



Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

LEVEL 3 MARK SCHEME

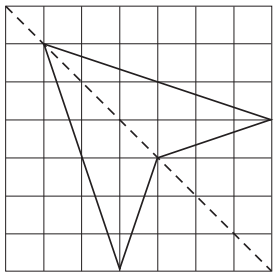
This is a suggested, not a prescriptive, mark scheme.

January 2011

The majority of answers are worth two marks.

Award M: 1 A: 1 unless otherwise stated.

MENTAL ARITHMETIC

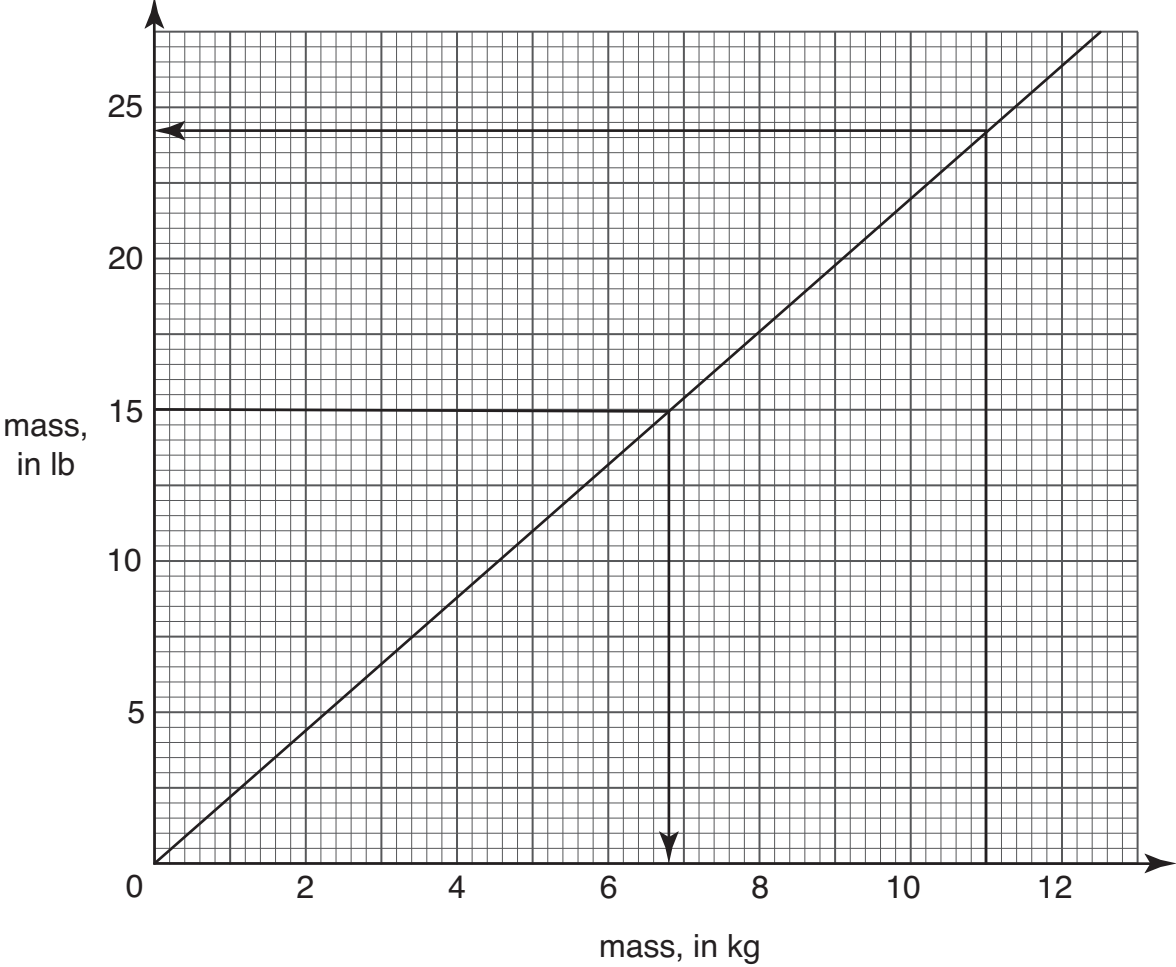
Q.	Answer	Mark	Additional Guidance
Practice question	41		
1.	56	1	
2.	74	1	
3.	20 45	1	
4.	4	1	
5.	2	1	
6.	20 100	1	
7.	11	1	
8.	130°	1	allow 110°–150°
9.	600 ml	1	
10.	165 minutes	1	
11.	32	1	
12.		1	
13.	0.015	1	accept .015
14.	131	1	
15.	\$56	1	
16.	18 apples	1	
17.	£36	1	
18.	16 km/h	1	
19.	$h = 4$ cm	1	
20.	7 , 8 , 11 , 17 , 17	1	
Total		20	

