



A2Z Learning: 11+
Mathematics CEM
Short Problems Paper 1


The **short problem paper** is the first part of the Problem Solving Paper. The second part is the long problem paper.

Read each question carefully and write your answers clearly. For each question, show all your working in full, as this will be marked, and then write your answer clearly in the space provided/ on the answer sheet.

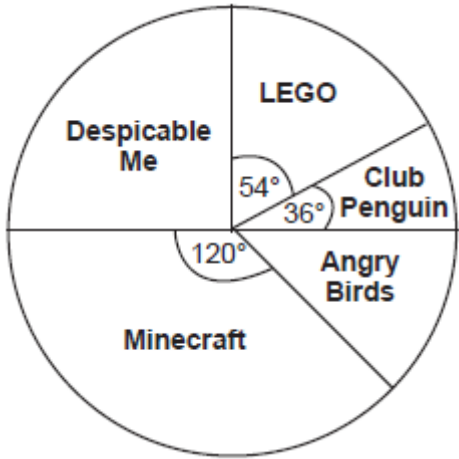
- If these are sat as one paper you will have 1 hour , the paper will be worth 80/85 marks.
- If these are sat as two papers: **the short problem paper will last 20minutes** and the long problem paper will last 40mins.

Good luck! You can do this!

Short Problems Paper 1 (1)

No.	Question	Answer										
1	<p>Complete this bill for a small shopping trip, filling in the five missing quantities and amounts in the spaces provided. (5 marks)</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">..... biscuits at 45p each</td> <td style="text-align: right;">£. p 3.60</td> </tr> <tr> <td style="text-align: right;">..... eggs which cost £1.60 for twelve</td> <td style="text-align: right;">0.80</td> </tr> <tr> <td style="text-align: right;">..... grams of butter at £2.50 per Kg</td> <td style="text-align: right;">1.50</td> </tr> <tr> <td style="text-align: right;">..... litres of milk costing 90p per litre</td> <td style="text-align: right;">.....</td> </tr> <tr> <td style="text-align: right;">TOTAL</td> <td style="text-align: right;">£ 8.15</td> </tr> </table> biscuits at 45p each	£. p 3.60 eggs which cost £1.60 for twelve	0.80 grams of butter at £2.50 per Kg	1.50 litres of milk costing 90p per litre	TOTAL	£ 8.15	
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TOTAL	£ 8.15											
2a	<p>Jarrad was born on 13th August 2000. How many birthdays did he have between 1st August 2001 and 1st September 2015? (2)</p>											
2b	<p>Carey was born on 10th November 2002. How many birthdays did she have between 20th November 2005 and 1st November 2015? (2)</p>											
2c	<p>Jenson was born on 29th February 2004, which was a leap year. How many true birthdays could he celebrate between 1st January 2005 and 31st December 2015? (2)</p>											
3	<p>A group of children are cutting squares off one corner of rectangular sheets of paper, as shown below.</p> <div style="text-align: center;">  </div>											
3a	<p>Imran's sheet of paper is 8cm by 7cm. He cuts out a square with sides of length 5cm. What area of paper is remaining when he has cut out his square? (2)</p>	cm ²										
3b	<p>Bella's sheet of paper is 11cm by 12cm. After her square is cut out, the area of the paper she is left with is 68cm². What is the length of each side of the square she cuts out? (2)</p>	cm										

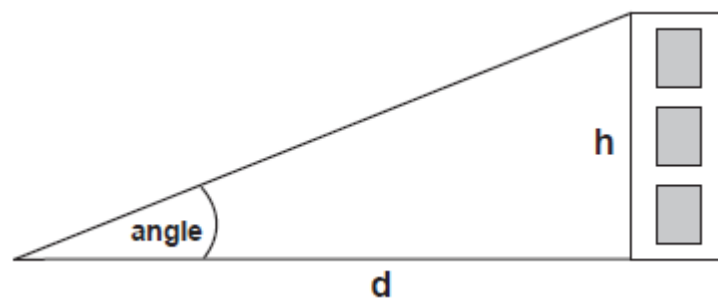
Short Problems Paper 1 (2)

