money on a pen, $\frac{1}{3}$ of it on books and $\frac{1}{6}$ of it on a magazine. What fraction of the money is left?

Spent $= \frac{1}{4} + \frac{1}{3} + \frac{1}{6} = \frac{3}{12} + \frac{4}{12} + \frac{2}{12} = \frac{9}{12} = \frac{3}{4}$

Left $= \frac{1}{4}$ /

6. Mrs Jones spends $\frac{1}{4}$ of her money in the market and $\frac{1}{3}$ of the remainder in a shop. What fraction of her money is left?

$1 - \frac{1}{4} = \frac{3}{4} - \frac{1}{3} = \frac{9}{12} - \frac{4}{12} = \frac{5}{12}$ X

7. Joan spends $\frac{3}{8}$ of her salary every month. She gives her parents $\frac{2}{5}$ of the remainder and saves the rest. What fraction of money does she save every month?

$1 - \frac{3}{8} = \frac{5}{8} - \frac{2}{5} = \frac{25}{40} - \frac{16}{40} = \frac{9}{40}$ /

8. A group of students went to a fast food restaurant.

a. $\frac{2}{5}$ of them bought a beef burger and $\frac{1}{3}$ of them bought a chicken burger.

The rest of them just bought drinks.

What fraction of the group bought food?

b. $\frac{3}{4}$ of those who bought a beef burger also bought chips.

What fraction of the whole group bought beef burger and chips?

Give your answer as a fraction in its simplest form.

a) $\frac{2}{5} + \frac{1}{3} = \frac{6}{15} + \frac{5}{15} = \frac{11}{15}$ /

b) $\frac{3}{4}$ of $\frac{2}{5}$

$= \frac{3}{4}$ of $\frac{8}{20}$

$= \frac{6}{20}$

$= \frac{3}{10}$ /

(57.5%)

L6 - Fractions

Assessment 4A 23 questions; 40 marks

L5 - Identify + obtain information to solve problems.

1) What fraction of the star is shaded?

Write your answer in its simplest form.

2) What must be added to $\frac{5}{9}$ to get $\frac{2}{3}$?

$$\frac{1}{9}$$

[1]

3) The mass of a basket of vegetables is $\frac{5}{6}$ kg. The basket has a mass of $\frac{1}{4}$ kg. Find the mass of the vegetables.

$$\begin{array}{l} B \quad \frac{1}{4} = \frac{3}{12} \\ B.O.V \quad \frac{5}{6} = \frac{10}{12} \end{array}$$

$$\frac{10}{12} - \frac{3}{12} = \frac{7}{12}$$

$$\frac{7}{12} \text{ kg}$$

[1]

4) Work out

$$\begin{array}{l} (a) \quad \frac{3}{4} - \frac{5}{12} = \frac{9}{12} - \frac{5}{12} = \frac{4}{12} = \frac{1}{3} \end{array}$$

$$(b) \quad \frac{7}{9} + \frac{4}{5} = \frac{35}{45} + \frac{36}{45} = \frac{71}{45} = 1\frac{26}{45}$$

[2]

5) What must be subtracted from $3\frac{4}{5}$ to get $\frac{3}{10}$?

$$3\frac{4}{5} = \frac{19}{5} = \frac{38}{10} - \frac{3}{10} = \frac{35}{10} = 3\frac{5}{10}$$

[1]

6) Tim had a wooden pole. $\frac{2}{5}$ of it was painted white and $\frac{1}{8}$ of it was painted blue.

The rest was painted yellow. What fraction of the pole was painted yellow?

$$\frac{2}{5} + \frac{1}{8} = \frac{16}{40} + \frac{5}{40} = \frac{21}{40}$$

$$\frac{19}{40} \text{ painted yellow}$$

[2]

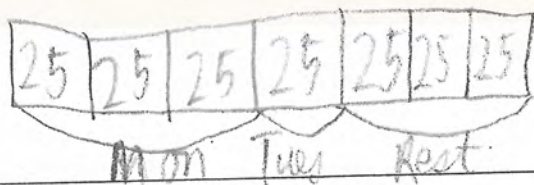
- 7) Shaun needs $\frac{3}{4}$ kg of butter to bake some cookies. He only has $\frac{1}{3}$ kg of butter. How much more butter does he

need?

$$\frac{1}{3} - \frac{1}{4} = \frac{4}{12} - \frac{3}{12} = \frac{1}{12}$$

[2]

- 8) Claire read $\frac{3}{7}$ of a book on Monday. She read $\frac{1}{4}$ of the remainder on Tuesday. If she had 75 more pages to read, how many pages were there in the book altogether?



175 pages

[2]

- 9) Sue gave $\frac{1}{4}$ of her stickers to Erica and $\frac{5}{16}$ of her stickers to Carol. If Erica received 12 fewer stickers than Carol, how many stickers has Sue at first?

$$\begin{array}{r} E \frac{4}{16} \\ C \frac{5}{16} \end{array}$$

$$\frac{1}{16} = 12$$

$$12 \times 16 = 184 \text{ stickers}$$

[2]

- 10) Work out the following, giving your answers in their simplest form.

