



THE BRITISH INTERNATIONAL SCHOOL
ABU DHABI

A NORD ANGLIA EDUCATION SCHOOL

Year 8 Maths

Topic 1-2-3 Workbook

In the table below translate the key terms into your home language and write a short definition for each term [if needed visit www.mathsisfun.com/definitions/].

TOPIC 1 – MIXED NUMBERS		
TERM	TRANSLATION	DEFINITION
Mixed Number		
Improper Fraction		
Numerator		
Denominator		
TOPIC 2 – EXPRESSIONS & FORMULAE		
Algebra		
Expression		
Formula		
Simplify		
Expand		
Substitute		
TOPIC 3 - SEQUENCES		
Linear Sequence		
Term-to-term Rule		
Position-to-term Rule		
Triangular Numbers		
Fibonacci Sequence		

Adding and Subtracting Fractions

1. Work out the following, giving each answer in its simplest form.



a) $\frac{3}{5} + \frac{1}{4}$

b) $\frac{3}{4} + 1\frac{2}{3}$

c) $\frac{11}{10} - \frac{5}{6}$

.....

.....

.....

d) $2\frac{1}{2} + 1\frac{1}{10}$

e) $4\frac{4}{5} - 1\frac{1}{3}$

f) $2\frac{1}{6} - 1\frac{3}{4}$

.....

.....

.....

2. Michelle and Nick take part in a sponsored ski. Michelle skis for $1\frac{1}{4}$ km and Nick skis for $\frac{6}{7}$ km.



How much further does Michelle ski than Nick?

..... km

3. Cam and Jules are digging a hole for a pond. Cam digs $1\frac{7}{9}$ m³ of soil and Jules digs $2\frac{2}{5}$ m³ of soil.



What volume of soil have they dug in total?



..... m³

How did you do?

Phew, that was a nice way to start off Section Two. It's okay if you don't spot the simplest common denominator straight off, as long as your final fraction is in its simplest form. You should be able to:

- Add and subtract fractions with different denominators.
- Add and subtract mixed numbers and improper fractions with different denominators.

Multiplying Fractions

1. Work out the following:



$$\frac{3}{4} \times 32$$

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

$$\frac{1}{8} \times \frac{5}{6}$$

.....

.....

.....

2. Kelly is getting some snacks for a party.



a) $\frac{1}{4}$ of her guests hate peanut butter. Of these, $\frac{2}{3}$ also hate cola.
What fraction of her guests hate both peanut butter and cola?

.....

b) $\frac{5}{12}$ of the guests who don't hate peanut butter are vegetarians.
What fraction of Kelly's guests are vegetarians who don't hate peanut butter?

.....

3. Work out the following, giving each answer in its simplest form.



$$\frac{2}{3} \times \frac{6}{7}$$

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

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

.....

.....

.....

4. On Monday, Izzy takes her llama on a $2\frac{2}{3}$ km long walk.
On Tuesday, they only walk $\frac{2}{7}$ of the distance they walked on Monday.



How many kilometres do they walk on Tuesday?

..... km



How did you do?

And that's all there is to that topic — just multiply the tops and bottoms separately, then simplify. Once you're happy with this stuff, put a big ol' tick in these boxes. By now, you should be able to:

Multiply fractions by whole numbers.

Multiply fractions together.



Dividing Fractions

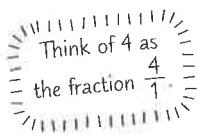
1. Fill in the gaps to complete these calculations.



Write the final answers in their simplest form.

$$7 \div \frac{3}{10} = 7 \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$$

$$\frac{5}{6} \div \frac{2}{5} = \frac{5}{6} \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$$



$$\frac{4}{5} \div 4 = \frac{4}{5} \times \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$$

2. Work out the following, giving each answer in its simplest form.



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

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

$$\frac{2}{3} \div \frac{7}{9}$$

.....

.....

.....

3. Samira has $\frac{2}{3}$ of a cake left in her bakery at the end of the day. She shares it equally between three of her employees.

What fraction of the original, full cake does each employee get?



.....

4. Work out the following, giving each answer in its simplest form.



$$1\frac{1}{3} \div \frac{4}{5}$$

$$\frac{2}{5} \div 1\frac{1}{7}$$

$$2\frac{1}{4} \div 1\frac{5}{6}$$

.....

