



GCSE MATHEMATICS

S21-C300

With Calculator Assessment Resource L

Higher Tier

Formula list

Area and volume formulae

Where r is the radius of the sphere or cone, l is the slant height of a cone and h is the perpendicular height of a cone:

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

Kinematics formulae

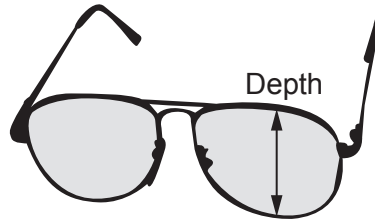
Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

1. Marie works for an optician.
She records the depth of a lens in each of the 100 pairs of glasses on display.



Her results are summarised in the table.

Depth of lens, x mm, to the nearest mm	Number of pairs of glasses
$10 \leq x < 20$	5
$20 \leq x < 30$	20
$30 \leq x < 40$	23
$40 \leq x < 50$	52

- (a) (i) Calculate an estimate for the mean depth of a lens. [4]

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- (ii) In which group does the median lie? [1]

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(b) In the display of 100 pairs of glasses at *Davy's Opticians*, the mean depth of a lens is exactly the same as Marie's opticians.

Marie says,

"Considering only the mean depth of a lens, our display is **certain** to be very similar to the display in *Davy's Opticians*."

Explain why Marie is incorrect.

[1]

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2. (a) Expand and simplify $(x + 6y)(3x + 5y)$. [3]

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(b) Factorise $x^2 - 13x + 36$. [2]

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(c) Solve $w^2 + 7w - 18 = 0$. [3]

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(d) Factorise $y^2 - 121$. [1]

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(e) You are given that:

- $y = x^2 + bx + c$
- $y = 16$ when $x = 0$
- $y = 0$ when $x = -2$

Find the values of b and c . [4]

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3. 7 cartons of apple juice and 2 cartons of grapefruit juice cost £6.15 altogether.
5 cartons of apple juice and 8 cartons of grapefruit juice cost £9.19 altogether.



Use an algebraic method to calculate the **total** cost of 2 cartons of apple juice and 5 cartons of grapefruit juice.

[5]

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Total cost of 2 cartons of apple juice and 5 cartons of grapefruit juice is £

4. Find the n th term of the following sequence.

[2]

-7, -4, 1, 8, 17,

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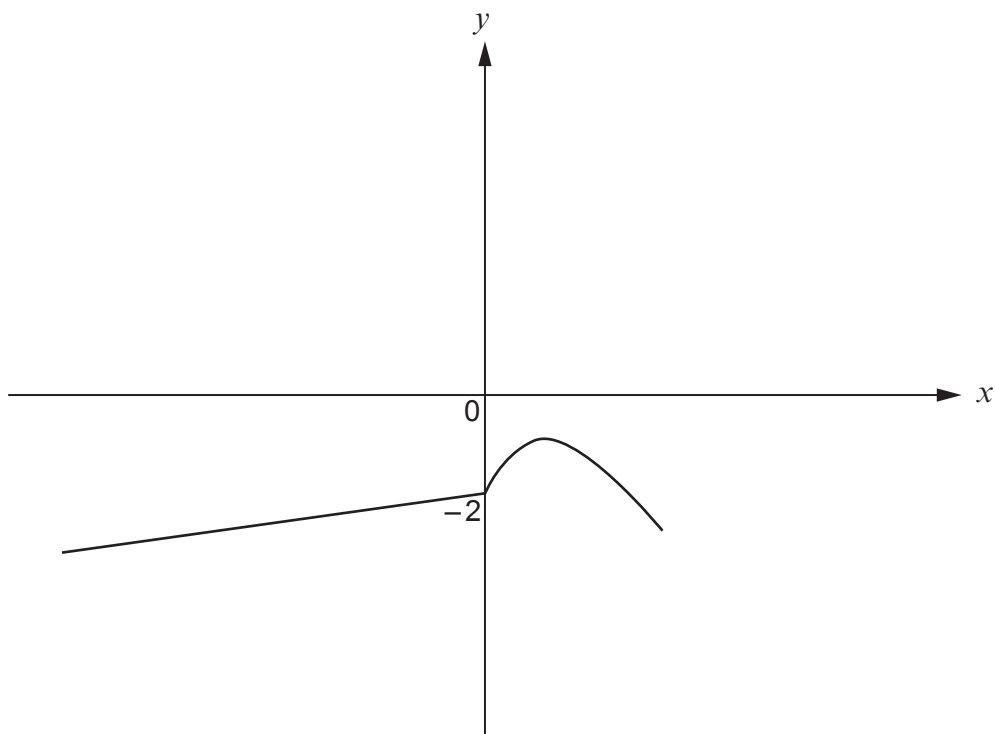
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5. (a) The diagram shows a sketch of $y = f(x)$.