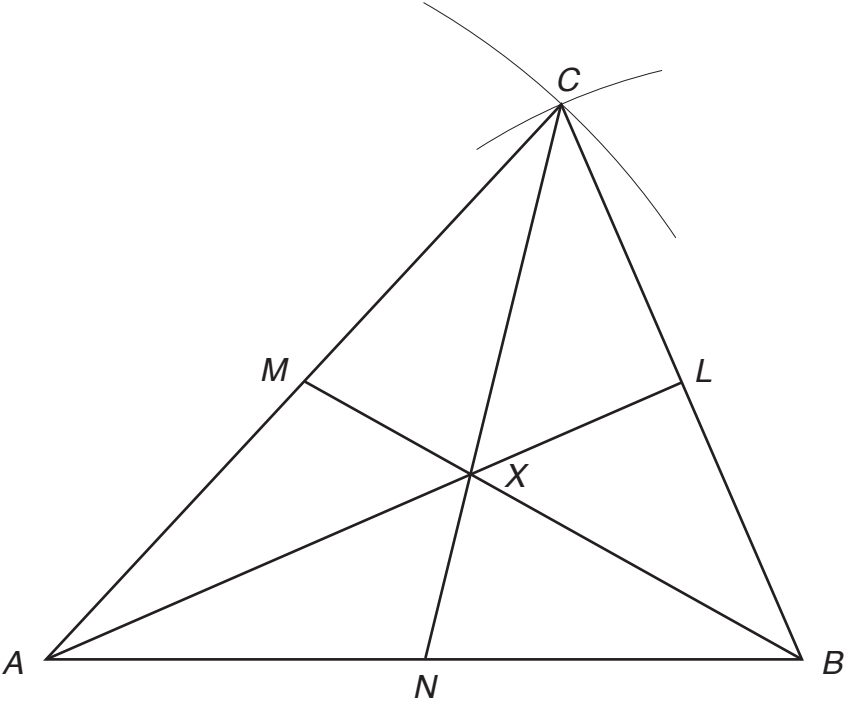
LEVEL 3: NON-CALCULATOR

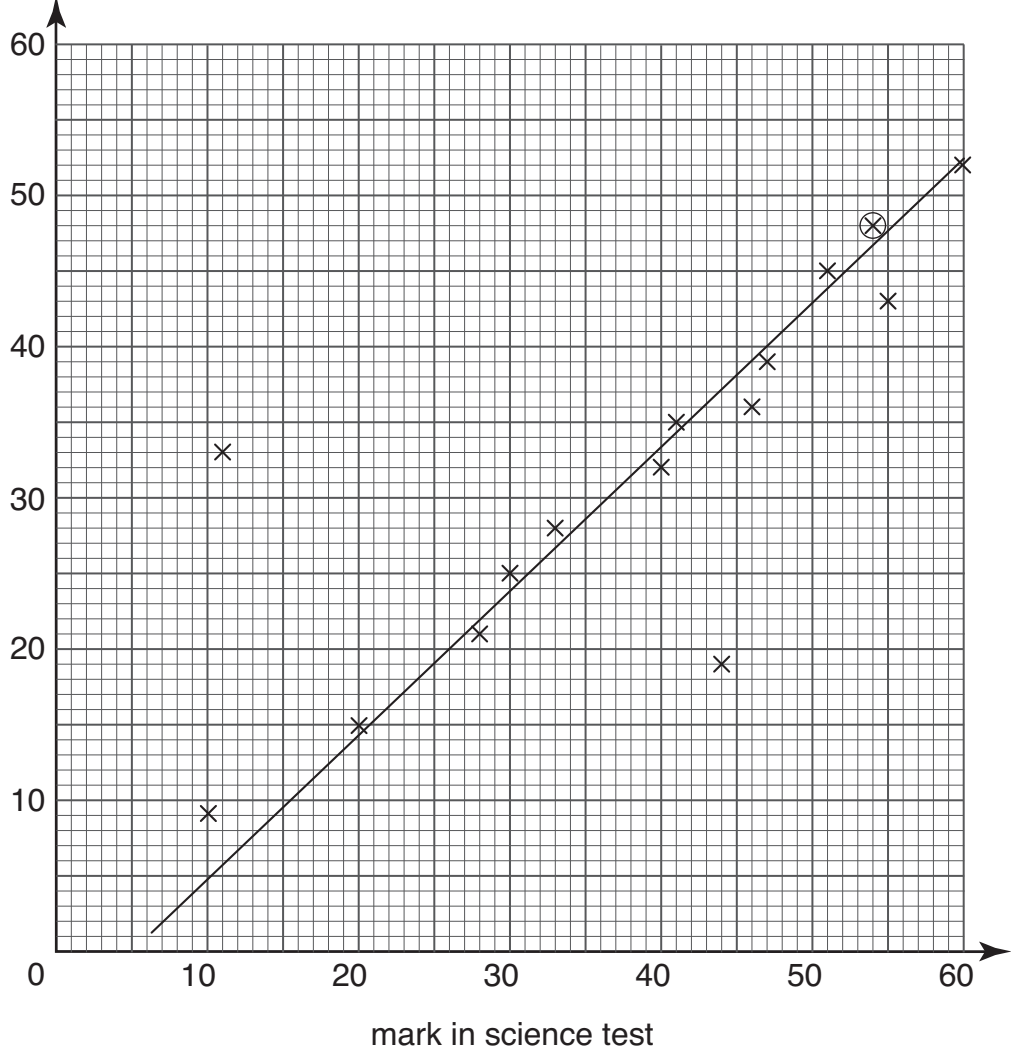
Q.	Answer	Mark	Additional Guidance
1. (a)	£8.63	2	
(b)	£13.71	1	A: 1
(c)	41.4 kg	2	
(d)	£66.50	2	accept £66.5
2. (i)	18	2	M: 1 for $8 \div 4$ A: 1 for answer
(ii)	5	2	M: 1 for 100 A: 1 for answer
3. (i)	91.8	1	A: 1
(ii)	680	1	A: 1
(iii)	93.15	2	M: 1 for $91.8 + 1.35$ A: 1 for answer
4. (a) (i)	$\frac{22}{25}$	2	M: 1 for $\frac{88}{100}$ A: 1 for answer
(ii)	87.5%	2	M: 1 for $\frac{700}{8}$ or $12\frac{1}{2}\%$ A: 1 for answer
(iii)	$\frac{7}{8}$, 0.88, 0.8, 90%	2	A: 1 for three in right order A: 2 for all four
(b)	£10.20	2	M: 1 for $\frac{85}{100} \times 12$ or $15\% = 1.8$ A: 1 for answer
5. (i)	$\frac{4}{15}$	2	M: 1 for $\frac{20}{15} + \frac{6}{15}$ A: 1 for answer
(ii)	3 kg	2	M: 1 for $800 \times \frac{15}{4}$ A: 1 for answer
6. (a)	9 days	1	A: 1
(b)	5 : 4	2	M: 1 for 125 : 100 A: 1 for answer

