# Year 7 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 – INTEGERS		
TERM	**TRANSLATION**	**DEFINITION**
Integer		
Place Value		
Negative Number		
BODMAS/ BIDMAS		
TOPIC 2 – INTRODUCTION TO ALGEBRA		
Algebra		
Symbol		
Expression		
Formula		
Substitution		
TOPIC 3 – SYMMETRY & COORDINATES		
Line Symmetry		
Rotational Symmetry		
Reflection		
Coordinates		
Polygon		

Place Value and Ordering Numbers

1. Gary has poked a nest, causing a swarm of angry numbers. Calm the swarm by drawing a circle around every number you see with a 5 in the tens column.

54

105   75   2015

35   7070   25   5850   57

953   450

95

2. Order the following from smallest to largest: 968 ml, 869 ml, 989 ml, 986 ml, 896 ml.

.... ml, ... ml, ... ml, ... ml, ... ml

3. For each pair of numbers below, choose the correct symbol from the shelf to fill the box.

< > =

12 ☐ 12   5 ☐ 6

7 ☐ 4   150 ☐ 1500

4. The code to my safe is "one million, ninety-eight thousand, four hundred and twelve".

a) Write down this value as a number.

....

b) What is the digit in the ones column?   c) What is the digit in the thousands column?

....

How did you do?

That's about it for whole numbers — I hope Gary made it out OK. Before you go, make sure you can:

☐ Understand place value in whole numbers.   ☐ Compare and order whole numbers.

☐ Understand and use inequality symbols.

Negative Numbers

1. Some numbers are missing from the number line below.

    Mark on the numbers –2, –6 and –9.

    ```
    -10                    -5                     0
    └─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┘
    ```
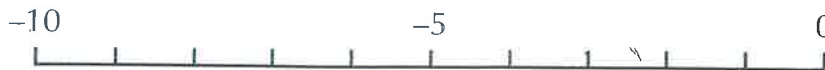
2. Order these numbers from lowest to highest.

–11	2	–6	–4	10	4

    ....

3. Work out the following calculations.

    6 + –2 = ...   –3 – 7 = ...   –1 – –5 = ...   –4 + –7 = ...

4. Answer true (☑) or false (☒) to the following statements.

    –2 < –5 ☐   –4 ≥ –6 ☐   –7 ≤ –10 ☐   –8 > –3 ☐

5. Edward is playing a game of 'Perfect 10'.
    To win the game he must throw 3 darts and score exactly 10.

    a) His first attempt is shown on the right.
        Did Edward win? Explain your answer.

        ....

        ....

    b) If Edward is allowed to throw one of his darts again to
        get a new score, is it possible for him to win the game?
        Explain your answer.
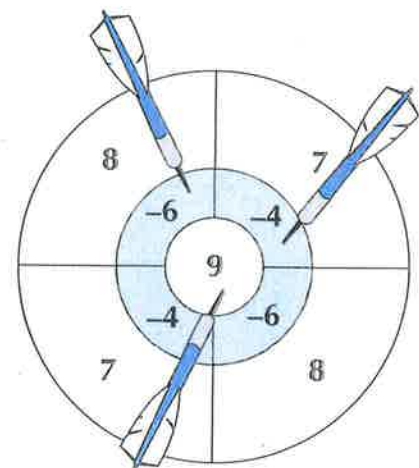
        ....

        ....

BODMAS

1. Work out these calculations.

a) $6 + 8 \div 4 - 2$

....

b) $2 \times 3 - 9 \div 3$

....

2. Mila starts with the number 4. She adds 5 to it, then doubles the result. Finally, she subtracts 3. What calculation has she done? Circle your answer.