.....

.....

How did you do?

And that's that... Dividing with fractions can be a bit confusing — remember, you just flip the second one upside down, and then multiply them together. By this point, you should be able to:

Divide fractions by whole numbers.

Divide numbers and fractions by fractions.

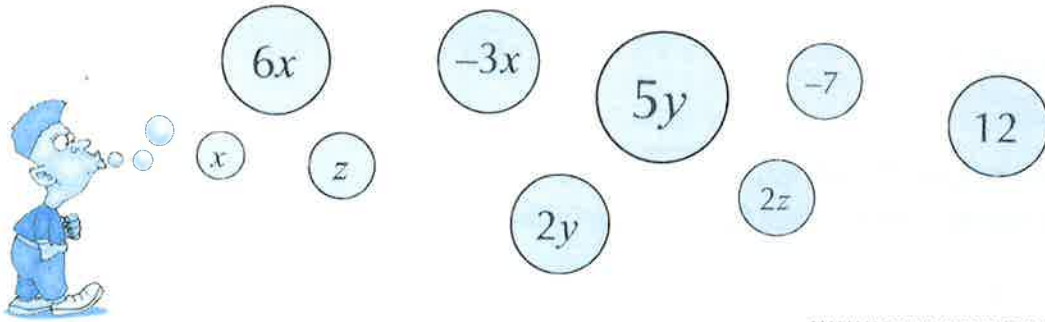






Simplifying Expressions

1. Collect all of the terms in the bubbles to write a simplified expression.



It might help if you cross off the terms as you go to help you keep track.

2. Simplify the following expressions, then circle the odd one out.

a) $2x + 2y - y$

b) $6y + 5y - 2x + 7 - 4y$

c) $6x + y + 5 - 3 - 4x - 2$

3. Draw a line joining each expression with its simplified form.

$3a + a + b$

$a \times 2a \times b$

$2a \div 4b$

$6b - a + a$

$a \times b \div 3a$

$\frac{a}{2b}$

$4a + b$

$6b$

$\frac{b}{3}$

$2a^2b$

4. At full price, jackets cost $\pounds x$ and shirts cost $\pounds y$. During a sale, each jacket has $\pounds 15$ off and shirts are sold at half-price.

- a) Which of these is an expression for the cost of a jacket and 4 shirts during a sale? Circle your answer.

$\frac{1}{2}(x + 4y) - 15$

$(x - 15) + (4 \times \frac{1}{2}y)$

$\frac{1}{2}(x + 4y - 15)$

- b) Write this expression in its simplified form.

How did you do?

Cor blimey, that's the first topic of Section Three finished already. The section might be new, but some things just never change — tick off these boxes when you're confident that you can:

Use algebraic notation correctly.

Collect like terms to simplify expressions.

Substituting into Expressions and Formulas

1. Find the value of the following expressions. 

a) $5b - 3$ when $b = 6$


.....

b) $10p + 7w$ when $p = 2$ and $w = 4$

.....

c) $100 + 3d - 8j$ when $d = 5$ and $j = 3$

.....

2. Write the expressions in order from smallest to largest when $t = 4$. 

$3t + 7$

.....

$33 - 6t$

.....

$\frac{10t}{2}$

.....

$50t - 189$

.....

3. The formula linking speed (s), distance (d) and time (t) is:

$s = \frac{d}{t}$ 

Find s when $d = 27$ and $t = 3$.

$s = \dots\dots\dots$

4. The formula on the right gives the number of minutes, T , it takes to bake a potato that weighs w kg.

$T = 35 + 50w$

a) Ed's potato weighs 0.5 kg. How many minutes should he bake it for?

..... minutes 

b) Nish only has 50 minutes to bake a potato.

What is the mass of the heaviest potato that can be baked in this time?

..... kg 

How did you do?

And that's another topic in the bag... Tick off the boxes once you're happy that you can:

Substitute numbers into expressions.

Substitute numbers into formulas.