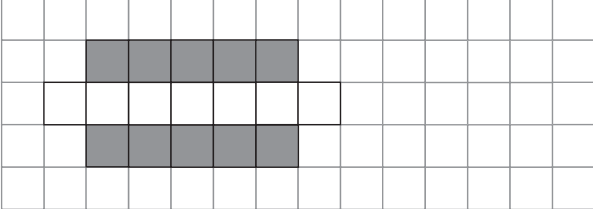
Q.	Answer	Mark	Additional Guidance
7. (i)	$2 \times 2 \times 3 \times 7$ (or equivalent)	2	M: 1 for factorising A: 1 for answer
(ii)	420 days	2	M: 1 for 84×5 or 30×14 A: 1 for answer
8. (a) (i)	17	1	A: 1
(ii)	-14	2	M: 1 for 2 or -16 A: 1 for answer
(iii)	12	1	A: 1
(iv)	5	2	M: 1 for $-5 \div -1$ A: 1 for answer
(b)	$m = 9$	2	M: 1 for $90 = 8m + 2m$ A: 1 for answer
9. (a) (i)	$a = 80$	2	M: 1 for 20×4 or $48 + 32$ A: 1 for answer
(ii)	$b = -\frac{1}{2}$	2	M: 1 for $6b = -3$ or equivalent A: 1 for answer
(iii)	$c = -2$	2	M: 1 for $-8 = 4c$ A: 1 for answer
(b) (i)	$d < -\frac{3}{2}$	2	M: 1 for $-d > \frac{6}{4}$ or $-6 > 4d$ A: 1 for answer
(ii)	-2	1	A: 1

Q.	Answer	Mark	Additional Guidance
10. (i)	$y = 2$	1	A: 1
(ii)			
(iii)	T	2	M: 1 for 90° rotation A: 1 for accuracy
(iv)	U	2	M: 1 for enlargement factor 2 A: 1 for accuracy

Q.	Answer	Mark	Additional Guidance
11.	$w = 40^\circ$ $x = 58^\circ$ $y = 104^\circ$ $z = 116^\circ$	1 1 2 2	A: 1 A: 1
12. (i)			
	conversion line	1	A: 1 line through (10, 22)
(ii) (a)	24 lb	1	A: 1 allow 24.0–24.5
(b)	6.8 kg	1	A: 1 allow 6.7–6.9
(iii)	92 lb	2	M: 1 for sensible conversion A: 1 for answer accept 91–94

Q.	Answer	Mark	Additional Guidance
13. (i)	0.55	1	A: 1
(ii)	60	2	M: 1 for 200×0.3 A: 1 for answer
(iii)	£40	2	A: 1 for £100 A: 1 for answer
(iv)	300	1	A: 1
14. (i)	 <p>triangle ABC</p>	2	M: 1 for use of compasses A: 1 for accuracy
(ii)	CN	1	A: 1
(iii)	AL	1	A: 1
(iv)	BM	1	A: 1
(v)	$XN = 2.5 \text{ cm}$ $CN = 7.5 \text{ cm}$	1	A: 1 for both correct
(vi)	36.66 cm^2	1	A: 1

Q.	Answer	Mark	Additional Guidance									
15. (i)	 <p style="text-align: center;">mark in mathematics test</p> <p style="text-align: center;">mark in science test</p> <p>Safi's point ⊗</p>	1	A: 1									
(ii)	positive	1	A: 1									
(iii)	line of best fit	1	A: 1									
(iv)	33	1	A: 1									
(v)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 20%;"></th> <th style="width: 40%;">science marks</th> <th style="width: 40%;">mathematics marks</th> </tr> </thead> <tbody> <tr> <td>range</td> <td>50</td> <td>43</td> </tr> <tr> <td>mean</td> <td>38</td> <td>30</td> </tr> </tbody> </table> <p>range for science = 50</p>		science marks	mathematics marks	range	50	43	mean	38	30	1	A: 1
	science marks	mathematics marks										
range	50	43										
mean	38	30										
(vi)	mean for science = 38	2	M: 1 for $570 \div 15$ A: 1 for answer									

