Various

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Reciprocal

The reciprocal of a number is 1 ÷ number or the fraction $\dfrac{1}{number}$

The reciprocal of 5 is 1 ÷ 5 = 0.2 or the fraction $\dfrac{1}{5}$

The reciprocal of 0.2 is 1 ÷ 0.2 = 5

The reciprocal of $\dfrac{2}{5}$ is $1 \div \dfrac{2}{5} = \dfrac{5}{2} = 2.5$
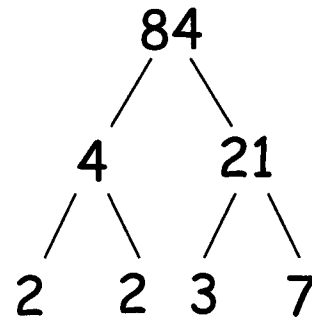
The reciprocal of -4 is 1 ÷ -4 = -0.25

Find the reciprocal of these numbers

1) 10
2) 0.5
3) 2
4) 0.1
5) $\dfrac{4}{5}$
6) -5
7) $\dfrac{1}{3}$
8) -0.125

①

Prime factor decomposition

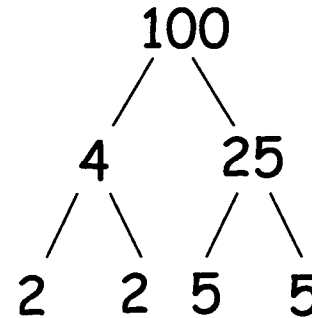Write the number 84 as a product of prime factors

$$84 = 2^2 \times 3 \times 7$$

84
/ \
4   21
/ \ / \
2   2 3   7

Write the number 100 as a product of prime factors

$$100 = 2^2 \times 5^2$$

100
/ \
4   25
/ \ / \
2   2 5   5

Find the highest common factor HCF and lowest common multiple LCM
of 84 and 100

HCF = 2 X 2 = 4

LCM = 3 X 7 X 2 X 2 X 5 X 5 = 2100

Write these pairs of numbers as
product of prime factors, then find
their HCF and LCM

1) 96 and 30

1) 90 and 735

②
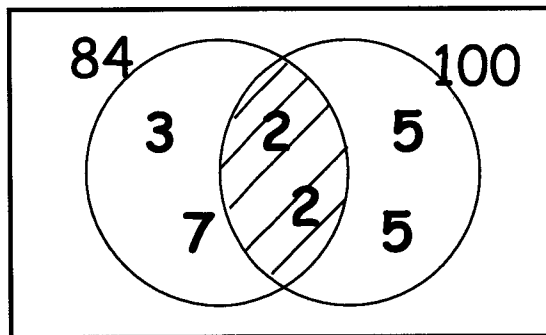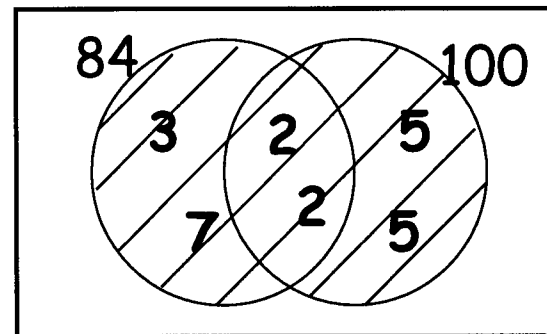
Vocabulary of Algebra

Equation $x + 7 = 10$

Has a specific answer or answers. Eg $x = 3$

Inequality $3x + 7 < 16$

Can be solved but has a range of answers

Formula $A = \pi r^2$

The letters have meaning, A = area, r = radius.
Has a specific purpose.
Generates an answer.

Expression $3x + 7$

Has no equals

Term $3x + 7$

Part of an expression separated by either a plus or minus sign.
The expression $3x + 7$ has an x term and a number term

Identity $x + 2x \equiv 3x$

Just another way of writing the same thing.
Has no answer or an infinite set of answers.
Has its own symbol $\equiv$

Types of Data

Quantative Data - data that can be counted of measured using number. E.g. Age, height, shoe size

Qualitative Data - data that cannot be measured using number. E.g. Colour, type of pet

Continuous Data - data that can be measured and take any value. E.g. height, weight

Discrete Data - data that can only be counted and take certain values. E.g. shoe size, number of cars

Primary Data - data that you collect yourself. New data

Secondary Data - data that someone else has collected

③

Comparing Terms

If one expression is the same as another it must have the same number of x^2's, x's and numbers.

$7x - 2 \equiv dx + e$ then d =   e =

$5x^2 - 3x + 2 \equiv ax^2 + bx + c$ then a =   b =   c =

$fx^2 + 5x - 4 \equiv 2x^2 + gx + h$ then f =   g =   h =

Sometimes you may have to multiply out brackets and simplify before you can compare the terms.