(a) $5\frac{3}{4} - 2\frac{1}{5} = 3\frac{11}{20}$

(b) $15 \times \frac{2}{3} = 10$

(c) $21 \times 2\frac{5}{14} = 2\frac{5}{14} \times \frac{99}{2}$

(d) $\frac{2}{15} \times \frac{3}{4} = \frac{6}{60} = \frac{1}{10}$

[4]

- 11) Miss Lee had some sugar in a container. After she used $1\frac{3}{4}$ kg of it, she had $2\frac{2}{5}$ kg left. How much sugar was in the container at first?

$$2\frac{2}{5} = \frac{48}{20} \quad 1\frac{3}{4} = \frac{35}{20} \quad \frac{48}{20} + \frac{35}{20} = \frac{83}{20} = 4\frac{3}{20}$$

[1]

- 12) Joy has $3\frac{5}{6}$ m of ribbon. She gives $\frac{3}{5}$ of it to Jane. Find the length of Jane's piece of ribbon.

$$3\frac{5}{6} = \frac{23}{6} \times \frac{3}{5} = \frac{69}{30} = 2\frac{9}{30} \text{ m}$$

[1]

- 13) To find the area of a rectangle we need to multiply the length of the rectangle by its width.

Find the area of a rectangle that has a length of $1\frac{3}{5}$ m and a width of $3\frac{3}{4}$ m.

$$1\frac{3}{5} = \frac{32}{20} \quad 3\frac{3}{4} = \frac{75}{20}$$

$$\frac{32}{20} \times \frac{75}{20} = \frac{2400}{400} = \frac{24}{4} = 6$$

[2]

- 14) A piece of wood measuring $\frac{5}{8}$ m is cut into 3 equal pieces. What is the length of each piece?

$$\frac{5}{8} \div 3 = \frac{5}{8} \times \frac{1}{3} = \frac{5}{24}$$

[1]

- 15) $\frac{1}{4}$ of the people at the beach are children. $\frac{2}{5}$ of the children are girls.

What fraction of the total number of people at the beach are girls?

$$\frac{1}{4} \times \frac{2}{5} = \frac{2}{20} = \frac{1}{10}$$

[1]

- 16) Work out the missing fraction in each box

(a) $4 \div \boxed{\frac{9}{10}} = 36$

(b) $7 \div \boxed{\frac{3}{10}} = 21$

[2]

- 17) Find the value of $21 \div \frac{7}{9}$

$$\frac{21}{1} \div \frac{7}{9} = \frac{21}{1} \times \frac{9}{7} = \frac{189}{7} = 27$$

[1]

- 18) Find the value of $\frac{4}{9} \div \frac{5}{12}$. Express your answer as a mixed number.

$$\frac{4}{9} \div \frac{5}{12} = \frac{4}{9} \times \frac{12}{5} = \frac{48}{45} = 1\frac{3}{45}$$

[2]

19) Work out $75 \div 9$, giving your answer as a mixed number in its simplest form.

$$9 \overline{) 75.555} \\ \underline{72} \\ 35 \\ \underline{36} \\ 155 \\ \underline{144} \\ 110 \\ \underline{108} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 20$$

$$7.\dot{5} \times \frac{75}{9} = 8\frac{2}{3} = 8\frac{1}{3}$$

[1]

20) Convert the following fractions to decimals

0.625

(a) $\frac{11}{20} = 0.55$ ✓

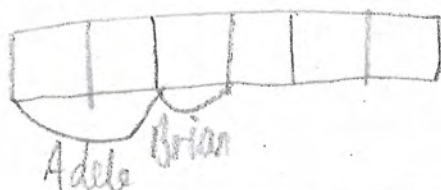
(b) $\frac{5}{8} = 0.125$ ✗ (1)

~~Write 0.25 as a fraction~~

$$\frac{2.5}{4} = \frac{1.25}{2} = \frac{0.125}{1} = \frac{12.5}{100}$$

[4]

21) Adele was given $\frac{1}{3}$ of a pizza and Brian was given $\frac{1}{4}$ of what was left. The remainder was then shared equally among 5 girls. What fraction of the pizza did each of the girls get?

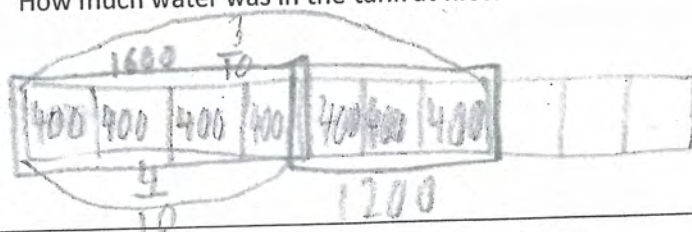


$$\frac{1}{2} \times \frac{1}{5} = \frac{1}{10}$$

[2]

22) A water tank was $\frac{2}{5}$ full of water. Helen poured 1200ml of water into the tank after which it became $\frac{7}{10}$ full.