$4 + 5 \times 2 - 3$ $\qquad$ $(4 + 5) \times 2 - 3$ $\qquad$ $4 + 5 \times (2 - 3)$ $\qquad$ $4 + (5 \times 2) - 3$

3. Add brackets to make each of the following calculations correct.

a) $1 + 3 \times 2 = 8$ $\qquad$ b) $8 - 2 + 1 = 5$

c) $12 \div 3 + 1 = 3$ $\qquad$ d) $4 + 2 \times 3 + 1 = 24$

4. Use the tiles on the right to make the number given. Each one tells you the number of tiles to use.

$\boxed{3}$

$\boxed{3}$ $\boxed{\times}$

$\boxed{3}$

$\boxed{)}$

$\boxed{+}$

$\boxed{-}$

$\boxed{(}$ $\boxed{3}$

E.g. Make 18, using 7 tiles: $\boxed{3} \boxed{\times} \boxed{(} \boxed{3} \boxed{+} \boxed{3} \boxed{)} = 3 \times (3 + 3) = 18$.

a) Make 6, using 3 tiles. ....

b) Make –3, using 7 tiles. ....

c) Make 3, using 9 tiles. ....
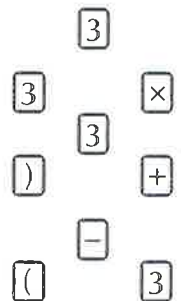
How did you do?

Using **BODMAS** takes some of the stress out of doing calculations.
Find your inner peace and reflect upon this page. You should be able to:

☐ Use **BODMAS** to do calculations in the correct order.

☺☐ ☺☐ ☺☐

Section One — Number

Simplifying Expressions

1. Collect all of the terms in the bubbles to write a simplified expression.
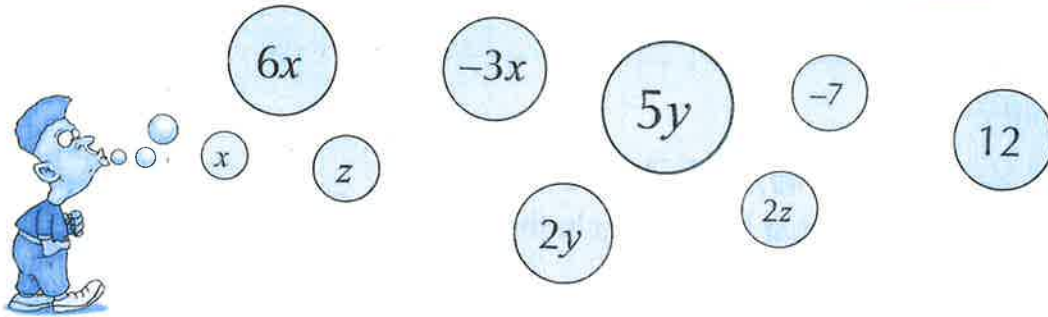
It might help if you cross off the terms as you go to help you keep track.

$6x$ $-3x$ $5y$ -7 12 x z $2y$ $2z$

....

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.

$3a + a + b$ $a \times 2a \times b$ $2a \div 4b$ $6b - a + a$ $a \times b \div 3a$

$\dfrac{a}{2b}$ $4a + b$ $6b$ $\dfrac{b}{3}$ $2a^2b$

4. At full price, jackets cost £x and shirts cost £y. During a sale, each jacket has £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.

Algebra — Simplifying

All you do is put all the things together that are the same...
in other words, you'd put 5x together with 2x and 4x, but not with 6y.

Q1 Complete the following. The first one is done for you.

a) $\bullet + \bullet + \bullet + \bullet + \bullet = 5\bullet$

b) $\bullet + \bullet + \bullet + \bullet = $ .... $\bullet$

c) $\clubsuit + \clubsuit + \clubsuit = $ .... $\clubsuit$

d) $\star + \star + \star + \bullet + \bullet = $ .... $\star + $ .... $\bullet$

e) $\clubsuit + \clubsuit + \bullet + \bullet + \bullet + \star + \star = $ .... $\clubsuit + $ .... $\bullet + $ .... $\star$

f) $\star + \star + \star + \star + \star + \star + \clubsuit + \clubsuit + \clubsuit = $ .... $\star + $ .... $\clubsuit$

g) $\clubsuit + \clubsuit + \clubsuit + \clubsuit - \clubsuit - \clubsuit = $ .... $\clubsuit$

h) $\star + \star + \star + \star + \star - \bullet - \star - \star - \bullet = $ .... $\star - $ .... $\bullet$

