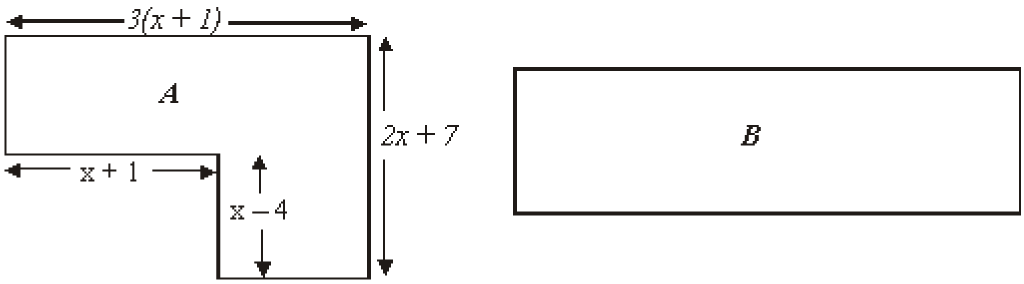
Q1.

Diagram **NOT** accurately drawn



The diagram shows two shapes.
In shape *A*, all of the angles are right angles.
Shape *B* is a rectangle.
All the measurements are in centimetres.

The area of shape *A* is equal to the area of shape *B*.

Find an expression, in terms of *x*, for the length and an expression, in terms of *x*, for the width of shape *B*.

....

(Total 6 marks)

Q2. q is inversely proportional to the square of t.

When t = 4, q = 8.5

(a) Find a formula for q in terms of t.

q = ...

(3)

(b) Calculate the value of q when t = 5

....

(1)
(Total 4 marks)

Q3. The diagram below shows a 6-sided shape.
All the corners are right angles.
All the measurements are given in centimetres.

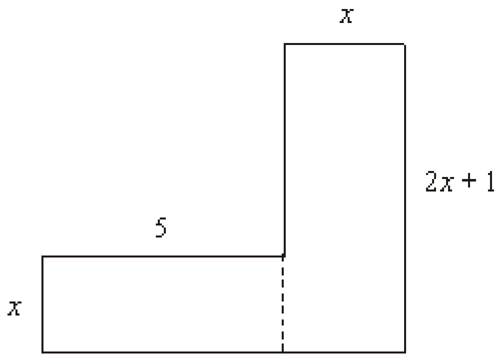


Diagram **NOT** accurately drawn

The area of the shape is 95 cm².

(a) Show that $2x^2 + 6x - 95 = 0$

(3)

(b) Solve the equation

$$2x^2 + 6x - 95 = 0$$

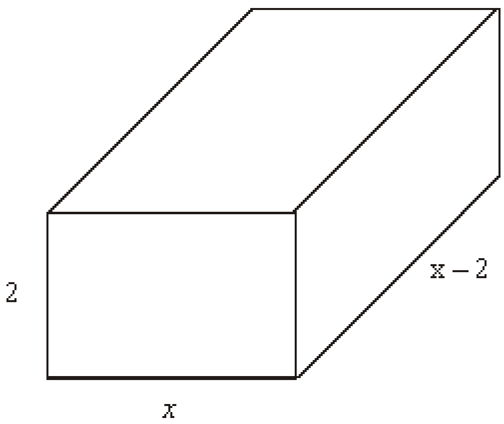
Give your solutions correct to 3 significant figures.

x = ... or x = ...

(3)
(Total 6 marks)

Q4.

Diagram **NOT** accurately drawn



The diagram shows a cuboid.
All the measurements are in cm.

The volume of the cuboid is 51 cm^3.

(a) Show that $2x^2 - 4x - 51 = 0$ for $x > 2$

(4)

(b) Solve the quadratic equation

$$2x^2 - 4x - 51 = 0$$

Give your solutions correct to 3 significant figures.
You must show your working.

....

(3)
(Total 7 marks)

Q5. Fred and Jim pay Malcolm to do some gardening.

Fred has £x.
Jim has ten pounds less than Fred.

Fred pays one third of his money to Malcolm.

Jim pays half of his money to Malcolm.

(a) Show that the amount that Malcolm is paid is $\frac{x}{3} + \frac{x-10}{2}$.

(1)

Malcolm is paid a total of £170.

(b) Use algebra to show how much money Fred has left.

....

(4)
(Total 5 marks)

M1.

Working	Answer	Mark	Additional Guidance
A = $3(x + 1)(2x + 7) – (x − 4)(x + 1)$ $= 3(2x^2 + 9x + 7) – (x^2 − 3x − 4)$ $= 5x^2 + 30x + 25$ Factorising gives $5(x + 1)(x + 5)$ **OR** Splitting shape A into rectangles, area to be added: e.g. $3(x + 1)(x + 11) + (x – 4)(2x + 2)$ $= 3(x^2 + 12x + 11) + (2x^2 – 6x − 8)$ $= 5x^2 + 30x + 25$ Factorising gives $5(x + 1)(x + 5)$	$5x + 5$ by $x + 5$ or $5x + 25$ by $x + 1$	6	**M1** for attempting to subtract the area of small rectangle from area of large rectangle in A **M1** for $3(x + 1)(2x + 7) – (x − 4)(x + 1)$ **A1** for $3(2x^2 + 9x + 7)$ and $(x^2 − 3x − 4)$ **A1** for $5x^2 + 30x + 25$ **M1** for attempting to factorise "$5x^2 + 30x + 25$" to get dimensions of B **A1** for $5x + 5$ by $x + 5$ or $5x + 25$ by $x + 1$ **OR** **M1** for attempting to add the area of two (or more) rectangles that make up the shape A **M1** for $3(x + 1)(x + 11) + (x − 4)(2x + 2)$ oe equivalent **A1** for $3(x^2 + 12x + 11)$ and $(2x^2 − 6x − 8)$ **A1** for $5x^2 + 30x + 25$ **M1** for attempting to factorise "$5x^2 + 30x + 25$" to get dimensions of B **A1** for $5x + 5$ by $x + 5$ or $5x + 25$ by $x + 1$
			Total for Question: 6 marks

M2.