How much water was in the tank at first?



1600ml

[1]

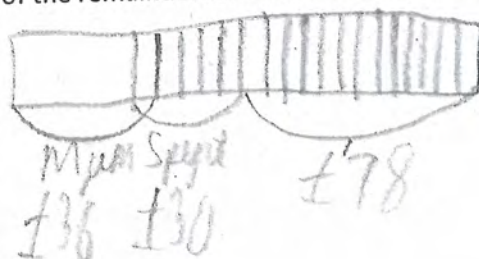
23) Carl gave $\frac{1}{4}$ of his money to his mother. He spent $\frac{5}{18}$ of the remainder on a wallet and 2 CDs and had £78 left.

The wallet cost 4 times as much as a CD.

(a) How much money did Carl have at first?

£44

£5 £5 £5 £5



$$78 \div 13 = 6$$

1 block = 0

(b) What was the cost of 1 CD?

£5

£5 £5

[3]

End of Assessment

67%

(blue = test correction)

32/48

21 questions; 48 marks

Name:

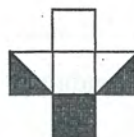
Think about using a model for any questions marked **

Level 3 4 5 6 7

1) Write down the fraction of each shape that has been shaded.



$\frac{4}{7}$



$\frac{2}{5}$

2
[2]

2) Write down the next six fractions equivalent to $\frac{3}{5}$

$\frac{3}{5} = \frac{6}{10} = \frac{9}{15} = \frac{18}{30} = \frac{24}{40} = \frac{27}{45}$

3
[3]

3) Fill in the missing numerators or denominators for the equivalent fractions below.

(i) $\frac{5}{8} = \frac{20}{32} = \frac{70}{112}$

(ii) $\frac{3}{7} = \frac{12}{28} = \frac{27}{63}$

2
[2]

4) Write the following fractions in their simplest form

(a) $\frac{15}{18} = \frac{5}{6}$

(b) $\frac{24}{32} = \frac{3}{4}$

2
[2]

5) Write the following mixed numbers as improper fractions.

(a) $4\frac{2}{3} = \frac{14}{3}$

(b) $1\frac{5}{7} = \frac{12}{7}$

2
[2]

6) Write the following improper fractions as mixed numbers.

(a) $\frac{7}{3} = 2\frac{1}{3}$

(b) $\frac{23}{5} = 4\frac{3}{5}$

2
[2]

7) Write down the answer to $78 \div 9$, giving your answer as a mixed number

$$9 \overline{) 78} \begin{array}{r} 08\frac{6}{9} \\ \underline{72} \\ 6 \end{array}$$

$$\left(8\frac{6}{9} \right)$$

2

[2]

8) Arrange the following fractions in ascending order. You must show your workings out.

$$\frac{5}{8} = \frac{15}{24} \quad 2$$

$$\frac{5}{8}$$

$$\frac{2}{3}$$

$$\frac{7}{12}$$

$$\frac{2}{3} = \frac{16}{24} \quad 3$$

$$\frac{7}{12}, \frac{5}{8}, \frac{2}{3}$$

$$\frac{7}{12} = \frac{14}{24} \quad 1$$

3

[3]

9) Calculate the following, draw a model if you need to.

(a) $\frac{1}{4}$ of 48 $24 = \frac{1}{2}$

$$12 = \frac{1}{4}$$

(b) $\frac{2}{3}$ of 21 $\frac{1}{3} = 7$

$$\frac{2}{3} = 14$$

(c) $\frac{3}{5}$ of 120

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

$$\frac{3}{5} = 72$$

(d) $\frac{2}{7}$ of 84 $7 \overline{) 84} \begin{array}{r} 12 \\ \underline{7} \\ 14 \end{array}$

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

$$\frac{2}{7} = 24$$

(e) $\frac{3}{4}$ of 56 $\frac{1}{4} = 14$

$$\frac{3}{4} = 42 \quad \frac{1}{4} = 14$$

(f) $\frac{5}{9}$ of 720

$$9 \overline{) 720} \begin{array}{r} 080 \\ \underline{72} \\ 0 \end{array}$$

$$80 \times 5 = 400$$

5

[6]

For questions 10 to 15 try to draw a model to help you find the answers.