Q2 Collect the like terms together.

a) $2x + 3x = $ ....

b) $5x - 4x = $ ....

c) $6x + 2y - 3x + y = $ ....

d) $10x + 3y + 2x - 3y = $ ....

e) $5x + 3y - 2z - 6y = $ ....

f) $-4z + 6x - 2y + 2z - 3y = $ ....

g) $15x - 4y + 3z - z - 11x + 5y - y - 4x + z = $ ....

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 $t = 4$.

   $3t + 7$ $33 - 6t$ $\dfrac{10t}{2}$ $50t - 189$

   ....

3. The formula linking speed (s), distance (d) and time (t) is: $s = \dfrac{d}{t}$

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

   $s = $ ....

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.

Symmetry

1. Draw all the lines of symmetry on each of the shapes below.

   a)
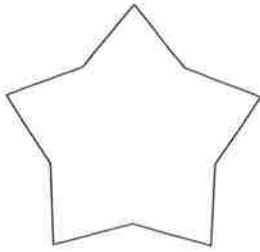
   b)
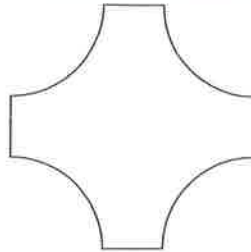
   c)

2. Draw lines to match each shape with its order of rotational symmetry.
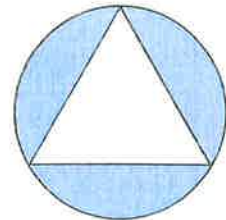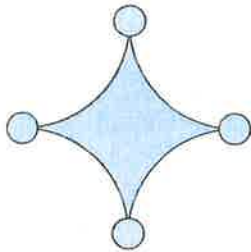
   Two   Three   Four

3. Shade four squares in the pattern below so that is has exactly one vertical line of symmetry.
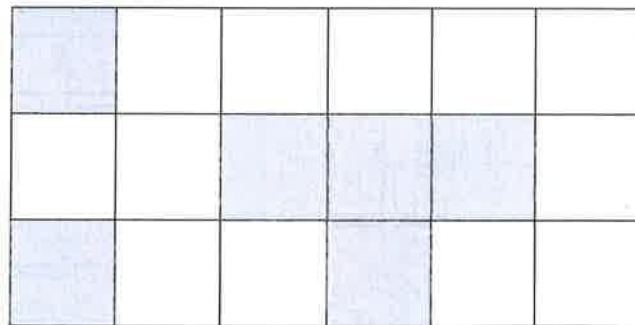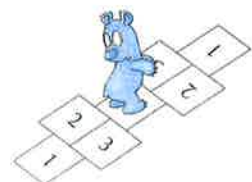
Symmetry

A shape has a line of symmetry if you can fold both sides exactly together.
Have a go using tracing paper — it's easier to see (and you won't crease your book).

Q1   Draw the lines of symmetry on the shapes below.

a)
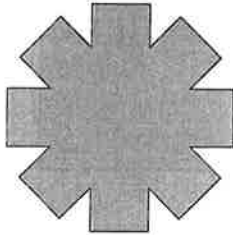
b)
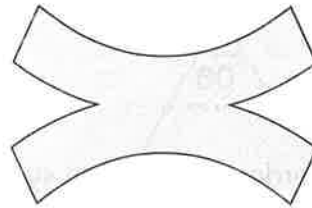
c)

d)
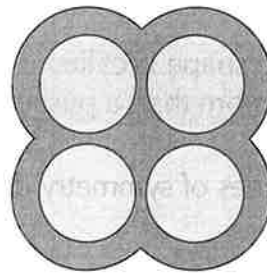
Q2   Find the order of rotational symmetry for these shapes.

a)
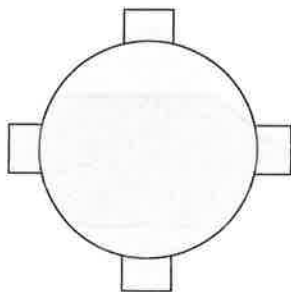
b)

....

