Essential GCSE Maths 14.10

This question makes use of the Isaac equation editor, you can find instruction on how to use the equation editor here.

Expand and simplify:

Part A Expand and simplify

$$(h+3)(h-3)$$

The following symbols may be useful: h

Part B Expand and simplify

$$(2x-1)(x+3)$$

The following symbols may be useful: x

Part C Expand and simplify

$$(3x+2)(5x-1)$$

The following symbols may be useful: x

Essential GCSE Maths 14.12

This question makes use of the Isaac equation editor, you can find instruction on how to use the equation editor here.

Expand and simplify:

Part A Expand and simplify

$$(x+1)(x+2)(x+3)$$

The following symbols may be useful: x

Part B Expand and simplify

$$(x-5)(2x-a+4)$$

The following symbols may be useful: a, x

Part C Expand and simplify

$$(x-3)(x-7)^2$$

The following symbols may be useful: x

Part D Expand and simplify

$$\left(\frac{1}{x}+5\right)\left(3x^2-9\right)$$

The following symbols may be useful: x

Essential GCSE Maths 14.9

This question makes use of the Isaac equation editor, you can find instruction on how to use the equation editor here.

Expand and simplify:

Part A Expand and simplify

$$(x+2)(x+0)$$

The following symbols may be useful: x

Part B Expand and simplify

$$(x-13)(x+13)$$

The following symbols may be useful: x

Part C Expand and simplify

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

The following symbols may be useful: `a, b`

Essential GCSE Maths 12.6

Using the equation $v_t = v_0 + at$, find v_t if

Part A Find v_t

$v_0 = 0\,\mathrm{m/s}$, $a = 3\,\mathrm{m/s^2}$ and $t = 10\,\mathrm{s}$

Give your answer in $\mathrm{m/s}$.

Part B Find v_t

$v_0 = 50\,\mathrm{mm/s}$, $a = 2\,\mathrm{mm/s^2}$ and $t = 4\,\mathrm{s}$.

Give your answer in $\mathrm{mm/s}$.

Part C Find v_t

$v_0 = 0.7\,\mathrm{km/s}$, $a = -0.04\,\mathrm{km/s^2}$ and $t = 10\,\mathrm{s}$.

Give your answer in $\mathrm{km/s}$.

Essential GCSE Maths 12.16

Write the following statements in algebra.

Part A Write the statement in algebra

α is twice β.

The following symbols may be useful: `alpha, beta`

Part B Write the statement in algebra

α cubed is the same as γ squared.

The following symbols may be useful: `alpha, gamma`

Part C Use your equations

$\beta = 2$ and γ is a positive integer.

Find the value of γ.

Essential GCSE Maths 12.14

A postman delivers mail to four houses. House 1 receives $3l$ letters and p parcels. House 2 receives $7l$ letters. House 3 receives $5l$ letters and $2p$ parcels. House 4 receives p parcels.

Part A Write the information as an equation

Write an equation for the total number of items the four houses receive, T. Simplify your answer as far as possible.

The following symbols may be useful: `T, l, p`

Part B Write an equation for W

Assuming that the weight of a letter is $80\,\mathrm{g}$ and the weight of a parcel is $550\,\mathrm{g}$, write an equation for W, the total weight in kilograms of the items delivered to the four houses.

The following symbols may be useful: `W, l, p`

Essential GCSE Maths 15.8

Simplify the following, factorising if possible:

Part A Simplify

$$3x^2 \times 2a \times ax^3$$

The following symbols may be useful: `a, x`

Part B Simplify

$$7p \times \frac{1}{2}x^2 \div \frac{p}{4} - 7x$$

The following symbols may be useful: `p, x`

Part C Simplify

$$3c \times \left(\frac{1}{2}x\right)^2 \times 8c^2x + 4c^3$$

The following symbols may be useful: `c, x`

Algebraic manipulation 5.4

GCSE C C C A Level C C C

Consider the following equations

$$w_x = \frac{c\cos\theta - v}{1 - \frac{v\cos\theta}{c}}$$

$$w_y = \frac{c\sin\theta}{\gamma\left(1 - \frac{v\cos\theta}{c}\right)}$$

where $\gamma = \dfrac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$.

Find an expression for $w = \sqrt{w_x^2 + w_y^2}$ in terms of one of either v, c or θ.

The following symbols may be useful: `c`, `cos()`, `sin()`, `tan()`, `theta`, `v`, `w`

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Algebraic manipulation 4.2

GCSE C C C A Level P P P

Write each of the following as a single fraction in its simplest form.

Part A $2/a - 3/(a+1)$

Write $\frac{2}{a} - \frac{3}{a+1}$ as a single fraction in its simplest form.

The following symbols may be useful: a

Part B $3/2r - 4/(3r-1)$

Write $\frac{3}{2r} - \frac{4}{3r-1}$ as a single fraction in its simplest form.

The following symbols may be useful: r

Part C $1/(b+4) + 2/(2b+3)$

Write $\frac{1}{b+4} + \frac{2}{2b+3}$ as a single fraction in its simplest form.

The following symbols may be useful: b

Part D $-2/(s-2) + 5/(s+3)$

Write $-\frac{2}{s-2} + \frac{5}{s+3}$ as a single fraction in its simplest form.

The following symbols may be useful: s

Algebraic manipulation 4.1

GCSE C C C A Level P P P

Rearrange each of the following equations to make the indicated symbol the subject.

Part A Find b if $1/4a - c/3b = 1$

Make b the subject of the equation $\dfrac{1}{4a} - \dfrac{c}{3b} = 1$.

The following symbols may be useful: `a, b, c`

Part B Find q if $p = 2/q^2 + 3/r$

Consider the equation $p = \dfrac{2}{q^2} + \dfrac{3}{r}$. Show that if you make q the subject of this equation it can be written in the form $q = \pm S$ and find an expression for S.

The following symbols may be useful: `S, p, r`

Part C Find x if $1/x^2 - a/z^2 = b$

Consider the equation $\dfrac{1}{x^2} - \dfrac{a}{z^2} = b$. Show that if you make x the subject of this equation it can be written in the form $x = \pm Y$ and find an expression for Y.

The following symbols may be useful: `Y, a, b, z`

Part D Find m if $m/a + n/b = c$

Make m the subject of the equation $\dfrac{m}{a} + \dfrac{n}{b} = c$.

The following symbols may be useful: `a, b, c, m, n`

Part E **Find s if $2/r - 5/s = 6$**

Make s the subject of the equation $\frac{2}{r} - \frac{5}{s} = 6$.

The following symbols may be useful: `r, s`

Part F **Find r if $1/p = 1/q + 1/r$**

Make r the subject of $\frac{1}{p} = \frac{1}{q} + \frac{1}{r}$.

The following symbols may be useful: `p, q, r`

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