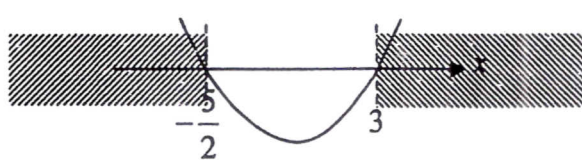


MARK SCHEME FOR PAPER 1 ADDITIONAL MATHEMATICS

Question No.	Working scheme and Marks	Mark allocation
1.	(a) 3  (b) $0 \leq f(x) \leq 9$ or $9 \geq f(x) \geq 0$ B1: when $f(x) \leq 9$ or $0 \leq f(x)$ seen.	1  2
2.	9  B1: $\frac{2\lambda}{\lambda+3} = \frac{3}{2}$	2
3.	13 B2: $f(x) = 1 - 3x$ B1: $f(2-x^2) = 3x^2 - 5$ or $g^{-1}(x) = \sqrt{2-x}$	3
4.	$x = 1.227$ , $-12.23$ ( $-12.227$ ) [Both correct] B2: $\frac{-11 \pm \sqrt{11^2 - 4(1)(-15)}}{2(1)}$ [For substituting the values correctly into the formula] B1: $x^2 + 11x - 15 = 0$	3
5.	$x \leq -\frac{5}{2}$ or $x \geq 3$ [Both inequalities correct] B2: The correct section is shaded with the x values shown or indicated.  B1: $(2x+5)(x-3) \geq 0$	3
6.	(2, -5) B2: $y = -(x-2)^2 - 5$ B1: $y = -[x^2 - 4x + (-2)^2 - (-2)^2] - 9$ or $y = -[x^2 - 4x + 4 - 4 + 9]$	3

7.	$p = \frac{25}{q^4}$ <p>B3 : <math>\log_5 p = \log_5 \left( \frac{25}{q^4} \right)</math> or <math>pq^4 = 25</math></p> <p>B2 : <math>\log_5 p + \log_5 q^4 = \log_5 5^2</math></p> <p>B1 : <math>\frac{\log_5 p}{2}</math> or <math>\log_5 5</math></p>	4
8.	<p>3</p> <p>B2 : <math>-n + 3 = 0</math></p> <p>B1 : <math>2^{3+n-3-2n+3} = 2^0</math></p>	3
9.	<p>-19</p> <p>B1 : <math>x - (-8) = -8 - 3</math> or <math>-30 - x = x - (-8)</math> or <math>-30 - x = -8 - 3</math> or other equivalent form</p>	2
10.	<p>108</p> <p>B2 : <math>S_\infty = \frac{36}{1 - \frac{2}{3}}</math></p> <p>B1 : <math>a = 36</math></p>	3
11.	<p>(a) 9</p> <p>(b) 1320</p> <p>B1 : <math>S_{24} = \frac{24}{2} [2(9) + (24-1)4]</math> or</p> $S_{28} - S_4 = \frac{28}{2} [2(-7) + (28-1)4] - \frac{4}{2} [2(-7) + (4-1)4]$	1 2
12.	<p><math>b = -4c</math></p> <p>B2 : <math>b = 8a</math> and <math>a = -\frac{c}{2}</math></p> <p>B1 : <math>(b, c) = \left( \frac{8a+6b}{7}, \frac{4a+9c}{7} \right)</math></p>	3
13.	<p><math>m = 4, n = 6</math></p> <p>B2 : <math>18 = 2 + 4(m)</math> or <math>n = 2 + 4(1)</math></p> <p>B1 : <math>\frac{y}{x^2} = 2 + 4x</math> or <math>Y = 2 + 4X</math></p>	3