....
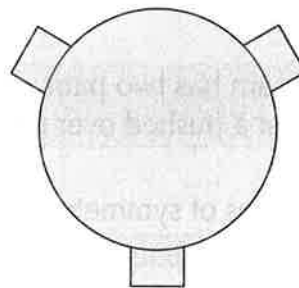
c)
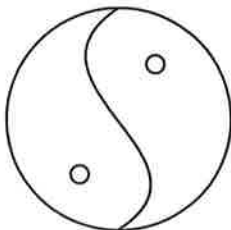
d)

....

....
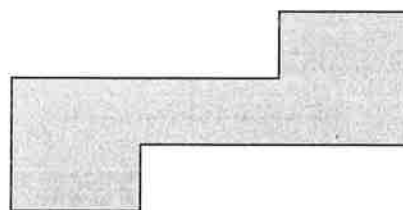
You can work out the order of rotational symmetry by turning your book around and
seeing how many times the shape looks the same before the book's back the right way up.

Reflection

1. Reflect shape A in the mirror line. Label the new shape B.

Mirror line | Mirror line
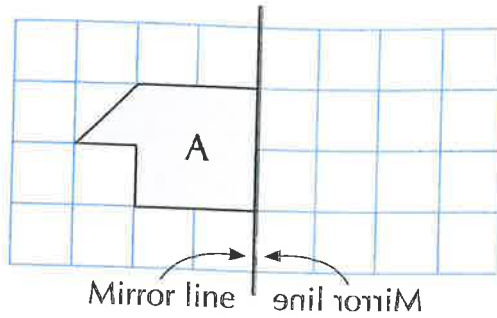
2. Reflect each of these shapes in the given mirror line.

a)

Mirror line

b)

Mirror line
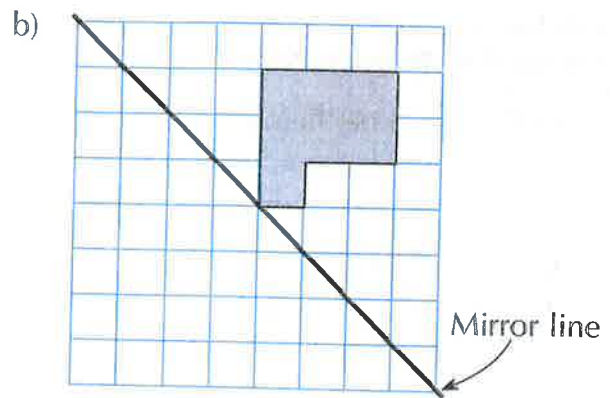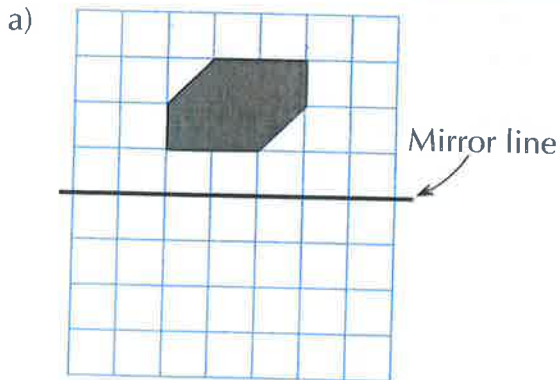
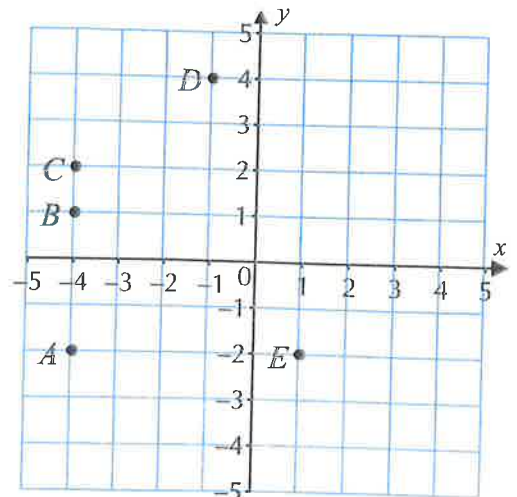3. Five points have been plotted on the axes on the right.