10) $\frac{2}{5}$ of the workers in a factory are female. If there are 150 workers in the factory altogether, find the number of female workers.

$$\frac{1}{5} = 30$$

$$\frac{2}{5} = 60$$

L5 - Calculate fractional parts of a quantity or measurement

- 11) There are 32 children in a class. $\frac{5}{8}$ of

$$\frac{1}{8} = 4$$

- 12) Sam received £96. He saved $\frac{1}{8}$ of it and spent the rest of the money over 10 days. If he spent the same amount of money each day, how much did he spend each day?

$$8 \overline{) 96}$$

$$10 \overline{) 84.00}$$

$$96 - 12 = 84$$

£8.40 per day

2

[2]

- 13) Susan spent $\frac{7}{12}$ of her money and had £40 left. How much did she have at first?

$$£40 = \frac{5}{12}$$

$$40 \div 5 = 8$$

$$\frac{1}{12} = £8$$

$$8 \times 12 = 96$$

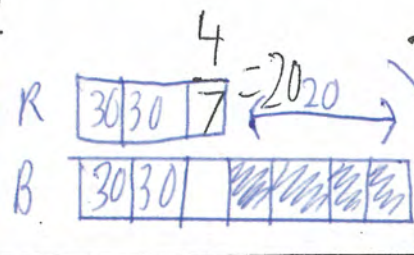
£96

2

[2]

- 14) A bookshop sold red files and blue files. There were 320 files altogether in the shop. After selling $\frac{4}{7}$ of the blue files and 20 of the red files there was an equal number of red and blue files left. How many files were sold?

	R	B
Start	160	160
1	140	140



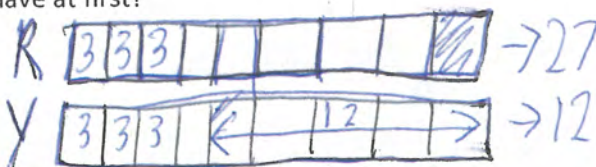
$$320 \div 7 = 45 \text{ R } 5$$

(300 without 20)

140 sold

[2]

- 15) John had some red and yellow balloons. After selling $\frac{1}{9}$ of the red balloons he has twice as many red balloons as yellow. If he has 12 more red balloons than yellow, how many red balloons and how many yellow balloons did he have at first?



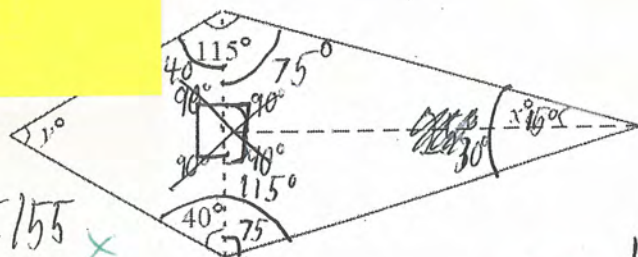
36

X

L6 - attempting to solve complex problems by breaking down into smaller tasks.

0 [2]

Correct in book, not so much correct on assessment

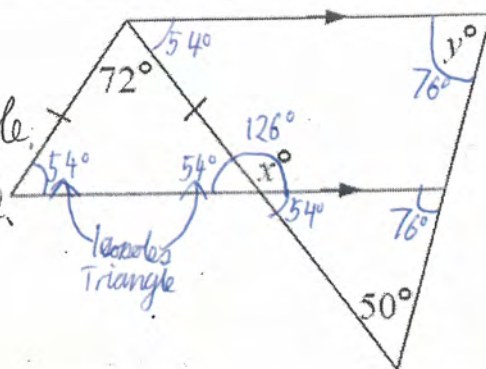


~~115 + 75 = 190~~
 $y = 80^\circ$ because 180° in a triangle. $40 + 115 = 155$ \times
 $x = 15^\circ$ because 180° \checkmark

1 [2]

17) Find the value of the angles x and y in the diagram.

$x = 72^\circ$ because it's an alternate angle.
 $y = 130^\circ$ because it's an allied angle.



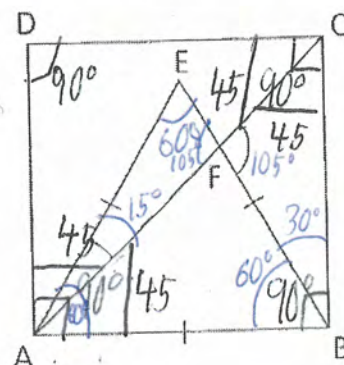
[2]

18) In the figure below ABCD is a square and ABE is an equilateral triangle.

Find

(a) $\angle FAE = 15^\circ$

(b) $\angle BFC = 105^\circ$



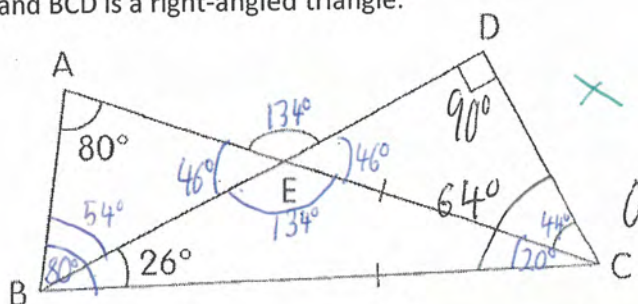
[2]

19) In the figure (not drawn to scale), ABC is an isosceles triangle and BCD is a right-angled triangle.