$(x + 2)^2 - 3 \equiv ax^2 + bx + c$ then a =   b =   c =
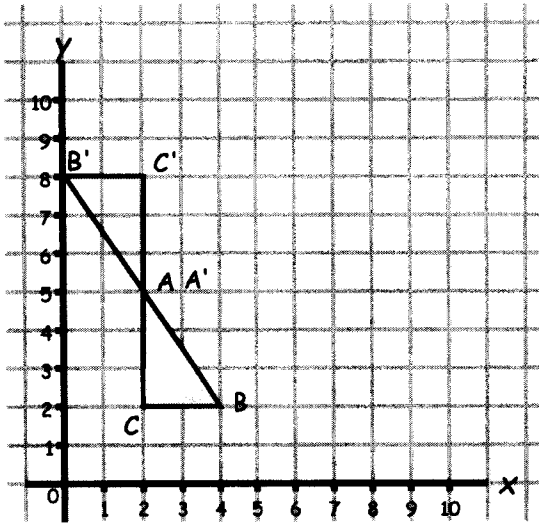
$x^2 + 6x + 1 \equiv (x + d)^2 + e$ then d =   e =

Find the value of the missing letters in each question

1) $4x - d \equiv ax + 9$

2) $4 + 2x^2 - 3x \equiv ax^2 + bx + c$

3) $3(x + 2) + 4(ax + 1) \equiv 11x + b$

4) $(x - 5)^2 - 42 \equiv ax^2 + bx + c$

5) $x^2 + 2x - 15 \equiv (x + d)^2 + e$

6) $5(2x - 1) - 2(ax - b) \equiv 6x + 3$

7) $2(x - 3)^2 - 11 \equiv ax^2 + bx + c$

8) $2x^2 + 16x + 5 \equiv a(x + b)^2 + c$
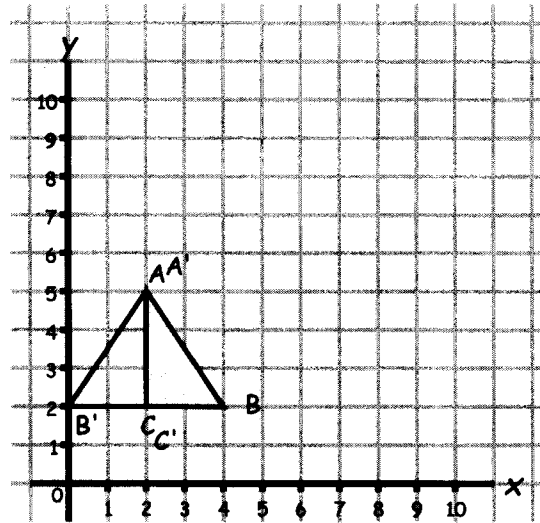
Invariant Points

If a point remains in the same position after a transformation it is called Invariant

Carry out the following transformation on the ORIGINAL triangle (shaded)
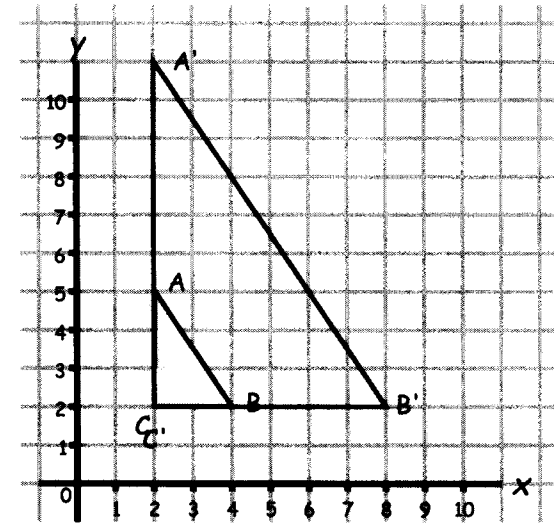a) Rotation 180° about (2,5)

The point A is invariant

Carry out the following transformations on the ORIGINAL triangle (shaded)
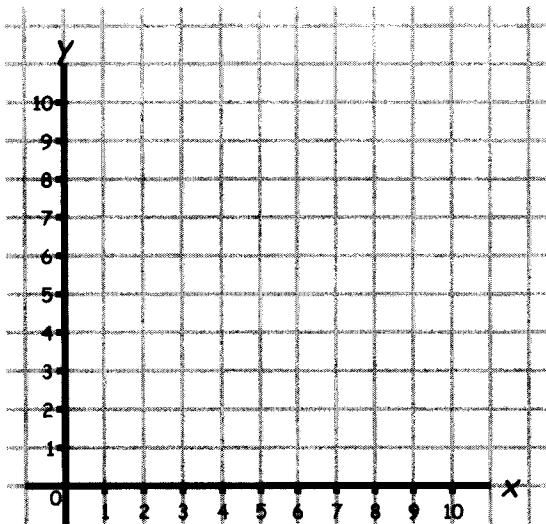b) Reflection in x = 2