a) What point is obtained by reflecting A in the x-axis?

Tick your answer: ☐ B ☐ C ☐ D ☐ E

b) Draw the triangle ACD and then draw its reflection in the y-axis.

c) The point E is reflected in the x-axis and then in the y-axis. What are its new coordinates?

(........., ...)

How did you do?

Well done, you've completed the page on reflections! Look in a mirror and you'll see a champion! What do you mean you'll need a mirror to read that? Check to see if you can now:

☐ Reflect shapes on grids and axes in horizontal, vertical and diagonal mirror lines.

Section Four — Geometry

Coordinates

1. A pirate can't remember the code to his treasure chest, but his parrot says the letters are on the map at coordinates (7, 8), (2, 2), (11, 1), (5, 6) and (5, 10). Write down the letters of the code that will open his treasure chest.

.........., ..., ..., ..., ...
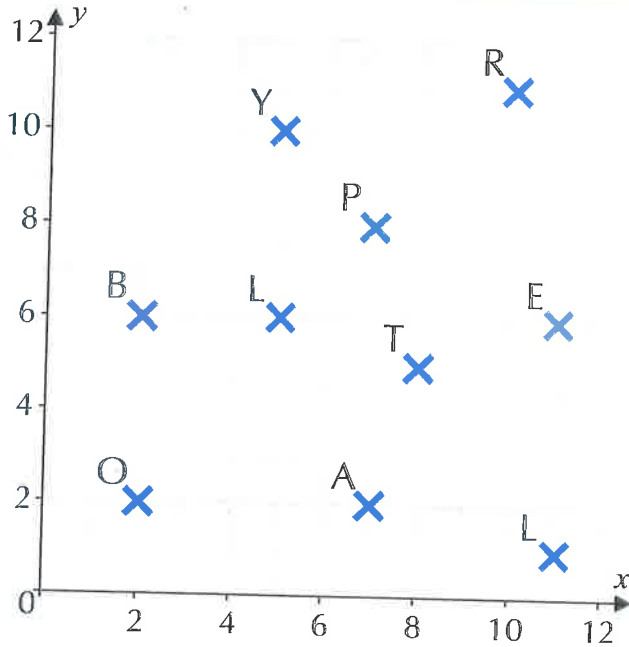
2. Dembe plotted some points on the grid below, but forgot to label them with their coordinates. Draw lines between the boxes to match the letters to the coordinates.

A	(−3, −4)
B	(0, −2)
C	(4, −3)
D	(−3, 3)
E	(−2, 0)
F	(3, 4)
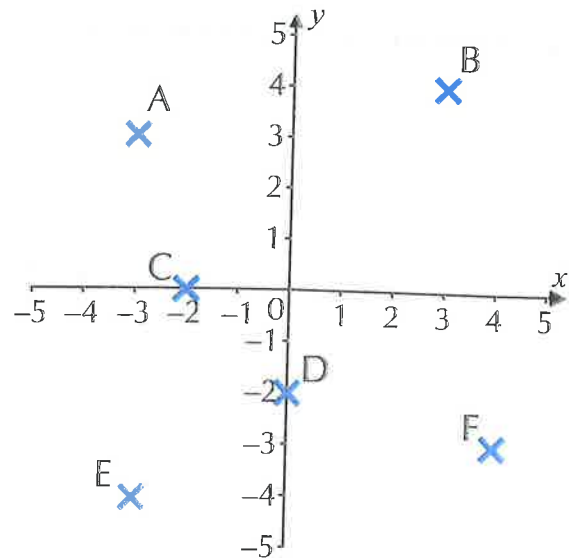
3. Circle the coordinates below where the x-coordinate is double the y-coordinate.