Find

(a) $\angle AED$

(b) $\angle DCE$



[2]

14% (Rounded)

Assessment 1A 18 questions: 57 marks

Name:

Sat next
to Luke
Thomas

Level 3 4 5 6 7

1) Fill in the blanks with figures (numbers)

(a) $79\ 042 = 70\ 000 + 9\ 000 + 40 + 2$

(b) $8\ 000\ 000 + 40\ 000 + 300 + 5 = 8\ 040\ 305$

[2]

2) (a) What is the difference between the 3rd multiple of 5 and the 5th multiple of 7? 20

(b) What is the sum of all the factors of 15? 24

[2]

3) Multiply or divide mentally

(a) $32 \times 7 = 224$

(b) $50 \times 900 = 45\ 000$

(c) $6 \times 700 = 4\ 200$

(d) $40 \times 8 = 320$

(e) $320 \div 4 = 80$

(h) $2400 \div 600 = 4$

[6]

4) Use a written method to work out

(a)
$$\begin{array}{r} 359 \\ \times 28 \\ \hline 2872 \\ 7180 \\ \hline 10052 \end{array}$$

(b)
$$\begin{array}{r} 0232 \\ 14 \overline{) 3248} \\ \underline{28} \\ 44 \\ \underline{42} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

[3]

For Questions 5 to 10, circle the correct answer.

5) In 5 368 147, the digit 3 stands for

(i) 3×100

(ii) 3×1000

(iii) $3 \times 10\ 000$

(iv) $3 \times 100\ 000$

6) Find the value of $20 \times 5 + 45 \div 5 - 20$

(i) 9

(ii) 14

(iii) 89

(iv) 71

7) What is the best estimate for 800×397 ?

(i) 320

(ii) 3200

(iii) 32 000

(iv) 320 000 ✓

8) What is the best estimate for $28\ 000 \div 30$

(i) 900

(ii) 9000

(iii) 10 000

(iv) 1000 ✗

9) What is the best estimate for 58.2×5.9

(i) 58×5

(ii) 58×6

(iii) 59×5

(iv) 59×6 ✓

L6 - Solve complex problems by breaking down into smaller tasks.

(iv) 10 000 ✗

..... (to 2 significant figures)

12) Problem Solving: Solve the following worded problems; put your answers in a sentence.

(a) A table and 4 similar chairs cost £470.

The same table and 8 similar chairs cost £710.

Calculate the individual cost of a table and a chair.

One table and one chair would cost £290.

$$470 = \text{Table} + 4 \text{ chairs}$$

$$710 = \text{Table} + 8 \text{ chairs}$$

$$060 = 1 \text{ chair}$$

$$710 - 470 = 240$$

$$240 \div 4 = 60$$

$$470 - 240 = 230$$

$$230 = \text{Table}$$

(b) Sally and Cerys had the same number of books. After Cerys gave 10 books to Sally, Sally had 3 times as many ✓

books as Cerys. How many books did each girl have to begin with?

Each girl started with 20 books.

Sally	Cerys
20	20
30	10

- (c) A domestic oil tank contains 150 litres of oil. A tanker lorry containing 3500 litres of oil arrives to make a delivery. After transferring some oil into the tank, the lorry contains 4 times as much oil as the tank. How many litres of oil did the tanker lorry transfer into the domestic tank?

The tanker transferred 725L of oil into the tank.

580L

$$\begin{array}{r} 0875 \\ 4 \overline{) 3500} \\ \underline{3600} \\ 875 \\ \underline{-150} \\ 725 \end{array}$$

- (d) Serena's father is 4 times as old as her. In 20 years time, he will be twice as old as her.

How old is her father now?

Serena's father is currently 40 years old.

$$\begin{array}{r} 10 \times 4 = 40 \\ +20 \\ \hline 30 \end{array} \quad \begin{array}{r} 40 \\ +20 \\ \hline 60 \end{array}$$

2

[8]

- 13) Calculate the value of

(a) 8^2

$8 \times 8 = 64$

(b) $\sqrt{121}$

$? \times ? = 121$

$10 \times 10 = 100$

$11 \times 11 = 121$

- 14) Calculate the value of

(a) $3^3 \times \sqrt{16}$

$3 \times 3 \times 3 = 27$

$4 \times 4 = 16$

$27 \times 16 = 432$

(b) 2^5

$2 \times 2 = 4$
 $4 \times 2 = 8$
 $8 \times 2 = 16$
 $16 \times 2 = 32$

[2]

- 15) (a) Given that $12^3 = 1728$, write down the value of $\sqrt[3]{1728000}$.

120

12000

$= 144000000$

- (b) The sum of 2 consecutive square numbers is 145. What are the numbers?

$72 + 73$

$2 \times 2 \times 3 \times 3$

$2 \times 2 = 4$
 $4 \times 2 = 8$
 $8 \times 3 = 24$
 $24 \times 3 = 72$

72
 36
 18
 9

72
 36
 18
 9

[1]

1. (c) Write 784 as a product of its prime factors. Hence write down the square root of 784.

$$= 2^4 \times 7^2$$

$$2 \times 2 \times 2 \times 2 \times 7 \times 7 = 2^4 \times 7^2$$

$$\begin{array}{r} 28 \\ 28 \\ \hline 784 \end{array}$$

$$(c) \frac{11^8 \times 11^3}{11^7} = 11^4$$

yr 7 POS - order of operations.

yr 7/8 POS - + / - / x / ÷ negative nrs.

yr 8 POS - Repeated powers.