Expanding Brackets

1. Fill in the boxes to make equivalent expressions on both sides of the equals sign.

$$3(x + 2) = 3x + \square$$

$$4(y + \square) = 4y + 12$$

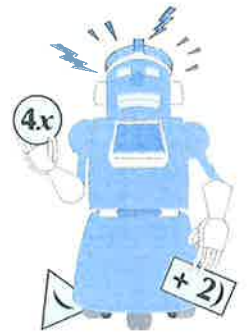
2. The Expandatron-2000 has malfunctioned. You'll have to expand these brackets yourself.

$$5(w + 4) = \dots\dots\dots$$

$$7(x - 3) = \dots\dots\dots$$

$$2(9 + y) = \dots\dots\dots$$

$$4(4 - 6z) = \dots\dots\dots$$



3. Circle the correct expansion of $-6(3 - a)$.

$18 + 6a$

$-18 - 6a$

$-18 + 6a$

$18 - 6a$

4. Kieran has forgotten how to expand brackets.

Show Kieran how it's done and expand these brackets.



$$5(x + y) = \dots\dots\dots$$

$$-3(p - q) = \dots\dots\dots$$

$$2(1 - s + 2t) = \dots\dots\dots$$

$$-5(6m - 9n + 3) = \dots\dots\dots$$

5. Expand the brackets in the following expressions.

$$x(y + 1) = \dots\dots\dots$$

$$m(6 - n) = \dots\dots\dots$$

$$-p(q + r) = \dots\dots\dots$$

$$s(s + 12) = \dots\dots\dots$$

How did you do?

Now that was an expansive workout. Towel off and then check you are able to:

Expand single brackets in algebraic expressions.



Algebra — Multiplying



Another lovely page of algebra...

It might look a bit weird but believe me — it's bound to come up in a test.

Q1 Remember that $x \times x = x^2$. Collect like terms:

a) $y \times y \times y = \dots\dots\dots$

d) $y \times y + x \times x \times x = \dots\dots\dots$

b) $y \times x = \dots\dots\dots$

e) $p \times p + 2q \times q \times q = \dots\dots\dots$

c) $x \times 2x = \dots\dots\dots$

f) $r \times r \times r + q^2 \times q \times 3p^2 = \dots\dots\dots$

Q2 Simplify by multiplying out the brackets.



a) $4(x + 3) = \dots\dots\dots$

d) $6(4x - y) = \dots\dots\dots$

b) $5(2x + 4) = \dots\dots\dots$

e) $2(5x - 3y) = \dots\dots\dots$

c) $3(3x + 1) = \dots\dots\dots$

f) $p(2a + 3b) = \dots\dots\dots$

Remember — everything outside the brackets multiplies everything inside the brackets.



Q3 Multiply out the brackets and then collect like terms.

a) $3(x + 4) + 5(6x + 5) = \dots\dots\dots = \dots\dots\dots$

b) $4(3x + 3) + 2(2x - 7) = \dots\dots\dots = \dots\dots\dots$

c) $2(2x + 2) + 7(7x - 3) = \dots\dots\dots = \dots\dots\dots$

d) $3(5x - 5) + 6(8x + 8) = \dots\dots\dots = \dots\dots\dots$

e) $5(3x - 7) + 9(2x + 2) = \dots\dots\dots = \dots\dots\dots$

f) $a(2b + 2) + a(5b - 6) = \dots\dots\dots = \dots\dots\dots$

Formulas



Formulas help you work out loads of interesting stuff, but you've gotta know how to use them properly. Just be careful when substituting values in and everything will be peachy.

Q1 Substitute the given values of x into the following expressions:

- | | | | |
|-------------|-----------------|------------|-----------------|
| a) $2x + 1$ | $x = 1$: | b) $5 - x$ | $x = 1$: |
| | $x = 2$: | | $x = 2$: |
| | $x = 3$: | | $x = 3$: |
| | $x = 4$: | | $x = 4$: |

Q2 Frau Debus works out the weekly pocket money for each of her children using this formula:

$$\text{Pocket money (in pence)} = \text{Age in years} \times 20$$

Work out the pocket money for each child, giving your answers in pounds.

