

# 4752 (C2) Concepts for Advanced Mathematics

## Section A

<b>1</b>	$4x^5$ $-12x^{\frac{1}{2}}$ $+ c$	1 2 1	M1 for other $kx^{\frac{1}{2}}$	4
<b>2</b>	95.25, 95.3 or 95	4	M3 $\frac{1}{2} \times 5 \times (4.3 + 0 + 2[4.9 + 4.6 + 3.9 + 2.3 + 1.2])$ M2 with 1 error, M1 with 2 errors. Or M3 for 6 correct trapezia.	4
<b>3</b>	1.45 o.e.	2	M1 for $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6}$ oe	2
<b>4</b>	105 and 165	3	B1 for one of these or M1 for $2x = 210$ or 330	3
<b>5</b>	(i) graph along $y = 2$ with V at (3,2) (4,1) & (5,2)  (ii) graph along $y = 6$ with V at (1,6) (2,3) & (3,6)	2  2	M1 for correct V, or for $f(x+2)$  B1 for (2,k) with all other elements correct	4
<b>6</b>	(i) 54.5  (ii) Correct use of sum of AP formula with $n = 50, 20, 19$ or 21 with their $d$ and $a = 7$ eg $S_{50} =$ $3412.5, S_{20} = 615$  Their $S_{50} - S_{20}$ dep on use of ap formula  $2797.5$ c.a.o.	2  M1  M1  A1	B1 for $d = 2.5$  or M2 for correct formula for $S_{30}$ with their $d$ M1 if one slip	5
<b>7</b>	$8x - x^2$ o.e. their $\frac{dy}{dx} = 0$ correct step $x = \frac{1}{2}$ c.a.o.	2  M1 DM1 A1	B1 each term  s.o.i. s.o.i.	5
<b>8</b>	(i) 48 geometric, or GP  (ii) mention of $ r  < 1$ condition o.e. $S = 128$	1 1  1 2	M1 for $\frac{192}{1 - -\frac{1}{2}}$	5
<b>9</b>	(i) 1  (ii) (A) $3.5 \log_a x$  (ii) (B) $-\log_a x$	1  2  1	M1 for correct use of 1 <sup>st</sup> or 3 <sup>rd</sup> law	4

## Section B

10	i	$7 - 2x$ $x = 2$ , gradient = 3 $x = 2$ , $y = 4$ $y - \text{their } 4 = \text{their grad } (x - 2)$  subst $y = 0$ in their linear eqn completion to $x = \frac{2}{3}$ (ans given)	M1 A1 B1 M1  M1 A1	differentiation must be used  or use of $y = \text{their } mx + c$ and subst (2, their 4), dependent on diffn seen	6
	ii	$f(1) = 0$ or factorising to $(x - 1)(6 - x)$ or $(x - 1)(x - 6)$ 6 www	1  1	or using quadratic formula correctly to obtain $x = 1$	2
	iii	$\frac{7}{2}x^2 - \frac{1}{3}x^3 - 6x$ value at 2 – value at 1 $2\frac{1}{6}$ or 2.16 to 2.17 $\frac{1}{2} \times \frac{4}{3} \times 4 - \text{their integral}$ 0.5 o.e.	M1  M1  A1  M1  A1	for two terms correct; ignore +c  ft attempt at integration only	5
11	i(A)	150 (cm) or 1.5 m	2	M1 for $2.5 \times 60$ or $2.5 \times 0.6$ or for 1.5 with no units	2
	i(B)	$\frac{1}{2} \times 60^2 \times 2.5$ or 4500 $\frac{1}{2} \times 140^2 \times 2.5$ or 24 500 subtraction of these 20 000 (cm <sup>2</sup> ) isw	M1 M1 DM1 A1	or equivalents in m <sup>2</sup>  or 2 m <sup>2</sup>	4
	ii(A)	attempt at use of cosine rule  $\cos \text{EFP} = \frac{3.5^2 + 2.8^2 - 1.6^2}{2 \times 2.8 \times 3.5}$ o.e. 26.5 to 26.65 or 27	M1  M1 A1	condone 1 error in substitution	3
	ii(B)	2.8 sin (their EFP) o.e. 1.2 to 1.3 [m]	M1 A1		2

12	i	$\log a + \log (b^t)$ www clear use of $\log (b^t) = t \log b$ dep	B1 B1	condone omission of base throughout question	2
	ii	(2.398), 2.477, 2.556, 2.643, 2.724 points plotted correctly f.t. ruled line of best fit f.t.	T1 P1 1	On correct square	3
	iii	$\log a = 2.31$ to $2.33$ $a = 204$ to $214$ $\log b = 0.08$ approx $b = 1.195$ to $1.215$	M1 A1 M1 A1	ft their intercept ft their gradient	4
	iv	eg £210 million dep	1	their £ $a$ million	1
	v	$\frac{\log 1000 - \text{their intercept}}{\text{their gradient}} \approx \frac{3 - 2.32}{0.08}$ $= 8.15$ to $8.85$	M1 A1	or B2 from trials	2