17) Calculate the following

(a) $18 - 29 = -11$ (b) $-13 + 47 = 34$ (c) $-5 - 36 = -41$ (d) $13 - (-8) = 21$

(e) $-3 - (-9) = 6$ (f) $-3 \times 18 = -54$ (g) $-180 \div (-6) = 30$ (h) $-5 \times (-16) = 80$

(i) $280 \div (7 - 11) = -70$ (j) $-9 \times (-4) = 36$ (k) $\dots \times 4 \times (-7) = 84$

[11]

18) Calculate the following

a) $32 - 12 \div 3 = 28$ b) $5 + 5 \times 5 \div 5 = 10$

c) Calculate $5 \times 4 + 5 \times 8 = 60$

Calculate $5 \times (4 + 8) = 60$

What can you conclude about $5 \times 4 + 5 \times 8$ and $5 \times (4 + 8)$?

They both make the same answer.

d) Evaluate $17 \times 87 + 17 \times 13$

$$\begin{array}{r} 17 \\ 87 \\ \hline 1479 \end{array}$$

$$\begin{array}{r} 17 \\ 13 \\ \hline 221 \end{array}$$

$$\begin{array}{r} 1479 \\ + 221 \\ \hline 1700 \end{array}$$

[6]

WORK ON WORDS

LG Formulate equations

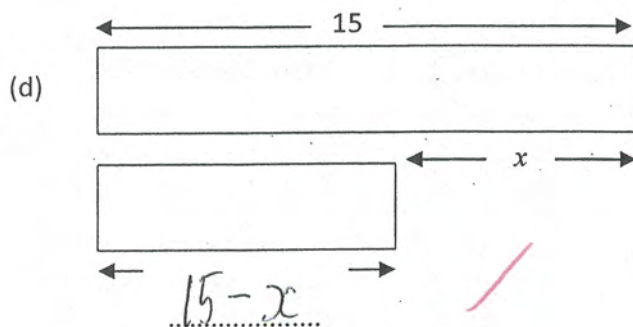
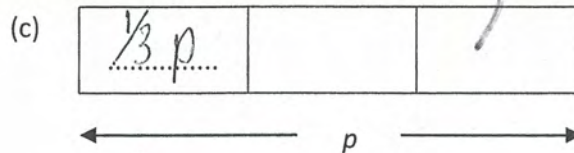
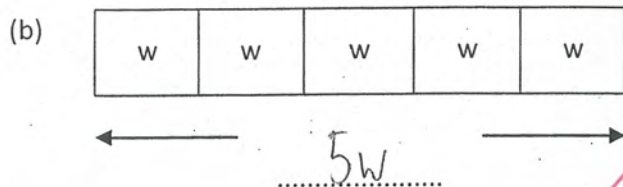
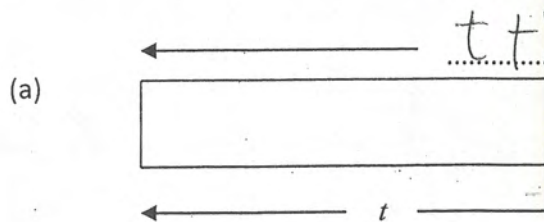
Substitute

Simplify

Expand.

Assessment 5A 19 questions; 50 marks

1) Write an algebraic expression that represents



[5]

2) Write an algebraic expression for each of the following

a) Add 8 to q $q + 8$	b) 12 more than a $a + 12$	c) Subtract 6 from x $x - 6$
d) Subtract w from 5 $5 - w$	e) 11 less than t $t - 11$	f) z less than 9 $9 - z$
g) multiply a by 3 and then add 5 to the result $a \times 3 + 5$	h) subtract 3 from t and then multiply the result by 7 $(t - 3) \times 7$	i) add 4 to p and then divide the result by 9 $(p + 4) \div 9$

[9]

3) In each box, find the expression in terms of n . For the circles on the right, find the value when $n = 12$.

n	$\times 2$	$2n$	$+ 5$	$2n + 5$	when $n = 12$	29
3	$\times n$	$3n$	$- 2$	$3n - 2$	when $n = 12$	34
n	$- 7$	$n - 7$	$\times 4$	$4n - 28$ $n - 7 \times 4$	when $n = 12$	20
n	$\div 3$	$n \div 3 = \frac{n}{3}$	$+ 5$	$\frac{n}{3} + 5$	when $n = 12$	9
28	$- n$	$28 - n$	$\div 2$	$\frac{28 - n}{2}$	when $n = 12$	8

[8]

4) Kathy is p years old. Her father is twice as old as her. What will her father's age be in 3 years time?

