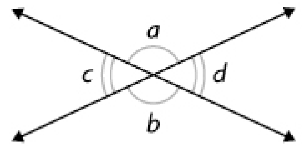
REVIEW OF TERMS AND CONNECTIONS

WORDS You Need to Communicate Effectively

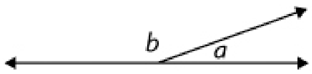
1. Match each term with a diagram or example below.

a) three-digit number
b) congruent shapes
c) equivalent form
d) expanded form
e) perfect square
f) prime number
g) supplementary angles
h) vertically opposite angles

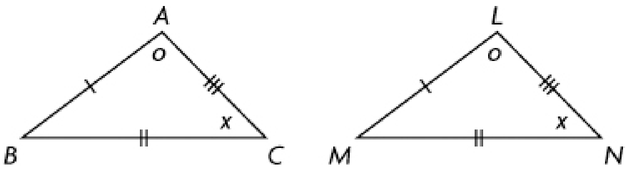
i) 81 **ii)** 135

iii)


iv) 61 **v)** $148 = 100 + 40 + 8$

vi)


vii) $4d = 3d + 1d$

viii)


Answers

1. a) ii)
b) viii)
c) vii)
d) v)
e) i)
f) iv)
g) vi)
h) iii)

REVIEW OF TERMS AND CONNECTIONS

CONNECTIONS You Need for Success

Working with Algebraic Expressions and Equations

Algebraic expressions may be represented symbolically with words or with variables, coefficients, and constants. Through the processes of simplification, expansion, and evaluation, algebraic expressions can be flexibly manipulated. For example:

$(x + 2)(x - 1) - x^2 + 5$	Given expression
$(x^2 + 2x - 1x - 2) - x^2 + 5$	Expand the expression.
$x^2 + x - 2 - x^2 + 5$	Gather like x terms.
$x - 2 + 5$	Gather like x^2 terms.
$x + 3$	Gather constants.

The simplified expression, $x + 3$, is much easier to evaluate than $(x + 2)(x - 1) - x^2 + 5$.

2. Simplify each expression. Then evaluate for $a = 5$, $d = 6$, and $v = 7$.

a) $a^2 - 5a + 6a + 3a^2$

b) $17 - d + 2(3d + 2)$

c) $(v + 2)(v - 2) + 13$

When you are asked to solve an algebraic equation, you need to determine the value of an unknown. Solving an algebraic equation requires a systematic approach, as well as an understanding of how to manipulate algebraic expressions (as shown above). You should also understand inverse operations and the order of operations. For example:

$2(3x + 5) = x$	Solve for x in the given equation.
$6x + 10 = x$	Expand the left side of the equation.
$6x + 10 - x = x - x$ $5x + 10 = 0$	Subtract x from each side to begin isolating the variable x on one side of the equation.
$5x + 10 - 10 = 0 - 10$ $5x = -10$	Subtract 10 from each side.
$\frac{5x}{5} = \frac{(-10)}{5}$ $x = -2$	Divide each side by 5 to isolate x and solve the equation.

3. Solve each equation.

a) $2x + 4 = 10$ **b)** $\frac{x}{2} - 3 = 5$ **c)** $2x^2 = 32$

Answers

2. a) $4a^2 + a$; 105 **b)** $5d + 21$; 51 **c)** $v^2 + 9$; 58

3. a) $x = 3$ **b)** $x = 16$ **c)** $x = 4, -4$

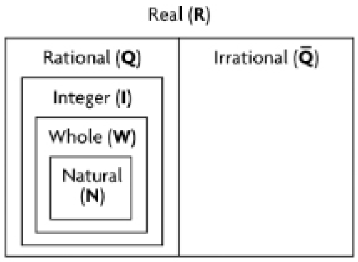
REVIEW OF TERMS AND CONNECTIONS

Applying Number Concepts

Number Classification

Sometimes problems identify a set of numbers to which an unknown value belongs. Knowing what is included in the set of numbers allows you to choose an appropriate value. For example:

- Double a **natural number** means 2 times a counting number such as 3, 7, or 15.
- Half a **rational number** means 0.5 times a number such as -5, 8, 1.36, or even 0.