(3, 6)   (10, 5)   (2, 0)   (4, 2)   (3, 5)

Section Three — Algebra and Graphs

Coordinates

4. Which of these pairs of coordinates lie on a vertical line? Tick all the correct answers.

☐ (1, 2) & (1, 3)   ☐ (2, 4) & (1, 4)   ☐ (–6, 2) & (–6, 1)   ☐ (–3, –3) & (–3, 3)
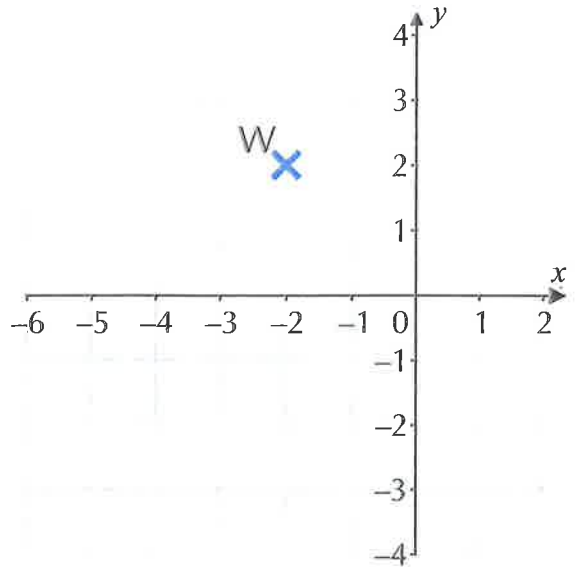
5. Look at the coordinate grid on the right.

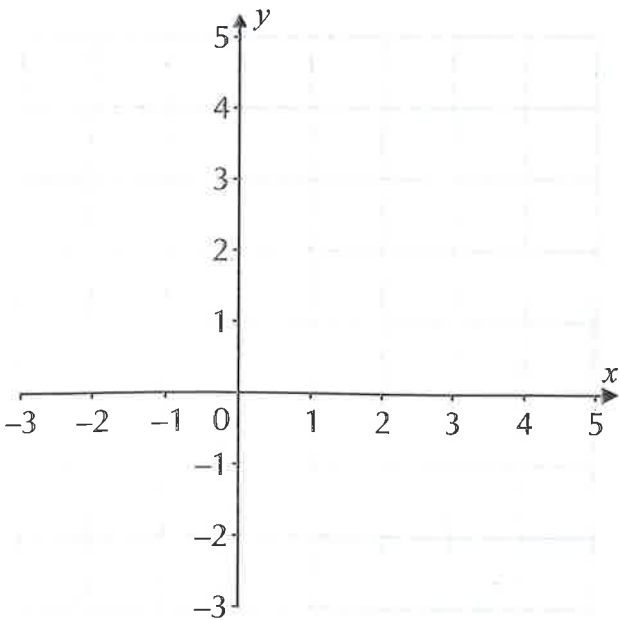   a) Write down the coordinates of point W.

   ....

   b) Plot and label the points X (–5, –1) and Y (–2, –4) on the grid.

   c) W, X and Y are three vertices of a square. Write down the coordinates of the fourth vertex.

   ....

6. Look at the coordinate grid below.

   a) Plot and label the points A (4, 2), B (–1, 1) and C (4, –1) on the grid.

   b) (i) Draw the lines AC and BC.

      (ii) The point D is the fourth vertex of a parallelogram ADBC. What are the coordinates of D?

   ....