- (i) $(p + 3)$ years (ii) $(2p - 3)$ years (iii) $(2p + 3)$ years (iv) $(3p + 3)$ years

[1]

5) Find the value of $15 - 2v$ when $v = 4$.

- (i) 7 (ii) 8 (iii) 11 (iv) 13

[1]

6) Simplify $6a + 17 - 3a - 10$

- (i) $3a - 7$ (ii) $3a + 7$ (iii) $9a + 7$ (iv) $9a + 27$

[1]

7) Find the value of $18 - \frac{3d}{2}$ when $d = 4$.

- (i) 12 (ii) 13 (iii) 17 (iv) 30

[1]

8) Simplify $11y + 7z - 9y - 4z$

$$2y + 3z$$

[1]

9) Mrs Jones bought s metres of ribbon. She used 3 metres of ribbon to decorate some presents. How much ribbon had she left in terms of s ?

$$s - 3$$

[1]

10) Jimmy spent £ x a week for 3 weeks and had £12 left. How much did he have at first in terms of x ?

$$3x + 12$$

[1]

11) (a) Expand $3(y + 7)$ $3y + 21$

(b) Expand $5(2a - 3)$ $10a - 15$

(c) Factorise $7p + 35$ $7(p + 5)$

(d) Factorise $8x^2 - 4x$ $4x(2x - 1)$
 $x(8x - 4)$

[4] $3\frac{1}{2}$

12) There were $36k$ apples in a box. Karen used one third of them to make apple pie. Express the number of apples left in terms of k .

$$\frac{1}{3} 36k \quad 24k$$

[1]

13) A t-shirt costs £ b . A pair of jeans costs twice as much as the t-shirt. A belt costs £8 less than the t-shirt.

How much does it cost Peter if he buys all three items? Give your answer in terms of b in its simplest form.

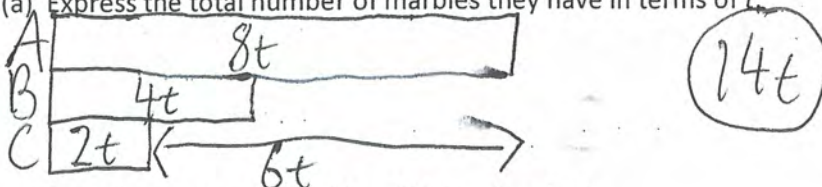
$$b + b \times 2 + b - 8 = 3b \times 2 - 8 = 6b - 8$$

$$4b - 8$$

[3]

14) Ali has twice as many marbles as Billy. Billy has twice as many marbles as Charlie and Ali has $6t$ more marbles than Charlie.

(a) Express the total number of marbles they have in terms of t .



(b) Find the number of marbles Ali has when $t = 7$.

$$8 \times 7 = 56$$

[4]

15) (Two times a number is greater than $\frac{1}{3}$ of the number by $10z$.) Find the number in terms of z .

$$z \times 2 = 2z$$

$$z \times \frac{1}{3} = \frac{1}{3}z$$

$$2z - \frac{1}{3}z = 10z$$

$$\frac{5}{3}z = 10z$$

$$z = 6z$$

$$6z$$

2

[2]

16) Simplify the following expressions

(a) $32p - 15q - 15p + 11q$

$17p - 26q$

$17p - 4q$ ✓

(b) $7a + 2b - 4a - b$

$3a + b$ ✓

$1\frac{1}{2}$

[2]

17) Expand and simplify

(a) $5(4a + 3b) + 2(3a - b)$

$20a + 15b + 6a - 2b = 26a + 13b$ ✓

(b) $2r - 3s - 5(r - s)$

$2r - 3s - 5r + 5s = -3r + 2s = 3r - 2s$ ✓ 4

[4]

18) Simplify

(a) $\frac{1}{3}(a+2) + \frac{1}{4}a = \frac{1}{3}a + \frac{1}{3}2 + \frac{1}{4}a = \frac{7}{12}a + \frac{1}{3}2$ ✓

$\frac{1}{3} = \frac{4}{12}$

$\frac{1}{4} = \frac{3}{12}$

2

[4]

19) Given that $a = 4$, $b = -2$ and $c = 7$, evaluate the following.

(a) $abc = 4 \times -2 \times 7 = -8 \times 7 = -56$ ✓ (b) $ac + b = 4 \times 7 + -2 = 28 - 2 = 26$ ✓ (c) $\frac{4a - 3b}{2a + b} = \frac{4 \times 4 - 3 \times -2}{2 \times 4 + -2} = \frac{16 - -6}{8 + -2} = \frac{16 + 6}{8 - 2} = \frac{22}{6} = \frac{11}{3}$ ✓

$\sqrt{65}$

(d) $\sqrt{c^2 - 2ab} = \sqrt{7^2 - 2 \times 4 \times -2} = \sqrt{49 - 8 \times -2} = \sqrt{49 - -16} = \sqrt{49 + 16} = \sqrt{65}$ ✓

Level 6: Learner profile

The materials in this folder consist of a learner profile which is judged to show the characteristics of a learner's standards of attainment which, overall, are at level 6. The commentary should enable the reader to see why the learner profile has been given a best-fit level 6.