No.	Question	Answer																																																							
3c	Chris has an area of 23cm^2 of paper left when he cuts a square with sides of 7cm from his sheet of paper. If his rectangular sheet of paper is 8cm wide, how long is it? (2)	cm																																																							
4	<p>Sixty pupils each voted for their favourite game app. The pie chart shows how they voted.</p>  <p style="text-align: right;">Favourite Game Apps (not drawn to scale)</p>																																																								
4a	What fraction of the class voted for Minecraft? (2)																																																								
4b	One quarter of the pupils voted for Despicable Me. What angle in the pie chart represents Despicable Me. (2)	o																																																							
4c	How many pupils voted for Angry Birds? (2)																																																								
5	<p>In the Sunnytown running competition, runners are placed in five heats and their time and position in their heat is used to work out when they can start in the final 'Sunnytime Fun Run' he results are below. (Times in minutes and seconds.)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th colspan="2">Heat 1</th> <th colspan="2">Heat 2</th> <th colspan="2">Heat 3</th> <th colspan="2">Heat 4</th> <th colspan="2">Heat 5</th> </tr> <tr> <th>Position</th> <th>Runner</th> <th>Time</th> <th>Runner</th> <th>Time</th> <th>Runner</th> <th>Time</th> <th>Runner</th> <th>Time</th> <th>Runner</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1st</td> <td>A</td> <td>1m 45s</td> <td>D</td> <td>1m 30s</td> <td>G</td> <td>2m 05s</td> <td>J</td> <td>1m 40s</td> <td>M</td> <td>1m 35s</td> </tr> <tr> <td>2nd</td> <td>B</td> <td>2m 03s</td> <td>E</td> <td>1m 58s</td> <td>H</td> <td>2m 20s</td> <td>K</td> <td>1m 50s</td> <td>N</td> <td>1m 55s</td> </tr> <tr> <td>3rd</td> <td>C</td> <td>2m 30s</td> <td>F</td> <td>2m 25s</td> <td>I</td> <td>2m 50s</td> <td>L</td> <td>1m 59s</td> <td>O</td> <td>2m 40s</td> </tr> </tbody> </table>		Heat 1		Heat 2		Heat 3		Heat 4		Heat 5		Position	Runner	Time	Runner	Time	Runner	Time	Runner	Time	Runner	Time	1st	A	1m 45s	D	1m 30s	G	2m 05s	J	1m 40s	M	1m 35s	2nd	B	2m 03s	E	1m 58s	H	2m 20s	K	1m 50s	N	1m 55s	3rd	C	2m 30s	F	2m 25s	I	2m 50s	L	1m 59s	O	2m 40s	
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Short Problems Paper 1 (3)

No.	Question	Answer
5	In the Fun Run the winner of each heat is given a 20 second handicap, the 2nd place runner is given a 10 second handicap and any runner with a time faster than 2 minutes is given an extra 5 second handicap. So runners with no handicap set off first, those with a 5 second handicap set off 5 seconds later and similarly for the other handicaps.	
a	List all the runners who set off when the start of the Fun Run is signalled because they have no handicap. (2)	
b	Which runner has a 20 second handicap in the Fun Run? (2)	
c	Which runners have a handicap of 15 seconds? (2)	

6 Dean discovers a method to find the heights of buildings. He measures the distance to the foot of the building, **d metres**. Then he measures the angle to the horizontal when he looks up at the top of the building, as shown in the diagram.



Using that angle, he then finds the quantity called the **tannangle** from the table below.

Angle °	10	20	30	40	50	60	70	80
Tannangle	0.2	0.4	0.6	0.8	1.2	1.7	2.7	5.7

The height of the building, **h metres**, is given by the following calculation.

$$h = d \times \text{tannangle}$$

E.g. if the building is 50 m away and the angle is 30° then the height is given by

$$h = 50 \times 0.6 = 30\text{m}$$

Short Problems Paper 1 (4)

No.	Question	Answer
6a	Find the height of a building 20m away when the angle is 60° . (2)	
6b	Find the distance to a building 24m high when the angle is 40° . (2)	
6c	Find the angle if a building 100m away is 270m high. (2)	
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Short Problems Paper 1 Answers

No.	
1	8 biscuits, 6 eggs, 600 grams, 2.5 litres and £2.25
2	a) 15 b) 9 c) 2
3	a) 31cm^2 b) 8cm c) 9cm
4	a) $\frac{1}{3}$ one third b) 90° c) 10
5	a) C, F, I, O b) G c) E, K, N
6	a) 34m b) 30m c) 70°