



CATERHAM  
SCHOOL

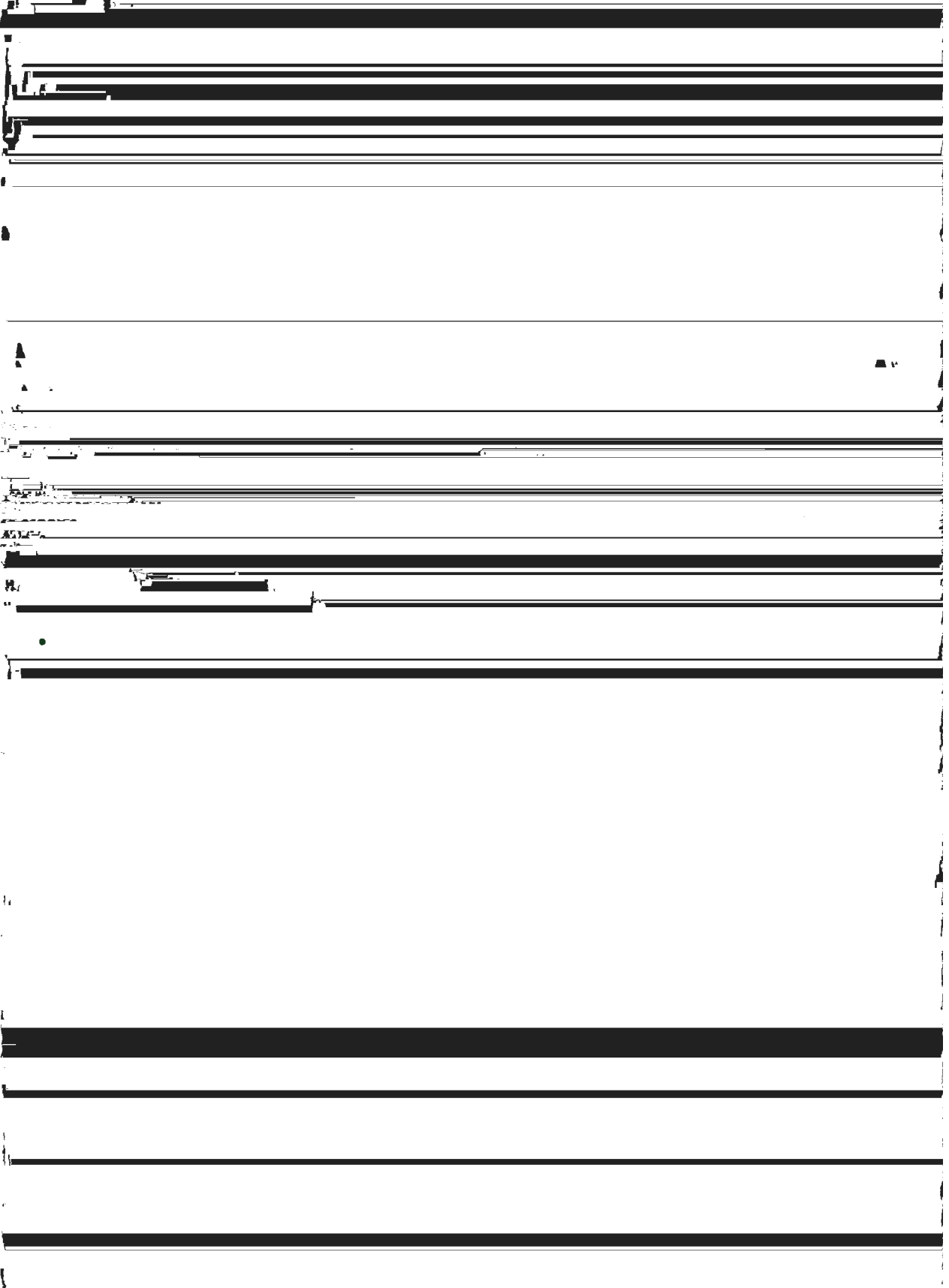
## **13+ MATHS SAMPLE QUESTIONS**

**13+ Entrance Examination**  
(For Entry into Year 9)

**1 Hour (Non Calculator)**

## s Examination information

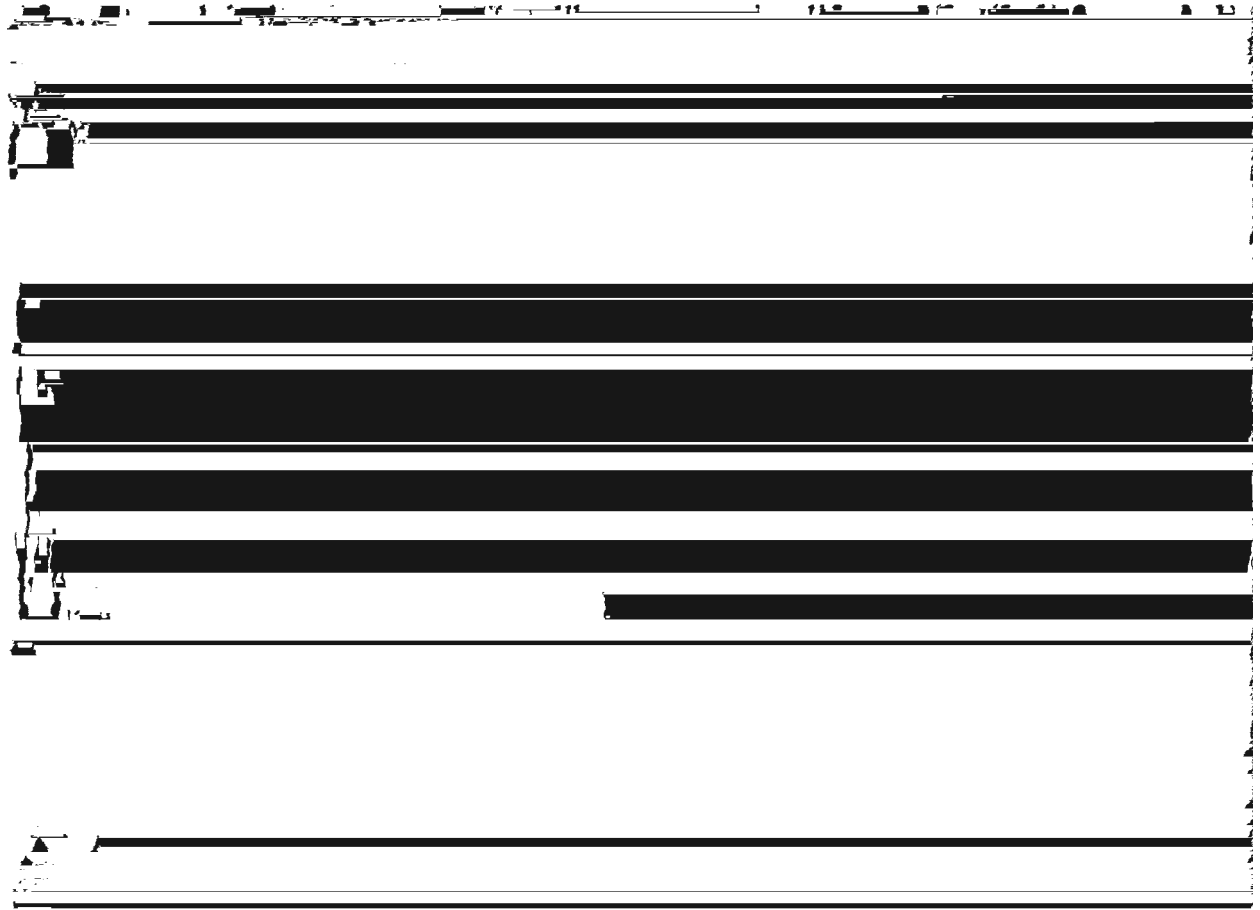
The entrance examination is 4 hours long. Calculators are not allowed.





*Algebra*

A1. Simplify  $3a + 5a - 7a$ .



The image shows a series of horizontal lines intended for writing the answer to the problem. The lines are arranged in a vertical stack, with some lines being solid black and others being white with a thin black border. The lines are positioned to the right of the problem statement, providing space for the student to write their solution.

*Shape, Space and Measures:*

- A1. A vase is made in the shape of a cuboid measuring 6 cm by 6 cm by 25 cm.  
Find the capacity of the vase in litres.