On the same diagram, sketch the curve $y = -f(x)$.

Mark clearly the coordinates of any point where this curve crosses an axis.

[2]

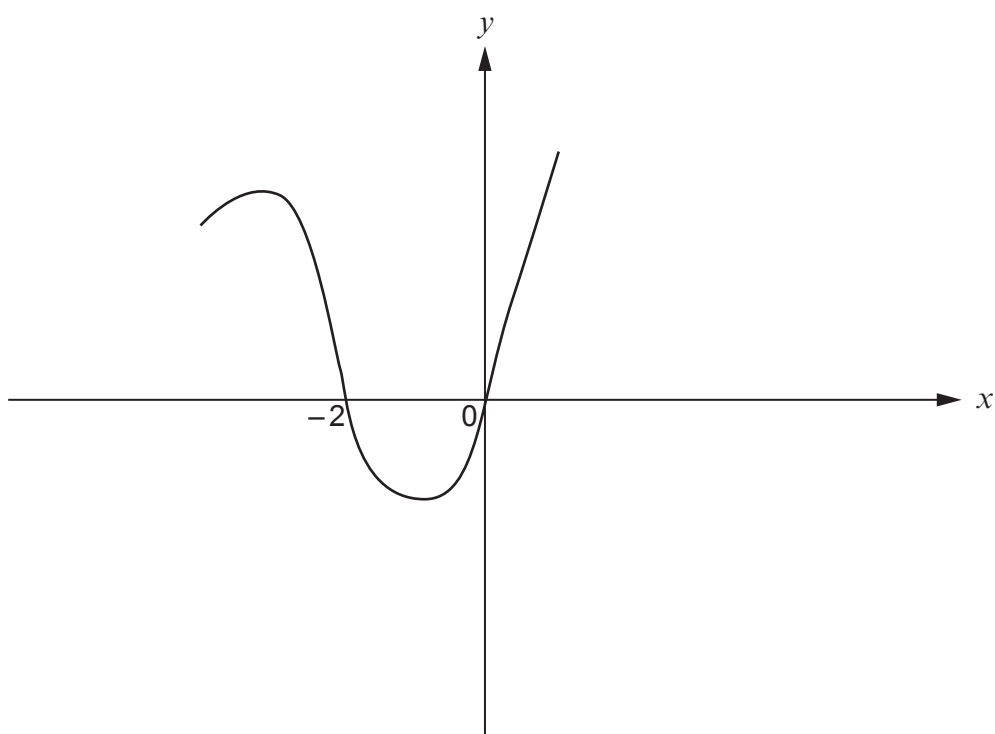


(b) The diagram shows a sketch of $y = g(x + 2)$.

On the same diagram, sketch the curve $y = g(x - 1)$.

Mark clearly the coordinates of the points where this curve crosses the x -axis.

[3]



- (c) Enlarge the triangle, shown on the grid below, by a scale factor of $-\frac{1}{2}$ with $(2, 1)$ as the centre of the enlargement. [2]