14.	$y = -\frac{3}{4}x - \frac{9}{4}$ <p>B2 : <math>y - 0 = -\frac{3}{4}[x - (-3)]</math> or <math>c = -\frac{9}{4}</math></p> <p>B1 : <math>m_2 \times \frac{4}{3} = -1</math></p>	3
15.	<p>(a) <math>3\bar{a} + \bar{b}</math></p> <p>(b) <math>\bar{a} - 3\bar{b}</math></p> <p>B1 : <math>\bar{a} + 3\overline{BO}</math> or <math>\bar{a} + (-3\overline{OB})</math></p>	1 2
16.	<p>(a) <math>m = 5</math></p> <p>B2 : <math>m + 4 = 3m \times \left(\frac{3}{5}\right)</math> or <math>\frac{5}{3}(m + 4) = 3m</math></p> <p>B1 : <math>\lambda = \frac{3}{5}</math> or <math>\lambda = \frac{5}{3}</math></p> <p>(b) <math>\sqrt{117}</math> or <math>3\sqrt{13}</math> or 10.82 or 10.817</p>	3 1
17.	<p><math>x = 45^\circ, 146.31^\circ, 225^\circ, 326.31^\circ</math> or <math>45^\circ, 146^\circ 19', 225^\circ, 326^\circ 19'</math></p> <p>B3 : <math>x = 45^\circ</math> and <math>146.31^\circ</math> or <math>x = 45^\circ</math> and <math>146^\circ 19'</math></p> <p>B2 : <math>(3 \tan x + 2)(\tan x - 1) = 0</math></p> <p>B1 : <math>3 \tan^2 x - \tan x - 2 = 0</math></p>	4
18.	<p>(a) 2.269</p> <p>(b) 72.62 or 72.615 or 72.61 or 72.608</p> <p>B2 : <math>2 \left[ \frac{1}{2}(6)^2(2.269) - \frac{1}{2}(2)^2(2.269) \right]</math> or equivalent</p> <p>B1 : <math>\frac{1}{2}(6)^2 \left( 130 \times \frac{3.142}{180} \right)</math> or <math>\frac{1}{2}(2)^2 \left( 130 \times \frac{3.142}{180} \right)</math></p>	1 3
19.	<p><math>p = \frac{1}{3}</math></p> <p>B1 : <math>-p = 2p(4) - 3</math></p>	2
20.	<p><math>r = 6</math></p> <p>B2 : <math>0 = -4r + 24</math></p> <p>B1 : <math>\frac{dy}{dx} = -4x + 24</math></p>	3

<p>21.</p>	<p>(a) <math>-5</math></p> <p>(b) <math>-2</math></p> <p>B2 : <math>10 - \left[ \frac{27}{2} - \frac{3}{2} \right]</math></p> <p>B1 : <math>2 \times 5</math> or <math>\frac{3x^2}{2}</math></p>	<p>1</p> <p>3</p>
<p>22.</p>	<p>(a) <math>\sum x = 300</math></p> <p>(b) <math>\sum x^2 = 2812.5</math></p> <p>B1 : <math>\sqrt{\frac{\sum x^2}{50} - 36} = 4.5</math> or <math>\frac{\sum x^2}{50} - 36 = 20.25</math></p>	<p>1</p> <p>2</p>
<p>23.</p>	<p>(a) 60</p> <p>B1 : <math>{}^5C_3 \times {}^6C_1</math> or <math>10 \times 6</math></p> <p>(b) 265</p> <p>B1 : <math>{}^6C_2 \times {}^5C_2 + {}^6C_3 \times {}^5C_1 + {}^6C_4</math> or</p> <p><math>15 \times 10 + 20 \times 5 + 15</math> or <math>150 + 100 + 15</math></p>	<p>2</p> <p>2</p>
<p>24.</p>	<p>(a) 0.04247</p> <p>B1 : <math>{}^{10}C_7 \left( \frac{2}{5} \right)^7 \left( \frac{3}{5} \right)^3</math> or equivalent</p> <p>(b) <math>n = 4</math></p> <p>B1 : <math>\left( \frac{2}{5} \right)^n = \frac{16}{625}</math> or equivalent</p>	<p>2</p> <p>2</p>
<p>25.</p>	<p>(a) <math>\mu = 9.16</math></p> <p>B1 : <math>2.2 = \frac{18.4 - \mu}{4.2}</math></p> <p>(b) 0.1842</p> <p>B1 : <math>P\left( \frac{10.02 - 9.16}{4.2} \leq Z \leq \frac{12.2 - 9.16}{4.2} \right)</math> or</p> <p><math>P(0.2048 \leq Z \leq 0.7238)</math></p>	<p>2</p> <p>2</p>