Q.	Answer	Mark	Additional Guidance																								
(vii)	science marks are higher than mathematics marks science marks are more spread out than mathematics marks	2	A: 1 for each																								
16. (i)	 <p>pattern 5</p>	1	A: 1																								
(ii)	<table border="1" data-bbox="295 757 1327 1003"> <thead> <tr> <th>pattern number</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>number of white tiles</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>number of black tiles</td> <td>2</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> </tr> <tr> <td>total number of tiles</td> <td>5</td> <td>8</td> <td>11</td> <td>14</td> <td>17</td> </tr> </tbody> </table>	pattern number	1	2	3	4	5	number of white tiles	3	4	5	6	7	number of black tiles	2	4	6	8	10	total number of tiles	5	8	11	14	17	<p style="text-align: center;">A: 1</p> <p style="text-align: center;">2</p>	<p style="text-align: center;">A: 1</p>
pattern number	1	2	3	4	5																						
number of white tiles	3	4	5	6	7																						
number of black tiles	2	4	6	8	10																						
total number of tiles	5	8	11	14	17																						
(iii) (a)	12	1	A: 1																								
(b)	32	1	A: 1																								
(iv)	68	2	M: 1 for pattern 22 A: 1 for answer																								
(v)	$2(t - 2)$ (or equivalent)	2	M: 1 for pattern $t - 2$ A: 1 for answer																								
Total		100																									