The level of detail exemplified here in the commentary is intended to give a good sense of how a best-fit level can be fully justified, in the case of learner profiles. For in-school awarding of best-fit levels at the end of a key stage and in-school moderation, it is still necessary for the teacher to justify that the range of work required is covered and the appropriate standard reached to award a best-fit level. How this is demonstrated is for each school to determine.

A learner profile will typically contain the work of one pupil from across the range of the subject and provide sufficient evidence to enable a judgement to be made on the level which best fits the standard represented in the profile. A learner profile should be as straightforward as the pupil's book or books which show evidence of the characteristics of levels and relevant attainment target(s). Other work which would give the complete picture of a pupil's standards might include a theme/topic book, audio visual recordings, reading record. A commentary on the learner profile will make clear how, on balance, the best fit judgement has been reached and why it is not at the level above or below if it is borderline. The commentary will signpost where the evidence of achievement at a particular level can be seen in the exercise book or other original material produced in the year.

Mathematics: Learner profile

Level 6

Comment	Source	Reference
In the 'Big Calculations' task, the learner is able to identify and obtain information in order to calculate how many seconds there are in a year. This level 5 characteristic is also evident throughout the algebra and fraction work whereby the learner regularly identifies and obtains information to solve problems.	Book 2	p5-6
When expressing a number as a product of its prime factors, the learner makes general statements of his own based on his evidence and concludes that, if the powers are even then the number must be a square number.	Book 2	p24
Within the context of angle properties and parallel lines at level 6, the learner solves complex problems by breaking them down into smaller tasks and provides some justification.	Book 2	p51-52
In the 'loft conversion' task, the learner is able to interpret, discuss and synthesise the information provided in order to work out how much architrave is required. The learner works systematically without teacher input.	Book 3	p70-72
Within the number strand it is evident that level 4 and level 5 number work is sustained throughout, which then feeds into the demand of the level 6 work. There is regular practice of multiplying and dividing whole numbers and decimals.	Book 2 Book 3	p21 and 35 p70
The learner shows evidence of understanding the four operations in negative numbers which is subsequently used in solving equations, simplifying algebraic expressions and BODMAS involving powers and brackets.	Book 2	p7 ff
There is extensive evidence of work involving fractions, including the four operations, equivalences and mixed numbers to top heavy fractions at level 6. During work on adding and subtracting mixed numbers, the learner realises that his original method is not working and calls on his prior knowledge of mixed numbers and top heavy fractions in order to solve the problems correctly.	Book 2	p61

The learner calculates a percentage increase or decrease by using the multiplier method which shows a thorough understanding of this topic and the demand of level 6.	Book 1	p27
Within the algebra strand, when given word problems, the learner identifies and obtains information to solve the problems before forming and solving a variety of linear equations. The equations include those with brackets, an unknown on both sides and fractions linking to the work on equivalent fractions and adding/subtracting fractions.	Book 3	p17-18
There is extensive evidence of algebraic work at level 6: expanding brackets, simple factorising, simplifying expressions (involving negative numbers), simple substitution and drawing linear graphs by mapping algebraically, which again shows a comprehensive understanding of this work.	Book 3	p7 p28-29
Within the shape strand the learner recaps enlarging shapes by a positive whole number scale factor. This is characteristic of level 6. The learner knows the properties of quadrilaterals and is beginning to use them to classify quadrilaterals. However, in order to secure level 6 further evidence of the learner using properties of quadrilaterals to solve problems is required.	Book 3	p64
Within the measures strand there is extensive evidence of level 6 work. The learner builds on his skills of angle properties, which confidently leads to using the properties of intersecting and parallel lines at level 6.	Book 2	p51-52 p78
The work on area and volume consolidates understanding at level 5 and leads onto area and circumference of circles which is characteristic of level 6.	Book 3	p 55-58
There is evidence of level 6 within the data strand. The learner starts by using the probability scale from 0 to 1 moving on to the demand of level 6 by identifying all outcomes when dealing with a combination of 2 experiments. The learner answers correctly GCSE past paper questions on finding and justifying probabilities at the demand of level 6.	Book 2	p67-74

In terms of graph work, while there is no evidence that the learner has collected data, various graphs have been constructed and interpreted meeting the demand of both levels 5 and 6.	Book 3	p32–44
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Best-fit level: Summary

The collection of work reflects evidence from across the skills and range of the mathematics programme of study.

Both level 5 and 6 criteria were considered for this profile. Three exercise books, assessments and homework tasks are included in this collection of work.

Based on the evidence available the learner demonstrates performance beyond level 5 and nearly all of the level 6 criteria. Therefore the best-fit judgement is level 6. However, to strengthen this, additional work based around rich investigational tasks will ensure the learner is given opportunities to provide mathematical justifications to support their conclusions.