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Maths

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Workbook

HODDER
EDUCATION

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Contents

SECTION (1)

(1) Place value, ordering and rounding

Place value

The position of a digit in a number determines its value.
Example: 3491.65 can be placed in a table like this:

Thousands	Hundreds	Tens	Units	Tenths	Hundredths
3	4	9	1	6	5

So the 3 is worth 3000   the 4 is worth 400   the 9 is worth 90
    the 1 is worth 1   the 6 is worth 0.6   the 5 is worth 0.05

To multiply by 10, 100 or 1000 move the digits one, two or three places to the left.
To divide by 10, 100 or 1000 move the digits one, two or three places to the right.

Exercise 1.1

1 Write these numbers in the correct columns in the place value table below.

    a) 6580.3   **b)** 483.5   **c)** 8.93

    d) 7602   **e)** 549.37   **f)** 6020.04

	Thousands	Hundreds	Tens	Units	Tenths	Hundredths
a)						
b)						
c)						
d)						
e)						
f)						

→

2 What is the value of the 6 in the following numbers?

    a) 3652 _____   **b)** 1064 _____

    c) 3.265 _____   **d)** 6273 _____

    e) 0.64 _____   **f)** 6.57 _____

3 Write the following sets of numbers in order, with the smallest first.
    a) 4.9, 2.2, 1, 0.9, 4.08, 4.07

    _____

    b) 0.181, 0.01, 0.1, 0.18, 0.118

    _____

    c) 4.7, 4.2, 4.17, 4.66, 4.07, 4.34

    _____

    d) 0.1, 0.12, 0.01, 0.121, 0.22, 0.2

    _____

    e) 1.11, 1.21, 2.1, 1.2, 1.13, 1.3

    _____

4 Multiply the following numbers by 10.

    a) 0.21 _____

    b) 0.023 _____

    c) 2.03 _____

5 Multiply the following numbers by 100.

    a) 0.06 _____

    b) 0.085 _____

    c) 3.012 _____

6 Multiply the following numbers without using a calculator.

a) 5.8×1000 _____

b) 0.014×1000 _____

c) 0.3×1000 _____

7 Divide the following numbers by 10.

a) 1.9 _____

b) 0.53 _____

c) 0.074 _____

8 Divide the following numbers by 100.

a) 3.02 _____

b) 0.1 _____

c) 0.088 _____

9 Find the value of the following.

a) $460 \div 1000$ _____

b) $0.0123 \div 1000$ _____

c) $7 \div 1000$ _____

Rounding

To **round** a number, look at the next digit after the one in question. If that digit is 5 or more, round up. If it is 4 or less, round down.
Example 1: 8.723 to the nearest whole number is 9.
Example 2: 1476 to the nearest ten is 1480.

Exercise 1.2

1 Round the following numbers to the nearest whole number.

a) 8.49 _____

b) 7.33 _____

c) 0.57 _____

d) 0.439 _____

e) 16.42 _____

f) 10.99 _____

2 Round the following numbers **(i)** to the nearest thousand, **(ii)** to the nearest hundred and **(iii)** to the nearest ten.

a) 12 673

(i) _____ **(ii)** _____ **(iii)** _____

b) 8973

(i) _____ **(ii)** _____ **(iii)** _____

c) 315 776

(i) _____ **(ii)** _____ **(iii)** _____

d) 33 437

(i) _____ **(ii)** _____ **(iii)** _____

Decimal places

To round to a given number of **decimal places**, look at the next digit after the one in question. If that digit is 5 or more, round up. If it is 4 or less, round down.

Example 1: 7.683 to one decimal place is 7.7.

Example 2: 5.35 to one decimal place is 5.4.

Exercise 1.3

1   Round the following numbers to one decimal place.

a) 4.572 _____   **b)** 6.358 _____

c) 0.388 _____   **d)** 11.537 _____

e) 0.059 _____   **f)** 0.043 _____

2   Round the following numbers to one decimal place.

a) 0.3742 _____   **b)** 6.5939 _____

c) 1.2345 _____   **d)** 2.3456 _____

e) 7.6543 _____   **f)** 5.6789 _____

Estimating answers to calculations

An **estimate** is an approximate answer obtained by rounding.
Example 1: Estimate the answer to 29×61.
           An easy estimate is $30 \times 60 = 1800$.
Example 2: Estimate the answer to $7654 \div 37$.
           An easy estimate is $8000 \div 40 = 200$.