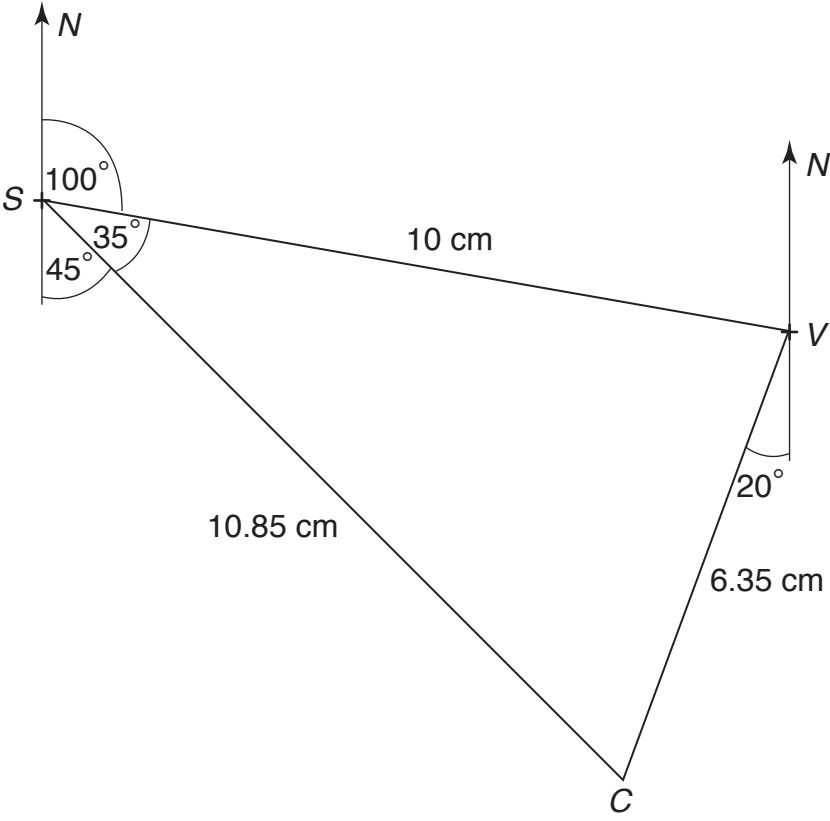
LEVEL 3: CALCULATOR

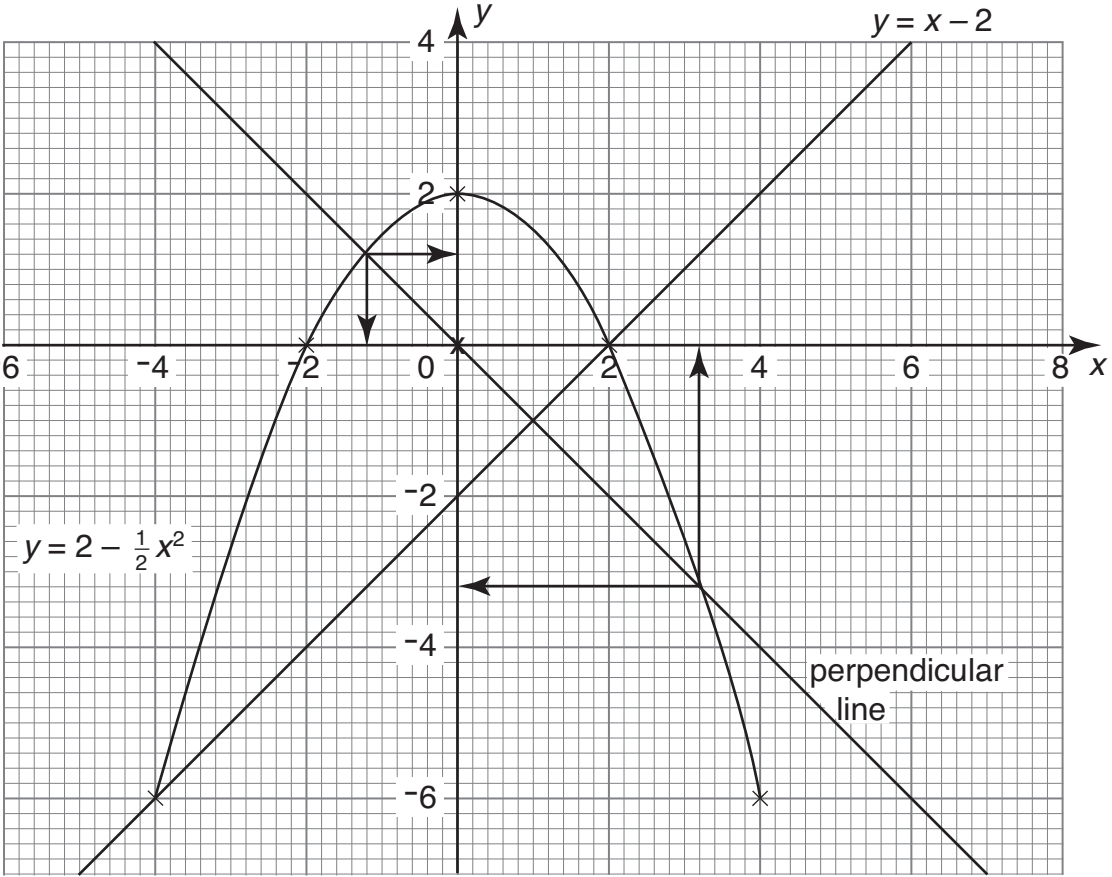
Q.	Answer	Mark	Additional Guidance
1. (i) (a)	$4 - \frac{200}{10 + 90}$	2	A: 1 for two correct A: 2 for four correct
(b)	2	1	A: 1
(ii) (a)	1.997381672	2	M: 1 for 1.802618328 A: 1 for answer
(b) (i)	1.997	1	A: 1
(ii)	2.00	1	A: 1
2. (i)	37	1	A: 1
(ii)	25	1	A: 1
(iii)	No, because 18 is divisible by 3 and the numbers in the pattern are not	1	A: 1
(iv)	-2	1	A: 1
(v)	9	1	A: 1
3. (i)	1.68 m	2	M: 1 for 18 cm or 1.5×1.12 A: 1 for answer
(ii)	8.75%	2	M: 1 for $4.9 \div 56 \times 100$ or $60.9 \div 56 \times 100$ A: 1 for answer
(iii)	24.9	2	M: 1 for $56 \div (1.5)^2$ A: 1 for answer
4. (i) (a)	13.5 km/h	2	M: 1 for $9 \div \frac{2}{3}$ A: 1 for answer
(b)	3.75 m/s	1	A: 1
(ii)	2 hours 20 minutes	2	M: 1 for $31\frac{1}{2} \div 13.5$ hrs or $31\ 500 \div 3.75$ secs A: 1 for answer
(iii)	12.5 km	2	M: 1 for $15 \times 5 \div 6$ A: 1 for answer

