



**NON CALCULATOR PAPER (20 marks – 1 mark each)**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
$3.8 \times 10^4$	€479.52	12	e.g. $7 \times 4$	400	A or -1	1200	65.4	B or 9 cm	$\frac{1}{2}$
<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
$\frac{1}{3}$	100 (o.e.)	3	50	-27	$\frac{3}{5}$ (o.e.)	5	998000	8	$\frac{1}{5}$ (o.e.)

**MAIN PAPER (80 marks)**

Que.	Requirements	Mark	Additional Guidance
<b>1</b>	a $p(2p - q)$	B1	
	b $\frac{2p - q}{q}$	B1	
<b>2</b>	Substitutes values into equation correctly. 937 500 000 000 $9.375 \times 10^{11}$	M1 M1 A1	3
<b>3</b>	a $560 = 112\%$ Valid method used to find profit 60	M1 M1 A1	5 Seen or implied e.g. divides by 112 and multiplies by 12
	b Valid method used to find selling price  575	M1 A1	
<b>4</b>	a $\pi r^2 h$	B1	6 Seen or implied
	b radius = 5.5 Correctly substitutes values into formula. 1710.60	M1 M1 A1	
	c $r^2 = \frac{V}{\pi h}$ $\sqrt{\frac{V}{\pi h}}$	M1 A1	
<b>5</b>	a $\angle CBE = 60^\circ$ ( $\angle$ of equilateral triangle) $\angle ABC = 90^\circ$ ( $\angle$ of square) $\therefore \angle ABE = 150^\circ$	B1 B1	6 Mark awarded for both statements, including reason.
	b EC = EB (sides of equilateral triangle) CD = BA (sides of square) $\angle ECD = \angle EBA = 150^\circ$ (proved in (a)) Triangles congruent (SAS)	B1 B1 B1 B1	

Que.		Requirements	Mark		Additional Guidance
6	a	Valid method used to find gradient 0.5	M1 A1	8	e.g. divides change in y by change in x
	b	$2y = x + 4$	B2		o.e.
	c	$2y = x + 12$	B2		o.e.
	d	10 7	B1 B1		
7	a	15 : 10 3 : 2	M1 A1	6	Seen or implied Accept 2 : 3
	b	Attempt to find cubes 27, 8	M1 A1		Accept other valid answers e.g. 3375 and 1000
	c	Valid method used. 1080	M1 A1		e.g. divides by 8 and multiplies by 27
8	a	$F = \frac{k}{d^2}$ Valid method used to find k.  $\frac{72}{d^2}$	M1 M1 A1	6	e.g. by substituting 2 and 18 into equation. o.e.
	b	Substitutes $F = 8$ into equation. $d^2 = \frac{72}{8}$ $d = 3$	M1 M1 A1		o.e.
9	a	Substitutes $6 - 2y$ for $x$ into quadratic. Valid attempt to solve equation $y = 1.5$ (or $1\frac{1}{2}$ ) $x = 3$	M1 M2 A1 A1	8	Accept any other valid method
	b	$x + 2 = 0$ or $x - 3 = 0$ $(x + 2)(x - 3) = 0$ $x^2 - x - 6 = 0$	M1 M1 A1		Accept other valid methods, e.g. trial and error
10	a	$1/20$	B1	6	
	b	$1/20$	B1		
	c	They are equal.	B1		
	d	Product is $\frac{1}{a(a+1)}$ Valid attempt to subtract the two fractions $\frac{1}{a(a+1)}$	B1 M1 A1		

Que.		Requirements	Mark		Additional Guidance	
11	a	-1, -0.125, 15.625 -2, -0.5, -12.5 -3, -0.625, 3.125	B3	9	-1 (e.e.o.o.)	
	b	Correct plotting of points Smooth curve drawn	B2 B1		-1 (e.e.o.o.)	
	c	Graph correctly drawn	B1			
	d	-1, 0.4 ( $\pm 0.2$ ), 2.6 ( $\pm 0.2$ )	B1		All correct	
	e	$x^3 - 2x^2 - 2x + 1 = 0$	B1		o.e.	
12	a	$\frac{k}{5-3} = 6$ $k = 12$	M1 A1	8		
	b	$\frac{12}{x-3} = 1.5$ 11	M1 A1			
	c	(i)	Valid attempt to find inverse $f^{-1} = \frac{12+3x}{x}$		M1 A1	
		(ii)	$\frac{3(4+x)}{x(x-4)(x+4)}$ $\frac{3}{x(x-4)}$		M1 A1	
13	a	44 36, 64 48 28, 36	B4	7	-1 (e.e.o.o.)	
	b	Girls spend more time than boys Reference to median The times of the girls exhibit a greater spread because the IQR is higher	B1 B1 B1			