Exercise 1.4

1   Estimate the answers to the following calculations.

a) $72 \div 6.9$ _____

b) $3947 \div 43$ _____

c) $859 \div 29$ _____

d) $39.8 \div 4.9$ _____

e) $76\,982 \div 38.9$ _____

f) $4.3 \div 0.19$ _____   →

2 Estimate the answers to the following calculations.

    a) 6.88 × 1.95 _____

    b) 4.82 × 3.14 _____

    c) 19.3 × 2.9 _____

    d) 11.2 × 8.7 _____

    e) 27.5 × 32.3 _____

    f) 0.8 × 3.3 _____

3 Estimate the answers to the following calculations.

    a) 4.9 × 8.8 ÷ 3.9 _____

    b) 9.8 ÷ 2.1 × 5.2 _____

    c) 8.9 × 0.9 ÷ 4.8 _____

    d) 3.7 ÷ 1.8 × 0.9 _____

    e) 12.7 × 29.3 ÷ 11.4 _____

    f) 0.8 × 0.9 ÷ 1.1 _____

4 Using estimation, decide which of these calculations are definitely wrong. Mark them with a tick or a cross.

    a) 9.4 × 0.13 = 10 _____   **b)** 48.4 ÷ 6.9 = 7 _____

    c) 8.7 × 0.23 = 0.5 _____   **d)** 48.4 ÷ 0.69 = 0.7 _____

    e) 48.3 × 0.09 = 5 _____   **f)** 48.4 ÷ 6.9 = 0.7 _____

Order of operations

A way of remembering the order of operations is to use the shorthand **BIDMAS**:

Brackets   **I**ndices   **D**ivision/**M**ultiplication   **A**ddition/**S**ubtraction

Example: Calculate $13 + 5 \times 9 - 18$.

$$13 + 5 \times 9 - 18 \qquad \text{The multiplication is done first.}$$
$$= 13 + 45 - 18$$
$$= 40$$

Exercise 1.5

Work out the following.

1   $4 + 3 \times 6 - 8$ _____

2   $6 \times 7 + 4 \times 7$ _____

3   $3 \times 5 - 10 - 7$ _____

4   $8 + 4 \times 2 - 40$ _____

5   $36 - 2 \times 7 \times 4$ _____

6   $7 \times (8 + 2) - 10$ _____

7   $8 + (22 + 3) \div 5$ _____

8   $80 \div (2 + 6) + 10$ _____

9   $3 + 4 \times 3 - 4$ _____

10 $(24 + 4) \div (8 - 1)$ _____

Teacher comments

2 Expressions

Expressions

An **expression** represents a value in algebraic form. In the expression $5x + 10$, $5x$ and $+10$ are **terms** in the expression. An **equation** contains an equals sign and shows that the expressions either side of it have the same value.

Order of operations when simplifying expressions

To **simplify** an expression, collect the like terms together. Use **BIDMAS** to remind you of the order of operations:

Brackets   **I**ndices   **D**ivision/**M**ultiplication   **A**ddition/**S**ubtraction

Example: Simplify the expression $3a + 5 \times 9a - 8b$.

$3a + 5 \times 9a - 8b$ The multiplication is done first.

$= 3a + 45a - 8b$

$= 48a - 8b$

Exercise 2.1

1 Simplify the following expressions where possible.
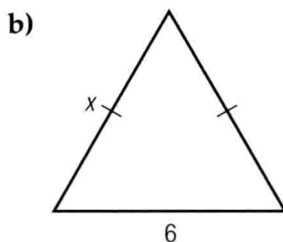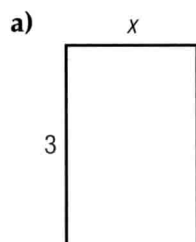
    a) $x + y + x =$ _____

    b) $p + p + q - p =$ _____

    c) $2x + m + m + x - y =$ _____

    d) $xy + x + xy + y =$ _____
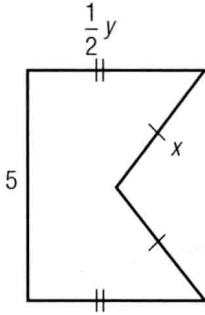
2 Write an expression for the perimeter (the distance around the edge) of each of these shapes.