The points A and C are invariant, as are all the points on the line AC

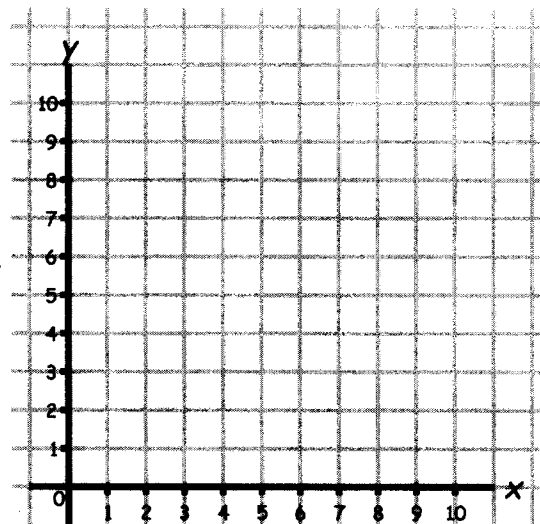Carry out the following transformations on the ORIGINAL triangle (shaded)
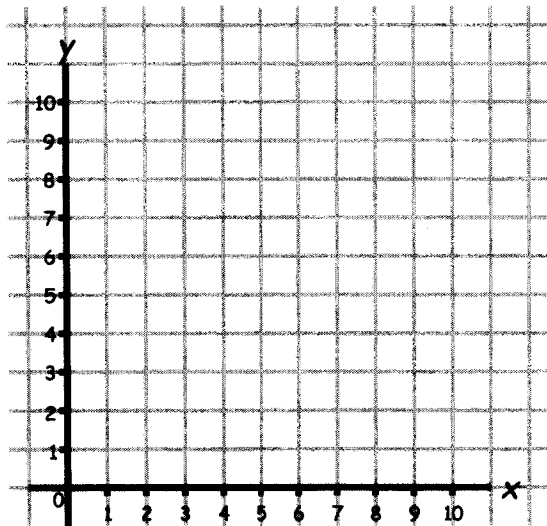c) Enlargement, scale factor 3, centre (2,2)

The point C is invariant

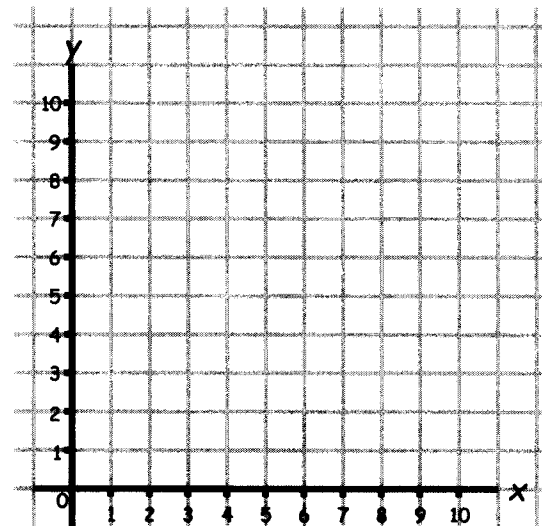Plot the points (2,3) and (8,6).

Find the coordinates of the midpoint.

Plot the points (1,3) and (3,7).

Find the coordinates of the midpoin

Plot the points (0,10) and (10,0).

Find the coordinates of the midpoint.

Plot the points (2,7) and (10,3).

Find the coordinates of the midpoint

⑥

Difference of Two Squares

subtract ⟋ ⟍ two squared terms

Examples

$a^2 - b^2 = (a - b)(a + b)$

$4x^2 - 1 = (2x)^2 - 1^2 = (2x - 1)(2x + 1)$

$9x^2 - 25y^2 = (3x)^2 - (5y)^2 = (3x - 5y)(3x + 5y)$

$2x^2 - 18y^2$ factorise first as neither 2 or 18 are square numbers

$2x^2 - 18y^2 = 2(x^2 - 9y^2) = 2(x^2 - (3y)^2)$
$= 2(x - 3y)(x + 3y)$

Have a go at these questions

$c^2 - d^2 =$

$x^2 - 9 =$

$16x^2 - 1 =$

$4x^2 - 9y^2 =$

$2x^2 - 50y^2 =$

$= (a - b)(a + b)$

$= (x - 2)(x + 2)$

$= (2x + 3)(2x - 3)$

$= (3a - 2b)(3a + 2b)$

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