Q.	Answer	Mark	Additional Guidance
5. (i)	800 ml	1	A: 1
(ii)	500 ml	2	M: 1 for $\frac{4}{8}$ litres A: 1 for answer
(iii)	3.2 l	2	M: 1 for $1.2 \times 8 \div 3$ A: 1 for answer
6. (i)	$8a - 3a^2$	2	A: 1 for $8a$ A: 1 for $-3a^2$
(ii)	$12b^7$	2	A: 1 for 12 A: 1 for b^7
(iii)	$8c^3d^6$	2	A: 1 for $8c^3$ A: 1 for d^6
(iv)	$6 + e^3$	2	A: 1 for 6 A: 1 for e^3
7. (a)	$13x - 15$	2	M: 1 for $-15 + 5x$ A: 1 for answer
(b)	$8xy(3x - y)$	2	M: 1 for partial factorisation A: 1 for answer
8. (i) (a)	February	1	A: 1
(b)	1.5	2	M: 1 for 14th/15th A: 1 for answer
(c)	2	2	M: 1 for $\sum fx = 56$ A: 1 for answer
(ii) (a)	4	1	A: 1
(b)	55	3	A: 1 for angles 72° , 36° , 180° , 48° , 24° M: 1 for days 6, 3, 15, 4, 2 A: 1 for $0 + 3 + 30 + 12 + 10$

Q.	Answer	Mark	Additional Guidance																																				
9. (i)	$\frac{3}{5}$	1	A: 1																																				
(ii)	<p style="text-align: center;">Jack's card</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>1</th> <th>3</th> <th>5</th> <th>7</th> <th>9</th> </tr> </thead> <tbody> <tr> <th>1</th> <td></td> <td>1, 3</td> <td>1, 5</td> <td>1, 7</td> <td>1, 9</td> </tr> <tr> <th>3</th> <td>3, 1</td> <td></td> <td>3, 5</td> <td>3, 7</td> <td>3, 9</td> </tr> <tr> <th>5</th> <td>5, 1</td> <td>5, 3</td> <td></td> <td>5, 7</td> <td>5, 9</td> </tr> <tr> <th>7</th> <td>7, 1</td> <td>7, 3</td> <td>7, 5</td> <td></td> <td>7, 9</td> </tr> <tr> <th>9</th> <td>9, 1</td> <td>9, 3</td> <td>9, 5</td> <td>9, 7</td> <td></td> </tr> </tbody> </table> <p style="text-align: left; margin-left: 100px;">Hayley's card</p>		1	3	5	7	9	1		1, 3	1, 5	1, 7	1, 9	3	3, 1		3, 5	3, 7	3, 9	5	5, 1	5, 3		5, 7	5, 9	7	7, 1	7, 3	7, 5		7, 9	9	9, 1	9, 3	9, 5	9, 7		2	A: 1 off for each error
	1	3	5	7	9																																		
1		1, 3	1, 5	1, 7	1, 9																																		
3	3, 1		3, 5	3, 7	3, 9																																		
5	5, 1	5, 3		5, 7	5, 9																																		
7	7, 1	7, 3	7, 5		7, 9																																		
9	9, 1	9, 3	9, 5	9, 7																																			
(iii) (a)	$\frac{1}{2}$	1	A: 1 accept $\frac{10}{20}$																																				
(b)	$\frac{1}{10}$	1	A: 1 accept $\frac{2}{20}$																																				
(iv)	$\frac{2}{5}$	2	M: 1 for 10 pairs A: 1 for answer accept $\frac{4}{10}$																																				