    a)   **b)**

    Perimeter: _____   Perimeter: _____

c)

Perimeter: _____

Expanding two linear expressions

To **expand** brackets, multiply the terms inside the brackets by the term outside.
Example: Expand $6(x + 7)$.

$$6\ (x + 7) = 6 \times x + 6 \times 7 = 6x + 42$$

Exercise 2.2

1 Expand the following expressions.

a) $2(x+4) =$ _____

b) $5(x-1) =$ _____

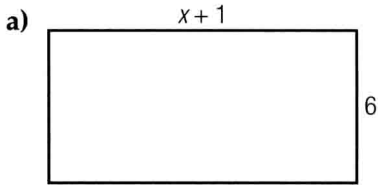**c)** $3(2x+1) =$ _____

d) $x(x+4) =$ _____

e) $2x(x-3) =$ _____

f) $3x(x+y) =$ _____
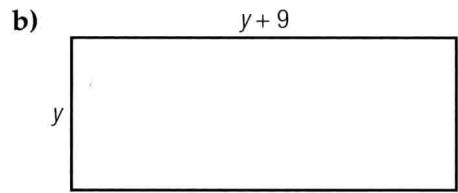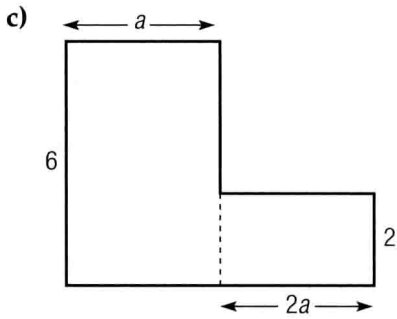
g) $2x(-x+6) =$ _____

h) $\frac{1}{2}x(-2x+4) =$ _____

➔

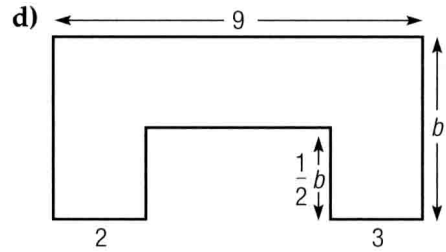**2** Write an expression for the area of each of these shapes. Expand the brackets and simplify your answer.

a)

$x + 1$

6

Area: _____

b)

$y + 9$

y

Area: _____

c)

a

6

2

$2a$

Area: _____

d)

9

b

$\frac{1}{2}b$

2

3

Area: _____

Teacher comments

# 3 Shapes and geometric reasoning

Transformations

If an **object** is **transformed** it can change either its position or its shape. The new shape after the transformation is known as the **image**. With the simplest forms of transformations – **reflections, rotations** and **translations** – only the position of the object changes.

Reflection

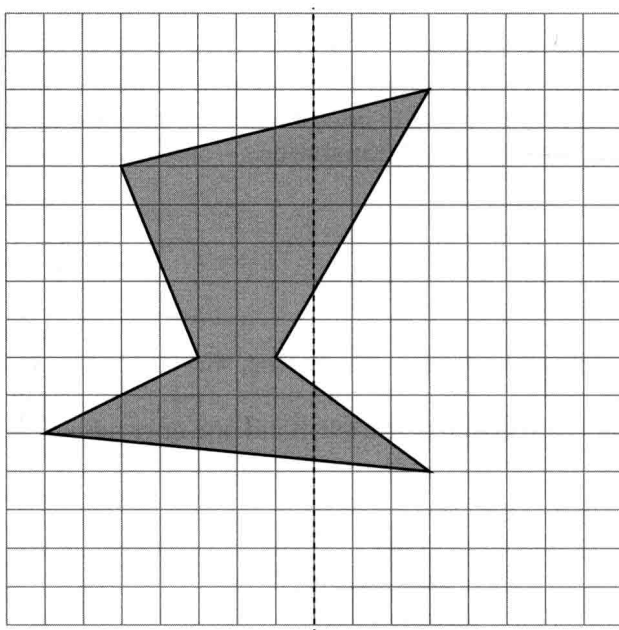If an object is **reflected**, it is *flipped* across the **mirror line**, shown on diagrams by a dotted line.