	Working	Answer	Mark	Additional Guidance

(a)	$q = \frac{k}{t^2}$; $8.5 = \frac{k}{4^2}$ $k = 8.5 \times 4^2$; $k = 136$	$q = \frac{136}{t^2}$	3	**M1** $q = \frac{k}{t^2}$, $(k \neq 1)$ **M1** $8.5 = \frac{k}{4^2}$ **A1** cao NB $q = \frac{k}{t^2}$ in the answer line followed by k being found correctly anywhere in (a) or (b) earns all 3 marks
(b)	q = "136" ÷ 5^2 = "136" ÷ 25	5.44	1	**B1** ft for $\frac{'136'}{25}$ oe
				Total for Question: 4 marks

M3.

	Working	Answer	Mark	Additional Guidance
(a)	$x(2x + 1) + x \times 5$ $2x^2 + 6x$	As given	3	**M1** $x(2x + 1)$ and $x \times 5$ **OR** $x(x + 5)$ and $x(x + 1)$ condone missing brackets. **M1** $2x^2 + x + 5x$ **OR** $x^2 + 5x + x^2 + x$ (can imply first **M1**) **A1** $2x^2 + 6x = 95$ AG
(b)	$x = \frac{-6 \pm \sqrt{6^2 - 4 \times 2 \times (-95)}}{4}$ $x = \frac{-6 \pm \sqrt{796}}{4}$ **or** $x^2 + 3x - 47.5 = 0$ $(x + 1.5)^2 - 1.5^2 - 47.5 = 0$ $x = -1.5 \pm \sqrt{49.75}$	5.55, –8.55	3	**M1** for correct substitution in formula of 2, 6 and ± 95 **M1** for reduction to $\frac{-6 \pm \sqrt{796}}{4}$ **A1** 5.55 to 5.555 inclusive **and** –8.55 to –8.555 inclusive **OR** **M1** $(x + 1.5)^2 - 1.5^2 - 47.5 = 0$ **M1** $x = -1.5 \pm \sqrt{49.75}$ **A1** 5.55 to 5.555 and –8.55 to –8.555 [SC: **B1** for one answer correct

				with or without working]
				Total for Question: 6 marks

M4.

	Working	Answer	Mark	Additional Guidance
(a)	Vol = $x \times (x - 2) \times 2 = 51$ Vol = $2x^2 - 4x - 51 = 0$	Derives given answer and condition	4	**M1** Vol = $x \times (x - 2) \times 2$ **M1** expands bracket correctly **A1** (E1) sets equal to 51 **B1** 2 > x as the lengths of the cuboid have to be positive.
(b)	$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4 \times 2 \times (-51)}}{2 \times 2}$ $x = \frac{4 \pm \sqrt{424}}{4}$	6.15, -4.15 both to 3sf	3	**M1** correct substitution (allow sign errors in *a*, *b* and *c*) into quadratic formula

Total for Question: 7 marks

M5.

	Working	Answer	Mark	Additional Guidance

(a)		Clear and coherent explanation	1	**C1** a clear and coherent explanation

(b)		£140	4	**M1** multiply through by 6 and cancels fractions **M1** (dep)expand 3(x − 10) **M1** (dep)collect terms on each side correctly **A1** cao **OR** **M1** collects terms over 6 **M1**(dep) expand 3(x − 10) **M1**(dep) multiply through by 6 and collect terms **A1** cao

Total for Question: 5 marks

E2. Proportionality laws are ubiquitous in science so it is not surprising that they get tested frequently at the higher level. Many candidates had the correct idea of writing the relationship as a formula involving a constant of proportionality k and then using the given information to find the value of k. After that, completing the question was straightforward. There were a few candidates who overlooked the word 'inverse' and changed the problem substantially. There were also many who answered the question for q directly proportional to t^2 or inversely proportional to t, or $\sqrt{t}$. Common wrong answers were $2t + 0.5$, $2.125t$ and $q = 34/t$

E3. Good candidates experienced little difficulty with this question particularly with part (a). However many candidates made very poor attempts often to both parts of the question. In part (a), although the dotted lines in the diagram gave a clue for the algebra needed, many candidates attempted to rearrange the equation and some attempted to substitute numbers into the equation. In part (b), despite the predictability of having to solve a quadratic equation, a good proportion of responses suggested a lack of familiarity or practice in the process. Those candidates who did attempt to use the formula often failed to substitute in the values correctly or made errors in using it such as putting and using the division by 2a for the square root part only. Some also substituted correctly but then made errors with the signs or the arithmetic. A few candidates did attempt to solve by completing the square but usually this was unsuccessful. A number also tried trail and improvement and many of these managed to find one solution, 5.55, and were awarded 1 mark.