Section A

1(a) Reflection $y + x = 0$	M1 A1	Condone mirrored (image) or flipped Condone ref. to line on diagram	
(b) C (2,1)(3,-2)(2,-2)	W2 {4}	M1 for incorrect centre or direction	
2(a)16x +1	W2	W1 for 16x or (+)1 or M1 for 12x +3 + 4x -2	
(b) – 4.5	W3	M1 $24 + 2x = 15$ (3×5) M1 $2x = -9$ $(15 - 24)$ (embedded answer W2)	
(c) (x - 4)(x + 9) x = 4, -9	M2 A1 {8}	M1 $(x \pm 4)(x \pm 9)$ W1 for 4 or –9 only	
3(a) 85 to 88	W1		
(b) 14 to 14.5	W2 {3}	M1 162 or 176 to 176.5 seen or W1 15	
4(a) $(x =) \frac{y+2}{4}$ or eq.	W2	M1 $y + 2 = 4x$	
(b) y = 2x + 3 or eq.	W3	W2 $y = 2x + c$ M1 gradient $\frac{11-3}{4-0}$ or 8,4 seen for ht & w and W1 for $y = mx + 3$ (W2 for 2x +3 only) {5}	
5 y = x + 1 drawn x+y = 5 drawn x = 1 drawn Region R	M1 M1 M1 A1 {4}	W4 for correct region Allow W3 for correct R not ruled	
6 (a) $3^2 + AD^2 = 6^2$ $AD = \sqrt{(36 - 9)}$ $\sqrt{27} = \sqrt{(3 \times 9)} = 3\sqrt{3}$	M1 M1 A1	or $\sqrt{27}$ dependent on first M1 dependent on first M1	
(b) $2\sqrt{6}$	W3 {6}	M2 $\sqrt{(36 - (2\sqrt{3})^2)}$ or $\sqrt{(36 - 12)}$ or eq Or M1 $TM^2 = TA^2 - AM^2$ or eq. **or** M1 $(AM) = 2\sqrt{3}$ or $DM = \sqrt{3}$	

7 (a) $y = \frac{100}{x^2}$	W3	M2 $4 = \frac{k}{25}$ Or M1 $y = \frac{k}{x^2}$ or $y \propto \frac{1}{x^2}$ or $y \propto \frac{k}{x^2}$
(b) 400	W1	ft their k/x^2 **SC** If $y = k/x$ used allow SC1 for $y = 20/x$ in (a) and SC1 for 40 in (b) If $y = kx^2$ used, allow SC1 for $y = \frac{4x^2}{25}$ in (a) and SC1 1/25 in (b)
	{4}	
8(a) 1	W3	M1 ¼ M1 2 or 4 from $(8)^{2/3}$ or $(64)^{1/3}$
(b) 3/11	W3	M1 $100r = 27.27(2.....)$ Or W2 27/99
	{6}	
9 (a) **b – a** **2b - 2a**	W1 W2	M1 BC = **2b** or DC = **2a** or 2OB – 2OA
(b) **Either** DC = 2OA, BD = 2AB, BC = 2OB So triangles similar	W2	W1 for DCB is twice the size of AOB
Or DC is parallel to OA <OAB = <BDC, <AOB = < BCD so triangles similar	M1 A1	
	{5}	
10 (a) $\frac{1}{130}$ or eq. (isw)	W2	M1 $\frac{4\times3}{40\times...}$ **or** $\frac{4}{40}$ and $\frac{3}{39}$ seen
(b) their(a) x 50	M1	**Or** M1 12/50 linked with (a)
× 10	M1	M1 10 × their (a)
Statement comparing '4' And '12'	A1	A1 12/50 compared to 10/130
	{5}	

Total section A 50

11 Value between 1 & 2 sub Value between 1.5 & 2 sub Value between 1.6&1.7sub	W1 W1 W1	outcome must be seen outcome must be seen outcome must be seen
1.67	W1 {4}	W1 for 1.67 only
12 (a) 0.54	W2	W1 for 0.53(9..) or 0.540 or 0.55 or 0.5 or W1 for 0.29 seen
(b) 0.008 or 8×10^{-3} or eq.	W2 {4}	W1 for fig 8 or figs 128 seen
13 5, 15, 25, 35, 45, 55 seen or used	M1	4 values
35×5+15×15+5×25+1×35 + 3×45+1×55 or 750	M1	accept 0,10,20 .. or 10,20,30… or any consistent value
÷ 60 or their total frequencies	M1	dependent on previous M1
12.5	A1 {4}	W4 12.5 only If M0 SC2 7.5 or 17.5
14(a) 7.05	W4	M1 sin 34 and 12.6 used M1 12.6sin34 A1 7.04(…) or 7 A1 7.0 or 7.05 **Or** W3 7.04(…) If A0, SC1 their AB from trig rounded to 2/3 s.f.
(b) Sub. in cosine formula 11.4… or 11.5	M1 A2 {7}	A1 131… or 132
15 (a) 220, 275, 330	W3	M1 825 ÷ (4+5+6) or 55 A2 220,275,330 Or A1 one correct
(b) £240000	W3	M2 324000 ÷ 1.35 (or 135) or M1 figs 135 seen
(c) Frequency dens. calculated prop to 20, 34, 13, 8, 1	W1	(4 correct)
vert axis scaled	W1	histogram not bar chart
all bars correct	W1	
units (freq. dens.)	W1 {10}	

16(a) $3(x-5y)(x+5y)$ W3 W2 $(3x-15y)(x+5y)$ or $(3x+15y)(x-5y)$

or $(x-5y)(x+5y)$or $3(x-5y)(x-5y)$

or M1 $3(x^2-25y^2)$ or $(\sqrt{3}x+\sqrt{75}y)(\sqrt{3}x-\sqrt{75}y)$

(b) $\sqrt{(7c/(3+b))}$ W3 M2 $a^2=\frac{7c}{3+b}$

or M1 $a^2(3+b)=7c$

{6}

17 (a) 532(.4) W2 M1 $(400\times)1.1^3$

(b) 15.48.. W3 M2 length SF $(440/400)^{(1/3)}$ or 1.03..
or $(1.1)^{(1/3)}$
or M1 440 seen
A1 15.5 or 15.48..

{5}

18 11.56... W3 M2 414.5 and 5.85 used
or M1 414.5 or 5.85 seen
A1 11.56..or 11.6 or 11.57...

{3}

19 (2.2..or 2.3, 5.8...or5.9) and
(-1.6..or -1.7, -6.0.or -6.1) W7 M1 $x^2+(3x-1)^2$
M1 $10x^2-6x+1=40$
M1 sub in quad formula or comp sq.
$(x-0.3)^2=k$ or eq
W1 2.2...or 2.3
W1 (2.2.. or 2.3, 5.8.. or 5.9)

W1 – 1.6.. or –1.7
W1 (- 1.6.. or -1.7, - 6.0...or - 6.1)
Allow SC1 for wrong 'pairing'
Allow SC1 for each point if signs of x reversed

{7}

Section B Total 50