Example: The right-hand kite is the image of the left-hand one after reflection in the mirror line.
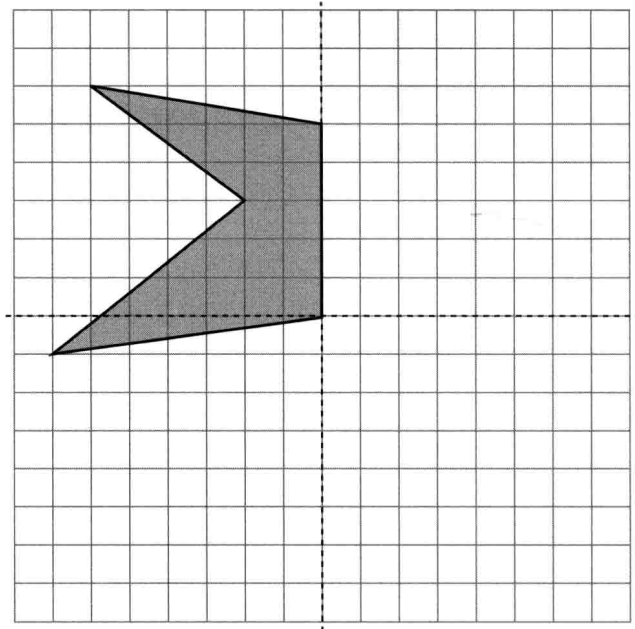

object   image
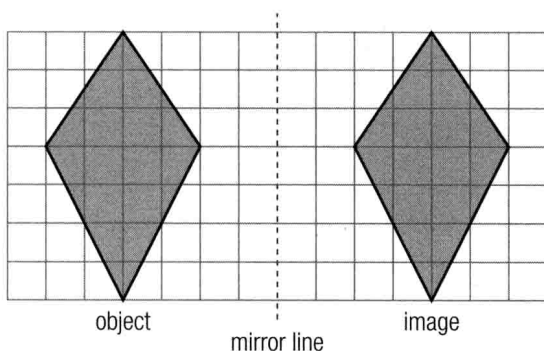
mirror line

Exercise 3.1

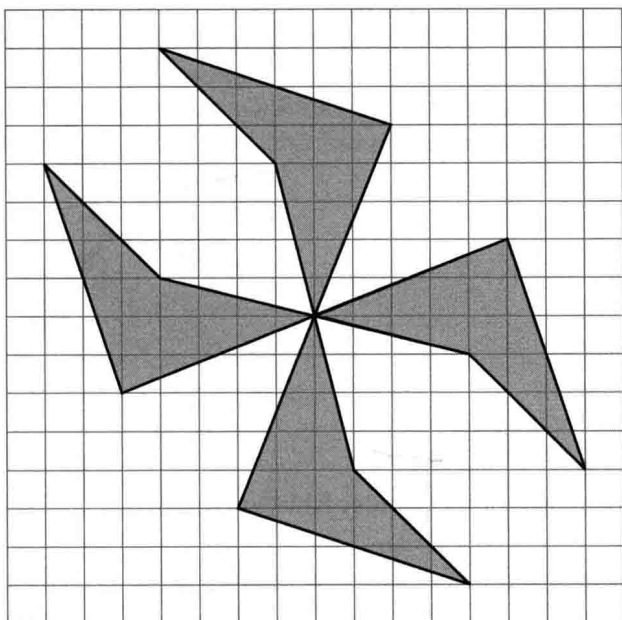1 In this question the object and mirror line(s) are given. Draw in the positions of the image(s).

a)

b)

2 In this question the objects and images are given. Draw in the position of the mirror line(s).

a)

b)