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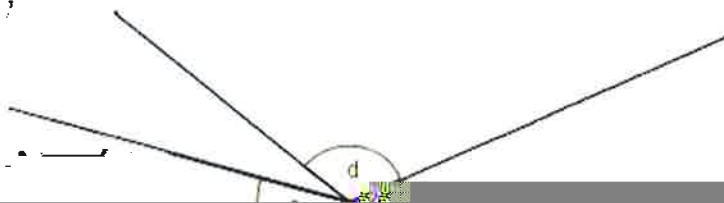
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- A2. A train sets off on its journey at 10<sup>57</sup> and arrives at its destination at 13<sup>09</sup>.  
How long does the journey take in hours and minutes?
- A3. Calculate the average speed of a car in km/h that travels for 330 km in 3 hours and 45 minutes.

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*Handling Data:*

A1. The table below shows the results of a traffic count.

Construct a pie chart of this data showing your calculations clearly.

BMW	19
Toyota	22
Other	17

A2. For this list of numbers, find the mean, the median, the mode and the range:

12, 4, 15, 3, 8, 4, 3, 11, 20, 3, 5

A3. The frequency table shows the results of rolling a die 50 times:

Score	1	2	3	4	5	6
Frequency	7	13	10	10	2	8

Calculate the mean score.

Is the die fair? Give a reason for your answer.

A4. A box contains some coloured balls.

### **Problem Solving Questions (non-calculator):**

*Number*

B1. The organisers of a concert hope to sell 22,000 tickets to the nearest 500. What is the ~~minimum~~ number of tickets they have to sell?

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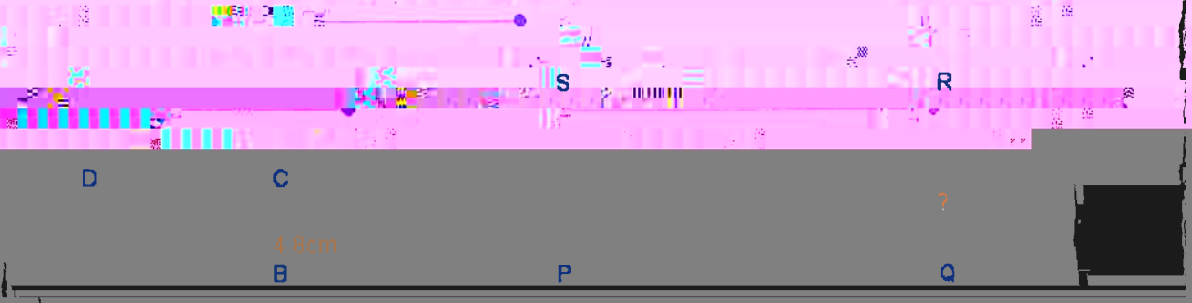
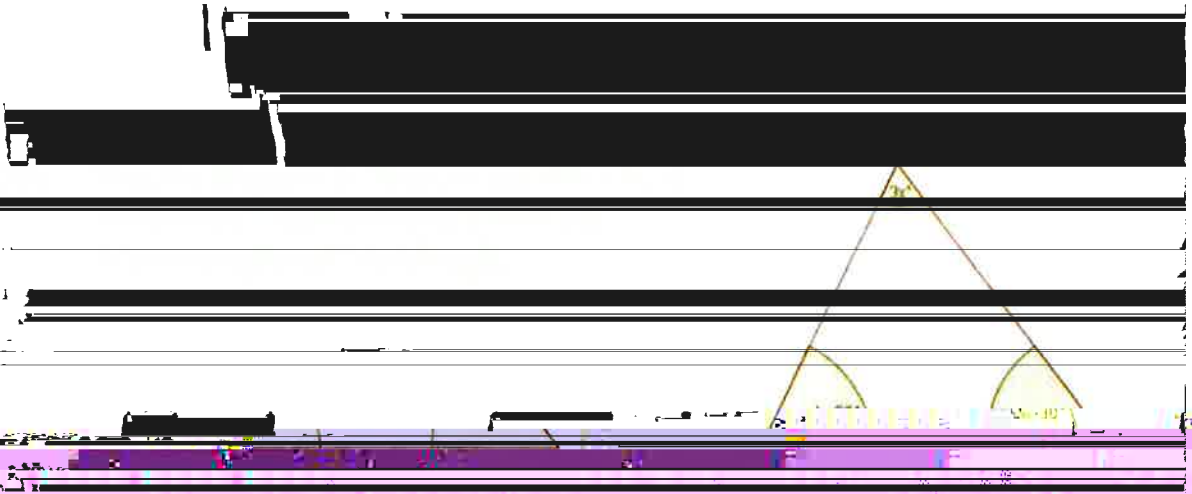
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B1. The  $n^{\text{th}}$  term of a sequence is  $3n^2 + 5$ .