4. Identify a number that matches each description.
   a) a whole number that is not a natural number
   b) an integer that is not a whole number
   c) a rational number that is not an integer

Number Properties

Within the set of whole numbers, there are special types of numbers. For example:

- A **factor** is a number that divides exactly into another number: 6 is a factor of 12 because $12 \div 6 = 2$.
- A **multiple** is the product of a number and a whole number: 12 is a multiple of 4 because $3 \times 4 = 12$.
- A **prime number**, such as 7, has exactly two factors, 1 and the number itself: $7 = 7 \times 1$
- A **perfect square**, such as 81, can be named as the product of a number with itself: $81 = 9 \times 9$.

5. a) Show why 144 can be a multiple, a factor, and a perfect square.
   b) Show why 144 cannot be a prime number.

Answers

4. a) 0
   b) Answers may vary, e.g., -7
   c) Answers may vary, e.g., $\frac{-7}{8}$

5. Answers may vary, e.g.,
   a) $144 = 3 \times 48$; $288 \div 144 = 2$; $144 = 12 \times 12$
   b) $144 = 2 \times 72$

REVIEW OF TERMS AND CONNECTIONS

PRACTISING

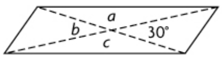
6. Order these expressions from least to greatest.
a) $2^3 - 5^2$
b) the difference between 4^2 and 3
c) the sum of the first three positive odd numbers
d) the product of -4 and 3

7. Provide one or more numbers to match each description. For example, the number for part a) could be 20 because $4 \times 5 = 20$ and 5 is a whole number.
a) four times a whole number
b) the sum of two consecutive integers
c) a multiple of 7 less than 50
d) a factor of 24 that is odd
e) the square root of an even number
f) a sum of two perfect squares that is greater than 50

8. Factor or expand each expression. Then evaluate for $x = 2$.
a) $4x^3 - 40$
b) $5x^2 + 20x - 3$
c) $(x + 3)(2x - 5)$
d) $7x(3x^3 + 5x)$

9. Which equations have a solution of $x = 2$?
a) $\left(\frac{1}{2}\right)x + 3 = 4$
b) $6x^2 - 3 = 21$
c) $\frac{\sqrt{x}}{10} = 0.5$

10. Determine angles a, b, and c without measuring.



11. Sketch each shape. Show all the congruent side lengths and right angles.
a) a rectangle that is not a square
b) a rhombus that is not a square
c) a quadrilateral that is not a right trapezoid

12. Examine the pattern below. Make a prediction about the next number.
$2^2 = 4$
$22^2 = 484$
$222^2 = 49284$
$2222^2 = 4937284$
$22222^2 = 493817284$

Answers

6. a), d), c), b)

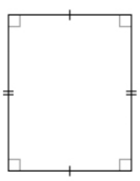
7. Answers may vary, e.g.,
a) 40 ($4 \times 10 = 40$)
b) 25 ($12 + 13 = 25$)
c) 42 [$6(7) < 50$]
d) 3 ($24 \div 3 = 8$)
e) 4 ($\sqrt{16} = 4, -4$)
f) 61 ($5^2 + 6^2 = 61$)

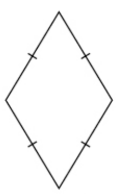
8. a) $4(x^3 - 10); -8$
b) $5x(x + 4) - 3; 57$
c) $2x^2 + x - 15; -5$
d) $21x^4 + 35x^2; 476$

9. a) and **b)**

10. $a = 150°$, $b = 30°$, $c = 150°$

11. Answers may vary, e.g.,

a)


b)


c)


12. Answers may vary, e.g., the next number will have 11 digits. It will be 49 38_ _17 284.