- a) Karl, aged 10 years
- b) Henri, aged 8 years
- c) Ingrid, aged 5 years



Q3 You can convert between degrees Fahrenheit ($^{\circ}\text{F}$) and degrees Celsius ($^{\circ}\text{C}$) using the formulas below:

$$F = \frac{9}{5}C + 32$$

$$C = \frac{5}{9}(F - 32)$$

- | | |
|--|--|
| a) Convert these from $^{\circ}\text{C}$ to $^{\circ}\text{F}$: | b) Convert these from $^{\circ}\text{F}$ to $^{\circ}\text{C}$: |
| i) 60°C | i) 41°F |
| ii) 100°C | ii) 77°F |

Sequences

1. For each of these sequences, draw a line to match the sequence to the term-to-term rule.

2, 5, 8, 11...	Divide by 2
67, 56, 45, 34....	Add 4
3, 6, 12, 24...	Add 3
-3, 1, 5, 9...	Subtract 11
16, 8, 4, 2...	Multiply by 2
2, -5, -12, -19...	Subtract 7

2. Fill in the missing terms of the following sequences.

- | | |
|---|---|
| <p>a) -3, 6,, 24, 33</p> <p>c) -2,, -18, -26,</p> | <p>b), 12, 17,, 27</p> <p>d) 28,,, 16, 12</p> |
|---|---|

3. The numbers of this sequence have been scrambled up. Put them back into order and write down the term-to-term rule. The first number has been done for you.

39 31 23 35 27

39,,,,

Rule:

4. Alex has a box of 40 chocolates. Each day, she eats 3 chocolates and gives her sister 2 chocolates.

a) Write down the first five terms of the sequence formed by the number of chocolates she has left at the end of each day.

.....

b) She was given the chocolates and starts eating them on her birthday. Counting her birthday as day 1, at the end of which day will the box be empty?

Day

Sequences

1. The expression for the n th term of a sequence is $5n - 2$.

Write down the first three terms of this sequence.

.....,, and

2. A sequence has n th term $6n + 13$.

- a) What is the 5th term of this sequence? b) What is the 50th term of this sequence?

.....

.....

3. Take a look at the sequence of numbers below.

9 12 15 18 21 ...

- a) Write down an expression for the n th term in this sequence.

.....

- b) Calculate the 100th term in this sequence.

.....

4. Write down an expression for the n th term in each of the following sequences.

a) 5, 10, 15, 20, 25, ...

b) 6, 11, 16, 21, 26, ...

.....

.....

c) 6, 12, 18, 24, 30, ...

d) 5, 11, 17, 23, 29, ...

.....

.....

5. Jin is recording the number of frogs he sees in a pond each day.



1st day



2nd day



3rd day

The number of frogs continues in the same pattern.

- a) Write down an expression for the number of frogs that Jin will see on the n th day. b) How many frogs will Jin see on the 30th day?

.....

.....

Sequences

6. Write down an expression for the n th term in each of the following sequences.

a) 3, 5, 7, 9, 11, ...

b) 1, 3, 5, 7, 9, ...

.....

.....

c) 6, 10, 14, 18, 22, ...

d) 2, 6, 10, 14, 18, ...

.....

.....

7. Ashley is investigating the sequence $-4n + 3$.

a) Write down the first 10 terms of their sequence. Circle the terms in odd positions.

.....

b) Which of the expressions below generates the terms circled above? Circle your answer.

$8n - 7$ $-8n - 7$ $-8n + 7$ $8n + 7$

c) What is the 20th term you would circle in Ashley's sequence?

.....

8. Sequentoid-5000 is looking for a pattern in the following sequence.

0.3 0.8 1.3 1.8 2.3 ...

a) Write down the term-to-term rule for the sequence.

.....

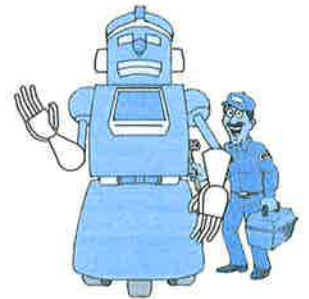
b) Write down an expression for the n th term in the sequence.

.....

c) Will there ever be a whole number in the sequence? Explain your answer.

.....

.....



How did you do?

You're all done — as simple as that. By now, you should be able to:

- Find an expression for the n th term of a sequence.
- Generate terms in a sequence using its n th term.

