Level 1 Mathematics and Statistics: practice paper 2026

AS 91947 Demonstrate mathematical reasoning · Vertex Academy practice paper, not an NZQA paper

Attempt ALL the questions. Show ALL working. Use NZQA's Level 1 formulae sheet. Write your answers on lined paper, or in the space under each question.

Achievement: demonstrate mathematical reasoning. Merit: with relational thinking. Excellence: with extended abstract thinking.

QUESTION ONE

(a) Expand and simplify $(2x + 3)(x - 4) - 2x(x - 5)$.

(b) A school sells hāngī meals at a fundraiser. Three adult meals and four child meals cost $86. Five adult meals and two child meals cost $106. Use an algebraic method to find the price of an adult meal and the price of a child meal.

(c) Plan A for a phone costs $25 a month plus $0.40 for each GB of data used. Plan B costs $40 a month, however much data is used. Write and solve an inequation to find the greatest whole number of GB that can be used in a month for Plan A to be cheaper.

(d) A rectangular garden bed is built against a straight fence, so only three sides need edging. There is 24 m of edging.

(i) Show that if each end of the bed is x m long, the area of the bed is $A = x(24 - 2x)$ m².

(ii) Find the dimensions of the bed with the largest possible area, and that area. Justify why it is the largest.

(iii) Explain why no bed made with this edging can have an area of 80 m².

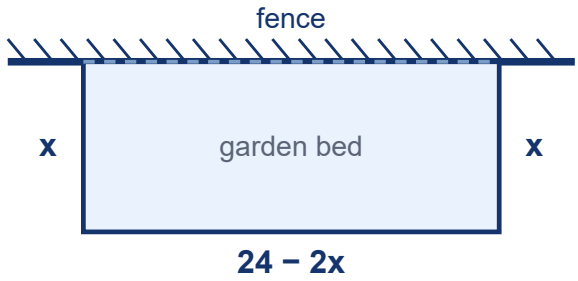


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QUESTION TWO

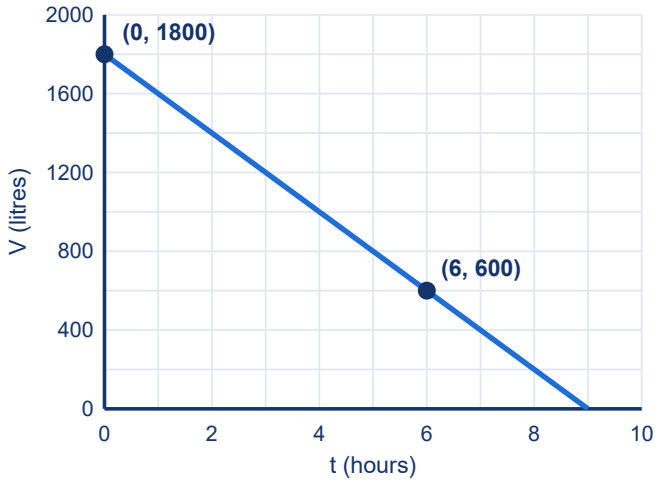
(a) Factorise and solve $x^2 - x - 20 = 0$.

(b) A path is made in a pattern of tiles. Pattern 1 uses 7 tiles, pattern 2 uses 12 tiles, pattern 3 uses 17 tiles and pattern 4 uses 22 tiles.
(i) Find a rule for the number of tiles, T, in pattern n.
(ii) Is there a pattern in this sequence that uses exactly 100 tiles? Explain your answer.

(c) A tap is opened at the bottom of a rain tank. The graph shows the volume, V litres, of water in the tank t hours after the tap is opened.

(i) Find the gradient of the line, and explain what it means in this context.

(ii) Write an equation for V in terms of t, and find how long the tank takes to empty.



(d) A parabola crosses the x-axis at $x = -1$ and $x = 7$, and crosses the y-axis at $(0, 14)$.

(i) Find the equation of the parabola.

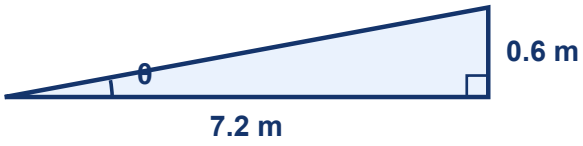
(ii) Find the coordinates of its turning point.

(iii) The horizontal line $y = k$ touches the parabola at exactly one point. Find k, and describe all the values of k for which the line $y = k$ meets the parabola at two points.

QUESTION THREE

(a) A wheelchair ramp rises 0.6 m over a horizontal distance of 7.2 m. Find the angle the ramp makes with the ground, to 1 decimal place.

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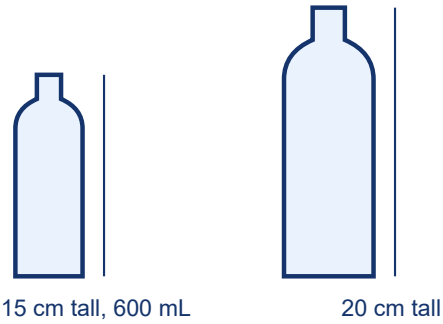


(b) Two drink bottles are mathematically similar. The small bottle is 15 cm tall and holds 600 mL. The large bottle is 20 cm tall.

(i) Find the length scale factor from the small bottle to the large bottle.

(ii) Find how much the large bottle holds, to the nearest millilitre.

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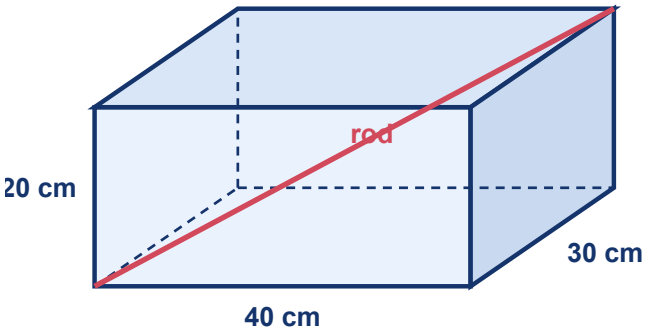


(c) A box is 40 cm long, 30 cm wide and 20 cm high.

(i) Find the length of the longest straight rod that fits inside the box, to 1 decimal place.

(ii) Find the angle between that rod and the base of the box, to 1 decimal place.

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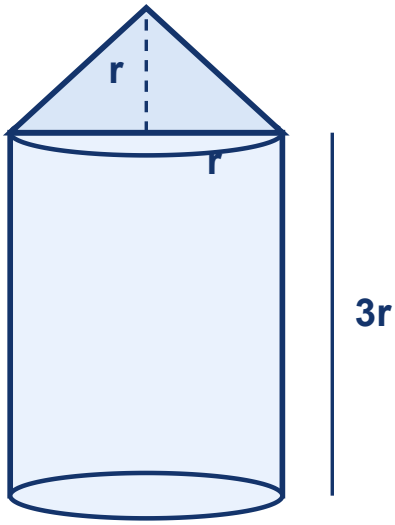


(d) A grain silo is a cylinder of radius r m and height 3r m, with a cone of radius r m and height r m on top.

(i) Show that the volume of the silo is $V = \frac{10}{3}\pi r^3$ m³.

(ii) The silo must hold 90 m³ of grain. Find r, and the total height of the silo, each to 2 decimal places. Do not round r before finding the height.

Diagram is NOT to scale



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