Write down the first three terms of the sequence



*Handling Data:*

B1. A paperboy's sales during a certain week were: Monday 84, Tuesday 112, Wednesday 108, Thursday 95 and Friday 131.

When the sales for Saturday were included the daily average increased to 128.  
How many papers were sold on Saturday?

Handwritten solution on lined paper:

Let  $x$  be the number of papers sold on Saturday.

Monday 84, Tuesday 112, Wednesday 108, Thursday 95 and Friday 131.

$$\frac{84 + 112 + 108 + 95 + 131 + x}{7} = 128$$
$$84 + 112 + 108 + 95 + 131 + x = 900$$
$$530 + x = 900$$
$$x = 900 - 530$$
$$x = 370$$

The number of papers sold on Saturday is 370.

*Additional problems:*

B1. Write down the  $n^{\text{th}}$  term of this sequence:  $\frac{1}{1}, \frac{4}{3}, \frac{9}{5}, \frac{16}{7}, \frac{25}{9}, \frac{36}{11}, \dots$

B2. A square matrix is an array of numbers like this:  $\begin{bmatrix} 3 & 7 \\ 2 & 1 \end{bmatrix}$ .

We can multiply these arrays together like this:

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix} = \begin{bmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{bmatrix} = \begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$$

a) Work out  $\begin{bmatrix} 1 & -1 \\ 2 & 0 \end{bmatrix} \times \begin{bmatrix} 3 & 0 \\ -1 & 2 \end{bmatrix}$ .

b) Find the values of  $x$  and  $y$  if  $\begin{bmatrix} x & -2 \\ 7 & 5 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$



## Answers to sample questions

### Skills:

<i>Number</i>		<i>Algebra</i>	<i>Shape, Space, and Measures</i>	<i>Handling data</i>
A1	£78	A1 $a$	A1 $900 \text{ cm}^3/0.9 \text{ L}$	A1 $F128^\circ, B76^\circ,$ $T88^\circ, O68^\circ$
A2	30	A2 $13a-6b$	A2 2 h 12 m	
A3	$3 \times 2^2 \times 5^2$	A3 -30, 12, -4.8	A3 88 km/h	A2 mean 8, median 5, mode 3 range 17
A4	4.522	A4 $P = 2a+2b$	A4 $a=50^\circ, b=30^\circ,$ $c=100^\circ, d=100^\circ$ $e=130^\circ$	
A5	327	A5 $2/3$	A5 pentagon, $540^\circ$	A3 3.22, would expect mean 3.5, so this appears close, so not biased OR would expect around 8 fives and we only get 2, so appears biased.
A6	$4 \frac{11}{15}$	A6 1		
A7	432.9	A7 12	A7	
A8	0.625, 62.5%	A8 23, 30, 38		
A9	70	A9 $t_n = 3n + 2$	A5 $1/6$	
A10	6	A10 $x=12$	A6 8	
A11	36:54:72			
A12	4.8kg			

### Problem solving

<i>Number</i>		<i>Algebra/Shape&amp;Space</i>	<i>Handling data</i>	<i>Additional questions</i>
B1	21 750	B1 8, 17, 32; 7 <sup>th</sup>	B1 106, 238	B1 $n^2/(2n - 1)$
B2	22, 2, 5 50	B2 16, -2, -1	B2 66.4 kg	B2 $[4 \ -2]$ $[6 \ 0]$
B3	£24800	B3 $70^\circ, 75^\circ, 35^\circ$	B3 mode 0, median 2, mean $2 \frac{1}{17}$	$x=5, y=3$
B4		B4 $86.4 \text{ cm}$		