Q.	Answer	Mark	Additional Guidance
10. (i)	12	1	A: 1
(ii) (a)	$\widehat{BOC} = 30^\circ$	1	A: 1
(b)	$\widehat{OCP} = 105^\circ$	2	M: 1 for $\widehat{OCB} = 75^\circ$ A: 1 for answer
(iii) (a)	540°	1	A: 1
(b)	$\widehat{CBF} = 45^\circ$	2	M: 1 for $3 \times 150^\circ$ A: 1 for answer

Q.	Answer	Mark	Additional Guidance
11. (i)	280°	1	A: 1
(ii)		2	A: 1 for each bearing
(iii) (a)	9 km	2	A: 1 for 21.7 and 12.7 km or 4.5 cm accept 4.35–4.65 cm A: 1 for answer accept 8.7–9.3 km
(b)	5.6 miles	1	A: 1 accept sensible answer

Q.	Answer	Mark	Additional Guidance												
12. (i) (a)															
	perpendicular line	1	A: 1												
(b)	$y = -x$ (or equivalent)	1	A: 1												
(ii) (a)	<table border="1" data-bbox="295 1285 986 1429"> <tbody> <tr> <td>x</td> <td>-4</td> <td>-2</td> <td>0</td> <td>2</td> <td>4</td> </tr> <tr> <td>y</td> <td>-6</td> <td>...0...</td> <td>...2...</td> <td>...0...</td> <td>...-6...</td> </tr> </tbody> </table>	x	-4	-2	0	2	4	y	-6	...0...	...2...	...0...	...-6...		
x	-4	-2	0	2	4										
y	-6	...0...	...2...	...0...	...-6...										
		2	A: 1 for 0 and 2 A: 1 for symmetry												
(b)	$y = 2 - \frac{1}{2}x^2$	2	A: 1 for plot A: 1 for curve												
(iii)	(-1.2, 1.2) and (3.2, -3.2)	2	A: 1 for each point accept $\pm 1.1 \rightarrow 1.4$ $\pm 3.1 \rightarrow 3.4$												

Q.	Answer	Mark	Additional Guidance
13.(i) (a)	$PX = 6.80 \text{ cm}$	2	M: 1 for $5.5^2 + 4^2$ A: 1 for answer accept 6.8
(b)	$QR = 10.9 \text{ cm}$	2	M: 1 for $12.2^2 - 5.5^2$ A: 1 for answer
(ii)	18.9 cm^2	2	M: 1 for $\frac{1}{2} \times XR \times 5.5$ or $29.947 - 11.0$ A: 1 for answer accept 19.0
14. (a) (i)	31.4 cm	1	A: 1
(ii)	$w = 11.6 \text{ cm}$	2	M: 1 for $2w = 31.4 - 8.2$ A: 1 for answer
(b) (i)	400 cm^2	1	A: 1
(ii)	$r = 11.3 \text{ cm}$	2	M: 1 for $r^2 = 400 \div \pi$ A: 1 for answer
15. (i)	$2a \text{ years}$	1	A: 1
(ii)	$2a + d = 31$	1	A: 1
(iii)	$2a - d = 5$ (or equivalent)	1	A: 1
(iv)	$a = 9$ $d = 13$	3	M: 1 for $4a = 36$ or $2d = 26$ A: 1 for 9 A: 1 for 13
(v)	40 years	1	A: 1
(vi)	8 years	2	M: 1 for 10 and 5 A: 1 for answer
Total		100	